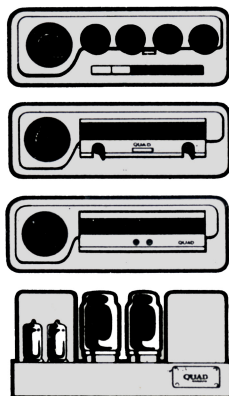
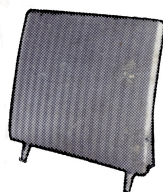


# Hi Fi YEAR BOOK

1964



**QUAD** for the closest approach to the original sound



PICKUPS · MOTORS · TUNERS · SPEAKERS ·  
AMPLIFIERS · MICROPHONES · RECORDERS

10/6



# Hi-Fi Year Book

————— 1964 Edition —————

*Editor* - - MILES HENSLOW



*Published by*

MILES HENSLOW YEAR BOOKS LIMITED,  
99 MORTIMER STREET - - LONDON, W.1

Printed in Great Britain by Portia Press Ltd., London, W.1

# INDEX

	<i>Page</i>
<b>Introduction</b> .. .. .	3
<b>Pickup Progress and Problems</b> <i>by John Crabbe</i> .. .. .	5
<b>Pickups and Arms</b> .. <i>DIRECTORY</i> .. .. .	11
<b>Pickup Accessories</b> .. <i>DIRECTORY</i> .. .. .	26
<b>Choosing a Motor Unit</b> <i>by B. J. Webb</i> .. .. .	31
<b>Motor Units</b> .. .. <i>DIRECTORY</i> .. .. .	33
<b>Radio Tuners</b> <i>by W. Ian Heath</i> .. .. .	37
<b>Radio Tuners</b> .. .. <i>DIRECTORY</i> .. .. .	43
<b>Transistor Amplifier Progress</b> <i>by George Tillett</i> .. .. .	53
<b>Tuner/Amplifiers</b> .. .. <i>DIRECTORY</i> .. .. .	59
<b>Amplifiers and Control Units</b> <i>DIRECTORY</i> .. .. .	63
<b>Tape Machines</b> <i>by Graham Balmain</i> .. .. .	89
<b>Tape Recorders</b> .. .. <i>DIRECTORY</i> .. .. .	95
Professional and Semi-professional .. .. .	95
General Purpose Tape Recorders .. .. .	105
Battery operated Portables .. .. .	125
Decks, general purpose and semi-professional .. .. .	131
Tape Units .. .. .	135
Tape Amplifiers and Mixer Units .. .. .	137
Tape Accessories and Components .. .. .	145
<b>Magnetic Tape</b> .. .. <i>DIRECTORY</i> .. .. .	157
<b>Test Tapes and Discs</b> .. .. <i>DIRECTORY</i> .. .. .	163
<b>Constructional Kits</b> .. .. <i>DIRECTORY</i> .. .. .	165
<b>Microphones and their Uses</b> <i>by Ralph West</i> .. .. .	173
<b>Microphones</b> .. .. <i>DIRECTORY</i> .. .. .	177
<b>Selecting a Speaker</b> <i>by Rex Baldock</i> .. .. .	197
<b>Speaker Drive Units</b> .. .. <i>DIRECTORY</i> .. .. .	203
<b>Speaker Accessories</b> .. .. <i>DIRECTORY</i> .. .. .	221
<b>Speaker Enclosures</b> .. .. <i>DIRECTORY</i> .. .. .	224
<b>Hi-Fi Dealers</b> .. .. <i>DIRECTORY</i> .. .. .	245
<b>Index to Advertisers</b> .. .. .	314

# INTRODUCTION

THE past twelve months have been some of the busiest that Hi-Fi manufacturers and dealers have experienced since the hobby first attracted the attention of the British public in 1956. As there is no outstanding reason for this remarkable increase of interest one must assume that it is the beginning of something that has been confidently expected for several years; namely, that music-lovers all over the country have begun to realise that high fidelity sound reproduction is an essential requirement and not the fad of a minority.

Primarily we have to thank the disc manufacturers for this really important event. They have done, and are still doing with untiring enthusiasm, something which seems to be the direct opposite to the practice of all too many manufacturers in other fields: they have consistently given the public more than was expected, and have joined wholeheartedly in the drive to make their customers aware of the unexplored benefits of their products—all without the usual ballyhoo and nonsense, and all without the customary ulterior motive of quick sales pushing. Indeed it is the manufacturers of sound reproducing equipment, and the enthusiasts who use what they make, who have been their main publicity mouthpiece. For years—ever since the first long playing discs appeared—almost everyone *except* the disc manufacturers has been preaching the message that the modern microgroove disc holds far more in terms of quality than most people realise, let alone bother to explore. And now at long last the penny has dropped, and tens of thousands of disc-buyers are discovering the truth.

## Other Factors

There are other contributory factors towards this recent appreciation of high fidelity sound reproduction. The often despised domestic tape recorder has been an unexpected Trojan Horse. Many people who bought tape recorders for their novelty value have dis-

covered the pleasures of music that can only come through a critical appraisal of what is being listened to, as opposed to unappreciative listening to music as background atmosphere. The gradual adoption of the BBC's excellent FM service has also done a tremendous amount of good. The advent of stereo on disc and the talk of stereo from radio to come—all these things have helped to make the public aware of the real potentialities of music from boxes. And, of course, all this *is* only the beginning. It is going to spread and it is going to snowball.

It is more than probable that this awakening of public interest is largely responsible for the recent increase in the number of new products which are appearing on the market, and the latest "foreign invasion", notably from America and Japan. With an expanding home demand there has been a more active and more sympathetic interest by traders in what is going on abroad, and this in turn will help to develop things overseas.

## Bigger Expansions

Truly one can say that the months recently behind us, and those that lie ahead, must be the most important of all in the real expansion of interest in things Hi-Fi. The years ahead will probably see bigger expansions in terms of trade, and the developments to come may well make our present-day progress seem comparatively insignificant; but we are now living in the days of the big change in terms of musical appreciation. "Hi-Fi", as it was a year or so ago, was the realm of the critical enthusiast and sound explorer; and it was a world in which, more often than not, the music took second place to the equipment which reproduced it. "Hi-Fi" today is the key to new standards of quality for everyone who values music as an important side of home entertainment.

One of the least noticed but most significant events which underlined this change of view-

point was the exhibition staged "in the suburbs" of the 1964 Audio Show by a firm which decided to enlarge upon the "Hi-Fi News" gospel of *Budget Stereo*. Because of the regulations which governed the admission of exhibitors to the show itself, this firm took space in a neighbouring hotel—and took every possible step to ensure that visitors should cross the road to see what it was all about. And so, having seen all that there was to see on the static display stands and in the demonstration rooms at the Russell Hotel, those who wanted their "Hi-Fi" music at prices which could just make it possible were able to see and compare different selections of equipment, tailored to suit various budgets. It was an excellent idea and it went down well. It will surely be repeated and almost certainly copied—though maybe a more realistic approach to the needs of the public will result in future exhibitions being larger and of such a comprehensive nature that this and similar ideas will form part of the background. The importance of the event was the proof that its success provided—that the public are beginning to want Hi-Fi for what it can add to the enjoyment of music—that the "Fi" need not necessarily be as "Hi" as that of Mr. Jones, provided that it gives true quality for the money available.

The directory sections of this 1964 edition of "**Hi-Fi Year Book**" reflect much of what is summarised in this short introduction. There are many new products in every section. There is much evidence of the "invasion". There is also a comprehensive range of products in the lower price bracket, from which an almost inexhaustible number of variations of reasonably priced Hi-Fi installations can be chosen, according to room size and personal taste and requirements. The technical specifications which are given in abbreviated form for every item of equipment that is listed will make this book immediately useful to the majority of readers. For those who are complete newcomers to the subject, and for those who have doubts about their ability to match A to B on paper, it is recommended that the most favoured items be chosen and listed, and that

the advice of a well-informed Hi-Fi dealer be sought. Today most good dealers are able to demonstrate a wide range of equipment by switching from one component to another. Certainly *all* good dealers will be able to assist with installation and will undertake to ensure that the customer is properly satisfied with his purchase. If there is any doubt at all about these points the reader is advised to try another dealer *before* purchasing! The Directory of Hi-Fi Dealers at the end of this edition has been compiled with as much care as possible and is made up from a list of dealers who have expressed a wish to be included in that section. It is sincerely hoped that this directory will be of use to readers. Dealers not included in this edition and who would like to appear in the directory of the **1965 Year Book** are invited to write for an application form. Readers who have genuine complaints of lack of facilities or poor service from dealers in this section should notify us.

As with all other directory sections, though every care has been taken during the compilation of the book, no responsibility can be accepted by the publishers for errors or omissions.

#### **New Directory Section**

Readers who have followed the progress of **Hi-Fi Year Book** though its previous eight editions will note yet another change in this ninth annual volume—the introduction of a new directory section for *Tuner/Amplifiers*. This section, placed between the Tuner and Amplifier sections, marks another stage in the evolution of the Hi-Fi set-up. The ● which denotes stereo equipment is rapidly becoming the standard rather than the exception. The 1965 edition of **Hi-Fi Year Book**, which is already being planned on a more ambitious scale than hitherto, will probably introduce an identification symbol for transistorized equipment. Readers who wish to register for information about the 1965 edition and other titles in the "Hi-Fi Books" list are invited to send their name and address to the editorial office.

# PICKUP PROGRESS & PROBLEMS

by John Crabbe

THE hobby—and industry—of high fidelity sound reproduction is based very largely on the gramophone disc record; indeed, apart from the earlier activities of a small number of dedicated enthusiasts, hi-fi has grown up with the long-playing record and can almost be said to have shared its birth. We have tape and VHF/FM radio, and before long we may have stereo radio through the Multiplex process, but here in 1964-65 the majority of those purchasing the equipment catalogued in this book will be listening to most of their music via the old-fashioned mechanism of a pickup stylus being waggled by a groove.

With the advent of stereo as a commercial proposition, it seemed for a while that tape might take over from disc as the standard medium, but the disc record is astonishingly adaptable and, despite the enormous difficulties of cutting two related but different signals in one groove and then obtaining two corresponding electrical outputs from a pickup with a single stylus tip, the stereo disc has now established itself as the most common source of high-quality recorded music. There have been difficulties, of course, and whenever there is a snag in the cutting or processing of a record it is usually the stereo version which needs to be done again. But, by and large, the stereo disc manages the seemingly impossible, and further progress will come only through the reduction or elimination of relatively minor sources of distortion which do not trouble the ordinary radiogram owner but which can stimulate the bug of discontent in the hi-fi enthusiast.

## Stimulating Discrepancy

One such stimulant, mentioned by John Goddard in the 1963 *Year Book*, is the discrepancy between the recorded angle of the 'vertical' component in stereo signals and the effective angle of vertical motion of the pickup stylus. Owing to lack of standardisation there is at present practically no correlation at all

between the two in Europe, though in the USA the RIAA's recommendation to adopt an angle of 15° forward from truly vertical seems to have been taken quite seriously during the last year, and we are informed that the major American record manufacturers are now cutting discs which will reproduce with least distortion when played with pickups conforming to this standard.

Since early in the history of the gramophone it has been standard practice to arrange the replay arm so that the lateral deflection path of the stylus lies within a few degrees of the truly radial path followed by the original cutter. However, with stereo discs the cutter moves both laterally and vertically in order to accommodate the independent motions of the two groove walls (the vertical component arising from the 'difference' or out-of phase aspect of the two waveforms), and non-coincidence between the *effective* motion angle of cutter and replay stylus in the vertical mode leads to distortion.

## Distorted Output

Fig. 1 shows, in a somewhat extreme form, the way in which a sine-wave modulation will produce a distorted pickup output when the motion paths differ by about 30°. The magnitude of this tracking-angle distortion is approximately proportional to recorded amplitude and inversely proportional to wavelength, so that the old headache of inner-groove distortion of the *tracing* variety (due to a stylus tip of finite radius) tends to be accentuated by this vertical *tracking* element.

It might be thought that a simple and obvious solution would be to make the effective vertical angle *truly* vertical for both records and pickups but this is bedevilled by the fact that it is well-nigh impossible—for mechanical and geometrical reasons—to make pickups in this way. The vast majority of pickups in use employ the cantilever principle in which the

stylus is mounted at the end of a tiny bar. The far end of this bar must pivot about a point above the record surface, so that when the stylus is deflected upwards it actually describes an arc, the tangent to which must be some degrees forward from vertical. Even among expensive top-quality pickups there are very few having a vertical stylus motion angle of less than 10s, so there seems to be a prima facie case for the RIAA standard of 15°. However, the subject is still controversial with senior recording engineers, and some European experts feel that the Americans have rushed into the question of standards too hastily in order to make things easy for the pickup manufacturers. Rumour has it that some quite different and unexpected type of solution may arrive on the scene during 1964, but whether this will be at the recording or reproducing end of the chain is anyone's guess.

### People are Buying

In the meantime people are buying stereo pickups, and some may be in doubt over which to choose because of the vertical tracking angle factor. Well, it so happens that the distortions associated with this are generally very small *as heard*, and the differences between pickups in other respects are often quite sufficient to mask any changes due to vertical 'errors'. It is true that by tipping a given cartridge back and forth in its shell—to alter the effective vertical tracking angle—one may discover that heavily recorded passages on various discs seem to reproduce most cleanly at different angles, but apart from a few particularly difficult specimens the changes are subtle and not such as to induce hi-fi heartache.

As far as can be ascertained stereo discs currently on sale in Britain may be cut with effective vertical angles anywhere between about 20° forward and 15° back, and even records from one company may differ because of the various cutting machines used in the one organisation. Fortunately the amplitude of vertical modulation on stereo records seldom exceeds about a quarter of the peak lateral figure, so the rather alarming theoretical

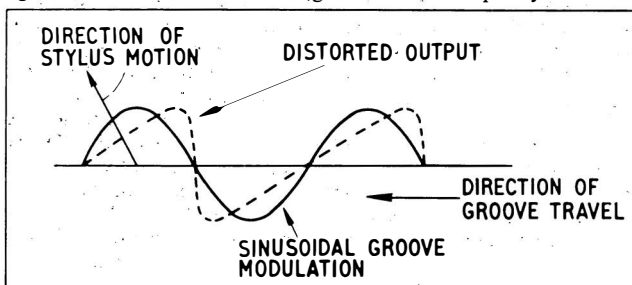
errors are not so disastrous in practice, even though we may reasonably hope for their eventual elimination through standardisation. Readers may take heart from the fact that, at the time of writing, the author's first choice in stereo pickups is a model with a vertical tracking angle which cannot be reduced below 16° forward, even though the effective recorded angle on many British records may be up to 15° backwards.

One final point on this particular pickup problem. The angle of the stylus shank when viewed from the side (if the pickup has a stylus large enough to have anything resembling a 'shank') is *not* the thing under discussion; when the stylus is deflected upwards it will move at some angle other than 90° with respect to the record surface, and it is the difference between this line of motion and a true vertical which is the pickup's vertical tracking angle. This is determined by the geometry of the cantilever mechanism, etc, and is not necessarily related in any way to the shank angle.

### The Inner Grooves

Another ever-present problem which is currently leading to some progress is 'inner-groove distortion'. This arises because discs are cut with a sharp-edged stylus and replayed with a spherical tip of finite radius. At constant revs per minute, the linear velocity of the groove past the stylus steadily diminishes as the pickup moves towards the record's centre; this means that the recorded wavelength—at any given frequency—also gets smaller, and at high frequencies it becomes comparable with or smaller than the stylus tip. Consequently the stylus fails to trace the recorded waveforms accurately and distortion is introduced.

At the pickup end of the chain there are two possible solutions to this problem: a smaller stylus tip of the same shape, or another shape entirely. As the stylus radius is reduced the pressure (for a given downward force) at the points of contact with the groove is raised, and a pickup which is just acceptable from the record wear point of view with, say, a 0.6 thou tip may deform or wear the groove too much



**Fig. 1.** If the vertical motion angle of the pick-up stylus is in the direction shown, a vertical sinusoidal groove modulation will produce a distorted electrical output.

with a 0.3 thou stylus. This means that reduction of stylus radius should be accompanied by a lowered mechanical impedance to permit a corresponding reduction of playing weight. Another difficulty with smaller spherical tips is that many discs are still not cut and pressed with sufficient sharpness at the groove bottoms to avoid 'bottoming' with styli smaller than the standard 0.5-0.6 thou radius. This means that although the advantages of a smaller radius are audible on some records, on others the exact position of the stylus tip *vis-à-vis* the two groove walls is somewhat indeterminate (fig. 2(a)), leading to distortion and reduced channel separation.

#### Another Solution

The second solution to the tracing distortion problem involves re-shaping the pickup stylus. A shape which approaches the ideal of infinitesimal dimensions in the direction of travel (for accurate scanning of short recorded wavelengths) without introducing excessive friction, is the ellipse. The idea is illustrated in fig. 3, where it will be seen that the minor radius allows the stylus to follow HF modulation more faithfully, while the major radius sits the tip across the groove walls without danger of 'bottoming'. However, there is a snag even with this arrangement. Taking the 0.5-0.6 thou radius tip as a reference, if the minor radius of the ellipse is made 0.3 thou, then for the same frictional drag on the groove the major radius must be around 0.8-0.9 thou. This can lead to the reverse of 'bottoming' by forcing the stylus up on to the corners of the groove (fig. 2(b)) on occasions when the groove becomes very shallow on the peaks of vertical modulations. To be certain that this will not happen, the major radius should be kept below 0.7 thou, which means reducing the playing weight in order to retain the original record wear conditions. This in turn requires that the mechanical impedance at the stylus shall also be reduced in proportion. The ideal would seem to be an elliptical tip with major and minor radii of 0.6-0.7 and 0.2-0.3 thou respectively, used in conjunction with a transducer system with

parameters permitting a playing weight of not more than 2 gms for the most difficult discs; this would mean an effective tip mass of less than 0.7 mg, a lateral compliance of  $10 \times 10^{-6}$  cm/dyne and vertical compliance of  $3.5 \times 10^{-6}$  cm/dyne.

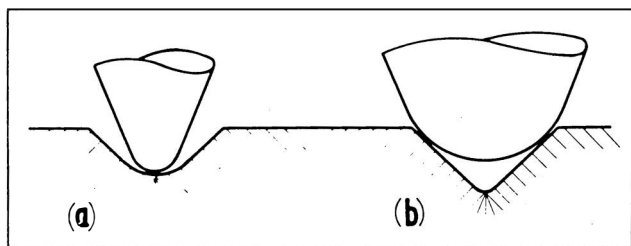
Last year saw the introduction of the first stereo pickup employing an elliptical stylus (*Oerofon* SPU/GT/E), and as we write there are rumours that others may be following, and indeed may have been announced by the time this *Year Book* appears.

#### Tackled at the Source

Another aspect of the tracing distortion problem which was opened right up during 1963-64 concerns methods of tackling things at the source. In theory, since the distortion introduced by a finite spherical tip is calculable, it should be possible to pre-distort the recorded waveform in a contrary manner such that the two distortions cancel and the actual motion of the pickup stylus corresponds exactly to the original electrical waveform. The *Dynagroove* process introduced by *RCA Vidor* in the USA (see fig. 4) purports to do this, though the general quality of records from this source, and other aspects of the *Dynagroove* system, make it very difficult to judge the effects on tracing distortion in isolation.

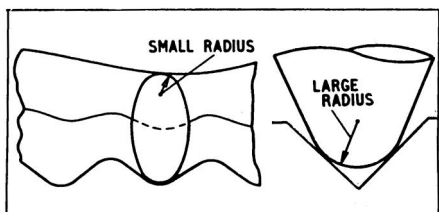
There has been much technical discussion across the Atlantic about this and other possible methods of counteracting pickup tracing distortion at the disc-cutting stage. One interesting suggestion, a revival of an old idea, is to cut records in the conventional manner, play them with a standard 'perfect' pickup, reverse the phase of the signal and re-record. This results in a recorded waveform of such a shape that, when played with a pickup having the same stylus dimensions as the standard model, the final electrical output is distortionless. Another possible solution is the use of a spherical *cutting* stylus, the idea being that what one sphere cuts another (of the same radius) can reproduce. 'Cuts' is hardly the correct word here, however, as the original

**Fig. 2.** In some grooves a stylus of less than 0.5 thou radius will 'bottom' as at (a), while some conditions of groove depth and vertical modulation will cause a stylus of more than 0.7 thou radius to ride on the groove corners as at (b). Both conditions can produce distortion.



groove would have to be embossed and there are many mechanical difficulties.

Whether the tracing distortion problem is eventually solved at the cutting or reproducing end of the chain, or by a suitable alliance between the two, there is no doubt that recording and pickup engineers are now giving the matter very serious thought, and provided suitable standards are agreed for replay stylus dimensions we can look forward to a time when 'inner-groove distortion' has faded into the past with '78' surface noise.

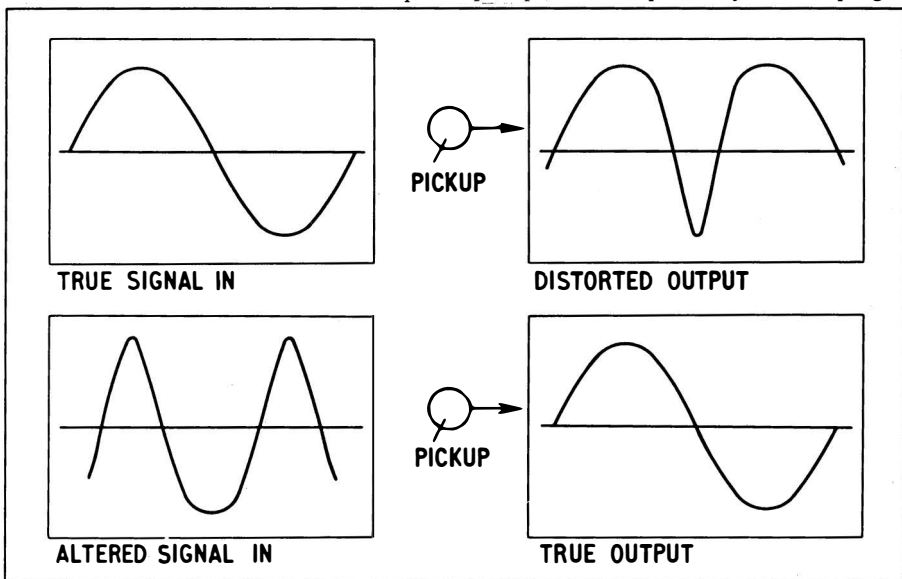


**Fig. 3.** An elliptical tip with major and minor radii of appropriate dimensions will give improved tracing at high frequencies while sitting correctly across the groove viewed from the front.

For the present we can only say that spherical tips of radius greater than 0.5-0.6 thou are to be avoided for top quality reproduction from modern stereo records, and that elliptical styli with minor radii around 0.3 thou do produce an even smoother and cleaner sound—par-

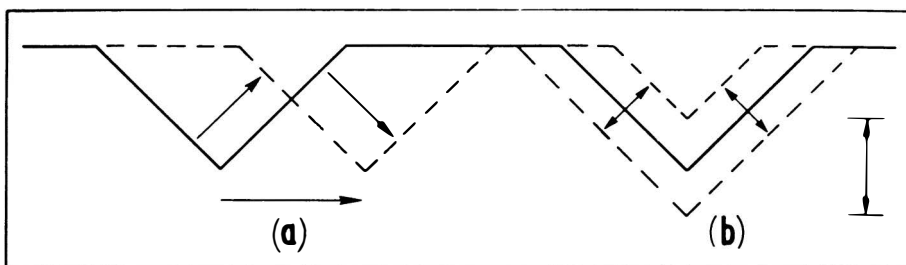
ticularly at the inner grooves. At least one pickup has been offered (*ADC Point Four*) with a spherical tip of 0.4 thou radius, and provided one avoids bottoming by sticking to the best modern discs this also should show an improvement.

However, all these points, while apparent to the hi-fi enthusiast listening via wide-range equipment, are relatively subtle to the average record buyer. In fact, larger differences may be heard due to the various types of pickup transducer commonly in use. The need to eliminate record wear and reduce the small distortions arising from deformation of the disc material has set the trend towards very low playing weights. At present there seems to be general agreement that 1-2 gms is a desirable operating region, but what is apparently not so readily understood is that reduced tracking weights demand a proportional reduction of mechanical impedance at the stylus tip, and this means low tip mass as well as high compliance. The active elements in any pickup transducer—magnet, armature, coil or crystal—generally have too much mass to permit direct coupling to the stylus, and in the case of crystal or ceramic elements the stiffness would be too great even if the mass were low enough. This means that decoupling procedures have to be adopted, with the operative element at some point remote from the stylus—usually via a cantilever; with the best variable-reluctance pickups, however, practically no decoupling is



**Fig. 4.** Graphical representation of the distortion normally introduced by a pickup (top) and the altered recorded signal used in Dynagroove to overcome this (bottom).





**Fig. 5.** With in-phase signals one wall moves up as the other moves down, giving lateral motion as at (a). The stereo 'difference' signal is in anti-phase in the two channels, producing a purely vertical groove movement as at (b).

needed (*Decca ffs*, for instance). The greater the inherent mass and/or stiffness of the generative component, the more decoupling required, and the point is eventually reached where the behaviour of the decoupling mechanism is so erratic that its disadvantages outweigh the gains from the reduced mechanical impedance at the stylus.

For these reasons variations of frequency response, crosstalk and tracking ability, both from one sample to another and with changing temperature, are usually most noticeable on pickups where the mechanical impedance change from stylus to generator is very large and/or the transformation is effected by two or more stages instead of one simple cantilever. Pickups with almost identical measured frequency responses but different generator/cantilever arrangements often sound poles apart when it comes to reproducing music, and some of the differences are probably due to minor resonances or motional modes interposing themselves between stylus and transducer.

This must not be taken as a sweeping condemnation of all pickups employing cantilevers—indeed some of the very best make use of them—but readers should be warned that cartridges (particularly of the crystal/ceramic variety) which rely on the reactive/resistive properties of plastic blocks in addition to using cantilevers should be looked upon with some scepticism if the very highest stereo sound quality is in view. The better quality ceramic pickups are doing an important job in opening up a new market for good stereo at moderate cost, but at the present state of the art (early 1964) the best few magnetic pickups take some beating.

#### Problematic Sandwich

For all the above reasons pickup progress is at present sandwiched between two problems: the need to reduce the effective mass at the stylus as seen by the record groove, and the

avoidance of too remote a relationship between the motion patterns of stylus and transducer. The two requirements are to some extent contradictory, unless we can learn to make use of much lower electrical outputs than those considered desirable at present (1 mV/cm/sec is generally thought to be near the lower limit). Alternatively, entirely new types of transducer may be evolved in which the effective mass at the stylus is little more than that of the diamond tip itself.

#### The Present Choice

For the present, however, we have to choose between some half dozen top-grade pickups if we want the best stereo sound from disc currently available—a choice which is considerably widened if the most stringent of ultra-hi-fi criteria are not applied. The best pickups claim effective tip masses in the region of one milligram (mg), and some, especially of American origin, are said to go considerably below this. Private experimental work by several experts shows some of these claims to be misleading or even downright false. It appears that the actual mass of the diamond tip itself can quite easily be in the region of 0.2-0.3 mg, and in some cases this is the figure which appears in specifications; but once the cantilever and transducer are coupled in the effective mass is raised considerably (with all current systems), and it is this final figure which sets the pickup's tracking ability at high frequencies. The outcome of all this is that there are really no pickups at present available (early 1964) which will properly track high frequencies on the most heavily modulated stereo discs at playing weights significantly less than about  $1\frac{1}{2}$  gms; in fact, most require 2 gms or more on the occasional difficult passage. In some cases it is claimed that cartridges will track at  $\frac{3}{4}$  gm or less in high quality arms; it can be stated categorically that this is untrue advertisers' nonsense, unless one is concerned only with low frequency tracking

(for which the compliance is often more than adequate). Ability to avoid groove jumping is undoubtedly desirable, but avoidance of high frequency distortion is also part of hi-fi!

### New Transducers

But the new transducing systems or unexpected variations on existing ones will come eventually, with corresponding tracking weights well below 1 gm. This in turn will lead to a re-assessment of *arm* requirements, resulting, perhaps, in radically different methods of suspending cartridges above the record surface. After all, even the best of our present arms are direct descendents from the earliest acoustic gramophones.

Finally, a few words about mono disc reproduction. Many people still seem to believe that a specifically mono pickup must be used for optimum performance from single-channel records, but this is not so. If the two outputs of a stereo pickup are connected together the sensitivity to vertical motion is nullified and the component then *is* a mono pickup for all practical purposes. It seems that the mechanism whereby the vertical response is cancelled is very commonly misunderstood, so some explanation is called for.

### Groove Convention

There is an agreed convention whereby if the two stereo signals are *in phase*, then as one groove wall goes up the other comes down. When the two signals are also of equal amplitude the resultant groove motion is purely lateral as for a mono recording (fig. 5(a)), so that a centrally placed sound in stereo produces a lateral groove modulation. If the two signals are in *anti-phase* both groove walls move up and down together, producing a purely vertical motion (fig. 5(b)). The in-phase condition will produce two electrical outputs which will aid each other if connected together, but the out-of-phase signals will produce outputs which will be self-cancelling when commoned. Since

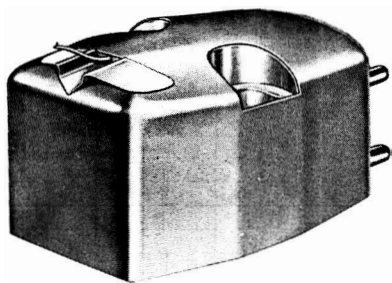
any vertical motion of a stereo pickup stylus will produce outputs in anti-phase, the simple act of connecting the two channels together will automatically convert the pickup into a purely lateral—or mono—device, provided the channels have equal sensitivity when used separately. Since this is a purely electrical procedure it may be accomplished at any point in the reproducing chain where the signal levels of the two channels are nominally equal. It would be quite in order, for instance, to use a stereo pickup and stereo control unit with the outputs of the latter commoned (impedances, etc, permitting) for feeding a single power amplifier. Mono records played with such a set-up should sound exactly the same as if played through a purely single-channel system, *provided* the mono pickup employed has the same basic mechanical parameters as the stereo model.

### Mono Design Overtaken

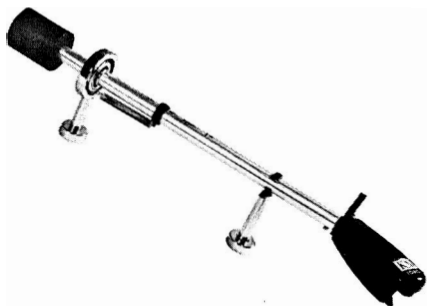
In fact, as most pickup development work during the last few years has been concerned with stereo, mono design has been rather overtaken in terms of tip mass, compliance, smoothness of response and general tracking ability. For this reason a stereo pickup should normally be the first choice for *all* types of record, the only remaining problem being the question of stylus tip size. Most mono discs of older vintage, and even some very recent issues, will not perform well with a stylus of 0.5-0.6 thou radius because of the 'bottoming' trouble mentioned earlier. On the other hand the standard mono LP stylus of 1.0 thou radius introduces rather more distortion at the inner grooves than many people find acceptable. Most mono discs will perform well with a 0.7 thou stylus, and such a tip fitted to a top-grade stereo pickup with commoned channels will usually enable one to get the best from one's valued mono LPs before they are eventually replaced with stereo versions.

# DIRECTORY OF PICKUPS AND ARMS

★ In the abridged specifications of this directory, the following abbreviations are used for economy of space: **P.w.**=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.



ADC Professional cartridge



B & O ST/A pickup arm



B & O ST/P arm



ADC Pritchard Pickup arm

**ACOUSTICAL HANDEL M.P. N.V.** Distributors: Telesonic Ltd., 92 Tottenham Court Road, London, W.1. Tel.: Museum 8177.

All **balance arm**, complete with head shell. Pressure adjustment 0.8 gm. Price: £7 5s. 6d. (U.K. purchase tax: £1 4s. 6d.).

★

**AUDIO DYNAMICS CORPORATION**, New York, U.S.A. Sole U.K. agents: KEF Electronics Ltd., Tovil, Maidstone, Kent. Tel.: Maidstone 55761. Cables: KEF, Maidstone.

● **ADC professional cartridge.** Stereo cartridge. Moving magnet.  $\frac{1}{2}$  in. fixing centres. Stylus 0.5 thou. diamond. P.w. 0.75-1.5 gm. Tip mass 0.5 mg. Compliance  $25 \times 10^{-6}$  cm/dyne. Range 10 c/s-20 Kc/s  $\pm 2$  dB. Separation 30 dB, 50 c/s-7 Kc/s. Output 1.27 mV. Rec. load 47 K. Price: £20 10s. (U.K. purchase tax: £3 5s. 9d.). Replacement stylus assembly £9 (U.K. purchase tax: £1 8s. 10d.).

● **ADC-3 stereo cartridge.** Moving magnet.  $\frac{1}{2}$  in. fixing centres. Stylus 0.5 thou. diamond. P.w. 2.5 gm. Tip mass 0.8 mg. Compliance  $15 \times 10^{-6}$  cm/dyne. Range 10 c/s-20 Kc/s  $\pm 3$  dB. Separation 30 dB, 50 c/s-7 Kc/s. Output 1.8 mV. Rec. load 47 K. Price: £12 (U.K. purchase tax: £1 18s. 6d.).

● **ADC Pritchard pickup arm.** Complete low inertia arm with side-thrust compensator and anti-drag lead-out arrangement. Price: £24 (U.K. purchase tax: £3 17s.).

● **ADC point four.** Stereo cartridge. Induced magnet.  $\frac{1}{2}$  in. fixing centres. Stylus 0.4 thou. diamond. P.w.  $\frac{3}{4}$ -1 $\frac{1}{2}$  gm. Compliance  $30 \times 10^{-6}$  cm/dyne. Range 10 c/s-20 Kc/s  $\pm 2$  dB. Separation 30 dB from 50 c/s-8 Kc/s. Output 1 mV. Rec. load 47 K. 15° vertical tracking angle. Price to be announced.

● **ADC R30.** Stereo stylus assembly. Moving magnet. Stylus 0.35 thou. diamond. P.w.

0.8 gm. Tip mass 0.4 mg. Compliance  $40 \times 10^{-6}$  cm/dyne. Range 10 c/s-20 Kc/s  $\pm 2$  dB. Separation 30 dB. Output 1.27 mV. Rec. load 47 K. Price: £14 (U.K. purchase tax: £2 4s. 11d.).

★

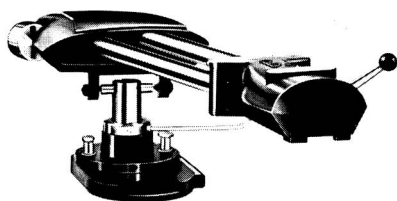
**BANG & OLUFSEN**, Struer, Denmark. Sole U.K. importers: Avey Electric Ltd., South Ockendon, Essex. Tel.: South Ockendon 3444.

● **Stereodyne SP.1 and SP.2**. Stereo cartridge. Moving iron. Plug-in. Stylus 0.7 thou. diamond. P.w. 2-4 gm. Range 30 c/s-15 Kc/s  $\pm 2$  dB. Separation 22 dB min. Output 7 mV. Rec. load 47 K. Price: £4 11s. 3d. (U.K. purchase tax: 13s. 9d.). Replacement styli 0.5, 0.7, 1.0, 3.0 thou. diamonds. Price: £2 5s. (U.K. purchase tax: 7s. 6d.).

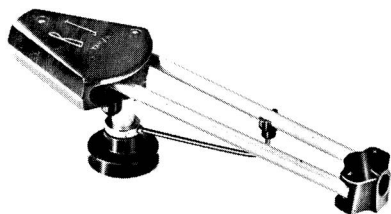
● **ST/L**. 9 in. pickup arm, less cartridge. Price: £7 4s. (U.K. purchase tax: £1 4s.).

● **ST/A arm**. Arm with plug-in shell for use with SP.1 cartridge, or will take all standard cartridges. Price: £7 4s. (U.K. purchase tax: £1 4s.).

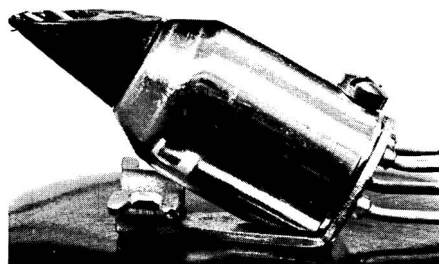
● **ST/P arm**. Professional 12 in. arm. Price: £8 2s. (U.K. purchase tax: £1 7s.).



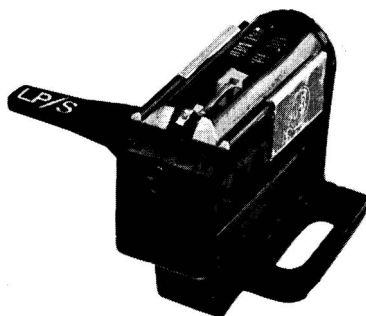
*B.J. Super 90 arm*



*B.J. Tan/II arm*



*B & O Stereodyne cartridge*



*Acostereo 81 cartridge*

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

**B.J. Tan/II arm**. Designed to overcome tracking error. Total tracking error less than  $\frac{1}{2}$  degree. Height adjustable. Price on application.

**B.J. Super 90 Mk. II pickup arm**. Two models. 12 in. and 16 in. Price (including two plug-in shells to carry standard cartridges).

**B.J. plug-in shell** for holding cartridges. Price on application.

★

**CLARKE & SMITH MANUFACTURING CO. LTD.**, Melbourne Works, Wallington, Surrey. Tel.: Wallington 9252. Cables: Electronic, Wallington.

● **E.M.I. EPU100**. Complete stereo pickup. Variable reluctance type. Stylus diamond, 0.5-0.6 thou. stereo, 0.8-1.0 thou. mono LP, 2.5-3.0-78. P.w. pre-set at 2.5 gm. Tip mass 1 mg. Compliance  $7 \times 10^{-6}$  cm/dyne lateral,  $3.5 \times 10^{-6}$  vertical. Range 30 c/s-20 Kc/s. Separation 20 dB at 1 Kc. Output 1.5 mV. Rec. load 50-100 K. Arm features built-in lowering device with all movement on a viscous damped uni-pivot. Price (stereo):

£16 8s. 9d. (U.K. purchase tax: £2 16s. 1d.); (mono): £15 13s. 1d. (U.K. purchase tax: £2 13s. 5d.).

**Spare heads:** Price (type EPH/S (stereo)): £7 16s. 7d. (U.K. purchase tax: £1 6s. 9d.); (type EPH/M (mono)): £7 0s. 11d. (U.K. purchase tax: £1 4s. 1d.); (type EPH/78 (78)): £10 (U.K. purchase tax: £1 14s. 2d.).

★

**CONNOISSEUR.** See A. R. Sugden & Co. Ltd.

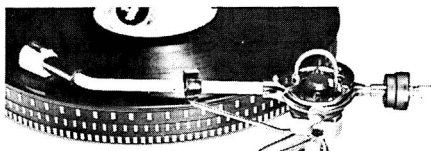
★

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

● **Acostereo 71-5.** Stereo crystal cartridge. Stylus 0.7 thou. diamond. P.w. 3-4 gm. Range 40 c/s-12 Kc/s. Output 140 mV. Rec. load 2 megohms. Price: £2 (U.K. purchase tax: 6s. 5d.).

● **Acostereo 73-2.** Stereo/mono crystal cartridge. Turnover type. Stylus, sapphire or diamond. P.w. 3-4 gm. Range 40 c/s-12 Kc/s. Output 150 mV. Rec. load 2 megohms. Price (two sapphires): £1 15s. (U.K. purchase tax: 5s. 8d.); (sapphire/diamond): £2 4s. 7d. (U.K. purchase tax: 7s. 2d.).

● **Acostereo 81.** Stereo/mono ceramic cartridge. Turnover type. Stylus, sapphire or diamond. P.w. 3-5 gm. Range 50 c/s-14 Kc/s  $\pm 4$  dB. Output 90 mV. Rec. load



*Acos Hi-Light arm and head*

2 megohms. Price (two sapphires): £2 (U.K. purchase tax: 6s. 5d.); (diamond/sapphire): £2 9s. 1d. (U.K. purchase tax: 7s. 11d.).

**HGP 39-3.** Slide-on mono head for discontinued Black Shadow pickup. Stylus, sapphire or diamond. P.w. 4-6 gm. Range 30 c/s-16 Kc/s. Output 300 mV. Rec. load 2 megohms. Price (sapphire): £1 12s. (U.K. purchase tax: 5s. 2d.); (diamond): £2 1s. 1d. (U.K. purchase tax: 6s. 7d.).

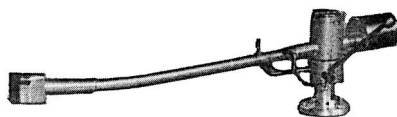
**Acos GP67-1.** Mono crystal cartridge. Turnover type. Stylus sapphire. P.w. 4-6 gm. Range 30 c/s-14 Kc/s. Output 200 mV. Rec. load 2 megohms. Price (sapphire/sapphire): 18s. (U.K. purchase tax: 2s. 11d.); (diamond LP/sapphire 78): £1 7s. 1d. (U.K. purchase tax: 4s. 4d.).

● **Acos hi-light.** Complete pickup with stereo and mono plug-in heads. Stylus 0.5 thou. diamond. P.w. 2 gm. Tip mass 0.9 mg. Compliance  $6 \times 10^{-6}$  cm/dyne. Range 20 c/s-20 Kc/s  $\pm 3$  dB. Output 40 mV. Rec. load 2 megohms. Ultra-lightweight adjustable arm. Price: £17 9s. (U.K. purchase tax: £2 16s. 1d.).

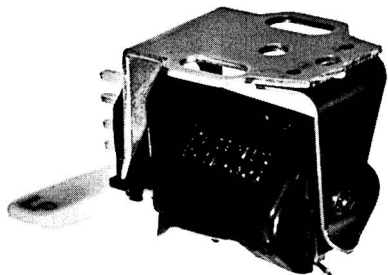
★

**DECCA RADIO & TELEVISION,** Ingate Place, Queenstown Road, London, S.W.8. Tel.: Macaulay 6677.

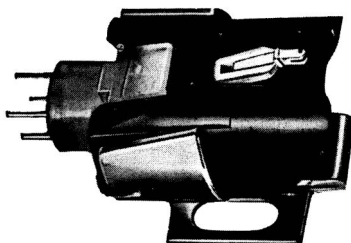
● **Deram cartridges.** Stereo/mono, transcription/autochange ceramic cartridges. Stylus 0.5 thou. diamond. P.w. 3-5 gm. Tip mass,



*E.M.I. EPU 100 arm and head*



*Acostereo 73.2 cartridge*



*Decca Deram cartridge*

1 mg. Compliance  $6 \times 10^{-6}$  cm/dyne lateral.  $3.5 \times 10^{-6}$  vertical. Range 40 c/s-12 Kc/s  $\pm 3$  dB. Useful response to 16 Kc/s. Output 50 mV/cm/sec. Rec. load 2 megohms. Price (stereo/mono transcription cartridge): £4 1s. 4d. (U.K. purchase tax: 13s. 2d.); (stereo-mono autochange cartridge): £3 3s. 4d. (U.K. purchase tax: 10s. 2d.).

Also available: other heads, with 1 thou. diamond for mono LPs; with 2.8 thou. sapphire for 78s.

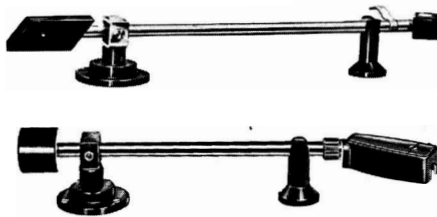
● **Deram universal transcription arm.** For use with above cartridges and the majority of other makes. Price: £4 10s. 6d. (U.K. purchase tax: 14s. 6d.). Complete Deram pickup (cartridge and arm combined): £8 11s. 11d. (U.K. purchase tax: £1 7s. 7d.).

● **ffss pickup.** Stereo pickup with slide-on head. Variable reluctance. Stylus 0.5 thou. diamond. P.w. 3.5 gm. Range 40 c/s-15 Kc/s  $\pm 1$  dB. Output 1.4 mV/cm/sec. stereo, 1 mV/cm/sec. mono. Rec. load 50 K. Price (arm): £4 10s. 6d. (U.K. purchase tax: 14s. 6d.); (stereo head): £11 15s. 3d. (U.K. purchase tax: £1 17s. 9d.); (mono head): £8 11s. 11d. (U.K. purchase tax: £1 7s. 7d.). Complete ffss pickup (head and arm combined): £16 5s. 9d. (U.K. purchase tax: £2 12s. 3d.).

● **Professional pickup.** Stereo pickup with slide-on head. (Will take Mk I and Mk. II heads.) Variable reluctance. Stylus 0.5 thou. diamond. P.w. 3.5 gm. Tip mass less than 1 mg. Compliance  $10 \times 10^{-6}$  cm/dyne lateral.  $2 \times 10^{-6}$  vertical. Range 40 c/s-16 Kc/s  $\pm 1$  dB. Separation min. 20 dB at 1 Kc/s, 15 dB at 50 c/s and 12 Kc/s. Output 1.2 mV/cm/sec. Rec. load 50 K. Arm has built-in lowering device and pressure adjustment. Price (arm): £15 16s. 8d. (U.K. purchase tax: £2 10s. 10d.); (Mk. II head): £13 2s. 5d. (U.K. purchase tax: £2 2s. 1d.). Complete professional pickup (head and arm combined): £28 19s. 1d. (U.K. purchase tax: £4 12s. 11d.).

● **Deram anti-rumble integrated stereo pickup.** Ceramic. Accepts all Deram heads (stereo, LP, 78). Normally supplied complete with transcription stereo cartridge. Stylus 0.5 thou. diamond. P.w. 3.5 gm. Tip mass 0.6 mg. Compliance (lateral)  $7.5 \times 10^{-6}$ ; (vertical)  $2.8 \times 10^{-6}$  cm/dyne. Range 40 c/s-12 Kc/s  $\pm 3$  dB. Useful output up to 16 Kc/s. The mechanical combination of arm and head attenuates rumble frequencies. Separation 18 dB at 1 Kc/s. Output 50-80 mV, depending on line capacity. Load imp. 2 megohms. Price (with head): £9 19s. 1d. (U.K. purchase tax: £1 11s. 11d.); (without head): £5 17s. 7d. (U.K. purchase tax: 18s. 11d.).

Decca ffss arm and head



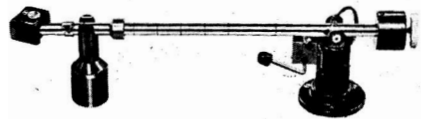
Decca Deram Transcription arm



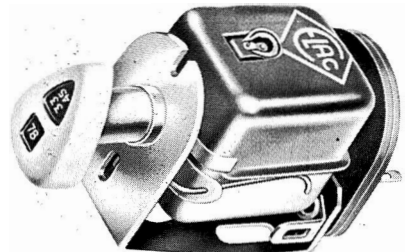
Elac MST 1 mono



Decca Anti-rumble Pickup



Decca Professional arm and head



Elac MST 2 mono

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

**A-18.** 12 in. tone arm plus two shells, stereo/mono. Arm rest, finger lift and height adjustments. Weight adjustment 0-15 gm. Price: £7 7s. (U.K. purchase tax: £1 4s. 8d.).

**A-15.** 12 in. tone arm plus two shells, stereo/mono. Arm rest, finger lift and height adjustments. Weight adjustment 0-20 gm. Price: £4 4s. (U.K. purchase tax: 14s.).



**ELAC.** Electroacoustic GmbH., Kiel, West Germany. U.K. importers: The High-Fidelity Centre, 61 West Street, Dorking, Surrey. Tel.: Dorking 4229.

**STS222D.** Stereo cartridge. Moving magnet.  $\frac{1}{2}$  in. fixing centres. Stylus 0.7 thou. diamond. P.w. 2.5-4.5 gm. Compliance  $7 \times 10^{-6}$  cm/dyne. Range 20 c/s-20 Kc/s (up to 10 Kc/s  $\pm 2$  dB). Separation 24 dB at 1 Kc/s. Output 2.2 mV. Rec. load 33-51 K. Price: £12 3s..4d. (U.K. purchase tax: £1 16s. 4d.).

**STS322.** Stereo cartridge. Moving magnet.  $\frac{1}{2}$  in. fixing centres. Stylus 0.5 thou. diamond. P.w. 2.5-3 gm. Compliance  $12 \times 10^{-6}$  cm/dyne. Range 20 c/s-20 Kc/s  $\pm 2$  dB. Separation 26 dB at 1 Kc/s, 20 dB at 10 Kc/s. Output

1 mV. Rec. load 33-51 K. Price: £17 17s. 6d. (U.K. purchase tax: £2 1s.).

**MST1.** Mono magnetic cartridge.  $\frac{1}{2}$  in. fixing centres. Stylus (33 $\frac{1}{2}$ , 45) 1 thou. diamond, (78) 2.6 thou. sapphire. P.w. 5-8 gm. Tip mass 2.5 mg. Compliance  $5.1 \times 10^{-6}$  cm/dyne. Range 20 c/s-20 Kc/s  $\pm 2$  dB. Output 4.5 mV. Rec. load 37 K. Price (diamond): £6 5s. 10d. (U.K. purchase tax: 14s. 8d.); (sapphire): £3 17s. 6d. (U.K. purchase tax: 9s.).

**MST2.** Two MST1 cartridges back to back. Price (diamond/sapphire): £7 5s. 10d. (U.K. purchase tax: 17s.); (sapphire / sapphire): £4 12s. 6d. (U.K. purchase tax: 10s. 9d.).

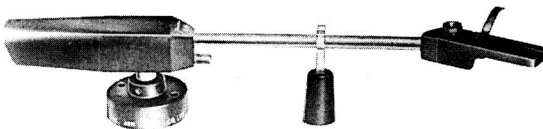


**E.M.I.** See Clarke & Smith Manufacturing Co. Ltd.



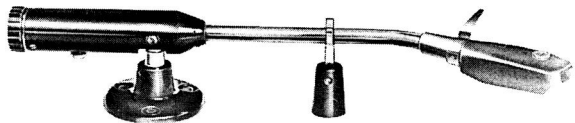
**EMPIRE SCIENTIFIC CORPORATION,** Long Island, New York, U.S.A. Distributor: J. Clipsham, 16 The Market Place, Hampstead Garden Suburb, London, N.W.11. Tel.: Speedwell 7940.

●**Empire 880P.** Stereo/mono cartridge. Moving magnet.  $\frac{1}{2}$  in. fixing centres. Stylus 0.6 thou. diamond P.w.  $\frac{1}{4}$ -5 gm. Tip mass 0.5 mg. Compliance  $30 \times 10^{-6}$  cm/dyne. Range 15 c/s-20 Kc/s  $\pm 2$  dB. Separation 30 dB. Output 2 mV. Rec. load 47 K. Price: £18 (U.K. purchase tax: £2 18s. 6d.).

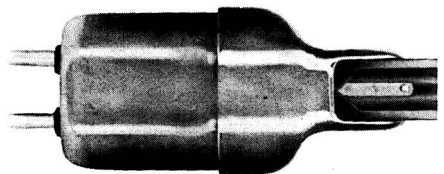


*Eagle Pickup Arm A-18*

*Eagle Pickup Arm A-15*



*Goldring G 60 arm*



*Empire 880 P. stereo*

**EXPERT PICKUPS LTD.**, 84D Belsize Lane, London, N.W.3. Tel.: Swiss Cottage 6324.

**Moving coil pickups for LP and 78.** Output 0.75 mV, with normal recordings. Impedance 10 ohms (step-up for most pre-amps required). Heads with 0.75 thou. or 1 thou. diamond styli and 2.5 thou. or 3 thou. fitted to most shells with  $\frac{1}{2}$  in. fixing centres. Price: £8 (U.K. purchase tax: £1 8s.). Special 4-pin plug-in heads for Expert, S.M.E., Ortofon arms, styli as above. Price: £9 (U.K. purchase tax: £1 11s. 6d.).

Miniature thorn heads: £6 10s. (U.K. purchase tax: £1 2s. 9d.); 4-pin: £7 12s. 6d. (U.K. purchase tax: £1 6s. 8d.).

**The expert arm.** Now fitted with S.M.E. type 4-pin adaptor. The head section can be raised at right angles to the arm portion, permitting the greatest facility for use with miniature thorns. Price: £4 10s. (U.K. purchase tax: 15s. 9d.).



**GARRARD ENGINEERING LTD.**, Newcaste Street, Swindon, Wilts. Tel.: Swindon 5381. Cables: Garrard, Swindon. Telex: 44-271.

●**EV26A.** Stereo ceramic turnover cartridge. Sapphire or diamond stylus. Output voltage 100 mV. P.w. 3-6 gm. Price: £1 8s. 3d. (U.K. purchase tax: 4s. 8d.).



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

**CM60.** Ceramic turnover cartridge fitted with sapphire LP and coarse groove styli. Load imp. 1 megohm. Output voltage 200 mV. Range 30 c/s-14 Kc/s  $\pm 2$  dB. P.w. 5-7 gm. Price: £1 5s. (U.K. purchase tax: 4s. 11d.).

**CM60/D.** As CM60 but fitted with LP diamond. Price: £2 1s. 6d. (U.K. purchase tax: 6s. 9d.).

●**SX10/L.** Stereo turnover cartridge. Fitted with sapphire LP and 78 styli. Output voltage 170 mV. Range 30 c/s-14 Kc/s. Load imp. 1 megohm. P.w. 4 gm. Price: £1 8s. 6d. (U.K. purchase tax: 4s. 8d.).

●**SX10/D.** As SX10/L but fitted with 0.7 thou. diamond. Price: £2 5s. (U.K. purchase tax: 7s. 4d.).

●**CS80.** Stereo/mono ceramic turnover cartridge. Stylus 0.7 thou. sapphire or diamond for stereo/LP and 2.5 thou. for 78. P.w. 2-4 gm. Compliance  $4 \times 10^{-6}$  cm/dyne. Range 30 c/s-14 Kc/s. Separation 20 dB (1 Kc/s), 10 dB (10 Kc/s). Output 200 mV. Rec. load 1-2 megohms. Price (sapphire): £1 15s. (U.K. purchase tax: 5s. 8d.); (diamond): £2 11s. 6d. (U.K. purchase tax: 8s. 5d.).

●**CS90.** Stereo ceramic cartridge. Stylus 0.5 thou. diamond. P.w. 2 gm. Compliance  $8 \times 10^{-6}$  cm/dyne. Range 30 c/s-18 Kc/s. Separation 25 dB (1 Kc/s); 10 dB (10 Kc/s). Output 50 mV. Rec. load 1-2 megohms. Price: £4 4s. (U.K. purchase tax: 13s. 8d.).

“**580**”. Variable reluctance turnover cartridge. Diamond stylus for LP, sapphire for 78. Output voltage 3.2 mV. Range 20 c/s-18 Kc/s. P.w. 6-7 gm. Load imp. 68 K. Price: £4 4s. (U.K. purchase tax: 13s. 8d.).

“**600**”. Variable reluctance turnover cartridge.  $\frac{1}{2}$  in. centre, mounting holes. Diamond stylus for LP, sapphire for 78. Output voltage 3.2 mV. Range 20 c/s-21 Kc/s  $\pm 2$  dB. P.w. 5 gm. Load imp. 68 K. Price: £8 8s. (U.K. purchase tax: £1 7s. 4d.).

●**700 Mk. 2.** Magnetic variable reluctance stereo cartridge. Diamond 0.7 thou. stylus (replaceable at works only). Load imp. 50 K. per channel. Output voltage 3 mV per channel (RMS). Range 40 c/s-16 Kc/s. P.w. 3-4 gm. Price: £7 7s. (U.K. purchase tax: £1 3s. 11d.).

●**Pickering 380A.** Moving-magnet stereo cartridge with  $\frac{1}{2}$  in. fixing centres. Stylus 0.7 thou. diamond. P.w. 2 gm. Output 3 mV. Price: £12 12s. (U.K. purchase tax: £2 0s. 11d.).

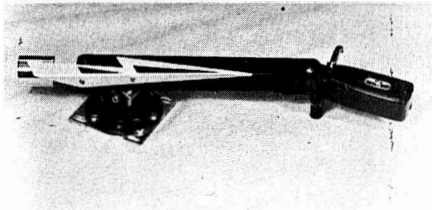
●**G60.** Transcription arm wired for stereo. Incorporates new slide-in head that will accommodate most cartridges. Height adjustable and P.w. variable from 2 gm. upwards. Price: £3 (U.K. purchase tax: 9s. 9d.).

●**Lenco L70.** Stereo and mono transcription pickup arm. P.w. adjustable. Price: £6 6s. (U.K. purchase tax: £1 0s. 6d.).

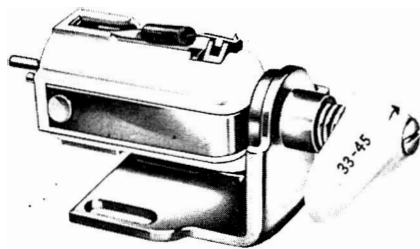
**Lenco P77.** Transcription pickup arm. P.w. adjustable and calibrated in grammes. Lowering device incorporated. Can be balanced in all planes. Price to be announced.



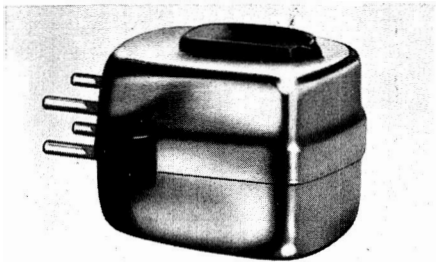
PICKUPS



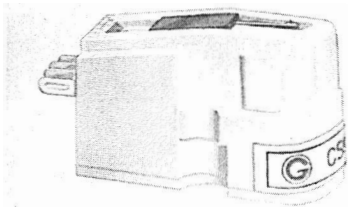
Worden Articulated Pickup Arm



Goldring SX 10-D stereo



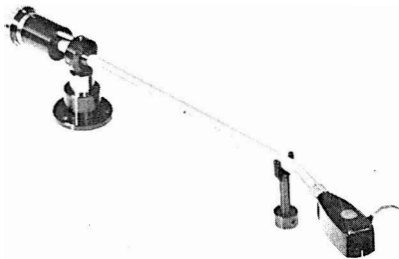
Goldring 700 stereo



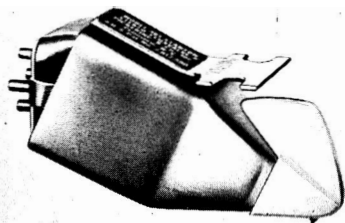
Goldring CS90 Stereo Ceramic Cartridge



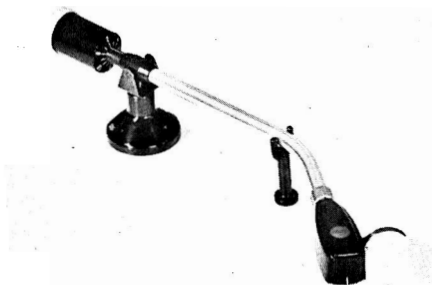
Goldring 580 cartridge



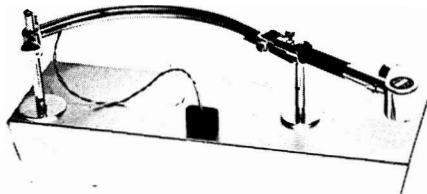
Ortofon RMG 309 arm



Pickering 380A stereo



Ortofon SKG 212 arm



Expert arm and head



Lenco L70 arm

**GRADO LABORATORIES INC.**, Brooklyn, N.Y., U.S.A. Distributors: Audioson Ltd., Orchard House, Orchard Street, London, W.1. Tel.: Mayfair 5431.

●**Imperial.** Stereo cartridge. Moving coil. Stylus 0.6 thou. diamond. Replaceable stylus assembly. P.w. 0.7-6 gm. Tip mass 0.3 mg. Compliance  $30 \times 10^{-6}$  cm/dyne. Range 10 c/s-30 Kc/s. Separation 30 dB. Output 0.9 mV. Rec. load: any value above 5 K. Price: £11 15s. (U.K. purchase tax: £2 1s. 6d.).

★

**INSTRUMATIC LTD.**, Marshall Works, Weybridge Trading Estate, Weybridge, Surrey. Tel.: Weybridge 46775 (3 lines).

**Worden articulated pickup arm.** Radially operated single arm with articulated head piece. Tracking correct to  $\pm \frac{1}{4}^\circ$ . Vertical and lateral friction less than 50 mg. Adjustable counterbalance weight, also provision for height adjustment. Detachable head-shell and Decca *ffss* adaptor. Price complete with one head: £14 7s. (U.K. purchase tax: £2 7s. 9d.). Extra shells: 15s. (U.K. purchase tax: 2s. 6d.). Decca *ffss* adaptor: 7s. 6d. (U.K. purchase tax: 1s. 3d.).

★

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

**Dynamic pickup Mk. II.** Moving coil interchangeable heads, both with diamond stylus. Output voltages LP and 78, 8 mV (at transformer secondary). Range 40-20,000 c/s  $\pm 1$  dB. P.w. LP 3 gm, 78, 5 gm. Load imp. 50,000-100,000 ohms. Price, with two heads: £16 (U.K. purchase tax: £2 9s. 11d.).

★

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

**Type A.** Moving coil, Interchangeable head with vertical coils. Diamond stylus. Output voltage LP 0.5 mV. Range 20-14,000 c/s  $\pm 2$  dB. P.w. 5-7 gm. Load imp. 2 ohms (transformer required). Price: £7 5s. (U.K. purchase tax: £1 3s. 3d.).

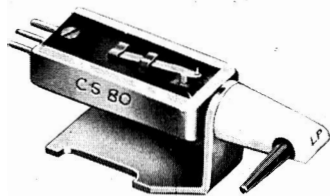
**Type C.** Moving coil as above. Diamond stylus. Output voltage LP 0.3 mV. Range linear 20-20,000 c/s. P.w. 3 gm. Load imp. 2 ohms (transformer required). Price: £14 (U.K. purchase tax: £2 4s. 10d.).

**Transformer** for use with above pickups. Price: £2 7s. 6d.

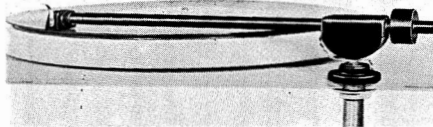
●**SPU/G.** Moving coil stereo cartridge. Diamond stylus 0.00065-0.0007. Output voltage 0.05 mV. Range 20-20,000 c/s. Separation 20-25 dB. P.w. 2 gm. Rec. load 2 ohms. Price: £18 (U.K. purchase tax: £2 17s. 9d.).

●**SPU/GT.** Moving coil cartridge with built-in transformers. Diamond stylus. Channel separation 20-25 dB. Range 20-20,000 c/s. Load imp. 50 K ohms. P.w. 2 gm. Output voltage 2 mV. Available with pure stereo 0.0005 or 0.00065 diamond for use with mono/stereo. Price: £20 (U.K. purchase tax: £3 4s. 2d.).

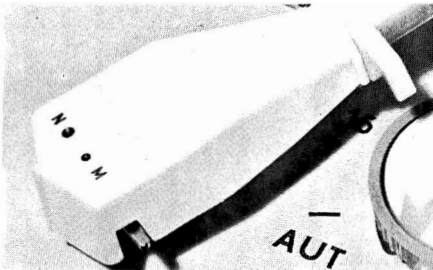
●**SKG/212.** 12 in. pickup arm with adjustable playing weight. Price: £4 15s. (U.K. purchase tax: 15s. 3d.).



*Goldring CS 80 ceramic stereo*



*Leak Dynamic arm and head*



*Philips AG 3302 stereo head*

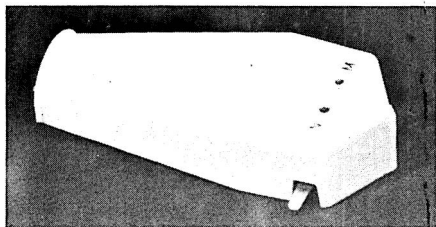
●**SMG/212.** 12 in. pickup arm for stereo and mono cartridges. Playing weight adjustable from 0-12 gm. Price: £10 (U.K. purchase tax: £1 12s. 1d.).

●**RKG/309.** 16 in. pickup arm. Details as for SKG/212. Price: £17 (U.K. purchase tax: £2 14s. 8d.).

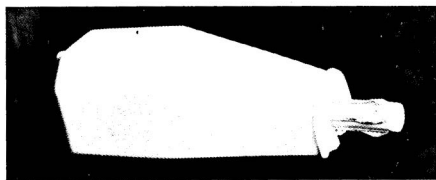
●**RMG/309.** 16 in. pickup arm. Details as for SMG/212. Price: £21 (U.K. purchase tax: £3 7s. 6d.).

●**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: £18 15s. (U.K. purchase tax: £3 0s. 2d.); (without lowering device): £16 (U.K. purchase tax: £2 11s. 5d.).

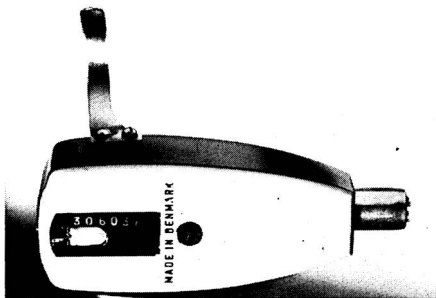
●**SPU-G/E** (SPU-E without shell). Stereo cartridge. Moving coil. Stylus elliptical diamond 23 × 8 microns. P.w. 2 gm. Tip mass 1 mg. Compliance 10 × 10<sup>-6</sup> cm/dyne. Range 20 c/s-20 Kc/s. Separation 25 dB.



*Philips AG 3301 crystal stereo*



*Philips AG 3402 stereo head*



*Ortofon SPU-G/T stereo head*

Rec. load 2 ohms. Output voltage 0.05 mV. Price (SPU-G/E): £23 (U.K. purchase tax: £3 13s. 10d.); (SPU-E): £22 (U.K. purchase tax: £3 10s. 7d.).

●**SPU-G/T-E** (SPU-T/E without shell). Stereo cartridge with built-in transformers. Output voltage 2 mV. Rec. load 50 K. Other details as for SPU-G/E. Price (SPU-G/T-E): £25 (U.K. purchase tax: £4 0s. 3d.); (SPU-T/E): £24 (U.K. purchase tax: £3 17s.).



**PHILIPS ELECTRICAL LTD.,** Century House, Shaftesbury Avenue, W.C.2. Tel.: Gerrard 7777. Cables: Phillamps.

●**AG.3016.** Crystal head fitted with sapphire styli. Output voltage 100 mV. Range 30-15,000c/s. P.w. 5-7 gm. Load imp. 470,000 ohms. Price: £1 1s. 6d. (U.K. purchase tax: 3s. 6d.).

●**AG.3401.** Stereo magnetodynamic head with diamond stylus. Output voltage 2 mV per channel. Range 20-20,000 c/s. P.w. 3-5 gm. Load imp. 68 K per channel. Price: £8 2s. 9d. (U.K. purchase tax: £1 6s. 3d.).

●**AG.3301.** Crystal stereo pickup cartridge with turnover head. Sapphire styli. Output voltage 120 mV per channel. P.w. 4-6 gm. Load imp. 470 K per channel. Price: £1 8s. (U.K. purchase tax: 4s. 6d.).

●**AG.3060.** Crystal stereo pickup. Diamond stylus. Range 30 c/s-12 Kc/s. Output voltage 120 mV per channel. P.w. 4-6 gm. Load imp. 470,000 ohms per channel. Price: £2 6s. 6d. (U.K. purchase tax: 7s. 6d.).

●**AG.3063.** Stereo crystal head. Sapphire 0.7 thou. stylus. Load imp. 470 K ohms per channel. Output voltage 120 mV per channel. Range 30-12,000 c/s. P.w. 4-6 gm. Price £1 8s. (U.K. purchase tax: 4s. 6d.).

●**AG.3302.** Stereo crystal turnover head. Sapphire styli, LP 0.7 thou.; 78, 3 thou. Load imp. 470 K ohms per channel. Output voltages 120 mV. P.w. 4-6 gm. Price: £1 8s. (U.K. purchase tax: 4s. 6d.).

●**AG.3304.** Stereo crystal turnover head. Styli: 3 thou. sapphire for 78, diamond 0.7 thou. for microgroove. Load imp. 470 K ohms per channel. Output voltage 120 mV per channel. P.w. 4-6 gm. Price: £2 14s. 3d. (U.K. purchase tax: 8s. 9d.).

● **AG.3305.** Stereo crystal turnover head. Details as for AG.3302 but with diamond 0.7 thou. stylus for microgroove. Price: £2 14s. 3d. (U.K. purchase tax: 8s. 9d.).

● **AG.3402 5-contact stereo magneto-dynamic pickup.** Microgroove only, 0.7 thou. diamond stylus. Output voltage 2 mV per channel. Range 20-20,000 c/s. P.w. 3-5 gm. Load imp. 68 K per channel. Price: £8 2s. 9d. (U.K. purchase tax: £1 6s. 3d.).

● **AG.3306.** Stereo crystal turnover head. Styli: sapphire (78) 3 thou., (LP) 0.7 thou. P.w. 3-6 gm. Compliance (lat.)  $3 \times 10^{-6}$  cm/dyne; (vert.)  $1.8 \times 10^{-6}$  cm/dyne. Range 30 c/s-16 Kc/s. Separation 18 dB. Output 70 mV. Load imp. 470 K per channel. Price: £1 6s. 4d. (U.K. purchase tax: 4s. 3d.).

**AG.3310.** Stereo crystal turnover head. Styli: sapphire (78) 3 thou.; diamond (LP) 0.7 thou. P.w. 3-6 gm. Range 30 c/s-16 Kc/s. Separation 18 dB. Output 70 mV. Load imp. 470 K per channel. Price: £2 14s. 3d. (U.K. purchase tax: 8s. 9d.).

★

**PICKERING.** See Goldring Manufacturing Co. Ltd.

★

**RADFORD ELECTRONICS LTD.,** Ashton Vale Estate, Bristol 3. Tel.: Bristol 662301/2.

**P.C. stereo cartridge.** Moving iron,  $\frac{1}{2}$  in. fixing centres. Stylus 0.7 thou. (0.5 thou., 1 thou. and 3 thou. also available). P.w. 2.5-3 gm. Tip mass less than 3 mg. Compliance  $5 \times 10^{-6}$  cm/dyne. Range  $\pm 2$  dB 30 c/s-15 Kc/s. Separation 22 dB minimum mid-band. Output 1.4 mV. Rec. load 47 K to 68 K. Price: £5 (U.K. purchase tax: 17s.).

**P.C.S.** Perforated lightweight shell to accommodate all cartridges with  $\frac{1}{2}$  in. fixing centres. Natural anodised. Price: £1 4s. (U.K. purchase tax: 4s.).

★

**RONETTE.** U.K. distributors: H. K. Harrison & Co. Ltd., 1-3 Jacob's Well Mews, George Street, London, W.1. Tel.: Welbeck 9453 and 9606. Cables: Empirian, Audley.

**DC-395.** Crystal turnover cartridge. Sapphire stylus. Load imp. 1 megohm 100 pfd. Output voltage 1,000 mV. Range 30-6,000 c/s. P.w. 6-10 gm. Price: £1 10s. (U.K. purchase tax: 4s. 10d.).

**DC-284-OV.** Crystal turnover cartridge. Sapphire stylus. Load imp. 1 megohm 100 pfd. Output voltage 230 mV. Range 30-10,000 c/s. P.w. 6-10 gm. Price: £1 10s. (U.K. purchase tax: 4s. 10d.).

**DC-284-T.** Crystal turnover cartridge. Sapphire stylus. Load imp. 1 megohm 100 pfd. Output voltage 600 mV. Range 30-8,000 c/s. P.w. 6-10 gm. Price: £1 10s. (U.K. purchase tax: 4s. 10d.).

**DC-284-P.** Crystal turnover cartridge. Sapphire stylus. Load imp. 1 megohm 100 pfd. Output voltage 105 mV. Range 30-12,000 c/s. 4-8 gm. Price: £1 10s. (U.K. purchase tax: 4s. 10d.).

**DC-395-S.** Crystal turnover cartridge. Sapphire stylus. Load imp. 1 megohm 100 pfd. Output voltage 1,450 mV. Range 30-6,000 c/s. P.w. 10 gm. Price: £1 10s. (U.K. purchase tax: 4s. 10d.).

**TX-88.** Crystal turnover cartridge. Sapphire stylus. Load imp. 1 megohm 100 pfd. Output voltage 150 mV. Range 30-20,000 c/s. P.w. 2-8 gm. Price: £1 15s. (U.K. purchase tax: 5s. 8d.).

● **BF-40.** Stereo single sided crystal cartridge. Sapphire 0.75 thou. stylus. Load imp. 1 megohm 100 pfd. Output voltage 180 mV. Range 30-12,000 c/s. P.w. 5-7 gm. Price: £2 10s. (U.K. purchase tax: 8s.).

● **Stereo 105.** Stereo crystal turnover cartridge. Sapphire stylus. Load imp. 1 megohm 100 pfd. Output voltage 250 mV. Range 30-12,000 c/s. P.w. 3-6 gm. Price: £2 11s. (U.K. purchase tax: 8s. 2d.).

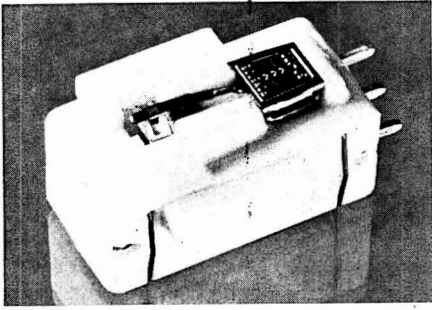
● **Stereo 106.** Stereo crystal turnover cartridge. Details as for 105 but output voltage 580 mV. Price: £2 11s. (U.K. purchase tax: 8s. 2d.).

● **Stereo 208.** Stereo crystal turnover cartridge. Details as for 105 but output voltage 750 mV. Range 30-6,000 c/s. P.w. 6-10 gm. Price: £2 11s. (U.K. purchase tax: 8s. 2d.).

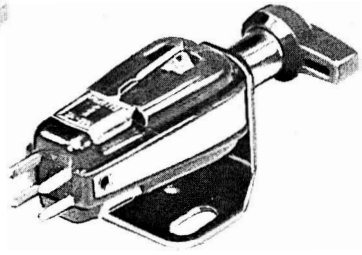
★

**SHURE ELECTRONICS LTD.,** 84 Blackfriars Road, London, S.E.1. Tel.: Waterloo 6361.

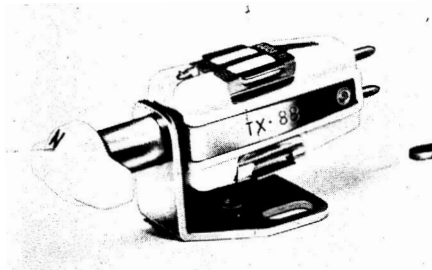
● **M7D custom stereo dynetic cartridge.** Moving magnet. Diamond stylus 0.7 thou. Load imp. 47,000 ohms. Output voltage 1 mV. Range 20-15,000 c/s. P.w. 4.7 gm. Price: £9 11s. 3d. (U.K. purchase tax: £1 10s. 9d.).



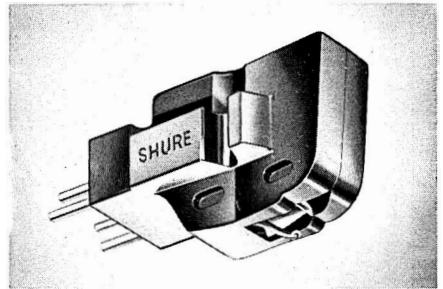
Ronette BF-40 stereo



Ronette Stereo 105 Cartridge



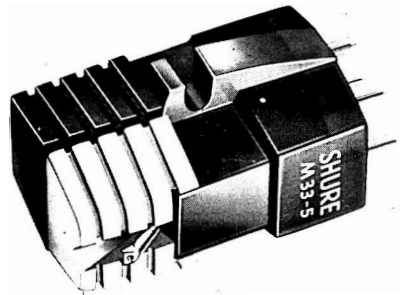
Ronette TX88 mono cartridge



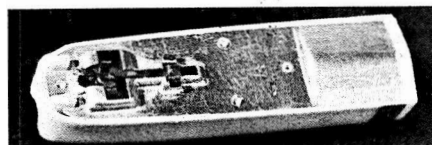
Shure M71D stereo cartridge



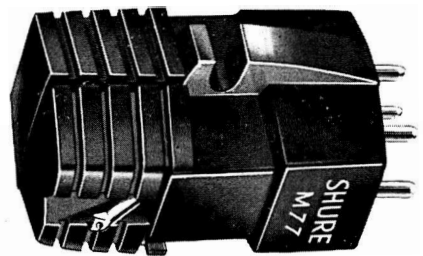
Ortofon RMG/212 Pickup Arm and Shell



Shure M33-5 Stereo Cartridge



Philips AG 3060 stereo head



Shure M77 stereo cartridge

●**M77 professional stereo dynetic cartridge.** Moving magnet. Diamond stylus 0.7 thou. Load imp. 47,000 ohms per channel. Output voltage 2 mV. Range 20-17,000 c/s. P.w. 3.6 gm. Price: £10 12s. 6d. (U.K. purchase tax: £1 14s. 1d.).

●**M33-5 professional stereo dynetic cartridge.** Moving magnet. Diamond stylus 0.5 thou. Load imp. 47,000 ohms per channel. Output voltage 1.2 mV. Range 20-20,000 c/s. P.w.  $\frac{3}{4}$ -1.5 gm. Price: £14 17s. 6d. (U.K. purchase tax: £2 7s. 9d.).

●**M44-5 professional stereo dynetic cartridge.** Moving magnet.  $\frac{1}{2}$  in. fixing centres. Stylus 0.5 thou. diamond (other stylus sizes also available). P.w.  $\frac{3}{4}$ -1 $\frac{1}{2}$  gm. Compliance 25  $\times$  10<sup>-6</sup> cm/dyne. Range 20 c/s-20 Kc/s. Separation 25 dB at 1 Kc/s. Output 1.1 mV. Load imp. 47 K. Price to be announced.

●**M212 studio stereo dynetic pickup.** Complete unit with moving magnet head. Diamond stylus 0.5 thou. Load imp. 47,000 ohms. Output voltage 0.9 mV. Range 20-20,000 c/s  $\pm$  2.5 dB. P.w.  $\frac{3}{4}$ -1 $\frac{1}{2}$  gm. Price: £36 2s. 6d. (U.K. purchase tax: £5 15s. 11d.).

●**M232 and M236 Precision Tone Arms.** Suitable for mono and stereo heads. P.w. 0.8 gm. Price M232 (12 in.): £7 8s. 9d. (U.K. purchase tax: £1 3s. 11d.); M236 (16 in.): £8 10s. (U.K. purchase tax: £1 7s. 4d.).



**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 standard shell S.3): £19 10s. (U.K. purchase tax: £3 5s.).

**Model 3012** (12 in.). Series II precision pickup arm. Details as above. Price (with standard shell S.3): £21 (U.K. purchase tax: £3 10s.).

**S.3 shell** with mounting hardware. Price: 18s. (U.K. purchase tax: 3s.).

**S.2 ultra light-weight shell.** Weighs only 6 grammes with mounting hardware. Price: £1 4s. (U.K. purchase tax: 4s.).

Companion balance weight for S.2 shell. Price: £1 1s. (U.K. purchase tax: 3s. 6d.).

**SONOTONE.** Distributors: Metro-Sound Manufacturing Co. Ltd., Bridge Works, Wallace Road, London, N.1. Tel.: Canonbury 8641. Cables: Metrosound, London.

**9TA.** Stereo turnover cartridge. Ceramic. Diamond stylus. P.w. 2-4 gm. Tip mass 3.5 mg. Compliance 5.3  $\times$  10<sup>-6</sup> cm/dyne. F.R. 30 c/s-15 Kc/s  $\pm$  3 dB. Separation 27 dB. Output voltage 80-120 mV. Load imp. 2 megohm. Price (including diamond stereo/LP stylus): £3 5s. (U.K. purchase tax: 10s. 6d.).



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

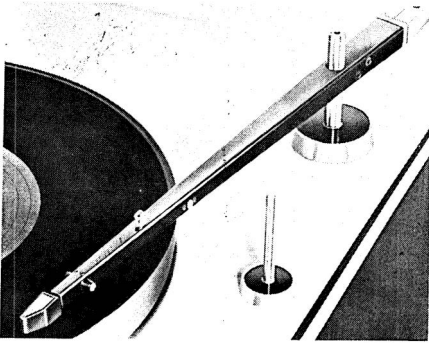
●**Connoisseur super lightweight pickup arm Mk. III.** Suitable for mono and stereo heads. Height adjustable. Heads available: Mk. II mono magnetic, with choice of 1, 2.8, 3.5 thou. stylus; stereo ceramic with 0.5 thou. diamond stylus. Price (arm only): £3 (U.K. purchase tax: 10s.).

●**Connoisseur stereophonic pickup arm CS1.** Also suitable for mono heads. Height adjustable. Pickup lifting device fitted. Price (arm only): £3 15s. (U.K. purchase tax: 12s. 6d.); (complete with stereo head): £9 15s. (U.K. purchase tax: £1 12s. 5d.).

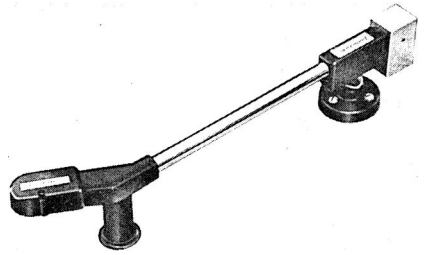
●**Connoisseur stereo head CS1.** Ceramic cantilever system. Diamond stylus 0.5-0.6 thou. Output. 20 mV. Load imp. 50,000-100,000 ohms. Range 20-16,000 c/s  $\pm$  2 dB. Channel separation 20/25 dB. P.w. 3 $\frac{1}{2}$ -4 gm. Price: £6 (U.K. purchase tax: 19s. 11d.). Prices of Mark II heads available. Mark II LP diamond: £6 10s. (U.K. purchase tax: £1 1s. 7d.); Mark II Std. or LP sapphire: £3 10s. (U.K. purchase tax: 11s. 8d.).

●**Connoisseur stereo ceramic cartridge SCU1.**  $\frac{1}{2}$  in. fixing centres. Stylus diamond 0.5-0.6 thou., or 1 thou. for mono. P.w. 2-4 gm. Tip mass 1 mg. Compliance: lateral 12  $\times$  10<sup>-6</sup> cm/dyne; vertical 8  $\times$  10<sup>-6</sup> cm/dyne. Range 20 c/s-20 Kc/s  $\pm$  3 dB. Separation (1 Kc/s) 25-30 dB; (10 Kc/s) 18 dB. Output 6 mV into 50 K (constant velocity); 26 mV into 2 megohms load. Features: 4-terminal output; easily replaceable diamond armature. Price: £4 10s. (U.K. purchase tax: 14s. 3d.).

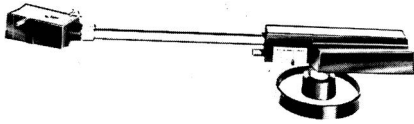
●**Connoisseur pickup arm SAU1,** with detachable head shell wired for stereo/mono. Optional lift/lower device. Single hole fixing. Single



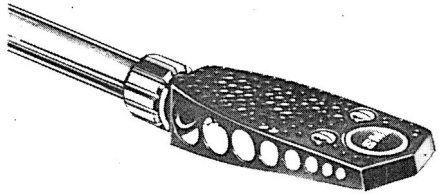
*Shure M212 Stereo Dynetic pickup*



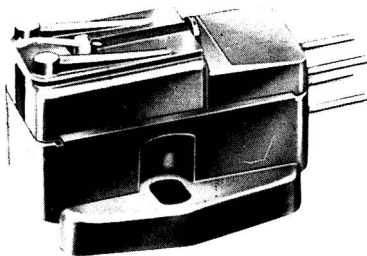
*Connoisseur Mk 3 Arm and Head*



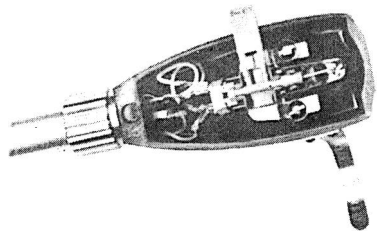
*Shure M232 pickup arm*



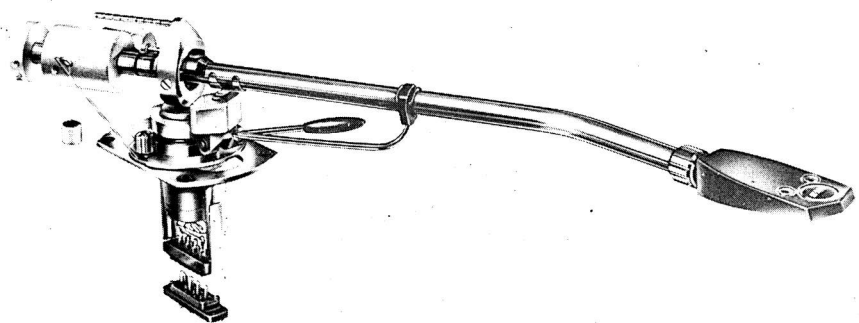
*S.M.E. Lightweight Shell*



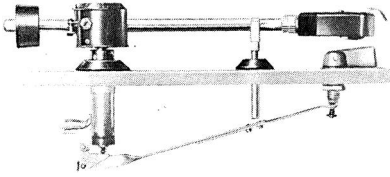
*Connoisseur stereo ceramic cartridge*



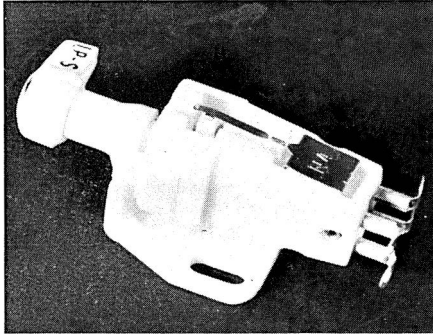
*Sonotone 9TA Stereo Turnover Cartridge*



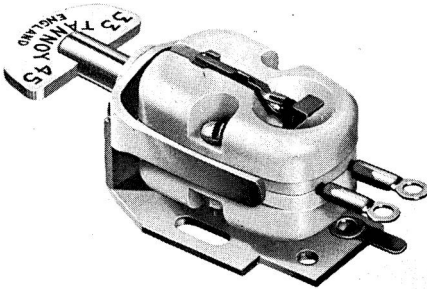
*S.M.E. Series 2 Precision Pickup Arm and Shell*



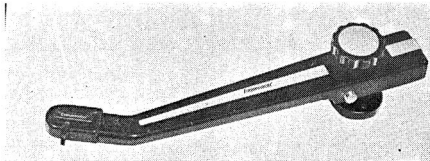
*Thorens BTD-12S pickup arm*



*Reuter St. D.I stereo cartridge*



*Tannoy variluctance cartridge*



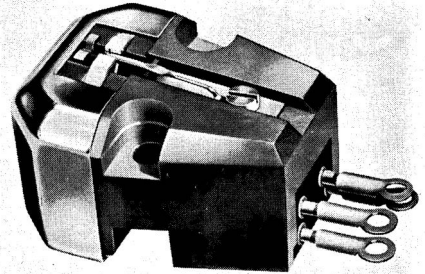
*Connoisseur stereo arm CSI*

unipivot bearing. Accommodates all standard cartridges. Adjustable stylus force-calibrated weights supplied. Single lever height adjustment. Price (arm): £5 5s. (U.K. purchase tax: 16s. 7d.); (arm with lifting device): £6 5s. (U.K. purchase tax: 19s. 9d.); (head shell): £1 2s. 6d. (U.K. purchase tax: 3s. 7d.).

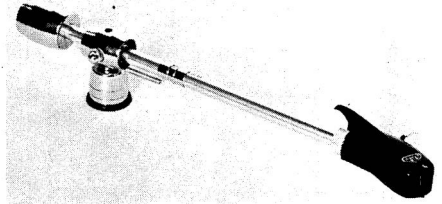


**TANNOY PRODUCTS LTD.**, West Norwood, London, S.E.27. Tel.: Gipsy Hill 1131. Cables: Tannoy, London.

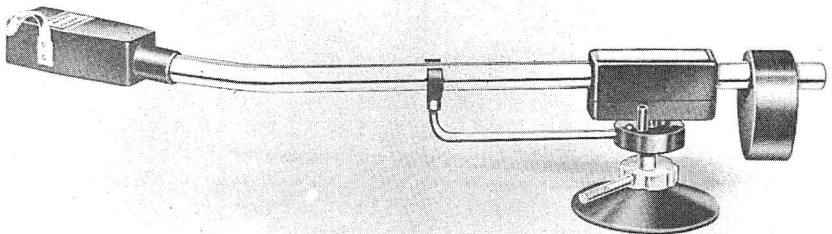
**Variluctance.** Turnover cartridge. Output voltages: LP: 10-12 mV; 78 18-20 mV. Range 20-16,000 c/s  $\pm 2$  dB. P.w. 5-6 gm (less with professional arms). Load imp. 50,000 ohms. Price (with 2 diamonds): £12 (U.K. purchase tax: £2 3s. 4d.); (with 1 diamond and 1



*Tannoy Vari-twin Mk II cartridge*



*All balance pickup arm 2400*



*Connoisseur Pickup Arm type SAU 1 with detachable Head*



sapphire): £9 10s. (U.K. purchase tax: £1 14s. 3d.); (with 2 sapphires): £7 (U.K. purchase tax: £1 5s. 3d.).

Single stylus version of Variluctance for LP also available. Price (with diamond): £6 15s. (U.K. purchase tax: £1 4s. 4d.).

● **Vari-twin Mk. II.** Magnetic stereo cartridge. Balance 4-pole system. Diamond stylus 0.5 or 0.7 thou. Output voltage 7 mV per channel. Range 30-15,000 c/s  $\pm 1.5$  dB. P.w. 4 gm (less with professional arms). Load imp. 100,000 ohms. Inductance 350 mH. Price: £9 19s. (U.K. purchase tax: £1 15s. 11d.).

★

**THORENS.** Distributed in the U.K. by Metro-Sound (Sales) Ltd., Bridge Works, Wallace Road, London N.1. Tel.: Canonbury 8641. Cables: Metrosound, London.

**BTD-12S pickup arm.** With air-brake, raise/lowering device, adjustable stylus pressure. Price: £13 10s. (U.K. purchase tax: £2 8s. 9d.); shell: £1 1s. (U.K. purchase tax: 3s. 10d.).

★

**TRIANON ELECTRIC LTD.,** 3 Violet Hill, London, N.W.8. Tel.: Maida Vale 2255.

● **Reuter St.D.1.** Crystal turnover stereo cartridge sapphire stylus. Range 30-13,000 c/s  $\pm 3$  dB. P.w. 3-5 gm. Load imp. 1 megohm. Price: £1 10s. (U.K. purchase tax: 5s.).

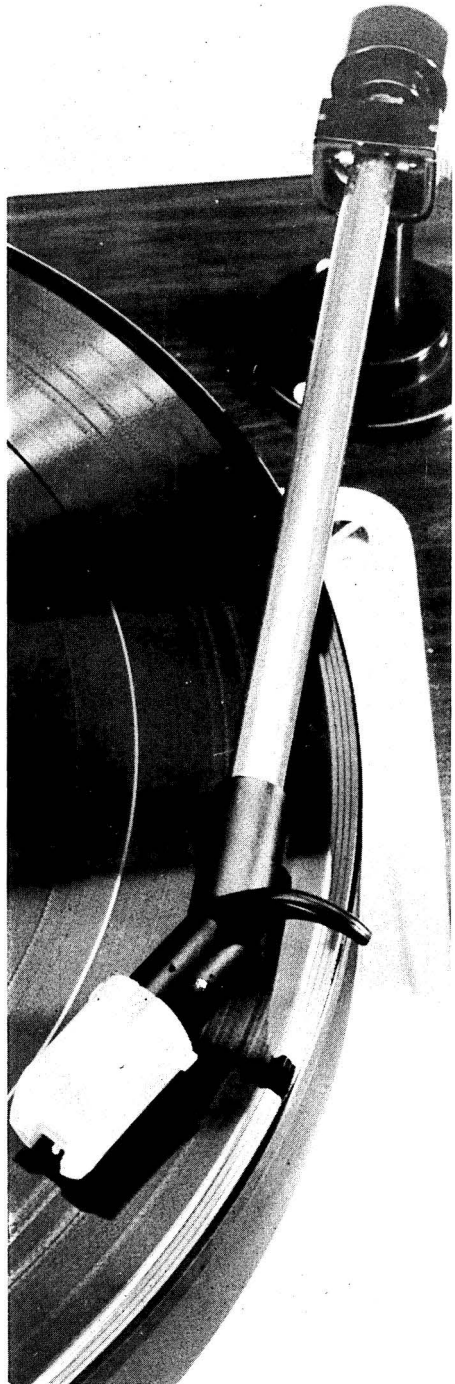
● **Reuter St.D.2.** Crystal turnover stereo cartridge. Sapphire stylus. Range 30-16,000 c/s  $\pm 3$  dB. P.w. 3-4 gm. Load imp. 1 megohm. Price: £1 10s. (U.K. purchase tax: 5s.).

● **Reuter St.D.3.** Crystal stereo cartridge. Sapphire stylus. Range 30-13,000 c/s  $\pm 3$  dB. P.w. 3-5 gm. Load imp. 1 megohm. Price: £1 10s. (U.K. purchase tax: 5s.).

**Trianette 100.** Mono crystal cartridge. Turnover LP/78. Stylus, standard sapphire (diamond extra). P.w. 5 gm. Range 30-12,000 c/s. Output voltage 160 mV. Rec. load 5 megohms. Price: £1 5s. (U.K. purchase tax: 4s. 2d.).

★

**WORDEN.** See Instrumatic Ltd.



*Decca Anti-Rumble Pickup*

## 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 microgrooves. Three cursors are provided to mark starting positions and an indexing clip is supplied to suit any specified pickup arm. Price: £3 1s. 3d. (U.K. purchase tax: 10s. 3d.).

**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 12s. (U.K. purchase tax: 12s.).

**BANG & OLUFSEN**, Struer, Denmark. Sole U.K. importers: Aveley Electric Ltd., South Ockendon, Essex. Tel.: South Ockendon 3444

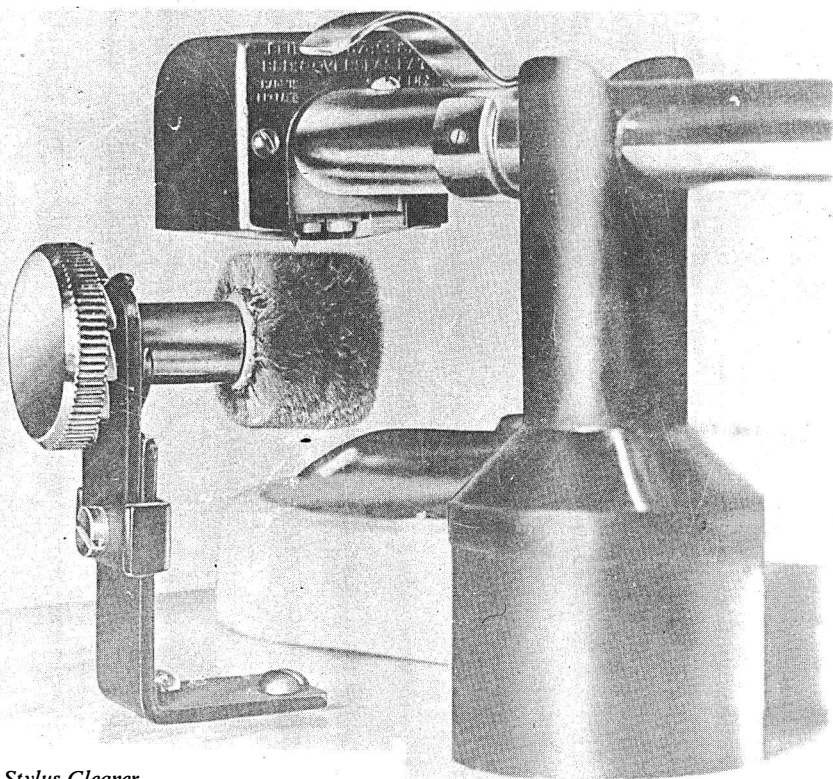
**Pickup lift type P.L.** for Bang & Olufsen arms only. Hydraulic operation. Price: £2 14s. (U.K. purchase tax: 9s.).



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

**Counterweight unit.** The addition of this unit to a B.J. pickup arm permits speed and accuracy in weight compensation. Price on application.

**Alignment protractor.** For measuring the tracking accuracy of all pickup assemblies. Made in plastic ivory. Price: 7s.



*Decca Stylus Cleaner*

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

**Antistaticloth.** A soft cloth impregnated with an anti-static material, for cleaning records. Price: 3s.

**Colton E.P. record centre adaptors** (45 r.p.m.). 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 (U.K. purchase tax: 6d.).



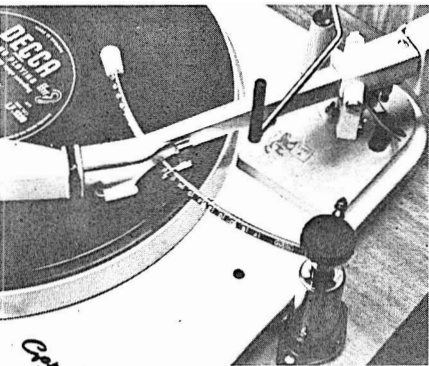
**COSMOCORD LTD.,** Eleanor Cross Road, Waltham Cross, Herts. Tel.: Waltham Cross 27331.

**Acos changer dust bug.** Developed in conjunction with Cecil Watts. Clips on to changer arms. Price: 17s. 6d. (U.K. purchase tax: 2s. 11d.).

**Acos stylus pressure gauge.** A spring balanced gauge calibrated 0-15 gm. Accurate to within 0.5 gm. Price: 9s. 6d. (U.K. purchase tax: 1s. 7d.).



Acos stylus pressure gauge.



Auril pickup control Mk. II.

**DECCA RADIO & TELEVISION,** Ingate Place, Queenstown Road, London, S.W.8. Tel.: Macaulay 6677.

**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 any back-pivoted pickup. It does not hinder record handling by overlapping the turntable. Price: £1 5s. 10d. (U.K. purchase tax: 4s. 2d.).

**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 all non-automatic record players on the market. Price: 18s. 1d. (U.K. purchase tax: 2s. 11d.).

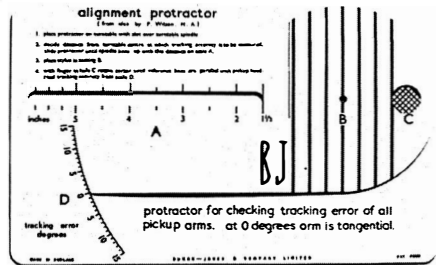


**EAGLE PRODUCTS.** Distributors: B. Adler & Sons (Radio) Ltd., 32a Coptic Street, London, W.C.1. Tel.: Museum 9606/7. Cables: Reldab, London.

**RC12 automatic record cleaner.** Easily fitted to any pickup arm. No change on stylus force. The brush contains hairs of different thickness



Colton Antistaticloth.



B-J Alignment protractor.

and length, set towards different directions, thus removing dirt and dust which is absorbed on a rotating roller. Complete with adjustable mounting bracket and operating instructions. Price: 14s. (U.K. purchase tax: 2s. 3d.).

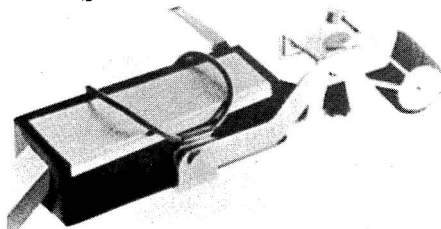
★

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

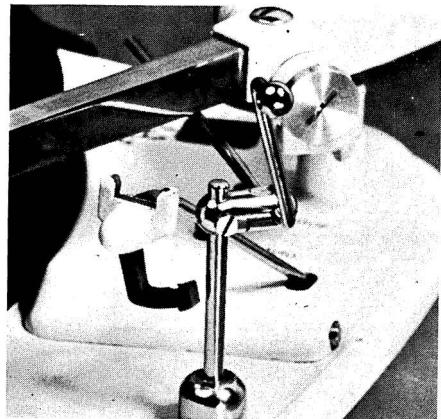
**Cuematic Mk. II.** Precision record groove locator and pickup lowering device with sufficient accuracy to locate within one micro-groove. Price: £19 7s. 6d. (U.K. purchase tax: £3 15s. 7d.).

**"Hi-Jack" Model "D".** A raising and lowering device specially designed for direct attachment to the Decca *ffss* pickup pedestal. All metal chrome plated construction, positive stops in gully raised and lowered positions. Price: £1 1s. (U.K. purchase tax: 3s. 6d.).

**"Hi-Jack" Model "U".** A raising and lowering device specially suited for use with



RC12 automatic record cleaner.



"Hi-Jack", U

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 3/16 in. hole needed for fixing. Price: £1 1s. (U.K. purchase tax: 3s. 6d.).

★

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

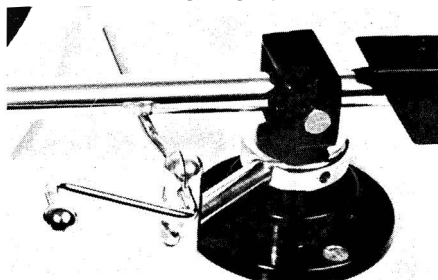
**S.P.G.3.** Stylus pressure gauge. 0-12 grammes with ½ gramme indications. Price: 15s. 3d. (U.K. purchase tax: 2s. 6d.).

★

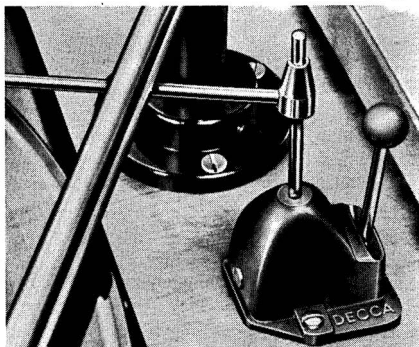
**GOLDRING MANUFACTURING CO. (GREAT BRITAIN) LTD.,** 486/488 High Road, Leytonstone, E.11. Tel.: Leytonstone 8343. Cables: Echovox, London.

**STB.1.** Stylus balance, a simple yet accurate gauge which operates a record level. Stylus pressure is read directly in grams off the calibrated scale. Price: 3s. 6d. (U.K. purchase tax: 7d.).

**Stylus microscope** designed especially for the examination of pickup styli; it has variable



"Hi-Jack" D



Decca Microlift.

magnification from  $\times 50$  to  $\times 150$  providing illumination both under and behind the stylus tip. A clip is fitted to hold any stylus in position under the lens. Price on application. Trade only.

**Lenco STR.2.** Stylus pressure balance. A simple and accurate device, not relying on springs. Price: 12s. 6d. (U.K. purchase tax: 2s. 1d.).

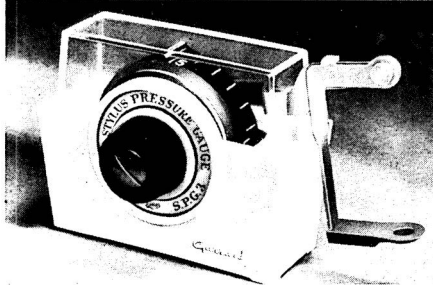


**METRO-SOUND (SALES) LTD.,** Bridge Works, Wallace Road, London, N.1. Tel.: Canonbury 8641 (Sole agents for U.K.).

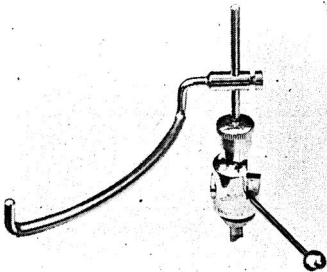
**Rexon.** An automatic record cleaning device which cleans discs as they are being played. A lightweight arm resembling that of a moulded plastic pickup with a head carrying a pad on a self-adhesive base. Price: 15s. (U.K. purchase tax: 2s. 5d.). Replacement pads price 2s. per set of three. (U.K. purchase tax: 4d.).



The "Dust Bug".



S.P.G.3.



Ortofon "Hi-Jack"

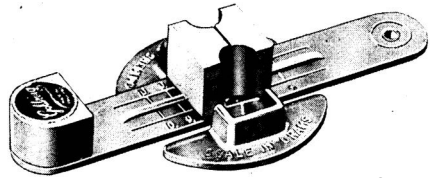
**ORTOFON A/S.** Distributors: Metro-Sound Sales Ltd., Bridge Works, Wallace Road, London, N.1. Tel.: Canonbury 8641. Cables: Metrosound, London, N.1.

**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. Price: £2 4s. (U.K. purchase tax: 8s. 8d.).



**Q-MAX (ELECTRONICS) LTD.,** Napier House, High Holborn, London, W.C.1. Tel.: Holborn 8534.

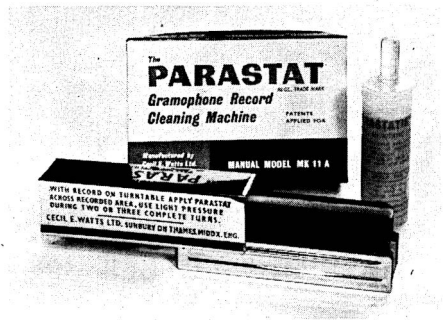
**Stylovue.** A device for projecting a magnified shadow of a stylus on to a screen facilitating inspection of a stylus *in situ*. Powered by torch batteries. Price: £1 4s.



STB.1.



Rexon.



Manual parastat.

**RIMINGTON VAN WYCK LTD.**, 42/3 Cranbourn Street, London, W.C.2. Tel.: Gerrard 1171.

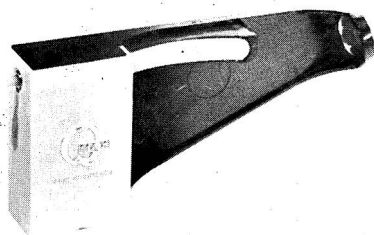
**Clendisc.** An anti-static cleaner and preserver for records. Price: 3s. 9d. Clendisc record cleaning pag. Price: 2s. 11d. including tax.



**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 all 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. (U.K. purchase tax: 2s. 11d.). Note: A model suitable for use on autochangers is produced in co-operation with Cosmocord Ltd.

**The "Parostat".** For cleaning both sides of an LP disc simultaneously and making it

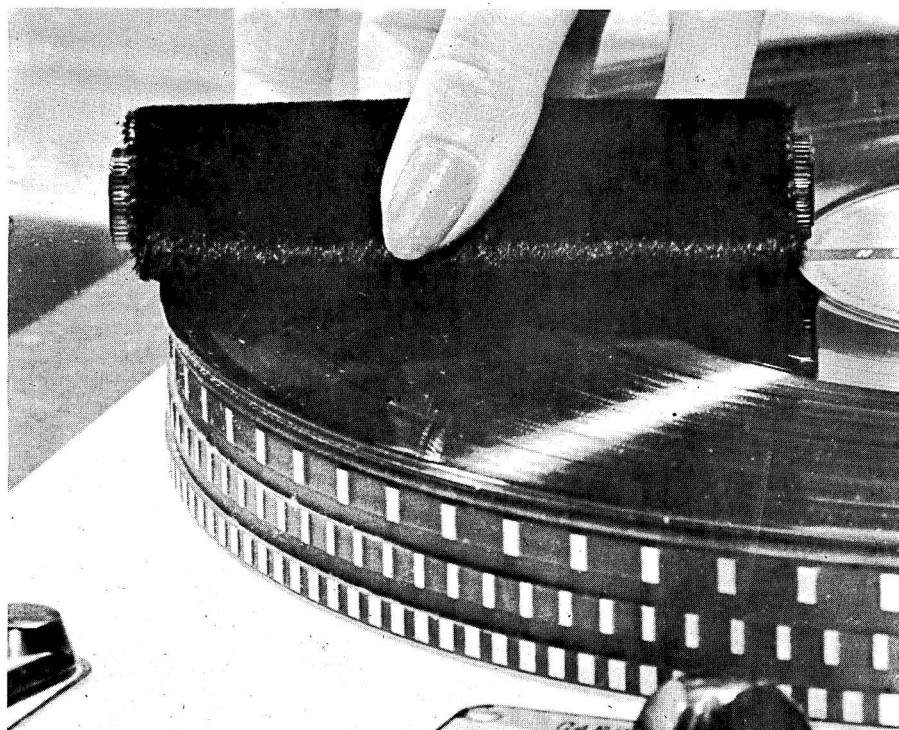


**Stylovue.**

inert to all static charges. Principally for trade use. Price Mk. II: £18 10s. (U.K. purchase tax: £3 1s. 8d.).

**"Parostatik"** regd. Disc Preener. For record maintenance where anti-static agents are not desirable (where stylus force is less than 2 gms.). Price: 6s. 9d. (U.K. purchase tax: 1s. 1½d.).

**Manual parostat.** Manual Model Parostat record cleaning machine. For the cleaning and application of anti-static agents to LP records. Price: £2 5s. (U.K. purchase tax: 7s. 6d.).



**"Parostatik"**

# CHOOSING A MOTOR UNIT

by B. J. Webb

**A** TRUISM which will bear frequent repetition is that sound reproducing equipment should be self effacing, since we wish to hear nothing but the original sound. All the real virtues of high quality apparatus are in a sense negative; nowhere in the chain are silence and anonymity more important than in the motor, and nowhere are these qualities more difficult to produce at reasonable cost. Consequently, the choice is limited in comparison with amplifiers, loudspeakers, radio tuners or even pickups of comparable quality. The models listed in the directory which follows are all in, or on the fringe of, the transcription class. The essential features of a high class motor are:

## The Essentials

(1) Speed constancy, both long and short term, which includes freedom from detectable wow and flutter, as well as from variations due to small fluctuations in the frequency of the electricity supply. Wow is a slow variation in speed causing a variation in pitch of the reproduced sound, particularly noticeable on sustained notes. Flutter is a rapid variation of speed, causing rapid pitch variation or "wobble" in reproduction.

(2) Freedom from vibration of turntable and motor plate, and from the generation of rumble when used with wide-range equipment.

(3) Freedom from stray magnetic fields likely to induce hum in a sensitive pickup.

(4) Silence in operation.

(5) Mechanical stability: i.e. the capacity to maintain consistent performance under all reasonable conditions of use over a period of years without constant adjustment.

(6) Ease of installation, and facility to accommodate any pickup and arm.

It must be realised that all these requirements will not be completely fulfilled in practice. If they were, the motor would be well-nigh perfect, and, while manufacturers and customers are constantly seeking perfection, it remains

elusive. A customer cannot, obviously, apply to a motor the type or variety of tests which are applied to one submitted for review by *Hi-Fi News*, but there are certain things which he can usefully do and look for before making his purchase, in his own interest.

First, if possible, study the reviews of motors which have appeared in the journals during the last year or two. Back numbers, with indices, are usually available in good public libraries, if you do not have them yourself. Failing access to these reports, consult the technical advice department of *Hi-Fi News* about the most suitable model for your installation, giving details, particularly of the mounting space available and the pickup you intend to use, quoting a price limit if this applies.

Second, examine one or two motors in your dealer's show room, and discuss the matter with him, with particular reference to the points mentioned above. Have the turntables removed from the motors and handle them. They should be solid, heavy, and preferably made of non-magnetic material. The object of a heavy turntable is to reduce vibration and contribute to even rotation by flywheel action. If the turntable is magnetic, it may preclude good results from certain pickups because of distortion of their magnetic fields and magnetic "pull" between cartridge and turntable. Pick up the motor base plates without the turntables. They, too, should be solid, heavy and rigid. Have the motor set to work, and listen to it. In a quiet room you should hear nothing at all with your head a foot or so away. Place the tips of your fingers on the motor plate in various different positions. You should feel no vibration.

## Play a test disc

Check wow and flutter by having a record played. The beginning of Mendelssohn's Overture *A Midsummer Nights Dream* is one suitable choice for this purpose. If the pickup

employed is the one you have, or intend to use, you can then test hum induction by removing the disc, turning the volume control well up and passing the pickup across the surface of the revolving turntable as close to it as possible without touching it, and noticing whether hum begins or varies when this is done. If so, it is being induced into the pickup by the motor. If your dealer does not have the same types of pickup and motor which you are considering in use together, you will have to postpone this test until the motor is installed at home, but ask your dealer whether he has had any trouble of this kind from the particular combination of motor and pickup which you have in mind, and if he has, decide to change one or the other.

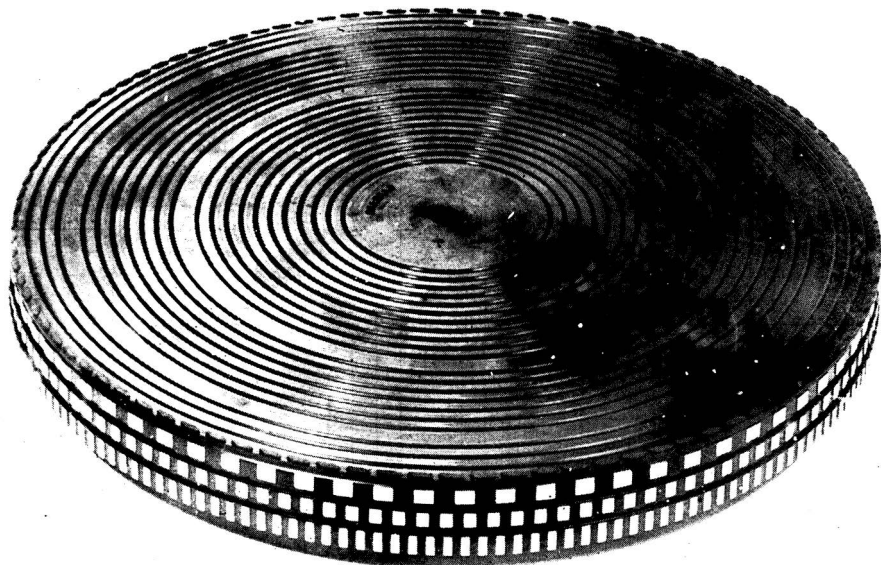
It is necessary to distinguish between hum and rumble. Hum is a steady sound at 50 or 100 c/s. Rumble is much deeper and less steady. Checking for rumble is impossible under showroom conditions, because so much depends on the speakers in use, their positions, the amplifier (which may or may not have a fixed rumble filter) and the discs used, for there is such a thing as *recorded* rumble, and records which are not really flat can also produce it. When you have the motor properly installed, if you get rumble on **all** your discs, and on the silent grooves between bands, you have cause for complaint, and you should ask for another motor.

Most transcription models now provide means of variation of the switched speeds, plus

or minus 2 to 4%. This is important if you have the sense of absolute pitch. Speed should always be adjusted with the pickup and Dust Bug actually tracing the grooves, and preferably after the motor has warmed up by running for a quarter of an hour or so.

Auto-changers are controversial devices. In general it may be said that they are unnecessary and undesirable under normal domestic conditions in this age of long playing records, but one can feel nothing but admiration for those makers who have produced these units to a really high quality specification such as that of the *Garrard Laboratory Series Type A* and the new *Thorens TD224*—an amazing piece of mechanism which is undoubtedly the outstanding new introduction of the past year in this field. These models, of course, have in common with some of the manual playing units the fact that they are fitted with their own arms integral with the motor plate. This makes for ease of installation, but to some extent restricts the choice of cartridge which must fit into the shell *with the stylus in exactly the right position* or serious tracking error and consequent distortion may result.

Installation is outside the scope of this article, but it is perhaps worthwhile to say that the use of springs for mounting the motor plate should be avoided whenever possible, and, if they are used they should be lightly stuffed with plastic foam or similar material between the coils.



*The Garrard Stroboscopic turntable with its finely milled strobe segments*



# DIRECTORY OF MOTOR UNITS

**ACOUSTIC RESEARCH INC.**, 24 Thorndike Street, Cambridge 41, Mass., U.S.A. Sole U.K. Importers: Aveley Electric Ltd., South Ockendon, Essex. Tel.: South Ockendon 3444.

**AR turntable.** Speeds  $33\frac{1}{3}$ , 45 rpm. AR arm incorporated, with viscous damping. Wow 0.05%, flutter 0.02%. Rumble -40 dB. Long term speed constancy, less than 1% deviation. Belt driven. Two synchronous motors. Supplied complete with playing weight gauge, oil, mounting hardware. Price to be announced.

★

**BANG & OLUFSEN**, Struer, Denmark. Sole U.K. Importers: Aveley Electric Ltd., Ayrton Road, South Ockendon, Essex. Tel.: South Ockendon 3444.

**Model 610V.** Transcription turntable. Four variable speeds. Belt driven. 12 in. turntable, fitted with stroboscopic mat. Complete with "Stereodyne" cartridge and ST/L pickup arm, in teak plinth. Price: £25 4s. 2d. (U.K. purchase tax: £4 3s. 10d.).

**Model 610VF.** Details as above, but less teak plinth for cabinet installation. Price: £23 17s. 1d. (U.K. purchase tax: £3 19s. 5d.).

**GF2.** Pre-amplifier for above. See Amplifier Section.

★

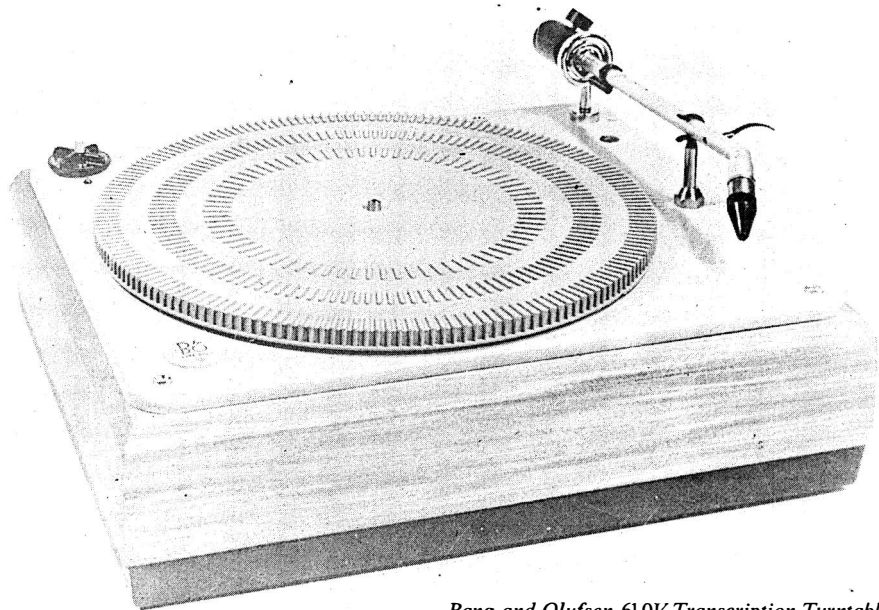
**DECCA RADIO & TELEVISION**, Ingate Place, Queenstown Road, S.W.8. Tel.: Macaulay 6677.

**Decola separates playing desk.** Speeds 33, 45, 78 rpm, variable  $\pm 2\frac{1}{2}\%$ . Incorporates the Garrard 301 and Microlift together with the Decca *ffss* pickup mounted on a  $\frac{3}{4}$  in. motor-board in cabinet. Price: £52 9s. 8d. (U.K. purchase tax: £8 8s. 4d.).

★

**ELAC.** Electroacoustic Gmbh., West Germany. U.K. Importers: The High Fidelity Centre, 61 West Street, Dorking, Surrey. Tel.: Dorking 4229.

**Miracord 10H.** Four speeds, with automatic shut-off. Magnetic pickup cartridge STS222. (Can also be supplied without cartridge or with other Elac cartridges.) Studio tone arm



*Bang and Olufsen 610V Transcription Turntable*

with adjustable stylus force (2-6 gm). Heavy balanced turntable, 12 in. dia. (driven by special hysteresis motor), 220V AC, 50 c/s or 110V AC, 60 c/s. Push-button control for various functions. Size  $14\frac{1}{2} \times 12\frac{1}{2}$  in. Weight  $14\frac{3}{4}$  lbs. Price: £50 (U.K. purchase tax: £6 5s.).

**Miraphon 17H.** Details as for Miracord 10H, but without push-button control. Pneumatic lowering device. Weight  $13\frac{1}{2}$  lbs. Price: £47 17s. 6d. (U.K. purchase tax: £5 19s.).



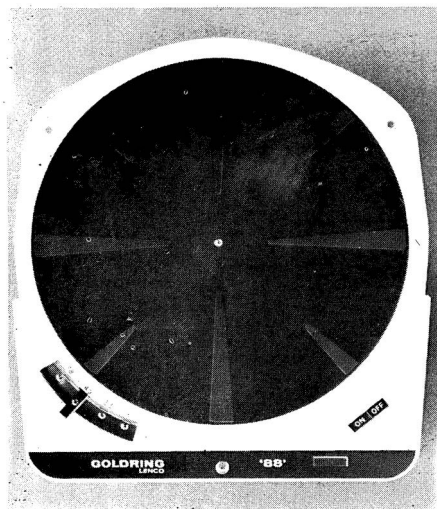
**GARRARD ENGINEERING LTD.,** Swindon, Wiltshire, England. Tel.: Swindon 5381. Cables: Garrard, Swindon.

**Model 301 transcription motor.** Three speeds. Variable speed adjustment. Price: £17 14s. 6d. (U.K. purchase tax: £2 17s. 8d.).

**Stroboscopic turntable,** extra cost: £1 4s. 9d. (U.K. purchase tax: 4s.).



*Elac Miraphon 17H*



*Goldring 88*

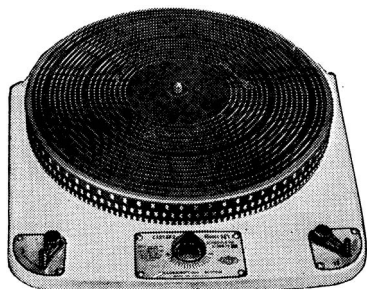
**Model 4HF.** Four-speed single record player complete with pickup arm. 12 in. turntable. Rheostat speed control  $\pm 3\%$ . Automatic stop may be disconnected. Price (with GC8 cartridge): £14 13s. 3d. (U.K. purchase tax: £2 7s. 8d.).

**Laboratory series type A turntable.** Transcription type record player with facilities for changing records if required. Heavy sandwich type turntable and weight counterbalanced pickup arm. Price (less pickup head): £15 18s. (U.K. purchase tax: £2 11s. 9d.).



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

**Lenco transcription unit GL58.** Continuously variable speed adjustment with pre-selected stops for 16,  $33\frac{1}{3}$ , 45, and 78 rpm. Groove location arm lowers pickup on to record as on/off is operated. Fitted with G.60 arm. Price: £14 14s. (U.K. purchase tax: £2 7s. 9d.).



*Garrard 301*



*Garrard Laboratory Type A*

**GL70 transcription unit.** Non-ferrous turntable, weight 8 lb. Speed may be continuously adjusted from above 80 rpm to below 30 rpm and from 15 to 18 rpm. Pre-set standard speeds. 4-pole constant velocity motor (15 watts). W & F max. 0.2%. Incorporates L.70 pickup arm. Pickup lowering device. Price: £23 12 s. 6d. (U.K. purchase tax: £3 16s. 10d.).

Both the GL58 and GL70 are now available on plinths. Price (GL58/P): £17 4s. (U.K. purchase tax: £2 15s. 11d.); (GL70/P): £26 12s. 6d. (U.K. purchase tax: £4 6s. 7d.).

**Goldring 88.** Four speeds, continuously variable. Stroboscope supplied. Can be used with any pickup. Total wow and flutter at each speed less than 0.2% RMS. Less than 1% variation for 13% change in mains voltage. 8 lb. non-ferrous turntable. Push-button on/off switch. Neon indication light. Price: £16 5s. 6d. (U.K. purchase tax: £2 12s. 11d.).



**PERPETUUM EBNER.** Distributors: Tele-sonic Ltd., 92 Tottenham Court Road, London, W.1. Tel.: Museum 8177.

**P.E.33 studio.** Speeds: 16½, 33½, 45, 78 rpm, variable +1% -2%. Illuminated strobe at 33½ rpm. Pickup arm incorporated, adjustable

weight 0.5-6 gm. Shure M77 cartridge fitted as standard. Wow better than  $\pm 1.5\%$ , flutter better than  $\pm 1\%$ . Rumble better than -53 dB. Lowering device for pickup. Optionally operated pickup lift at end of travel. Individually balanced turntable made of alloy. Belt driven step pulley coupling to intermediate wheel. Price: £40 14s. 4d. (U.K. purchase tax: £6 10s. 8d.).

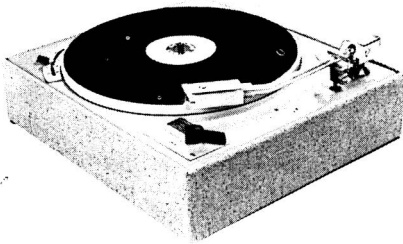
Plug-in transistor pre-amplifier available, allowing P.E.33 to be used with any low gain amplifier. Price: £7 10s.



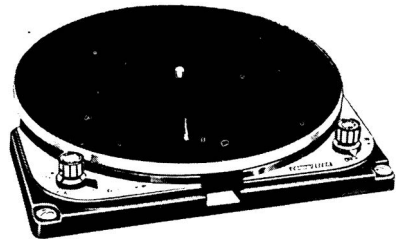
**A. R. SUGDEN & CO. (ENGINEERS) LTD.,** Market Street, Brighouse, Yorkshire. Tel.: Brighouse 2142. Cables: Connoisseur, Brighouse.

**Connoisseur "Craftsman" two speed transcription motor.** Operates at 33½ 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: £14 14s. (U.K. purchase tax: £2 8s. 11d.).

**Connoisseur "Craftsman" three speed transcription turntable.** Requires minimum mounting space. Heavy non-ferrous 12 in. turntable. 33, 45 and 78 rpm. 4% variation on all speeds.



*Goldring GL70/P*



*Connoisseur Craftsman 3 speed*



*Goldring GL 58/P*



*Connoisseur Craftsman 2 speed*

Neon lit stroboscope fitted. Dynamically and electrically balanced synchronous motor. All bearings are adjustable. Price: £19 10s. (U.K. purchase tax: £3 9s. 6d.).

**Connoisseur plinth.** Available with "Craftsman" two speed or three speed, with or without SAU1 arm and shell. Size: 16 × 14 × 4½ in., plus overall height of pickup fitted. Finish: wood grain effect base with dark grey motor-board. Price (two speed unit, SAU1 arm, SCU1 cartridge on plinth): £30 10s. (U.K. purchase tax: £5 1s. 5d.); (previous assembly, but arm with lifting device): £31 10s. (U.K. purchase tax: £5 4s. 9d.); (three speed unit, SAU1 arm and SCU1 cartridge on plinth): £36 15s. (U.K. purchase tax: £6 2s. 2d.); (previous assembly, but arm with lifting device): £37 15s. (U.K. purchase tax: £6 5s. 5d.).

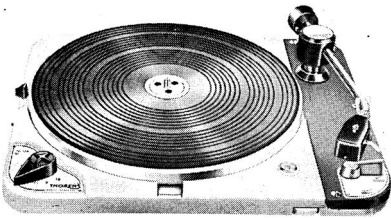


**THORENS.** Distributed in the U.K. by Metro-Sound (Sales) Ltd., Bridge Works, Wallace Road, London N.1. Tel.: Canonbury 8641. Cables: Metrosound, London.

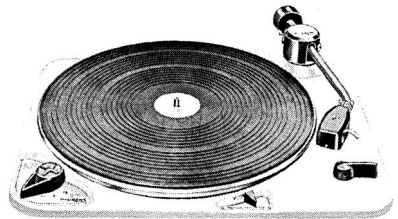
**TD124.** Speeds 78, 45, 33½, 16 rpm, variable ±3%. Total wow and flutter 0.07% RMS. Rumble, -38 dB referred to 1 cm/sec. Built-in neon stroboscope and levelling device. Inertia controlled drive system with clutch action and two-step speed reduction. Price: £32 10s. (U.K. purchase tax: £5 17s. 4d.).

**TD135.** Speeds 78, 45, 33½, 16 rpm, variable ±3%. Metal stroboscope disc. BTD-12S pickup arm incorporated. Total wow and flutter 0.12% RMS. Rumble, -36 dB referred to 1 cm/sec. Precision-built 4-pole motor. Special built-in levelling device. Arm raise/lower air brake control. Price: £30 (U.K. purchase tax: £5 8s. 4d.).

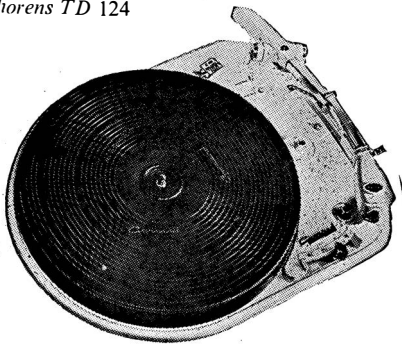
**TD224.** Speeds: 78, 45, 33½, 16 rpm, variable ±3%. Built-in neon-lit stroboscope. Incorporates Thorens BTD-12S pickup arm. Total wow and flutter 0.07% RMS. Rumble -38 dB referred to 1 cm/sec. Transcription auto-change unit. Record stacking before and after play completely separated from turntable. Each record placed on turntable and removed after playing. Records cleaned and static removed whilst playing. Price: £67 10s. (U.K. purchase tax: £12 3s. 8d.).



Thorens TD 124



Thorens TD 135



Garrard 4HF



Connoisseur Plinth

# RADIO TUNERS

by W. Ian Heath

**W**HOO buys a tuner? The answer usually is the listener who already enjoys the clarity and, at its best, the deceptive realism of a good record reproducer, and inevitably he wants to hear his chosen radio programmes with the same breadth and clarity.

By comparison with a good microgroove record played on apparatus that can do it justice, the small domestic radio receiver is reminiscent of that phrase of thirty years ago 'listening in'. It is like listening at the keyhole, but not actually being present.

Is there anything to be gained by connecting such a receiver to the larger amplifier and loud-speaker cabinet used for playing records? Most amplifiers have a 'radio' input socket, but if the extension speaker outlet of the receiver is connected to this the results are very likely to be disappointing. To keep the price competitive the electrical performance of a receiver is usually restricted with the knowledge that it is always going to operate with its own small loudspeaker and cabinet. Indeed in a well designed receiver the loudspeaker unit itself is chosen to give the best overall effect, within the imposed restrictions, and the results may actually be less satisfactory when the receiver is connected to the larger reproducing system.

## Audio Bandwidths

A tuner, on the other hand, is designed especially to operate into a wide-range amplifier and loudspeaker. It contains only the circuits needed to select and detect the broadcast station whose programme is required. It contains no amplifier, and in its simplest form has only one control knob for 'tuning-in' or selecting the required station. At this point in the discussion it would be appropriate to examine just what can be expected from such a

tuner, what we are trying to receive with it, and why the Frequency Modulation (FM) broadcasts on the Very High Frequency (VHF) band are capable of giving greater breadth and clarity than the corresponding broadcasts on the Medium and Long wave-bands.

Sound is perceived by our ears only when vibrations of the air particles around us produce changes of atmospheric pressure at our ear drums.

The manner in which this 'sound-pressure' varies with time, is called the *wave-form*, and depends on the nature and behaviour of the source. Every musical instrument produces a different, and highly characteristic waveform.

It can be shown, as we say when we do not want to become deeply involved in mathematics, that any waveform can be exactly represented by a series of 'pure' tones of different frequencies added together, a sort of frequency 'spectrum'.

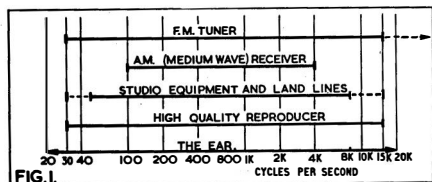
A young ear can respond to a range of frequencies from about 20 cycles per second to nearly 20,000 cycles per second, and in some people even higher. Apart from damage due to occupation, illness, accident or war, the high frequency limit falls as age advances, and in middle-age 15 Kc/s is average, whilst old age sometimes brings an upper limit nearer 1 Kc/s than 10 Kc/s. At the low frequencies the transition from *hearing* to *feeling* lies in the region of 30 c/s.

## Bandwidth Requirements

What do these very high and very low frequencies contribute to our listening? At the low-frequency end of the scale the tympani (kettle-drums) in a symphony orchestra are tuned, and their pitches lie in the region of 80 to 100 c/s, but the double-bass, which so often accompanies other instruments, not infre-

quently plays tunes in the octave below this, that is down to about 40 c/s. The big bass drum gives a spectrum of frequencies which also ranges from about 40 c/s, upwards, and in real life it sounds much lower than the tymps. These lower regions add 'life', and a great deal of musical satisfaction, whether we are listening to Bach, Berlioz or just beat. At the high frequencies the octave from 4 Kc/s to 8 Kc/s is

phone, through amplifiers and faders to the land-line connecting the studio to the transmitter itself. Where older studio equipment is in use, or a long land-line has to be hired from the concert-hall to the listener's local transmitter, then the bandwidth may be restricted to the range 50 c/s to 8 Kc/s. *Fig. 1* compares the frequency range of the ear, with that of a good reproducer, the broadcast programme, and also with that of a typical domestic table receiver on the Medium waveband. At the low frequencies the bass is restricted by the small size of the cabinet, and the loudspeaker mounted in it. At the high frequencies the restriction is more fundamental to the process of receiving the broadcast programme, and this is discussed in the next section. The overall effect is that such a receiver loses an octave or more at both ends of the frequency spectrum usually broadcast.



above the range of all musical *fundamentals*, but it contains the predominating overtones and harmonics of the higher-pitched musical instruments, and also some very important components of the consonant sounds in speech, so that this octave is vital for intelligibility of both speech and the musical score. The higher octave from 8 Kc/s to 16 Kc/s is important not so much for sheer intelligibility, as for the fact that it contains those higher harmonics and other sounds which, when truthfully presented, lift the veil and add that subtle clarity which enables us to forget that we are listening to a *reproduction* of the original sound.

A really ambitious reproducing apparatus covers the frequency range 30 c/s to 15 or 20 Kc/s. Only the most carefully designed equipment will do justice to such a wide range, and for continued listening smooth reproduction without coloration or distortion is far more important than the widest bandwidth. A very good equipment is one which covers the range 40 c/s to 12 or 15 Kc/s comfortably and without a sense of strain, and this usually implies that response is not entirely absent beyond these limits, but falls smoothly away towards and beyond the nominal limits.

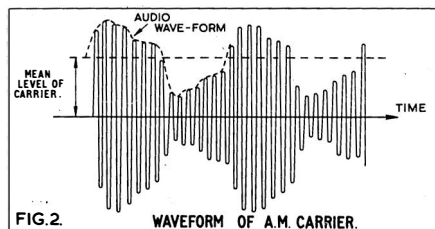
The bandwidth of the equipment used in the broadcasting studios may cover the full range from 30 c/s to 15 Kc/s, but the overall performance depends on every link from the micro-

### AM Bandwidth

It is doubtless fortunate for audio enthusiasts that audio-frequency currents do not radiate noticeably, but radio-frequency currents do radiate energy to the surrounding space, and this is what makes broadcasting possible. In order to broadcast a programme the radio-frequency current must be made to 'carry' the audio-frequency information. On the broadcast bands (Medium and Long waves) this is achieved at the transmitter by Amplitude Modulation: the amplitude of the radio-frequency carrier-current is varied, about a mean level, in a manner that exactly corresponds to the waveform of the audio-frequency programme. This is shown in *Fig. 2*.

As before, it can be shown that this waveform consists of a spectrum of frequencies. In this case the centre-frequency is that of the broadcast transmitter, the 'carrier frequency', which is  $f_0$  in *fig. 3*. On each side are other radio-frequency components which are only present if the 'carrier' is modulated by a programme. These 'side-band' components are constantly varying with the programme, in both amplitude and frequency. Their separations in cycles per second from the carrier frequency,  $f_0$ , are exactly equal to the frequency of the corresponding components in the audio-frequency spectrum of the programme waveform at any given moment. So that if the original AF components were  $f_1, f_2, f_3, f_4, f_5$ , then the side-band components are  $f_0 + f_1, f_0 + f_2, f_0 + f_3$ , etc. There is also a 'mirror' set of side-band components below  $f_0$ , having frequencies  $f_0 - f_1, f_0 - f_2$ , etc., as shown in *fig. 3(a)*.

If the audio spectrum contains components up to 15 Kc/s then the total band-width of the



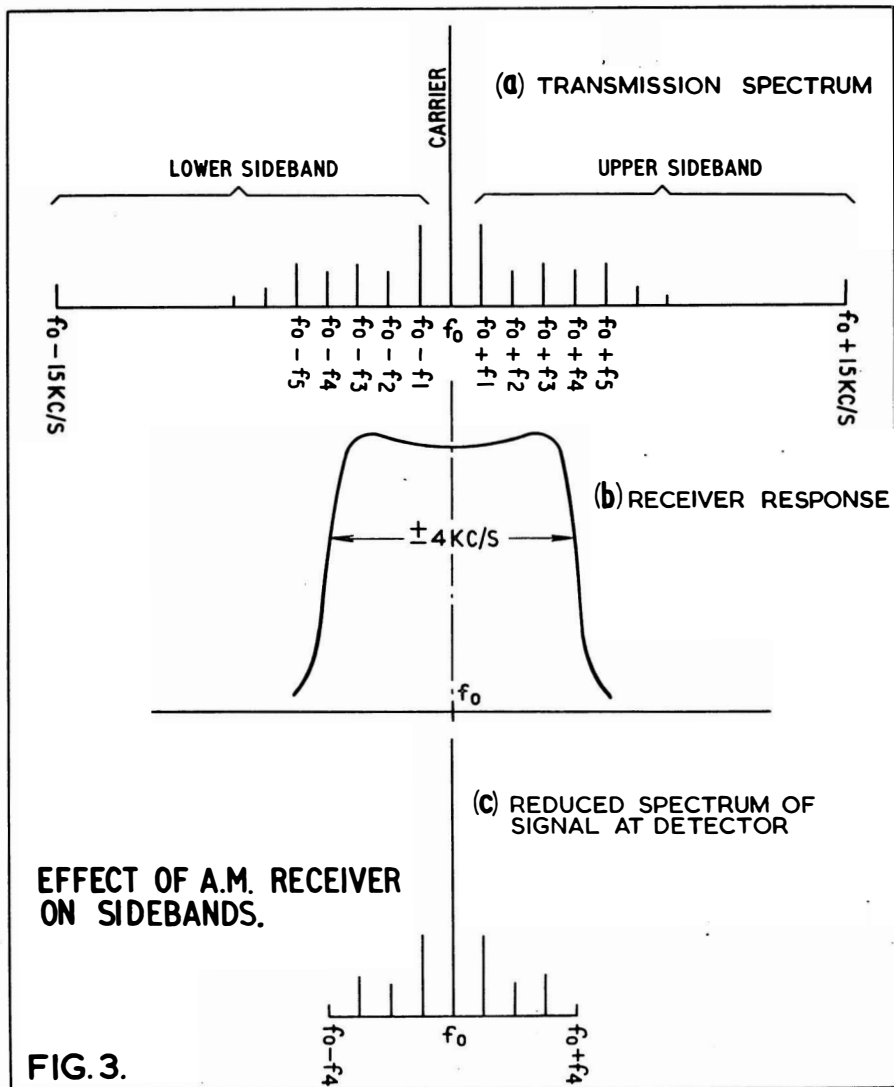
modulated RF carrier is from  $f_0 - 15 \text{ Kc/s}$  to  $f_0 + 15 \text{ Kc/s}$ , which is  $30 \text{ Kc/s}$ .

The tuning response of a typical AM receiver is something like **fig. 3(b)**. In order to separate the many stations on the medium waveband the response falls sharply on each side of the centre frequency to which the receiver is tuned. A typical band-width is plus and minus  $4 \text{ Kc/s}$ , and so no sidebands outside this range will reach the detector (which recovers the audio-waveform from the modulated 'carrier') or the audio-amplifier which follows. The resulting side-band spectrum is 'pruned' as shown in **fig. 3(c)**, and after detection the audio-fre-

quency signal contains only the components up to  $4 \text{ Kc/s}$ , which is what we showed in **fig. 1**.

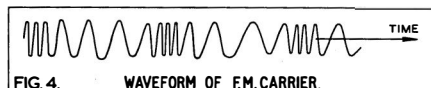
Before Frequency Modulation broadcasts were available some of us constructed wide-band AM receivers in the hope that nearness to a BBC transmitter would enable us to ignore the interfering foreign stations, but after sunset the range of distant transmitters always 'improved' sufficiently to cause whistles and background chatter, and the receiver had to be switched back to the usual narrow bandwidth just as the promenade concert was getting into full swing.

The important thing about a Frequency



Modulation transmission is that whether there is modulation going on, or not, the RF carrier remains at a *constant amplitude*. In AM the louder the programme becomes, the more does the amplitude of the carrier vary (there is a limit to this). In FM the louder the programme becomes the more is the *frequency* of the carrier changed from the central (unmodulated) frequency. A Frequency Modulated carrier therefore 'looks like' **fig. 4**. The frequency deviation from the mean or central frequency is chosen at will by the designers of the system, and a suitable choice improves the signal-to-noise advantage which FM has over AM anyway. The BBC transmissions use a maximum deviation of plus and minus 75 Kc/s. At first sight this suggests that the overall of bandwidth of a fully modulated programme adds up to 150 Kc/s, but by a piece of rather high-brow mathematics it can be shown that the Frequency Modulated carrier has an extremely complicated spectrum of side-band components, the useful components of which spread over a total RF bandwidth of 240 Kc/s. This seems a lot compared with AM, and it is, but the important thing is that it is effectively constant for *all* audio frequencies present in the programme.

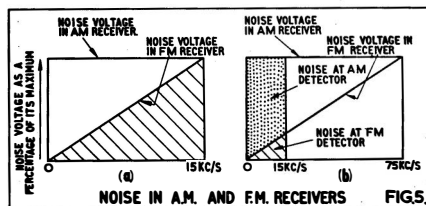
Provided we can accommodate this bandwidth there is no restriction inherent in the FM system to limit the audio frequency bandwidth. **Fig. 1** therefore shows an FM tuner as covering the full audio bandwidth, and more.



The bandwidth required for an FM transmission, 240 Kc/s, would be completely impractical on the Medium wave-band, even if there were no other stations to interfere. At a carrier frequency of 1 Mc/s (corresponding to 300 metres) this bandwidth would be about 24% of the carrier frequency, compared with 3% or less for the usual AM broadcast (for which a practicable receiver has a bandwidth of less than 1%, as we have seen).

### Why VHF?

Now that electronic techniques have enabled us to use the Very High Frequency band, with carrier frequencies around 90 Mc/s, the bandwidth for FM becomes a mere 0.26% of the carrier frequency. This is well within the practical figure for a receiver, and FM thus becomes possible because of this very high carrier frequency. Of course the percentage bandwidth required for AM becomes extremely small on VHF, so there would be no difficulty in receiving all the sideband com-



ponents, and so covering the whole audio spectrum. The advantage of increased audio-bandwidth would seem to lie with VHF transmission, rather than with FM in particular. This is true, and over 10 years ago the BBC was broadcasting experimentally on VHF using both AM and FM to discover whether the other theoretical advantages of FM were worth having. The verdict in the end was given in favour of FM.

### Signal-to-Noise

Noise consists of those unwanted background sounds which become more noticeable when the received programme is very low in level, usually at a tense and inappropriate moment. It includes unwanted clicks and buzzes, together with noises from 'neighbouring' transmitting stations picked up by the receiver's aerial. It also includes the 'hiss' of circuits in the receiver itself, but whatever the source, the receiver does not respond to any noise signal outside its own bandwidth.

If the audio noise signal (at the detector) is compared for AM and FM systems of the *same* bandwidth, say plus and minus 15 Kc/s, it can be shown by suitable analysis that the comparison is as in **fig. 5(a)**. The noise in an AM receiver is independent of frequency, and the rectangle therefore represents the total noise possible. The noise in the FM receiver is proportional to frequency, approaching zero at low audio frequencies, and the total noise represented by the shaded area is seen to be less. If the *deviation* of the FM system is increased to 75 Kc/s then the picture is as in **fig. 5(b)**: the noise in the FM receiver equals that of the AM receiver only at maximum deviation, now 75 Kc/s. If the audible bandwidth is restricted to 15 Kc/s then the total noise, represented by the small shaded triangle, is at least 20 dB down on that in the AM receiver. This applies to all forms of noise, however received.

Another interesting point of comparison is that the noise in the FM receiver is predominantly of high frequencies. Interference from the ignition of a passing car will sound like a series of 'plops' in the AM receiver, but it will be a series of 'clicks' in the FM receiver. The sharpness of these is reduced by de-emphasis



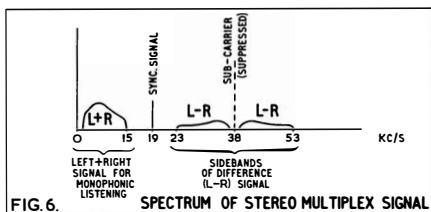


FIG. 6. SPECTRUM OF STEREO MULTIPLEX SIGNAL

after detection, which rolls off the treble response. A corresponding pre-emphasis of the treble is always applied at the FM transmitter so that the programme itself is received with normal tonal balance.

The range of loudness from very soft to very loud is a means by which all composers since Haydn's 'Surprise' symphony have excited us, thrilled us, or held us in suspense. No reproducing system has yet been devised with quite the range, in terms of loudness, of the human ear. At the 'loud' end of the range the limitations of reproduction are set by the uneven acoustics of the listening room, or merely by the lack of output power (neighbours apart!). At the 'soft' end of the range the ambient noise at home is seldom as low as in a concert hall, and the signal-to-noise ratio of the receiver may be the most important limitation, especially if it is sited in a 'fringe' area where the signal is not very strong.

To ensure that its programmes are received at listening strength by the majority of its listeners, the BBC manually compresses the loudness range of its programmes, and then sets the loudest passages to give just comfortably less than full modulation. With AM full modulation is limited abruptly by the amplitude of the carrier, which cannot at any instant be reduced to less than zero. Also the AM receiver has quite fundamental difficulty in detecting (or de-modulating) a fully modulated carrier, the overall result is that loud passages become confused, while soft passages may be lost in background noise.

In an FM system, however, the limit on full

modulation is not as abruptly defined, for the maximum deviation ( $\pm 75$  Kc/s) is an arbitrary choice, and the receiver bandwidth need not impose so sudden a restriction as the AM detector. Loud passages in orchestral or choral scores are clearer and less strangled when heard through a FM system. The softer passages benefit from the lower background noise of the FM receiver, in the same way that the quieter surfaces of microgroove records has enabled us to hear more intimate detail in the music than was ever possible in shellac discs. One also has the impression that the BBC tends to make use of the wider dynamic range possible in its FM broadcasts and the results can be very satisfying.

### Aerials

The fundamental reason why an FM tuner provides a better signal-to-noise ratio than an AM tuner, as indicated in fig. 5, is that the FM tuner is designed to be insensitive to variations of amplitude. This is possible because there is no wanted information contained in any amplitude variations of the carrier, and the modulation of the frequency is unaffected by purposely limiting the carrier amplitude in the receiver. This 'chops off' noise and interference which invariably arrive as variations of amplitude.

This 'limiting' process is only possible if there is sufficient signal to limit, and therefore it is desirable that, if there is any doubt about signal strength in a particular locality, one should buy the most sensitive tuner that one can afford. In addition, although a sensitive tuner may work quite well with a picture-rail aerial, it will work much more cleanly with a good signal from an aerial mounted in the attic or on the roof. Under difficult conditions the signal-to-noise can be improved by using a directional aerial orientated to discriminate against the direction from which interference is received.

Stereophonic reproduction is now defined as that from two loudspeakers, facing the listener

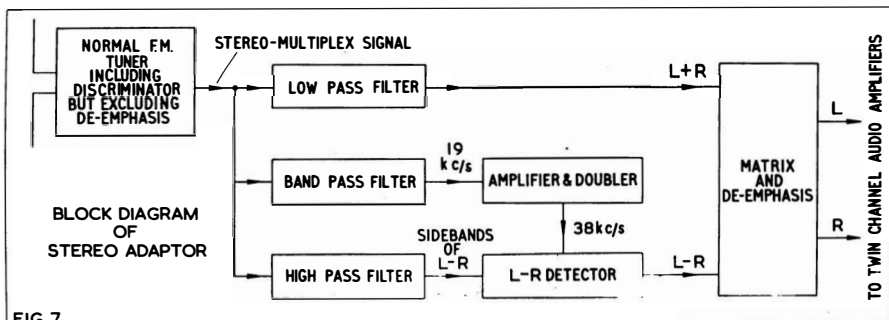


FIG. 7.

on his Left and Right, which are fed via broadcast (or recording) from the left-looking and right-looking microphones respectively of a stereo-pair in the studio, theatre, or concert hall.

### Stereo

It seems highly probable that the BBC will adopt the GE-Zenith system of stereo-multiplex broadcasting because it complies very reasonably with the basic requirements. These are (1) that listeners using a normal monophonic FM receiver should be able to receive the programme satisfactorily, and that the signal-to-noise ratio for them should not be appreciably worse than a normal monophonic programme. (2) that stereophonic listeners should be provided with a pair of full stereophonic signals for the Left- and Right-hand channels.

The system depends on the fact that the modulation bandwidth of an FM system is not fundamentally limited to audio frequencies. The frequency spectrum of the stereo-multiplex modulation signal is shown in **fig. 6**. Instead of broadcasting the Left- and Right-hand signals separately, neither one of which could satisfy a monophonic listener, the sum and difference signals are broadcast. The first 15 Kc/s of the modulation spectrum are occupied by the sum,  $L + R$ , signal which can be received by any normal monophonic FM receiver or tuner. This signal is allocated 90% of the maximum deviation, and so is very little down in signal-to-noise ratio compared with normal monophonic programmes. The different signal,  $L - R$ , is amplitude-modulated on to a 38 Kc/s sub-carrier (which is suppressed to reduce the deviation required by this signal). A 19 Kc/s pilot tone is included as a synchronising signal, so that the 38 Kc/s sub-carrier can be re-inserted at the receiver. The 19 Kc/s is easier to separate in the receiver from the sum and difference signals, than a 38 Kc/s pilot tone would be.

The whole multiplex signal occupies an 'audio' bandwidth from 30 c/s to 53 Kc/s and is Frequency Modulated on to the VHF carrier.

On reception, the process of sorting out the Left and Right signals is illustrated in **fig. 7**. An essential requirement is that the FM tuner must have an outlet *without de-emphasis* that gives a flat response, without phase-shift, from 30 c/s to 53 Kc/s. The  $L + R$  signal can be passed direct to the sum-and-difference matrix network, but the  $L - R$  side-bands must first

have their carrier re-inserted in correct phase, and then the  $L - R$  signal can be detected and passed to the matrix with the  $L + R$  signal.

Stereo adaptors or de-coders in their simplest form can contain but two transistors, but in more refined form they may contain perhaps half-a-dozen valves or transistors. The cost is likely to be a few pounds upwards.

If the purchaser of a tuner is contemplating stereo now, or in the future, then he should make sure that he has ample signal: up to ten times the normal mono requirements is a good idea. This he can do by installing a better aerial, and using a more sensitive tuner than would be necessary for purely monophonic reception. The reason is that the signal-to-noise ratio of stereo reception is poorer for weak-signal conditions than it is for mono reception. In addition the tuner must have on the necessary wide 'audio' bandwidth, without phase shift, up to 53 Kc/s; otherwise distortion and cross-talk between Left and Right can result.

An increasing number of manufacturers are making provision for the addition of stereo adaptors to their tuners. Some even leave space to add an adaptor within the tuner itself.

### Transistor Tuners

The industry is just reaching the stage at which transistors can operate at VHF, and are sufficiently competitive in price, so that manufacturers can usefully market completely transistorised tuners. For FM the transistor does not have the disadvantages that make design difficult for AM: limiting the signal peaks does not cause distortion, limiting is necessary to suppress noise; automatic gain control is in general unnecessary, so the absence of a 'variable  $\mu$ ' transistor is not important. VHF demands compact, short wiring. Transistor circuits lend themselves to this, and there are no heaters to cause feedback. Above all the power dissipation is much lower, about 3W for a tuner, compared with 20-40W for a valve tuner. This is important because one of the main difficulties with VHF tuner design is tuning drift, due to the drift of the oscillator frequency with temperature. Automatic Frequency Control corrects this, but to remove one of the causes is even better.

There are some very good valve tuners about, and no one need be afraid to buy them, but some of the makers with reputations to lose are now offering transistor tuners with very attractive specifications indeed.

# DIRECTORY OF RADIO TUNERS

★ In the abridged specifications of these directory entries the following abbreviations have been used: **P.s.n.**—Power supply needed; **A.F.C.** Automatic frequency control; **A.G.C.**—Automatic gain control; **Mc/s**—Megacycles; **ind.** Indicator; **disc**—Discriminator; **imp.**—Impedance; **det.**—Detector.

**ACOUSTICAL MANUFACTURING CO. LTD.,** St. Peter's Road, Huntingdon, Hunts. Tel.: Huntingdon 361 and 574. Cables: Acoustical.

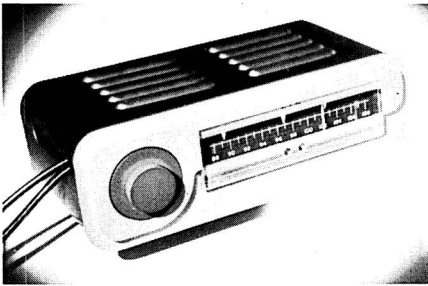
**F.M. tuner.** Variable tuning. Range 87.5-108 Mc/s. Special double neon display ind. P.s.n. 330V at 27 mA; 6.3V at 1.85 amps. Size:  $10\frac{1}{2} \times 3\frac{1}{2} \times 6$  in. Price: £21 (U.K. purchase tax: £3 18s. 9d.).

**A.M. II tuner.** Variable tuning. Range 5.8-18.5 Mc/s. 185-588 and 800-2070 metres. Magic Eye ind. P.s.n. 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 (U.K. purchase tax: £4 10s.).

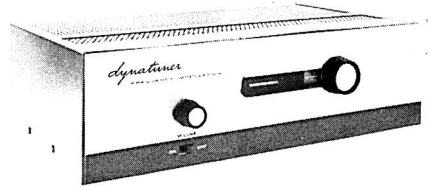
**ARMSTRONG AUDIO LTD.,** Warlters Road, Holloway, London, N.7. Tel.: North 3213/4.

**A.M./F.M. tuner 223.** Variable tuning. Range M.W. 180-600 metres; F.M. 87-108 Mc/s. Foster Seeley disc. Tuning meter. Full facilities for multiplex. Aerial imp. 70-80 ohms and 300 ohms. Output 0.2V variable from dual stereo outputs. P.s.n. 200-250V AC. Size:  $12\frac{3}{8} \times 4\frac{3}{4} \times 9$  in. Price: £24 11s. 3d. (U.K. purchase tax: £4 3s. 9d.).

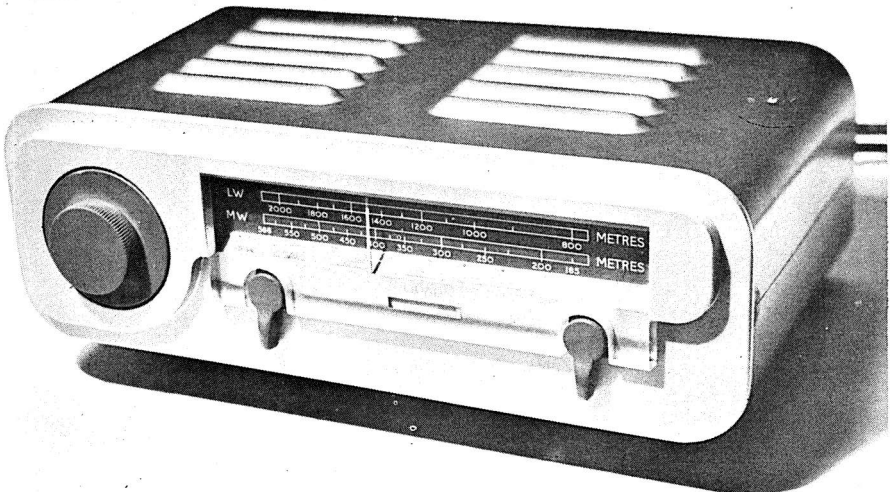
**F.M. tuner 224.** Variable tuning. Range 87-108 Mc/s. Foster Seeley disc. Tuning meter. Full facilities for multiplex. Aerial imp. 70-80 ohms and 300 ohms. Output 0.2V



*Acoustical FM tuner*



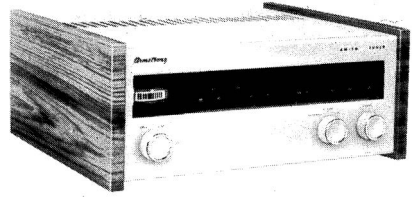
*Aveley Dynatuner FM-1*



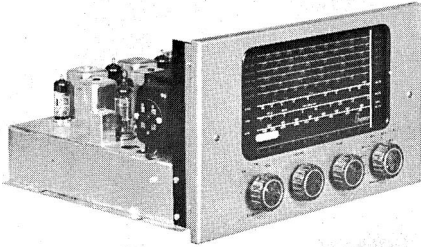
*Acoustical AM tuner covering short, medium and long wave bands*



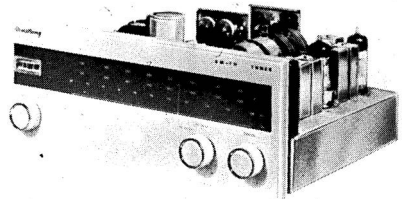
*Armstrong 224 FM Tuner*



*Armstrong FM Tuner 223*



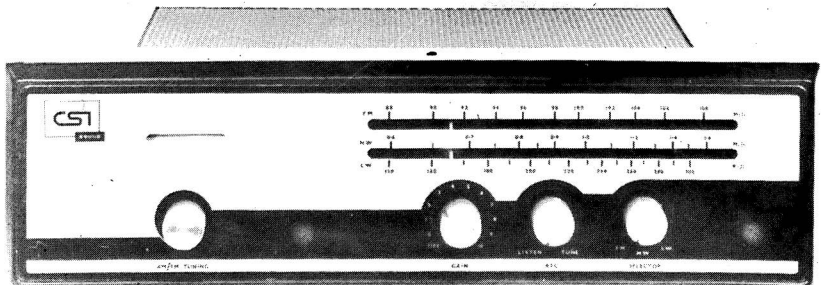
*Derritron S6BS/FM AM/FM tuner*



*Armstrong AM/FM Tuner 223*



*Chapman FM 1000 Transistorized FM Tuner*



*Clarke and Smith CSI 658 Mk 2 AM/FM Tuner*

variable from dual stereo outputs. Ps.n. 200-250V AC. Size:  $10\frac{3}{8} \times 4\frac{3}{4} \times 9$  in. Price: £19 4s. 6d. (U.K. purchase tax: £3 5s. 6d.).



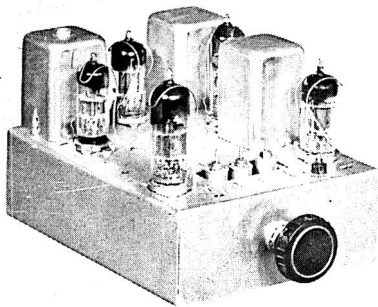
**AVELEY ELECTRIC LTD.**, South Ockendon, Essex. Tel.: South Ockendon 3444. Cables: Telex: 24120, Avel, Ockendon.

**F.M. dynatuner FM-1.** Free tuned. Range 88-108 Mc/s. Drift-free design F.C. Balance bridge disc. Magic eye ind. Self-powered. Size:  $13 \times 3\frac{3}{4} \times 7\frac{7}{8}$  in. Price: £44 12s. (U.K. purchase tax: £8 7s. 3d.). Also available in kit form: £38 12s. (U.K. purchase tax: £7 4s. 9d.).



**BANG & OLUFSEN**, Struer, Denmark. Sole U.K. Importers: Avey Electric Ltd., South Ockendon, Essex. Tel.: South Ockendon 3444.

**"Minette" FM21 tuner.** Free-tuned. Range 87.5-108 Mc/s. A.F.C. may be switched in or out. Ratio det. Tuning ind. EM87, magic eye. Prepared for multiplex stereo. Aerial imp. 75 ohms. Output 10-100 mV RMS. Ps.n. 220-240V AC 50 c/s. Size:  $18\frac{1}{2} \times 8 \times 4\frac{1}{4}$  in. Price: £27 0s. 2d. (U.K. purchase tax: £4 9s. 10d.).



*Derritron FM90*

**CHAPMAN (ULTRASONICS) LTD.** See Derritron (Ultrasonics) Ltd.



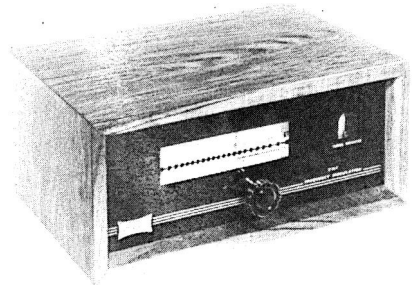
**CLARKE & SMITH MANUFACTURING CO. LTD.**, High Fidelity Components Division, Melbourne Works, Wallington, Surrey. Tel.: Wallington 9252. Cables: Electronic, Wallington.

**CSI 658 Mk. II. A.M./F.M.** Continuously variable tuning. Range M.W. 600 Kc/s-1.6 Mc/s; L.W. 150-320 Kc/s; E.M. 88-108 Mc/s. Ratio det. E.M.87 M.E. ind. Multiplex conversion facilities. Aerial imp. 75 ohms. Output 0-5V. Self-powered. Size:  $4 \times 14 \times 8$  in. Price: £34 1s. 8d. (U.K. purchase tax: £5 16s. 4d.).

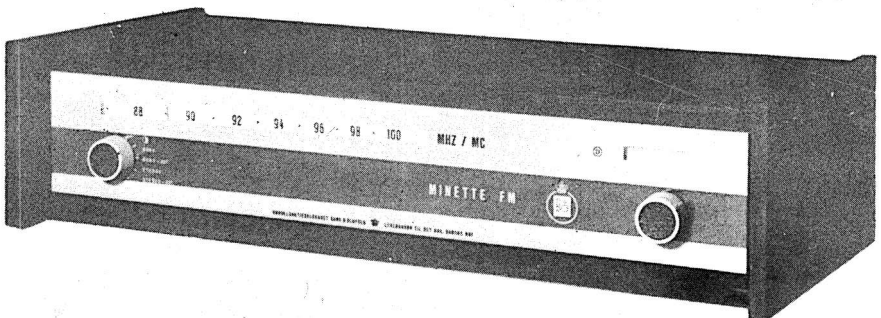


**DECCA RADIO & TELEVISION**, Ingate Place, Queenstown Road, S.W.8. Tel.: Macaulay 6677.

**Decola "Separates" F.M. tuner.** Variable tuning. Range 86-108 Mc/s. Tuning ind., M.E. Ps.n. 200V DC 20 mA; 6-3V AC 1-6 amps. Size:  $11 \times 5\frac{3}{4} \times 5\frac{1}{4}$  in. Price: £17 3s. 10d. (U.K. purchase tax: £2 15s. 2d.).



*Decola "Separates" FM tuner*



*Bang and Olufsen Minette FM 21 Tuner*

**DERRITRON (ULTRASONICS) LTD.,** 24 Upper Brook Street, London, W.1. Tel.: Hyde Park 2291.

**Chapman F.M. tuner FM90.** Switched, 4 positions. Range 87.5-100 Mc/s. A.F.C. Ratio disc. P.s.n. 250V at 40 mA; 6.3V at 2 amps. Size:  $5 \times 4\frac{1}{2} \times 6\frac{1}{2}$  in. Price: £15 3s. 6d. (U.K. purchase tax: £2 13s. 3d.).

**Chapman A.M./F.M. S6BS/FM.** Free-tuned. Range F.M. 87.7-108 Mc/s; A.M. 6 bandspreads: 11, 13, 16, 19, 25 and 31 metres; also 15-43, 43-140, 175-570 metres. 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: £54 6s. 9d. (U.K. purchase tax: £9 8s. 3d.).

**Chapman A.M. tuner S6BS.** Free-tuned. Range 6 bandspread ranges: 11, 13, 16, 19, 25 and 31 metres, also 13-43, 43-140, 175-570 metres. Magic eye ind. P.s.n. 6.3V at 1.5 amps. Self-powered. Size:  $13\frac{3}{4} \times 11 \times 8\frac{1}{4}$  in. Price: £38 14s. 6d. (U.K. purchase tax: £6 14s. 3d.).

**Chapman FM1000.** Transistorised F.M. tuner. Variable tuning. Range 87.5-108 Mc/s. A.F.C. Multiplex conversion facilities. Aerial imp. 75 ohm co-ax. Output 250 mV. Self-powered. Size:  $14\frac{1}{2} \times 3\frac{1}{2} \times 7\frac{1}{4}$  in. Price: £21 6s. (U.K. purchase tax: £3 14s. 9d.).

**Chapman FM1005.** Transistorised A.M./F.M. tuner. Variable tuning. Range F.M. 87.5-108 Mc/s; A.M. 16-50 m., 50-195 m., 195-550 m., 800-2000 m. A.F.C. Multiplex conversion facilities. Aerial imp. F.M. 75 ohms; A.M. high imp. Output 250 mV, 100 K. Self-powered 100-125V, 10W consumption. Size:  $14\frac{1}{2} \times 5\frac{1}{2} \times 7\frac{1}{4}$  in. Price: £31 3s. (U.K. purchase tax: £5 9s. 0d.).

★

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

**FMT 640 F.M. tuner.** Variable tuning. Range 88-108 Mc/s. A.F.C. Armstrong circuit with dual limiters and wide-band discs. F.M. calibrated signal metre. Input for multiplex adaptor. Aerial imp. 300 ohms. Self-powered. Size:  $11 \times 6\frac{1}{2} \times 3\frac{3}{4}$  in. Price: £22 (U.K. purchase tax: £3 14s. 1d.).

**GOODSELL LTD.,** Gardner Street, Brighton, Sussex. Tel.: Brighton 65752.

**F.M. tuner FMT701.** Manual tuning (permeability). Range 85-100 Mc/s. Ratio det. Magic eye ind. P.s.n. 250V at 20 mA. Price: £10 10s. (U.K. purchase tax: £1 14s. 2d.).

★

**GRAMPIAN REPRODUCERS LTD.,** 19 Hanworth Trading Estate, Feltham, Middx. Tel.: Feltham 2657. Cables: Reamp, Feltham.

**F.M. tuner 571.** Free-tuned. Range 85-98 Mc/s. Ratio det. Magic eye ind. P.s.n. 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: £18 10s. (U.K. purchase tax: £3 3s. 4d.).

★

**HENRY'S RADIO LTD.** See Constructional Kits Section.

★

**JASON ELECTRONIC DESIGN LTD.,** 23 Wardour Street, London, W.1. Tel.: Gerrard 3977/8.

**F.M. tuner FMT/4.** Variable tuning. Range 88-108 Mc/s. Transistor amplified. A.F.C. Ratio det. Multiplex adaptor output. Self-powered. Size:  $11\frac{1}{4} \times 6\frac{3}{8} \times 4\frac{3}{8}$  in. Better than 5  $\mu$ V for 40 dB quieting. Price: £17 5s. (U.K. purchase tax: £2 15s. 4d.).

**JTV/2 F.M. and A.M./TV sound tuner.** Switched turret tuning. Automatic frequency control. Range 88-96 Mc/s, plus all television channels. Disc. Self-powered. Size:  $11\frac{1}{4} \times 6\frac{3}{8} \times 4\frac{3}{8}$  in. 10  $\mu$ V for 40 dB quieting. Price: £19 4s. (U.K. purchase tax: £3 1s. 7d.).

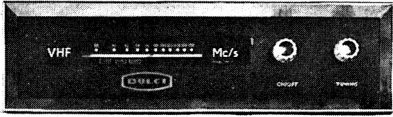
**Monitor F.M. and A.M./TV sound tuner.** Switched tuning. A.F.C. Range 40-212 Mc/s. Foster-Seeley disc. P.s.n. 230V at 35 mA; 6.3V at 1.5 amps. Size:  $5 \times 5\frac{1}{2} \times 7$  in. Price: £14 5s. (U.K. purchase tax: £2 5s. 8d.).

★

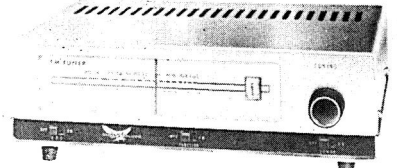
**H. J. LEAK & CO. LTD.,** 57/59 Brunel Road, East Acton, London, W.3. Tel.: Shepherds Bush 1173. Cables: Sinusoidal, Ealux, London.

**Trough line 3 F. M. tuner.** Variable tuning. Range 88/108 Mc/s. A.F.C. giving tuning stability from the instant of switching on. Foster-Seeley disc. Magic eye ind. Self-powered. Size:  $11\frac{1}{2} \times 4\frac{1}{2} \times 7\frac{3}{4}$  in. Price: £25 (U.K. purchase tax: £4 7s. 6d.).

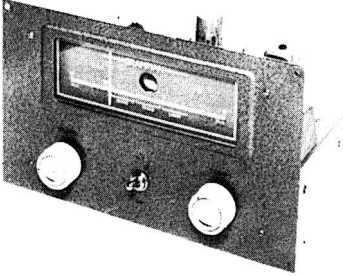
TUNERS



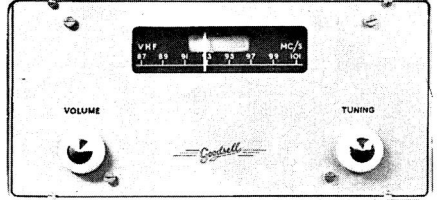
Dulci FMT-5 FM tuner



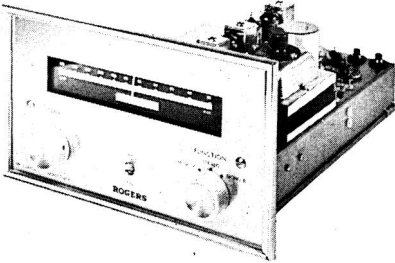
Eagle FMT 640 FM Tuner



Grampian 571 FM tuner



Goodsell FMT 701



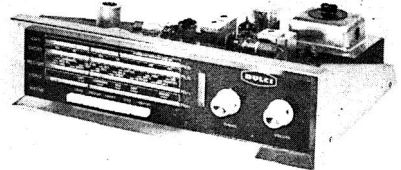
Rogers Variable FM tuner chassis



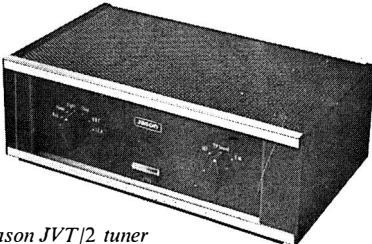
Rogers RD Junior Variable FM tuner



Jason FMT|4 tuner



Dulci H4T-55 AM|FM tuner



Jason JVT|2 tuner



Chapman FM 1005

**LEE PRODUCTS (GREAT BRITAIN) LTD.,**  
10-18 Clifton Street, London, E.C.2. Tel.:  
Bishopsgate 6711. Cables: Leprod, London.

**Dulci H4T-55 A.M./F.M. tuner.** Variable tuning. Range L.W., 1,100-1,800 m.; M.W., 195-550 m.; S.W., 6-18 Mc/s; F.M., 88-108 Mc/s. A.F.C. locks over 100 Kc/s. Ratio det. Tuning ind. EM84. Facilities for external multiplex connection. Aerial imp. 75 ohms. Output 8V adjustable. P.s.n. 200-250V AC. Size:  $12\frac{1}{8} \times 3\frac{1}{8} \times 10\frac{1}{4}$  in. Price: £24 7s. 6d. (U.K. purchase tax: £3 18s. 2d.).

**Dulci FMT-5 F.M. tuner.** Variable tuning. Range 88-108 Mc/s. A.F.C. locks over 100 Kc/s. Foster Seeley disc. Facilities for external multiplex connection. Aerial imp. 75 ohms. Output 10V adjustable. P.s.n. 200-250V AC. Size:  $12\frac{3}{8} \times 3\frac{3}{8} \times 9\frac{3}{4}$  in. Price: £18 13s. 6d. (U.K. purchase tax: £2 19s. 11d.).



**LOWTHER MANUFACTURING CO.,**  
Lowther House, St. Mark's Road, Bromley,  
Kent. Tel.: Ravensbourne 5225. Cables:  
Lowther, Bromley.

**F.M. tuner Mk. V self-powered.** Twin gang tuning, horizontal scale. Range 87.5-108 Mc/s. A.F.C. 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. (U.K. purchase tax: £4 2s. 6d.).

**F.M. tuner Mk. V.** Variable tuning. Range 87.5-108 Mc/s. A.F.C. Foster-Seeley disc. Switched A.F.C. and hum check ind. P.s.n. 250V 30 mA; 6.3V 2 amps. Size:  $10\frac{1}{4} \times 4\frac{3}{4} \times 7$  in. Price: £22 (U.K. purchase tax: £3 14s. 1d.).



**PAMPHONIC REPRODUCERS LTD.,** Westmoreland Road, London, N.W.9. Tel.: Colindale 7131.

**640 F.M. tuner.** Variable tuning. Range 86-103 Mc/s. Ratio det. Magic eye ind. P.s.n. 200V at 30 mA; 6.3V at 2 amps. Size (panel):  $9\frac{3}{16} \times 3\frac{3}{4}$  in. Price: £15 15s. (U.K. purchase tax: £2 12s. 6d.).



**PIONEER ELECTRONICS CORPORATION.** Distributors: C. Hammond & Co. Ltd., 296 Kensington High Street, London, W.14. Tel.: Western 4343.

**MXA-1A multiplex adaptor.** Self-powered for use with most F.M. tuners. Price: £16 16s.

**PYE LTD., HIGH FIDELITY DIVISION,**  
P.O. Box 49, Cambridge. Tel.: Cambridge 58985. Cables: Pyrad, Cambridge.

**F.M. tuner Mozart HFT.109.** Variable tuning. Range 88-108 Mc/s. A.F.C. Self-powered. Size:  $10\frac{1}{2} \times 3\frac{3}{8} \times 5$  in. Price (chassis): £23 12s. 6d. (U.K. purchase tax: £3 5s. 3d.); (metal case): £25 14s. 6d. (U.K. purchase tax: £3 11s. 2d.).



**RADFORD ELECTRONICS LTD.,** Ashton Vale Estate, Bristol 3. Tel.: Bristol 662301/2.

**FMT1 F.M. tuner.** Variable tuning. Range 88-108 Mc/s. M.E. ind. Multiplex facilities with additional insert. Aerial imp. 75 ohms unbalanced, 300 ohms balanced. Output up to 4V adjustable. Self-powered, 100-250V AC. Size:  $10\frac{1}{2} \times 3\frac{3}{4} \times 13$  in. Weight:  $13\frac{1}{4}$  lb. Price: £30 (U.K. purchase tax: £5 12s. 6d.).



**ROGERS DEVELOPMENT (ELECTRONICS), LTD.,** Rodevco Works, 4-14 Barmeston Road, Catford, S.E.6. Tel.: Hither Green 7424 and 4340. Cables: Rodevco, London.

**R.D. junior Mk. II variable F.M. tuner.** Variable tuning. Printed circuit coil pack. Range 87-107.5 Mc/s. A.G.C. Foster-Seeley disc. Twin limiters. Tuning ind. Twin cathode follower output. Self-powered. Provision for multiplex adaptor. Size:  $8\frac{5}{8} \times 5\frac{3}{8} \times 10\frac{3}{8}$  in. To operate with any Rogers control unit. Available in teak case to match HG88 Mk. II. Price (chassis model): £21 (U.K. purchase tax: £3 11s. 8d.); (teak case model): £24 7s. 6d. (U.K. purchase tax: £4 3s. 2d.).

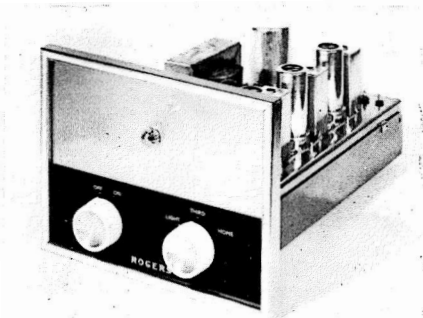
**Mk. II switched F.M. tuner.** Range 87-96 Mc/s. A.F.C. Foster-Seeley disc. Multiplex conversion facilities. Aerial imp. 70-90 ohms. Output 0-25V RMS. Self-powered. Size:  $6\frac{1}{2} \times 10 \times 4\frac{1}{8}$  in. Cathode follower output. Price: £15 16s. (U.K. purchase tax: £2 14s.).



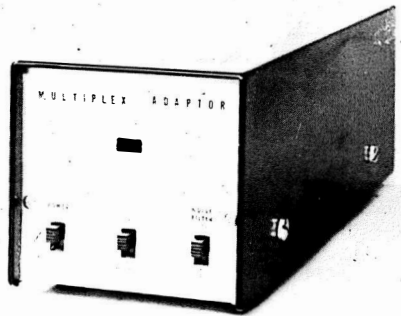
**SHERWOOD ELECTRONIC LABORATORIES, INC.,** U.S.A. Distributors: Audioson Ltd., Orchard House, Orchard Street, London, W.1. Tel.: Mayfair 5431.

**S-3000 III F.M. tuner.** Variable tuning. Range 87.5-108.5 Mc/s. Foster-Seeley disc. A.G.C. provides inter-channel "hush". Zero-

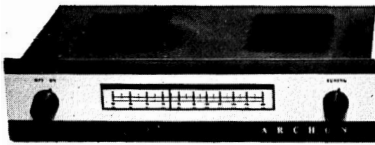




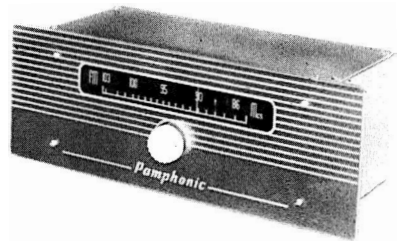
Rogers Mk. II switched FM tuner



Pioneer MXA-1A Multiplex adaptor



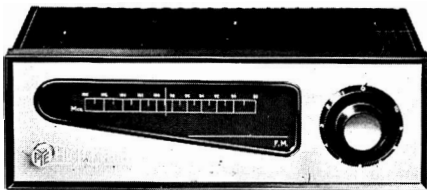
Archon PF41 FM tuner



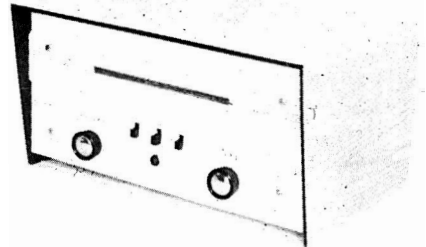
Pamphonic FM 640 tuner



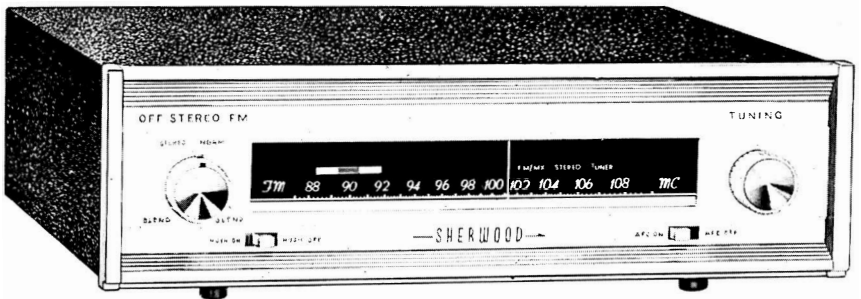
Leak Troughline 3 FM tuner



Pye Mozart HFT109 FM



Lowther FM tuner Mk. V



Sherwood S-3000 III FM tuner with provision for Multiplex reception

centred tuning meter. Power supply and chassis space for A3MX multiplex adaptor. Aerial imp. 300 ohms. Output 2V at 100% F.M. Self-powered, 240V. Size: 14 × 4 × 10½ in. Price: £54 10s. (including tax).

**A3MX multiplex adaptor** for S-3000 III tune. Price: £17 10s.

**S3MX multiplex adaptor**, self-powered, for use with all modern F.M. tuners. Price: £25 18s.

★

**SHIRLEY LABORATORIES LTD.**, 3 Prospect Place, Worthing, Sussex. Tel.: Worthing 30536.

**F.M. tuner SB/V16.** Variable tuning. Standard range. Ratio det. Magic eye ind. P.s.n. 200-300V 15 mA; 6.3V 2.5 amps. Price: £20 (U.K. purchase tax: £3 15s.).

★

**SYMPHONY AMPLIFIERS LTD.**, 16 Kings College Road, London, N.W.3. Tel.: Primrose 3314.

**FM2 F.M. tuner.** Variable tuning. Range 88-100 Mc/s. A.F.C. Foster-Seeley disc. Tuning ind. EM84 strip. Aerial imp. 75 ohms. Output 1V. P.s.n. self-powered version 200-250 AC., unpowered version 250V at 35 mA; 6.3V at 1.5 amps. Dimensions: 13 × 4 × 4¾ in. Enclosed in steel cabinet. Price (unpowered): £16 16s. (including purchase tax); (self-powered): £18 18s. (including purchase tax).

**No. 2 A.M./F.M. tuner.** Variable tuning. Range 87-101 Mc/s, 16-50, 190-550, and 1,000-2,000 m. Ratio det. Magic eye tuning ind. Self-powered. Size: 13½ × 8½ × 7½ in. Price: £24 (including purchase tax).

★

**TANSLEY-HOWARD LTD.**, 144 Holland Park Avenue, London, W.11. Tel.: Bayswater 2848.

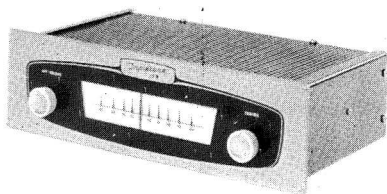
**Archon PF41F.M. tuner.** Variable tuning. Range 88-108 Mc/s. A.F.C. Self-powered. Size: 12 × 6 × 2¾ in. Panel: 12½ × 3 in. Price: £18 15s. (U.K. purchase tax: £3 7s. 9d.).

★

**TECHNICAL SUPPLIERS LTD.**, Hudson House, 63 Goldhawk Road, London, W.12. Tel.: Shepherds Bush 2581. Cables: Teknika, London, W.12.

**International Mk. IV F.M. tuner.** Variable tuning. Range 87-109 Mc/s. A.F.C. Ratio det. Aerial imp. 75/90 ohms. Output 500 mV. P.s.n. 110V to 250V AC. Size: 12 × 6¼ × 3¼ in. Price: £15 14s. 6d. (U.K. purchase tax: £2 12s. 10d.).

See also Constructional Kits section.



*Tripletone FM tuner*



*Radford FMT1 FM tuner*

**TRIO.** Distributors: Winter Trading Co. Ltd., 95/99 Ladbroke Grove, London, W.11. Tel.: Park 1341.

**AFE-220.** A.M./F.M. Flywheel tuning. Range M.W. 535-1605 Kc/s; L.W. 150-350 Kc/s; F.M. 88-108 Mc/s. A.F.C. on F.M. Foster-Seeley disc. Tuning meter. Multiplex conversion facilities. P.s.n. 110 or 220V AC. Output F.M. 2V; A.M. 1-5V. Size:  $12\frac{1}{4} \times 5 \times 9\frac{1}{4}$  in. Price: £35 8s. 7d. (U.K. purchase tax: £6 0s. 11d.).

**FM-105.** Flywheel tuning. Range 80-108 Mc/s. A.F.C. Foster-Seeley disc. Tuning meter. Socket for multiplex adaptor. Aerial imp. 300 ohms, unbalanced. Size:  $11\frac{1}{4} \times 5 \times 8$  in. Weight: 10 lb. 2 oz. Price: £27 17s. 4d. (U.K. purchase tax: £4 13s. 8d.).

**FX-121.** F.M. multiplex stereo tuner. Flywheel tuning. Range 80-108 Mc/s. A.F.C. Foster-Seeley disc. Tuning meter. Output 1-5V. Size:  $5\frac{3}{4} \times 13\frac{1}{4} \times 9\frac{1}{8}$  in. Weight: 12 lb. Price: £43 18s. 11d. (U.K. purchase tax: £7 10s. 1d.).

**AFX-210.** A.M./F.M. multiplex stereo tuner. Flywheel tuning. Range A.M. 535-1605 Kc/s; F.M. 80-108 Mc/s. A.F.C. variable. Foster-Seeley disc. Tuning meter. P.s.n. 110-117/220-230V AC. Size:  $15 \times 9\frac{1}{2} \times 5$  in. Weight:  $16\frac{1}{2}$  lb. Price: £49 6s. 8d. (U.K. purchase tax: £8 8s. 4d.).

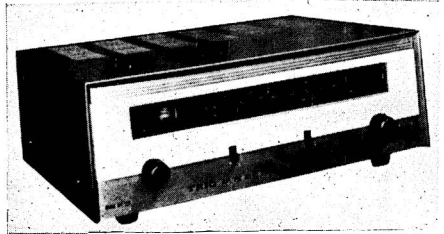
**TRIPLETONE MANUFACTURING CO. LTD.,** 241a The Broadway, Wimbledon, S.W.19. Tel.: Liberty 1189.

**Tripletone F.M. tuner.** Variable tuning. Range 86-104 Mc/s. A.G.C. Ratio det. Aerial imp. 70-80 ohms. Output 500 mV. Cathode follower output. P.s.n. 200-250V AC for powered version; 250V DC at 25 mA and 6-3V at 2 amps for unpowered version. Size:  $11 \times 6\frac{1}{2} \times 3$  in. Price (unpowered): £11 17s. 11d. (U.K. purchase tax: £2 1s. 7d.); (powered): £13 7s. 8d. (U.K. purchase tax: £2 6s. 10d.).

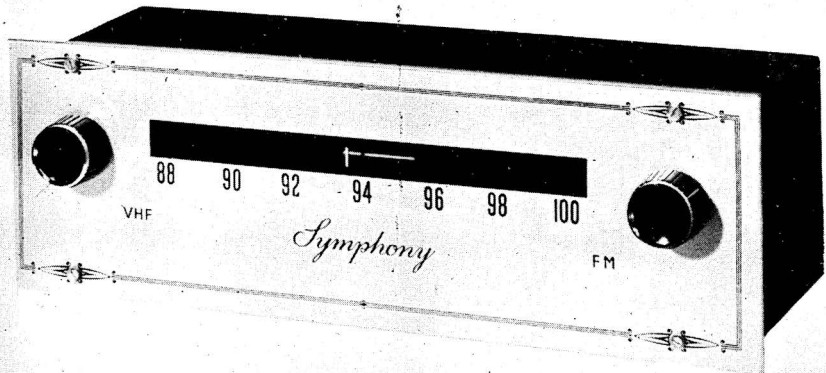


**WHITELEY ELECTRICAL RADIO CO. LTD.,** Victoria Street, Mansfield, Nottinghamshire. Tel.: Mansfield 1762-5. Cables: White-bon, Mansfield.

**W/B Stentorian F.M. tuner Mk. II.** Variable permeability tuning. Range 88-108 Mc/s.



*Trio AF220 AM/FM tuner*



*Symphony FM2 tuner*



*Stentorian Mk. II FM tuner*



*Zenith MHT 15 Stereo tuner*

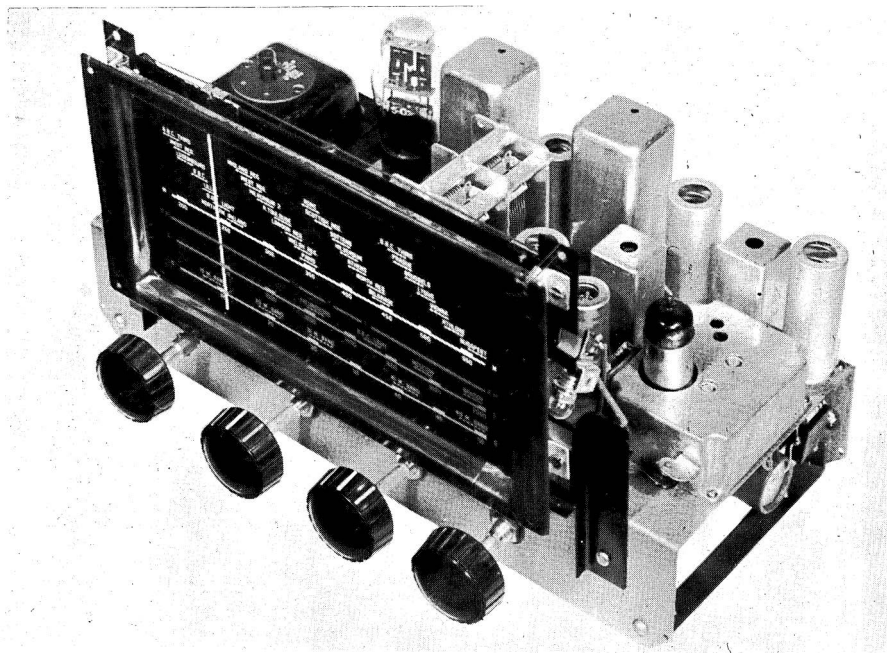
Foster-Seeley disc. P.s.n. 200-240V at 45 mA; 6.3V at 2 amps. Size:  $11\frac{3}{8} \times 4 \times 7\frac{1}{2}$  in. Price: £16 2s. 9d. (U.K. purchase tax: £2 14s. 3d.).

**V.H.F. F.M. tuner.** Switched. Range 88-98 Mc/s. A.F.C. Ratio det. Multiplex conversion facilities. Aerial imp. 75 ohms. P.s.n. 250V, 25 mA; 6.3V, 2 amps. Size:  $12 \times 4 \times 6\frac{1}{2}$  in. Price: £25 16s. 6d. (including purchase tax).



**ZENITH RADIO CORPORATION.** U.K. Distributors: United Mercantile Co. Ltd., Sovereign House, 13/14 Queen Street, London, W.1. Tel.: Grosvenor 4901. Cables: Ramsaco, Telex, London.

**MHT15 stereo F.M./A.M. tuner.** Range A.M. 550-1,600 Kc/s, F.M. 88 to 108 Mc/s. A.F.C. Ratio det. Limiter. Multiplex incorporated. Aerial imp. 300 ohms. Sensitivity  $2-3\mu\text{V}$  at 30 dB quieting. P.s.n. 110V. Dimensions:  $13\frac{1}{2} \times 6 \times 10$  in. Price: £52 10s. (U.K. purchase tax: £8 8s. 5d.).



*Symphony AM/FM tuner*

# TRANSISTOR AMPLIFIER PROGRESS

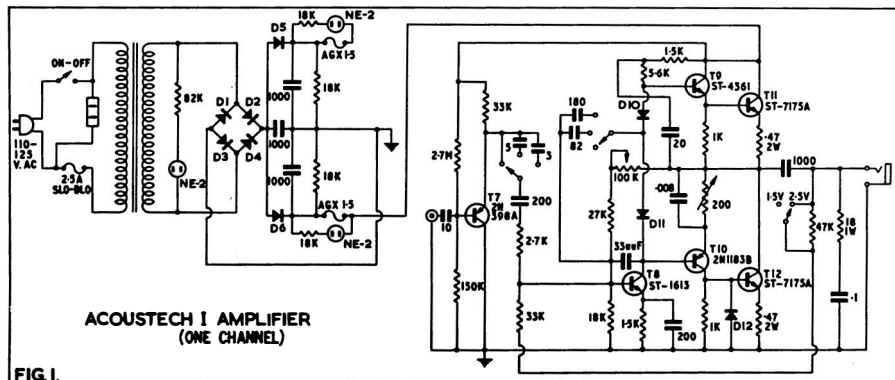
by George Tillett

TRANSISTOR amplifiers have been with us for a year or two without making any real impact, but now at last the situation is changing and soon we must accept them as serious challengers to the supremacy of valve amplifiers. Experts in this country are not by any means agreed on all the advantages of transistors—and there is no doubt that much nonsense has been written about ‘pure transparent transistor sound’ and the like, but there *are* solid advantages and I, for one, am absolutely convinced that valve amplifiers are obsolete—except for certain specialised applications. There are a number of transistor amplifiers available and those manufacturers now making valve amplifiers will, I feel certain, replace them with transistors when the time comes for design changes.

In the 1962 *Yearbook* I stated that the advantages of transistors for Hi-Fi amplifiers were as follows: “. . . valve amplifiers with their low distortion, wide frequency range, etc, can hardly be improved on—or can they? Let us take a look at the transistor claims: (1) greater efficiency (lower power consumption), (2) lower heat dissipation, (3) higher damping factors possible, (4) lower hum level, (5) lower voltages mean a saving in component costs, (6) no output transformers needed, (7) greater compactness, and (8) transistors have a longer life. A formidable list, to which must be added the possible advantage of no warm-up time (I cannot see that this is important but it *is* quoted by the American adverts!

“The modern valve amplifier is still relatively inefficient and the average 10+10W unit would consume some 150-200W from the mains, thus most of the power is dissipated in the form of heat. In contrast, a transistor amplifier of similar power rating would use 50-70W. This is partly due to the inherent efficiency of transistors, the absence of heater current, and also to the fact that high power transistor stages are of the Class B or AB type. The lower heat dissipation is of course due to the higher efficiency. Higher damping factors are explained by the large amounts of negative feedback necessary to extend the band-width and reduce the inherent distortion as well as for stabilising the operating parameters. Feedback loops of 40 to 60 dB are quite common, with resulting damping factors of 50 and over. The lower hum level is mainly due to the absence of a heater supply for the first stages, but the smaller mains transformer means a worthwhile reduction in hum fields which are always a problem with small integrated amplifiers. So what do these claims add up to in practise?

“First, the lower power consumption is obviously not too important as it means a saving of a few pence per week at the most. The lower heat dissipation scores a point, for it does enable an amplifier to be mounted quite close to an FM tuner without causing any dire effects. It could also mean that an amplifier could be enclosed in a small wooden free-standing cabinet if so desired. The higher



damping factor as such is of no great importance, as any increase over 30 (which equals an output impedance of  $\frac{1}{2}$  ohm) is quite negligible compared with the 15 ohms of the speaker itself.

"Lower hum level is undoubtedly a factor to consider—especially with amplifiers working at inputs of 2-3 mV. The saving likely to result from the lower voltage would not be very much, and the reduced cost of the mains transformer may well be offset by the higher costs elsewhere. The inherent low impedance of transistors *does* mean that output-transformerless stages are a practical possibility and in theory at any rate the scrapping of output transformers offers better stability, better frequency ranges and superior transient response.

"There is no doubt that smaller, more compact amplifiers will give greater scope for styling and presentation whilst being somewhat easier to install. Now let us take a look at the other side of the picture (as it appeared in 1962): "are there, in fact, any snags? Yes, here are some of them: (1) transistors are 'heat conscious', (2) the spreads in characteristics are much greater than we have become accustomed to with valves, (3) the frequency response is restricted at the HF end, and (4) the noise level is higher.

### Operating Conditions

"The operating condition of transistors, especially high power types, is related to the working temperature. Furthermore, if the collector current can increase without control, a condition known as 'thermal runaway' is reached, when the transistor will destroy itself. These problems can be overcome by the provision of heatsinks and reasonable ventilation plus the proper stabilising precautions which take the form of feedback loops, potentiometer bias supply, thermistors, etc. Variations in gain and other parameters can be dealt with by using large amounts of negative feedback, which will also increase the amplifier bandwidth—provided the right types of transistor are used. As for noise level, again provided that the right types of transistor are selected, this is no longer a serious problem. The real difficulty—at the time of writing—centres on the production of suitable types of transistor (low noise and output types) at a reasonable price. It is now possible to produce a 20W amplifier in the laboratory—an all-transistor amplifier which is quite comparable with a valve type—but the cost is prohibitive. This situation will change, and probably sooner than many people anticipate."

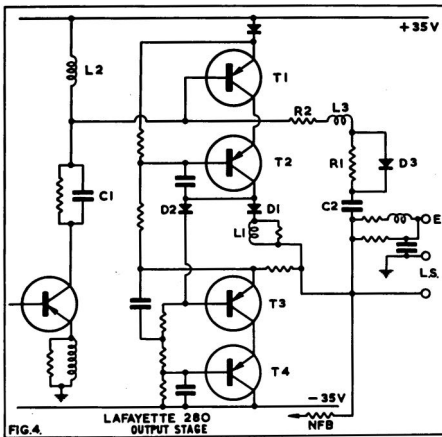
Yes, the situation *has* changed (1964) and the 20W amplifier has now left the laboratory

and its cost is not *very* much more than equivalent valve jobs. In fact it may even be cheaper. There is a large range of low-noise transistors to choose from and some have lower noise figures than the best valve types. As far as power transistors are concerned, well, the main limitation used to be the restricted frequency response and most of the early types tended to have a cut-off point around 4 Kc/s (the cut-off point is defined as the frequency where the gain drops by 3 dB). I had mentioned that the bandwidth could be increased by the application of feedback, but some time ago *Mallard* came up with an ingenious circuit which increased the drive at higher frequencies and so extended the useful band-width of their AD140s from a basic 4 Kc/s to a half-power figure of nearly 30 Kc/s. In the higher power class i.e. from 15 to 30W there are a number of transistors available such as the 2N4587 and 2N2147 with cut-offs from 400 Kc/s to over 4 Mc/s. Used in a straightforward circuit, two of these latter types can deliver up to 25W—with half power at 30 Kc/s. Not 'Music power' but solid RMS watts—more than enough for most people!

Opinion is divided as to whether or not America is ahead of us in transistor design, but one thing is certain: the Americans have produced more transistor amplifiers over a longer period than we have and so they have accumulated more experience. That being so, we will take a brief look at the Transatlantic scene before examining some of our own products. Most of the American manufacturers have turned over to transistors (*solid state devices* as they call them, sounds more impressive!), but there are notable exceptions. *McIntosh*, for instance still concentrate on high power valve amplifiers and their adverts state with some condescension: "You will not be oversold by *McIntosh* exaggerating the importance of square-wave response or useless extensions of high frequency response, nor will you find *McIntosh* amplifiers limited to 12 seconds at full treble power as are some of today's transistor amplifiers, etc, etc." Which is countered by *Altec-Lansing's*: "The 360A is far more perfect than the finest tube amplifier . . ." and *Harmon-Kardon's* "finest square-wave—less than 1 microsecond!"

One of the most interesting amplifiers is the *Acoustech I* which I recently had an opportunity of testing. The circuit of the power amplifier is shown in **fig. 1**. All the transistors are silicon types and the HT rail is unusually high at 100V. This amplifier will give more than 70W per channel, with half power at about 32 Kc/s (see **fig. 2**). Switched high- and low-pass filters are provided and the frequency response in the level position is within 1 dB from 20 c/s





note!). The output stage is unbalanced as the drive is applied to T1 which then drives T2 through its emitter. During negative half cycles the collector signal from T2 drives T3 as an emitter-follower through the diode D2, and the other diode D1 disconnects the collector of T2 from the load during negative outputs. Under no-signal conditions all four transistors are biased into a region of high gain, and crossover distortion is determined by the current through D1, since this diode conducts only when the output is driven positive. The choke L1 improves the time-constant of the circuit and effectively increases the band-width. Further compensation is given by L2 and C1. The network L3, R1, R2, C2 and the diode D3 provide a compensating feedback loop which functions only when the output cycle is positive. This loop and the main loop provide a total of no less than 70 dB feedback, which completely removes the inherent distortion caused by the asymmetrical arrangement of the output stage.

A complicated piece of circuitry, but as the figures prove it *does* work.

One of the most interesting British developments is the 'II mode' Class AB circuit which Mullard introduced in 1962 and revised last year. In this arrangement the output transistors function in Class A up to nearly half power and then operate in Class AB until at full power they change over to Class B. The advantages of this system are as follows:

- (1) Absence of cross-over distortion associated with Class B operation
- (2) Very low distortion over normal listening levels arising from Class A push-pull operation
- (3) Constant current drain from the supply, so rendering regulation unnecessary.
- (4) Short-circuit of the output terminals does not damage the transistors.

Fig. 5 shows the basic circuit. TR1 and TR2 form the phase-splitter stage and are connected as a 'long-tailed pair'. The driver transistors are CC81Zs and they are directly coupled to a pair of AD140s. These transistors have a cut-off frequency of 4 Kc/s, and to overcome this deficiency the drive current is increased at high frequencies. This is partly achieved by overall negative feedback (44 dB via R9) and partly by allowing some reversal of base current of the output transistors to take place by returning the emitters of the driver transistors to a positive potential with respect to the output transistor emitter, and operating the driver transistors at a fairly high quiescent current. R1 and R2 are 1 ohm resistors which increase the bias at cut-off point and so reduce distortion at high power. This circuit is capable of giving very good results, and up to 12W can be obtained with low distortion. Incidentally, the

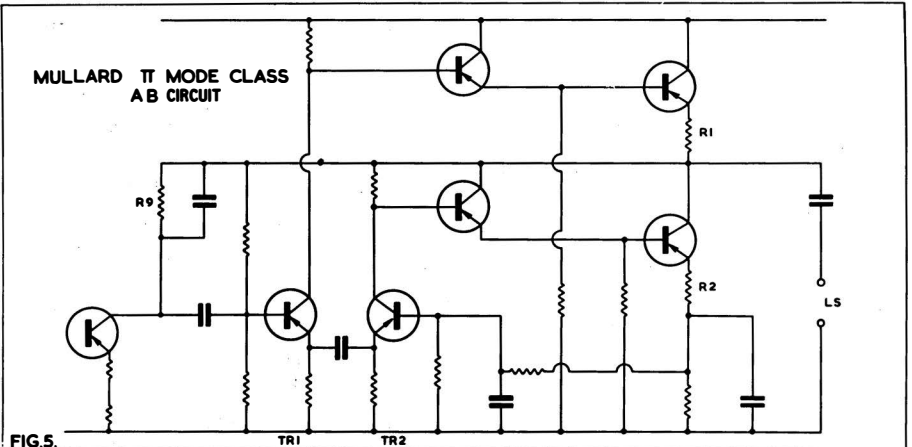


FIG.5.



current consumption is about 420 mA and the variation from zero to full output is no more than 3-5 mA.

Another circuit which is proving very popular is due to Tobey and Dinsdale and was published in *Wireless World* in November and December 1962. Fig. 6 shows the variation used by *Pye* in their HFS30T. TR1 is the voltage amplifier and TR2 the current amplifier which drives the 'complementary pair', consisting of a PNP and NPN type with matching characteristics, a 'mirror image' if you like. The types used are a 2N1302 *Texas* NPN and a *Newmarket* NKT 207 PNP. The output transistors are NKT401s connected in the usual single-ended push-pull arrangement with the diode D1 acting as bias stabiliser. The quiescent current is set by the present control RV1 and is very low, so the output stage functions in a 'low-loading' or music-power type of circuit where the power supply provides high current for short duration peaks only.

Fig. 7 shows the input arrangement. Equalisation is partly provided by a selective loop R2, C1, C2 from base to collector and partly by R1 and the source inductance (L) levelling off the rising record characteristic above an upper turn-over frequency. Thus it follows that the equalising will only be correct for a certain value of source inductance, but in practise the variation is quite small. In this particular circuit R1 is chosen to match pickups having an inductance of 500 mH, but its value can be changed to deal with inductances of 200-700 mH if necessary.

The *Bryan* 303 and Stereo 400 are also based on the Tobey & Dinsdale circuit, but the output stage operates at a higher quiescent current and an extra transistor is used as an emitter-follower between the volume control and the main amplifier. Fig. 8 shows the circuit of the

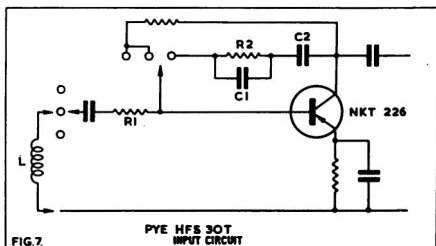


FIG. 7 PYE HFS 30T INPUT CIRCUIT

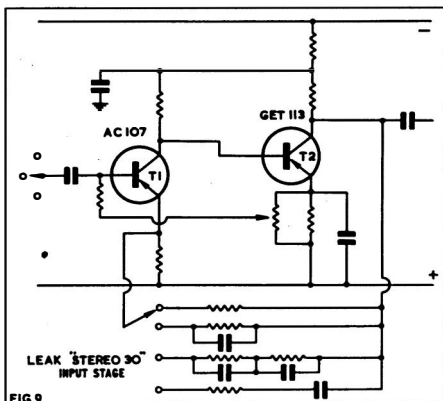


FIG. 8

output stages of the new Leak 'Stereo 30'. It is very similar to the *Pye* arrangement but there are one or two divergencies. A thermistor Th.1 is used in the base circuit of the first transistor to give temperature compensation, and another thermistor, Th.2, is employed for bias stabilisation instead of a diode. Two main feedback loops are provided, a DC loop through R1 and an AC connection via R2. The output transistors operate under music-power conditions, but otherwise the basic circuit is not unlike that used by *Leak* valve amplifiers. In fact the

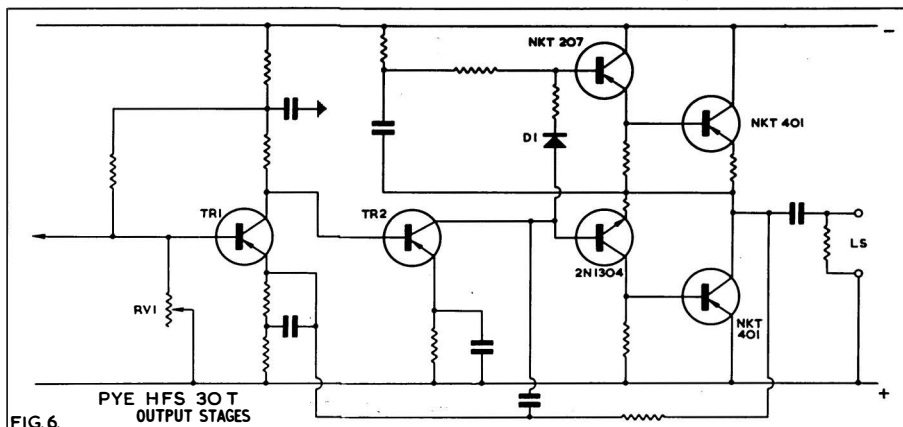


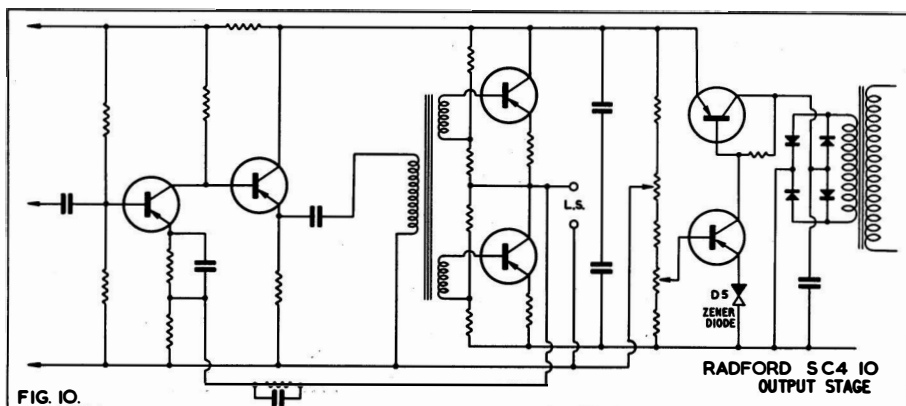
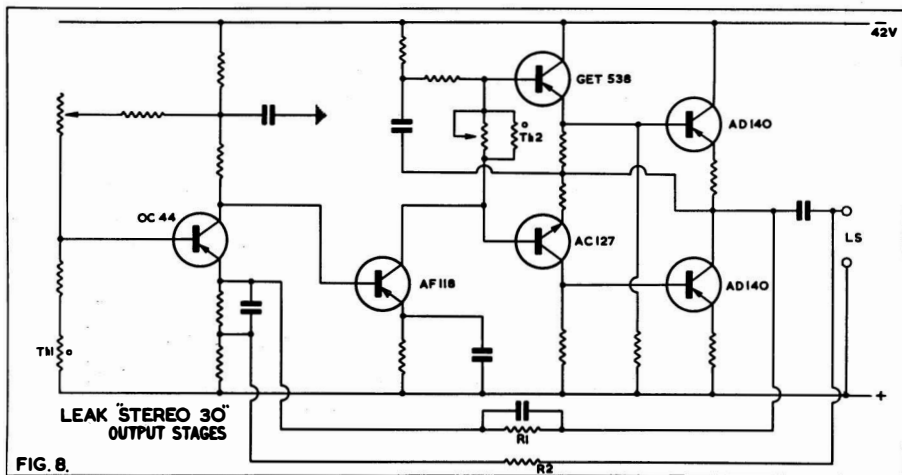
FIG. 6 PYE HFS 30T OUTPUT STAGES

specifications are very similar to the Stereo 20 and Varislope unit and it is stated that the only real difference is in the signal-noise ratio. The circuit of the input stage is shown in fig. 9, and it will be seen that the two transistors form a DC-coupled pair with equalisation given by a feedback loop connected between the emitter of T1 and the collector of T2. A total of 15 transistors and two diode rectifiers are used in the complete amplifier.

A more ambitious amplifier is the Radford SC410, which uses no fewer than 28 transistors plus five diodes! Fig. 10 shows the circuit of the output stages and power supply, which is fully regulated by a series-parallel arrangement with two AD140s. D5 is a zener reference diode and the output and driver transistors are 2N2147s. In order to simplify driving problems a transformer is used, and cross-over complications avoided by having the three windings closely coupled in a tri-filar system. The driver transis-

tor is coupled by the emitter rather than the collector to give a low impedance source. The SCR410 is rated at 15W per channel continuous RMS and eight transistors are used in each of the preamplifier stages. No filters are provided—which seems a pity.

The situation may be summarised as follows: (1) silicon transistors have many advantages for large power amplifiers but they are very expensive; (2) top-grade germanium transistors can give comparable results by the use of more complicated circuits—they are much cheaper; (3) germanium transistors with relatively low cut-off frequencies can also give good results by using various compensating methods, but circuits using germanium output transistors without compensation will have a falling power response above about 5 Kc/s; and (4) for amplifiers in the 10-12W class the Mullard II mode arrangement is very much worthwhile, as the power supply need not be stabilised.



# DIRECTORY OF TUNER/AMPLIFIERS

★ The abbreviations used in this section are defined at the beginning of the Tuner and Amplifier Sections.

**ARMSTRONG AUDIO LTD.**, Warlters Road, Holloway, London, N.7. Tel.: North 3213/4.

● **Model 226.** Stereo tuner/amplifier. A.M./F.M. Variable tuning. Range M.W. 180-600 metres; F.M. 87-108 M/cs. Foster-Seeley disc. Tuning meter. Full multiplex facilities. Aerial imp. 70-80 ohms and 300 ohms. Output 10W per channel. P.s.n. 200-250V AC. Inputs: gram. (1) 80 mV, 1 megohm; gram. (2) 3.5 mV, 47 K (RIAA); tape playback 80 mV, 1 megohm; tape monitor 600 mV, 100 K. Controls: sel., vol., balance, bass, treble, waveband, tuning, treble filter, rumble filter, tape monitor, loudness. Treble filter 7 Kc/s, 12 dB per octave. F.R. 30 c/s-20 Kc/s  $\pm 1$  dB. H and N better than -55 dB. H.D. less than 0.5% at 8W (overall). Feedback 15 dB. L.S. matching 4, 8, 16 ohms. Output stages 4  $\times$  ECL86. Free-standing. Size:  $15\frac{1}{4} \times 5\frac{3}{8} \times 15$  in. Optional case. Price: £47 16s. 9d. (U.K. purchase tax: £8 3s. 3d.).

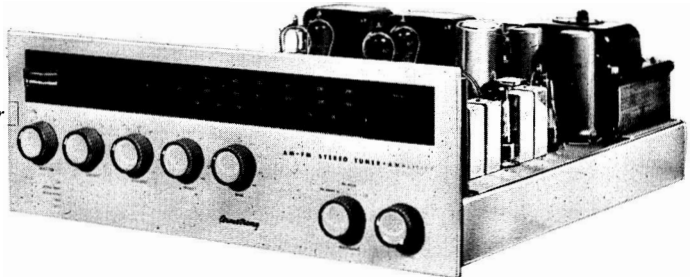
● **Model 227.** Stereo tuner/amplifier. A.M./E.M. Variable tuning. Range M.W. 180-600 metres; E.M. 87-108 M/cs. Foster-Seeley disc. Tuning meter. Full multiplex facilities. Aerial imp. 70-80 ohms and 300 ohms. Output 10W per channel. P.s.n. 200-250V AC. Inputs: gram. 80 mV, 1 megohm; tape playback 80 mV, 1 megohm. Controls: sel., vol., balance, bass, treble, waveband, tuning. Rumble filter -6 dB at 35 c/s. F.R. 30 c/s-20 Kc/s  $\pm 1$  dB. H and N better than -55 dB. H.D. less than 0.5% at 8W (overall). Feedback 15 dB. L.S. matching 4, 8, 16 ohms. Output stages 4  $\times$  ECL86. Free-standing. Size:  $15\frac{1}{4} \times 5\frac{3}{8} \times 15$  in. Optional case. Price: £41 13s. (U.K. purchase tax: £7 2s.).

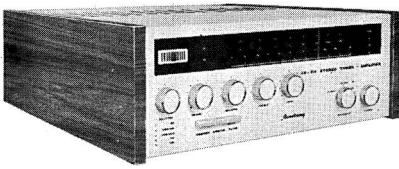
● **Model 227M.** Mono tuner/amplifier. A.M./F.M. Variable tuning. Range M.W. 180-600 metres; F.M. 87-108 Mc/s. Foster-Seeley disc. Tuning meter. Aerial imp. 70-80 ohms.



*Armstrong 226  
stereo tuner/amplifier*

*Armstrong 227  
stereo tuner/amplifier*





*Armstrong 226 stereo tuner/amplifier*

Output 10W. P.s.n. 200-250V AC. Inputs: gram/tape playback 80 mV, 1 megohm. Controls: vol., bass, treble, sel., tuning. Rumble filter -6 dB at 35 c/s. F.R. 30 c/s-20 Kc/s  $\pm 1$  dB. H and N better than -55 dB. H.D. less than 0.5% at 8W (overall). Feedback 15 dB. L.S. matching 4, 8, 16 ohms. Output stages 4  $\times$  ECL86. Free-standing. Size 13  $\times$  5 $\frac{3}{8}$   $\times$  10 $\frac{1}{2}$  in. Optional case. Price: £28 19s. 3d. (U.K. purchase tax: £4 18s. 9d.).



**FISHER RADIO CORPORATION**, Long Island City 1, New York, U.S.A. Distributors: Imhofs (Retail) Ltd., 112-116 New Oxford Street, London, W.C.1. Tel.: Museum 7878.

●**800C tuner amplifier**. Stereo. A.M./F.M. Variable tuning. Range F.M. 87.5-108 Mc/s; A.M. 522-1630 Kc/s. A.F.C. Ratio disc. Horizontal tuning meter. Multiplex incorporated. Aerial imp. 72 ohms. Inputs: high level 230 mV; gram 3.3 mV; tape head 2.5 mV. Controls: speaker, sel., bass, treble, vol., tape monitor, loudness contour. High and low filters 12 dB/octave. Response 25 c/s-25 Kc/s  $\pm 1.5$  dB. H and N -80 dB. Output 30W per channel. H.D. 0.5%. Load imp. 4, 8, 16 ohms. Direct tape monitor. Self-powered. Size: 17 $\frac{1}{2}$   $\times$  5 $\frac{3}{4}$   $\times$  13 $\frac{1}{2}$  in. Price: £179 7s. 5d. (U.K. purchase tax: £29 5s. 7d.).



*Armstrong 227M tuner/amplifier*

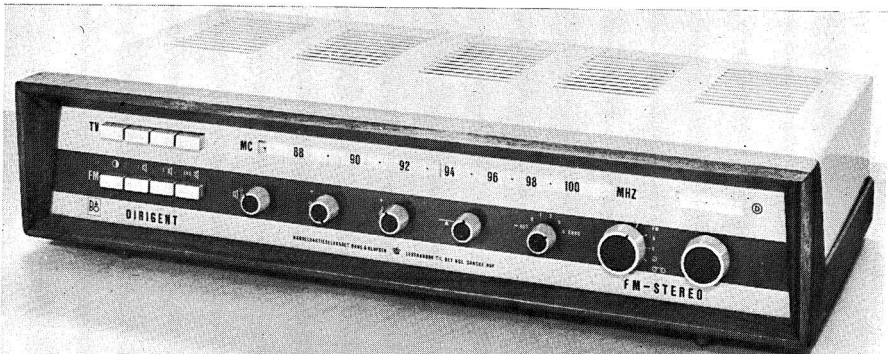
**BANG & OLUFSEN**, Struer, Denmark. Sole U.K. Importers: Avey Electric Ltd., South Ockendon, Essex. Tel.: South Ockendon 3444.

●**"Dirigent" 609K F.M. tuner amplifier**. Free-tuned. Range 87.5-108 Mc/s. A.F.C. may be switched out when tuning, if required. Ratio det. EM87 magic eye tuning indicator. Multiplex conversion facilities. Aerial imp. 75 ohms. Amplifier 5 + 5W stereo, with inputs for crystal pickup, A.M. radio, tape recorder. P.s.n. 220-240V AC 50 c/s. Size: 19  $\times$  10  $\times$  4 $\frac{1}{2}$  in. Price: £43 4s. 3d. (U.K. purchase tax: £7 3s. 9d.).



**PIONEER ELECTRONICS CORPORATION**. Distributors: C. Hammond & Co. Ltd., 296 Kensington High Street, London, W.14. Tel.: Western 4343.

●**SM-G205**. Stereo tuner/amplifier. A.M./F.M. Variable tuning. Range M.W. 535-1605 Kc/s; F.M. 88-108 Mc/s. A.F.C. Foster-Seeley disc. M.E. tuning ind. Multiplex incorporated. Aerial imp. 300 ohms. Output 11W per channel. H.D. less than 1%. Response 20 c/s-50 Kc/s  $\pm 1$  dB. S/N (mag. pu) better than 50 dB; (aux.) better than 70 dB. L.S. matching 8, 16 ohms (switchable). Output



*Bang & Olufsen 'Dirigent' 609K stereo tuner/amplifier*



*Pioneer Q300 stereo tuner/amplifier*

stages ECL86s. Inputs: mag. pu 2.5 mV; crystal pu 28 mV; tape playback 165 mV; aux. 165 mV. Controls: tone, separate bass and treble for each channel, loudness control, balance, vol., high- and low-pass filters, mode sel., function sel., tape monitor switch. Switchable A.M. selectivity. P.s.n. 115, 230V (switchable). Free-standing. Size: 18½ × 13¼ × 5½ in. Price: £89 5s. (including purchase tax).

monitor switch, loudness, sel. A, sel. B, bass, treble, balance, vol., mode blend. Remote control sub-balancer. P.s.n. 115, 230V (switchable). Free-standing. Size: 18½ × 13¼ × 5½ in. Price: £89 5s. (including purchase tax).

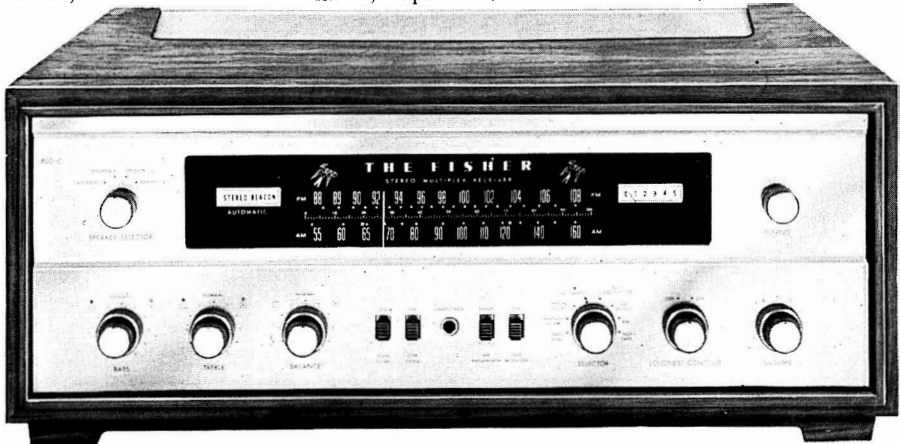


**TRIO.** Distributors: Winter Trading Co. Ltd., 95/99 Ladbroke Grove, London, W.11. Tel.: Park 1341.

●**SM-Q300.** Stereo tuner/amplifier. F.M./A.M. Tuning variable, S.W./M.W. and F.M./M.W. Range S.W. 3.5-108 Mc/s; M.W. 535-1605 Kc/s; F.M. 80-108 Mc/s. A.F.C. Foster-Seeley disc. 2 × M.E. tuning ind. Output for multiplex. Aerial imp. 300 ohms. Output 15W per channel. H.D. less than 1%. Response 20 c/s-50 Kc/s ±1 dB. S/N (mag. pu) better than 50 dB; (aux.) better than 65 dB. L.S. matching 4, 8, 16 ohms (switchable). Output stages EL84s. Inputs: mag. pu 3.4 mV; mic. 4 mV; crystal pu. 38 mV; tape playback/aux. 160 mV. Controls: tuning A, tuning B, scratch, rumble and whistle filters; tape

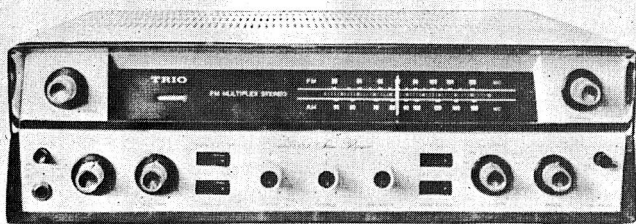
●**W38.** Stereo tuner/amplifier. A.M./F.M./S.W. Range F.M. 76-108 Mc/s; A.M. 535-1605 Kc/s; S.W. 3-8-11 Mc/s. A.F.C. on F.M. Foster-Seeley disc. Multiplex facilities. M.E. tuning ind. Output 7W per channel. Response 20 c/s-50 Kc/s ±0.5 dB. H.D. less than 2%. L.S. matching 4, 8, 16 ohms. P.s.n. 110/230V AC. Size: 18 × 10¼ × 5½ in. Weight: 30 lb. Price: £71 6s. 3d. (U.K. purchase tax: £12 3s. 3d.).

●**WE-8S.** Stereo tuner/amplifier. A.M./F.M. Range F.M. 88-108 Mc/s; M.W. 550-1600 Kc/s; L.W. 150-350 Kc/s. A.F.C. on F.M.



*Fisher 800-C 75 watt AM/FM stereo Multiplex tuner/amplifier*

*Trio  
WX 400U*



Foster-Seeley disc. Multiplex facilities. Output 3W per channel. Response 20 c/s-20 Kc/s  $\pm 1$  dB (for 500 mW). L.S. matching 4, 8, 16 ohms. P.s.n. 110-230V AC. Size:  $16\frac{1}{2} \times 5 \times 11$  in. Weight: 22 lb. Price: £52 18s. 5d. (U.K. purchase tax: £9 0s. 7d.).

● **WX-400U.** Stereo tuner/amplifier. A.M./F.M. Range F.M. 80-108 Mc/s; A.M. 535-1605

Kc/s. A.F.C. on F.M. Multiplex facilities available. Output 10W per channel. Response F.M. 20 c/s-20 Kc/s  $\pm 0.5$  dB; F.M. stereo 50 c/s-15 Kc/s  $\pm 0.5$  dB. Inputs: mag. pu 3 mV; crystal pu 30 mV; aux. 150 mV. High- and low-pass filters (-10 dB at 30 c/s and 10 Kc/s). Bass, treble and loudness controls. Size:  $17\frac{3}{4} \times 5\frac{1}{2} \times 14$  in. Weight: 31 lb. Price: £88 16s. (U.K. purchase tax: £15 3s.).



*Trio W38 stereo tuner/amplifier*

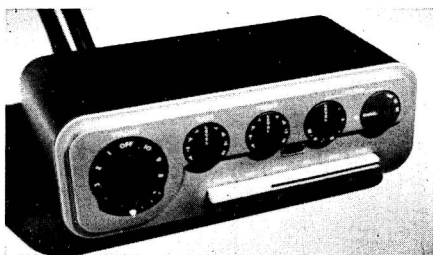
# DIRECTORY OF AMPLIFIERS & CONTROL UNITS

★ The following abbreviations are used in this directory section: **H.D.**=Harmonic Distortion; **<**=less than; **H and N**=Hum and Noise; **P.a.t.**=Power supplies available for tuner; **RMS**=root mean square; **N.L.**=Noise level; **Sel.**=Selector switch; **P.s.n.**=Power supply needed; ●=Stereo equipment.

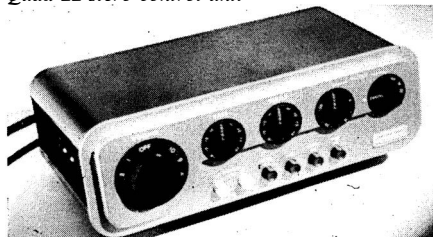
**ACOUSTICAL MANUFACTURING CO. LTD.**, St. Peter's Road, Huntingdon, Hunts. Tel.: Huntingdon 361 and 574. Cables: Acoustical.

● **Quad II Q.C. II control unit.** Inputs: radio/tape 100 mV; mic. 1.5 mV; gram. to suit pickup. Treble, bass, vol. and on/off, filter slope. Switch filter 5, 7, 10 Kc/s and "out". Tape record socket, switched playback socket. H.D. <0.1%. H and N -70 dB. Size:  $10\frac{1}{2} \times 3\frac{1}{2} \times 6\frac{1}{2}$  in. To operate with Quad II power amp or similar. Price: £19 10s.

● **Quad 22 control unit.** Inputs: radio/tape 70 mV at 100 K; mic. 1.5 mV at 100 K; pickup dependent on adaptor unit used. Vol. and on/off bass, treble, filter slope, filter switch 5, 7, and 10 Kc/s. Push-button selection of channels, mono/stereo, and record equalisation. H.D. <0.02%. H and N -70 dB total. P.a.t. 330V 35 mA each tuner; 6.3V 3 amps. Size:  $10\frac{1}{2} \times 3\frac{1}{2} \times 6$  in. Price: £25. To operate with Quad II amplifiers.



*Quad 22 stereo control unit*



*Quad Q.C. II control unit*

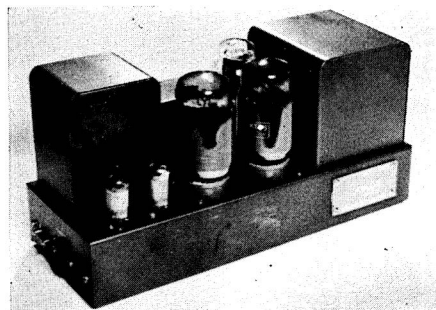
● **Quad II amplifier.** 15W. Dist. total 3rd harmonic and higher. <0.1% at 12W. Input for spec. output 1.4V RMS for 15W. Response 20-20,000 c/s  $\pm 0.2$  dB; 10-50,000 c/s  $\pm 0.5$  dB. Feedback incorporated in original ultra-linear arrangement. N.L. -80 dB at 15W. Output imp. 7 and 15 ohms. Output 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: £22 10s.

★

**ARMSTRONG AUDIO LTD.**, Warlters Road, Holloway, N.7. Tel.: North 3213/4.

● **Model 222.** Integrated stereo amplifier. Inputs: gram. 80 mV, 1 megohm; tape playback 80 mV, 1 megohm. Output 10W per channel. Controls: sel., vol., balance, treble, bass. Rumble filter -6 dB at 35 c/s. F.R. 30 c/s-20 Kc/s  $\pm 1$  dB. H and N better than -55 dB. P.s.n. 200-250V AC H.D. less than 0.5% at 8W (overall). Feedback 15 dB. L.S. matching 4, 8, 16 ohms. Output stages 4  $\times$  ECL86. Free-standing. Size:  $12\frac{3}{8} \times 4\frac{3}{4} \times 10\frac{3}{8}$  in. Optional case. Price: £27 10s.

● **Model 220.** Stereo amplifier. Output 12W nominal, 25W max. per channel. H.D. less than 0.1%. F.R. 15 c/s-22 Kc/s. Feedback 29 dB. N.L. -80 dB. Input 410 mV. L.S. matching 4, 8, 16 ohms. Output stages 4  $\times$  EL84. P.s.n. 200-250V; 100-130V AC. To operate with



*Quad II power amplifier*

pre-amp Model 225. Size: 14 × 7 × 7 in. Price: £24 18s.

● **Model 225.** Stereo control unit. Inputs: tape 100 mV, 1 megohm and 3 mV, 75 K (NAB); mic. 1.8 mV, 75 K; radio 100 mV, 1 megohm; aux. 100 mV, 1 megohm; gram. 3.5 mV, 50 K (RIAA). Output 410 mV. Controls: sel., vol., balance, treble, bass. Rumble filter (switched) -3 dB at 80 c/s; treble filter with variable slope. F.R. 20 c/s-20 Kc/s ±1 dB. H and N -61 dB (pickup input 3.5 mV sensitivity). To operate with 220 amplifier, which supplies power. Size: 10 $\frac{3}{8}$  × 4 $\frac{3}{4}$  × 7 $\frac{1}{4}$  in. Price: £22 12s.



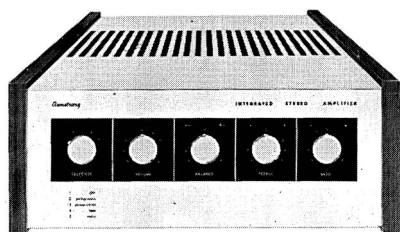
**ASSOCIATED ELECTRONIC ENGINEERS LTD.**, 10 Dalston Gardens, Stanmore, Middx. Tel.: Wordsworth 4474/5/6. Cables: Astronic, Stanmore.

**Astronic A1332 control unit.** Inputs: mic. 20 mV; gram. A.E.S., *ffrr*, NARTB 10-20 mV; radio/tape 220 mV. 6-pos. sel., treble, bass, vol. and on/off, gram. input attenuator. Tape record and playback socket. H and N -70 dB. Size: 12 × 3 $\frac{3}{8}$  × 1 $\frac{7}{8}$  in. To operate with A1333 power amp. Price: £9 10s. 6d.

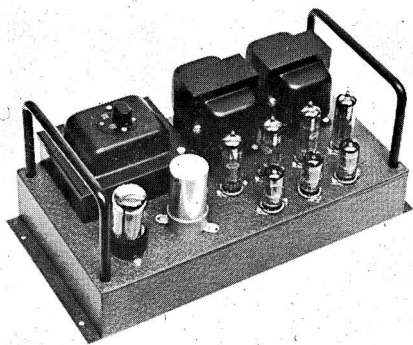
**Astronic A1432 control unit.** Inputs: mic. 20 mV; radio 120 mV; P/U 4 mV or 20 mV; tape (C.C.I.R.) 1-2 mV. 6-pos. sel. (3 record equal), treble, bass, vol. on/off. Filter 5, 7, 10 Kc/s. Slope 6-30 dB/octave. Loudness -18 dB max. Presence +6 dB, 2-3 Kc/s. Rumble filter. Variable pu. attenuator. Socket for direct replay from tape head. H.D. not measurable. H and N -65 dB. Size: 11 $\frac{1}{2}$  × 3 $\frac{1}{2}$  × 5 $\frac{1}{4}$  in. To operate with A1333 or A1440 amplifiers. Price: £21 19s.

**Astronic A1333 amplifier.** 10W nom., 13W max. Dist. 0.1% at 10W. Input for spec. output 0.33V RMS. Response 20-20,000 c/s ±0.5 dB. Feedback 18 dB. N.L. -72 dB. Output imp. 3 $\frac{3}{4}$ , 7 $\frac{1}{2}$  and 15 ohms. Output N709s or EL84s. Ultralinear. Size: 11 $\frac{1}{2}$  × 6 $\frac{1}{4}$  × 6 in. To operate with A1332 control unit. Price: £18 19s. 6d.

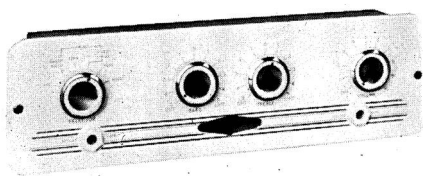
● **Astronic A1434 stereo control unit.** Inputs, single channel: tape 1-2 mV; LP (Int.) 4 mV; radio 120 mV; mic. 20 mV; aux. 120 mV. Stereo inputs for tape, PU and radio same sensitivities. 8-pos. sel., bass, treble, vol., on/off, rumble filter, presence switch, channel balance (pre-set). Dist. negligible. H and N -65 dB. Size: 11 $\frac{1}{2}$  × 3 $\frac{1}{2}$  × 6 in. To operate with amplifiers A1333 Mk. I and Mk. II or A1440. Price: £22 5s.



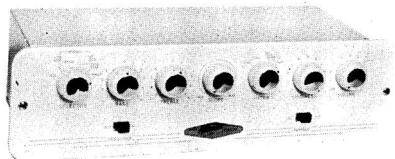
Armstrong 222 Integrated Stereo Amplifier



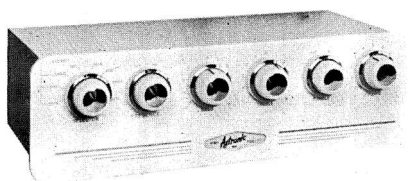
Armstrong 220 Stereo Power Amplifier



Astronic A1332 control unit



Astronic A1432 control unit



Astronic A1434 stereo control unit



● **Astronic A1444 combined stereo unit.** 4W. Dist. 2%. Inputs: radio, tape and LP discs. 150 mV; 78 discs. 350 mV. 4-position sel., bass, treble, volume and on/off. Output imp. 3 and 15 ohms. Size:  $11\frac{1}{2} \times 8\frac{3}{4} \times 3\frac{1}{4}$  in. Price: £24 3s.

**Atlas A1440.** 20W nominal, 35 W max. Dist. 0.1%. Input for spec. output 0.25V. Response 20-20,000 c/s  $\pm 5$  dB. Feedback 30 dB. N.L. -85 dB. Output imp.  $3\frac{3}{4}$ ,  $7\frac{1}{2}$  and 15 ohms. Output EL34s. Ultralinear. Size:  $13 \times 7\frac{1}{4} \times 8\frac{1}{2}$  in. Price: £37 16s. To operate with amplifiers A1332, A1432, and A1434.



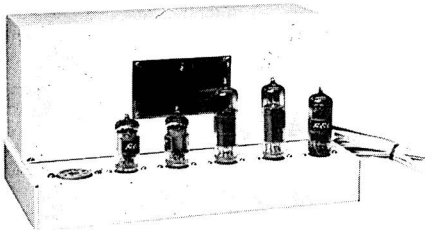
**AVELEY ELECTRIC LTD.,** South Ockendon, Essex. Tel.: South Ockendon 3444. Cables: Avel, Ockendon.

**Dynakit PAM-1.** Free-standing mono control unit. Inputs: pickup, radio, tape. Output 2V max. 6-pos. sel., bass, treble, volume, tape monitor switch, loudness switch hum balance. H and N 70 dB down on 10 mV cartridge. Power supplies required DC 200 to 400V at 4 mA; AC 6V at 0.75 amp AC Response  $\pm 0.5$  dB 10-40,000 c/s. DC heater supply. To operate with Avel-Dynaco Mk. IV

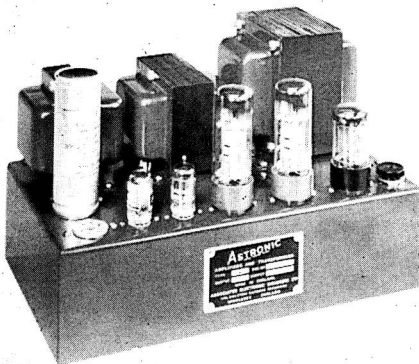
power amplifier. Size:  $12 \times 2\frac{5}{8} \times 6\frac{1}{8}$  in. Weight:  $4\frac{1}{2}$  lb. Price: £22 14s. 1d. (available in kit form): £17 14s. 1d.

● **Dynakit PAS-2.** Free-standing stereo control unit. Inputs: mic., tape, radio. Scratch filter. Output 2V max. 6-pos. sel., volume, balance, blend, ind. tone controls for each channel, tape monitor switch, loudness switch. H.D. unmeasurable. I.M. dist.  $<0.05\%$  at full output. H and N -70 dB down. Self-powered. Response  $\pm 0.5$  dB 10-40,000 c/s. DC heater supply. To operate with two Mk. IV power amplifiers or Avel-Dynaco Stereo 70. Size  $13 \times 3\frac{3}{4} \times 7\frac{3}{4}$  in. Weight: 8 lb. Price: £35 9s. 7d. (also available in kit form): £28 7s. 11d.

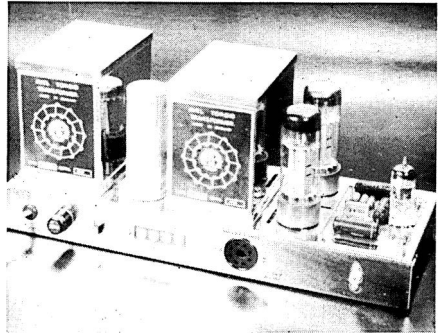
**Avel-Dynaco Mk. IV amplifier.** 30W nom., 50W max. H.D. L.F. range  $<0.25\%$ , high range 15,000 c/s  $<1\%$ , mid range  $<0.1\%$ . Input for spec. output 1.4V. Response  $\pm 0.5$  dB from 20-60,000 c/s. Feedback 20 dB overall.



*Astronic A1333 power amplifier*



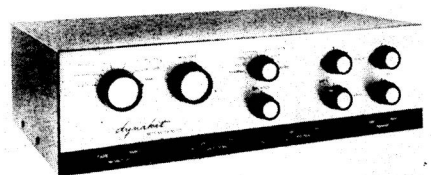
*Astronic A1440 power amplifier*



*Avel-Dynaco Mk. IV amplifier*



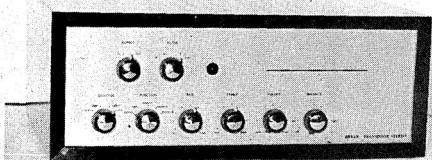
*Dynakit PAM-1 control unit*



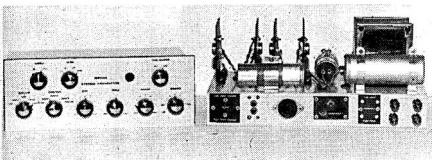
*Dynakit PAS-2 stereo control unit*



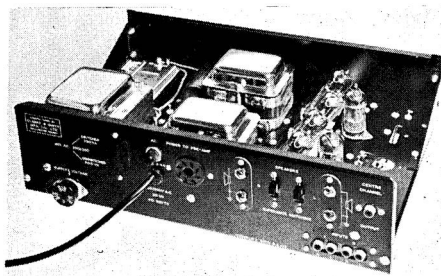
Bang and Olufsen 609 Integrated Stereo



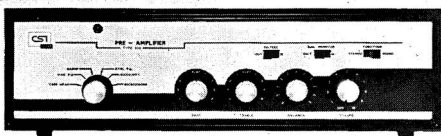
Bryan Model 400 Integrated Stereo



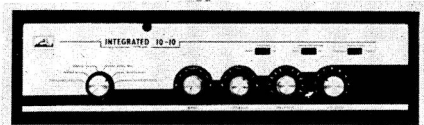
Bryan Models 500 and 600



Clarke and Smith 657 Stereo Power Amplifier



Clarke and Smith 656 Stereo Control Unit



Clarke & Smith Model 655 integrated

N.L. 90 dB down on 30W. Output imp. 4, 8, 16 ohms. Output matched EL34s. Ultra-linear. Power supplies required AC 0-200/240V. To operate with PAM-1 or PAS-2 control units. Size: 5 × 14 × 6½ in. Price: £35 9s. 1d. (also available in kit form): £31 14s. 1d.

● **Avel-Dynaco "Stereo 70" amplifier.** 35W per channel, 40W max. H.D. as for Mk. IV. Input for spec. output 1.4V each channel. Response ±0.5 dB 20-60,000 c/s. Feedback 20 dB both channels. N.L. 90 dB below 30W out. Output imp. 4, 8 or 16 ohms. Output EL34s. Ultra-linear. Power supplies required 200-240V AC. To operate with PAS-2 control unit. Size: 10 × 13 × 6½ in. Price: £66 13s. (also available in kit form): £60 8s. 1d.



**BANG & OLUFSEN, Denmark.** Sole U.K. Distributors: Aveley Electric Ltd., South Ockendon, Essex. Tgl.: South Ockendon 3444.

● **Type 609 integrated stereo amplifier.** 15W per channel. Inputs: pickup, 2 mV; tape 100 mV; radio 100 mV. Bass, treble, balance controls with visual display showing effect of tone controls. Transistorised input stage. Response 20-20,000 c/s ±1 dB Distortion <0.5% at 10W. 16 dB feedback. Crosstalk ±50 dB between channels. N.L. -60 dB. Output ECL85s. Output imp. 15 ohms. Size approx.: 15 × 9 × 6 in. Price: £52 10s.

● **Type GF2.** Transistorised stereo pickup pre-amplifier. Sensitivity: 7 mV input for 0.5V output per channel. N.L. -62 dB. Price: £5 5s.

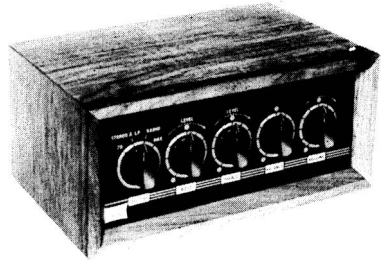


**BRYAN AMPLIFIERS LTD.** Distributors: Tellux Ltd., Avenue Works, Gallows Corner, Colchester Road, Romford, Essex. Tel.: Ingrebourne 43971. Cables: Tellux, Romford.

● **Model 400.** Transistorised integrated stereo amplifier. 13 + 13W or 15W on each channel independently. Dist. less than 0.25% at 10W. Response 40 c/s-20 Kc/s ±1 dB. Feedback 60 dB. H. and N. -60 dB. Inputs: mag. pu. 5 mV, 6 K; ceram. pu. 25 mV, 250 K; radio 100 mV, 100 K; tape 100 mV, 100 K; aux. 100 mV, 100 K. Controls: input sel., and mono/stereo function switches, bass, treble, balance. Size: 15½ × 6 × 10½ in. Price: £63.

● **Model 500.** Transistorised stereo control unit. Inputs: mag. pu. 5 mV, 6 K; ceram. pu. 25 mV, 250 K (R.I.A.A. corrected); radio, tape,

aux. 100 mV, 100 K. Output 100 mV. Controls: input sel., and mono/stereo function switches; bass, treble, balance. Filters: high-pass 70 c/s and 25 c/s; low-pass 4, 6 and 9 Kc/s at 8-10 dB per octave. H. and N. -70 dB (including power amplifier, Model 600). Powered from Model 600 amplifier with which it operates. Size: 11 × 4½ × 6⅜ in.



*Decca Decola "Separates" control unit*

★ **Model 600.** Transistorised stereo amplifier. Output 12W + 12W for 100 mV inputs. Feedback 60 dB. Response ±1 dB 40 c/s-20 Kc/s. Dist. less than 0.25% at 10W. Size: 12½ × 8¼ × 5½ in. Price (together with Model 500): £63.

★

**CHAPMAN (ULTRASONICS) LTD.** See Derritron (Ultrasonics) Ltd.

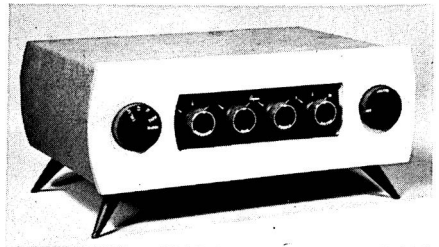
★

**CLARKE & SMITH MANUFACTURING CO. LTD.,** High Fidelity Components Division, Melbourne Road, Wallington, Surrey. Tel.: Wallington 9252. Cables: Electronic, Wallington.



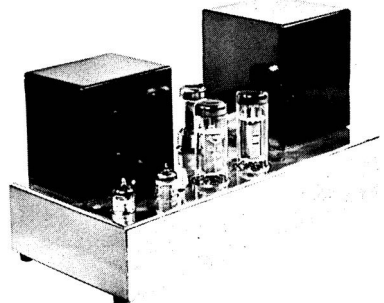
*Decca Decola "Separates" amplifier*

● **Model 656 stereo control unit.** Inputs: tape 470 K, 3 mV; mag. pickup 68 K, 2 mV; crystal/ceramic pickup 33 K, 100 mV; aux. 470 K, 100 mV; radio 470 K, 100 mV; mic. 470 K, 2 mV; tape monitor 1 M, 500 mV. Output 0.5V. Controls: volume, bass, treble, balance, input selector. Filters: high-pass 30 c/s, low-pass 7 Kc/s. Response 40 c/s to 20 Kc/s (depending upon input). Noise equivalent to 0.8µV on R.I.A.A. input. P.s.n. 300V DC 15 mA; 6.3V AC or DC 1.8 amps. Tape monitor facilities. To operate with Model 657. Size: 4 × 14 × 7 in. Price: £27 6s.



*Derritron 105 integrated*

● **Model 657.** Stereo power amplifier. Output 10W per channel. Distortion 0.2% for 10W at 1 Kc/s. Response 30 c/s-20 Kc/s ±1 dB. Derived centre channel signal, 1V at rated output. Noise -80 dB referred to 10W. Input 500 mV. L.S. matching, 4 or 16 ohms. Output stages, EL84s ultra-linear push-pull. P.s.n. 200-250V 50 c/s. Size: 4 × 14 × 8¾ in. To operate with control unit, Model 656. Price: £25 4s.



*Derritron 205 amplifier*

● **Model 655.** Stereo integrated amplifier. Specification as for Models 656 and 657. Free-standing. Size: 4 × 14 × 13¾ in. Price: £44 2s.

**DECCA RADIO & TELEVISION**, Ingate Place, Queenstown Road, London, S.W.8. Tel.: Macaulay 6677.

● **Stereo Decola "Separates" control unit.** Inputs: pickup 14 mV; mic. 15 mV; radio 60 mV; tape 35 mV. Output 90 mV. Controls sel., bass, treble, balance, vol. Filters high-pass 40 c/s. Response 40 c/s-25 Kc/s. P.s.n. 280V DC 8 mA; 37-5V DC. To operate with "Separates" power amplifier. Size:  $11 \times 7\frac{1}{2} \times 5\frac{1}{4}$  in. Price: £23 2s.

● **Stereo Decola "Separates" power amplifier.** Output 12W per channel. Distortion 0.1% at 10W, measured at 1 Kc/s. Response 30 c/s-25 Kc/s  $\pm 1$  dB. Noise -75 dB referred to 12W. Input 90 mV. L.S. matching, 15 ohms. P.s.n. 100-250V AC. To operate with "Separates" control unit. Price: £37 16s.



**DERRITRON (ULTRASONICS) LTD.**, 24 Upper Brook Street, London, W.1. Tel.: Hyde Park 2291.

● **Chapman 205 amplifier.** 30W from 30-20,000 c/s. Dist. <0.05% at 20W; 0.1% at 30W. Response 2-100,000 c/s  $\pm 1$  dB. Feedback 30 dB. N.L. -89 dB at 20W. Output imp. 15 ohms. Output EL34s. Ultra-linear. Price: £34.

● **Chapman 105 combined control unit and amplifier.** 10W nominal, 20W peak. Inputs: pickup 10 and 50 mV; radio and tape 100 mV. Sel., bass, treble, filter, loudness control, vol. and on/off. Rumble filter. Dist. <0.1%. Response 30-20,000 c/s  $\pm 0.2$  dB. N.L. -80 dB. Output imp. 3 and 15 ohms. Output EL84s. Ultra-linear. Size:  $12 \times 4\frac{1}{8} \times 8\frac{1}{2}$  in. Price: £29 18s.

● **Chapman 305 stereo control unit.** Inputs: gram. 5 mV, 100 K (R.I.A.A.); radio, aux. 100 mV, 250 K flat; tape 50 mV, 100 K flat. Tape output 75 mV with above inputs. Controls: bass, treble, balance, function, vol., filter, press-button sel. Filters: low-pass, 5, 10, 20 Kc/s at 12 dB octave; high-pass, fixed roll-off at 30 c/s for rumble. Response within 0.2 dB 30 c/s-20 Kc/s without filters. H. and N. -50 dB on all channels. P.s.n. 10 mA, 250V; 1.5 amps, 6.3V. Fully tropicalised. Operates with 305 and 205 amplifiers. Size:  $14\frac{1}{2} \times 5\frac{1}{2} \times 4\frac{1}{2}$  in. Price: £19 17s.

● **Chapman 305MA stereo amplifier.** 8W per channel, 15W peak. Dist. less than 0.1% at 8W. Response within 0.2 dB 30 c/s-20 Kc/s. Feedback 10 dB. N.L. -80 dB to 8W. Input

350 mV. Output matching, 3, 15 ohms. Output  $4 \times$  EL84 ultra-linear. To operate with 305CU pre-amplifier. Size:  $12 \times 7 \times 5$  in. Price: £22 1s.

● **Chapman integrated 306 stereo amplifier.** Inputs: gram. 5 mV, 100 K (R.I.A.A.); radio, aux. 100 mV, 250 K flat; tape 50 mV, 100 K flat. Controls: bass, treble, function, balance, vol., filter, press-button sel. Filters: low-pass, 5, 10, 20 Kc/s at 12 dB octave. Response ( $\pm 0.5$  dB) 36 c/s-20 Kc/s including filters at 1W level, 25 c/s-25 Kc/s without filters. H. and N. (main amp) -75 dB; (radio, tape, aux.) -60 dB; (gram.) -50 dB. P.s.n. 200-250V 50 c/s. Output 8W per channel. H.D. less than 0.1% at 1 Kc/s, intermodulation less than 1%. Feedback 15 dB. Output imp. 3, 15 ohms. Output  $4 \times$  ECL86. Size:  $14\frac{1}{2} \times 5\frac{1}{2} \times 9\frac{1}{2}$  in. Free-standing. Fully tropicalised. Price: £37.



**EAGLE PRODUCTS.** Distributors: B. Adair & Sons (Radio) Ltd., 32a Coptic Street, London, W.C.1. Tel.: Museum 9606/7. Cables: Reldab, London.

● **SA.80 integrated stereo amplifier.** Output 4W per channel. H.D. 4W, 1%; 8W, 2%. Response 50 c/s-15 Kc/s. N.L. -40 dB. Inputs: gram. 5 mV; tuner 50 mV. L.S. matching 16 ohms. Self-powered. Controls: sel., vol. A, vol. B, tone. Free-standing. Size:  $7\frac{1}{8} \times 3 \times 6$  in. Price: £9 10s.

● **SA.300 integrated stereo amplifier.** Output 15W per channel. H.D. less than 1% to 20W, 10W per channel, 1 Kc/s. Response 30 c/s-25 Kc/s  $\pm 0.5$  dB. N.L. -60 dB. Inputs: tape 3.5 mV; tuner and aux. 0.5V; mag. pu. 4.5 mV; ceram. pu. 0.16V. L.S. matching 4, 8, 16 ohms. Controls: bass, treble, vol., balance, stereo normal/reverse, rumble filter, loudness, speaker phasing, hum, on/off. High- and low-pass filters. Self-powered. Free-standing. Size:  $13\frac{1}{2} \times 10\frac{3}{4} \times 4\frac{3}{8}$  in. Price: £32 10s.



**ELSTONE ELECTRONICS LTD.**, Edward Street, Templar Street, Leeds 2. Tel.: Leeds 35111.

**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.

● **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 Hi-Gain, transistorised pre-amplifier.** Battery operated (1,000-hour battery life). F.R.  $\pm 1$  dB 30-25,000 c/s. Built-in switched CCIR equalisation for monitoring, dubbing, high gain, amplification for moving coil mics., etc. Size:  $6\frac{7}{8} \times 2\frac{1}{8} \times 2\frac{1}{2}$  in. Price: £7 16s.



**EXPERT GRAMOPHONES LTD.,** Audio Works, 197 Laleham Road, Staines, Middlesex. Tel.: Staines 53761.

● **Model 62 stereo control unit.** Input to suit any combination of sensitivity, impedances and characteristic. Output 200 mV. Filter, high-pass -15 dB at 10 c/s. Distortion less than 0.01%. Crosstalk -40 dB at 1 Kc/s. "Audiorama" giving pseudo-stereo effects from mono signals. Size:  $13\frac{1}{4} \times 5\frac{1}{4} \times 6\frac{1}{4}$  in. To operate with two expert standard amplifiers or any stereo amplifier of 200 mV sensitivity. Price: £36 15s.

**Standard amplifier.** Output 12W. Distortion 0.1%. Response 20 c/s-25 Kc/s  $\pm 0.5$  dB. Feedback 30 dB. Noise -80 dB at 8W. Input 200 mV. L.S. matching, 15 ohms. Output stages EL84s, ultra-linear. Size:  $12 \times 9 \times 6\frac{1}{2}$  in. To operate in pairs with stereo control unit, Model 62, or singly with the expert mono control unit. Price: £21.

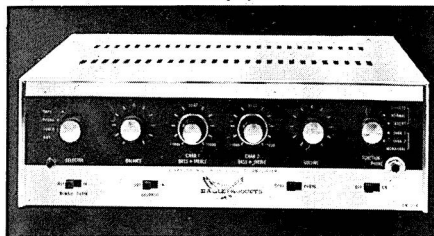
● **Mk. II stereo amplifier.** Output 10W. H.D. 0.2% at 10W. Response 40 c/s-40 Kc/s. Feedback 25 dB. N.L. -80 dB at 8W. L.S. matching, 15 ohms. Output stages ECL86s. P.s.n. 240V A.C. Size:  $10 \times 7 \times 7$  in. To operate with Mk. II control unit. Price: £22 1s.

● **Mk. II stereo control unit.** Input 150 mV, 1 megohm. Controls: input sel., vol., balance, treble, bass, function. Response 30 c/s-20 Kc/s. Record and replay tape inputs on front panel as well as at the back. Can be mounted vertically or horizontally. To operate with Expert 10  $\times$  10 stereo amplifier, or two 35W mono amplifiers. Size:  $10\frac{1}{2} \times 2\frac{1}{2} \times 2\frac{1}{2}$  in. Price: £12 12s.

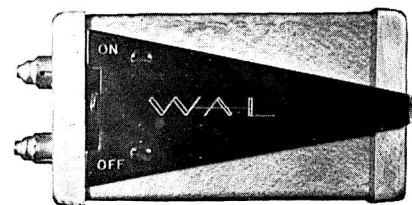
**Mono 34 amplifier.** Output 35W max. H.D. 0.1% at 30W. Response 40 c/s-40 Kc/s. Feed-



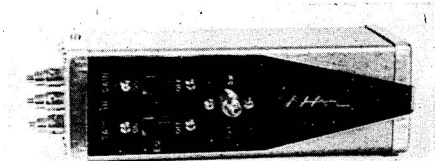
Eagle SA 80 Stereo Amplifier



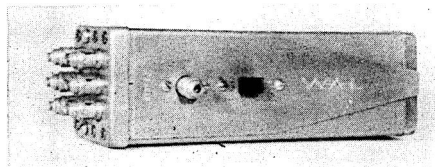
Eagle SA 300 Stereo Amplifier



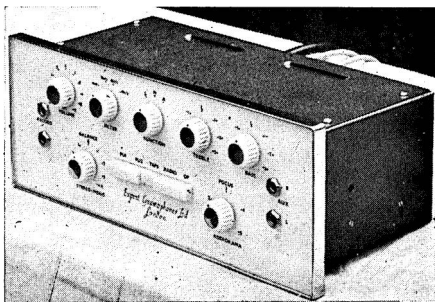
WAL gain



WAL Hi-Gain



Stereo WAL Gain



Expert model 62 stereo C.U.

back 25 dB. N.L. -90 dB. Input 500 mV. L.S. matching, 7 and 15 ohms. Output stages ECL86s. P.s.n. 240V AC. Size: 13 × 8 × 8 in. To operate with Model 62 or Mk. II Expert. Price: £32.



**FISHER RADIO CORPORATION**, Long Island City 1, New York, U.S.A. Distributors: Imhofs (Retail) Ltd., 112-116 New Oxford Street, London, W.C.1. Tel.: Museum 7878.

●**X-100**. Integrated stereo amplifier. 20W per channel. H.D. 0.8%. Response 20 c/s-20 Kc/s ±1 dB. N.L. better than -90 dB with vol. control at minimum. Inputs for mono and stereo pu., tape head, tuner, aux., tape monitor. High- and low-pass filters. Independent tone controls for each channel. Output stages EL184s. P.s.n. 200-240V AC. Price (in chassis form): £59 17s. Also available in cabinet form.

●**X101-C**. Integrated stereo amplifier. 27W per channel. H.D. 0.5%. Response 20 c/s-20 Kc/s ±1 dB. N.L. -88 dB. Load imp. 4, 8, 16 ohms. Inputs: high level 300 mV; gram. 3.5 mV; tape head 2 mV. Controls: mode, vol., sel., bass, treble, balance. High-pass filter sub-sonic cutoff 12 dB/octave. Direct tape monitor. Derived centre-channel output. Size: 15½ × 4¾ × 12½ in. Price: £99 18s.

●**X202-B**. Integrated stereo amplifier. 35W per channel. H.D. 0.5%. Response 20 c/s-20 Kc/s. Feedback 22 dB. N.L. -90 dB. Load imp. 4, 8, 16 ohms. Inputs: high level 280 mV; gram. 3.5 mV; tape head 2 mV. Controls: vol., dual concentric bass, treble, mode, programme sel., loudness contour, centre-speaker switch. High-pass filter 12 dB/octave. Direct tape monitor. Derived centre-channel output. Self-powered. Size: 15½ × 4¾ × 12½ in. Price: £137 12s. 9d.

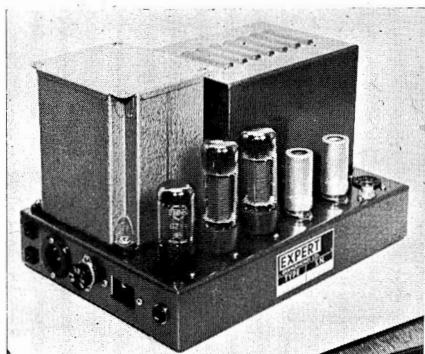
●**X1000**. Integrated stereo amplifier. 50W per channel. H.D. 0.5%. Response 20 c/s-20 Kc/s ±0.5 dB. Feedback 12 dB output, 17 dB pre-driver stage. N.L. -95 dB. Inputs: gram. 3.3 mV; tape head 1.5 mV; high level 230 mV. Load imp. 4, 8, 16 ohms. Controls: low-level inputs, centre-power level, vol., balance, equalizer, dual concentric bass and treble, loudness contour. High-pass filter 12 dB/octave. Direct tape monitor. Derived centre-channel output. Self-powered. Size: 17 × 4¾ × 13¾ in. Price: £161 5s.

The X-100 is available from stock. Others are supplied to special order.

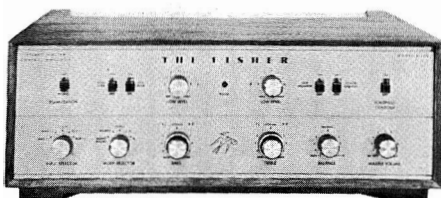


**GOODSELL LTD.**, Gardner Street, Brighton. Tel.: Brighton 65752.

●**Stereo II control unit**. Inputs: pickup 7 mV stereo; radio 150 mV; tape 3 mV. Sel. switch,



*Expert Gramophones Mono 34 Amplifier*



*Fisher X100 Integrated Stereo Amplifier*



*Expert Gramophones Stereo Amplifier Mk II*

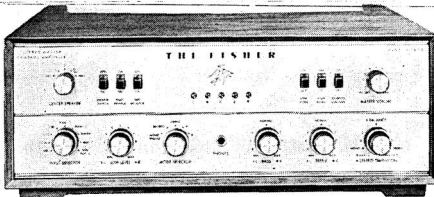


*Fisher X101-C Integrated Stereo Amplifier*

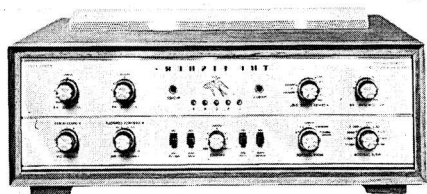
vol., bass, treble, on/off. H.D. 0.1%. To operate with GW25 amplifier. Size: 13 × 7½ × 3¾ in. Price: £27 15s.

●**Stereo III control unit.** Inputs: pickup 60 mV, radio and tape 100 mV. Push-button sel., ganged bass, treble, volume controls. H. and N. -65 dB. To operate with GW25 amplifier. Price: £9 15s.

**GW25 amplifier.** 20W. Dist. 0.1%. Input for spec. output 1.5V. Response 20-100,000 c/s. Feedback 20 dB. N.L. better than -75 dB. Output imp. 3, 8 and 15 ohms. Output KT66s. Ultra-linear. Size: 14 × 10 × 7 in. Weight: 35 lb. To operate with Stereo II and III control units. Price: £33 10s.



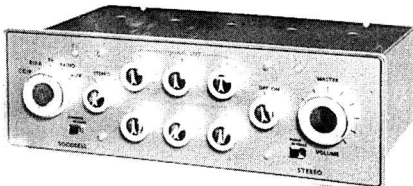
*Fisher X202-B Integrated Stereo Amplifier*



*Fisher X1000 Integrated Stereo Amplifier*



*Goodsell stereo III control unit*

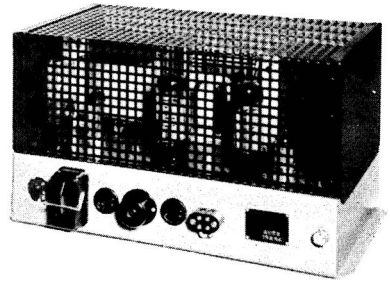


*Goodsell stereo II control unit*

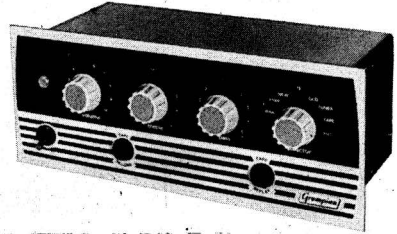
**GRAMPIAN REPRODUCERS LTD.**, Hanworth Trading Estate, Feltham, Middx. Tel.: Feltham 2657/8/9. Cables: Reamp, Feltham.

**Grampian 582 control unit.** Inputs: pickup 15 mV; radio 200 mV; tape 500 mV. Sel. switch, bass, treble, vol. Size: 10¼ × 4 × 5½ in. Price: £14. To operate with "Ten Fifteen" amplifier.

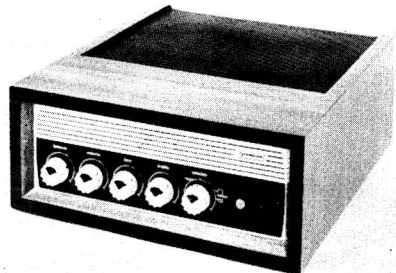
**Grampian 10-15 amplifier.** 10W nom., 15W peak. Dist. 0.1% at 10W. Input for spec. output 50 mV. Response 30-20,000 c/s ± 1 dB. Feedback 20 dB. N.L. -65 dB below full output. Output imp. 4, 8, 15 ohms. Output EL84s. Ultra-linear. Size: 11 × 7½ × 6½ in. To operate with "582" control unit. Price: £18.



*Goodsell GW25 amplifier*



*Grampian 582 control unit*



*Grampian 590/2 integrated stereo*

● **Grampian 590/2 series.** Stereo unit. 7W per channel, 10W peak. Dist. 1%. H. and N. -60 dB. Inputs: pickup 0.5V at 1 megohm; tuner and tape IV at 0.5 megohm. Sel., switch, balance, bass, treble. Output imp. 4 and 15 ohms. Size (chassis):  $10\frac{1}{8} \times 3\frac{7}{8} \times 13$  in., (wood surround):  $12\frac{1}{4} \times 5\frac{3}{4} \times 13$  in. Price 590/2 (control unit and two 584 amplifiers): £32; (wood surround): £2.



**HENRY'S RADIO LTD.** See Constructional Kits Section.

**HART ELECTRONICS,** 193 Hart Road, Manchester 14. Tel.: Rusholme 2212-3. Cables: Alloys Mcr.

**Stereo 20.** Integrated transistorised amplifier. Output 20W. H.D. 0.2%. F.R. .40 c/s-20 Kc/s. Feedback 60 dB. N.L. -70 dB. L.S. matching 15 ohms. Inputs: mag. pu 5 mV, 6K; crystal pu 80 mV, 100 K; mic 1.5 mV, 1 K; tape replay 2.5 mV, 1 K; aux 150 mV, 100 K. Controls: on/off, input sel., bass, treble, filter, function, vol., bal., speaker phase. Low-pass filters: 6, 10, 20 Kc/s. Internal power supply. Third head tape monitoring at 100 mV level independent of vol. control (optional extra). Cabinet mounting. Size  $12 \times 7 \times 3\frac{1}{4}$  ins. Price: £50 8s.

**Mono 10.** Integrated transistorised amplifier. Output 10W. H.D. 0.25%. F.R. 40 c/s-20 Kc/s. Feedback 60 dB. N.L. -70 dB. L.S. matching 3-15 ohms. Inputs: mag pu 5 mV, 6 K; crystal pu 100 mV, 100 K; aux. 150 mV, 100 K; mic 1.5 mV, 1 K; tape replay 2.5 mV, 1 K. Controls: input sel., on/off, bass, treble, filter, vol. Low-pass filters: 6, 10, 20 Kc/s. Internal power supply. Free standing or cabinet mounting. Size:  $9 \times 6\frac{1}{4} \times 3\frac{1}{4}$  ins. Price: £24 14s.



**JASON ELECTRONIC DESIGNS LTD.,** 23 Wardour Street, London, W.1. Tel.: Gerard 3977/8.

**J10 combined control unit and power amplifier.** Inputs: mic. 1 mV; tape 0.5V; radio 0.4V; pu. 1.0V and crystal pu. 6-position sel., treble, bass, vol. P.a.t. 270V at 10 mA; 6.3V at 0.3 amps. Output 10W nom., 15W max. Dist. 0.1%. Response 30-30,000 c/s  $\pm 2$  dB. N.L. better than 55 dB (mic. input). Output imp. 15 ohms (other imps. to order). Output EL84s. Ultra-linear. Size:  $11\frac{1}{4} \times 8\frac{1}{4} \times 4\frac{3}{8}$  in. Price: £24.

● **J2-10 integrated stereo amplifier Mk. III.** Inputs: pickup 3 mV and 60 mV; tape 1.5 mV; radio 60 mV; mic. 5 mV. 5-position sel. switch, bass, treble, vol., balance, function, 9 Kc/s and 6 Kc/s filter. H.D. less than 0.1%. H. and N. -55 dB. Rumble filter. 10W per channel, 15W max. 18 dB feedback. Output imp. 4, 8, 15 ohms. Output EL84s. Size:  $15 \times 4\frac{3}{8} \times 12$  in. Price: £40 19s.



**KERR McCOSH & CO. LTD.,** 435 Sauchiehall Street, Glasgow, C.2.

● **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:  $12\frac{1}{2} \times 4\frac{1}{2} \times 10\frac{1}{4}$  in. Price: £34.

**CWA10 amplifier.** 10W. Dist. 0.1% at 10W. N.L. -85 dB at 10W. Response 25-30,000 c/s  $\pm 0.2$  dB; 20-20,000 c/s  $\pm 1$  dB. Output imp. 7 and 15 ohms. Size:  $11\frac{1}{2} \times 7\frac{3}{4} \times 4\frac{1}{2}$  in. Price: £24.

**CWA40 mono amplifier.** 40W output. L.S. matching  $7\frac{1}{2}$ , 15 ohms. Output stages EL34s. To operate with DSI stereo control unit. Price to be announced.



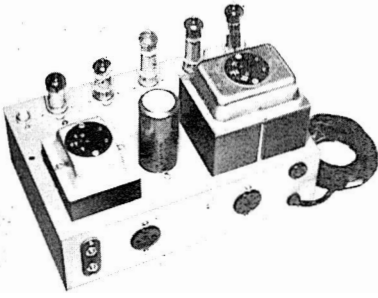
**H. J. LEAK & CO. LTD.,** 57-59 Brunel Road, East Acton, London, W.3. Tel.: Shepherds Bush 1173. Cables: Sinusoidal, Ealux, London.

“**Point One**” **TL/12 plus amplifier.** 12W. Dist. 0.1%. Input for spec. output 125 mV. Response 20-20,000 c/s  $\pm 0.25$  dB. Feedback 26 dB. N.L. -82 dB. Output imp. 4, 8 and 16 ohms. Output EL84s. Ultra-linear. Size:  $10 \times 8 \times 6$  in. To operate with Varislope mono control unit. Price: £18 18s.

“**Point One**” **TL/25 plus amplifier.** 25W. Dist. 0.1%. Input for spec. output 125 mV. Response 20-20,000 c/s  $\pm 0.25$  dB. Feedback 26 dB. N.L. -83 dB. Output imp. 4, 8 and 16 ohms (other imps. to order). Output EL34s. Ultra-linear. Size:  $10 \times 8 \times 6\frac{3}{8}$  in. To operate with Varislope mono control unit. Price: £25 4s.

“**Point One**” **TL/50 plus amplifier.** 50W. Dist. 0.1%. Input for spec. output 125 mV. Response 20-20,000 c/s. Feedback 26 dB. N.L. -84 dB. Output imp. 4, 8 and 16 ohms (other

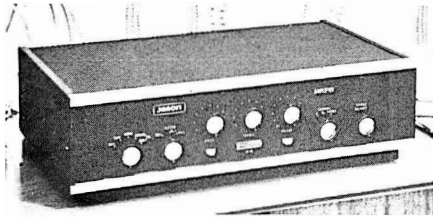




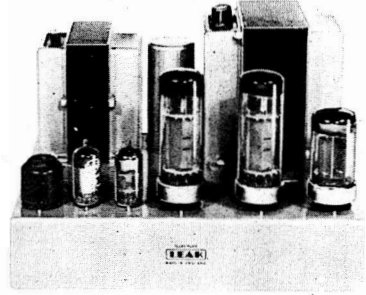
*Grampian 10-15 amplifier*



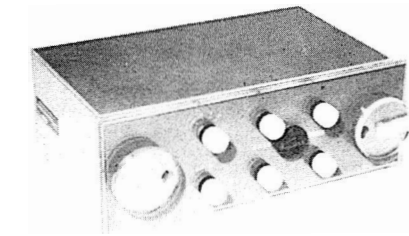
*Hart Mono 10 Integrated Amplifier*



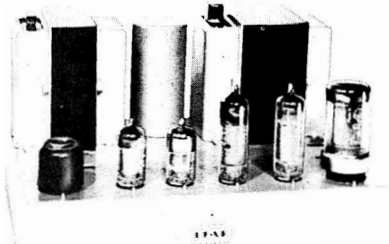
*Jason J2-10 integrated stereo*



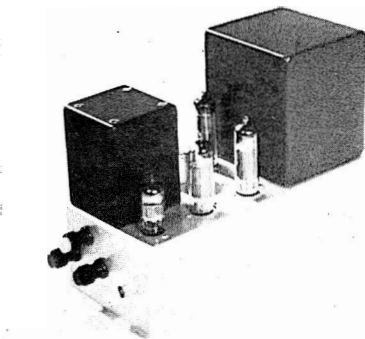
*Leak "Point One" TL/50 plus*



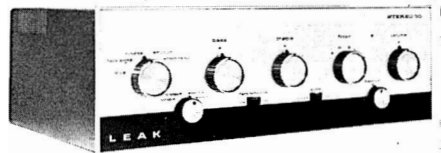
*Kerr McCosh DSI stereo control unit*



*Leak "Point One" TL/12 plus*



*Kerr McCosh C.W.A.10 amplifier*



*Leak stereo 30 integrated amplifier*



*Dulci Stereo-Five control unit*

imps. to order). Output KT88s. Ultra-linear. Size:  $11\frac{1}{2} \times 9 \times 6\frac{1}{4}$  in. To operate with Vari-slope mono control unit. Price: £33 12s.

● **"Point One" stereo 20 amplifier.** 11W each channel. Dist. 0.1% on each channel. Input for spec. output 125 mV. Response 20-20,000 c/s. Feedback 24 dB. N.L. -80 dB. Output imp. 4, 8 and 16 ohms. Output EL84s. Ultra-linear. To operate with Vari-slope II stereo control unit. Price: £30 9s.

● **"Point One" stereo 60 amplifier.** Details as for stereo 20 but 30W each channel. Price: £42.

**Vari-slope mono control unit.** Inputs: pu. (R.I.A.A. correction) 3.5 mV, 70 K; tape head (CCIR correction) 3 mV, 120 K; mic. 3 mV, 120 K; tuner 50 mV, 70 K; tape amp. 125 mV, 70 K. Output 125 mV. Controls: input, bass, treble, filter, slope, vol. (AC-on/off), tape monitor. Low-pass filter-off, 9 Kc/s, 6 Kc/s, 4 Kc/s. Response: flat for tuner, mic., tape amp; R.I.A.A. for pu; CCIR for tape head. H. and N. -60 dB (tuner, tape amp); -52 dB (mic., pu, tape head). P.s.n. H.T. and L.T. supplied by TL/12 Plus; TL/25 Plus or TL/50 Plus. H.D. 0.01%. Input level controls, tape record sockets with level control, tape monitor facility. To operate with TL/12 Plus, TL/25 Plus or TL/50 Plus. Size:  $11\frac{1}{2} \times 4\frac{1}{4} \times 5$  in. Price: £15 15s.

● **Vari-slope II stereo control unit.** Inputs: pu. (R.I.A.A. correction) 3.5 mV, 70 K; tape head (CCIR correction) 3 mV, 120 K; mic. 3 mV, 120 K; tuner 50 mV, 70 K; tape amp 125 mV, 120 K. Output 125 mV. Controls: input, bass, treble, filter, slope, vol. (AC-on/off), tape monitor, function, balance. Low-pass filter-off, 9 Kc/s, 6 Kc/s, 4 Kc/s. Response: flat for tuner, mic., tape amp; R.I.A.A. for pu; CCIR for tape head. H. and N. -60 dB (tuner, tape amp); -52 dB (mic., pu, tape head). P.s.n. H.T. and L.T. supplied by stereo 20 or stereo 60. Input level controls, tape sockets for recording with level control, tape monitoring facility. H.D. 0.01%. To operate with stereo 20 or stereo.60. Size:  $11\frac{1}{2} \times 4\frac{1}{4} \times 6\frac{1}{2}$  in. Price: £25.

● **Stereo 30. Transistorised integrated amplifier.** Inputs: pu (R.I.A.A. correction) 3.5 mV, 47 K; tape head (CCIR correction) 3 mV, 47 K; mic. 3 mV, 33 K; tuner 100 mV, 100 K; tape amp 125 mV, 50 K. 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 Kc/s, 6 Kc/s, 4 Kc/s. Response: flat on mic., tuner, tape amp; R.I.A.A. on pu; CCIR on tape head. H. and N. -66 dB (tuner, tape amp); -52 dB (mic., pu, tape head).

H.D. 0.1% at 8W, 15 ohms. Feedback 60 dB. L.S. matching 4, 15 ohms. N.L. (power amp, vol. at minimum) -82 dB. P.s.n. 110-250V, 40-60 c/s. Input level controls, tape outlets for recording with level control, tape monitor facility. Free-standing. Size:  $13 \times 4\frac{1}{4} \times 9$  in. Price: £49 10s.



**LEE PRODUCTS (G.B.) LTD.,** 10-18 Clifton Street, London, E.C.2. Tel.: Bishopsgate 6711. Cables: Leprod, London.

**Elpico AC88.** Inputs: mic. 4 mV; radio, pickup and tape 100 mV. 10W nom., 16W max. Dist. 0.5% at 10W. Response 50-20,000 c/s  $\pm 3$  dB. N.L. -55 dB. Output imp. 3-15 ohms. Output EL84s. Ultra-linear. Size:  $14 \times 7\frac{1}{2} \times 8$  in. Price: £25 4s.

● **Dulci SP-55 amplifier.** Input sensitivity: 200 mV for 3W output per channel. Output 8W peak (4W per channel). H.D. better than 0.5% total harmonic content. H. and N. -70 dB. Response  $\pm 1$  dB from 40-25,000 c/s. Size:  $11\frac{1}{2} \times 6 \times 7\frac{1}{2}$  in. Weight: 13 lb. 12 oz. To operate with Stereo-Five pre-amplifier control unit. Price: £15 15s.

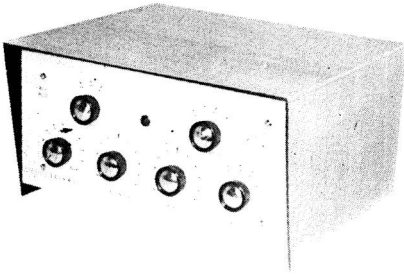
**Dulci DPA-15 amplifier.** 12W nom., 15W max. H.D. total harmonic below 0.3% at 10W. Response at 1W within 5 dB 3-50,000 c/s; at 10W within 1 dB 30-15,000 c/s. H. and N. 75 dB below 10W. Output imp. switchable 3-5, 6-8, 12-16 ohms. Output EL84s. Ultra-linear. Size:  $11\frac{1}{2} \times 6 \times 7\frac{1}{2}$  in. To operate with DPA-15 control unit. Price: £15 15s.

● **Dulci GA-505 integrated stereo amplifier.** 4W nom., 5W per channel max. H.D. better than 1% at 4W per channel. N.L. -55 dB. Output imp. 3 or 15 ohms. Output two ECL86s. Power supply required AC 230V, 40-60 cycles. Size:  $12\frac{3}{4} \times 3\frac{3}{4} \times 6\frac{1}{2}$  in. Price: £18 18s.

● **Stereo-Five control unit.** Inputs: radio and tape 100 mV; pickup 50 mV -2V (adjustable); radio and tape 250 K ohms; pickup 1 megohm (for low sensitivity pickups the TA-6 transistor pre-amplifier plugs into the back of the Stereo-Five). Separate bass, treble, balance and vol. controls together with 6-position sel. switch. Size:  $12\frac{3}{4} \times 3\frac{3}{4} \times 5$  in. Price: £11 11s. To operate with two DPA-15 or SP-55 amplifier.

**DPA-15 control unit.** Inputs: mic. 1.5 mV, 2 megohms; tape replay 100 mV, 100 K ohms; radio 1, 100 mV, 100 K-ohms; radio 2, 300 mV, 560 K-ohms. Separate bass, treble and vol. control together with 6-position sel. switch.

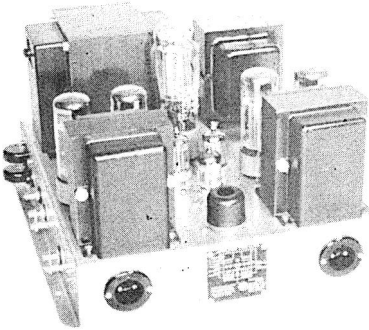
**AMPLIFIERS**



*Lowther Mk. IV control unit*



*Lowther LL15 amplifier*



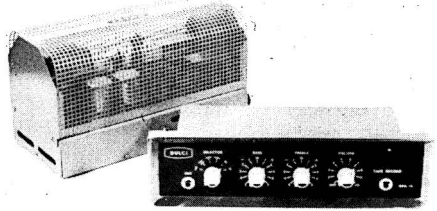
*Lowther LL15S stereo amplifier*



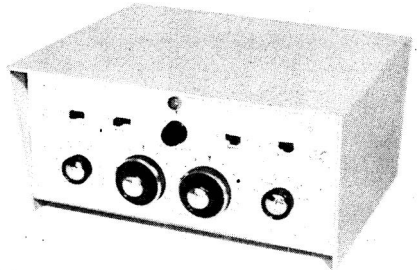
*Lowther LL26 amplifier*



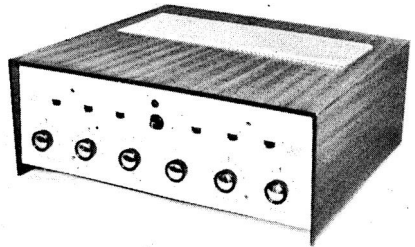
*Dulci GA505 integrated stereo*



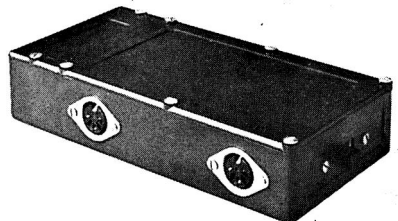
*Dulci DPA15 control unit and amplifier*



*Lowther stereo control unit*



*Lowther integrated stereo*



*Metrosound Pickup/Mic stereo pre-amp*

Size:  $12\frac{3}{4} \times 3\frac{3}{4} \times 5\frac{1}{2}$  in. Price: £10 10s. To operate with DPA-15 amplifier.



**LOWTHER MANUFACTURING CO.,** Lowther House, St. Mark's Road, Bromley, Kent. Tel.: Ravensbourne 5225. Cables: Lowther, Bromley.

**Lowther No. 2 control unit.** Inputs: mic. 15 mV; pu 15 mV; radio 250 mV. 4-pos. sel., treble, bass, vol., on/off. Mic./tape input socket. H.D. 0.1% on 1V RMS. H. and N. -60 dB. Size:  $10\frac{3}{4} \times 2\frac{1}{2} \times 3\frac{1}{2}$  in. To operate with LL15. Price: £10 10s.

**Lowther LL15 amplifier.** 16W. Dist. <0.1%. Input for spec. output 0.75V. Response 20-40,000 c/s  $\pm 1$  dB. Feedback 20 dB. N.L. -85 dB. Output imp. 16 ohms with adjustment. Output EL34s. Lowther Linear (screen and anode feedback). P.a.t. Size:  $12 \times 6 \times 6$  in. To operate with Mk. IV or No. 2 control units. Price: £27 10s.

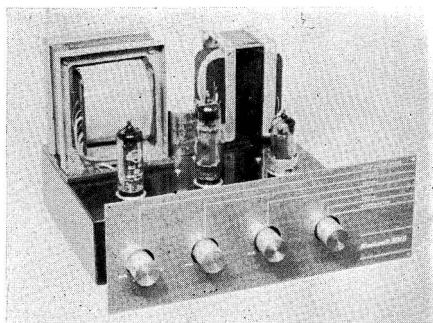
**Lowther LL26 amplifier.** 26W. Dist. <0.1%. Input for spec. output 0.75V. Response 20-70,000 c/s  $\pm 1$  dB. Feedback 22 dB. N.L. -90 dB. Output imp. 16 ohms with adjustment. Output EL34s. Lowther Linear. Size:  $11 \times 12 \times 7\frac{1}{2}$  in. Weight: 33 lb. To operate with Mk. IV control unit. Price: £47.

**Lowther Mk. IV 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: 9, 7 and 4.5 Kc/s. H.D. <0.5%. H. and N. -65 dB. Output cathode follower 1V RMS. To operate with Lowther LL15 Mk. 1. Size:  $10\frac{3}{4} \times 4\frac{5}{8} \times 7$  in. Price: £20.

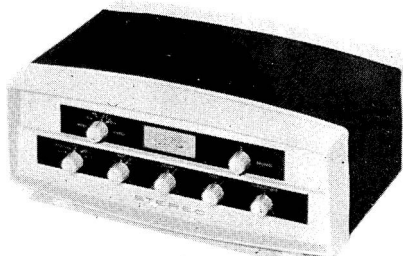
● **Lowther Mk. I stereo control unit.** Input as for master control unit Mk. IV. Tape input sockets. H.D. 0.1%. Dual low-pass filters. Dual output balanced and balance controls between channels. Size as Mk. IV. To operate with LL15S power amp. Price: £40.

● **Lowther LL15S stereo amplifier.** 16W output on each channel. Dist. 0.1%. Input for spec. output 0.75V. Response 20-40,000 c/s  $\pm 1$  dB. N.L. -85 dB. Output imp. 8.4 or 16 ohms. Output EL34. Lowther Linear. Size:  $11 \times 12 \times 7\frac{1}{2}$  in. To operate with Mk. I control unit. Price: £47.

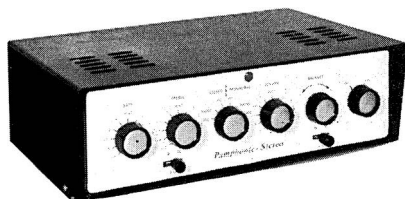
● **Lowther integrated stereo amplifier.** 12W per channel. Inputs: mic. 2 mV; pickup 2 mV; tape 100 mV; radio 100 mV; aux. 100 mV. H.D. 0.2% at 12W. Response 30-30,000 c/s  $\pm 1$  dB. N.L. -70 dB. Built-in oscillator for calibration. Output imp. 16 ohms, with adjustment. Price: £60; £64 with cabinet.



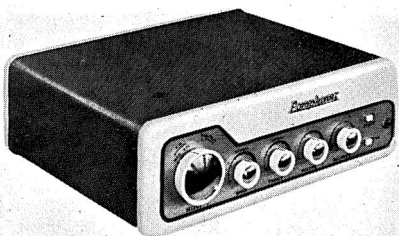
*Musicraft MM3 integrated*



*Ortofon KS601 integrated stereo*



*Pamphonic 3000 integrated stereo*



*Pamphonic 3001 integrated stereo*



*Pamphonic 2001 amplifier*

**MARTIN ELECTRONICS LTD.** See Constructional Kits Section.



**METRO-SOUND MANUFACTURING CO. LTD.**, 19a Buckingham Road, London, N.1. Tel.: Clissold 8506/7. Cables: Metrosound, London, N.1.

● **Pickup/microphone matching unit stereo pre-amplifier.** Transistorised. Input 0.05 mV, 2/50 ohms. Voltage gain 140. Response 20 c/s-30 Kc/s  $\pm 3$  dB. P.s.n. 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.



**MUSICRAFT AUDIO PRODUCTS LTD.**, 13 King Street, Richmond, Surrey. Tel.: Richmond 6798.

**M.M.3.** Integrated mono amplifier. Output 3W. Dist. 1%. F.R. 35 c/s-30 Kc/s. Feedback 20 dB. N.L. -55 dB. Output imp. 15 ohms. Output stages EL84. P.s.n. 230V AC. Inputs: pickup, radio, tape 100 mV. Controls: sel., bass, treble, vol. Size: 8 x 6 x 6 in. Price: £15 15s.



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

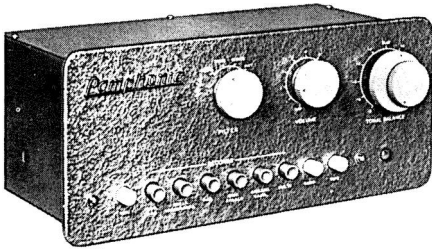
● **KS601 integrated stereo amplifier.** Pre-amp. details: Inputs F.M., tape, aux. 100 mV; mic. 2 mV; pickup 2 mV at 1 Kc/s. Controls: sel. switch, mono/stereo, vol., balance, bass, treble. Filter high-pass 20-10 c/s (adjustable).

Power amp. details: Output 15W per channel. Dist. less than 1%. Response 20 c/s-20 Kc/s  $\pm 1$  dB. Feedback 20 dB. Noise 7 mV at 3 ohm output. L.S. matching 3, 7 and 16 ohms. Output stages, two 6973s per channel. P.s.n. 220V AC on request, 110V AC. Price: £95.



**PAMPHONIC REPRODUCERS LTD.**, Westmoreland Road, London, N.W.9. Tel.: Colindale 7131.

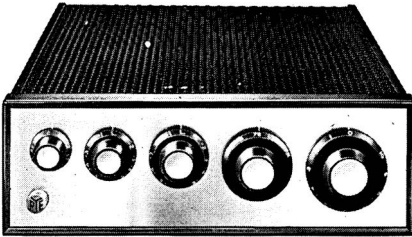
**1002B control unit.** Inputs: mic. 2-3 mV; radio-tape 60 mV; pu 6-8 mV. Push-button sel. 9-pos. (6 gram.). Cut-off filter 4, 7, 12



*Pamphonic 1002B control unit*



*Pye Mozart-HF10 amplifier*



*Pye Mozart stereo HFS20*



*Pye HS30T stereo amplifier*



*Pioneer SM-801 integrated stereo amplifier*

Kc/s and "out". Terminals for tape input. H. and N. 60 dB below 0.5V. Size:  $10\frac{1}{4} \times 4\frac{1}{2} \times 7\frac{1}{2}$  in. To operate with 2001 power amp. Price: £25 4s.

**2001A control unit.** Inputs: 3-120 mV depending on input. 6-pos. sel. Pre-set level control for tape/radio. Cut-off filter at 4, 7, 12 Kc/s and "out". Loudness control. Tape input sockets. H. and N. 60 dB below 0.5V. To operate with 2001 power amp. Price: £12 12s.

**2001 amplifier.** Mono. Output 25W. Dist. at 1,000 c/s, 0.05% at 15W. Input for spec. output 0.5V. Response substantially flat 2-100,000 c/s. Feedback 28 dB. N.L. 90 dB below full output. Output imp. 3.75, 6.6, 10 and 15 ohms. Output KT66s. Ultra-linear. To operate with 2001A or 1002B control units. Price: £29 8s.

● **3000 stereo amplifier.** Output 7.5W per channel. Dist. 0.5%. Inputs: radio 1V; tape 0.5V; pickup crystal stereo. Response 50-15,000 c/s. Feedback 20 dB. N.L. -57 dB. Output imp. 15 ohms each channel. Ultra-linear. Size:  $14 \times 9\frac{3}{4} \times 4\frac{1}{2}$  in. Price: £31 10s.

● **Stereo amplifier Model 3001.** Output 7.5W. Dist. 0.5% at 1 Kc/s 6W. F.R. 40 c/s-20 Kc/s  $\pm 1$  dB. H. and N. -60 dB (all input sockets). Inputs: mag. pu 4-6 mV; 56 K: crystal pu 150 mV; 780 K: tape or radio 1, 400 mV; 100 K: tape or radio 2, 1V, 100 K. Output imp. 15 ohms. Output stages: ECL82 (2) per channel. Controls: bass, treble, vol., balance, sel. Free-standing, or mounted in cabinet. Size:  $13 \times 10\frac{1}{4} \times 4\frac{1}{2}$  in. Weight: 18 $\frac{1}{2}$  lb. Price: £38 10s.



**PIONEER ELECTRONICS CORPORATION.** Distributors: C. Hammond & Co. Ltd., 296 Kensington High Street, London, W.14. Tel.: Western 4343.

● **SM-801.** Integrated stereo amplifier. 35W per channel. H.D. below 1%. Response 20 c/s-100 Kc/s  $\pm 1$  dB. S/N (mag. pu) better than 50 dB; (aux.) extra (than 60 dB. L.S. matching 8, 16 ohms (switchable). Output stages 7591s. Inputs: mag. pu 3.7 mV; crystal pu 24 mV; tape head 3.5 mV; mic. 3.7 mV; tuner 240 mV; aux. 240 mV; extra (with separate control) 3.5 mV. Controls: sel., tape monitor switch, vol., loudness, high- and low-pass filters, bass, treble, balance, earphone loudspeaker switch, mode sel. Speaker phase-reversing switch. Centre-channel output. Socket for earphones. P.s.n. 115, 230V (switchable). Free-standing. Size:  $16\frac{7}{8} \times 12\frac{3}{4} \times 5\frac{3}{4}$  in. Price: £78 15s.

**PERIOD HIGH FIDELITY LTD.,** 41 Beauchamp Place, Knightsbridge, London, S.W.3. Tel.: Knightsbridge 9258/9.

● **Saville Double Six integrated stereo amplifier.** Inputs: pickup 5 and 100 mV; tape 100 mV; tuner 100 mV; mic. 4 mV. 6-pos. sel., bass, treble, balance, vol. controls. H.D. <0.25% at 1 Kc/s 4W. H. and N. better than -55 dB (main amp. better than -70 dB relative to nominal output. 6W per channel. Response 25-25,000 c/s  $\pm 1$  dB, ref. 1 Kc/s. Low-pass filter 5, 7 and 10 Kc/s. Filter slope control. 12dB feedback. Output imp. 15 ohms, or to order. Output ECL83s. Ultra-linear. Size:  $13 \times 8 \times 3\frac{3}{4}$  in. Price: £38 17s.



**PYE LIMITED, HIGH FIDELITY DIVISION.** P.O. Box 49, Cambridge. Tel.: Cambridge 58985. Cables: Pyrad, Cambridge.

**HF10 Mozart self-contained control unit and power amplifier.** Inputs: tape 100 mV; radio 100 mV; pu 15, 8 and 8 mV on each of the 3 curves at 1,000 c/s, special compensation for all makes of pu. 5-pos. sel. treble, bass, vol., mains on/off, filter at 4, 7, 12 Kc/s and out. Tape replay socket. H.D. 0.3% at 1,000 c/s and 9W. H. and N. main amp. -70 dB; tape, radio -60 dB; pu -55 dB. Output 10W nom. Response 3-70,000 c/s  $\pm 3$  dB. Feedback 3 main loops over output stage 5, 8 and 14 dB. Output imp. 4, 8 and 15 ohms. Output one EL34. Integrated single-ended ultra-linear. Size:  $10\frac{1}{2} \times 5\frac{1}{2} \times 5\frac{1}{2}$  in. Price: £23 12s. 6d. Also available in metal case for shelf mounting. HF10M: £25 4s.

● **Mozart stereo amplifier and control unit, HFS20.** Inputs: pick-up 7 mV; radio and tape 100 mV. Controls: col., bass, treble, balance, on/off, sel. switch. H. and N. -58 dB. 8W per channel nominal 9W max. Dist. 0.2%. Response 20 c/s-20 Kc/s  $\pm 2$  dB. Feedback 34 dB. Output imp. 4, 8 and 15 ohms. Output EL34. Size:  $4 \times 10\frac{1}{2} \times 11$  in. Price (chassis): £36 15s.; (metal cased): £38 6s. 6d. Mounted in cabinet with provision for motor (HFP3): £47 5s.

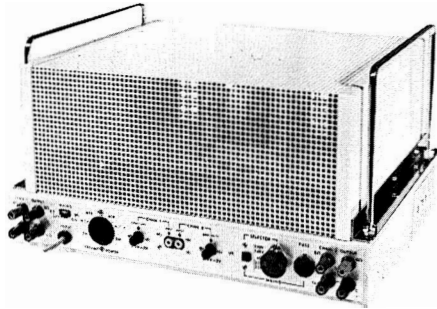
● **HFS30T.** Integrated transistorised stereo amplifier. Output 15W at 15 ohms, 18W at 8 ohms. Dist. 0.7% total at 10W; 1% at 15W; over range 50 c/s-8 Kc/s. F.R. 15 c/s-35 Kc/s (pre-amp); 30 c/s-20 Kc/s (power amp). N.L. -65 dB (pre-amp), -95 dB (power amp). L.S. imp. 15, 8 ohms. P.s.n. 110-250V, 50-60 c/s. Inputs: mag. pu 7 mV; crystal-ceram. pu 120 mV; radio, aux. 100 mV. Controls: bass, treble, loudness, balance, high- and low-pass filters,



Saville Double Six

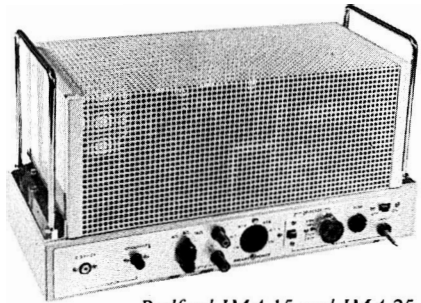


Radford SC4-10 Integrated Amplifier



Radford ISTA 30 and ISTA 60

mono/stereo switch. Low-pass filter 6 dB/octave from 5 Kc/s; high-pass filter -3 dB at 50 c/s, slope increasing to 12 dB/octave. Available (as chassis  $11\frac{1}{2} \times 3\frac{1}{2} \times 8\frac{1}{2}$  in. behind front panel): £66 3s.; (or in veneered box  $12\frac{3}{4} \times 4\frac{3}{4} \times 8\frac{3}{4}$  in.): £71 8s.



Radford IMA 15 and IMA 25

●**ISTA15.** Stereo amplifier. 15W per channel. H.D. 0.1% (15W); 1% (20W). Input for spec. output 500 mV to 4V variable. L.S. matching 4, 8, 16 ohms. P.s.n. 110, 125, 140V or 220, 235, 250V by tapping selection. Size:  $15 \times 10\frac{3}{4} \times 7\frac{3}{4}$  in. Weight: 25½ lb. Price: £42 10s.

●**ISTA30.** Stereo amplifier. 30W per channel. H.D. 0.1% (30W); 1% (40W). Other details as for ISTA15. Size:  $15 \times 12\frac{1}{4} \times 7\frac{1}{4}$  in. Weight: 46 lb. Price: £67 10s.

●**ISTA60.** Stereo amplifier. 60W per channel. H.D. 0.1% (60W); 1% (75W). Other details as for ISTA15. Size:  $15 \times 12\frac{1}{4} \times 7\frac{3}{4}$  in. Weight: 48 lb. Price: £85.

★  
**RADFORD ELECTRONICS LTD.,** Ashton Vale Estate, Bristol 3. Tel.: Bristol 662301/2.

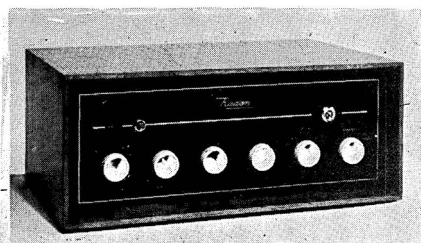
●**SC4-10.** Transistorised integrated stereo amplifier. 15W, 16 ohms; 20W, 8 ohms. H.D. less than 0.1%. Inputs for mag. and ceram. pu, tuner, aux. L.S. matching 8 ohms. P.s.n. 110, 125, 140V or 220, 235, 250V. Size:  $10\frac{1}{2} \times 3\frac{3}{4} \times 13$  in. Weight: 20 lb. Free-standing. Controls: bass, treble, sel., vol., push-button functions. Price: £65.

**IMA 15.** Mono amplifier. 15W. H.D. 0.1% (15W); 1% (20W). Input for spec. output 500 mV at 4V variable. L.S. matching 4, 8, 16 ohms. P.s.n. 110, 125, 140V or 220, 235, 250V by tapping selection. Size:  $15 \times 6\frac{3}{4} \times 7\frac{3}{4}$  in. Weight: 18 lb. 3 oz. Price: £24 10s.

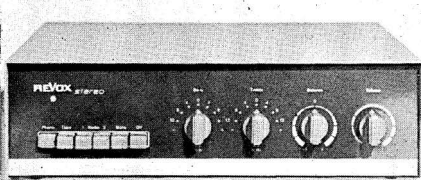
**IMA25.** Mono amplifier. 25W. H.D. 0.1% (25W); 1% (34W). Input for spec. output 500 mV to 4V variable. L.S. matching 4, 8, 16 ohms. P.s.n. 110, 125, 140V or 220, 235, 250V by tapping selection. Size:  $15 \times 6\frac{3}{4} \times 7\frac{3}{4}$  in. Weight: 24 lb. 5 oz. Price: £25.

●**SC2 stereo control unit.** Inputs: pickup 4 mV 68 K; tape monitor 500 mV; aux. 1, 100 mV or 250 mV/250 K approximately; aux. 2, 250 mV or 500 mV/250 K approximately; Output 500 mV. Controls: treble, bass, vol., balance. Push-button sel. High-pass filters 35 c/s, low-pass 7 Kc/s. Response 40 c/s-20 Kc/s  $\pm 1$  dB. N.L. better than 65 dB. P.s.n. 5 mA 300V; 1.2 amps 6.3V. Cathode follower outputs, channel-to-channel fade balance control. To operate with ISTA15, ISTA30, ISTA60, or two IMA15 Mk. II and IMA25 Mk. II. Size:  $8\frac{1}{2} \times 10\frac{1}{2} \times 3\frac{1}{4}$  in. Price: £27 10s.

●**SC3 stereo control unit, three channel.** Inputs: pickup and mic. 3 mV 68 K; tape monitor 500 mV; aux. 1, 100 mV or 250 mV;



*Radon R600S integrated stereo*



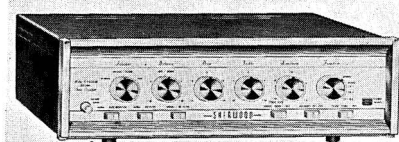
*Revox Model 40 integrated stereo*



*Rogers RD Cadet II stereo control unit*



*Rogers HG88 Mk. II integrated stereo*



*Sherwood S-5500III Integrated Stereo Amplifier*

aux. 2, 250 mV or 500 mV/250 K approximately. Output 500 mV. Controls: treble, bass, vol. —L. and R. pre-set gain. Third channel gain. Push-button sel. High-pass filters 35 c/s, low-pass 7 Kc/s. Response 40 c/s-20 Kc/s  $\pm 1$  dB. N.L. better than 65 dB. P.s.n. 7 mA 300V; 1.8 amps 6.3V. Composite third channel with separate gain control. Cathode follower output on all three channels. To operate with three-power amplifiers, or one mono amplifier and one dual amplifier. Size:  $8\frac{1}{2} \times 10\frac{1}{2} \times 3\frac{3}{4}$  in. Price: £34.

●SC5. Transistorised stereo control unit. Sensitivity 4 mV for 2V output. Pre-set gain on each channel. Suitable for driving any power amplifier requiring up to 2.5V input. Low distortion and noise. Controls: bass, treble, balance, vol., tape monitor, mono/stereo function button, treble filter, input sel. Usual input facilities. Mains-operated. Price: £34 10s.

●SC6. Transistorised stereo control unit. Identical in construction and design to SC5, but has additional output amplifier for 3-channel reproduction. Price: £39 10s.



**RADON INDUSTRIAL ELECTRONICS CO. LTD.**, Brooklands Trading Estate, Orme Road, Worthing, Sussex. Tel.: Worthing 1063. Cables: Radon, Worthing.

●R. 600S integrated transistorised stereo amplifier. Inputs: tape 10 mV, 1 K; aux. 100 K or 1 K. Crystal pick-up 6 K. Mag. pickup 100 K. Output 10W. Free-standing. Dist. 0.15% at 10W; 0.07% at 4W. Response 20 c/s-20 Kc/s. Feedback 65 dB. N.L. 75 dB below full output power with input shorted. L.S. matching, 15 ohms. Output stages AD140s in push-pull. Size:  $14 \times 10 \times 6$  in. Price: £49 7s.

R. 610M integrated transistorised mono amplifier. Inputs: tape 10 mV, 1 K; aux. 100 K or 1 K; crystal pickup 6 K; mag. pickup 100 K. Output 10W. Controls: vol., bass, treble, filter,



*Rogers RD Junior III stereo control unit*



sel. Low-pass filters 6 Kc/s, 10 Kc/s, 20 Kc/s. Free-standing. Dist. 0.15%; response 20 c/s-20 Kc/s  $\pm 1$  dB and above. Feedback 65 dB. N.L. 75 dB below full output power with input shorted. L.S. matching, 15 ohms. Output stages AD140s in push-pull. Fully transistorised and integrated in wood case. Size: 14 x 10 x 6 in. Price: £40 19s.



**REVOX (U.K. CONCESSIONAIRES) LTD.**,  
296 Kensington High Street, London, W.14.  
Tel.: Western 4343.

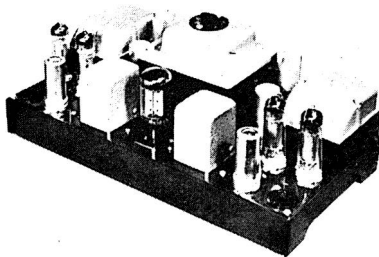
● **Model 40 integrated stereo amplifier.** Pre-amp. details: Inputs-pickup 5 mV, 100 K; tape 1.2V, 300 K; radio 150 mV, 220 K. Controls: bass, treble, 7 stages of 4 dB at 50 c/s and 10 Kc/s  $\pm 12$  dB. Push-button inputs-pickup, tape, radio 1 and 2, mono. Free-standing. Power amp. details: output—10W per channel, 12.5W peak; distortion less than 0.5% at 10W, 1 Kc/s. Response 30 c/s-20 Kc/s  $\pm 1$  dB. N.L. better than -60 dB relative to 5 mV pickup input. L.S. matching, 4, 8 or 16 ohms. P.s.n. about 80W. Size: 16 x 10 x 5 in. Price £50 8s.



**ROGERS DEVELOPMENT (ELECTRONICS) LTD.**, 4-14 Barmeston Road, Catford, S.E.6. Tel.: Hither Green 7424 and 4340. Cables: Rodevco, London, S.E.6.

● **RD Cadet Mk. II stereo control unit.** Inputs: disc 75 mV; radio 75 mV; tape 75 mV. Push-button sel., bass, treble, function and balance. Vol. and separate on/off switch. Size:  $8\frac{1}{2}$  x  $5\frac{1}{2}$  x 5 in. To operate with RD Cadet Mk. II stereo amplifier. Booster unit available as optional extra. Price (including amplifier): £26 15s.

● **RD Cadet Mk. II stereo amplifier.** 6 + 6W. Harmonic distortion 0.25%. Peak output 7 + 7W. Response 20-20,000 c/s  $\pm 1$  dB. Output imp. 4 or 16 ohms. Feedback 18 dB.



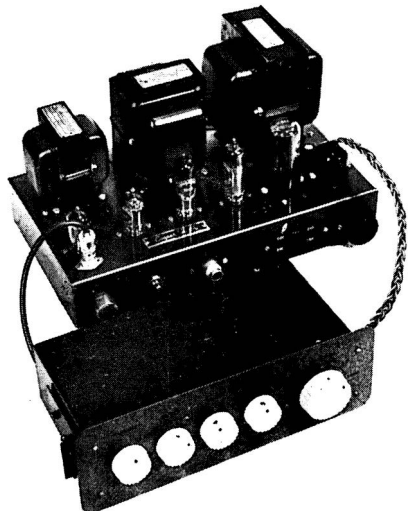
*Rogers RD Junior stereo amplifier*



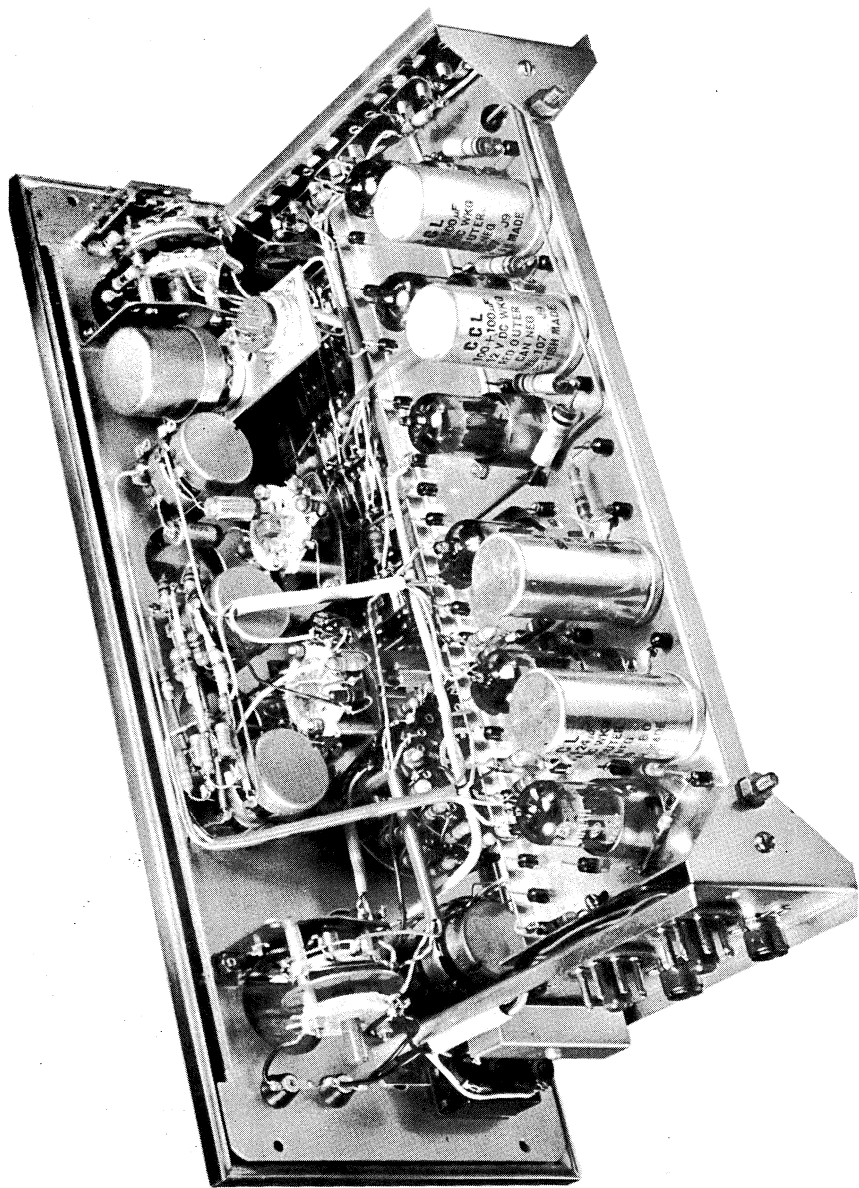
*Rogers Master II Stereo Control Unit*



*Cooper-Smith control unit and amplifier*



*Cooper-Smith Mk. II C.U. and BPI amp.*



*Rogers Master Stereo control unit with cover removed*

Hum and noise 75 dB below 6W. Output ECL86s. Size:  $12 \times 6 \times 4\frac{1}{4}$  in. to operate with RD Cadet Mk. II stereo control unit. Booster unit available as optional extra. Price (including control unit): £26 15s.

●**RD Junior Mk. III stereo control unit.** Inputs: disc. 4 or 80 mV; R.I.A.A. or flat. Provision second mono pickup. Tape 4 mV (CCIR) 25 mV (flat) radio: 100 mV, aux. 2.5 or 30 mV. Panel socket for tape record and replay, mic. Push-button sel., bass, treble, filter, function, balance, vol. and on/off. High-pass filter. Mono/stereo disc. switch. Output ECC83s. Size:  $11\frac{3}{4} \times 7\frac{1}{4} \times 5\frac{1}{2}$  in. To operate with RD Junior stereo amplifier. Price: £22 10s.

●**RD Junior stereo amplifier.** 12 + 12W nominal, 15 + 15W peak. Harmonic distortion 0.2% at 12W. Input sensitivity 750 mV for 12W. Response 20-20,000 c/s  $\pm 0.25$  dB. Feedback 20 dB. Hum and noise 0.85 dB below 12W. Output imp. 4, 8 or 16 ohms. Output ECC83s. Size:  $14 \times 8 \times 5\frac{3}{8}$  in. To operate with RD Junior Mk. III stereo control unit. Price: £27 5s.

●**HG88 Mk. II combined stereo amplifier and control unit.** 12 + 12W, 14 + 14W peak output. Harmonic distortion 0.25% for 12W. Hum and noise 80 dB below 12W. Response 30-20,000 c/s  $\pm 1$  dB. Feedback 16 dB. Output imp. 4, 8 or 16 ohms. Inputs: disc. 4 or 80 mV (R.I.A.A.) 6 or 120 mV (flat); radio 120 mV; tape 4 or 20 mV (CCIR) 20 or 120 mV (flat). 5-pos. sel. Function, bass, treble, filter, vol., on/off, balance. Size:  $15\frac{3}{8} \times 10\frac{3}{8} \times 7$  in. Price (chassis): £40; (teak case model): £43 10s.

●**Master II stereo control unit.** Inputs: mic. 1-10 mV, 100 K; disc. 1, 2-20 mV, 68 K; disc. 2, 60-600 mV, 2.2 megohms; tape 1-10 mV, 68 K; radio 15-100 mV, 300 K. (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 Kc/s and 10 Kc/s + slope; high-pass 20 c/s and 60 c/s. P.s.n. 300V, 10 mA; 6.3V, 2 amps. To operate with Junior stereo amplifier. Size:  $14 \times 6\frac{1}{2} \times 5\frac{3}{8}$  in. Price: £38; (self-powered): £40.



**H. H. SCOTT**, 111 Powdermill Road, Maynard, Mass., U.S.A. U.K. Distributors: Elstone Electronics Ltd., Edward Street, Templar Street, Leeds 2. Tel.: Leeds 35111.

●**299C integrated stereo amplifier.** Pre-amp. details: inputs—tape (NARTB corrected) 3 mV; mag. pickup 3 mV or 9 mV; radio and aux. 0.5V. Controls: treble, bass, vol. High-pass filters 20 c/s, low-pass 5 Kc/s. Response 20 c/s to 20 Kc/s. Noise -80 dB high level input, equivalent to  $10\mu\text{V}$  on low level. Derived centre channel provided. Free-standing. Power amp. details: output 20 + 20W. Dist. 0.8%. Response 20 c/s-20 Kc/s  $\pm 1$  dB. Noise -80 dB. Input 3.0 mV. L.S. matching, 4, 8 or 16 ohms. Output stages, 7591s (2 for each channel). P.s.n. 210-250V AC. Size:  $15\frac{1}{2} \times 5 \times 13$  in. Price: £142 16s. (Cabinet extra).



**SHERWOOD ELECTRONIC LABORATORIES INC.**, U.K. Distributors: Audioson Ltd., Orchard House, Orchard Street, London, W.1. Tel.: Mayfair 5431.

●**S-5500 III integrated stereo amplifier.** Pre-amp. details: inputs—tuner 0.25V; tapehead 1.6 mV; pickup 1.2 mV. Controls: sel., balance/gain, bass, treble, loudness, function. Switches: tape monitor, Hi-filter, Lo-filter, phase reverse. Response 20 c/s-20 Kc/s  $\pm \frac{1}{2}$  dB. H. and N.: tuner -90 dB, pickup -72 dB. DC filament supply. Free-standing, but can be mounted. Power amp. details: output 80W music power. (Each channel, 40W music power, 36W continuous, 72W peak.) H.D. less than 0.6%. Feedback 16 dB. L.S. matching, 4, 8, 16 ohms. Output stages, four 7868s. Self-powered 220-240V. Size:  $14 \times 4 \times 13\frac{1}{2}$  in. Price: £69 10s. (without case). Walnut-tone leatherette case: £2 10s.



**SHIRLEY LABORATORIES LTD.**, 3 Prospect Place, Worthing, Sussex. Tel.: Worthing 30536.

“**Jupiter**” **SB/1-15E.** Integrated mono amplifier. 12W (17W peak). Dist. 0.2% at 10W 1 Kc/s. F.R. 45 c/s-25 Kc/s  $\pm 1$  dB. N.L. -80 dB. Inputs: radio/tape 100 mV; gram. to suit pickup in use. L.S. matching, 15 ohms. Controls: bass, treble, vol., sel. P.a.t. 300V, 30 mA; 6.3V, 1.5 amps. Output stages EL84s. Self-powered. Front panel  $12 \times 3$  in. Price: £23 2s.

●**SBS/15 integrated stereo amplifier.** 12W per channel (17W peak). Dist. 0.1%. F.R. 45 c/s-25 Kc/s  $\pm 1$  dB. N.L. -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. P.a.t. 300V, 45 mA; 6·3V, c.t., 2 amps. Equalisation for two or three tape speeds. Facility for playing on both channels from monaural source. Price: £57 15s.

See also Tape Amplifiers Section.



**H. L. SMITH & CO. LTD.**, 287/289 Edgware Road, London, W.2. Tel.: Paddington 5891/7595.

**Cooper-Smith Mk. II control unit.** Inputs: radio 100 mV; pu 3 mV variable; mic. 1·5 mV; tape 100 mV. 6-pos. sel. (3 record equal.), treble, bass, vol., on/off. Switch filter 6, 8 and 10 Kc/s. Co-axial tape replay switch. H.D. 0·1% or less at 1,000 c/s. H. and N. -80 dB. Rumble filter 12 dB cut at 30 c/s. Size: 10 × 3½ × 6½ in. To operate with B.P.I. power amp. Price (kit): £7 17s. 6d.; (assembled and tested): £10 17s. 6d.

**Cooper-Smith B.P.I. amplifier.** 10W nom., 12W max. Dist. 0·15% or better at 10W. Input for spec. output approximately 1·9V. Response 20-30,000 c/s ±1 dB. Feedback 18 dB. N.L. 90 dB below max. output. Output imp. 3·75 and 15 ohms. Output 6BQ5s or EL84s. Ultra-linear. Size: 12 × 7 × 7½ in. To operate with Cooper-Smith Mk. II control unit. Price (kit): £12 5s.; (assembled and tested): £14 5s.

**Cooper-Smith "Prodigy" combined amplifier and control unit.** Inputs: pick-up 8 mV variable; radio and tape 100 mV, 6W, 9W max. Dist. 0·2%. Response 30-25,000 c/s ±1 dB. Feedback 15 dB. N.L. -70 dB. Output imp. 3½, 7½ and 15 ohms. Output ECL82s. Ultra-linear. Size: 10½ × 7 × 5½ in. Price (kit): £12 10s.; (assembled and tested): £15 15s.

● **Cooper-Smith stereo control unit.** Inputs: pick-up 3 mV variable; tape 100 mV; radio 100 mV. 4-pos. sel., bass, treble, vol., balance. H.D. 0·15%. H. and N. -60 dB. Size: 10½ × 4½ × 3½ in. To operate with Cooper-Smith stereo amplifier. Price (kit): £12 12s.; (assembled and tested): £15.

● **Cooper-Smith stereo amplifier.** 6W per channel, 9W peak. Dist. 0·2% at 6W. Input for spec. output 800 mV. Response 40-25,000 c/s at 6W. 15 dB feedback. N.L. -80 dB. Output imp. 3·75, 7·5, 15 ohms. Output ECL82s. Size: 12 × 7 × 6½ in. To operate with Cooper-Smith stereo control unit. Price (kit): £13 13s.; (assembled and tested): £16.

**Cooper-Smith "Bantam" integrated mono amplifier.** Output 3·4W. Response 40 c/s-25 Kc/s ±1 dB at 1W. L.S. matching 3·75, 15 ohms. Output stages ECF80, EL84/6BQ5, EZ81. Input 60 mV, 3W. Controls: bass and treble cut and boost, continuously variable. Self-powered. Size: 8 × 6½ × 4½ in. Weight: 8¾ lb. Price (kit): £7 10s.; (assembled and tested): £8 5s.



**STERN-CLYNE**, 109 Fleet Street, London, E.C.4. Tel.: Fleet Street 5812-3. 23 Tottenham Court Road, London, W.1. Tel.: Museum 6128-9. Branches: Bristol, Manchester.

**Mullard 2-valve pre-amplifier tone control unit.** Inputs: pickup 5 mV and 13 mV (magnetic); 70 mV and 200 mV (crystal); radio 300 mV, tape 1, 300 mV; tape 2, 3 mV; mic. 3 mV, 6-pos. sel., bass, treble, vol. P.s.n. 300V at 3 mA, 6·3V at 0·6 amps. Employs two EF86s. To operate with the 5-10 and similar power amplifiers. Size: 9½ × 4½ × 2¾ in. Price: £9 10s.; (also available in kit form): £6 6s.

● **Mullard dual-channel pre-amplifier.** Inputs: pickup 5-15 mV and 70-220 mV; tape 4 mV; radio and aux. 330 mV. 5-pos. sel., bass, treble, vol. and balance. Output 250 mV per channel. Dist. less than 0·15%. Employs four EF86s. P.s.n. 6·3V at 1 amp., 250/350V at 6 mA. Size: 11 × 5 × 4 in. Price: £15; (also available in kit form): £12 10s.

● **Mullard "10-10" stereo amplifier.** 10W per channel. H.D. < 0·2%. Input for spec. output. 23 mV. Response at 10W 20-60,000 c/s ±3 dB. Feedback 20 dB. N.L. -65 dB. Output imp. 15 ohms, alternative 3·75 or 7·5 ohms. Output two ECL86s in each channel. Ultra-linear. Size: 14 × 6½ × 6½ in. To operate with Mullard dual channel pre-amplifier. Price: £20; (kit): £16.

● **Mullard "10-10" stereo amplifier with passive control unit.** Output 10W per channel. H.D. < 0·2%. Input for spec. output, passive unit 250 mV. Response 20-60,000 c/s ±3 dB. Feedback 20 dB. N.L. -65 dB. Output imp. 15 ohms (alternative 3·75 or 7·5 ohms). Output two ECL86s in each channel. Ultra-linear. Size (with passive unit attached): 14 × 8½ × 6½ in. Price: £24; (kit): £20.

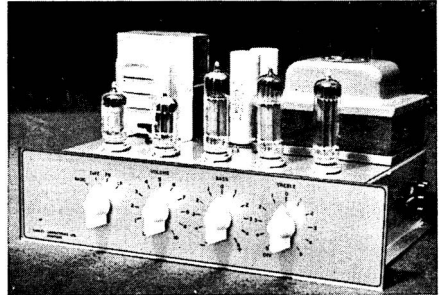
**Mullard 3-valve pre-amplifier.** Mono. Inputs: mag. pu 7 mV, 12 mV; crystal 150 mV, 270 mV; tape head 2·5 mV; mic. 7·5 mV; radio 250 mV; aux. 250 mV. Output 250 mV. Controls: sel., treble, bass, vol. High-pass

filters 160 c/s, 80 c/s, 40 c/s, 20 c/s; low-pass 5 Kc/s, 7 Kc/s, 9 Kc/s, flat. H. and N.: mag. and crystal -58 dB; tape head -47 dB; mic. -44 dB; radio and aux. -60 dB. P.s.n. 6 mA at 250V. 1 amp at 6.3V. Jacks on front panel. Auxiliary input. Record output. Ferroxcube inductor in filter circuit. To operate with Stern/Mullard range power amplifiers (mono). Size: 11 x 4 x 4 in.; (front panel): 12½ x 4½ in. Price: £13 13s.; (kit): £10.



*Scott 299c integrated stereo*

**Mullard 5-10 mono amplifier.** Output 10W. H.D. 0.1%. Response 30 c/s-15 Kc/s ± 1 dB. Feedback 26 dB. N.L. -65 dB. Input 40 mV. L.S. matching, 3.75 or 15 ohms. Output stages 2 x EL84. Self-powered (AC mains 200-250V). Size: 10 x 7 x 7 in. To operate with Stern/Mullard 2- or 3-valve pre-amplifiers. Price: £13 10s.; (kit): £10. Alternative model with partridge output transformer available £1 6s. extra.



*Shirley Jupiter SB1-15E*

**Mullard 3-valve, 3W power amplifier, Series II.** Mono. 3W output. H.D. 1%. Response 35 c/s-30 Kc/s. Feedback 20 dB. N.L. -70 dB. Input 100 mV. L.S. matching, 3 or 15 ohms. Output stages EL84. Self-powered. Incorporates sel. switch, separate bass and treble controls, vol. control. Size: 10 x 6 x 6 in. Price: £11 10s.; (kit): £8 8s.



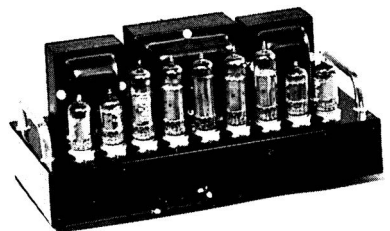
*Symphony Integrated Stereo Amplifier*

**JL10 power amplifier.** Mono. 10W. Response 15 c/s-30 Kc/s. Feedback 20 dB. N.L. -85 dB. Input 1V. L.S. matching, 3, 7.5, 15 ohms (switched). Output stages 2 Mullard ECL86. Self-powered. To operate with dual feature pre-amplifier. Size: 11¼ x 5½ x 5½ in. Price: £14 14s.; (kit): £11 11s.



*Archon SP31 stereo control unit*

**Dual feature pre-amplifier.** Mono. Inputs: mic. 2.5 mV, mag. pu 1.6 mV, crystal pu 500 mV, radio 150 mV, tape 2.5 mV. Output 1V and 100 mV. Controls: input sel., treble, bass, vol., record level, tape speed equalising. F.R. (measured with controls set flat) 20 c/s-20 Kc/s. H. and N. -50 dB average of all inputs at level response. P.s.n. 6.3 mV, 1.6 amps; 300V, 30 mA. Record output correctly equalised for direct connection to high imp. tape heads. Self-contained bias and erase oscillator. To operate with J.L.10, or any high quality power amplifier with an input sensitivity of up to 1V. Size: 13¾ x 4½ x 5 in. Price: £21; (kit): £17.



*Archon SL101 stereo amplifier*

If dual feature pre-amp and JL10 power amp are purchased together, the inclusive price is £33 12s.; (kit): £27 10s.

**SYMPHONY AMPLIFIERS LTD.**, 16 Kings College Road, London, N.W. 3. Tel.: Primrose 3314/5.

**Symphony integrated mono amplifier.** 10W push-pull output (15 ohms). Dist. less than 0.2% at 6W. Input for spec. output 60 mV. Response 30 c/s-20 Kc/s  $\pm 1$  dB. N.L. -85 dB. Fully enclosed in steel case,  $12\frac{1}{2} \times 9\frac{1}{2} \times 4\frac{1}{2}$  in. high. Suitable for shelf-mounting or drop-through. Price: £21.

★ **Symphony integrated stereo amplifier.** 5W per channel output. Dist. 0.3%. Input for spec. output 60 mV. Response 30 c/s-20 Kc/s  $\pm 1$  dB. N.L. -80 dB. 15 ohms outputs from 6BW6s. Fully enclosed in steel case,  $12\frac{1}{2} \times 9\frac{1}{2} \times 4\frac{1}{2}$  in. high. Suitable for shelf-mounting or drop-through. Price: £29 8s.

★ **No. 2 stereophonic amplifier.** Output 10W per channel. H.D. 0.15%. Response 20 c/s-20 Kc/s  $\pm 1$  dB. Feedback 27 dB. N.L. 75 dB below. Input 3 mV. L.S. matching, 15 ohms. Output stages E184s in push-pull. P.s.n. 200-250V AC. Self-powered. Size:  $13 \times 4\frac{1}{2} \times 9\frac{1}{2}$  in. Price: £33 12s. (integrated).

★

**TANSLEY-HOWARD LTD.**, 144 Holland Park Avenue, London, W.11. Tel.: Bayswater 2848.

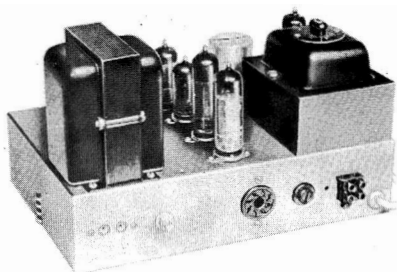
★ **Archon SP31. Stereo control unit.** Inputs: pickup 1, 7 or 70 mV variable; 2, 7 mV; tape 60 mV; radio 60 mV variable. Sel., balance, treble, bass, filter controls. H.D. 0.05%. H. and N. -61 dB. Rumble filter. Size:  $12 \times 6 \times 2\frac{3}{8}$  in. To operated with SL101 stereo amplifier. Price: £20 9s. 6d.

★ **Archon SL101. Stereo amplifier.** 10W per channel. Dist. 0.2% at 10W. Input for spec. output 200 mV. Response 3-50,000 c/s  $\pm 1$  dB. 22 dB feedback. N.L. -80 dB. Output imp. 3, 7 and 15 ohms. Output EL84s. Size:  $12 \times 6 \times 5\frac{1}{2}$  in. To operate with SP31 stereo control unit. Price: £29 8s.

★

**TECHNICAL SUPPLIERS LTD.**, Hudson House, 63 Goldhawk Road, London, W.12. Tel.: Shepherds Bush 2581/4794.

★ **BH Hi-Fi 14. Integrated mono amplifier.** Output 12-14W. Response 25 c/s-25 Kc/s. Two inputs with separate volume controls, 2 mV and 50 mV. Separate bass and treble controls.



*Stern 5-10 amplifier*



*Stern-Clyne JL10 Power Amplifier*



*Stern-Clyne Dual Feature Pre-Amplifier*

L.S. matching, 3-4.5, 15-16 ohms. Output stages EL84s. Phono jack input. P.s.n. 220-240V. Size:  $10 \times 7\frac{1}{2} \times 2$  in. Price: £9 19s. 6d.

★

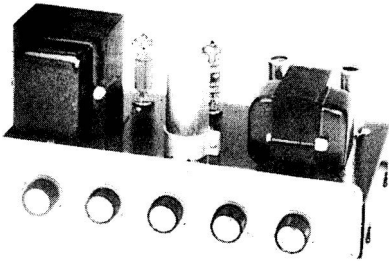
**TRIO.** Distributors: Winter Trading Co. Ltd., 95/99 Ladbroke Grove, London, W.11. Tel.: Park 1341.

★ **WE-24. Integrated stereo amplifier.** 7W per channel. Response 20 c/s-20 Kc/s  $\pm 0.5$  dB. L.S. matching, 4, 8, 16 ohms. P.s.n. 117/230V AC. Size:  $11\frac{1}{2} \times 5 \times 7\frac{5}{8}$  in. Price: £47 5s.

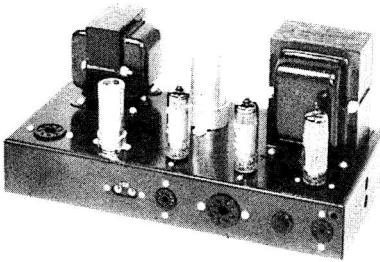
★ **W41U. Integrated stereo amplifier.** 10W per channel. Response 20 c/s-20 Kc/s  $\pm 0.5$  dB. L.S. matching, 4, 8, 16 ohms. P.s.n. 110/230V AC. Inputs: mag. pu/tape head 1.7 mV; aux./tuner/tape play 110 mV. Size:  $12\frac{1}{2} \times 5 \times 10$  in. Tape monitor switch. Price: £57 15s.

★

**TRIPLETONE MANUFACTURING CO. LTD.**, 241a The Broadway, Wimbledon, S.W.19. Tel.: Liberty 1189.



*Tripletone Hi-Fi Major integrated*



*Tripletone DP12 amplifier*

**Hi-Fi Major integrated amplifier.** Inputs: high imp., pickup and mic. Mixing facilities. 12W, 15W max. Dist. 0.15%. Response 15-20,000 c/s  $\pm 1$  dB. Negative feedback 32 dB. N.L. -80 dB. Output imp. 2-3 or 15 ohms switchable. Output EL84s. Size: 12  $\times$  5 $\frac{3}{4}$   $\times$  6 in. Price: £15 18s. 9d.

**D.P.12 power amplifier.** 12W nom., 15W max. H.D. 0.15%. Input 500 mV for 10W. Response 15-50,000 c/s  $\pm 0.25$  dB. Feedback 16 dB. N.L. -80 dB. Output imp. 2-3 or 15 ohms switchable. Output EL84s. To operate with stereo S.C.P.2 or mono C.P.10. Size: 12  $\times$  6  $\times$  5 $\frac{3}{4}$  in. Price: £12 6s.

**C.P.10 mono control unit.** Inputs: pu (crystal or ceramic) 80 mV, 2 megohms; tape 200 mV, 200 K; radio 200 mV, 200 K; mag. pu (equalised to RIAA curve) 5 mV; tape head (equalised to CCIR curve) 8 mV; aux. 80 mV, 2 megohms. Output 500 mV. Controls: bass, on/off, middle, treble, vol., sel., rumble filter, low-pass filter. Filters: rumble two positions, -20 dB at 20 c/s, -15 dB at 20 c/s; low-pass variable from 3-30 Kc/s, slope 6 dB/octave. H. and N. -65 dB. P.s.n. 6.3V, 0.3 amps; 250V DC, 3 mA. To operate with DP12. Size: 11  $\times$  3 $\frac{1}{2}$   $\times$  2 $\frac{1}{2}$  in. Price: £9 17s. 6d.

● **S.C.P.2 stereo control unit.** Inputs: pu 80 mV, 2 megohms; radio 200 mV, 100 K; tape 80 mV, 100 K. Output 500 mV. Controls: bass, on/off, middle, treble, vol., sel. Response 30 c/s-20 Kc/s  $\pm 1$  dB. H. and N. -62 dB. P.s.n.

6.3V, 0.6 amps; 250V DC, 6 mA. Dual-concentric controls allow very accurate balance. To operate with one or two D.P.12s and stereo 8-8 chassis (not sold separately). Size: 11  $\times$  3 $\frac{1}{2}$   $\times$  2 $\frac{1}{2}$  in. Price: £10 18s. 9d.

● **Stereo 8-8.** Stereo amplifier including S.C.P.2 control unit. 8W per channel. H.D. 0.2%. Response 30 c/s-20 Kc/s  $\pm 1$  dB. Feedback 42 dB. N.L. -65 dB. Inputs: pu 80 mV, 2 megohms; radio 220 mV, 100 K; tape 80 mV, 100 K. L.S. matching 2-3 or 15 ohms (switchable). Output stages ECL86s. Internal power supply. Size (main chassis): 12  $\times$  5 $\frac{3}{4}$   $\times$  6 in.; (pre-amp S.C.P.2): 11  $\times$  3 $\frac{1}{2}$   $\times$  2 $\frac{1}{2}$  in. Price: £25 18s. 9d.

**Tripletone stereo 12-12** comprises two D.P. 12s and the S.C.P.2 control unit. Details as above. Price: £35 10s. 9d. for three units.

**Transistorised pre-amplifier.** Mono or stereo version. Inputs for magnetic cartridges or tape heads. Various tape/disc combinations. S/N 70 dB. Equalisation  $\pm 2$  dB (RIAA or CCIR curve). P.s.n. 200-300V DC. Octal plug connector. Size: 5  $\times$  2  $\times$  2 in. Price (mono): £3 17s. 6d.; (stereo): £5 10s.

● **Stereo balance indicator.** Indicates volumetric and tonal balance. Can be switched in or out as required, and gives channel reversal facilities. Price: £2 16s. 3d.



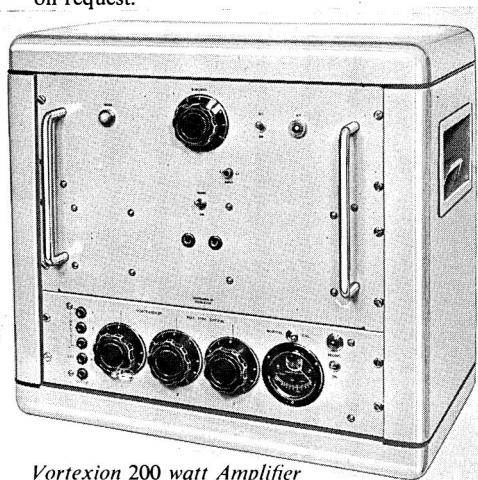
**VORTEXION LTD.,** 257/263 The Broadway, Wimbledon, London, S.W.19. Tel.: Liberty 2814, 6242/3. Cables: Vortexion, "Wimble", London.

**30/50 watt amplifier.** Can deliver 50W of speech and music or over 30W of continuous sine wave. Main amplifier has response of 30 c/s-20 Kc/s  $\pm 1$  dB; 0.1% distortion. Outputs 4, 7, 5, 15 ohms, 100V line. Models are available with two, three or four mixed inputs for low impedance balanced line microphones, pickup or guitar. Price £65.

**120/200 watt amplifier.** Can deliver its full audio power at any frequency in the range of 30 c/s-20 Kc/s  $\pm 1$  dB. Less than 0.2% distortion at 1 Kc/s. Can be used to drive mechanical devices for which power is over 120W on continuous sine wave. Input 1 mV, 600 ohms. Output 100-120V or 200-240V. Additional matching transformers for other impedances are available. Price: £112.

**WORDEN AUDIO DEVELOPMENTS LTD.**, 54 Chepstow Road, London, W.2. Tel.: Bayswater 4996.

● **Stereo transistorised control unit.** Inputs: pickup, 4, 10, 8 and 20 mV; radio, 250 mV; mic. or tape, 1.4 mV per channel. Output 200 mV per channel. Controls: sel., bass, treble, stereo/mono, combined vol. balance, on/off. Response 15 c/s-25 Kc/s. Pickup inputs all equalised, radio and mic. flat. Channel separation better than 55 dB. P.s.n. self-powered 9V. Free-standing or for cabinet mounting. To operate with companion 4W per channel stereo main amplifier, or any amplifiers with input sensitivity of 200 mV or less. Size:  $8\frac{3}{4} \times 8\frac{1}{4} \times 2\frac{3}{8}$  in. Front panel  $9 \times 3$  in. Price: £18 18s. Companion stereo main amplifier to the above control unit. Price: £15; specification on request.



*Vortexion 200 watt Amplifier*

**WELLINGTON ACOUSTIC LABORATORIES LTD.** See Elstone Electronics Ltd.

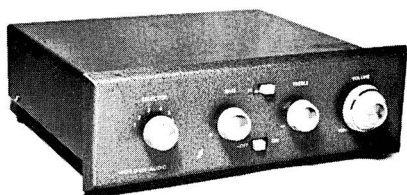


**WHITELEY ELECTRICAL RADIO CO. LTD.**, Victoria Street, Mansfield, Notts. Tel.: Mansfield 1762/3/4/5. Cables: Whitebon, Mansfield.

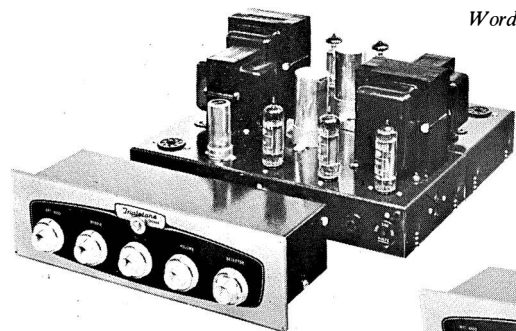
**WB8/10 integrated mono amplifier.** Input 50 mV. Controls: sel., vol., bass, treble, on/off. Response 25 c/s-15 Kc/s. H. and N. -60 dB. Output 8W. H.D. 0.2%. Feedback 8 dB. Output imp. 3, 15 ohms. Outputs ECL86s. Self-powered. Size:  $12 \times 4 \times 6\frac{1}{2}$  in. Free-standing. Price: £26 7s. 6d.

**WB12/14 mono amplifier.** Output 12W. H.D. 0.2%. F.R. 20 c/s-20 Kc/s. Feedback 25 dB. N.L. -80 dB. Input 1V. Output imp. 3, 15 ohms. Outputs EL84s. Self-powered. Size:  $9 \times 6 \times 6\frac{1}{2}$  in. To operate with stereo control unit. Price: £22 10s.

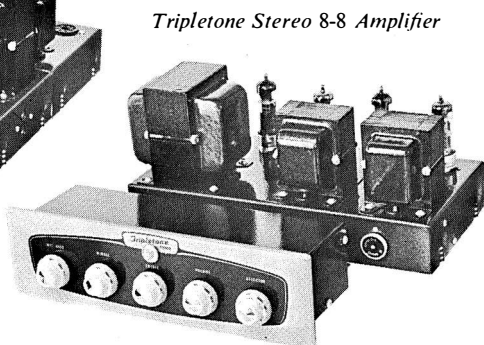
● **Stereo control unit.** Inputs: gram. 8 mV (RIAA corrected), crystal 80 mV; radio, tape 120 mV; mic. 2 mV. Output 1V. Controls: sel., bass, treble, vol., balance, function. Filters 25 c/s (built-in). Response RIAA for mag. pu, flat for others. H. and N. -60 dB. P.s.n. 250V, 50 mA; 6.3V, 1 amp. To operate with WB12/14 amplifier. Size:  $12 \times 4 \times 6\frac{1}{2}$  in. Price: £27 15s.



*Worden transistorised stereo control unit*



*Tripletone Stereo 12-12*



*Tripletone Stereo 8-8 Amplifier*



# TAPE MACHINES AND THEIR USES

by Graham Balmain \*

SO, you want to buy a tape recorder? Or do you? Think carefully—this could save money—then answer these questions: Are you completely happy listening to your gramophone? Do you think the BBC does a grand job? Are you entranced by the great musicians? Do you see tape as a means of listening with fewer interruptions? ‘Yes’ three or four times probably means that you would be happier with a tape *player*.

But if you are dissatisfied with a passive part in entertainment, or you go to concerts, or sing, or play or act, or make films, then read on. Tape recording is essentially an active and creative occupation which complements and enhances all these activities, and more. Think carefully again: the wrong choice this time will not only be a waste of money, it will also be frustrating. For—despite the leaflets’ implications that they are technical marvels, engineers’ showpieces, the last touches in stylish furnishing, or merely status symbols—tape machines are to be used and enjoyed. Tape recorders (and players) are for *people*.

## The Comparison Game

However you choose your recorder, whether you go to a specialist hi-fi dealer or retain a consultant or ask a friend for advice, you will sooner or later have to play the traditional audio game of Comparisons. The preliminaries involve making decisions about the kind of recorder you want and then collecting information for the game itself. Since it is easy enough to collect a hundred odd leaflets about tape recorders which will apparently suit you, some clear ideas on that subject will obviously help at the start. The fewer leaflets reach the semi-

finals, the more likely you are to win. Who are you playing? All the recorder manufacturers in the market, each of whom is trying to convince you that one of his machines is the only one for you.

## Points Worth Noting

First make the decisions. Price is an obvious one, and fairly easily determined for most of us. Having fixed it, remember these points:

(1) You will be paying for a mixture of facilities (functions represented by knobs on the panel, gadgets on the deck and sockets almost anywhere) and overall quality of construction and performance. The fewer facilities you need, the higher the quality can be. Don’t have frills.

(2) A good second-hand recorder may be better value for you than a new one, provided the source is reliable.

(3) If you do have a new one, bear in mind that good basic quality maintains the best second-hand value, provided it is properly cared for.

(4) Don’t be sidetracked into buying ‘famous manufacturer’s surplus’ or ‘bankrupt stock’ or other ‘fantastic bargains’, unless you are prepared to risk some fatal peculiarity in the machine or the lack of proper spares and servicing arrangements.

(5) You *can* get good value for money at almost all price levels. Cheap recorders (say £30 and below) need not be positively bad, as opposed to merely poor-but-honest, but the latter need searching out.

The second decision is the *kind* of recorder you want, which depends in turn on what you propose doing with it. Assuming that you are

not aiming at professional standards straight away (it is not that easy!) you have these choices:

**Deck-Amplifier Units** to build into hi-fi systems. Definitely for fixed installations only, these usually contain microphone, gramophone and radio inputs and the necessary recording, bias and erase supplies, but a playback *pre*-amplifier only, whose output must be fed into an external power amplifier for loudspeaker listening. They are an economical way of adding high quality tape facilities to a hi-fi system, with obvious limitations. They can be put in cases and used as portables, with some weight/quality advantage, provided headphone listening is acceptable if you are away from home.

**Decks alone**, to build into hi-fi systems, are ideal for tape players, since many hi-fi pre-amplifiers will accept inputs from tape heads. However, recording requires separate bias/erase supplies to be provided; these are available in 'tape amplifiers', which invariably accept microphone and gram/radio inputs, and have either a playback pre-amplifier or a complete playback chain including a loudspeaker amplifier. For recording it is easier to use a deck-amplifier unit as described above.

### The Semi-Professional Machine

**Semi-Professional Recorders** are usually elaborate and heavy. Remember that anything weighing over 50 lbs. gets heavier the more you move it about. Some, indeed, are styled as table models—no handles. Prices range from £60-£150. Most are very good, but be prepared to spend a few solid weeks getting to know the machine and learning to produce decent recordings. It is generally better to start with something simple.

**High Quality Domestic Portables** may produce recordings as good as those from semi-professional machines, but they will be less elaborate and may not be quite so robust. They nevertheless have all the necessary basic facilities and, priced at about £40-£80 make the best choice for general-purpose requirements: recording almost anything, almost anywhere where there is a mains supply.

**Cheaper Domestic Portables** (£20-£40) account at present for the bulk of the market. By and large, recorded quality is noticeably inferior to that of higher-priced machines, but, as noted above, there are some which do not sound actively unpleasant. Their operation is very simple and only essential facilities are provided. They are more than adequate for speech, dance music, pops, background music

and so on, but give the impression of struggling a bit with music which is meant to be listened to rather than just heard.

### Recorders For Outdoor Use

All the types mentioned so far need an AC mains supply, although one can get **Converter Units** which will enable them to be worked from 6-24V DC supplies or batteries, and even from 100-120V DC mains supplies. However, if you want a really light machine which is independent of all fixed supplies, look at the growing range of **Transistor Portables**, which are powered by internal batteries. Some of these are obviously in direct competition with the cheaper domestic mains portables, with the same facilities and much the same sound quality. Others, down to the famous £5 pocket recorder, may be little more than toys as far as the hi-fi public is concerned, although they are certainly useful for verbal notes, dictation and similar speech-only applications.

Where transistor portables really score for the serious user are the medium and high quality applications in what is rather oddly known as 'the field'; in other words, reporting, interviews, background material, folk music and dancing, outdoor activities in general. Anywhere, in fact, where immediacy and often unobtrusiveness are essential for success. Nothing inhibits naturalness so much as a big shiny box and yards of cable. Transistor portables suitable for any or all of these purposes can be had at prices up to £360 (a professional job, and well worth it) but about £50-£70 should buy one good enough for most amateur work.

The cost is the inevitable result of fitting so much into so small a space and still getting good sound on to the tape. That it can be done well at all is because the recording process, as such, needs relatively little power and space. Most of the better transistor portables omit power-consuming loudspeaker amplifiers and have either playback into headphones or external amplifiers, or none at all, the practice being to record on the portable and to play the tape back in the studio or wherever on a larger machine. Much of the BBC's news and documentary material is now collected in just this way using 'shoulder-bag' recorders, as it was previously on similar but larger recorders with valves before transistors became commercially useful.

Although the facilities available on transistor portables of this class are otherwise similar in *kind* to those on mains types (if not in *amount*), other features show less variety. The range offered is not yet large and a choice is therefore not unduly difficult, being dictated mainly

by facilities and price. One contrary note: units are available for powering transistor portables from the mains supply and some even have the facility built in. Note also that a few of the larger mains recorders are transistorised.

### Keep Stereo Indoors

The third problem is sharply topical: Mono or Stereo? Now, and from here on, I am going to be a shade dogmatic and make sweeping generalisations which will make the experts say "Yes, but . . ." But I believe in recommending beginners to play it safe. It is hard enough making decent recordings at first, especially live ones, without having to cope with touchy or complicated equipment as well; keep it simple and reliable. So I recommend firmly that live stereophonic recording is not for beginners. Recording from stereo discs—yes, and from stereo radio also, should this ever appear, although it hardly seems worth having a stereo recorder for one exercise which is pointless and for another which is not yet possible to any interesting extent in this country.

This does not necessarily prevent you from playing **Stereo Tape Records**, even if you buy a monophonic recorder, for many machines are arranged to record mono only but to play either mono or stereo. Some have all the necessary amplifiers built in, others need a **Stereo Add-On Unit** to supplement the existing playback amplifier; this is usually available from the firm which makes the recorder. Tape decks used as players in existing hi-fi systems can always be arranged to play stereo tapes provided, of course, that the rest of the system will handle stereo signals.

The last preliminary decision really involves four problems in one: tape speeds, track widths, reel sizes and the kind of tape to use. All four are bound together, and between them they will decide how long your longest continuous recording can be and how much recording time you get for the price of a reel of tape. However, there are certain overriding considerations which simplify the problem somewhat.

### How Many Tracks

First, tape speed and track width. In general, an increase in tape speed or track width, or both, gives an improvement in sound quality. Mechanical difficulties with tape guiding and head alignment appear at lower speeds (at or below  $3\frac{3}{4}$  i/s), while little quality advantage is gained by going too far in the high speed direction (above  $7\frac{1}{2}$  i/s). Half-track at  $3\frac{3}{4}$  i/s or quarter-track at  $7\frac{1}{2}$  i/s are capable of com-

parable results in domestic use only, provided first-class quarter-track recorders and good tapes are used; quarter-track reproduction may otherwise suffer from more appreciable background hum and noise, fading, roughness, dropouts and other irregularities.

**Full-Track** means that the whole width of the tape is used for one recording. **Half-Track** recorders use only half of the tape width for each recording (a little less, in fact, to leave a safety lane between the tracks), so that the length of the tape can be effectively doubled by recording first on the upper half and then on the lower. **Quarter-track** machines use a little less than a quarter of the tape width and thus effectively quadruple the tape length. Half-track machines may have either single- or twin-track facilities; quarter-track ones are always twin. Stereo reproduction requires two tracks simultaneously; full tracks cannot be used, obviously, so tape consumption, for a given system, is doubled.

### Four Main Types

There are four main *types* of tape: **Standard**, **Long Play**, **Double Play** and **Triple Play**, in descending order of thickness. The strength and flexibility of tape is determined mainly by the **Base Material**. The three main groups used are:

**Acetates**, which tear and break fairly easily, are stiffish and may become stiffer or more brittle with age. The easy breaking means little stretching if broken, which many experts consider an advantage; the recording is not unduly affected by the break, apart from fluctuations at the rejoined break itself. The main virtue of acetates is their low price.

**PVC** (Polyvinyl-chloride) is fairly tough and flexible, but stretches considerably before breaking, thus spoiling beyond repair recordings around the break. It does not appear to age appreciably. It is usually toughened by pre-stretching for use with thin tapes. A reasonably cheap, general-purpose base.

**Polyesters** (Melinex, Mylar) are very tough but rather stiff, chemically inert and apparently ageless. They are all pre-stretched but can also be 'tensilised' for thin tapes. Expensive.

Consideration of the factors mentioned will reveal some limiting features to be avoided, particularly when account is taken of the lengths of various types of tape on various size reels. For instance, if you want to record high-quality music in continuous lengths of up to 45 minutes for home listening, this suggests a half-track or good quarter-track machine running at  $7\frac{1}{2}$  i/s. Long Play PVC or Polyester, Standard PVC, or Double Play Polyester are suitable. The time factor limits you to machines



*EMI RE301 stereo recorder.*

taking at least 8½ in. reels for Standard Tape, 7 in. reels for Long Play or 5½ in. reels for Double Play. Since machines taking only 5½ in. reels tend to be in the 'Cheaper domestic portable' class, it has to be one of the other two, and the price will probably make the final decision for you.

### Examining a Specification

Now you have some idea of what you need, start collecting. The tape recorder directory following this article will sort the wheat from the chaff and give you some names to look out for at the same time, but the entries there are too brief to serve as a basis for even a semi-final choice. What you want now is a specification for each likely machine. This is the section tucked away on the back of the nice glossy leaflets which you are collecting. The information it contains is, by and large, factual, but not all of it is useful for your purposes; much of it will merely confirm that the machine has things which are essential for making recordings on tape!

It is convenient to divide the specification into two sections: Performance, Features and Facilities. Let us first pick a few comparison points out of the former. Some care is needed here, as this is obviously the place for imaginative compilers to give way to their enthusiasm, especially if the machine is in the lower price ranges and needs boosting a bit. The more modest the claims made—and those for some of the best machines are really very restrained indeed—the more reliable they are likely to be. But for the low-priced machines it is probably better to ignore this section altogether and to rely mainly on listening to them, when you have drawn up your short list.

High-quality domestic and semi-professional machines deserve a little study here, however, if only to check that what is offered is consistent with the price.

Among the electrical points, the **Frequency Range** is probably the most quoted figure and the one *least* indicative of general quality. The upper frequency limits, to be consistent with good, clean, reliable sound, are not spectacular. Pushing these figures above about 12 Kc/s for 3½ i/s or 15 Kc/s for 7½ i/s (for -3 dB) may cause loss of cleanness on any but the very best machines and it is pointless anyway; no programme source available to the beginner will contain much *useful* sound above 10-12 Kc/s, short of paying £100 and over for a studio microphone for live recordings. Do not be dazzled by frequency ranges up to 20 Kc/s or more, at any speed.

The low frequency limit varies fairly predictably from about 100 c/s on cheaper machines to about 20 c/s on the most expensive.

The **AC Bias Frequency** should be four or more times the highest quoted audio frequency (e.g. at least 60 Kc/s if the latter is 15 Kc/s) on high quality domestic machines, and at least three times on cheaper machines, but in any case the higher the better. Any less may cause harshness in strong signals. (But note that many of the cheaper transistor portables use DC bias, so that this and most other criteria of quality are irrelevant to their purposes: speech and low-quality stuff only).

The figure entered in the specification against **Distortion** is a useful check on the general design quality of a machine. Semi-professional and professional machines are usually quoted as producing 1.5-3% (3rd harmonic at 1 Kc/s, generally) while high-quality domestic and the more honest of the cheaper machines go to 5%. All is not what it seems here. Distortion in tape recorders is a quite unavoidable result of impressing a signal on the tape; the more signal, the more distortion. What this entry really means is that the meter or 'magic eye', has been arranged to show the maximum permissible signal input when this suffers the quoted distortion figure. That one recorder can manage 1.5% whereas another has to go to 5% means that the former has a much lower inherent background noise than the latter and can therefore afford to do with less signal input to the tape while still giving reproduction which is reasonably free of background noise. In fact, the distortion is not of an unpleasant kind, even at 5%, which seems high by hi-fi standards; and remember that this order if distortion should occur only on the very short signal *peaks* if the recorder is controlled properly.

### Background Noise

I hesitate to be dogmatic about **Background Noise**, because the figure measured depends very much on the *character* of the noise and how it is measured, and this is not always made clear. Many specifications quote an 'unweighted' figure, however, which should be directly comparable with those of other recorders in the same class. Background noise of -50 dB (relative to the maximum permissible signal, that is) should ensure almost noiseless reproduction under ordinary domestic conditions, while -40 dB might be obtrusive. Professionals aim at -60 dB or better. 'Weighted' measurements correspond more nearly than unweighted to how one *hears* the noise, and these are generally 20 dB or so better (i.e. -70, -60, -80 dB respectively). They are not much used yet.

The **Recording Level Indicator** may be a magic eye in various forms, a 'VU Meter' or a 'peak meter', 'peak level meter' or 'peak

programme meter'. The great majority of domestic machines have magic eyes, which are adequate for most domestic recording. VU meters are popular among certain groups of professionals, but inexperienced users often find them misleading because they are unable to follow the rapid signal peaks which cause most overloading distortion. Even after several years, I would rather have either a peak meter or a magic eye. Meters are usually indicative of better overall design quality. They occur more in the semi-professional class than the domestic, and appear on all professional machines. Magic eyes, incidentally, are basically a simple kind of peak meter.

Two mechanical points must also be checked. The long-term **Speed Accuracy** is usually  $\pm 2\%$  for high quality domestic machines, which will suffice for most purposes. However, if you need really accurate reproduction of pitch or timing (subject to the mains frequency remaining constant, of course) look for  $\pm 0.5\%$ .

Short-term speed accuracy appears under **Wow and Flutter**, which explain themselves better than I can explain them. This is another dangerous subject, but in general a total figure of 0.2% RMS is fair domestic quality, 0.1% is good and 0.05% inaudible by anyone under any programme conditions. If your taste is for solemn organ music, aim at the last. Orchestral music will usually stand 0.1%, dance music and pops 0.2% or more. Speech will take up to 10% without noticeable effect and 25% without losing intelligibility; but do not bother to look for figures like these. Wow and Flutter figures usually increase as the tape speed decreases.

#### Features and Facilities

In the Features and Facilities section of the specification, the choice will depend entirely on what you need. Two essentials always appear on domestic recorders, however: **Input Sockets** for a microphone (usually supplied with cheaper recorders but not with high quality ones) and for a radio or gramophone pickup. A socket for an **External Loudspeaker** is usually fitted on all but the cheapest machines and the professional ones, but only the high quality or the semi-professional class can drive it well enough for serious listening. A 'Line output' or 'pre-amplifier output' socket, to be connected to a high quality power amplifier and loudspeaker, may give better results. An internal loudspeaker in a recorder case, however good, cannot give high quality sound, although it may well give a sound which is pleasant for background listening or sufficient for speech.

Most recorders have two alternative **Tape Speeds**, and may have three. Some cheap

machines have only one and some expensive ones four. Bear in mind that more than two speeds are difficult to arrange in the cheaper machines without running into wow and flutter troubles. A **Pause Control** and a **Tape Position Indicator** are near-essentials for planning and editing recorded tapes; most recorders have them anyway.

#### More Useful Facilities

A host of other facilities and accessories are offered besides these. Some of those likely to be most useful to beginners are noted briefly:

**Automatic Recording Level Control** removes the need for adjusting recording input level. Especially useful when you want to take part in the recording, or to leave the recorder altogether. One company calls this a 'Magic Ear'.

**Automatic Stop** switches the mechanism off if the tape runs out and sometimes also if it breaks.

**Cross-Track Recording.** A long-winded method of **Mixing**, on twin-track machines only, by re-recording material from one track on to the other together with a fresh input signal. The process can be repeated several times, although earlier recordings may suffer in the process.

**Echo Effect.** A 'trick' facility arranged by feeding part of the output back to the recording head. Rather artificial since natural echoes contain reverberation also; on *Three-Head machines* only.

**Parallel-Track Recording or Playback** on twin-track machines is the separate recording or playback of two dissimilar signals at the same time.

**Sound-on-Sound**—Cross-Track Recording.

**Straight-Through Amplifier.** The tape amplifier with various networks switched out to permit its use for amplifying microphone, radio or gramophone signals.

**Superimposing** allows a fresh signal to be added to an already-recorded track. Some loss in the original track is unavoidable, but the method is good for adding commentary to music background, for instance.

**Variable Winding** can be controlled in speed and tension by the operator.

Having on this basis arrived at your short list of three or four likely machines, go and *listen* to them; play with the controls and *listen*; turn your back to them and *listen*; get the feel of the things and *listen* again. Try to imagine yourself with sounds like that, relaxing in your living room or whatever you aim to do with them; and if you can't, then don't buy. If it feels wrong and sounds wrong, then it is wrong, whatever the figures say.

# DIRECTORY OF TAPE RECORDERS

★ The abbreviations used for the specifications in this directory are as follows: **F.R.** = frequency response; **i/s** = inches per second; **P.s.n.** = power supply needed; **<** = better than; **M.E.** = 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: The Pullin Optical Co. Ltd., Ellis House, Aintree Road, Perivale, Greenford, Middlesex. Tel.: Alperton 1541/7.

● **Model 345.** Stereo recorder.  $\frac{1}{4}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F.  $7\frac{1}{2}$  i/s, 0.08%;  $3\frac{3}{4}$  i/s, 0.14%. H. and N. -42 dB referred to 250 c/s. F.R.  $7\frac{1}{2}$  i/s, 40 c/s-21 Kc/s  $\pm 6$  dB;  $3\frac{3}{4}$  i/s, 40 c/s-12.5 Kc/s  $\pm 6$  dB. Replay char. NARTB. Inputs: mic. 0.8 mV; radio 50 mV. Cathode-follower line output. Three motors.  $10\frac{1}{2}$ -in. spool. Rewind 45 secs., 1,200 ft. VU meters. Partly transistorised. Three heads. Tape lifter. Operates vertically or horizontally. 10W per channel output. Size:  $17\frac{3}{8} \times 16 \times 12\frac{1}{2}$  in. Weight: 72.6 lb. Price: £208 19s.

● **Model M-7.** Stereo recorder.  $\frac{1}{4}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F.  $7\frac{1}{2}$  i/s, 0.15%;  $3\frac{3}{4}$  i/s, 0.25%;  $1\frac{7}{8}$  i/s, 0.35%. H. and N. -40 dB. F.R.  $7\frac{1}{2}$  i/s, 30 c/s-23 Kc/s;  $3\frac{3}{4}$  i/s, 40 c/s-20 Kc/s;  $1\frac{7}{8}$  i/s, 40 c/s-13 Kc/s. Replay char. NARTB. Outlet from pre-amp. One motor. 7-in. spool. Rewind 75 secs., 1,200 ft. VU meters. Operates vertically or horizontally. 6W per channel output. Air cooling system. High quality performance at low speeds. Size:  $20 \times 13 \times 9$  in. Weight: 47.3 lb. Price (including mic. and accessories): £139 13s.

For matching speakers SS70 and SS50, see Speaker Section.

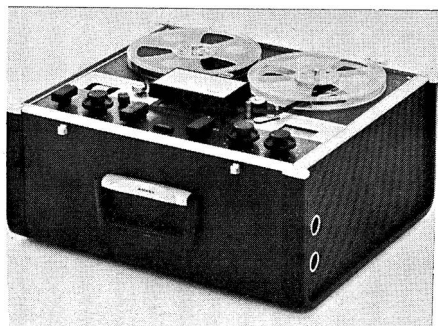
**Model 707.** Semi-professional mono recorder.  $\frac{1}{2}$ -track. Speeds:  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F. below 0.15%. H. and N. -50 dB. F.R. 30 c/s-12 Kc/s  $\pm 3$  dB,  $7\frac{1}{2}$  i/s. Replay char. NARTB. Outlet from replay head (recorder amplifier may be switched off). One motor. 7 in. spools.  $2\frac{1}{2}$  min. rewind. VU meter. Pause control. Automatic shut-off of whole recorder at end of tape, if required. For vertical or horizontal use. Size:  $13\frac{1}{4} \times 18\frac{1}{4} \times 9$  ins. Weight: 37 lbs. Price to be announced.



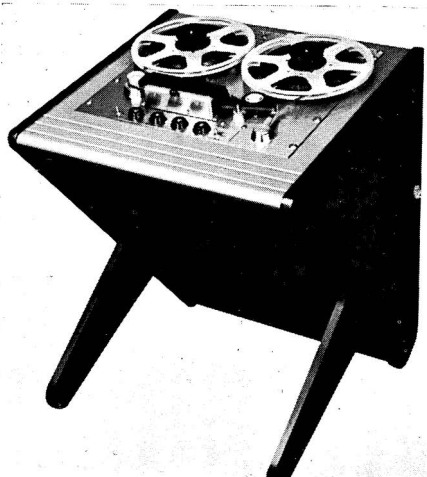
*Akai Model 345*



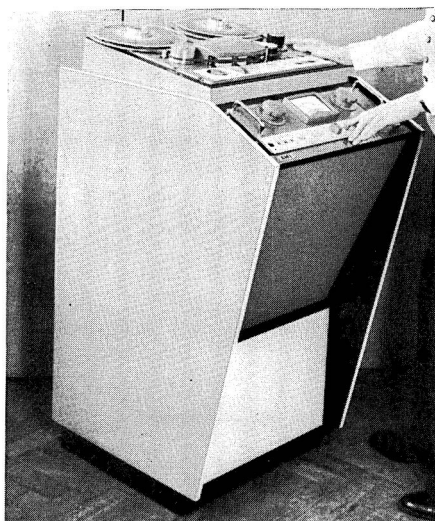
*Akai Model 707*



*Ampex F-44*



*Ampex 352 console.*



*EMI Type 311*

**AMPEX (GREAT BRITAIN) LTD.**, 72 Berkeley Avenue, Reading, Berkshire. Tel.: Reading 55341. Cables: Videotape, Reading.

**Ampex 300 series.** Professional recorders. One to eight tracks. Speeds 15 and  $7\frac{1}{2}$  i/s. Three motors. 14-in. spools up to 1 in. wide. F.R. 15 i/s, 30-18,000 c/s;  $7\frac{1}{2}$  i/s, 40-12,000 c/s, both  $\pm 2$  dB. Large scale VU meter. H. and N. -60 dB full track, -55 dB multi-track. W. and F. less than 0.1% at 15 i/s. Prices on application.

**Ampex 351.** Professional recorder in console, portable or rack-mounted form. Full or  $\frac{1}{2}$ -track. Speeds 15 and  $7\frac{1}{2}$  i/s, or  $7\frac{1}{2}$  and  $3\frac{3}{4}$  i/s. Three motors.  $10\frac{1}{2}$  in. NAB spools. F.R. 15 o/s, 30-18,000 c/s;  $7\frac{1}{2}$  i/s, 40-12,000 c/s;  $3\frac{3}{4}$  i/s, 50-8,000 c/s, all  $\pm 2$  dB. Large scale VU meter. H. and N. -70 dB full track, -65 dB  $\frac{1}{2}$ -track at 15 i/s. W. and F. less than 0.15% at 15 i/s. Size (console): 48 x 24 x 28 in. Weight: 168 lb. Price (15 and  $7\frac{1}{2}$  i/s) on application.

**Ampex 352.** Professional reproducer only in console or rack-mounted form. Full or  $\frac{1}{2}$ -track, or stereo. Speeds 15 and  $7\frac{1}{2}$  i/s. Three motors.  $10\frac{1}{2}$  in. NAB spools. F.R. 15 i/s, 30-18,000 c/s;  $7\frac{1}{2}$  i/s, 40-12,000 c/s, both  $\pm 2$  dB. H. and N. -70 dB full track, -65 dB half track. W. and F. less than 0.15% at 15 i/s. Size (console): 35 x 24 x 24 in. Weight: 109 lb. Price on application.

● **Ampex 354.** Professional console recorder. Speed 15 and  $7\frac{1}{2}$  i/s or  $7\frac{1}{2}$  and  $3\frac{3}{4}$  i/s. Three motors.  $10\frac{1}{2}$  in. NAB spools. F.R. 15 i/s 30-18,000 c/s;  $7\frac{1}{2}$  40-12,000 c/s  $\pm 2$  dB. 2 VU meters. H. and N. -65 dB. W. and F. 0.15% at 15 i/s. Price on application.

**Ampex 602.** Professional portable recorder. Speed  $7\frac{1}{2}$  i/s. One motor. 7-in. spools. F.R. 40-10,000 c/s  $\pm 2$  dB. Large scale VU meter. H. and N. -55 dB full track, -50 dB half track. W. and F. less than 0.17%. Size:  $16\frac{1}{2}$  x  $13\frac{3}{4}$  x 8 in. Weight: 28 lb. Price: £295.

● **Ampex 602-2.** Stereo version of Ampex 601. Size:  $24\frac{1}{2}$  x 13 x 8 in. Weight: 42 lb. Price: £486.

● **PR-10.** Professional recorder. Stereo or mono versions. Full or  $\frac{1}{2}$ -track.  $\frac{1}{4}$ -track version available shortly. Speeds: 15,  $7\frac{1}{2}$  i/s or  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F. 15 i/s, 0.15%;  $7\frac{1}{2}$  i/s, 0.18%;  $3\frac{3}{4}$  i/s, 0.25%. H. and N. -60 dB at 15,  $7\frac{1}{2}$  i/s, full track. F.R. 15 i/s, 30 c/s-15 Kc/s  $\pm 2$  dB;  $7\frac{1}{2}$  i/s, 40 c/s-12 Kc/s  $\pm 2$  dB. Replay char. NAB/CCIR/AME (15 i/s only) plug-in equalisers. Various inputs by plug-in transformers and





*Ampex E-65 Stereo*

pre-amps. Outlet from pre-amp +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 (mono): £485.

● **E65.** Transistorised stereo recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F. 0.3%,  $7\frac{1}{2}$  i/s. H. and N. -50 dB,  $7\frac{1}{2}$  i/s; -44 dB,  $3\frac{3}{4}$  i/s. F.R.  $7\frac{1}{2}$  i/s, 150 c/s-10 Kc/s  $\pm 2$  dB;  $3\frac{3}{4}$  i/s, 150 c/s-5 Kc/s  $\pm 2$  dB. Replay char. NAB. Inputs: line 0.5V, mic. 0.5 mV. Outlets from pre-amp: 1, headset 2 K, 1V; 2, line 2 K, 1V; 3, to speaker/amplifier. One motor. 7-in. spool.  $1\frac{1}{2}$  mins. rewind. Special educational and language study recorder. Size:  $8 \times 13\frac{3}{4} \times 16\frac{1}{2}$  in. Weight: 30 lb. Price to be announced.

● **F-44 series.** Professional stereo/mono recorder.  $\frac{1}{4}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F.  $7\frac{1}{2}$  i/s, 0.12%;  $3\frac{3}{4}$  i/s, 0.18%. H. and N. -53 dB,  $7\frac{1}{2}$  i/s; -48 dB,  $3\frac{3}{4}$  i/s. F.R.  $7\frac{1}{2}$  i/s, 50 c/s-15 Kc/s  $\pm 2$  dB;  $3\frac{3}{4}$  i/s, 50 c/s-10 Kc/s + 2-4 dB. Replay char. N.A.B. Inputs: line 0.15V, 500 K; mic.

0.5 mV, 2.2 megohms. Cathode-follower output 1V. One motor. Level meters. Three heads. Details of individual models:

**F-4450.** Unmounted, for use in custom installation (optional walnut cabinet). Size:  $13 \times 15 \times 7\frac{1}{2}$  in. Weight: 28 lb.

**F-4452.** Unmounted, for use in component systems. Size and weight as for F-4450.

**F-4460.** Portable. Size:  $14 \times 17\frac{1}{2} \times 9\frac{1}{4}$  in. Weight: 36 lb.

**F-4470.** Portable, with built-in dual-channel amplifier and speakers. Size:  $14 \times 24\frac{3}{4} \times 9\frac{1}{4}$  in. Weight: 48 lb.

**Model 2044.** Portable self-contained amplifier and speaker system for use with F-44 series. Size:  $14 \times 17\frac{1}{2} \times 9\frac{1}{4}$  in. Weight: 26 lb.



**BALMORAL ELECTRONICS LTD.,** Oxford Circus House, Oxford Street, London, W.1. Tel.: Regent 3311.

**Enthusiast.** Semi-professional mono recorder.  $\frac{1}{2}$ -track. Speeds 15,  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{1}{2}$  i/s. W. and F.



*EMI TR 52-2 portable stereo.*

$7\frac{1}{2}$  i/s, better than 0.2%. H. and N. -50 dB. F.R. 15 i/s, 40 c/s-15 Kc/s  $\pm 2$  dB;  $7\frac{1}{2}$  i/s, 40 c/s-12 Kc/s  $\pm 2$  dB;  $3\frac{3}{4}$  i/s, 50 c/s-6 Kc/s  $\pm 2$  dB. Replay char. CCIR. Inputs: 1, 0.5 mV (peak); 2, 50 mV (peak). Three motors. Rewind less than 1 min., 1,200 ft. Level meter. Pause control, monitoring, superimpose. Three heads. Size:  $18 \times 16\frac{1}{2} \times 9\frac{1}{2}$  in. Weight: 40 lbs. Price: £99 15s.



**DYNATRON RADIO LTD.**, St. Peter's Road, Furze Platt, Maidenhead, Berks. Tel.: Maidenhead 23331.

**Specialist 1200.** Mono recorder using Reflectograph deck.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F. 0.15%. H. and N. -50 dB. F.R.



*EMT Studer C37 Console*

35 c/s-15 Kc/s at  $7\frac{1}{2}$  i/s  $\pm 3$  dB, 35 c/s-9 Kc/s at  $3\frac{3}{4}$  i/s  $\pm 3$  dB. Replay char. CCIR. Outlet from pre-amp. Three motors.  $8\frac{1}{4}$ -in. spool, 1 min. rewind. Level meter. Separate records/playback amplifiers and heads. Dual speed sync. capstan motor. Superimpose. Variable bias. Three-channel electronic mixing. Built-in echo effect. Continuous monitoring from input or tape through inbuilt speaker or phones. Variable speed wind. Foil auto-stop. Clock counter.  $10 \times 6$  in. speaker 15 ohms. Fully independent bass, treble, record and playback controls. Size:  $20\frac{1}{2} \times 18 \times 11\frac{1}{4}$  in. Weight: 58 lb. Price: £145 19s.



**EMI ELECTRONICS LTD.**, Hayes, Middx. Tel.: Hayes 3888. Cables: Emidata, London.

● **TR52/D.** Professional portable stereo/mono recorder. Speeds  $7\frac{1}{2}$  and  $3\frac{3}{4}$  i/s. One motor. 7-in. spools. F.R.  $7\frac{1}{2}$  i/s, 50-10,000 c/s;  $3\frac{3}{4}$  i/s, 50-6,000 c/s, both  $\pm 2$  dB. W. and F. less than 0.25% at  $7\frac{1}{2}$  i/s. Crosstalk -45 dB. VU meter. Size:  $20 \times 17\frac{1}{2} \times 13\frac{1}{2}$  in. Weight: 80 lb. Price: £245.

**RE301.** Stereo/mono recorder in transportable rack or trolley form.  $\frac{1}{2}$ -track. Speeds 15,  $7\frac{1}{2}$  i/s, or  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F. 0.2% at 15 i/s, 0.25% at  $7\frac{1}{2}$  i/s, 0.3% at  $3\frac{3}{4}$  i/s. H. and N. 50 dB below peak level. F.R. 15 i/s, 50 c/s-15 Kc/s;  $7\frac{1}{2}$  i/s, 50 c/s-10 Kc/s;  $3\frac{3}{4}$  i/s, 50 c/s-6 Kc/s (all  $\pm 2$  dB). Replay char. CCIR. Inputs: mic. 30/50 ohms, less than 100  $\mu$ V for peak recording level. Line floating and bridging for 600 ohms, less than 200 mV for peak record level. One motor.  $8\frac{1}{4}$ -in. spool.  $1\frac{3}{4}$  mins. rewind. Plug-in record and replay amplifiers. VU meter. Size:  $14\frac{3}{8} \times 19\frac{1}{4} \times 18\frac{3}{8}$  in. Weight: 97 lb. Price: £278.

● **Type 311.** Professional stereo/mono recorder. Full, twin, three, four track. Speeds  $3\frac{3}{4}/7\frac{1}{2}$  or  $7\frac{1}{2}/15$  i/s. W. and F. 15 i/s, better than 0.1%;  $7\frac{1}{2}$  i/s, 0.1%;  $3\frac{3}{4}$  i/s, 0.15%. H. and N. (2% distortion) -60 dB unweighted. F.R. 15 i/s, 30 c/s-20 Kc/s;  $7\frac{1}{2}$  i/s, 30 c/s-12 Kc/s;  $3\frac{3}{4}$  i/s, 40 c/s-8 Kc/s ( $\pm 2$  dB). Replay char. CCIR, NARTB, aux. switched. Input 10 K bridging, and 200 or 600 ohm line. Balanced floating output at 35, 200 or 600 ohms. Three motors.  $11\frac{1}{4}$ -in. spools (European). Rewind (NAB spool)  $1\frac{1}{4}$  mins. VU meter. Separate track erasure on multi-channel machines. Size (deck):  $19 \times 17 \times 12$  in., 80 lb.; (amplifier):  $19 \times 16\frac{1}{4} \times 7$  in., 32 lb. Basic price: £595.

**EMT WILHELM FRANZ GMBH**, Switzerland. Sole U.K. Agents: F. W. O. Bauch Ltd., Chaddlewood, Cockfosters Road, Cockfosters, Barnet, Herts.

● **Studer A62**. Professional transistorised studio recorder. Stereo/mono. Full track or  $\frac{1}{2}$ -track. Speeds 15,  $7\frac{1}{2}$  i/s. W. and F. 15 i/s, 0.04%;  $7\frac{1}{2}$  i/s, 0.06%. H. and N. 15 i/s, -60 dB;  $7\frac{1}{2}$  i/s, -56 dB. F.R. 30 c/s-15 Kc/s  $\pm 1.5$  dB. Replay char. CCIR or NARTB (either by request). Inputs: -6 dBm to +22 dBm, balanced 1 K. Outlet from pre-amp. Three motors. 10-in. spools.  $1\frac{1}{2}$  mins. rewind. No speaker or power amplifier. Size: 19 x 14 x  $8\frac{1}{4}$  in. Weight: 57 lb. (complete chassis). Price (mono): £525; (stereo): £626.

● **Studer C37**. Professional studio recorder. Full track mono or  $\frac{1}{2}$ -track stereo. Speeds 15,  $7\frac{1}{2}$  i/s. W. and F. (0.5-250 c/s) 15 i/s, 0.04%;  $7\frac{1}{2}$  i/s, 0.05%; (0.5-6 c/s) 15 i/s, 0.015%;  $7\frac{1}{2}$  i/s, 0.025%. H. and N. 15 i/s, -70 dB;  $7\frac{1}{2}$  i/s, -66 dB. F.R. 30 c/s-15 Kc/s +1 dB -2 dB. Replay char. CCIR or NARTB (either by request). Inputs: 0.7-7V (0 dBm to +20 dBm); balanced input imp. greater than 15 K. Outlet from pre-amp. Three motors. 12-in. spools. 2 mins. rewind 2,400 ft. No speaker or power amplifier. Size: 21 x 26 x 17 in. Weight: 172 lb. Price (complete chassis): mono, £985; stereo, £1,250.



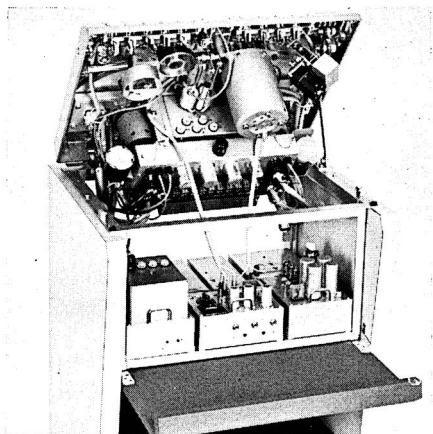
**FERROGRAPH CO. LTD.**, 84 Blackfriars Road, London, S.E.1. Tel.: Waterloo 1981/2/3. Cables: Britferro, London, S.E.

● **Model 422U**. Stereo/mono recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F. 15% at  $7\frac{1}{2}$  i/s, 0.2% at  $3\frac{3}{4}$  i/s. H. and N. 52 dB. F.R.  $7\frac{1}{2}$  i/s, 40 c/s-15 Kc/s  $\pm 3$  dB;  $3\frac{3}{4}$  i/s, 50 c/s-10 Kc/s  $\pm 3$  dB. Replay char. NARTB, CCIR. Inputs: 1 megohm, 2 mV; 0.5 megohm, 350 mV per channel. Output 1V at 5 K per channel. Three motors. 8 $\frac{1}{2}$ -in. spools, 1 min. rewind. Level meter. Stereo recording and playback with monitoring on both channels. Echo effects. Recording from track to the other. Supply 200/250V, 50 c/s. Size:  $18\frac{1}{2}$  x  $17\frac{1}{2}$  x  $9\frac{3}{4}$  in. Weight: 48 lb. Price: £115 10s.

● **Model 422E**. Details as for Model 422U, but for operation at 110V, 50 c/s.

● **Model 424A**. Details as for Model 422U, but for operation at 117V, 60 c/s, and with  $\frac{1}{4}$ -track playback.

● **Model 424U**. Details as for Model 422U, but with  $\frac{1}{4}$ -track playback.



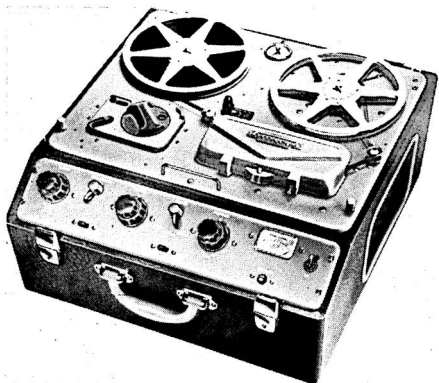
*EMT Studer C37 (interior view)*

● **Model 424E**. Details as for Model 422E, but with  $\frac{1}{4}$ -track playback.

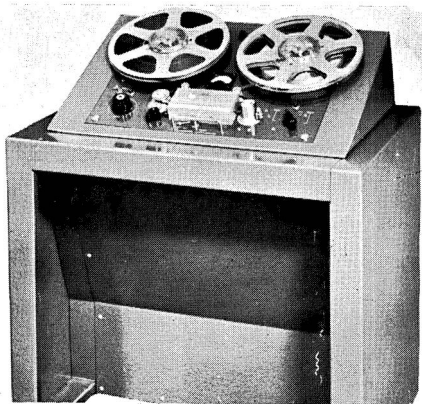
**Model 5A/N**. Mono recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F. 0.16% at  $7\frac{1}{2}$  i/s, 0.2% at  $3\frac{3}{4}$  i/s. H. and N. 45 dB. F.R.  $7\frac{1}{2}$  i/s, 40 c/s-15 Kc/s  $\pm 3$  dB;  $3\frac{3}{4}$  i/s, 40 c/s-10 Kc/s  $\pm 3$  dB. Replay char. CCIR. Inputs: 1 megohm, 3 mV; 80 K, 15 mV. Outlet from replay head or pre-amp. Three motors. 8 $\frac{1}{2}$ -in. spools, 1 min. rewind. Level meter. Switches from wind-on to wind-back without stopping.  $2\frac{1}{2}$ W output. Interchangeable heads. Size:  $18\frac{1}{2}$  x  $17\frac{1}{2}$  x  $9\frac{3}{4}$  in. Weight: 50 lb. Price: £89 5s.



**LEEVEERS-RICH EQUIPMENT LTD.**, 319b Trinity Road, Wandsworth, London, S.W.18. Tel.: Vandyke 9054. Cables: Leemag, London, S.W.18.



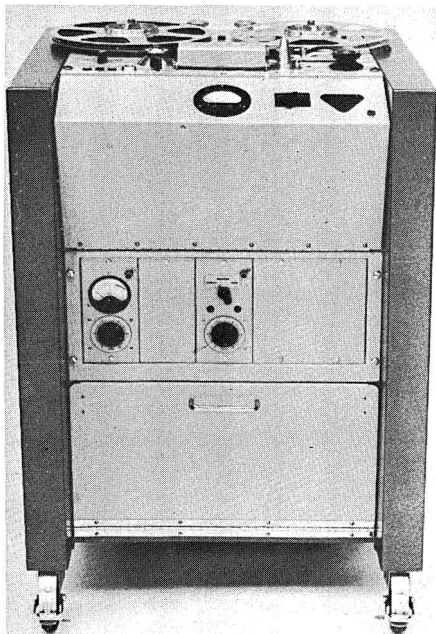
*Ferrograph 422 stereo*



*Leavers-Rich Series E console*

**Model E.141.M.** Professional recorder console. Speeds 15 and  $7\frac{1}{2}$  i/s. Three motors.  $11\frac{1}{2}$  in. spools. F.R. 15 i/s and  $7\frac{1}{2}$  i/s, 50-15,000 c/s  $\pm 2$  dB. VU level meter. H. and N. -60 dB unweighted. W. and F. 0.06% at 15 i/s and  $7\frac{1}{2}$  i/s. Outlet from pre-amp at 600 ohms. Size:  $24 \times 24 \times 36$  in. Weight: 205 lb. Price: £640.

**Model E.141.P.** Two case portable version of E.141.M above. Size (recorder):  $21 \times 17 \times 11\frac{1}{2}$  in.; (amplifier):  $18\frac{3}{4} \times 14\frac{1}{2} \times 10\frac{3}{4}$  in. Weight (recorder): 71 lb.; (amplifier) 25 lb. Price: £615.



*Leavers-Rich Model E.141.M*

**Model E.141.R.** Rack mounting version of E.141.M above. Size:  $19 \times 17\frac{1}{2} \times 10$  in. Weight: 50 lb. Price: £545.

**Model E.242.M.** Professional dual channel recorder console. Three motors.  $11\frac{1}{2}$  in. spools. Speeds 15 and  $7\frac{1}{2}$  i/s. F.R. 15 i/s and  $7\frac{1}{2}$  i/s, 50-15,000 c/s  $\pm 2$  dB. VU level meter. H. and N. -60 dB unweighted. W. and F. 0.06% at 15 i/s and  $7\frac{1}{2}$  i/s. Outlet from pre-amp at 600 ohms. Size:  $24 \times 24 \times 36$  in. high. Weight: 210 lb. Price: £790.

**Model E.242.P.** Portable version of E.242.M above. Two cases. Size (recorder):  $21 \times 17 \times 11\frac{1}{2}$  in.; (amplifier):  $18\frac{3}{4} \times 14\frac{1}{2} \times 10\frac{3}{4}$  in. Weight (recorder): 71 lb.; (amplifier): 30 lb. Price: £765.

**Model E.242.R.** Rack mounting version of E.242.M above. Size:  $19 \times 17\frac{1}{2} \times 10$  in. Weight: 55 lb. Price: £675.



**PAMPHONIC REPRODUCERS LTD.,**  
Westmoreland Road, London, N.W.9. Tel.: Colindale 7131.

**Reflectograph Model A.** Semi-prof. recorder. Speeds  $7\frac{1}{2}$  and  $3\frac{3}{4}$  i/s. Three motors.  $8\frac{1}{2}$  in. spools. F.R.  $7\frac{1}{2}$  i/s 35-15,000 c/s;  $3\frac{3}{4}$  i/s 35-9,000 c/s both  $\pm 2$  dB. Level meter. H. and N. -55 dB. W. and F. <0.15%. Outlet from pre-amp. Size:  $20 \times 16 \times 10$  in. Weight approx.: 50 lb. Price: £110 5s.

● **Model B.** Similar specification to Model A but fitted with  $\frac{1}{4}$  track heads and facility for playing back  $\frac{1}{4}$  track or  $\frac{1}{2}$  track pre-recorded stereo tapes with addition amplifier. Now only to special order. Price: £120 15s.

**Reflectograph Model D.**  $\frac{1}{2}$ -track tape player. Speeds  $7\frac{1}{2}$  and  $3\frac{3}{4}$  i/s. Three motors.  $8\frac{1}{2}$  in. spools. F.R.  $7\frac{1}{2}$  i/s 35-15,000 c/s;  $3\frac{3}{4}$  i/s 35-9,000 c/s, both  $\pm 3$  dB. H. and N. -50 dB. W. and F. 0.15%. Outlet from pre-amp. 250 mV. Size:  $20 \times 16 \times 10$  in. Weight approx.: 50 lb. Price: £78 15s.

**Reflectograph Model EA.**  $\frac{1}{2}$ -track tape player. Speeds  $7\frac{1}{2}$  or  $3\frac{3}{4}$  i/s to order. Three motors.  $8\frac{1}{2}$  in. spools. F.R. to NAB standard. H. and N. -50 dB. W. and F. 0.2% total. Output from pre-amp 250 mV. Automatic track reversal. Fitted with automatic start for clock control operation. Size:  $20 \times 16 \times 10$  in. Weight approx.: 50 lb. Price: £99 15s.

**Reflectograph Model S.** Semi-prof. recorder.  $\frac{1}{2}$ -track. Stacked erase, record and playback heads. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F. 0-13% at  $7\frac{1}{2}$  i/s, 0-18% at  $3\frac{3}{4}$  i/s. H. and N. -55 dB at 3% distortion. F.R. 35 c/s-15 Kc/s  $\pm 2$  dB,  $7\frac{1}{2}$  i/s; 35 c/s-10 Kc/s  $\pm 2$  dB,  $3\frac{3}{4}$  i/s. Replay char.  $7\frac{1}{2}$  i/s, CCIR;  $3\frac{3}{4}$  i/s, NARTB. Inputs: mic. 600 ohms balance or unbalanced as required, 6 mV; Radio not less than 10 K unbalanced 0-25V. Two outlets from stacked playback head, one from pre-amp. Three motors:  $8\frac{1}{4}$  in. spools, less than 45 seconds rewind. Level meter. Twin input mixers. Switched tracks. Plays back bottom track, but operator can record and playback on top track. On playback both tracks heard together. Size: 20 x 16 x 10 in. Weight approx.: 50 lb. Price (complete with phones and boom microphone): £125.

★

**PHILIPS.** Distributors: Peto Scott Electrical Instruments Ltd., 167-169 Wardour Street, London, W.1. Tel.: Gerrard 2911.

● **EL3566.** Professional recorder. Stereo/mono full and  $\frac{1}{2}$ -track. Speeds 15,  $7\frac{1}{2}$  i/s. W. and F. 15 i/s, 0-1%;  $7\frac{1}{2}$  i/s, 0-15%. H. and N. 15 i/s, better than -55 dB;  $7\frac{1}{2}$  i/s, better than -52 dB. F.R. 15 i/s, 60 c/s-10 Kc/s +0-2 dB, 40 c/s-15 Kc/s +0-4 dB;  $7\frac{1}{2}$  i/s, 60 c/s-8 Kc/s +0-2 dB, 40 c/s-12 Kc/s +0-4 dB. Replay char. CCIR. Inputs: mic. 0-1 mV, 400 ohms; line 150 mV, 100 K. Monitor (headphones) and line outputs. Three Papst motors. 11 in. spools. 2 min. rewind, 3,300 ft. VU meter. Provision for adding pilot-tone head. Time indicator in mins. and secs. Suitable for 19 in. rack mounting. Size (deck): 20 x  $15\frac{1}{2}$  x  $10\frac{1}{2}$  in.; (amplifier, mono): 20 x  $15\frac{1}{2}$  x  $5\frac{1}{4}$  in. Weight (deck): 60 lb.; (amp): 24 lb. Price on application.

★

**REFLECTOGRAPH.** See Pamphonic Reproducers Ltd.

★

**REVOX (U.K. CONCESSIONAIRES) LTD.,** 296 Kensington High Street, London, W.14. Tel.: Western 4343.

● **Model 736.** Stereo recorder.  $\frac{1}{2}$  or  $\frac{1}{4}$ -track versions. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F. less than 0-1% at  $7\frac{1}{2}$  i/s. H. and N. -60 dB. F.R.  $7\frac{1}{2}$  i/s, 30 c/s-18 Kc/s + 2-3 dB;  $3\frac{3}{4}$  i/s, 40 c/s-12 Kc/s + 2-3 dB. Replay char. DIN. Inputs (3 per channel): mic. 3 mV, 2 megohms, diode 3-50



*Reflectograph model S*

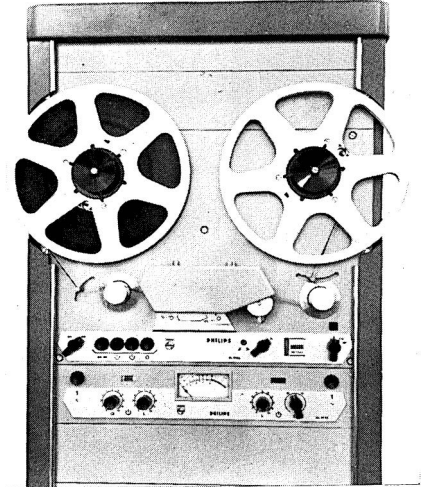
mV, 47 K; radio 50 mV, 1 megohm. Outlet from pre-amp. Three motors.  $10\frac{1}{2}$  in. NAB spool.  $1\frac{1}{2}$  min. rewind, 2,400 ft. 2 VU meters. Three heads, remote control, switchable tape tension, superimpose, mixing, echo, on and off tape monitoring, multiplay. Size:  $18\frac{1}{2}$  x  $12\frac{1}{4}$  x  $11\frac{1}{2}$  in. Weight: 45 lb. Price (chassis model): £123 18s.; (with portable case): £130 4s.

● **SP36.** Details as for Model 736, but different case. Price: £128.

★

**SONY.** Distributors: Tellux Ltd., Avenue Works, Gallows Corner, Colchester Road, Romford, Essex. Tel.: Ingrebourne 43971.

● **TC500.** Stereo recorder.  $\frac{1}{4}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F. less than 0-15%,  $7\frac{1}{2}$  i/s; less than 0-2%,  $3\frac{3}{4}$  i/s. F.R.  $7\frac{1}{2}$  i/s, 30 c/s-18 Kc/s;  $3\frac{3}{4}$  i/s, 30 c/s-13 Kc/s ( $\pm 2$  dB). Replay char.



*Philips Type EL 3566 Rack Mounted*



*Sony TC 500 Stereo*

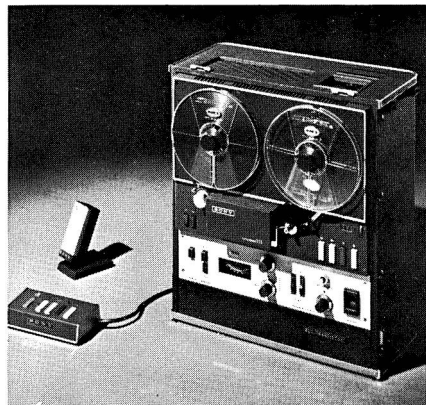
**NARTB.** H. and N. -50 dB. Inputs (mic./aux.) high impedance. Outlet from pre-amp. One motor. 7 in. spools. 2 VU meters. Sound on sound recording, tape counter, mic./aux input mixing facilities. Size:  $18\frac{1}{2} \times 16\frac{3}{8} \times 12\frac{1}{4}$  in. Weight: 55 lb. Price (with ext. speakers, 2 mics., all leads): £111 6s.

**TC777A.** Transistorised mono recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F.  $7\frac{1}{2}$  i/s, 0.15%. F.R.  $7\frac{1}{2}$  i/s, 30 c/s-17 Kc/s;  $3\frac{3}{4}$  i/s, 30 c/s-10 Kc/s ( $\pm 2$  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:  $16\frac{1}{8} \times 10\frac{1}{8} \times 18\frac{3}{4}$  in. Weight: 42 lb. Price: £166 19s.



**TANDBERG.** U.K. distributors: Elstone Electronics Ltd., Edward Street, Templar Street, Leeds, 2. Tel.: Leeds 3-5111.

● **Tandberg Series 6.** Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  and  $1\frac{7}{8}$  i/s. F.R. 30-20,000 c/s.  $\frac{1}{4}$ -track. 7 in. spools. H. and



*Sony TC 777A*

N. -55 dB. W. and F. 0.1% M.E. level ind. Outlet from pre-amp. No power amplifier or speaker. Superimposing. Size:  $15\frac{1}{4} \times 11\frac{1}{2} \times 6$  in. Weight: 25 lb. Price: £115 10s. Alternative  $\frac{1}{2}$ -track model also available: £115 10s.



**TEAC.** Distributors: C. Hammond & Co. Ltd., 296 Kensington High Street, London, W.14. Tel.: Western 4343.

● **Series R310.** Stereo/mono recorders. Model 311: full track mono; Model 312:  $\frac{1}{2}$ -track mono; Model 313:  $\frac{1}{2}$ -track stereo; Model 314:  $\frac{1}{4}$ -track stereo. Speeds 15,  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F. less than 0.15% at 15 i/s. H. and N. -60 dB (full track); -55 dB ( $\frac{1}{2}$ -track); -50 dB ( $\frac{1}{4}$ -track). Replay char. JIL, NARTB or SPEC.



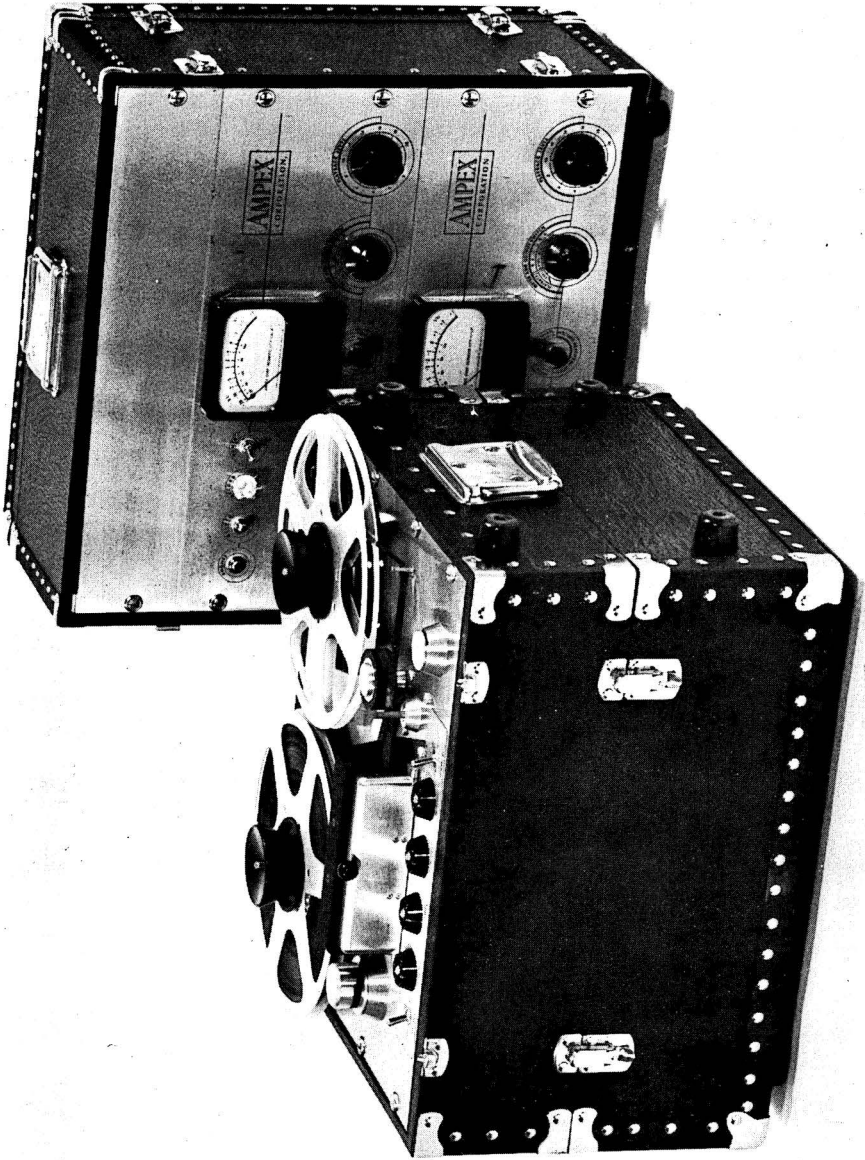
*Tandberg Series 6 stereo*

Inputs: mic. 1 megohm, -55 dBm; line 100 K, -2 dBm. Line output 600 ohms +4 dBm; output from pre-amp. high imp. -2 dBm. Three motors.  $10\frac{1}{2}$  in. NAB spool.  $1\frac{1}{2}$  min. rewind, 2,400 ft. 2 VU meters. Mixable inputs, on and off tape monitoring. Size (deck):  $19 \times 15\frac{3}{4} \times 17\frac{3}{4}$  in.; (pre-amp):  $19 \times 5\frac{1}{4} \times 7\frac{3}{4}$  in. Weight (deck):  $48\frac{1}{2}$  lb.; (pre-amp): 12 lb. Model 313, additional  $\frac{1}{4}$ -track playback head. Model 314, additional  $\frac{1}{2}$ -track playback head. Prices on application.



**TELEFUNKEN.** Sole U.K. distributors: Welmec Corporation Ltd., Lonsdale Chambers, 27 Chancery Lane, London, W.C.2. Tel.: Chancery 9944.

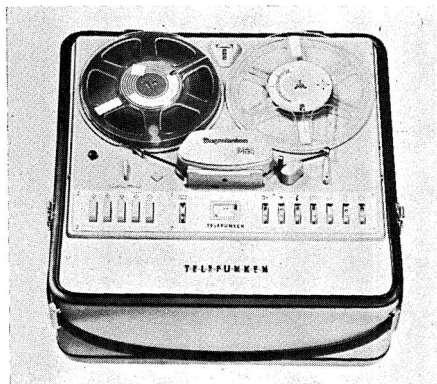
**Magnetophon M24.** Studio recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F. 1.5% at  $7\frac{1}{2}$  i/s. H. and N. -50 dB. F.R. 30 c/s-18 Kc/s,  $7\frac{1}{2}$  i/s; 40 c/s-15 Kc/s,  $3\frac{3}{4}$  i/s. Three motors.  $8\frac{3}{4}$  in. spools. Size according to cabinet. Prices from £208 19s.



*Ampex Model 351-2 professional portable stereo recorder*

**VORTEXION LTD.**, 257/263 The Broadway, Wimbledon, London, S.W.19. Tel.: Liberty 6242/3. Cables: Vortex, Wimbledon.

**Model WVA.** Complete semi-pro. mono recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F.  $7\frac{1}{2}$  i/s, 0.16%;  $3\frac{3}{4}$  i/s 0.2%. H. and N. (after erasure) -50 dB. F.R.  $7\frac{1}{2}$  i/s, 40 c/s-15 Kc/s;  $3\frac{3}{4}$  i/s, 40 c/s-12 Kc/s (all  $\pm 3$  dB). Replay char. CCIR. Inputs: mic.,  $12\mu\text{V}$  on 30 ohms; gram/radio 20 mV on  $\frac{1}{2}$  megohm. Output 15 ohms at  $3\frac{1}{2}$ W. Three motors.  $8\frac{1}{4}$  in. spools, less than 1 min. rewind for 1,750 ft. tape. Level meter. Size:  $8\frac{1}{4} \times 22\frac{1}{2} \times 15\frac{3}{8}$  in. Weight: 51 lb. Pause control. Price: £93 13s.

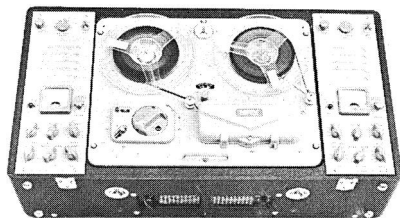


*Telefunken M24*

● **Model WVA/S.** Details as for WVA, but facilities for stereo playback. Price: £112 10s.

**Model WVB.** Details as for WVA, but facilities for monitoring, adding echo, superimpose. Price: £110 3s.

● **Model CBL.** Stereo/mono recorder.  $\frac{1}{2}$ -track, with  $\frac{1}{4}$ -track playback also available. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F.  $7\frac{1}{2}$  i/s, 0.16%;  $3\frac{3}{4}$  i/s, 0.2%. H. and N. (after erasure) -50 dB. F.R.  $7\frac{1}{2}$  i/s, 40 c/s-15 Kc/s;  $3\frac{3}{4}$  i/s, 40 c/s-12 Kc/s (all  $\pm 3$  dB). Replay char. CCIR. Inputs: mic.  $40\mu\text{V}$  on 30 ohms; gram/radio 100 mV on  $\frac{1}{2}$  megohm (mixable on each amplifier). Output 15 ohms at  $3\frac{1}{2}$ W each amplifier. Three motors.  $8\frac{1}{4}$  in. spools, less than 1 min. rewind for 1,750 ft. tape. Level meter. Size:  $16\frac{3}{8} \times 27\frac{1}{2} \times 8\frac{3}{8}$  in. Weight: 69 lb. Pause control, monitoring, echo, superimpose. Price: £160.



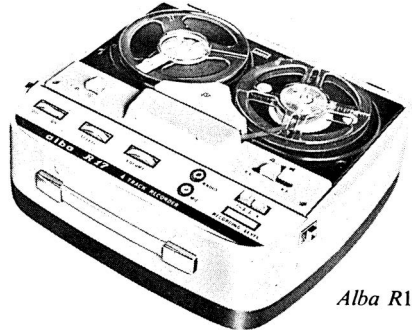
*Vortexion CBL stereo*



## GENERAL PURPOSE TAPE RECORDERS

**ABBEY TAPE RECORDERS**, 1a Compton Terrace, Hoppers Road, London, N.21. Tel.: Palmers Green 7492.

**Major.** Mono recorder.  $\frac{1}{4}$ -track. Magnavox Studio deck. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. H. and N. -45 dB. F.R.  $7\frac{1}{2}$  i/s, 50 c/s-12 Kc/s;  $3\frac{3}{4}$  i/s, 60 c/s-8 Kc/s;  $1\frac{7}{8}$  i/s, 60 c/s-5 Kc/s (all  $\pm 3$  dB). Replay char. CCIR. Inputs: gram 250 mV, 500 K; mic. 5 mV, 2 megohms. Outlet from pre-amp. Three motors. 7 in. spool. 65 secs. rewind, 1,200 ft. M.E. Pause control, superimpose. Size:  $14\frac{1}{2} \times 17\frac{1}{2} \times 8$  in. Weight: 36 lb. Price: £37 16s.



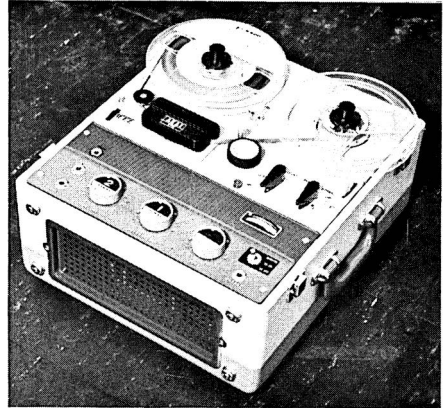
Abba R17

**Minor.** Mono recorder.  $\frac{1}{2}$ -track. Speed  $3\frac{3}{4}$  i/s. BSR deck. W. and F. 0.26%. F.R. 60 c/s-8 Kc/s. Inputs: gram 250 mV, 500 K; mic. 5 mV, 2 megohms. One motor.  $5\frac{3}{4}$  in. spool. DM70 level indicator. Size:  $10\frac{1}{2} \times 14\frac{1}{2} \times 7$  in. Weight: 17 lb. Price: £18 18s.



**AKAI.** Distributors: The Pullin Optical Co. Ltd., Ellis House, Aintree Road, Perivale, Greenford, Middx.

**Model 903.** Mono recorder.  $\frac{1}{2}$ -track. Speeds:  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F. below 0.1%. F.R. 40 c/s-12 Kc/s. Replay char. NARTB. Mixing of two inputs. One motor. 7 in. spools. 2 $\frac{1}{2}$  mins. rewind. VU meter. Monitoring while recording. Size:  $15\frac{1}{2} \times 13\frac{1}{2} \times 8\frac{1}{2}$  ins. Weight: 28 $\frac{1}{2}$  lbs. Price to be announced.

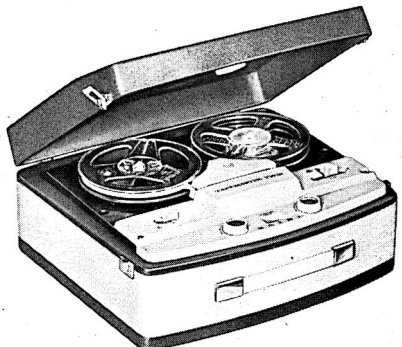


Akai Model 903



**ALBA (RADIO/TELEVISION) LTD.**, Tabernacle Street, London, E.C.2. Tel.: Clerkenwell 1322. Cables: Abalgramo, Ave, London.

**R17.** Mono recorder.  $\frac{1}{4}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F. 0.4%. H. and N. -47 dB. F.R. 100 c/s-9 Kc/s. Replay char. CCIR. Input 3 mV, 100 K. Outlet direct from pre-amp. One motor.  $5\frac{3}{4}$  in. spools. Rewind 3 mins. for 850 ft. EM87 level indicator. Rev. counter, pause control. Size:  $14 \times 12\frac{1}{2} \times 6$  in. Weight:  $17\frac{1}{4}$  lb. Price: £28 7s.



Baird Tapemaster Twin Model 280

**R16.**  $\frac{1}{2}$ -track model of R17. Price: £25 14s. 6d.

**BAIRD TV DISTRIBUTORS LTD.**, Empire House, 414 Chiswick High Road, London, W.4. Tel.: Chiswick 6411.

**Tapemaster Twin Model 280.** Mono recorder.  $\frac{1}{2}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F. 0.4%. H. and N. -50 dB. F.R. 60 c/s-8 Kc/s. One motor.  $5\frac{3}{4}$  in. spool. Rewind 3 mins., 850 ft. M.E. Automatic safety locking device. Rev. counter. Size:  $14\frac{1}{2} \times 12 \times 5$  in. Weight:  $18\frac{1}{4}$  lb. Price: £23 2s.

★

**BALMORAL ELECTRONICS LTD.**, Oxford Circus House, Oxford Street, London, W.1. Tel.: Regent 3311.

**TH15.** Mono recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F.  $3\frac{3}{4}$  i/s, better than 0.3%. F.R.  $7\frac{1}{2}$  i/s, 50 c/s-10 Kc/s  $\pm 3$  dB. Replay char. CCIR. Inputs: mic. 3 mV; radio/gram 30 mV. Three motors. 7 in. spools. M.E. Weight: 26 lb. Pause control, superimpose, monitoring. Price: £40 19s.

★

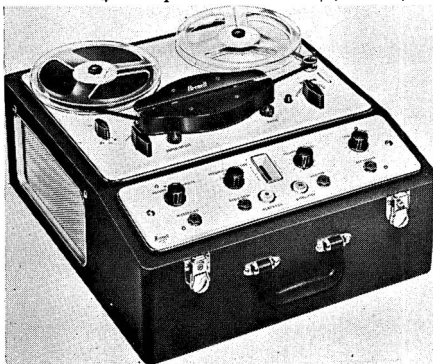
**C. BRADDOCK (BLACKPOOL) LTD.**, 266 Waterloo Road, Blackpool, Lancs. Tel.: Blackpool 45049.

**Q-Cord.** Battery/mains recorders. For details see Battery Operated Portables Section.

★

**BRENELL ENGINEERING CO. LTD.**, 1a Doughty Street, London, W.C.1. Tel.: Holborn 7356-7-8.

**Mk. 5. Series 2.** 15,  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  and  $1\frac{7}{8}$  i/s. Three motors.  $8\frac{1}{4}$  in. spools. F.R. 15 i/s, 40-15,000



*Brenell Mk5 Series 2*

c/s,  $\pm 2$  dB.  $7\frac{1}{2}$  i/s, 40-14,000 c/s;  $3\frac{3}{4}$  i/s, 40-11,000 c/s;  $1\frac{7}{8}$  i/s, 40-6,000 c/s.  $\pm 3$  dB. M.E. level ind. (Meter available). H. and N. -45 dB. W. and F. 0.05% at 15 i/s. Hi-fi outlet at 200 mV. Straight-through amp. Switched frequency correction. Pause control and monitoring. Size:  $18 \times 18 \times 8$  in. Weight: 38 lb. Price: £72 9s.; with meter: £77 14s.

**Mk. 5. Type M.** Speeds 15,  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. Three motors.  $8\frac{1}{4}$  in. spools. F.R. 15 i/s, 40-20,000 c/s;  $7\frac{1}{2}$  i/s, 40-18,000 c/s;  $3\frac{3}{4}$  i/s 40-13,000 c/s;  $1\frac{7}{8}$  i/s, 40-6,000 c/s. 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%. Outlet from pre-amp. Mixing. Superimposing. Tape monitoring. Input monitoring. Size:  $18 \times 17 \times 9$  in. Weight: 40 lb. Price: £92 8s.

★

**BRITISH RADIO CORPORATION LTD.**, 21 Cavendish Place, London, W.1. Tel.: Langham 9291.

**HMV 2204.** Mono recorder.  $\frac{1}{4}$ -track. Speeds  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F. <0.2%. F.R.  $3\frac{3}{4}$  i/s, 60 c/s-12 Kc/s;  $1\frac{7}{8}$  i/s, 60 c/s-6 Kc/s. Replay char. CCIR. Inputs: 1.5 mV, 10 megohms; 1.5 mV, 22 K; 75 mV, 1 megohm. Outlet from pre-amp. 500 mV, 22 K. One four-pole motor.  $5\frac{3}{4}$  in. spools. 2 $\frac{1}{2}$  min. rewind. EM87 level indicator. Auto-stop. Remote pause. Tape position indicator. Piano key controls. Superimposition. Size:  $15\frac{1}{2} \times 14\frac{1}{4} \times 7\frac{1}{4}$  in. Weight: 20 lb. Price: £37 16s.

**Marconiphone 4200.** Mono recorder.  $\frac{1}{4}$ -track. Speeds  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F. <0.2%. F.R.  $3\frac{3}{4}$  i/s, 60 c/s-12 Kc/s;  $1\frac{7}{8}$  i/s, 60 c/s-6 Kc/s. Replay char. CCIR. Inputs: 1.5 mV, 10 megohms; 1.5 mV, 22 K; 75 mV, 1 megohm. Outlet from



*Bush TP50*

pre-amp. 500 mV, 22 K. One four-pole motor.  $5\frac{3}{4}$  in. spools,  $2\frac{1}{2}$  min. rewind. EM87 level indicator. Auto-stop. Remote pause. Tape position indicator. Piano key controls. Superimposition. Size:  $12\frac{1}{2} \times 7\frac{1}{4} \times 14$  in. Weight: 19 lb. Price: £34 13s.

★

**BUSH RADIO LTD.**, Division of the Rank Organisation, Power Road, London, W.4. Tel.: Chiswick 6491. Cables: Supasetz, London, W.4.

**TP50.** Mono recorder with BSR TD2 deck.  $\frac{1}{4}$ -track. Speeds  $3\frac{3}{4}$  i/s. W. and F.  $<0.2\%$ . H. and N.  $<-40$  dB. F.R. 80 c/s-10 Kc/s. Inputs: mic. 0.35 mV, 1 megohm; radio 25 mV, 250 K. Separate outlet from second track of replay head. One motor.  $5\frac{3}{4}$  in. spool  $2\frac{3}{4}$  min. rewind. "Spirit-level" type M.E. Monitor socket for phones. Pause control, digital counter. Size:  $7\frac{1}{4} \times 14 \times 13\frac{3}{4}$  in. Weight:  $25\frac{1}{2}$  lb. Price (including microphone): £39 18s.

★

**CINECODER.** See K.G.M. Electronics.

★

**CLARKE & SMITH MANUFACTURING CO. LTD.**, Melbourne Works, Wallington, Surrey. Tel.: Wallington 9252/7.

**TR634.** Transistorised mono recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F.  $7\frac{1}{2}$  i/s,  $0.2\%$ ;  $3\frac{3}{4}$  i/s,  $0.3\%$ . H. and N.  $7\frac{1}{2}$  i/s,  $-50$  dB;  $3\frac{3}{4}$  i/s,  $-48$  dB. F.R.  $7\frac{1}{2}$  i/s, 50 c/s-15 Kc/s;  $3\frac{3}{4}$  i/s, 50 c/s-9 Kc/s ( $\pm 3$  dB). Replay char. CCIR. Inputs:  $1\frac{1}{2}$  mV,  $15\mu$ V, 60 mV. Outlet from pre-amp. 15 ohms, 70V line and 1V at 5 K. Three motors.  $8\frac{1}{4}$  in. spools. Level meter. Mixing. Tone controls. Size:  $17\frac{1}{2} \times 17 \times 10$  in. Weight: 45 lb. Price: £108 3s.



Marconiphone 4200

**TR635.** 7 in. spools. Weight: 41 lb. Other details as for TR634. Price: £90 6s.

★

**CONTRONICS LTD.**, Garth Works, Deepcut Bridge Road, Blackdown, Nr. Aldershot. Hants. Tel.: Deepcut 236.

**Carol TR4.** Mono recorder.  $\frac{1}{2}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F.  $0.4\%$ . F.R. 50 c/s-8 Kc/s. Replay char. CCIR. Inputs: mic., radio, gram. Outlet from pre-amp. One motor.  $5\frac{3}{4}$  in. spools. M.E. Line outlet. Size:  $13\frac{3}{4} \times 12\frac{3}{4} \times 7$  in. Weight: 20 lb. Price: £20 9s. 6d.

★

**COSSOR RADIO & TELEVISION CO. LTD.**, 233 Tottenham Court Road, London, W.1. Tel.: Gerrard 2931.

**CRI605.** Mono recorder.  $\frac{1}{4}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$ ,  $\frac{1}{16}$  i/s. W. and F.  $<0.6\%$  (peak-to-peak) at  $3\frac{3}{4}$  i/s. H. and N.  $-40$  dB. F.R.  $7\frac{1}{2}$  i/s, 60 c/s-16 Kc/s;  $3\frac{3}{4}$  i/s, 60 c/s-13 Kc/s;  $1\frac{7}{8}$  i/s, 60 c/s-10 Kc/s;  $\frac{1}{16}$  i/s, 60-4, 500 c/s (all  $\pm 3$  dB). Inputs: mic. 1 mV, 1 K; diode 3 mV, 20 K; gram 150 mV, 500 K. Outlets from replay head or pre-amp. One motor. 7 in. spools. Moving coil meter. Pause control. Parallel track. Monitoring by loudspeaker or headphones. Straight amplifier. Stereo output. Extension loudspeaker output. Transistor amplifier. Size:  $17 \times 15\frac{1}{2} \times 8\frac{1}{4}$  in. Weight: 26 lb. Price (with microphone and tape): £65 2s.

**CRI603.** Mono recorder.  $\frac{1}{4}$ -track. Speed  $3\frac{3}{4}$  i/s. H. and N.  $-40$  dB. F.R. 80 c/s-13 Kc/s. Inputs: mic. 0.4 mV, 1.5 K; gram 100 mV, 680 K; diode 2 mV, 20 K. Outlet from pre-amp. One motor.  $5\frac{3}{4}$  in. spools. Moving coil meter. Extension loudspeaker output. Transistorised amplifier. Size:  $12 \times 10\frac{1}{2} \times 6$  in. Weight: 11 lb. Price (with microphone and tape): £29 8s.



HMV 2204



*Cossor CR1605*



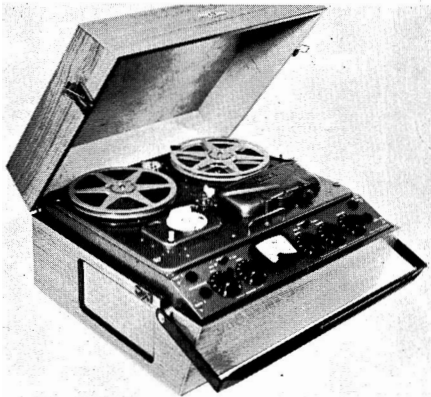
*Cossor CR1603*



*C.W.S. Defiant T15*



*Cossor CR 1604*



*Clarke & Smith TR 634*



*Clarke & Smith TR 635*

**CR1604.** Mono recorder.  $\frac{1}{4}$ -track. Speeds  $3\frac{3}{4}$ ,  $1\frac{1}{8}$  i/s. W. and F.  $3\frac{3}{4}$  i/s,  $<0.6\%$  (peak to peak). H. and N.  $-40$  dB. F.R.  $3\frac{3}{4}$  i/s,  $60$  c/s- $13$  Kc/s;  $1\frac{1}{8}$  i/s,  $60$  c/s- $10$  Kc/s ( $\pm 3$  dB). Inputs: mic.  $1$  mV,  $1$  K; radio  $3$  mV,  $20$  K; gram  $150$  mV,  $500$  K. Outlets from replay head, and pre-amp. One motor.  $7$  in. spools. M.E. Pause control, stereo output, straight amplifier, monitor (L.S. or phones). Size:  $14\frac{1}{4} \times 14\frac{1}{4} \times 7\frac{1}{4}$  in. Weight:  $18$  lb. Price:  $\pounds 40$  19s.

★

**C.W.S. LTD.,** Radio and Television Department, Alma Park, Warley Street, Upminster, Essex. Tel.: Upminster 3200.

**Defiant T12R.** Mono recorder.  $\frac{1}{2}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F.  $0.2\%$ . H. and N.  $-40$  dB at  $1$  Kc/s. F.R.  $100$  c/s- $8$  Kc/s  $\pm 3$  dB. Compromise replay char. Inputs: mic.  $4$  mV, radio  $100$  mV. One motor.  $5\frac{3}{4}$  in. spools,  $3$  min. rewind. EM84 tuning indicator. Digital tape indicator. Superimpose. Size:  $14 \times 13 \times 6$  in. Weight:  $19$  lb. Price:  $\pounds 27$  6s.

**Defiant T14.**  $\frac{1}{4}$ -track version of T12R. Price:  $\pounds 29$  8s.

**Defiant T15.** Basic amplifier as T12R, but without superimpose, and using DM70 indicator.  $\frac{1}{2}$ -track. Tape counter. Size:  $6\frac{1}{8} \times 13\frac{3}{8} \times 12\frac{3}{8}$  i/s. Price:  $\pounds 23$  2s.

★

**DANSETTE PRODUCTS LTD.,** Dansette House, Honeyput Lane, Stanmore, Middx. Tel.: Wordsworth 0021.

**Consort.** Mono recorder.  $\frac{1}{2}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F.  $0.4\%$ . H. and N.  $-50$  dB. F.R.  $60$  c/s- $10$  Kc/s. Replay char. CCIR. Inputs: high imp. for mic., medium imp. for radio/gram. One motor.  $5\frac{3}{4}$  in. spools,  $3\frac{1}{2}$  min. rewind. M.E. Size:  $14 \times 12\frac{1}{2} \times 7$  in. Weight:  $16\frac{1}{2}$  lb. Price:  $\pounds 23$  2s.

★

**DUAL.** See TAK Continental Importers Ltd.

★

**ELIZABETHAN (TAPE RECORDERS) LTD.,** Crow Lane, Romford, Essex. Tel.: Romford 64101. Cables: Elizabethan, Romford.

**Popular 200.** Mono recorder.  $\frac{1}{2}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F.  $0.4\%$ . F.R.  $60$  c/s- $10$  Kc/s. Inputs: mic.  $2$  mV, gram  $200$  mV. Outlet from



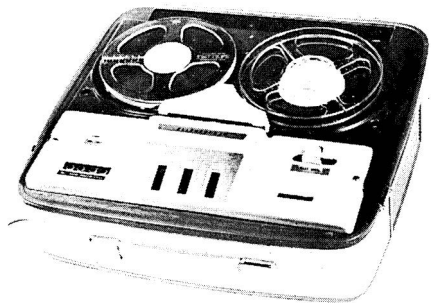
*Dansette Consort*

pre-amp. One motor.  $5\frac{3}{4}$  in. spools. "Fluid light" level indicator. Rev. counter. Superimpose. Size:  $15 \times 14 \times 5$  in. Price:  $\pounds 24$  3s.

**Popular 400.** Details as for 200, but  $\frac{1}{4}$ -track model. No superimpose. Price:  $\pounds 26$  5s.

**LZ27.** Mono recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F.  $7\frac{1}{2}$  i/s,  $0.15\%$ . H. and N.  $-40$  dB. F.R.  $7\frac{1}{2}$  i/s,  $50$  c/s- $14$  Kc/s;  $3\frac{3}{4}$  i/s,  $50$  c/s- $10$  Kc/s. Replay char. CCIR. Inputs: mic.  $2$  mV, gram  $200$  mV. Outlet from pre-amp. One motor.  $7$  in. spools. "Fluid light" indicator. Size:  $15 \times 13 \times 6\frac{3}{4}$  in. Weight:  $20$  lb. Price:  $\pounds 28$  7s.

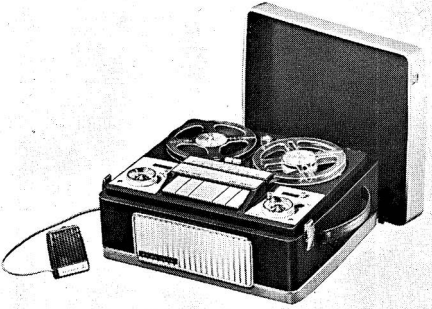
**LZ29.** Mono recorder.  $\frac{1}{4}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{1}{8}$  i/s. W. and F.  $0.15\%$  at  $7\frac{1}{2}$  i/s. H. and N.  $-40$  dB. F.R.  $7\frac{1}{2}$  i/s,  $50$  c/s- $14$  Kc/s;  $3\frac{3}{4}$  i/s,  $50$  c/s- $10$  Kc/s;  $1\frac{1}{8}$  i/s,  $50$  c/s- $6$  Kc/s. Inputs: mic.  $2$  mV, gram  $200$  mV. Outlet from pre-amp. Three motors.  $7$  in. spools. "Fluid light" level indicator. Monitoring while recording. Pause control. Size:  $15\frac{1}{4} \times 16\frac{1}{2} \times 6\frac{1}{2}$  in. Weight:  $29$  lb. Price:  $\pounds 39$  18s.



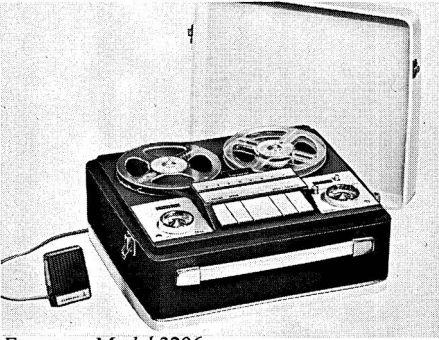
*Elizabethan Popular 200*



*Fidelity Playmaster-4*



*Ferguson Model 3204*



*Ferguson Model 3206*



*Grundig TK23*

**FERGUSON RADIO CORPORATION LTD.**, Thorn House, Upper St. Martin's Lane, London, W.C.2. Tel.: Temple 2444. Cables: Fergusad, Lesquare, London.

**Model 3204.** Mono recorder.  $\frac{1}{4}$ -track. Speeds  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F.  $3\frac{3}{4}$  i/s, better than 0.2%;  $1\frac{7}{8}$  i/s, 0.3%. H. and N. -40 dB. F.R.  $3\frac{3}{4}$  i/s, 60 c/s-10 Kc/s;  $1\frac{7}{8}$  i/s, 60 c/s-6 Kc/s. Replay char. CCIR. Inputs: mic. 1.5 mV, 10 megohms; radio 1.5 mV, 22 K; gram 75 mV, 1 megohm. Outlets from replay head and pre-amp. One motor.  $5\frac{3}{4}$  in. spools.  $2\frac{1}{2}$  min. rewind, 850 ft. EM87 Electron beam level indicator. Pause key. Mic. stop/start switch. Facility for stereo. Size:  $13\frac{1}{2} \times 12 \times 6\frac{1}{2}$  in. Price: £34 13s.

**Model 3206.** Mono recorder.  $\frac{1}{2}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F. better than 0.2%. H. and N. -40 dB. F.R. 60 c/s-10 Kc/s. Replay char. CCIR. Inputs: mic. 1.5 mV, 10 megohms; radio 1.5 mV, 22 K; gram 75 mV, 1 megohm. Outlet from pre-amp. One motor.  $5\frac{3}{4}$  in. spools.  $2\frac{1}{2}$  min. rewind, 850 ft. EM87 electron beam level indicator. Pause key. Size:  $13\frac{1}{2} \times 12 \times 6\frac{1}{2}$  in. Price: £27 6s.



**FIDELITY RADIO LTD.**, 11/13 Blechynden Street, London, W.11. Tel.: Park 0131. Cables: Amplify, London, W.11.

**Playmaster Major De-Luxe.** Mono recorder.  $\frac{1}{4}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F.  $7\frac{1}{2}$  i/s, 0.15%;  $3\frac{3}{4}$  i/s, 0.25%;  $1\frac{7}{8}$  i/s, 0.35%. H. and N. -50 dB. F.R.  $7\frac{1}{2}$  i/s, 60 c/s-15 Kc/s;  $3\frac{3}{4}$  i/s, 60 c/s-10 Kc/s;  $1\frac{7}{8}$  i/s, 60 c/s-7 Kc/s. Inputs: mic. 2 mV, high imp; gram 200 mV, high imp. Replay char. CCIR. One motor. 7 in. spools.  $3\frac{1}{2}$  min. rewind. Level meter. Transistor 1st stage. Output socket. Stereo replay. Tape position indicator. Internal monitor. Bass and treble controls. Superimpose switch. Size:  $19\frac{1}{2} \times 16\frac{1}{2} \times 8$  ins. Weight:  $30\frac{1}{2}$  lb. Price: £36 15s.

**Playmaster-2.** Mono recorder.  $\frac{1}{4}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F. better than 0.2%. H. and N. -50 dB. F.R. 60 c/s-8 Kc/s. Replay char. CCIR. Inputs: mic 3 mV, high imp; gram 200 mV, high imp. Outlet from pre-amp. One motor.  $5\frac{3}{4}$  in. spools. Rewind 3 mins. M.E. Size:  $14\frac{3}{4} \times 12 \times 5\frac{3}{4}$  in. Weight:  $15\frac{7}{8}$  lb. Price: £21.

**Playmaster-4.**  $\frac{1}{4}$ -track version of Playmaster-2. Tape position indicator. Price: £24 3s.



**FINEX (OVERSEAS) LTD.**, 7 West End Lane, Kilburn Bridge, London, N.W.6. Tel.: Maida Vale 6905/9200.

● **Paros 750.** Stereo recorder.  $\frac{1}{4}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F. less than 0.25% at  $7\frac{1}{2}$  i/s. H. and N. better than -40 dB per channel. F.R. 40 c/s-15 Kc/s. Inputs: m/c mic 50 K; aux. 500 K. Outlet from pre-amp. One motor. 7 in. spool. Rewind approx. 2 mins. Two VU meters. Tape counter; two separate level controls for mic and playback, providing professional mixing facilities; two built-in speakers; superimpose; automatic stop. Size:  $15 \times 10\frac{1}{2} \times 17$  in. Weight approx.: 40 lb. Price: £75.



**GENERAL SONIC RADIOS,** 92 Caledonian Road, London, N.1. Tel.: Terminus 0322.

**Sonic V.** Collaro deck.  $\frac{1}{4}$ -track. 3 speeds. 7 in. spools. F.R.  $7\frac{1}{2}$  i/s. 40-12,000 c/s  $\pm 3$  dB. M.E. level ind. W. and F. 0.15%. H. and N. -45 dB. Tone controls, superimposition, pause key. Outlet from pre-amp. Two loudspeakers fitted. Output: 5.3W. Size:  $16 \times 16 \times 9\frac{1}{4}$  in. Weight: 33 lb. Price: £52 10s.

**G. H. GILKES & CO. LTD.,** Trafford House, Talbot Road, Old Trafford, Manchester 16. Tel.: Trafford Park 1242. Cables: Gilkes, Manchester 16.

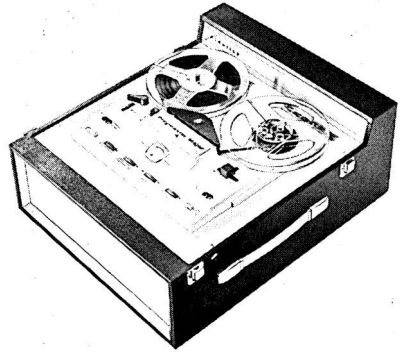
**Pakasound Connoisseur.** Mono recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F. 0.2% at  $7\frac{1}{2}$  i/s. H. and N. < -70 dB. F.R.  $7\frac{1}{2}$  i/s, 60 c/s-10 Kc/s  $\pm 3$  dB;  $3\frac{3}{4}$  i/s, 60 c/s-8 Kc/s  $\pm 3$  dB. Replay char. CCIR. Inputs: mic 5 mV, 1 megohm; radio 400 mV, 1 megohm. L.S. outlet parallel with monitor control. Three motors. 7 in. spool, 3 mins. 3 secs. rewind for 1,200 ft. EM85 level indicator. Pause control, superimpose, monitor control. Size:  $17 \times 15 \times 8$  in. Weight: 32 lb. Price: £49 7s.

**Pakasound Enthusiast.** Mono recorder.  $\frac{1}{2}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F. 0.2% at  $3\frac{3}{4}$  i/s. H. and N. < -60 dB. F.R.  $3\frac{3}{4}$  i/s, 60 c/s-10 Kc/s  $\pm 3$  dB. Replay char. CCIR. Inputs: mic 5 mV, 1 megohm; radio 400 mV, 1 megohm. L.S. outlet switched. One motor.  $5\frac{3}{4}$  in. spool,  $2\frac{1}{2}$  mins. rewind. EM85 level indicator. Size:  $14 \times 12 \times 8$  in. Weight: 19 lb. Price: £33 12s.

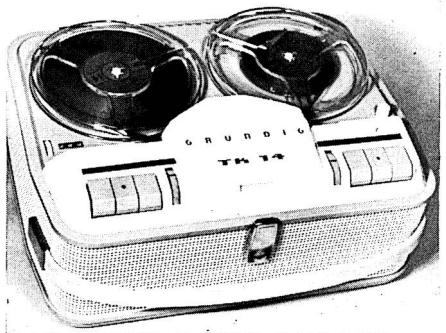


**GRUNDIG (GT. BRITAIN) LTD.,** Newlands Park, Sydenham, S.E.26. Tel.: Sydenham 2211.

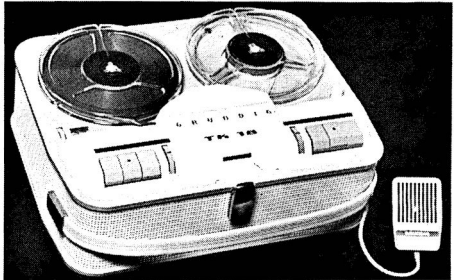
**TK14.** Speed  $3\frac{3}{4}$  i/s. One motor.  $5\frac{3}{4}$  in. spools. F.R. 40-12,000 c/s  $\pm 3 - 5$  dB. M.E. level ind.



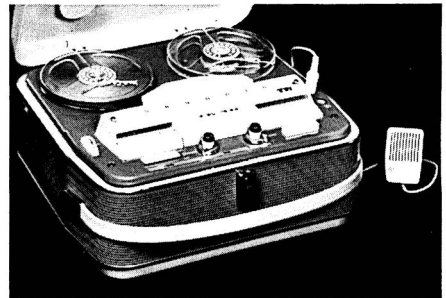
*Fidelity Playmaster Major*



*Grundig TK 14*



*Grundig TK 18*



*Grundig TK 40*



*Elizabethan LZ29*

W. and F.  $< \pm 0.2\%$ . H. and N.  $< -50$  dB. Size  $14\frac{3}{4} \times 11\frac{1}{2} \times 6\frac{3}{4}$  in. Weight: 20 lb. Price: £36 15s.

**TK18.** Mono recorder.  $\frac{1}{2}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F. less than  $0.25\%$ . H. and N.  $-47$  dB. F.R. 40 c/s-12 Kc/s  $+3.5$  dB. Replay char. CCIR. Inputs: mic 2.5 mV-45 mV/1.5 megohm; radio/gram 120 mV-2.4 V/1 megohm. Outlet from pre-amp. One motor.  $5\frac{3}{4}$  in. spools. Completely automatic volume control. Size:  $14\frac{3}{4} \times 11\frac{1}{2} \times 6\frac{3}{4}$  in. Weight: 20 lb. Price: £40 19s.

**TK23.** Mono recorder.  $\frac{1}{4}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F.  $\pm 0.2\%$ . H. and N.  $-47$  dB. F.R. 40 c/s-12 Kc/s. Replay char. NARTB. Inputs: mic 2 mV, 500 K; radio diode 11 mV, 40 K; gram 450 mV, 1 megohm. Outlets from channel 3 and 4 head only, or pre-amp. One motor.  $5\frac{3}{4}$  in. spools. M.E. Pause control. Size:  $14\frac{3}{4} \times 11\frac{1}{2} \times 6\frac{3}{4}$  in. Weight: 20 lb. Price (including microphone): £47 5s.



*KGM Cinecorder Model A*

**TK40.** 4-track. Speeds  $1\frac{7}{8}$ ,  $3\frac{3}{4}$  and  $7\frac{1}{2}$  i/s. One motor. 7 in. spools with lid off,  $5\frac{3}{4}$  in. spools with lid on. F.R.  $1\frac{7}{8}$ ; 60 to 10 Kc/s.  $3\frac{3}{4}$ ; 60 to 15 Kc/s.  $7\frac{1}{2}$ ; 60 to 18 Kc/s. S-N  $< 45$  dB. W. and F.  $\pm 1\%$  at  $7\frac{1}{2}$  i/s. Facilities: Inching, Cine-socket, built-in tape cleaner, indicator re-set, automatic stop, remote control, mixing facilities, monitoring, synchronous recordings and superimposition. Price: £78 15s. (including tape and microphone).

**TK41.** Mono recorder.  $\frac{1}{4}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F.  $7\frac{1}{2}$  i/s,  $\pm 0.1\%$ ;  $3\frac{3}{4}$  i/s,  $\pm 0.12\%$ . F.R.  $7\frac{1}{2}$  i/s, 60 c/s-18 Kc/s;  $3\frac{3}{4}$  i/s, 60 c/s-15 Kc/s;  $1\frac{7}{8}$  i/s, 60 c/s-10 Kc/s. Replay char. NARTB. Outlet from pre-amp. One motor. 7 in. spools (without lid),  $5\frac{3}{4}$  in. spools (with lid). Rewind (double play tape) 1,700 ft. 2 mins. 40 secs. M.E. Pause control. Inching. Build-in tape cleaner. Automatic stop. Remote control. Size:  $16\frac{1}{8} \times 15 \times 7\frac{5}{8}$  in. Weight:  $28\frac{1}{2}$  lb. Price (including microphone): £78 15s.

● **TK46.** Stereo/mono recorder.  $\frac{1}{4}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F.  $7\frac{1}{2}$  i/s,  $\pm 0.1\%$ ;  $3\frac{3}{4}$  i/s,  $\pm 0.12\%$ ;  $1\frac{7}{8}$  i/s,  $\pm 0.2\%$ . F.R.  $7\frac{1}{2}$  i/s, 60 c/s-15 Kc/s;  $3\frac{3}{4}$  i/s, 60 c/s-13 Kc/s;  $1\frac{7}{8}$  i/s, 60 c/s-9 Kc/s (all  $\pm 3$  dB). Replay char. NARTB. Outlet from pre-amp. One motor. 7 in. spools (without lid),  $5\frac{3}{4}$  in. spools (with lid). Rewind (double play tape) 2 mins. 40 secs. M.E. Pause control. Synchronous and multiple synchronous recordings. Echo. Size:  $20 \times 15\frac{3}{4} \times 8\frac{1}{4}$  in. Weight: 33 lb. Price: £103 19s. (microphone extra).

**TK6.** Battery/mains recorder. For details see Battery Operated Portables Section.

★

HMV. See British Radio Corporation Ltd.

★

**K.G.M. ELECTRONICS LTD.**, Bardolph Road, Richmond, Surrey. Tel.: Richmond 7171. Cables: Kelec, Richmond, Surrey.

**Cinecorder Model A.** Mono recorder with B.S.R. deck.  $\frac{1}{2}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F.  $0.4\%$ . F.R. 60 c/s-10 Kc/s. Replay char. CCIR. Two channel mixing with two inputs per channel. 4W, 15 ohm output. One motor.  $5\frac{3}{4}$  in. spools. 10 in. elliptical speaker housed in detachable lid with 24 ft. cable. Separate bass and treble controls. Boost and cut. Superimposition. "Shift-rack" tape control for dual recordings. Tapelift/Pause control for cueing, cross-fading. Remote control. Accessories:



microphones and extension cables, perforated Cinetape, tape sprockets, tape/film synchronisers. Size:  $16\frac{1}{2} \times 14 \times 8\frac{1}{2}$  in. Weight: 28 lb. Price: £75.



**KOLSTER-BRANDES LTD.**, Footscray, Sidcup, Kent. Tel.: Footscray 7733. Cables: Matchtone, Sidcup.

**WT20.** Mono recorder.  $\frac{1}{2}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F. 0.2%. H. and N. -46 dB. F.R. 80 c/s-8 Kc/s -3 dB. Replay char. CCIR. Inputs: mic 2 mV, 1M; radio 500 mV, 100 K. One motor.  $5\frac{3}{4}$  in. spools. Rewind  $1\frac{1}{2}$  mins. M.E. indicator. Extension L.S. socket. Size:  $13\frac{7}{8} \times 12\frac{3}{8} \times 6\frac{1}{8}$  in. Price: £25 4s.



**KORTING.** Distributors: Highgate Acoustics, 71/73 Great Portland Street, London, W.1. Tel.: Museum 2901.

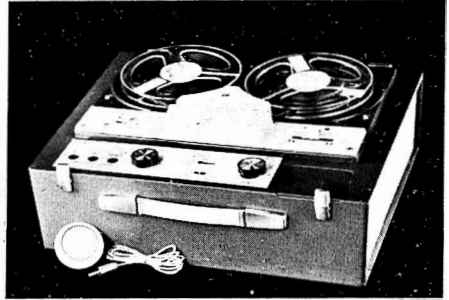
**MT2223.** Mono recorder.  $\frac{1}{4}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. H. and N. -42 dB. F.R.  $7\frac{1}{2}$  i/s, 30 c/s-20 Kc/s  $\pm 3$  dB;  $3\frac{3}{4}$  i/s, 30 c/s-14 Kc/s  $\pm 3$  dB. Inputs: radio 0.5 mV, 4.7 K; mic 0.1 mV, 200 ohms; gram 200 mV, 2 Meg. Outputs: line 1.5V, 33 K; speaker 4.5 ohms, 2W. One motor. 7 in. spool. Rewind 3 mins. M.E. indicator. Transistor input. Tape counter. Monitoring, Bass/treble control. Size:  $14\frac{1}{2} \times 12 \times 7\frac{1}{2}$  in. Weight: 20 lb. Price: £55 13s.

● **MT3623.** Stereo recorder.  $\frac{1}{4}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. H. and N. -42 dB. F.R.  $7\frac{1}{2}$  i/s, 30 c/s-18 Kc/s  $\pm 3$  dB;  $3\frac{3}{4}$  i/s, 40 c/s-14 Kc/s  $\pm 3$  dB. Inputs: radio 0.5 mV, 4.7 K; mic 0.1 mV, 200 ohms; gram 100 mV, 1 megohm. Outlets: line 0.7V, 33 K; speaker 4.5 ohms, 2W. One motor. 7 in. spool. Rewind 5 mins. M.E. indicator. Transistor input. Tape counter. Pause control. Superimpose. Monitoring. Bass/treble control. Size:  $16\frac{1}{2} \times 12\frac{3}{4} \times 7\frac{1}{2}$  in. Weight: 24 lb. Price: £78 15s.



**LEE PRODUCTS (G.B.) LTD.**, Elpico House, Longford Street, London, N.W.1. Tel.: Euston 5754. Cables: Leprod, London, N.W.1.

**Elpico/Geloso G.258.**  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  and  $1\frac{1}{8}$  i/s. One motor. 5 in. spools. F.R. 50-12,000 c/s H. and N. -40 dB. W. and F. <0.2%. M.E. level ind. Size:  $13 \times 8\frac{3}{4} \times 6\frac{1}{4}$  in. Weight:  $12\frac{3}{4}$  lb. Price: £40 19s.



*Kolster-Brandes WT20*

**Elpico TR802.** Mono recorder.  $\frac{1}{2}$ -track. Speed  $3\frac{3}{4}$  i/s. H. and N. -40 dB. F.R. 60 c/s-10 Kc/s. Outlet from pre-amp. Ext. speaker socket. One motor.  $5\frac{3}{4}$  in. spools. M.E. Size:  $14 \times 12 \times 6\frac{1}{4}$  ins. Weight: 18 lb. Price: £27 6s.

**Elpico TR804.** Mono recorder.  $\frac{1}{4}$ -track. Speeds:  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. H. and N. -40 dB. F.R. 60 c/s-10 Kc/s,  $3\frac{3}{4}$  i/s. One motor.  $5\frac{3}{4}$  in. spool. M.E. Outlet from pre-amp. Digital place counter. Ext. speaker socket. Size:  $15\frac{1}{4} \times 13\frac{1}{2} \times 6\frac{1}{2}$  in. Weight: 21 $\frac{1}{2}$  lb. Price: £34 13s.



**LOEWE-OPTA.** Sole U.K. distributors: Highgate Acoustics, 71/73 Great Portland Street, London, W.1. Tel.: Museum 2901.

**Optacord 414 and Optacord 414 Dia.** Battery/mains recorders. For details see Battery Operated Portables Section.



**LUXOR INDUSTRI AKTIEBOLAG,** Motala, Sweden. Distributors: Britimpex Ltd., 16-22 Great Russell Street, London, W.C.1. Tel.: Museum 7600. Cables: Brytron, London.



*Lee Products TR804*

● **Luxor MP-423.** Stereo recorder.  $\frac{1}{4}$ -track. Speeds:  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F.  $7\frac{1}{2}$  i/s, 0.1%;  $3\frac{3}{4}$  i/s, 0.2%;  $1\frac{7}{8}$  i/s, 0.35% (peak to peak). H. and N. -50 dB (weighted with recorded tape). F.R.  $7\frac{1}{2}$  i/s, 50 c/s-19 Kc/s;  $3\frac{3}{4}$  i/s, 50 c/s-12 Kc/s;  $1\frac{7}{8}$  i/s, 80 c/s-6 Kc/s (all  $\pm 3$  dB). Replay char. NARTB. Inputs: mic 7 mV; gram 200 mV; radio 30 mV, Imp. 1 megohm. Outlet from pre-amp. One motor. 7 in. spool. Rewind 2 min. for 7 in. tape. Two M.E.s. Separate balance control. Separate level indicator. Facilities for mixing. Size:  $14\frac{1}{8} \times 11\frac{3}{8} \times 6\frac{3}{4}$  in. Weight: 24 $\frac{1}{2}$  lb. Price: £77 14s.

● **MP-424.** Details as for MP-423. Size:  $14\frac{3}{4} \times 11\frac{3}{4} \times 6\frac{1}{2}$  in. Weight: 28 $\frac{1}{2}$  lb. Price: £80 17s.

★

**MAGNAVOX ELECTRONICS CO. LTD.,** Alfred's Way, By-Pass Road, Barking, Essex. Tel.: Rippleway 5533.

**Magnavox TM840.** Mono recorder.  $\frac{1}{4}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. 7 in. spools. Level meter. W. and F. 0.15%. F.R.  $7\frac{1}{2}$  i/s, 40 c/s-16 Kc/s;  $3\frac{3}{4}$  i/s, 40 c/s-11 Kc/s;  $1\frac{7}{8}$  i/s, 60 c/s-5 Kc/s (all  $\pm 2$  dB). Replay char. CCIR. Tone controls. Superimposition. Outlet from pre-amp.  $3\frac{1}{2}$ W output. Size:  $15\frac{1}{2} \times 9 \times 14$  in. Weight: 32 lb. Price: £51 9s.

★

**MARCONIPHONE.** See British Radio Corporation Ltd.

★

**MARTIN ELECTRONICS LTD.** See Constructional Kits section.



Lee Products TR802

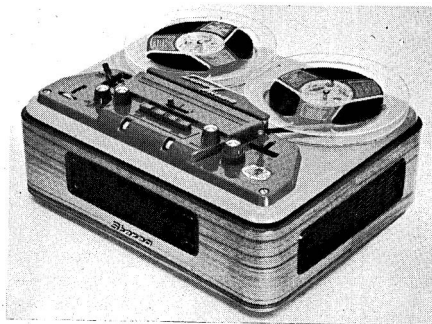
**PHILIPS ELECTRICAL LTD.,** Century House, Shaftesbury Avenue, London, W.C.2. Tel.: Gerrard 7777. Cables: Phillamps, London.

**EL3514.** Mono recorder.  $\frac{1}{4}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F. <1% (peak-to-peak). H. and N. -40 dB. F.R. 80 c/s-10 Kc/s  $\pm 3$  dB. Inputs: mic 0.2 mV, 3 K; radio 3 mV, 50 K; gram 130 mV, 2.2 megohms. Outlet from pre-amp. One motor. 5 in. spools. M.E. Extension loudspeaker output. Size:  $9\frac{3}{4} \times 13\frac{1}{2} \times 4\frac{3}{4}$  in. Weight: 10 $\frac{1}{2}$  lb. Price (with microphone and tape): £28 7s.

● **EL3534.** Stereo recorder.  $\frac{1}{4}$ -track. Speeds:  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$ ,  $1\frac{5}{8}$  i/s. W. and F. <0.6% (peak-to-peak) at  $3\frac{3}{4}$  i/s. H. and N. -40 dB. F.R.  $7\frac{1}{2}$  i/s, 60 c/s-16 Kc/s;  $3\frac{3}{4}$  i/s, 60 c/s-13 Kc/s;  $1\frac{7}{8}$  i/s, 60 c/s-10 Kc/s;  $1\frac{5}{8}$  i/s, 60-4,500 c/s (all  $\pm 3$  dB). Inputs: mic. 1 mV, 1 K; diode 3 mV, 20 K; gram 150 mV, 500 K. Outlet from pre-amp. One motor. 7 in. spools. Moving coil level meter. Transistor amplifier. Multiplay. Loudspeaker and phones. Extension speaker output. Size:  $10 \times 18\frac{1}{2} \times 15$  in. Weight: 35 lb. Price (with stereo microphone and tape): £96 12s.

**EL3541.** Mono recorder.  $\frac{1}{4}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F. <1% (peak-to-peak). H. and N. -40 dB. F.R. 60 c/s-13 Kc/s  $\pm 3$  dB. Inputs: mic. 3 mV, 100 K; radio 3 mV, 1 megohm; gram 150 mV, 1 megohm. Outlets from replay head or pre-amp. One motor. 7 in. spools. M.E. Pause control. Parallel track facility. Monitoring. Stereo output. Straight amp. Extension loudspeaker output. Size:  $6\frac{3}{4} \times 14\frac{1}{4} \times 12$  in. Weight: 18 lb. Price (with microphone and tape): £37 16s.

**EL3541H.** Mono recorder.  $\frac{1}{4}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F. <1% (peak-to-peak). H. and N. -40 dB. F.R. 60 c/s-13 Kc/s  $\pm 3$  dB. Inputs: mic 3 mV, 100 K; radio 3 mV, 1



Luxor MP-423/424 Stereo

megohm; gram 150 mV, 1 megohm. Outlets direct from replay head, and pre-amp. One motor. 7 in. spool. M.E. Pause control. Double track playback. Monitoring. Stereo output. Extension L.S. output. Size:  $15\frac{1}{4} \times 13 \times 6\frac{1}{2}$  in. Weight: 19 lb. Price: £44 2s.

**EL3549.** Mono recorder.  $\frac{1}{4}$ -track. Speeds:  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$ ,  $1\frac{1}{8}$  i/s. W. and F.  $<0.6\%$  (peak-to-peak) at  $3\frac{3}{4}$  i/s. H. and N.  $-40$  dB. F.R.  $7\frac{1}{2}$  i/s, 60 c/s-16 Kc/s;  $3\frac{3}{4}$  i/s, 60 c/s-13 Kc/s;  $1\frac{7}{8}$  i/s, 60 c/s-10 Kc/s;  $1\frac{1}{8}$  i/s, 60-4,500 c/s (all  $\pm 3$  dB). Inputs: mic. 1 mV, 1 K; diode 3 mV, 20 K; gram 150 mV, 500K. Outlets from replay head or pre-amp. One motor. 7 in. spools. Moving coil level meter. Pause control. Parallel track. Monitoring by loudspeaker or phones. Straight amp. Stereo output. Transistor amplifier. Extension loudspeaker output. Size:  $8\frac{1}{4} \times 16\frac{1}{2} \times 15\frac{1}{2}$  in. Weight: 26 lb. Price (with microphone and tape): £65 2s.

★

**PORTADYNE RADIO**, Portadyne Works, 30-34 Gorst Road, N. Acton, London, N.W.10. Tel.: Elgar 7541-3.

**TR300.** Mono recorder.  $\frac{1}{4}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F. 0.4%. H. and N.  $-50$  dB. F.R. 100 c/s-8 Kc/s  $\pm 3$  dB. Replay char. CCIR. Inputs: mic. 1 mV, 1 megohm; radio 20 mV, 47 K. Output from pre-amp 1 mV, 10 K. One motor.  $5\frac{1}{2}$  in. spool. Rewind 3 min., 850 ft. DM70 level indicator. Size:  $17\frac{1}{4} \times 12\frac{3}{4} \times 5\frac{1}{2}$  in. Price: £20 9s. 6d.

★

**PORTOGRAM RADIO ELECTRICAL INDUSTRIES LTD.**, Audio Works, Paxton Road, Tottenham, London, N.17. Tel.: Tottenham 7683/4/5.



Magnavox TM840

**Minitape.**  $\frac{1}{2}$ -track. Speed  $3\frac{3}{4}$  i/s. One motor.  $5\frac{1}{2}$  in. spools. F.R. 50-9,000 c/s. M.E. level ind. H. and N.  $-50$  dB. W. and F. 0.2%. 3W output. Size:  $14\frac{1}{2} \times 12\frac{1}{4} \times 6\frac{1}{2}$  in. Weight: 18 lb. Price with tape and mic.: £24 3s.

**Monotape.** De-luxe version of Minitape. Compartment for storing mains lead, mic and spare tape. Size:  $15\frac{1}{4} \times 14\frac{1}{2} \times 7\frac{3}{4}$  in. Weight: 18 lb. Price (inc. mic, tape, two spools): £26 5s.

**Audiotape.**  $\frac{1}{2}$ -track. Speeds:  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  and  $1\frac{7}{8}$  i/s. Three motors. 7 in. spools. F.R.  $\pm 3$  dB;  $7\frac{1}{2}$  i/s, 40-12,000 c/s;  $3\frac{3}{4}$  i/s, 40-9,000 c/s;  $1\frac{7}{8}$  i/s, 40-7,000 c/s. H. and N.  $-60$  dB. W. and F. 0.15%. Outlet from pre-amp. Mixing. Superimposing. Straight-through amplifier. 3W output. Size:  $18\frac{1}{2} \times 16\frac{1}{2} \times 9\frac{3}{4}$  in. Weight: 38 lb. Price (with tape and mic): £47 5s.

**Audiotape.**  $\frac{1}{4}$ -track model. Specification as for  $\frac{1}{2}$ -track version. Price: £52 10s.

★

**Q-CORD.** See C. Braddock (Blackpool) Ltd.

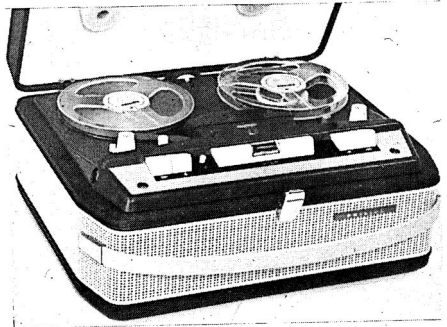
★

**RADIO & ALLIED (HOLDINGS) LTD.**, Langley Park, Slough, Bucks. Tel.: Slough 22201.

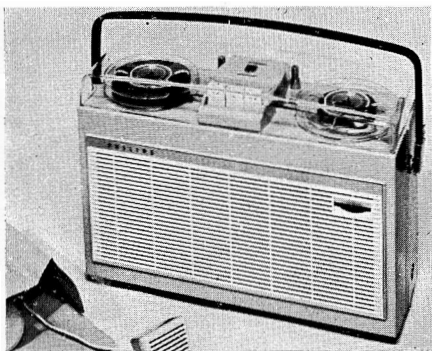
**Sobell S601 Festival.** Mono recorder.  $\frac{1}{4}$ -track. Speed  $3\frac{3}{4}$  i/s. F.R. 60 c/s-8 Kc/s. Inputs: mic 4-100 mV, 1 megohm; radio 32-800 mV, 350 K; gram 200 mV-5V, 2-6 megohms. One motor.  $5\frac{1}{2}$  in. spool. Rewind approx. 2 mins. Neon level indicator. Size:  $14 \times 14 \times 6\frac{1}{2}$  ins. Weight: 18 lb. Price: £26 5s.

★

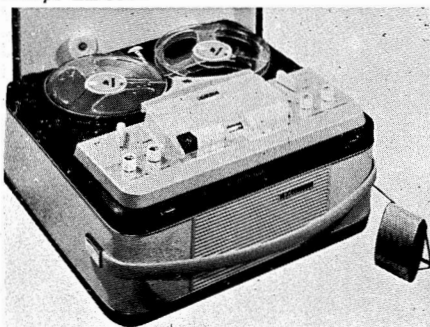
**REPS. (TAPE RECORDERS) LTD.**, 118 Park Road North, South Acton, London, W.3. Tel.: Acorn 4141.



Philips EL3541H



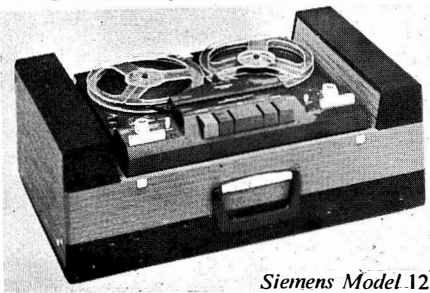
Philips EL 3514



Philips EL 3549



Portogram Minitape



Siemens Model 12

**R.10.** Collaro Studio deck. Speeds:  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  and  $1\frac{7}{8}$  i/s. F.R.  $7\frac{1}{2}$ , 40-16,000 c/s  $\pm 3$  dB;  $3\frac{3}{4}$ , 40-10,000 c/s;  $1\frac{7}{8}$ , 50-6,000 c/s. Level meter. H. and N.  $-50$  dB. W. and F.  $0.1\%$ . Size:  $15\frac{1}{2} \times 15 \times 9$  in. Weight: 31 lb. Price (with tape, crystal mic., and recording lead): £61 19s. two track; £72 9s. four track.



**ROBUK ELECTRICAL INDUSTRIES LTD.,**  
559/561 Holloway Road, London, N.19. Tel.: Archway 1022.

**Robuk RK 3.** Speeds:  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  and  $1\frac{7}{8}$  i/s. Three motors. 7 in. spools. F.R.  $7\frac{1}{2}$ , 60-14,000 c/s  $\pm 3$  dB;  $3\frac{3}{4}$ , 60-7,000 c/s  $\pm 3$  dB;  $1\frac{7}{8}$ , 60-3,500 c/s. M.E. level ind. H. and N.  $< -40$  dB. W. and F.  $< 0.2\%$ . Outlet from pre-amp stage. Size:  $16 \times 11\frac{1}{2} \times 7\frac{1}{4}$  in. Price: £37 16s.

**RK4.** Details as for RK3, but alternative styling and colour scheme.



**SIEMENS NORGE A/S,** Rosenkrantzgt 11, Oslo, Norway. U.K. distributors: Denham & Morley Ltd., 173-175 Cleveland Street, London, W.1. Tel.: Euston 3656.

● **Siemens No. 10.** Transistorised stereo recorder.  $\frac{1}{4}$ -track. Speeds:  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F.  $7\frac{1}{2}$  i/s,  $0.13\%$ ;  $3\frac{3}{4}$  i/s,  $0.16\%$ ;  $1\frac{7}{8}$  i/s,  $0.2\%$ . H. and N.  $-52$  dB. F.R.  $7\frac{1}{2}$  i/s, 45 c/s-18 Kc/s;  $3\frac{3}{4}$  i/s, 45 c/s-11 Kc/s;  $1\frac{7}{8}$  i/s, 45 c/s-7 Kc/s ( $\pm 2$  dB). Replay char. NARTB. Inputs: mic 1 mV, 5K; line 10 mV, 150 K; gram 150 mV, 680 K. Outlet from pre-amp. One Papst motor (low noise, outside rotor). 7 in. spools. 2 mins. rewind. Two VU meters with dB calibration. Pause control, sound on sound. Superimpose. Facility for playing both tracks through one speaker. Instant reset tape counter. One internal speaker. Size:  $7 \times 14 \times 15$  in. Weight: 29 lb. Carrying handle. Deck covering lid. Rexine covered wood cabinet. Price: £93 9s.

● **Model 14.** Details as for Model 10, but no deck cover or carrying handle. Teak cabinet. Weight: 26 lb. Size:  $7 \times 13 \times 15$  in. Price: £91 7s.

● **Model 12.** Details as for Model 10, but two internal speakers. Size:  $7 \times 13 \times 15$  in. Weight: 35 lb. Price: £98 14s.



**SILVERTONE.** See W. Wood & Son Ltd.

**SIMON EQUIPMENT LTD.**, 48 George Street, London, W.1. Tel.: Welbeck 2371. Cables: Simsale, London.

**SP/5.** Speeds  $7\frac{1}{2}$  and  $3\frac{3}{4}$  i/s. Three motors. 7 in. spools. F.R.  $\pm 3$  dB.  $7\frac{1}{2}$  i/s 30-20,000 c/s;  $3\frac{3}{4}$  i/s, 30-10,000 c/s. Level meter. H. and N.  $< -50$  dB weighted against frequencies below 50 c/s. W. and F.  $7\frac{1}{2}$  i/s  $< 0.15\%$ ;  $3\frac{3}{4}$  i/s  $< 0.2\%$ . Monaural, can be converted to stereo. Re-record from one track to another. Monitoring of recorded signal. Outlet from pre-amp. Size:  $22\frac{1}{2} \times 20 \times 9\frac{1}{4}$  in. Weight: 45 lb. Price monaural: £97 13s.; stereo: £111 6s.



**SOBELL.** See Radio & Allied (Holdings) Ltd.



**SONY.** Distributors: Tellux Ltd., Avenue Works, Gallows Corner, Colchester Road, Romford, Essex. Tel.: Ingrebourne 43971.

● **Sony TC464.** Stereo recorder.  $\frac{1}{4}$ -track. Speeds:  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. One motor. 7 in. spools. F.R.  $7\frac{1}{2}$  i/s, 60 c/s-15 Kc/s;  $3\frac{3}{4}$  i/s, 60 c/s-10 Kc/s. Two M.E. level indicators. Instant stop lever and 8 mm. synchronising facilities. Size:  $14\frac{3}{4} \times 12\frac{3}{8} \times 6\frac{1}{16}$  in. Weight: 26 lb. Price: £75 12s.

● **Sony TC111 Portable Recorder.**  $3\frac{3}{4}$  and  $1\frac{7}{8}$  i/s. 5 in. spools. F.R.  $3\frac{3}{4}$  i/s, 70-8,000 c/s;  $1\frac{7}{8}$  i/s, 70-4,000 c/s. M.E. level ind. Size:  $8\frac{3}{4} \times 4\frac{1}{2} \times 7\frac{3}{4}$  in. Weight: 10 lb. Price (inc. mic., tape, leads and carrying case): £30 19s. 6d.

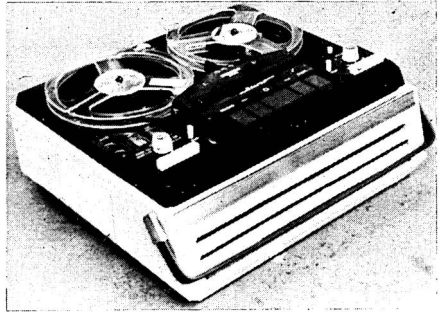
● **TC200.** Stereo recorder.  $\frac{1}{4}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F.  $7\frac{1}{2}$  i/s, less than 0.19%;  $3\frac{3}{4}$  i/s, less than 0.25%. F.R.  $7\frac{1}{2}$  i/s, 50 c/s-14 Kc/s;  $3\frac{3}{4}$  i/s, 50 c/s-11 Kc/s ( $\pm 2$  dB). Replay char. NARTB. Inputs: mic. low impedance, aux. high impedance. Outlet from pre-amp. One motor. 7 in. spool. 2 VU meters. Size:  $15 \times 9 \times 15\frac{7}{8}$  in. Weight: 27 lb. Price (inc. ext. speakers, 2 mics., leads): £82 19s.

● **TC272.** Mono recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F. 0.3%. F.R.  $7\frac{1}{2}$  i/s, 50 c/s-15 Kc/s;  $3\frac{3}{4}$  i/s, 50 c/s-10 Kc/s ( $\pm 2$  dB). Replay char. NARTB. Inputs: mic, radio, DIN connection. Outlet from pre-amp. One motor. 7 in. spool. Slide illumination level indicator. Pause control. Size:  $14 \times 13 \times 7$  in. Weight: 26 $\frac{1}{2}$  lb. Price (with mic. and accessories): £58 16s.

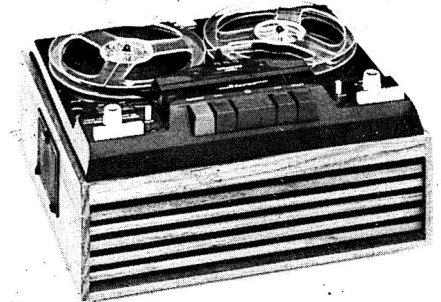
● **TC801.** Battery/mains recorder. For details see Battery Operated Portables section.



*Robuk RK3*



*Siemens No. 10*



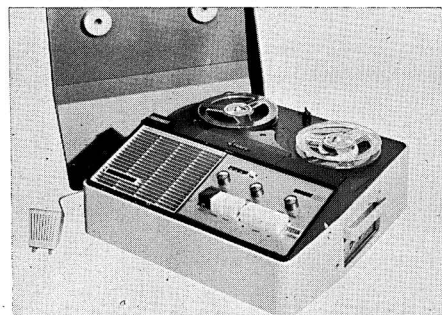
*Siemens Model 14*



*Stuzzi 604*



*Stuzzi 504 and 802 FM*



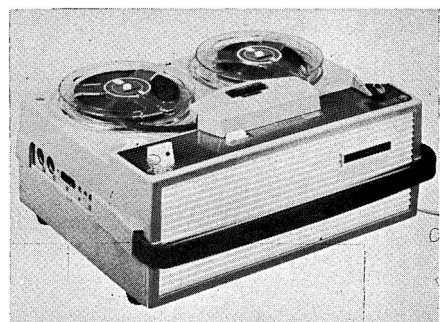
*Stella ST458*



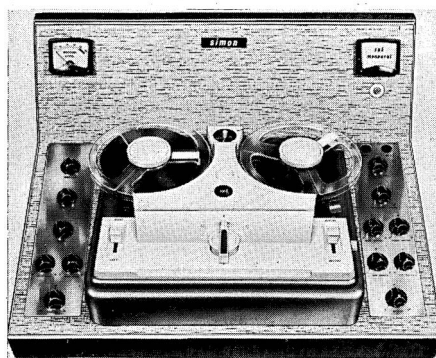
*Sony TC 272*



*Stella ST 459*



*Stella ST 456*



*Simon SP5*



*Stuzzi 202*

**STELLA RADIO & TELEVISION CO. LTD.**, Astra House, 121-3 Shaftesbury Avenue, London, W.C.2. Tel.: Gerrard 7086.

**ST456.** Mono recorder.  $\frac{1}{4}$ -track. Speed  $3\frac{3}{4}$  i/s. H. and N. -40 dB. F.R. 80-13 Kc/s. Inputs: mic. 0.4 mV, 1.5 K; gram 100 mV, 680 K; diode 2 mV, 20 K. Outlet from pre-amp. One motor.  $5\frac{3}{4}$  in. spools. Moving coil meter. Extension loudspeaker output. Transistorised amplifier. Size:  $12 \times 10\frac{1}{2} \times 6$  in. Weight: 11 lb. Price (with microphone and tape): £29 8s.

**ST458.** Mono recorder.  $\frac{1}{4}$ -track. Speeds  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F.  $3\frac{3}{4}$  i/s, 0.6% (peak-to-peak). H. and N. -40 dB. F.R.  $3\frac{3}{4}$  i/s, 60 c/s-13 Kc/s;  $1\frac{7}{8}$  i/s, 60 c/s-10 Kc/s ( $\pm 3$  dB). Inputs: mic. 1 mV, 1 K; radio 3 mV, 20 K; gram 150 mV, 500 K. Outlets from replay head, and pre-amp. One motor. 7 in. spool. M.E. Pause control, stereo output, straight amplifier, monitor (L.S. or phones). Size:  $14\frac{1}{2} \times 14\frac{1}{2} \times 7\frac{1}{4}$  in. Weight: 18 lb. Price: £40 19s.

**ST459.** Mono recorder.  $\frac{1}{4}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$ ,  $\frac{1}{16}$  i/s. W. and F. <0.6% (peak-to-peak) at  $3\frac{3}{4}$  i/s. H. and N. -40 dB. F.R.  $7\frac{1}{2}$  i/s, 60 c/s-16 Kc/s;  $3\frac{3}{4}$  i/s, 60 c/s-13 Kc/s;  $1\frac{7}{8}$  i/s, 60 c/s-10 Kc/s;  $\frac{1}{16}$  i/s, 60-4,500 c/s (all  $\pm 3$  dB). Inputs: mic. 1 mV, 1 K; diode 3 mV, 20 K; gram 150 mV, 500 K. Outlets from replay head or pre-amp. One motor. 7 in. spools. Moving coil meter. Pause control. Parallel track. Monitoring (loudspeaker or phones). Straight amp. Stereo output. Transistor amplifier. Size:  $17 \times 15\frac{1}{2} \times 8\frac{1}{4}$  in. Weight: 26 lb. Price (with microphone and tape): £65 2s.



**STEREOSOUND PRODUCTIONS LTD.**, 12-14 Wakefield Road, Brighouse, Yorkshire. Tel.: Brighouse 1755.

**Carousel Junior Radiotape** (Mk. II). Mono recorder in console cabinet.  $\frac{1}{2}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F. 0.25%. H. and N. -38 dB. F.R. 60 c/s-9 Kc/s. Replay char. CCIR. Inputs: mic. 2.5 mV, 1 megohm; gram 100 mV, 1 megohm. Outlet from pre-amp. One motor.  $5\frac{3}{4}$  in. spools. M.E. Size:  $23 \times 10\frac{3}{4} \times 22\frac{1}{2}$  in. high, (including legs). Weight: 26 lb. Price: £31 10s. Optional radio tuner (AM) £8 8s.

**Carousel Unit-tape.** Mono recorder in console cabinet.  $\frac{1}{2}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F. 0.25%. H. and N. -38 dB. F.R. 60 c/s-9 Kc/s. Replay char. CCIR. Inputs: mic. 2.5 mV, 1 megohm; gram 100 mV, 1 megohm. Outlet from pre-amp. One motor.  $5\frac{3}{4}$  in. spools. M.E.

Optional record player £9 19s. 6d.) and AM Radio (£8 8s.). Size:  $30 \times 23\frac{3}{4} \times 14$  in. Weight: 45 lb. Price: £44 2s.

**Carousel Unit-tape Mk. II.** Details as for Mk. I, but with  $\frac{1}{2}$ -track 3-speed deck. Price: £47 5s.



**STUZZI.** U.K. distributors: Recording Devices Ltd., 44 Southern Row, Kensington, London, W.10. Tel.: Ladbroke 4775.

**Stuzzi Tricorder.** Speeds  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  and  $\frac{1}{16}$  i/s. Papst motor.  $5\frac{3}{4}$  in. spools. F.R. 40-16,000 c/s;  $1\frac{7}{8}$  i/s, 40-8,000 c/s;  $\frac{1}{16}$  i/s, 40-4,000 c/s. M.E. level ind. H. and N. -40 dB. W. and F. 0.25%. Mixing. Variable Superimposing, Monitoring and remote control. Size:  $13 \times 10 \times 6$  in. Weight: 18 lb. Price: £66 3s.

**Stuzzi 401 de luxe.** Mono recorder.  $\frac{1}{4}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. F.R.  $7\frac{1}{2}$  i/s, 40 c/s-14 Kc/s;  $3\frac{3}{4}$  i/s, 60 c/s-9 Kc/s. One Papst motor. 7 in. spools. M.E. level indicator. W. and F. 0.15% at  $3\frac{3}{4}$  i/s. Outlet from pre-amp. Built-in stereo pre-amp. Inter-track transfer facilities. Superimposition. Price: £61 19s.

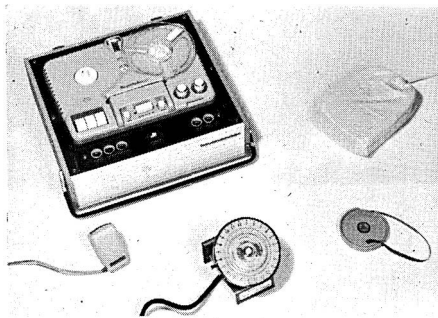
**504.** Mono recorder.  $\frac{1}{4}$ -track. Speeds  $7\frac{1}{2}$  and  $3\frac{3}{4}$  i/s, or  $3\frac{3}{4}$  and  $1\frac{7}{8}$  i/s. W. and F.  $7\frac{1}{2}$  i/s, 0.25%;  $3\frac{3}{4}$  i/s, 0.3%. F.R.  $7\frac{1}{2}$  i/s, 40 c/s-20 Kc/s. Replay char. close to CCIR. Outlet from pre-amp. One motor. 7 in. spool.  $2\frac{1}{2}$  min. rewind. M.E. Built-in M.W./L.W. radio. Size:  $15\frac{1}{4} \times 11\frac{1}{4} \times 6\frac{1}{4}$  in. Weight: 19 $\frac{1}{2}$  lb. Price: £69 6s.

**502.**  $\frac{1}{2}$ -track version of 504. H. and N. -43 dB.

**802FM.** Mono recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F. 0.25%,  $7\frac{1}{2}$  i/s; 0.3%,  $3\frac{3}{4}$  i/s. H. and N. -43 dB. F.R.  $7\frac{1}{2}$  i/s, 40 c/s-20 Kc/s. Replay char. close to CCIR. Outlet direct from pre-amp. One motor. 7 in. spool.  $2\frac{1}{2}$  min. rewind. M.E. Built-in transistorised F.M. V.H.F. radio. Size:  $15\frac{1}{4} \times 11\frac{1}{4} \times 6\frac{1}{4}$  in. Weight: 19 $\frac{1}{2}$  lb. Price: £78 15s.

**202.** Mono recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F. 0.25%,  $7\frac{1}{2}$  i/s. H. and N. -40 dB. F.R.  $7\frac{1}{2}$  i/s, 40 c/s-20 Kc/s. Replay char. close to CCIR. Outlet from pre-amp. One motor. 7 in. spool. Rewind  $2\frac{1}{2}$  mins. M.E. Built-in stereo pre-amp. for replay. Size:  $13 \times 10\frac{1}{2} \times 6$  in. Weight: 18 $\frac{1}{2}$  lb. Price: £49 7s.

**604.** Mono recorder.  $\frac{1}{4}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F.  $7\frac{1}{2}$  i/s, 0.25%;  $3\frac{3}{4}$  i/s, 0.3%.



### *Symphony Pre-Sleep Study Outfit*

H. and N. -43 dB. F.R.  $7\frac{1}{2}$  i/s, 40 c/s-20 Kc/s. Replay char. close to CCIR. Outlet from pre-amp. One motor. 7 in. spool. Rewind  $2\frac{1}{2}$  mins. M.E. Size:  $15\frac{1}{4} \times 11\frac{1}{4} \times 6\frac{1}{4}$  in. Weight:  $19\frac{1}{2}$  lb. Price: £52 10s.



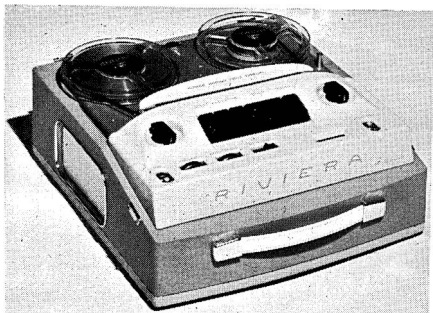
**SYMPHONY AMPLIFIERS LTD.**, 16 Kings College Road, London, N.W.3. Tel.: Primrose 3314.

**Symphony Pre-Sleep Study Outfit.** Comprises: Special recorder with full electronic control to permit time-switch control without incurring "flats". Large dial time switch for easy setting. Dynamic mic. Data tape, 900 ft; Induction tape (learning). Price: £58 16s.



**TAK CONTINENTAL IMPORTERS**, Stone, Staffs. Tel.: Stone 260.

**Dual TG12SK.** Stereo recorder.  $\frac{1}{4}$ -track. Speeds:  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. At  $7\frac{1}{2}$  i/s, W. and F.  $\pm 0.15\%$ ; H. and N. -46 dB; F.R. 40 c/s-20 Kc/s  $\pm 3$  dB. At  $3\frac{3}{4}$  i/s, W. and F.  $\pm 0.25\%$ ; H. and N. -45 dB; F.R. 40 c/s-16 Kc/s  $\pm 3$  dB.



*Sound Riviera 3-speed 2-track*

At  $1\frac{7}{8}$  i/s, W. and F.  $\pm 0.5\%$ ; H. and N. -42 dB; F.R. 40 c/s-8 Kc/s  $\pm 3$  dB. Inputs for mic., tuner, gram. One motor. 7 in. spools. Rewind approx. 2 mins, 1,200 ft. M.E. Monitoring facilities. Tape counter. Two detachable loud-speakers. Size:  $15\frac{1}{2} \times 13\frac{1}{2} \times 10\frac{1}{2}$  in. Weight: 32 lb. Price: £99 15s.



**TANDBERG.** U.K. distributors: Elstone Electronics Ltd., Edward Street, Templar Street, Leeds 2. Tel.: Leeds 35111.

●**Tandberg 74.** Stereo/mono recorder.  $\frac{1}{4}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F.  $7\frac{1}{2}$  i/s, 0-15%;  $3\frac{3}{4}$  i/s, 0-2%;  $1\frac{7}{8}$  i/s, 0-3%. H. and N. -53 dB. F.R.  $7\frac{1}{2}$  i/s, 40 c/s-16 Kc/s;  $3\frac{3}{4}$  i/s, 40 c/s-10 Kc/s;  $1\frac{7}{8}$  i/s, 50 c/s-5 Kc/s (all  $\pm 2$  dB). Replay char. NARTB. Inputs: 7 mV; mic. 1.5 mV. One motor. 7 in. spools, 2 mins. rewind. Two EAM86 M.E.s. Pause control. Playback on



*Tandberg 74 Stereo*

one channel while recording on other channel. Size:  $15\frac{3}{8} \times 11\frac{1}{8} \times 6\frac{3}{8}$  in. Weight (instrument alone):  $27\frac{1}{2}$  lb.; (with carrying case):  $32\frac{1}{2}$  lb. Price: £97 13s.

●**Tandberg 72.**  $\frac{1}{2}$ -track version of Tandberg 74. Details as above, but H. and N. -56 dB.



**TAPE RECORDERS (ELECTRONICS) LTD.**, 784-788 High Road, Tottenham, London, N.17. Tel.: Tottenham 0811-3. Cables: Taperec, London.

**Sound Slimline One-Two.** Speed  $3\frac{3}{4}$  i/s. One motor.  $5\frac{3}{4}$  in. spools. F.R. 80-12,000 c/s  $\pm 3$  dB. M.E. level ind. H. and N. 40 dB. W. and F.  $< 0.2\%$ . Outlet from pre-amp. Monitoring. Mixing. Superimposing. Straight-through amplifier. Size:  $13\frac{1}{2} \times 13\frac{1}{2} \times 5\frac{3}{4}$  in. Weight: 19 lb. Price: £33 12s.



**Sound Slimline One-Four.** 4-track version of Sound Slimline One-Two. Price: £38 17s.

**Sound Slimline Three-Two.** Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  and  $1\frac{7}{8}$  i/s. Two motors. 7 in. spools. F.R. Amp. 10-18,000 c/s; Record-replay 80-13,000 c/s  $\pm 3$  dB at  $7\frac{1}{2}$  i/s. M.E. level ind. H. and N. -40 dB. W. and F. <0.2%. Outlet from pre-amp. Superimposing. Mixing. Monitoring. Straight-through amplifier. Size:  $13\frac{1}{2} \times 13\frac{1}{2} \times 6$  in. Weight: 22 lb. Price: £42.

**Sound Slimline Three-Four.** 4-track version of Sound Slimline Three-Two. Price: £47 5s.

**Sound Riviera.** Mono recorder.  $\frac{1}{2}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F. 0.2%. H. and N. -38 dB. F.R. 70 c/s-6 Kc/s  $\pm 3$  dB. Inputs: mic. 4 mV, 1 megohm; radio 200 mV, 1 megohm. Monitor outlet from pre-amp. One motor  $5\frac{3}{4}$  in. spool, 1 min. rewind. M.E. Size:  $13\frac{1}{4} \times 14 \times 7$  in. Price: £23 2s.



*Sound Riviera 3-speed 4-track*

**Riviera de Luxe.**  $\frac{1}{4}$ -track version of Sound Riviera, but outlet from second track for stereo replay via Add-on unit. Price: £26 5s.

**Riviera 3-Speed.** Mono recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F. 0.15% at  $7\frac{1}{2}$  i/s. H. and N. -38 dB. F.R. 70 c/s-12 Kc/s  $\pm 3$  dB. Replay char. CCIR. Inputs: mic. 4 mV, 1 megohm; radio 200 mV, 1 megohm. Monitor outlet from pre-amp. Three motors. 7 in. spools, 1 min. rewind. M.E. Pause control. Size:  $15\frac{3}{4} \times 14 \times 7$  in. Price: £30 9s.

**Riviera 3-Speed de Luxe.**  $\frac{1}{4}$ -track version of Sound from second track for stereo replay via Add-on unit. Price: £32 11s.

● **Sound Stereo Add-on unit.** Model A47. Enables all Sound 4-track models to play back stereo tapes. Comprises a stereo amplifier giving over 3W output. For use on 200-250V 50 c/s AC mains. Complete with matched speaker, and housed in vinyl covered cabinet. Price: £14 14s.



*Telefunken Magnetophon 55*

**TELEFUNKEN.** Sole U.K. distributors: Welmecc Corporation Ltd., Lonsdale Chambers, 27 Chancery Lane, London, W.C.2. Tel.: Chancery 9944. Cables: Welmcors, London.

**Magnetophon 55.** Mono recorder.  $\frac{1}{2}$ -track. Speeds  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F.  $\pm 0.2\%$  at  $3\frac{3}{4}$  i/s. H. and N. -46 dB. F.R.  $3\frac{3}{4}$  i/s, 40 c/s-16 Kc/s;  $1\frac{7}{8}$  i/s, 40 c/s-9 Kc/s. NARTB. Inputs: mic. 2 mV, 2 megohms; radio 2 mV, 47 K, or 160 mV, 2 megohms. Outlet from pre-amp, 1.5V across 18 K. One motor.  $5\frac{3}{4}$  in. spool. Rewind (with DP tape) 4 mins. Fluorescent bar indicator. Size:  $14\frac{1}{2} \times 13 \times 6$  in. Weight: 22 lb. Pause Control. Price: £45 3s.

**Magnetophon 95.** Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. 7 in. spools. F.R.  $7\frac{1}{2}$  i/s, 30-18,000 c/s;  $3\frac{3}{4}$  i/s, 30-16,000 c/s;  $1\frac{7}{8}$  i/s, 30-9,000 c/s. Fluorescent bar level ind. W. and F. 0.15% at  $7\frac{1}{2}$  i/s. H. and N. -40 dB. Outlet from pre-amp. Straight-through amplifier. Size:  $16\frac{1}{2} \times 11\frac{1}{2} \times 7\frac{3}{4}$  in. Weight: 24 lb. Price: £61 19s.

**Magnetophon 96.** 4-track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  and  $1\frac{7}{8}$  i/s. One motor. 7 in. spools. F.R.  $7\frac{1}{2}$  i/s, 30-18,000 c/s;  $3\frac{3}{4}$  i/s, 30-16,000 c/s;  $1\frac{7}{8}$  i/s, 30-9,000 c/s. Fluorescent bar level ind. H. and N. <-40 dB. W. and F. 0.15% at  $7\frac{1}{2}$  i/s.



*Magnetophon 85*



**Uher 712 Umatic**

Outlet from pre-amp via radio socket. May be used with external amplifier for replaying stereo tapes. Size:  $16\frac{1}{4} \times 11\frac{1}{2} \times 9$  in. Weight: 24 lb. Price: £65 2s.

● **Magnetophon 97.** 4-track stereo. Details as for Magnetophon 96. Price: £99 15s.

● **Magnetophon 98.** Stereo recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F.  $7\frac{1}{2}$  i/s, 0-15%;  $3\frac{3}{4}$  i/s, 0-2%;  $1\frac{7}{8}$  i/s, 0-3%. H. and N.  $7\frac{1}{2}$  i/s, -55 dB;  $3\frac{3}{4}$  i/s, -50 dB;  $1\frac{7}{8}$  i/s, -45 dB. F.R.  $7\frac{1}{2}$  i/s, 30 c/s-18 Kc/s;  $3\frac{3}{4}$  i/s, 30 c/s-16 Kc/s;  $1\frac{7}{8}$  i/s, 30 c/s-9 Kc/s. Replay char. NARTB. Inputs: radio 2 mV, 47 K; mic. 2 mV, 2 megohms. Outlet from pre-amp. One motor. 7 in. spools, 4 min. rewind (long play tape). Fluorescent bar level indicator. Separate erase, record and playback heads facilitate "before" and "off" tape monitoring. Size:  $7\frac{3}{4} \times 16\frac{1}{4} \times 11\frac{1}{2}$  in. Price: £99 15s.

**Magnetophon 85 de Luxe.** Mono recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F.  $7\frac{1}{2}$  i/s, 0-15%;  $3\frac{3}{4}$  i/s, 0-2%. H. and N. -55 dB. F.R.  $7\frac{1}{2}$  i/s, 40 c/s-18 Kc/s;  $3\frac{3}{4}$  i/s, 40 c/s-16 Kc/s.



Sound Slimline Three-Two

Replay char. CCIR and NARTB, selected by switch. Inputs: radio 2 mV, 47 K; mic. 2 mV, 2 megohms. Outlet from pre-amp. One motor. 7 in. spools, 3 min. rewind (long play tape). Fluorescent bar level indicator. Mixing facilities. Size:  $8\frac{1}{2} \times 18\frac{1}{4} \times 16\frac{3}{4}$  in. Price: £87 3s.

★

**TRUVOX LTD.,** Neasden Lane, London, N.W.10. Tel.: Dollis Hill 8011. Cables: Truvoxeng-Norphone N.W.10.

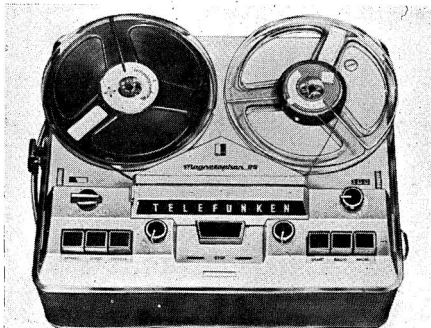
**R92.** Mono recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F.  $7\frac{1}{2}$  i/s, 0-1%;  $3\frac{3}{4}$  i/s, 0-15%;  $1\frac{7}{8}$  i/s, 0-25%. Hum -45 dB; Noise -50 dB. F.R.  $7\frac{1}{2}$  i/s, 40 c/s-17 Kc/s  $\pm 2$  dB;  $3\frac{3}{4}$  i/s, 40 c/s-10 Kc/s  $\pm 2$  dB;  $1\frac{7}{8}$  i/s, 60 c/s-8 Kc/s  $\pm 3$  dB. Replay char. CCIR. Inputs: 1.4 mV, 2.2 megohms; 150 mV, 500 K. Outlet from pre-amp, across 100 ohms, IV variable. Three motors. 7 in. spools. Rewind 1 min. VU meter. Editing panel. Auto-stop. 4 digit counter. Cue and inching control. Cathode-follower output. Size:  $16\frac{1}{2} \times 17\frac{3}{4} \times 8\frac{1}{2}$  in. Weight: 35 lb. Price: £72 9s.

**R94.**  $\frac{1}{4}$ -track version of R92.

★

**UHER.** U.K. distributors: Bosch Ltd., 205 Great Portland Street, London, W.1. Tel.: Langham 1809.

**Uher Universal 5000.** Transistorised mono recorder.  $\frac{1}{2}$ -track. Speeds  $3\frac{3}{4}$ ,  $1\frac{7}{8}$ ,  $\frac{1}{2}$  i/s. W. and F.  $\pm 2\%$ . H. and N. -50 dB. F.R.  $3\frac{3}{4}$  i/s, 40 c/s-16 Kc/s;  $1\frac{7}{8}$  i/s, 40 c/s-8 Kc/s;  $\frac{1}{2}$  i/s, 40 c/s-4 Kc/s. Replay char. NARTB. Inputs: mic. 0.1 mV, 4 K; radio 1 mV, 47 K; gram 50 mV, 1 megohm. Outlet direct from pre-amp. One motor.  $5\frac{1}{2}$  in. spools. Rewind 2 mins.



Magnetophon 98

Three figure counter. Price (incl. 4-position remote control, mic. and 5 $\frac{3}{4}$  in. tape): £93 9s. 0d.

**Uher U-Matic 712.** Transistorised mono recorder.  $\frac{1}{2}$ -track. Speed 3 $\frac{3}{4}$  i/s. W. and F.  $\pm 0.2\%$ . H. and N. -42 dB. F.R. 50 c/s-16 Kc/s. Replay char. NARTB. Inputs: mic. 0.2 mV, 2 K; radio 2 mV, 50 K; gram 40 mV, 1 megohm. Outlet direct from pre-amp. One motor. 7 in. spool. Rewind 3 mins. Three-figure counter. Automatic level device. Size: 15 x 14 x 7 in. Weight approx.: 18 lb. Price (incl. LP tape and m/c mic.): £72 9s. 0d.

● **Uher Royal Stereo 784.** Transistorised stereo recorder.  $\frac{1}{4}$ -track. Speeds 7 $\frac{1}{2}$ , 3 $\frac{3}{4}$ , 1 $\frac{7}{8}$ ,  $\frac{1}{16}$  i/s. W. and F. 7 $\frac{1}{2}$  i/s,  $\pm 0.15\%$ . H. and N. -50 dB. F.R. 7 $\frac{1}{2}$  i/s, 50 c/s-20 Kc/s; 3 $\frac{3}{4}$  i/s, 50 c/s-16 Kc/s, 1 $\frac{7}{8}$  i/s, 50 c/s-9 Kc/s;  $\frac{1}{16}$  i/s, 50 c/s-4 Kc/s. Replay char. NARTB. Inputs: mic. 0.15 mV, 2 K; radio 5 mV, 50 K; gram 350 mV, 1 megohm. Outlets direct from replay head, and pre-amp. One motor. 7 in. spool. Rewind 3 mins. Three figure counter. Pause control. 11-position selector. Mixing. Size: 15 x 14 x 7 in. Weight approx.: 23 $\frac{1}{2}$  lb. Price: £141 15s. 0d.



**ULTRA RADIO & TELEVISION LTD.,** Television House, Ruislip, Middx. Tel.: Pinner 8761.

**Model 6202.** Mono recorder.  $\frac{1}{4}$ -track. Speeds 3 $\frac{3}{4}$ , 1 $\frac{7}{8}$  i/s. W. and F. 3 $\frac{3}{4}$  i/s, 0.2%; 1 $\frac{7}{8}$  i/s, 0.25%. H. and N. -40 dB. F.R. 3 $\frac{3}{4}$  i/s, 60 c/s-12 Kc/s  $\pm 5$  dB; 1 $\frac{7}{8}$  i/s, 60 c/s-6 Kc/s  $\pm 5$  dB. Replay char. extension of CCIR. Inputs: mic. 1.5 mV, 10 megohms; gram 75 mV, 1 megohm; radio 1.5 mV, 22 K. Outlets from replay head or pre-amp., unused track is brought out to socket at rear, 500 mV, 22 K. One motor. 5 $\frac{3}{4}$  in. spools, 2 $\frac{1}{2}$  min. rewind. M.E. Pause control. Superimpose. Straight-through amp. Autostop.



Ultra Model 6202



Truvox R92

Remote pause control. Aux. socket with 30V DC supply for accessories. Size: 7 x 12 $\frac{1}{2}$  x 14 in. Weight: 19 lb. Price: £34 13s.



**UNICORDER.** Distributors: Denham & Morley Ltd., Denmore House, 173-175 Cleveland Street, London, W.1. Tel.: Euston 3656.

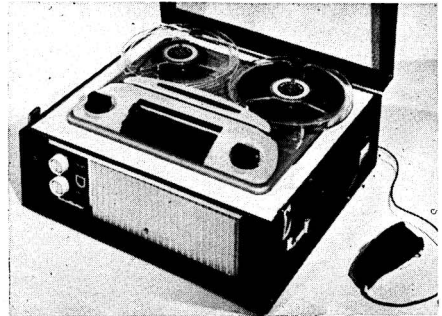
**SR-F61RT.** Battery/mains recorder. For details see Battery Operated Portables section.



**VOLMAR LTD.,** 154 High Street, Brentford, Middx. Tel.: Isleworth 1161/5885. Cables: Volmar, Brentford, Hounslow.

**TR236.** Mono recorder.  $\frac{1}{4}$ -track. Speeds 7 $\frac{1}{2}$ , 3 $\frac{3}{4}$ , 1 $\frac{7}{8}$  i/s. F.R. 7 $\frac{1}{2}$  i/s, 80 c/s-12 Kc/s; 3 $\frac{3}{4}$  i/s, 80 c/s-8 Kc/s; 1 $\frac{7}{8}$  i/s, 80 c/s-5 Kc/s (all  $\pm 3$  dB). Replay char. CCIR. Inputs: mic. 3 mV, 500 K; radio/gram 400 mV, 1 megohm. Three motors. 7 in. spools. M.E. Pause control. Size: 19 x 16 $\frac{1}{4}$  x 10 $\frac{3}{4}$  in. Weight: 25 lb. Price £35 3s. 6d.

**TR463.** Mono recorder.  $\frac{1}{4}$ -track. Other details as for TR23. Price £38 6s. 6d.



WyndSOR Trident

**W. WOOD & SON LTD.**, Electronics Division, Kelvin Works, Power Road, Chiswick, London, W.4. Tel. Turnham Green 9321. Cables: Compendium, London, W.4.

**Silvertone RT15.** Mono recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F.  $7\frac{1}{2}$  i/s, 0-15%. H. and N. -40 dB. F.R.  $7\frac{1}{2}$  i/s, 50 c/s-15 Kc/s;  $3\frac{3}{4}$  i/s, 50 c/s-9 Kc/s;  $1\frac{7}{8}$  i/s, 50 c/s-7 Kc/s. Replay char. CCIR. Inputs: mic. 2 mV, 1 megohm; radio 250 mV, 1 megohm. Extension speaker socket. Output from monitor when recording. Three motors. 7 in. spool. Rewind approx. 1 min. M.E. Pause control. Superimpose. Digital counter. Size:  $14\frac{1}{2} \times 15\frac{1}{2} \times 7\frac{3}{4}$  in. Weight: 27 lb. Price: £36 15s.

★

**WYNDSOR RECORDING CO. LTD.**, (inc. Magnetic Recording Co.), WyndSOR Works, 2 Bellevue Road, Friern Barnet, London, N.11. Tel.: Enterprise 2226/7. Cables: Wyndreco, London.



*Grundig TK41*

**Trident.** Mono recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. F.R.  $7\frac{1}{2}$  i/s, 50 c/s-15 Kc/s;  $3\frac{3}{4}$  i/s, 50 c/s-9 Kc/s;  $1\frac{7}{8}$  i/s, 50 c/s-7 Kc/s. Inputs: mic. and radio. Output 4W. 7 in. spools. M.E. Superimpose. Monitoring through microphone. Pause control. Tone control. Digital counter for reset. Size  $14\frac{1}{2} \times 15\frac{1}{2} \times 7\frac{3}{4}$  in. Weight (including microphone) 27 lb. Price: £34 13s.;  $\frac{1}{4}$ -track version: £36 15s.

## BATTERY OPERATED PORTABLES

**ACME ELECTRIC CO. (FINSBURY) LTD.,**  
Acme House, 63 Great Eastern Street, London,  
E.C.2. Tel.: Shoreditch 6486. Cables: Alectro,  
London.

**Ajax Mayfair FT303.** Transistorised battery portable mono recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. H. and N. -40 dB. F.R. 200 c/s-7 Kc/s. Extension speaker socket. One motor. 5 in. spools. Rewind 2 mins. (600 ft.). Size: 8 x 11 x  $3\frac{3}{8}$  in. Weight: 7 lb. Powered by 4.5V (3 U2 cells) and 9V (PP3). Price: £18 18s. (incl. mic., earpiece, tape, batteries).

**Ajax Mayfair FT155.** De luxe version of FT303. Price: £19 19s.



**C. BRADDOCK (BLACKPOOL) LTD.,**  
266 Waterloo Road, Blackpool, Lancs. Tel.:  
Blackpool 45049.

**Q-Cord R119K.** Transistorised mono recorder. Battery/mains.  $\frac{1}{2}$ -track. Speed  $3\frac{3}{4}$  i/s. W. and F. <0.5%. H. and N. -50 dB. F.R. 60 c/s-10 Kc/s  $\pm 3$  dB. Replay char. NARTB. Inputs: radio/mic./gram/tele-adaptor 2 mV, 50 K. Outlet from pre-amp. One motor.  $4\frac{1}{4}$  in. spool. Rewind 4 mins. DM70 level indicator. Pause control. Remote stop/start control. Can be used in any position. Size:  $9\frac{1}{4}$  x 4 x  $9\frac{3}{4}$  in. Price: £34 13s.

**Q-Cord R119K. De luxe version.** Mixing, straight-through amp. Remote control. Price: £40 19s.

**Q-Cord 203.** Size: 10 x 4 x  $10\frac{1}{2}$  in. Other details as for R119K. Price: £35 14s.

**Q-Cord 203. De luxe version.** Straight-through amp. Price: £38 17s.



**BUTOBA**—Sole U.K. distributors, Denham & Morley Ltd., Denmore House, 175 Cleveland Street, London, W.1. Tel.: Euston 3656. Cables: Denmorl, Wesdo, London.

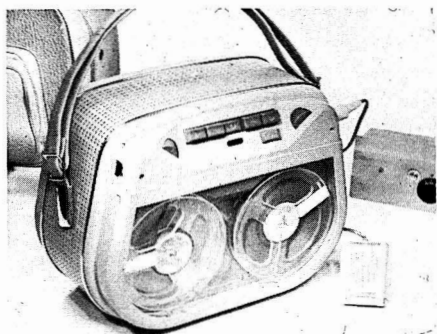
**Butoba MT5.** Transistorised battery portable. Speeds  $3\frac{3}{4}$  and  $1\frac{3}{8}$  i/s.  $\frac{1}{2}$ -track. W. and F.  $3\frac{3}{4}$  i/s, 0.11%;  $1\frac{3}{8}$  i/s, 0.16%. H. and N. -57 dB. Replay char. CCIR. Inputs: 200 $\mu$ V, 200



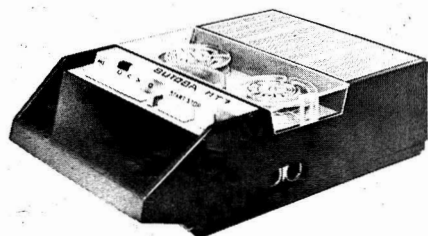
*Ajax Mayfair Model FT 155 Model FT 303*



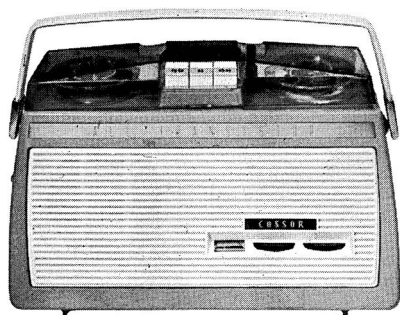
*Q-Cord R119K*



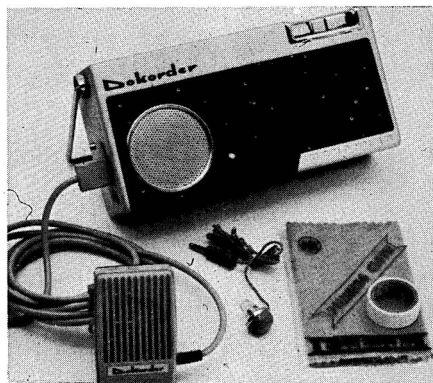
*Butoba MT5*



*Butoba MT5*



Corsor 1621



Dokorder PT-4K



EMI RE 321

ohms; 100 mV, 100 K. Outlet from pre-amp. 5 in. spools, 2½ min. rewind. Pause control, straight amplifier. M.E. level ind. Two motors. F.R. 3¼ i/s, 50-13,000 c/s; 1½ i/s, 60-5,000 c/s. Battery life 20-40 hours. Eight 1.5V batteries. Size: 12 × 9½ × 6 in. Weight including batteries: 12 lb. Price: £69 6s. Mains converter: £11 11s.

**Butoba MT7. Transistorised battery portable.** Speed 3¼ and 1½ i/s. F.R. 100-12,000 c/s at 3¼; 100-5,000 c/s at 1½. W. and F. 0.5%. M.E. level ind. Output 0.8W. Four 1.5V batteries. Weight: 7 lb. Price (including m/c microphone and tape): £39 18s. Mains converter available.

**Butoba MT7R.** Details as for MT7, but with remote control facility and switched microphone. Price (including microphone and tape): £45 3s.



**COSSOR RADIO & TELEVISION CO. LTD.,** 233 Tottenham Court Road, London, W.1. Tel.: Gerrard 2931.

**CR1621.** Mono battery portable recorder. ½-track. Speed 1½ i/s. W. and F. <1% (peak-to-peak). H. and N. -40 dB. F.R. 80 c/s-8 Kc/s ±3 dB. Inputs: mic./radio/gram 0.3 mV, 2 K. Outlet from pre-amp. One motor. 4 in. spools. Moving-coil meter. Headphone playback, remote control, mains unit connection, battery voltage indicator. Size: 12 × 9 × 4½ in. Weight: 8 lb. Price: £27 6s.



**DANSETTE PRODUCTS LTD.,** Dansette House, Honeypot Lane, Stanmore, Middlesex. Tel.: Wordsworth 0021.

**Cadet.** Battery operated mono recorder. ½-track. Speeds 3¼, 1½ i/s. One motor. 4 in. spools, 2 min. rewind for 650 ft. tape. M.E. Size: 11½ × 5½ × 12 in. Weight: 10 lb. Price: £27 6s.



**DOKORDER.** See The Goshco Co. Ltd.

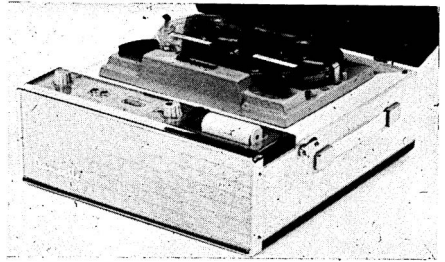


**EMI ELECTRONICS LTD.,** Hayes, Middx. Tel.: Hayes 3888. Cables: Emidata, London.

**EMI RE321.** Transistorised professional battery portable. Speed 7½ i/s. One motor.

F.R. 50-10,000 c/s. H. and N. -44 dB. W. and F. 0.25%. Level meter. Eight 1.5V cells. Full track recording and playback. CCIR characteristics. Size:  $14\frac{1}{2} \times 6\frac{1}{2} \times 8$  in. Weight:  $17\frac{1}{2}$  lb. Price: £124.

★

*Dansette Cadet*

**EMT WILHELM FRANZ G.m.b.H.**, Switzerland. Sole U.K. Agents: F. W. O. Bauch Ltd., Chaddlewood, Cockfosters Road, Cockfosters Barnet, Herts. Tel.: Barnet 3170.

● **Stellavox SM5**. Professional transistorised battery portable recorder. Full track mono, half-track stereo. Speed  $7\frac{1}{2}$  i/s. W. and F. 0.15% ( $\pm 0.3\%$  peak weighted). H. and N. (weighted) -50 dB. F.R. 60 c/s-12 Kc/s +2 -3 dB. CCIR or NARTB (either by request). Input 0.18 mV, greater than 4 K. Outlet from pre-amp. One motor.  $3\frac{3}{8}$  in. spools. 1.5 min. rewind. VU meter. Re-chargeable battery. Size:  $10 \times 5\frac{1}{2} \times 2\frac{1}{2}$  in. Weight approx.: 6 lb. Price: £212 (mono); £234 10s. (mono, with pilot-tone head, for use with film camera).

★

**FI-CORD LTD.**, 40a Dover Street, London, W.1. Tel.: Hyde Park 3448. Cables: Fi-Cord, London.

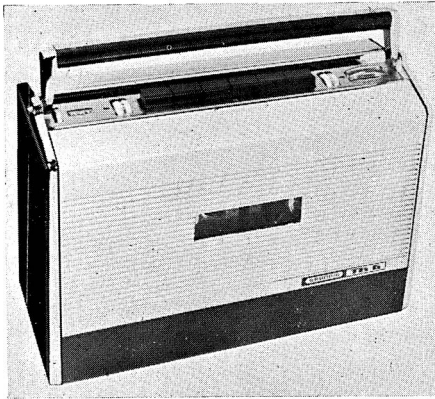
**Fi-Cord 202**. Battery portable recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$  and  $3\frac{3}{4}$  i/s. 4 in. spools. F.R. 50-12,000 c/s  $\pm 3$  dB at  $7\frac{1}{2}$  i/s; 50-8,000 c/s  $\pm 3$  dB at  $3\frac{3}{4}$  i/s. W. and F.  $< 0.3\%$  rms at  $7\frac{1}{2}$  i/s.  $< 0.4\%$  rms at  $3\frac{3}{4}$  i/s. VU meter. Mercury batteries. Size:  $9 \times 6\frac{1}{2} \times 4\frac{1}{2}$  in. Weight:  $6\frac{3}{4}$  lb. inc. batteries. Price inc. tape: £69 6s. Mains converter £7 10s. extra.

★

**FONADEK (BRANSON) LTD.**, Vivian Road, Harborne, Birmingham 17. Tel.: Harborne 2267. Cables: Fonadek.

**Transicorder TR100**. Battery portable recorder.  $\frac{1}{2}$ -track. Speeds  $3\frac{3}{4}$ ,  $1\frac{1}{8}$  i/s. W. and F. 0.3%. F.R.  $3\frac{3}{4}$  i/s, 150 c/s-7 Kc/s. Replay char. CCIR. Input: mic. Outlet from pre-amp. 100 mV. One motor.  $3\frac{1}{2}$  in. spools. VU meter. Controlled by microphone. Size:  $7 \times 7 \times 1\frac{1}{2}$  in. Weight: 4 lb. Price: £51 9s.

*EMT Stellavox SM5*



Grundig TK6

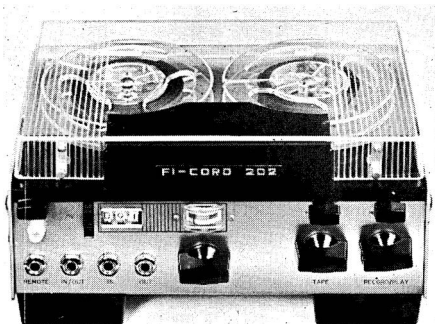
**THE GOSHO CO. LTD.**, Lee House, London Wall, London, E.C.2. Tel.: National 4381. Cables: Gosho, London.

**Dokorder PT-4KB. Kari-Korder.** Battery operated portable transistorised recorder. Speeds  $3\frac{3}{8}$  and  $1\frac{7}{8}$  i/s. One motor.  $3\frac{1}{2}$  in. spools. F.R.  $3\frac{3}{8}$  200-7,000 c/s;  $1\frac{7}{8}$  200-3,500 c/s. VU level meter. W. and F. 0-7% max. Outlet from replay head. Size:  $3\frac{3}{8} \times 2\frac{1}{4} \times 7\frac{3}{8}$  in. Weight: 3 lb. Price, with telephone pickup, case, earphone, ext. lead: £51 9s.



**GRUNDIG (GREAT BRITAIN) LTD.**, Newlands Park, Sydenham, S.E.26. Tel.: Sydenham 2211.

**TK6.** Transistorised battery/mains mono recorder.  $\frac{1}{2}$ -track. Speeds  $3\frac{3}{8}$ ,  $1\frac{7}{8}$  i/s. W. and F.  $3\frac{3}{8}$  i/s, 0-5%;  $1\frac{7}{8}$  i/s, 0-8%. H. and N. -48 dB. F.R.  $3\frac{3}{8}$  i/s, 50 c/s-13 Kc/s  $\pm 3$  dB;  $1\frac{7}{8}$  i/s, 50 c/s-9 Kc/s -5, +3 dB. Replay char. NARTB.



Fi-Cord 202

Inputs: mic 0.3-20 mV, 10 K; radio 5-100 mV, 10 K; gram 50-1,500 mV, 500 K. Outlet direct from pre-amp 550 mV, 18 K. One motor.  $4\frac{1}{2}$  in. spools. Rewind with supplied tape (TTP11) 2 mins. 10 secs. Level meter. Pause control. Will operate from car or boat batteries. Size:  $12\frac{3}{4} \times 5\frac{1}{4} \times 9\frac{1}{2}$  in. Weight:  $13\frac{3}{4}$  lb. Price (incl. mic. and triple-play tape): £68 5s.



**HITACHI, JAPAN.** Distributed by Lee Products (G.B.) Ltd., 10-18 Clifton Street, London, E.C.2. Tel.: Bishopsgate 6711. Cables: Leprod, London.

**Belsona TRQ-399.** Battery portable recorder.  $\frac{1}{2}$ -track. Speeds  $3\frac{3}{8}$  i/s, F.R. 150 c/s-7 Kc/s;  $1\frac{7}{8}$  i/s, 150 c/s-4 Kc/s. Outlet from pre-amp. One motor.  $3\frac{1}{2}$  in. spools. Level meter. One knob control. Remote control. Size:  $8\frac{1}{8} \times 3\frac{3}{8} \times 6\frac{1}{8}$  in. Weight:  $4\frac{1}{2}$  lb. Price: £36 15s.



Transicorder TR100

**LOEWE-OPTA.** Sole U.K. distributors: Highgate Acoustics, 71/73 Great Portland Street, London, W.1. Tel.: Museum 2901.

**Optacord 414.** Transistorised mono mains/battery recorder.  $\frac{1}{2}$ -track. Speed  $3\frac{3}{8}$  i/s. W. and F. 0-3%. H. and N. -46 dB. F.R. 50 c/s-12 Kc/s  $\pm 3$  dB. Replay char. CCIR. Inputs: mic. 100 mV, 2,500 ohms; radio 1 mV, high impedance. Outlet from pre-amp. One motor.  $4\frac{1}{2}$  in. spool. Operates from five 1.5V cells, car batteries or mains. Meter level indicator and battery check. Pause control. Plays or records in any position. Size:  $15 \times 4\frac{1}{2} \times 9\frac{1}{2}$  in. Weight:  $8\frac{3}{4}$  lb. Price: £49 7s.

**Optacord 414 Dia.** Details as for 414, but with synchroniser for use with slide projector. Price: £59 17s.



**NAGRA.** Distributed by: Livingston Laboratories Ltd., 31 Camden Road, London, N.W.1. Tel.: Gulliver 4191.

**Nagra IIIB.** Professional battery portable recorder. Mono. Full track. Speeds 15,  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F.  $7\frac{1}{2}$  i/s, 0.2%. H. and N. 15,  $7\frac{1}{2}$  i/s, -62.5 dB. F.R. 15 i/s, 30 c/s-18 Kc/s  $\pm 1$  dB;  $7\frac{1}{2}$  i/s, 40 c/s-15 Kc/s  $\pm 1.5$  dB;  $3\frac{3}{4}$  i/s, 50 c/s-7 Kc/s. Replay char. CCIR (or Ampex on request). Inputs: mic 0.2-10 mV, 200 ohms, or 0.1-5 mV, 50 ohms; line 0.5-10V, 100 K, or 10 mV-1V, 2.5 K. Outlet from pre-amp. One motor. 5 in. spool (7 in. with lid raised). Level meter. Mixing of various inputs. 3 heads. Monitor speaker. Batteries, twelve 1.5V torch cells, life approx. 20 hours. On alkaline accumulators, approx. 70 hours' life. Size:  $8\frac{3}{4} \times 12\frac{1}{2} \times 4\frac{1}{4}$  in. Weight approx.: 15 $\frac{1}{2}$  lb. Price: £317 incl. duty.



*Sony TC 801*

amp. One motor. 4 in. spool. Moving-coil meter. Headphone playback, remote control, mains unit connection, battery voltage indicator. Size:  $11\frac{1}{2} \times 8\frac{7}{8} \times 3\frac{3}{4}$  in. Weight (incl. batteries): 8 lb. Price: £26 5s.



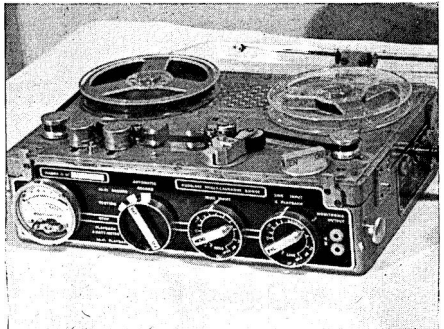
**SANYO.** Sole U.K. agents: Marubeni-Iida Co. Ltd., Moor House, London Wall, E.C.2. Tel.: Metropolitan 0841.

**Sanyo S61TMR.** Transistorised battery portable mono recorder.  $\frac{1}{2}$ -track. Speeds  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. F.R. 150 c/s-7 Kc/s,  $3\frac{3}{4}$  i/s; 150 c/s-4 Kc/s,  $1\frac{7}{8}$  i/s. Extension speaker outlet. One motor.  $3\frac{1}{2}$  in. spools. Rewind less than 2 mins. Level meter. Size:  $8\frac{1}{8} \times 10 \times 3$  in. Weight (excl. batteries): 5 $\frac{3}{4}$  lb. Power supply: 9V DC (6 size C cells). Price (incl. carrying case, mic., tape, earphone): £37 16s. Mains adaptor available at £4 4s.

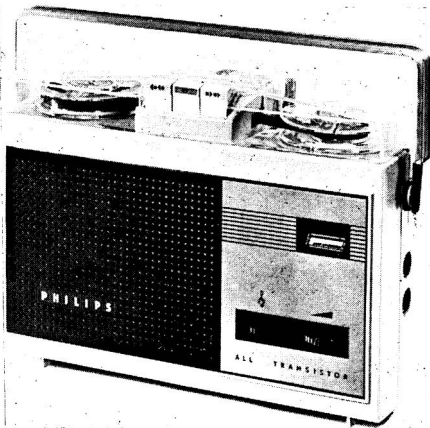


**SHARP.** Distributors: Wholesale Supplies (Swinton) Ltd., 16/18 Worsley Road, Swinton, Manchester. Tel.: Swinton 3232.

**Sharp TRC-1004.** Transistorised battery portable mono recorder.  $\frac{1}{2}$ -track. Speed  $1\frac{7}{8}$  i/s.



*Nagra 111B*



*Philips EL3586*

**Nagra IIINP.** Similar to IIIB, 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 c/s or 60 c/s signal transversely on the tape. Price: £340 incl. duty.



**PHILIPS ELECTRICAL LTD.,** Century House, Shaftesbury Avenue, London, W.C.2. Tel.: Gerrard 7777. Cables: Phillamps, London.

**EL3586.** Mono battery portable recorder.  $\frac{1}{2}$ -track. Speed  $1\frac{7}{8}$  i/s. W. and F. <1% (peak-to-peak). H. and N. -40 dB. F.R. 80 c/s-8 Kc/s  $\pm 3$  dB. Inputs: mic., radio, gram 0.3 mV, 2 K; radio/gram 225 mV, 1.5 megohms (with attenuator lead supplied). Outlet from pre-

Powered by 4 U7 cells. W. and F. 0.8%. F.R. 200 c/s-3 Kc/s  $\pm 3$  dB. Input imp. 1.5 K for dynamic mic. Monitoring outlet for crystal earphone. One motor. 3 in. spools. Rewind 3 mins. Level meter. Size:  $3\frac{3}{4} \times 7\frac{3}{8} \times 2\frac{7}{8}$  in. Speaker is in separate box. Price: £37 10s.

★

**SONY.** Distributors: Tellux Ltd., Avenue Works, Gallows Corner, Colchester Road, Romford, Essex. Tel.: Ingrebourne 43971.

**Sony TC 801.** Portable mono battery/mains recorder.  $\frac{1}{2}$ -track. Speeds  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. Output, 250 mW. Recording level/battery indicating meter. Push button function selector. Built-in microphone. Tape counter. Nine transistors. Microphone with "hold" button. Back spacer for review. Earphone. Weight: 13 lb. Price: £93 9s.

★

**STELLA RADIO & TELEVISION CO. LTD.,** Astra House, 121/3 Shaftesbury Avenue, London, W.C.2. Tel.: Gerrard 7086.

**ST471.** Mono battery portable recorder.  $\frac{1}{2}$ -track. Speed  $1\frac{7}{8}$  i/s. W. and F. 1% (peak-to-peak). H. and N. -40 dB. F.R. 80 c/s-8 Kc/s  $\pm 3$  dB. Inputs: mic./radio/gram 0.3 mV, 2 K. Outlet from pre-amp. One motor. 4 in. spools. Moving-coil meter. Headphone playback facility, remote control facility, connection for mains unit, battery voltage indicator. Size:  $12\frac{1}{2} \times 9 \times 4\frac{1}{2}$  in. Weight: 8 lb. Price: £27 6s.

★

**UHER.** U.K. distributors: Bosch Ltd., 205 Great Portland Street, London, W.1. Tel.: Langham 1809.



Stella 471

**4000 Report S.** Transistorised mono battery portable recorder.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$ ,  $\frac{1}{16}$  i/s. W. and F.  $7\frac{1}{2}$  i/s,  $\pm 0.15\%$ . H. and N. -55 dB. F.R.  $7\frac{1}{2}$  i/s, 50 c/s-20 Kc/s;  $3\frac{3}{4}$  i/s, 50 c/s-17 Kc/s;  $1\frac{7}{8}$  i/s, 50 c/s-10 Kc/s;  $\frac{1}{16}$  i/s, 50-4,500 c/s. Replay char. NARTB. Inputs: mic. 0.1 mV, 2 K; radio 1 mV, 47 K; 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:  $10\frac{1}{2} \times 8\frac{1}{2} \times 3\frac{3}{4}$  in. Weight: 6 lb. Price (including remote control mic. and LP tape): £97 13s. Accumulator charger: £16 16s. Carrying case: £9 9s.

★

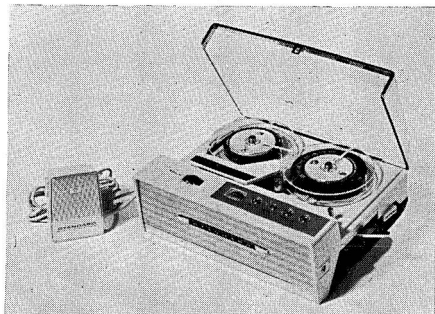
**UNICORDER.** Distributors: Denham & Morley Ltd., Denmore House, 173-175 Cleveland Street, London, W.1. Tel.: Euston 3656.

**SR-F61RT.** Portable battery/mains recorder.  $\frac{1}{2}$ -track. Speeds  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. Inputs: m/c mic. (200-600 ohms); radio (100 K).  $3\frac{3}{8}$  in. spools. Meter indicates recording level and battery state. Powered by 10 U7 cells or AC mains (100-225V). Two built-in  $2\frac{1}{2}$  in. speakers; 300 mW at 8-10 ohms available for external speaker. Fast forward/rewind. Size:  $8 \times 6\frac{1}{2} \times 3$  in. Weight: 6 lb. (inclusive). Price (including leather carrying case and other accessories): £37 16s.

★

**WINTER TRADING CO. LTD.,** 95-99 Ladbroke Grove, London, W.11. Tel.: Park 1341.

**National RQ115.** Transistorised battery portable mono recorder. Speeds  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. F.R.  $3\frac{3}{4}$  i/s, 100 c/s-7 Kc/s;  $1\frac{7}{8}$  i/s, 100 c/s-4 Kc/s. Outlet from pre-amp. One motor. 3 in. spool. Level meter. Remote control on mic. Fast wind. Monitoring while recording. Adaptor available for mains operation. Powered by 12 U7 cells. Size:  $7\frac{3}{4} \times 2\frac{1}{2} \times 7\frac{1}{8}$  in. Weight:  $4\frac{1}{2}$  lb. (without batteries). Price: £36 15s.



Unicorder SR-F61RT

## DECKS—GENERAL PURPOSE and SEMI-PROFESSIONAL

**BSR LTD.**, Monarch Works, Powke Lane, Old Hill, Staffs. Tel.: Cradley Heath 69272. Telex 33282.

**BSR Monardeck TD2.** G.P. deck  $3\frac{3}{4}$  i/s. One motor.  $5\frac{3}{4}$  in. spools. F.R.: with good amplifier equalisation 30-10,000 c/s  $\pm 3$  dB. 2 heads. W. and F. 0.2%. RMS. Size:  $13 \times 8\frac{3}{4}$  in. Price: £12 12s.; with 4 track head: £14.

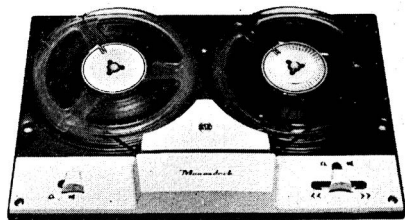
**BSR TD10.** G.P. deck.  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. One motor. 7 in. spools. F.R. 30 c/s-10 Kc/s  $\pm 3$  dB. Two or three heads. W. and F.  $7\frac{1}{2}$  i/s, 0.15%;  $3\frac{3}{4}$  i/s, 0.26%;  $1\frac{7}{8}$  i/s, 0.3%. Size:  $12\frac{1}{4} \times 8\frac{3}{8}$  in. Price: £14; (with 4-track heads): £15 15s.



**BRADMATIC LTD.**, 338 Aldridge Road, Streetly, Sutton Coldfield, Warwickshire. Tel.: Streetly 3171.

**Bradmaster.** Models 5B, 5CS, 5CD, 5D Semi-prof. tape deck.  $7\frac{1}{4}$  and  $3\frac{3}{4}$  i/s. Three motors. Models 5B 7 in. spools; 5CS and 5CL  $9\frac{3}{8}$  in. spools; 5D  $10\frac{1}{2}$  in. NAB spools. F.R.  $7\frac{1}{2}$  i/s, 40-15,000 c/s;  $3\frac{3}{4}$  i/s, 40-7,500 c/s, both  $\pm 4$  dB (dependent on amp. used). Size and weight dependent on model. Price 5B: £42; 5CS: £45 10s.; 5CL: £47 10s.; 5D: £50. Available with full track or stereophonic heads to special order. Prices on application.

**Model 5DF.** Semi-prof. tape deck. 15 and  $7\frac{1}{2}$  i/s. Three motors.  $10\frac{1}{2}$  in. NAB spools. F.R. 15 i/s, 30-18,000 c/s;  $7\frac{1}{2}$  i/s, 30-15,000 c/s, both  $\pm 2$  dB. W. and F., 0.1% at 15 i/s. Variable spooling control. Size:  $20 \times 14\frac{1}{2}$  in. Weight: 20 lb. Price: £62.



B.S.R. Monardeck TD2

**BRENELL ENGINEERING CO. LTD.**, 1a Doughty Street, London, W.C.1. Tel.: Holborn 7356-7-8.

**Mark 5 Series 2.** 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: £32 11s.

**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, 45 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): £40 19s.; (with heads) price on application.

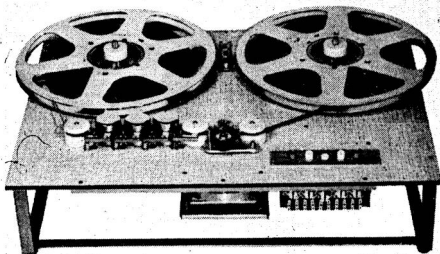


**GARRARD ENGINEERING LTD.**, Newcastle Street, Swindon, Wilts. Tel.: Swindon 5381. Cables: Garrard, Swindon.

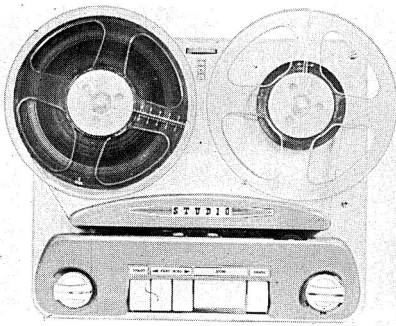
**Garrard Battery Tape Deck.**  $\frac{1}{2}$ -track. Speeds  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F. 0.2% at  $3\frac{3}{4}$  i/s. F.R.  $3\frac{3}{4}$  i/s, 40 c/s-10 Kc/s;  $1\frac{7}{8}$  i/s, 40 c/s-6 Kc/s (depending upon amplifier design). One motor, 9V DC. 4 in. spools, 2-3 min. rewind. Pause control. Garrard Magazine or separate spools, spool brakes, forward and reverse wind. Size:  $9 \times 6\frac{5}{8}$  in. above and  $2\frac{1}{4}$  in. below mounting. Weight: 3 lb. Price (less tape or magazine): £12 5s.



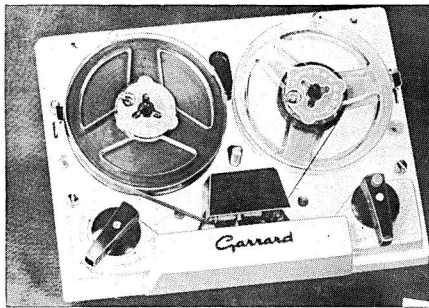
**LORLIN ELECTRONIC CO. LTD.**, 23 Wardour Street, London, W.1. Tel.: Gerrard 3977/8.



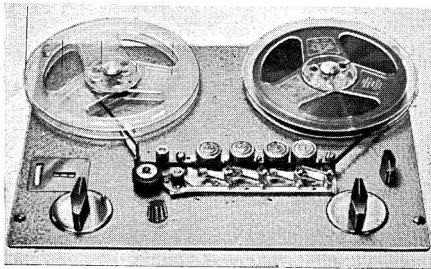
Bradmaster 5D



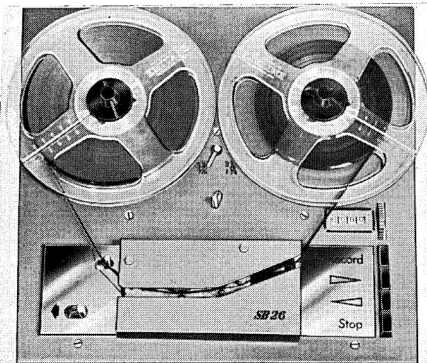
*Magnavox Studio*



*Garrard Battery deck*



*Brenell Mark 5*



*Lorlin SB26*

●**SB26.** Stereo/mono deck mechanism.  $\frac{1}{4}$  or  $\frac{1}{2}$  track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F. better than 0.1% at  $7\frac{1}{2}$  i/s. Three motors. 7 in. spools. Rewind 45 secs. Provision for fitting up to three heads. Size:  $13\frac{1}{8} \times 12\frac{1}{4}$  in. with  $1\frac{1}{2}$  in. clearance above top of cabinet board and 5 in. below. For 7 in. reels,  $\frac{5}{8}$  in. to be allowed on each side. Weight:  $18\frac{1}{2}$  lb. Price ( $\frac{1}{4}$ -track stereo): £40 19s.; ( $\frac{1}{2}$ -track mono): £32 11s.

★

**MAGNAVOX ELECTRONICS CO. LTD.,** Ripple Works, Alfred's Way, By-pass Road, Barking, Essex. Tel.: Rippleway 5533. Telex, Barking 28748.

**Magnavox Studio** (previously Collaro). G.P. tape deck. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. Three motors. 7 in. spools. F.R. 30 c/s-10 Kc/s at  $7\frac{1}{2}$  i/s. Record-playback equalisation, two heads. Price: £17 10s.

★

**MODERN TECHNIQUES,** Wedmore Street, London, N.19. Tel.: Archway 3114.

**Motek K10.** G.P. tape deck.  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. Three motors. 7 in. spools. F.R. approx. 40-14,000 c/s at  $7\frac{1}{2}$  i/s depending on amplifier used. W. and F. <0.2% at  $7\frac{1}{2}$  i/s. 2 heads. High imp. record head. Size:  $15\frac{1}{4} \times 10\frac{3}{4}$  in. Price: £22 1s.

★

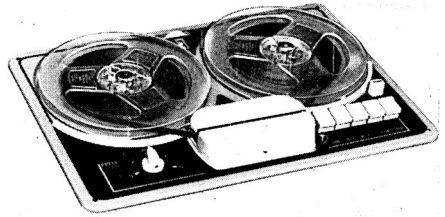
**PLANET PROJECTS LTD.,** Goodman Works, Belvue Road, Northolt, Middx. Tel.: Viking 1775.

●**Planet U.1.** Stereo/mono deck mechanism.  $\frac{1}{4}$  or  $\frac{1}{2}$  track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F.  $7\frac{1}{2}$  i/s, 0.08%;  $3\frac{3}{4}$  i/s, 0.12%;  $1\frac{7}{8}$  i/s, 0.18%. F.R.  $7\frac{1}{2}$  i/s, 18 Kc/s;  $3\frac{3}{4}$  i/s, 16 Kc/s;  $1\frac{7}{8}$  i/s, 9 Kc/s. Outlet direct from three heads. One motor. 7 in. spools, 90 secs. rewind. Lockable pause control. Size:  $14 \times 12 \times 6$  in. Weight:  $12\frac{1}{2}$  lb. Price ( $\frac{1}{4}$ -track mono with three heads): £39 10s.; ( $\frac{1}{2}$ -track mono/stereo with three heads): £45; ( $\frac{1}{2}$ -track stereo with three heads): £46.

●**Planet U.1/15.** Stereo/mono deck mechanism.  $\frac{1}{4}$  or  $\frac{1}{2}$  track. Speeds 15,  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s. W. and F. 15 i/s, 0.06%;  $7\frac{1}{2}$  i/s, 0.08%;  $3\frac{3}{4}$  i/s, 0.12%. F.R. 15 i/s, 20 Kc/s;  $7\frac{1}{2}$  i/s, 18 Kc/s;  $1\frac{7}{8}$  i/s,

16 Kc/s. Outlet from replay head. One motor. 7 in. spools, 90 sec. rewind. Lockable pause control. Size: 14 × 12 × 6. Weight: 12½ lb. Price (three head ½-track mono): £44 10s.; (three head ¼-track mono): £50; (three head ½-track stereo): £51.

Both the above decks are available with either semi or fully remote facilities. Prices on application.



*Motek K 10*

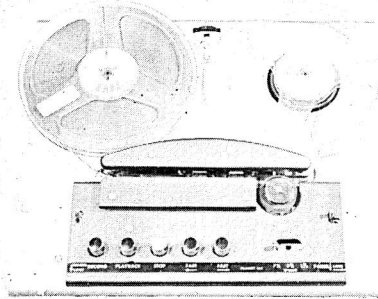
★

**TRUVOX LTD.**, Neasden Lane, London, N.W.10. Tel.: Dollis Hill 8011. Cables: Truvoxeng, London, N.W.10.

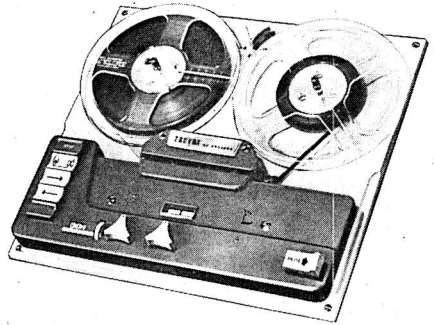
**D82.** Mono deck mechanism. ½-track. Speeds 7½, 3¾, 1⅞ i/s. W. and F. 7½ i/s, 0.1%; 3¾ i/s, 0.15%; 1⅞ i/s, 0.25%. Three motors. 7 in. spools. 1 min. rewind. Pause. Superimpose. No-tape autostop. F.R. (with suitable amplifier) 7½ i/s, 30 c/s-20 Kc/s; 3¾ i/s, 30 c/s-12 Kc/s; 1⅞ i/s, 60 c/s-8 Kc/s; (all ± 3 dB). H. and N. -50 dB. W. and F. <0.1% at 7½ i/s. Outlet from replay head. Size: 14¼ × 13 × 6⅞ in. Weight: 15 lb. Price: £26 5s.

**D84.** ¼-track version of D82. Price: £29 8s.

★



*Planet U.1*

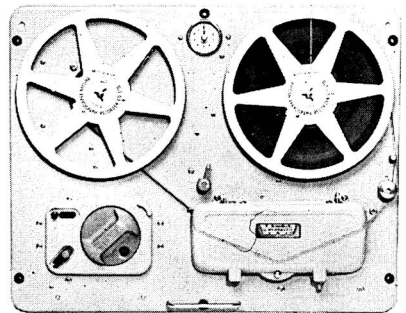


*Truvox D 82 .*

**WRIGHT & WEAIRE LTD.**, 84 Blackfriars Road, London, S.E.1. Tel.: Waterloo 1981. Cables: Writewea, S.E.

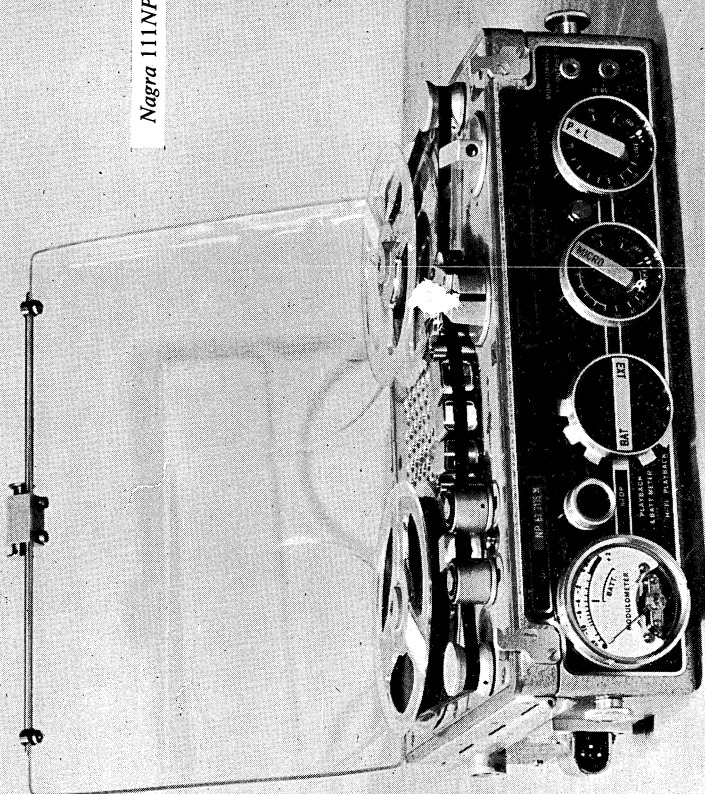
**Wearite Models 5A, 5B, 5C.** Semi prof. tape deck. 3¾ and 7½ i/s. Three motors. 8¼ in. spools. W. and F. 0.16% at 7½ i/s. Size: 16½ × 13 × 7 in. Weight: 18 lb. 5A standard monaural record/replay. Price: £42. 5B monaural record/replay plus monitor head, price: £47. 5C Industrial dual track, price: £51 10s.

● **Model 5SN.** 7½, 3¾ i/s. Monaural record/replay plus stereo replay. Price: £49 7s.



*Wearite Model 5A*

Nagra 111NP



## TAPE UNITS

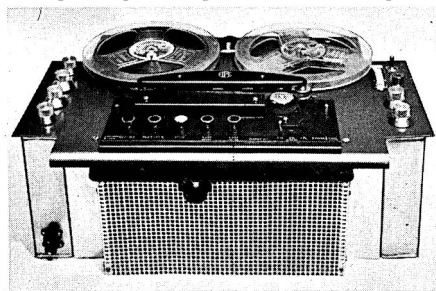
**BRENNEL ENGINEERING CO. LTD.**, 1a Doughty Street, London, W.C.1. Tel.: Holborn 7356-7-8.

● **STB1.** Stereo/mono deck mechanism with pre-amplifiers.  $\frac{1}{2}$  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%. 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): £120; ( $10\frac{1}{2}$  in. spools): £140.



**CAPE ELECTROPHONICS LTD.**, 43/45 Shirley High Street, Southampton. Tel.: Southampton 74251.

**Cape VLTA/B/C.** Mono deck mechanism with pre-amplifiers.  $\frac{1}{2}$  and full track. Speeds

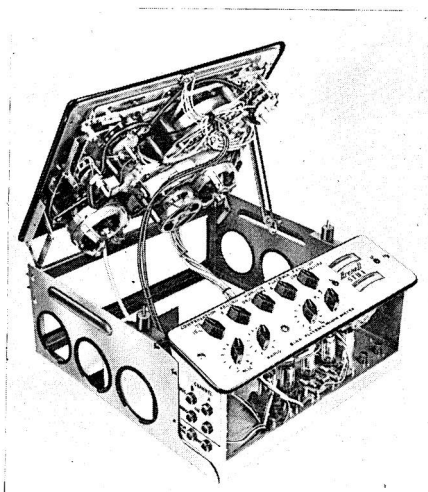


*Cape Electrophonics VLTA/B/C*

15,  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s or  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. AC mains. W. and F. 15 i/s, 0.06%;  $7\frac{1}{2}$  i/s, 0.08%;  $3\frac{3}{4}$  i/s, 0.12%;  $1\frac{7}{8}$  i/s, 0.18%. H. and N. -55 dB at  $7\frac{1}{2}$  i/s,  $\frac{1}{2}$ -track. F.R. 15 i/s, 30 c/s-18 Kc/s;  $7\frac{1}{2}$  i/s, 40 c/s-12 Kc/s;  $3\frac{3}{4}$  i/s, 50 c/s-8 Kc/s;  $1\frac{7}{8}$  i/s, 60 c/s-4 Kc/s ( $\pm 1$  dB). Replay char. CCIR, NARTB and optimum R/P. Inputs: mic. 1 mV, radio 50 mV. Outlet from pre-amp only via cathode-follower. One motor. 7 in. spools. Edgewise meter. Automatic stop, pause, monitoring with comparison switch. Size:  $19 \times 12\frac{1}{2} \times 8\frac{1}{2}$  in. ( $7\frac{1}{2}$  in. below deck). Price (VLTA:  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s,  $\frac{1}{2}$ -track): £80; (VLTB: 15,  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s,  $\frac{1}{2}$ -track): £85; (VLTC: 15,  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  i/s, full track): £100.



**GRAMDECK.** U.K. distributors, Andrew Merryfield Ltd., 29/31 Wright's Lane, Ken-



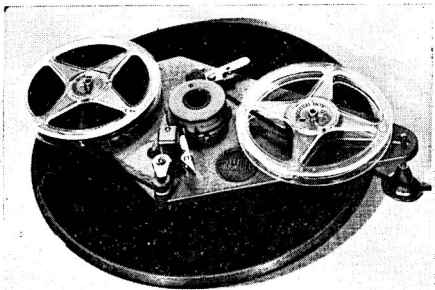
*Brennell STB1 (interior view)*

sington, London, W.8. Tel.: Western 3603. Cables: Technology, Kens, London.

**Gramdeck.** Head and drive mechanism for attachment to gramophone turntable. Speeds  $7\frac{1}{2}$ , 4.33, 3.2 and 1.6 i/s for the standard disc speeds.  $5\frac{3}{4}$  in. spools. F.R. 60-10,000 c/s  $\pm 3$  dB at  $7\frac{1}{2}$  i/s. W. and F. 0.15%. Microphone to be used, Lustraphone LD61 medium impedance. Size:  $13\frac{1}{2} \times 6$  in. Weight approx.: 2 lb. with tape. Price (including transistor pre-amplifier, tape and microphone): £9 19s. 6d.



**GRUNDIG (G.B.) LTD.**, Newlands Park, Sydenham, S.E.26. Tel.: Sydenham 2211. Cables: Grundig, London.



*Gramdeck*

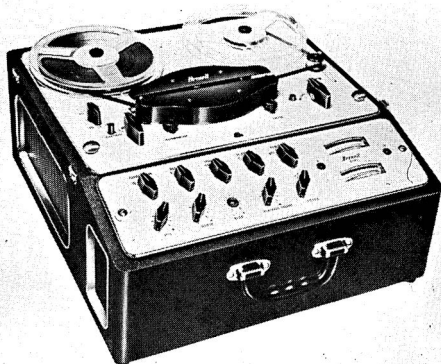
●**TM45.** Stereo/mono deck with pre-amplifiers.  $\frac{1}{4}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F.  $7\frac{1}{2}$  i/s,  $\pm 0.1\%$ ;  $3\frac{3}{4}$  i/s,  $\pm 0.12\%$ ;  $1\frac{7}{8}$  i/s,  $\pm 0.2\%$ . F.R.  $7\frac{1}{2}$  i/s, 60 c/s-15 Kc/s;  $3\frac{3}{4}$  i/s, 60 c/s-13 Kc/s; char. NARTB. One motor. 7 in. spools. 2 mins. 40 secs. rewind for 1,700 ft. M.E. Pause, synchronous and multiple synchronous recording. Echo. Size:  $14\frac{1}{16} \times 13 \times 6\frac{1}{2}$  in. Weight:  $18\frac{3}{4}$  lb. Price: £73 10s. (microphone extra).



Grundig TM45



Truvox PD97 and PD99



★

Brenell STB1

★

**MARTIN ELECTRONICS LTD.** See Constructional Kits section.

★

**TANDBERG.** U.K. distributors: Elstone Electronics Ltd., Edward Street, Templar Street, Leeds 2. Tel.: Leeds 3-5111.

**Tandberg Series 6.** For details see Professional and Semi-Professional Tape Recorders section.

★

**TRUVOX LTD.,** Neasden Lane, London, N.W.10. Tel.: Dollis Hill 8011. Cables: Truvoxeng-Norphone, N.W.10.

**PD93.** Mono tape unit.  $\frac{1}{2}$ -track. Speeds  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. W. and F.  $7\frac{1}{2}$  i/s,  $0.1\%$ ;  $3\frac{3}{4}$  i/s,  $0.15\%$ ;  $1\frac{7}{8}$  i/s,  $0.25\%$ . Hum -45 dB; Noise -50 dB. F.R.  $7\frac{1}{2}$  i/s, 40 c/s-17 Kc/s  $\pm 2$  dB;  $3\frac{3}{4}$  i/s, 40 c/s-10 Kc/s  $\pm 2$  dB;  $1\frac{7}{8}$  i/s, 60 c/s-8 Kc/s  $\pm 3$  dB. Replay char. CCIR. Inputs: 1.4 mV, 2.2 megohms; 150 mV, 500 K. Outlet from pre-amp, across 100 ohms, 1V variable. Three motors. 7 in' spools. Rewind 1 min. VU meter. Editing panel. Auto-stop. 4 digit counter. Cue and inching control. Cathode-follower output. Size:  $16 \times 16\frac{1}{2} \times 8$  in. Weight: 26 lb. Price: £61 19s.

**PD95.**  $\frac{1}{4}$ -track version of PD93.

●**PD97.** Stereo tape unit. Two VU meters. Weight: 29 lb. Other details as for PD93. Price: £82 19s.

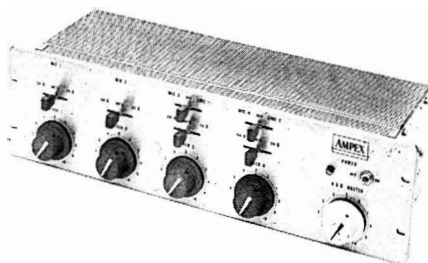
●**PD99.**  $\frac{1}{4}$ -track version of PD97.



## TAPE AMPLIFIERS AND MIXER UNITS

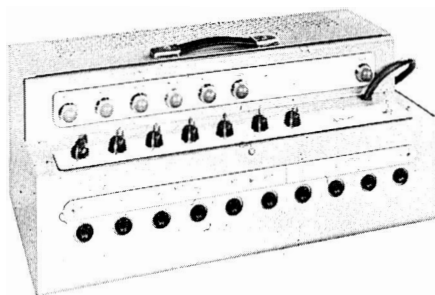
**AMPEX (GREAT BRITAIN) LTD.**, 72 Berkeley Avenue, Reading, Berkshire. Tel.: Reading 55341. Cables: Videotape, Reading. Telex: 84146.

**Ampex 622 Speaker/amplifier.** Comprises 8 in. drive unit in special enclosure. Acoustically flat from 60 to 10,000 c/s. The built-in amplifier has 10 watts output. F.R. 20-20,000 c/s  $\pm 0.5$  dB. Price: £86.



*Ampex MX10 stereo mixer*

● **Ampex MX10.** Stereo mixer unit. Inputs: 4 mic., or 2 mic. 2 line. Mic. 200 ohms, Line 100 K bridging. Gain  $-67$  dBm mic.,  $-27$  dBm line will produce 1V output. Up to 4 mixers may be coupled to give 12 in., 2 out channels. Output: 1V normal, 30V max. unbalanced. F.R. 40-1,500 c/s. Signal/noise 65 dB for inputs of  $-55$  dBm. Controls: 4 pots, 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, 30 W. Size:  $5\frac{3}{2} \times 19 \times 5\frac{1}{16}$  in. Price: £175.



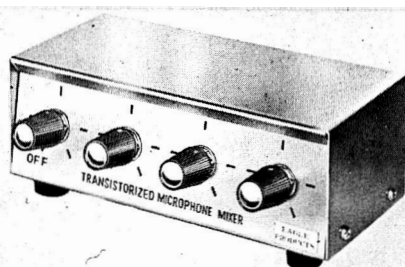
*Astronic A1446 mixer*

● **Ampex MX35.** Identical to MX10, except in physical appearance.



**ASSOCIATED ELECTRONIC ENGINEERS LTD.**, 10 Dalston Gardens, Stanmore, Middx. Tel.: Wordsworth 4474/5/6. Cables: Astronic, Stanmore.

**Astronic A.1446.** 6 channel electronic mixer unit. Designed for 5 low impedance sources each 10/30 ohms, 0.5 mV; 1 high impedance source 250 K ohms, 0.2 volts. There are four output sockets supplying 0.7V into 600 ohms. A master gain fader is incorporated, and each channel has an indicator lamp to show which sources have been faded up. AC mains required. Size:  $9 \times 11 \times 8\frac{1}{2}$  in. Price: £58 10s.



*Eagle MM4 Microphone Mixer*

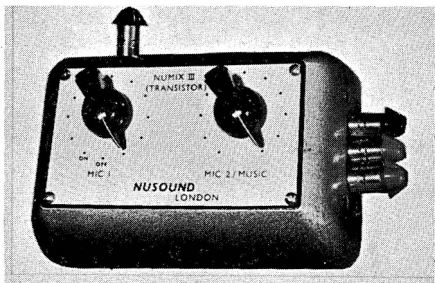


**BRENELL ENGINEERING CO. LTD.**, 1a Doughty Street, London, W.C.1. Tel.: Holborn 7356-7-8.

**Mk. 5 Series 2 Record/playback amplifier.** Inputs: mic. 2 Series 2 mV, radio/gram 75 mV, both high impedance. Outputs: 200 mV at 50,000 ohms, and 4W into 15 ohms for direct



*Binson Echorec Baby*



*Numix III*

connection to loudspeaker. Headphone monitoring M.E. level ind. or meter if required. Price: £26. Meter: £5 5s. extra.

**Brenell Mixer Unit.** 3 channel unit. High impedance 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.

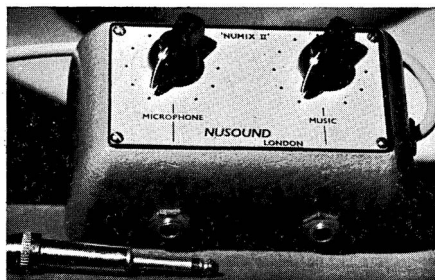


**DEIMOS LTD.**, 8 Corwell Lane, Hillingdon, Middx. Tel.: Hayes 3561.

● **Deimos Tape Amplifier.** Stereo/mono Flexible tape amplifier system available with many alternative 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 M.E. Separate power supply available. Full details and prices on request.



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



*Numix II*

**Model MM.4 4-Channel Microphone Mixer.** 4 high imp. inputs, with individual gain controls; max. signal 1.5V. One output, max. signal 2.5V. Self-powered (9V battery). Size:  $6 \times 3\frac{1}{4} \times 2$  in. Price: £2 19s. 6d.



**ELECTROMAN (POLDEW LTD.),** 2 Laing's Corner, Mitcham, Surrey. Tel.: Mitcham 3282.

**Transmatch TMU1.** Transistor mono pre-amplifier. Inputs: guitar, gram, m/c and ribbon mics. (between 25 ohms-1 K impedance). Output 100 K or above. F.R. flat 40 c/s-20 Kc/s. Voltage gain 100 approx. (40 dB). Noise very low under optimum matching condition. Operates from internal PP3 battery, switched on by input jack plug. Size:  $4\frac{7}{8} \times 2\frac{3}{8} \times 1\frac{1}{4}$  in. Price: £3 10s. 6d. (including PP3 battery).

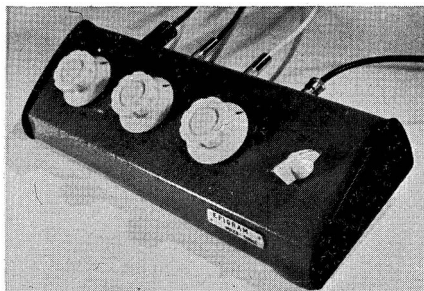


**ELECTRONIC & SCIENTIFIC INSTRUMENTS (WORTHING) LTD.,** Distributors: Shirley Laboratories Ltd., 3 Prospect Place, Worthing, Sussex. Tel.: Worthing 30536.

**Esimix Major.** Four-channel electronic microphone and signal mixer. F.R. at full gain: 15 c/s-20 Kc/s  $\pm 2$  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.

**Esimix Minor.** Details as for Major. P.s.n. 250-300V DC, 10 mA; 6.3V, 0.6 amps. Price: £12 12s.; (4 mic. version): £13 13s.

Power Supply Unit available for Esimix Minor. Price: £3 13s. 6d.



*Epigram mixer*

**ELSTONE ELECTRONICS LTD.**, Edward Street, Templar Street, Leeds 2. Tel.: Leeds 35111.

**Wal Hi-Gain.** Transistorised pre-amplifier. For details see Amplifiers Section.

★

**ESIMIX.** See Electronic & Scientific Instruments (Worthing) Ltd.

★

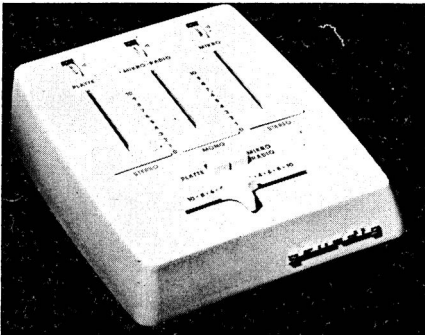
**GRAMPIAN REPRODUCERS LTD.**, 19 Hanworth Trading Estate, Feltham, Middx. Tel.: Feltham 2657. Cables: Reamp, Feltham.

**Grampian Mike 3.** Transistorised electronic mixer. Inputs: 2 low level mics. 300 mV, 600 ohms; 1 high level aux. for tape or radio 500 mV, 1 megohm. Output 1V, 600 ohms. F.R. 50 c/s-15 Kc/s  $\pm 1$  dB on all inputs. Signal/noise: overall (all channels closed, tone controls level) 68 dB, full output; (all channels open, tone controls level) 50 dB, full output. Controls: supply switch, bass cut, treble cut, aux. gain, mic. 2 gain, mic. 1 gain. Three channels. Powered by internal 9V dry battery. Size:  $8\frac{1}{4} \times 5\frac{1}{4} \times 3\frac{1}{2}$  in. Weight (incl. battery) less than 4 lb. Price: £19 10s. (battery extra).

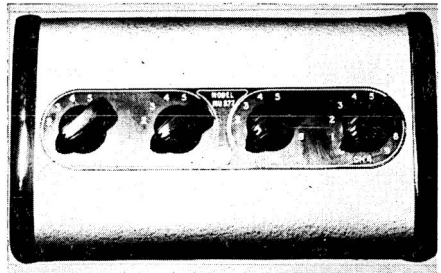
★

**GRUNDIG (GT. BRITAIN) LTD.**, Newlands Park, Sydenham, S.E.26. Tel.: Sydenham 2211. Cables: Grundig, London. Telex: 22054.

● **Stereo/Mono Mixer Type 608.** F.R. substantially flat, 30 c/s-20 Kc/s. Fully transistorised. Fed from two batteries type PP3 (or equivalent). Connecting sockets for two microphones (left-hand and right-hand channels), a further microphone, and connection of



Grundig 608 Stereo mixer



Lustraphone MU577

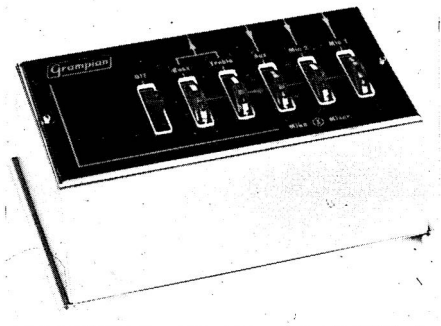
radio and stereo pickup. Mono/stereo output socket provided. Linear fading controls. Inputs from mono microphone or radio connected to appropriate socket can be mixed with stereo programme, and with aid of a "Directional Control" these mono inputs may be mixed with either left- or right-hand channels, or combined with both. Coarse level controls provided, and two press buttons select appropriate mono signal and feed this to directional control. Size:  $9\frac{1}{2} \times 8 \times 3$  in. Weight:  $3\frac{3}{4}$  lb. Price: £18 18s.

★

**JASON ELECTRONIC DESIGNS LTD.**, 23 Wardour Street, London, W.1. Tel.: Gerrard 3977/8.

● **JTL. Stereo tape pre-amplifier.** One input, 100 mV sensitivity. Output 0.5V. Equalisation for  $7\frac{1}{2}$  and  $3\frac{3}{4}$  i/s. M.E. level ind.

Controls: function, record amplifier level, playback amplifier level, recording track, playback track, monitor, H.F. bias level, signal/bias. Simultaneous record/replay. Self-powered. Push/pull oscillator. H. and N. 55 dB down on 2% distortion. Suitable for any deck. To operate with Jason J2-10 amplifier. Size:  $15 \times 9\frac{1}{4} \times 4\frac{3}{8}$  in. Price assembled: £30 9s.; Kit: £22 1s.



Grampian Mike 3 Mixer

**THE LOWTHER MANUFACTURING CO.,**  
St. Mark's Road, Bromley, Kent. Tel.:  
Ravensbourne 5225. Cables: Lowther, Brom-  
ley.

**Companion Supply Unit No. 2.** H.T. and L.T.  
power supply suitable to power radio tuners.  
Pre-amp and tape bias amplifier. Output 250V  
at 40 mA, 6.3V at 3 amps. Price: £5 5s.

**Companion Supply Unit No. 1.** H.T. and L.T.  
power supply suitable to power radio tuners.  
Pre-amp and tape bias amplifier. Output 150V  
at 35 mA, 6.3V at 2.5 amps. Price: £4 15s.

**Companion Supply Unit No. 3.** H.T. and L.T.  
power supply suitable to power radio tuners.  
Pre-amp and tape bias amplifier. Output 350V  
at 35 mA, 6.3V at 3 amps. Price: £5 15s.

★

**LUSTRAPHONE LTD.,** St. George's Works,  
Regent's Park Road, London, N.W.1. Tel.:  
Primrose 8844. Cables: Lustraphon, London.

**M.U.577.** Transistor mixer unit. Inputs:  
1 and 2 are balanced and are suitable for low  
imp. mics. (line or high imp. to order). 3 and 4  
are high imp. and suitable for radio or pu.  
High impedance output. F.R. substantially flat  
50-14,000 c/s. Power by mercury cell with 1,000  
hours life. Alternative input and output impe-  
dances to specification. Price, standard model:  
£19 19s.

A range of transistorised power amplifiers,  
up to 50 watts, and complete public address  
systems. Details on application.

★

**MARTIN ELECTRONICS LTD.** See Con-  
structional Kits section.



*Binson Echorec Mark 2*

**MODERN ELECTRICS (RETAIL) LTD.,**  
120 Shaftesbury Avenue, London, W.1. Tel.:  
Gerrard 9692. and Temple Bar 7587. Cables:  
Modcharex.

**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. 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: £176 8s.

**Binson Echorec Baby.** Single channel version  
of the Mark 2, for echo and swell. Price:  
£110 5s.

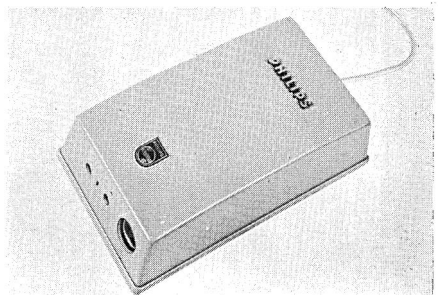
★

**NUSOUND RECORDING CO.,** 93 Mortimer  
Street, Oxford Circus, London, W.1. Tel.:  
Museum 1219.

**Numix I.** Low impedance two channel  
mixer. Output: high Z. Single control. For use  
with Ferrograph Model D, 2A, 3A, 4A. Price:  
£4 7s. 6d.

**Numix II.** Low or high impedance two  
channel mixer. Mic. and music control. For  
use with all tape recorders having a high impe-  
dance input microphone stage. Price: £6 10s.

**Numix III.** Transistorised mixer. Inputs:  
mics. 1 and 2, 30-600 ohms, 0.2 mV; music  
680 K, 140 mV. Outputs 80 mV at 25 K,  
terminated at phono socket. Up to 45 ft. of  
cable may be used. Signal/noise -51 dB  
referred to 0.2 mV i/p. Controls: mic. and  
music level controls. 2 mics., or 1 mic. and  
1 musical channel. P.s.n. 8V Mallory cell  
(TM146) or 9V PP3 (battery may be changed



*Philips EL 3374 pre-amplifier*

by removing base plate mixer). Price (with Mallorycell): £9 6s. 6d. Set of phono to Jack adaptor leads: £1 10s.



**PENCO PRODUCTS**, 36 Coniston Road, Kings Langley, Herts. Tel.: Kings Langley 3134.

**Epigram Mix/4**. 3 channel unit. Incorporates 3 transistors and is designed for 2 low impedance 15/30 ohms and one high impedance input. Power derived from 4½V battery. Output is high impedance. Rectangular case: 12 × 3 × 2½ in. Price: £15 15s.

**Epigram Mix/35**. Details as above except that 5 transistors are included, giving extra gain, e.g. to by-pass input stage of recorder. Price: £26 5s. Specials to order.

**Epigram Mix/35L**. As Mix 35 but fitted with low noise transistors. Price: £29 8s.



**PHILIPS ELECTRICAL LTD.**, Century House, Shaftesbury Avenue, London, W.C.2. Tel.: Gerrard 7777. Cables: Phillamps, London.

**ET 1042/10**. 4 channel mixer unit. Input impedance 50 ohms, 0.2 mV. Outputs: 50,000 ohms at 200 mV or 6,500 ohms at 10 mV. Four individual mic. input controls and master. F.R. 50-12,000 c/s with speech filter giving 6 dB cut at 60 c/s. S-N -70 dB. Self-powered, 200-250V 50 c/s AC. Suitable for all Philips amplifiers. Size: 13½ × 7 × 3⅞ in. Price: £35.

**EL 3774**. Tape pre-amplifier. Outputs 5 pin DIN socket, 1V across 150 K ohms; 2 pole socket, 200 mV across 1 K ohm. Response 5 pin DIN socket, 60-10,000 c/s; 2 pole socket, 60-4,500 c/s. Powered from tape recorder. Synchronised record/playback. Suitable for

use with Philips EL 3541, EL 3542; Stella ST 454, ST 455; Cossor CR 1601, CR 1602. Size: 6⅜ × 3½ × 1⅝ in. Price: £6 10s.

**EL 3787/00**. Stereo tape pre-amplifier. Enables stereo playback (with additional equipment) Duoplay and Multiplay. For connection to the "stereo" socket of the following recorders: Philips EL 3549, Cossor CR 1604 and CR 1605, Stella ST 458 and ST 459. Price: £6 10s.



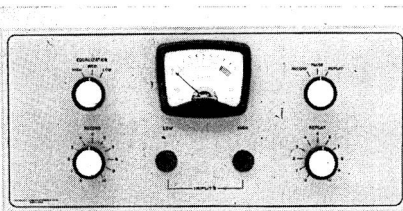
**RESLOSOUND LTD.** (Derritron Group), 24 Upper Brook Street, London, W.1. Tel.: Hyde Park 2291. Cables: Derritron, Audley, London.

**Reslo GE2**. Transistor coupler. Designed for use between 15-50 ohm microphones with mu-metal screened balanced input transformer. Output at high impedance (nominal min. 100 K) for microphone input of tape recorder or power amplifier. Response -1 dB at 40 c/s, +1.5 dB at 20 Kc/s. "Balanced to Earth" input transformer allows use of long lengths of screened and twisted cable between microphone and GE2, without picking up noise or hum or degrading the quality of reproduction. Battery and screened plugs provided. Price: £11.

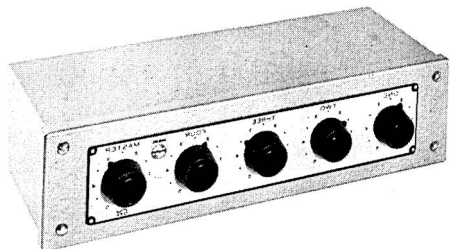
**Type SRM5**. Mono mixer. 5, 30 ohm balanced mic. inputs. Output 30 ohms balanced, 650µV. F.R. (±1 dB) 130 c/s-14 Kc/s with 30 ohm load. Controls: 5 min. max knobs, power on/off. Five channels. P.s.n. 100-120V, 200-250V 50 c/s or 9V interval. Size: 15 × 4 × 6 in. Price: £32.



**SHIRLEY LABORATORIES LTD.**, 3 Prospect Place, Worthing, Sussex. Tel.: Worthing 30536.



Shirley TW/PA4



Philips ET 1042/10 mixer

**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 modulations 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 × 5½ × 5¼ in. P.s.n. from main amp. or power pack can be supplied at £6 16s. 6d. Price: £31 10s.

● **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). F.R. 45 c/s-25 Kc/s ±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, speaker muting switch, sel., rec/replay, equalisation, mono/stereo. Heavy duty power pack on separate chassis. Size (control unit): 23 × 7½ × 7 in.; (power unit): 10 × 8 × 7½ in. TWP/1515HG for Planet decks. TWA/1515HG for Ferrograph decks. TWH/1515HG for Brenell and similar decks. Price: £100 6s.

● **TW/15HG**. Single channel mono version of TWA/1515HG. Price: £47 5s.

**T/P4**. Combined recording and replay amplifier. Mono. Inputs: 2 mV and 50-100 mV. Output up to 2V RMS on replay. F.R. depends on tape heads. Low distortion bias/erase oscillator included. Valve voltmeter level indicator. Controls: record and replay gain, meter pre-set, bias pre-set. P.s.n. 6.3V, 2 amps; 260-290V, 45 mA. TP/PA4U for Planet decks. TW/PA4 for Ferrograph decks. TH/PA4 for Brenell and similar decks. Price: £31 10s. T/PA matching power pack available for all these models. Price: £6 16s. 6d.

● **T/P4S**. Stereo version of T/P4. TP/PA4US for Planet decks. TW/PA4S for Ferrograph decks. TH/PA4S for Brenell and similar decks. Price (incl. power pack): £63.

**T/RP**. Replay tape pre-amplifier for direct connection to a high imp. tape head. Provides up to 1V RMS, equalised for the three standard

speeds, and suitable for feeding into any power amplifier or pre-amplifier. Controls: tape-speed equalisation, output gain. P.s.n. 6.3V, 6 amps; 250-300V, 10 mA. Price: £10 10s.

For Ferrograph heads, a Type 977 head transformer is required, price: £1 10s.

**TA/01**. Oscillator unit for use with existing amplifiers, providing the necessary bias and erase current for recording purposes. F.R. 50-55 Kc/s. Bias variable. P.s.n. 6.3V, 1 amp; 250-290V, 45 mA. TA/01H for high imp. heads. TA/01L for low imp. heads. Price: £6 16s. 6d.

**TA/OR**. Oscillator unit combined with a two-stage recording head-drive amplifier for use with an existing power or pre-amplifier. Equalisation for 3 speeds. High frequency peak variable for both lift and frequency. Input voltage for full drive 600 mV. Controls (all pre-set): input, peaking frequency, peaking height, bias; (non-pre-set) tape speed equalisation. P.s.n. 6.3V, 1½ amps; 290V, 50 mA. TA/OR4 for high imp. heads. TA/OR2 for low imp. heads. Price: £10 10s.

Stereo version of TA/OR is available. Also meter and magic-eye monitoring units. Details on application.

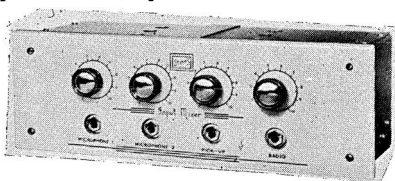
Mixer Units supplied to order. Up to 36 inputs. Prices on application.



**SOUND NEWS PRODUCTIONS**, 10 Clifford Street, New Bond Street, London, W.1. Tel.: Regent 2745.

**Unimixer 1**. 3 channel unit. Channels 1 and 2 have independently controlled duplicate sockets for low or high impedance microphones 30 ohms or 400 K approx. Recommended load impedance not less than 500 K ohms. F.R. from 30 ohm input 50-10,000 c/s ±3 dB. Price: £9 9s.

**Unimixer 2**. 3 channel unit. Inputs as above but high impedance is 5 M ohms 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



*Stern Mullard mixer*



*Stern STP-1*

direct from Ferrograph or Vortexion recorders without any alteration. Price: £15 15s.



**STERN-CLYNE LTD.**, 109 Fleet Street, London, E.C.4. Tel.: Fleet Street 5812-3; 23 Tottenham Court Road, London, W.1. Tel.: Museum 6128-9.

**HF/TR3 Mk. II.** Tape amplifier. Inputs: mic. 2.5 mV, radio/pickup 300 mV. F.R. 35-17,000 c/s  $\pm 3$  dB at 15 i/s. Equalisation available for 15,  $7\frac{1}{2}$  and  $3\frac{3}{4}$  i/s or  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  and  $1\frac{1}{8}$  i/s. 3W output into 3,  $7\frac{1}{2}$  or 15 ohms. To Mullard design, suitable for Brenell, Collaro, Motek, Truvox and Wearite decks. Price, with separate power unit: £19. Plus £3 3s. for special matching to Wearite decks. Also available in kit form: £13 13s.

**Type C Mk. II.** Tape pre-amplifier. Inputs: mic. 0.5 mV, radio/pickup 250 mV. F.R. 30-17,000 c/s  $\pm 3$  dB at 15 i/s. Equalisation available for 15,  $7\frac{1}{2}$  and  $3\frac{3}{4}$  i/s or  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  and  $1\frac{1}{8}$  i/s. 250 mV audio output. To Mullard design, suitable for Brenell, Collaro, Motek, Truvox and Wearite decks. Price, with separate power unit: £19 10s. Plus £3 3s. for special matching to Wearite 4A/5A decks. Also available in kit form: £14.

**Mullard 4 channel Electronic Mixer. Model 2H.** Inputs: 2  $\times$  microphone. High "Z". 3 mV; radio/tape 250 mV; pickup 250 mV. Outputs: A: 40 mV; B: 100 mV; C: 250 mV; D: 500 mV. Impedance 600 ohms. Cathode follower. Individual channel controls. Response 15-20,000 c/s  $\pm 2$  dB. S-N - 50 dB. Self-

powered. Suitable for most machines. Size: 11  $\times$  4  $\times$  4 in. Price, assembled: £11 10s. Kit: £8 8s.

**Model 1L.** Alternative to Model 2H. Incorporates matching transformer in one microphone channel. Suitable for ribbon mics., etc. Price, assembled: £13 7s. Kit: £10 5s.

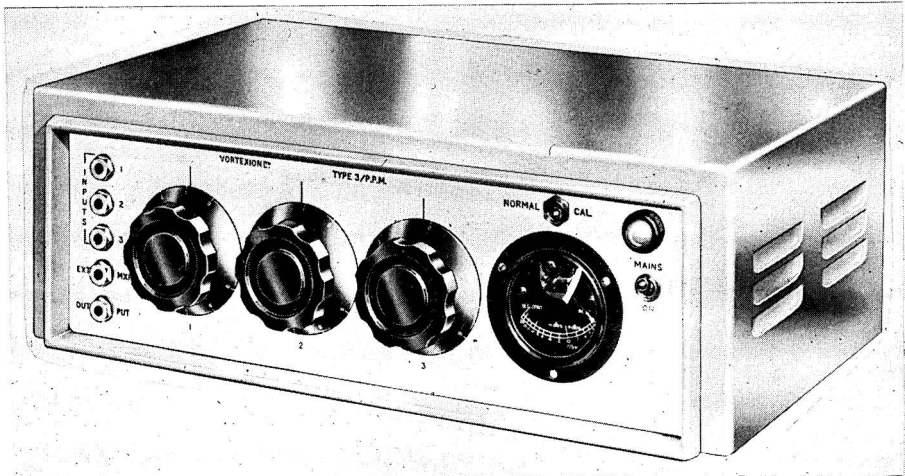
● **STP-1.** Stereo tape pre-amplifier. Inputs (each channel): radio 250 mV, impedance 500 K ohms; microphone 2 mV, impedance 2 megohms. Outputs: standard 250 mV (alternatives up to 2V). Response at  $7\frac{1}{2}$  i/s 40-16,000  $\pm 3$  dB. Equalisation for 15,  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  and  $1\frac{1}{8}$  i/s. 2 in. moving coil meter. Controls: function, equaliser, record level (2); meter, meter set zero. Separate track switch. H. and N. -55 dB. P.s.n. 290V at 30 milli-amp; 6.3V at 2 amps. Suitable for Brenell and Truvox (quarter-track Miniflux head) and Collaro (quarter-track Reuter head). Size: 14  $\times$  6  $\times$   $3\frac{3}{8}$  in. Price: £28. Available in kit form, price: £22.

**Dual Feature Pre-Amplifier.** (See Amplifier Section).



**TECHNICAL SUPPLIERS LTD.**, Hudson House, 63 Goldhawk Road, London, W.12. Tel.: Shepherds Bush 2581/4794. Cables: Teknica, London.

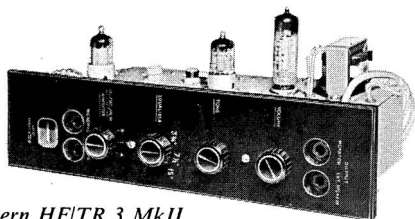
**Sound Mixer Mk. 2.** Three high impedance inputs, one output. Three individual controls for input levels. Three channels. Size: 5  $\times$  4  $\times$  3 in. Weight: 11 $\frac{1}{4}$  oz. Price: £2 7s. 6d.



*Vortexion Peak Programme Meter*

**TELE-RADIO (1943) LTD.**, 189 Edgware Road, London, W.2. Tel.: Paddington 4455.

**Masterlink M3.** Tape pre-amplifier. Mainly for Wearite series of decks, but suitable for Collaro and Brenell. Inputs: mic. 3 mV, 1 megohm; radio/pickup 100 mV, 1 megohm. Output: approx. 200 mV. Response at  $7\frac{1}{2}$  i/s with Wearite deck 30-14,000 c/s. Equalisation for 15,  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  and  $1\frac{7}{8}$  i/s. EM84 level ind.



*Stern HF/TR 3 MkII*

Controls: bias, selector, indicator, equaliser, gain. Self-powered (separate power pack). Price: £22 1s.

**Master-Mixer.** 4-channel electronic mixer, complete with power supply, in matching case and finish to Masterlink M3. Separate output control. Input sensitivity 3 mV per channel at high impedance for maximum output of 250 mV. Inputs and output connection at rear by jack sockets. F.R. 20 c/s-20 Kc/s  $\pm 2$  dB. Modifications to specific requirements, also to low impedance channels available on request. Price: £22 1s.



**TRIPLETONE MANUFACTURING CO. LTD.**, 241a The Broadway, Wimbledon, S.W.19. Tel.: Liberty 1189.

**Transistorised Pre-Amplifier.** For details see Amplifiers Section.



**UHER.** Distributors: Bosch Ltd., 205 Great Portland Street, London, W.1. Tel.: Langham 1809.

●**A121.** Stereo/mono mixer unit. Input: 0-1 mV, 2 K. Output approx. 50 mV. F.R. 20 c/s-20 Kc/s. Five glider controls. Five channels. P.s.n. 9V. Price: £40 19s.



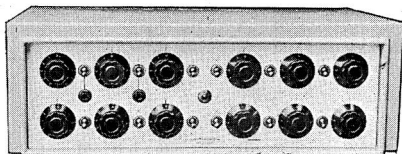
**VORTEXION LTD.**, 257/263 The Broadway, Wimbledon. Tel.: Liberty 6242/3. Cables: Vortexion, Wimble, London.

**Electronic Mixers.** A variety of mixers are available: 3-channel with accuracy within 1 dB. Peak programme meter. 4-channel, 12-channel and  $2 \times 5$  channel stereo. Tropicalised controls. Built-in screened supplies. Balanced line mic. inputs. 0-5V or alternative 1 mW, 600 ohms balanced, unbalanced or floating outputs. A version is available which has recording erase and bias, playback and echo facilities with metering of bias and signal. Prices on application.



**WAVERLEY ELECTRONICS LTD.**, Waverley Road, Weymouth, Dorset. Tel.: Weymouth 3721.

**Waverley Mixer/fader.** Pocket 3 channel mixer. Jack sockets as standard. Input and output. Price: £2 5s.



*Vortexion 12-way Mixer Unit*

**Waverley Monitor.** Transistorised unit to provide monitoring or act as pre-amplifier. Powered by 2 torch cells. Price: £5 5s.



**WELLINGTON ACOUSTIC LABORATORIES LTD. (WAL).** See Elstone Electronics Ltd.



## TAPE ACCESSORIES and COMPONENTS

**AGFA LTD.**, 27 Regent Street, London, S.W.1.  
Tel.: Regent 8581.

**Tape Accessory Kit.** Plastic case containing red, green and white leader tape, adhesive splicing tape, silver stop foil, non-magnetic scissors, tape clips and splicing template. Price: £1 14s. 6d.



**AKG (Akustische and Kino-Geräte G.m.b.H.).**  
Sole U.K. and Commonwealth agents:  
Politechna (London) Ltd., 3 Percy Street,  
London, W.1. Tel.: Langham 6326. Cables:  
Polindust, London.

**A.K.G. K50.** Dynamic headphones. F.R.  
20-25,000 c/s. Impedance 400 ohms per ear  
piece. Suitable for stereo or mono. Weight:  
80 grams. Price: £7 10s. Ear pads available.



**AMOS OF EXETER LTD.**, Weircliffe Court,  
Exwick, Exeter. Tel.: Exeter 72132. Cables:  
Amos Exeter.

**Weircliffe Bulk Erasers.** Models 6, 7, 8.  
Cleaning time 6 secs. per tape. Model 6 takes  
reels up to 10½ in. dia., ¼-1 in. tape; Model 7



*Weircliffe Bulk Eraser*

takes 6½ × 8 in. cassettes of continuous ¼ in.  
tape; Model 8 takes 10-14 in. reels of ¼-2 in.  
tape. Size: 11½ × 12¼ × 7½ in. Weight: 33 lb.  
Price (Models 6 and 7): £29; (Model 8) to be  
announced.



**BASF Chemicals Ltd.**, 5a Gillespie Road,  
London, N.5. Tel.: Canonbury 2011.

**Cutter Box.** Contains automatic splicer,  
spare knife, 4 tape clips, stop foils, splicing  
tape, 3 leader tapes, spool labels and marking  
pencil. Price: £2 12s. 6d.

**Splicing Set.** Plastic box with bonding  
groove and 33 ft. of splicing tape. Price: 5s.



*A.K.G. K50 headphones*

**BEYER.** Distributors: Fi-Cord International,  
40a Dover Street, London, W.1. Tel.: Hyde  
Park 3448. Cables: Fi-Cord, Piccy, London.

**DT48.** Studio quality headphones. Response  
16 c/s-18 Kc/s. Output level ±1 dB 114 dB/  
mW. Imp. 5 ohms. Price: £23 5s. 9d.

**DT49.** Headphones. Telephone type hand-  
set. Response 30 c/s-13 Kc/s. Output level  
111 dB/mW at 400 c/s. Imp. 15 ohms. Weight:  
9 oz. Price: £8 4s. 6d.

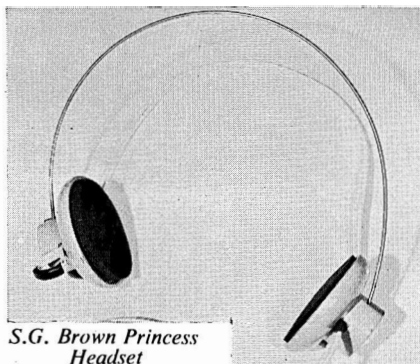
**DT96.** Headphones. Response 30 c/s-17  
Kc/s. Output level 110 dB/mW ±3 dB at  
400 c/s. Imp. 2 × 100 ohms stereo. Price:  
£9 14s.

**DT98.** Type DT96 headphones with micro-  
phone attached. Principally for use in  
Language Laboratories. Price: £16 16s.

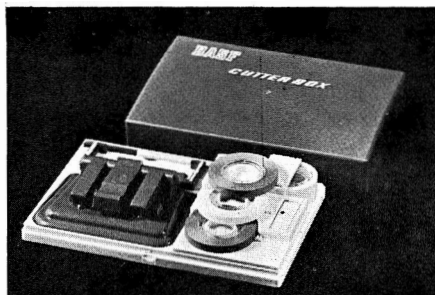


**BRADMATIc LTD.**, 338 Aldridge Road,  
Streetly, Sutton Coldfield, Warwickshire. Tel.:  
Streetly 3171.

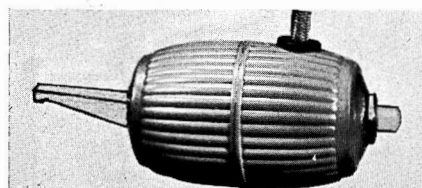
A range of twin track high impedance  
sound heads, single hold fixing, pole pieces are  
cylindrically ground flush with caps. Screening  
cans available.



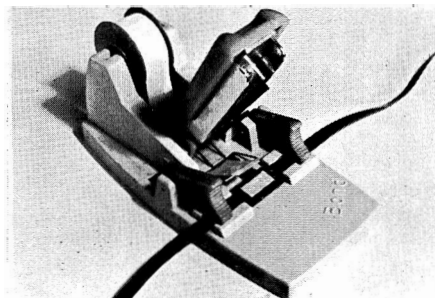
*S.G. Brown Princess Headset*



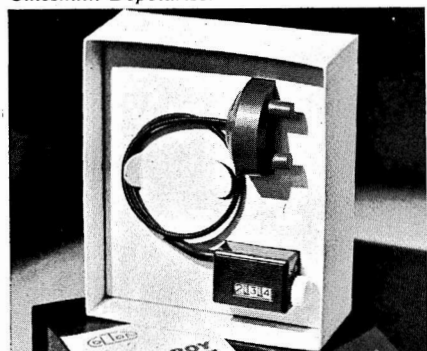
*BASF Tape Editing Kit*



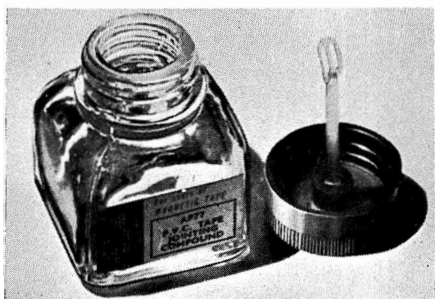
*Cinesmith Depolariser*



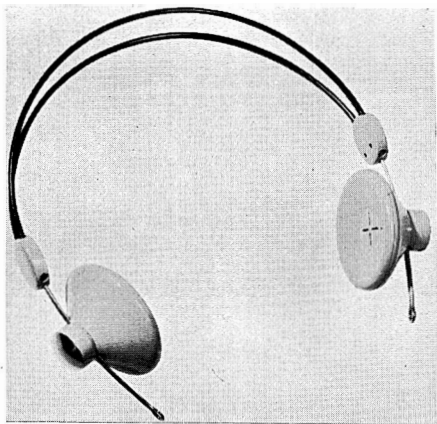
*Bond Tape Splicer*



*Colton Call Boy*



*Emitape jointing compound AP77*



*S. G. Brown Diplomat Headset*



*A. Brown recorder cover*

**Type 5 RP.** Combined record/replay head 0-0004 in. gap. Price: £3 5s.

**Type 6 RP.** Super fidelity record/replay head 0-0002 in. gap. Price: £3 15s.

**Type 5R.** Record only 0-0007 in. gap. Price: £3 5s.

**Type D5E.** Erase head. Price: £3 5s.

Full track versions of the above are also available.

●**Type ST-RP.** Stereo record/replay head. Price with screen can, without fixing stem, £6.



**A BROWN & SONS LTD.,** 24-28 George Street, Hull.

**Tape Recorder Covers.** For all popular makes. Prices range from £1 15s. to £4 10s.



**S. G. BROWN LTD.,** King George's Avenue, Watford, Herts. Tel.: Watford 23301. Cables: Radiolink, Watford.

A range of headphones suitable for recording and dictating equipment, e.g. light-weight miniature model. Price from £3 5s.

**Super "K".** Moving coil headphones. Available as monaural or binaural. Price: £6 10s.

**Diplomat.** Lightweight, high quality headset. Frequency response substantially flat from 30 c/s-12 Kc/s. Price to be announced.

**Control Unit for use with headphones.** Stereo or mono. Separate volume control for each channel, allows compensation for hearing deficiencies. Channel-blend device for stereo use. Isolation transformer. Impedance matching to 15 ohms or 600 ohms. Price to be announced.



**CINE ACCESSORIES (BRIGHTON) LTD.,** 15 Bond Street, Brighton, Sussex. Tel.: 27674.

**Bond Tape Splicer.** Semi-automatic; self-contained tape dispenser. Price: £1 9s. 6d.

**CINESMITH PRODUCTS,** Britannic Works, Regent Street, Barnsley, Yorks. Tel.: Barnsley 4445.

**Cinesmith Depolariser.** A special tool for demagnetising the record/playback heads of any tape recorder. Comprises a plastic moulding with operative switch at one end and demagnetising polepiece at the other, so designed that recording heads can be demagnetised *in situ* without any dismantling. Price: £1 15s.



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

**Call Boy.** Counter-type position indicator, incorporating three-figure counter and reset wheel. Provides accurate cueing for tape recorders with no counter device. Fitted by means of a suction pad. Drive taken direct from spool, obviating slip and ensuring accuracy. Coupling device, used to connect the counter with the spool, can be placed into position, or removed, swiftly and without disturbing tape. Available in two spool fitting. Price: £2 2s.



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

**TD.79 Tape Head Demagnetiser.** 250V mains operation. Price: £1 9s. 6d.

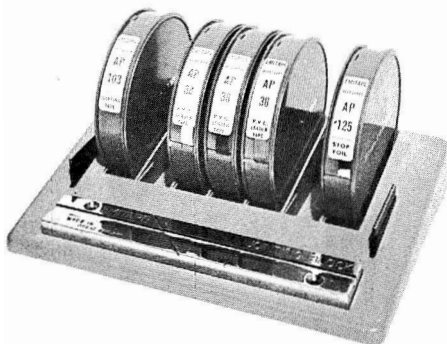
**GT.50 Plug-in Radio Jack.** Receives MW 550 Kc/s-1600 Kc/s. For use with any amplifier, tape recorder, etc. Features high-gain aerial with adjustable coil, coupled to a micrometer tuning knob for station selection. Price: £1 5s. 4d. (U.K. purchase tax: 4s.)

**T.635 Tape Splicer.** Complete with cutting and trimming blades. Price: 15s.

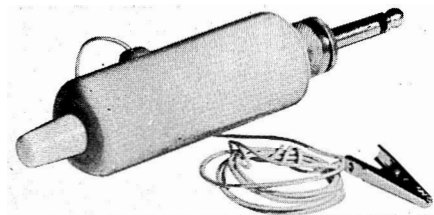
**S.E.I. Professional Stereo Headphones.** F.R. 25 c/s-14 Kc/s. 3 in. dynamic speakers. Isolated right and left channels. "Flexifoam" seals. Dual adjustment.  $\frac{1}{2}$ W input. Complete with control box for remote operation and impedance matching network. Price: £6 16s. 6d.



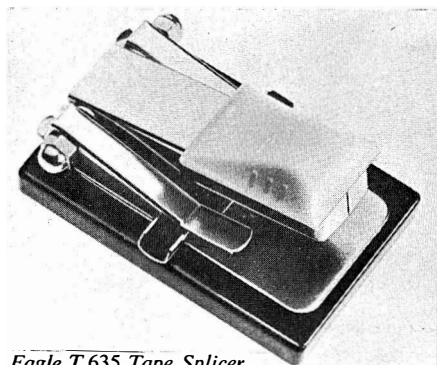
*Eagle SE.1 Stereo Headphone*



*Emitape Accessory Kit AP124*



*Eagle GT.50 Plug-in Radio Jack*



*Eagle T.635 Tape Splicer*

**ELIZABETHAN (TAPE RECORDERS) LTD.**, Crow Lane, Romford, Essex. Tel.: Romford 64101.

**Elizabethan Stethoset Headphones.** Lightweight, high impedance. Price: £1 1s.



**ELSTONE ELECTRONICS LTD.**, Edward Street, Templar Street, Leeds 2. Tel.: Leeds 35111.

**WAL Tape Eraser.** A mains operated tape demagnetiser, accommodates from 5 to 10 in. reels, push button operated. Erases both tracks in a few seconds. Available for 200-250V, 50 c/s or 110-125V, 60 c/s. Price: £6 18s. 6d.

**WAL D-MAG.** A mains operated head demagnetiser providing complete degaussing circuit. Suitable for erasing short passages from tape or striped film. Price: £2 10s.



**E.M.I. TAPE LTD.**, Blyth Road, Hayes, Middx. Tel.: Hayes 3888. Cables: Emitape, London.

**Emiguide AP128.** Set of 6 instructional tapes, giving practical guidance in tape recording. Price: £2 11s. Available separately, 8s. 6d. each.

**"Emitape Guide to Better Recording".** All elements of tape recording described in straightforward terms by John Borwick. 56 pages fully illustrated. Price: 2s. 6d.

**Emitape Jointing Compound.** AP35 for C.A. base tape. AP77 for PVC base tape. A jointing fluid for making permanent welded joints in magnetic tape. Price: 7s. 6d. per bottle.

**Emitape Jointing Tape.** Adhesive jointing tape for simple and quick splicing and editing of magnetic tape. Price (AP102,  $\frac{3}{4}$  in. wide): 4s. 9d. per reel; (AP103,  $\frac{1}{2}$  in. wide): 7s. 6d. per reel.

**Emitape P.V.C. Leader Tapes.** A range of six coloured tapes to enable colour code references to be inserted in a reel of recorded tape for quick editing and indexing purposes. Packed in plastic dispensers. AP38/1 white; AP38/2 red; AP38/3 yellow; AP38/4 blue; AP38/5 orange; AP38/6 green. Price: 4s. 6d. per reel.

**Emitape Jointing Block AP123.** The undercut channel holds the tape securely enabling a clean cut at 45° or 90°. Price: 10s. 6d.

**Emitape Non-magnetic Scissors.** AP39. Made of non-ferrous metal, the scissors may be used for splicing magnetic tape without risk of magnetising, so ensuring a completely noiseless joint. Price: 16s.

**Emitape Accessory Kit AP124.** Holds three reels of coloured leader tape, 1 reel of jointing, 1 reel of stop foil, 1 Emitape jointing block, 2 cutters. Packed in plastic rack (to hold 7 spools), designed for the workbench. Price: £1 17s. 6d.

**Emitape Metallic Stop Foil.** AP125. Sufficient for 50 tapes. In plastic container. Price: 6s. 6d.

**Emitape Plastic Spools in cartons.** Price (AP93, 3 in.): 3s.; (AP93N, 3½ in.): 3s.; (AP84, 4 in.): 3s. 6d.; (AP85, 5 in.): 4s.; (AP86, 5½ in.): 4s. 6d.; (AP87, 7 in.): 5s.; (AP88, 8½ in.): 8s. 6d.

**Emicase.** Polystyrene containers. Price (AP115, 5 in.): 3s. 6d.; (AP116, 5½ in.): 3s. 6d.; (AP117, 7 in.): 4s.



**A. C. FARNELL LTD.,** Hereford House, North Court, Vicar Lane, Leeds 2. Tel.: Leeds 35111.

**Irish S.P.3 Tape Splicer.** Enables quick professional splices, without scissors or razor-blades. Uses ¼ in. of tape per splice, leaving edges free of adhesive. Removable base enables splicer to be mounted on recorder. Price: £3 7s. 6d. Spare cutter and fibre pad: 19s. 6d.



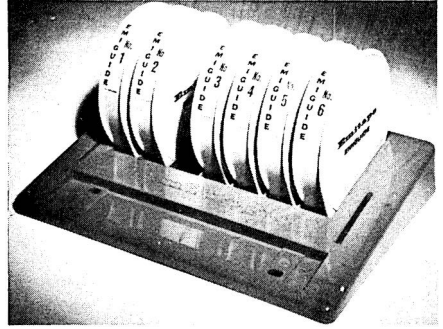
**GLOBAL PRODUCTS,** 13 Stanley Street, Rothwell, Kettering, Northants. Tel.: Rothwell 540.

**Bulk Eraser Mk. 1 and Mk. 2.** Held in hand. Push-button operation. AC Mains from 90-250V. Fully insulated plastic case. Fully erases in 30 to 60 secs. Weight: 2½ lb. (Mk. 2 has a more powerful working unit together with a red neon indicator light.) Price (Mk. 1): £2 2s. 6d.; (Mk. 2): £4 7s. 6d.

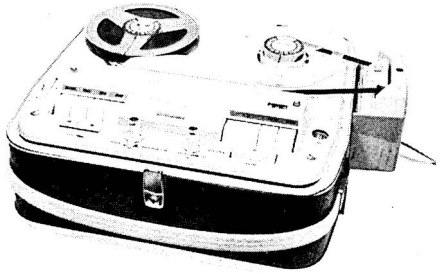
**Tape Splicing Block.** Price: 15s. 6d.



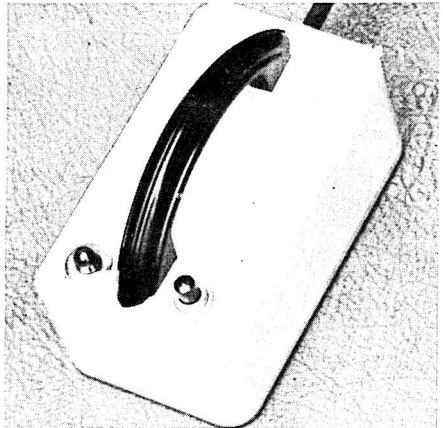
**GRAMPIAN REPRODUCERS LTD.,** Hanworth Trading Estate, Feltham, Middx. Tel.: Feltham 2657. Cables: Reamp, Feltham.



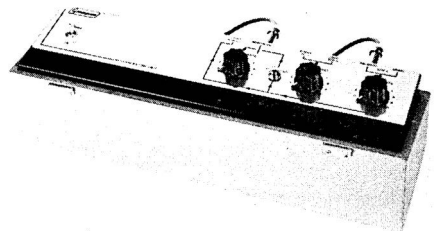
*Emiguide AP 128*



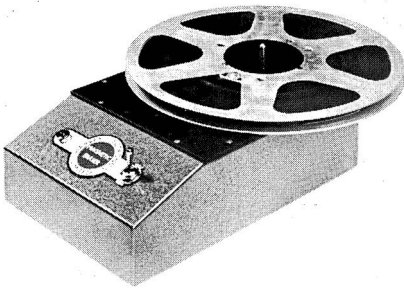
*Grundig Sono Dia attached to TK41*



*Global Mk 2 Bulk Eraser*



*Grampian Reverberation Unit*



*Harvey bulk eraser*

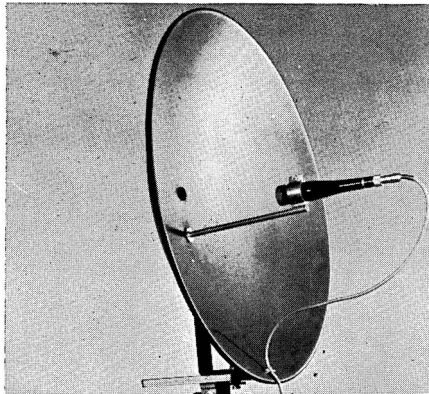
**Grampian G.7.** Matching units, consisting of double wound transformer in a Mu-metal case with jack socket on the primary and a screened lead on the secondary. Dimensions:  $3\frac{3}{8} \times 1\frac{1}{2}$  in. diameter. Versions available for matching 15/30 ohms, 600 ohms and 50,000 ohms or greater. Price: £3 5s.

**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 Microphone. Weight:  $4\frac{3}{4}$  lb. Price: £6 5s.

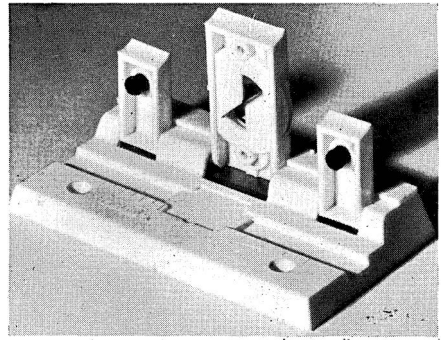
**Grampian Reverberation Unit.** Self-contained portable unit, transistorised and operated from internal dry batteries. Independent input channels, low level and high level. Output 1V, 600 ohms. Size (including detachable lid):  $17\frac{1}{2} \times 5\frac{1}{4} \times 6\frac{1}{2}$  in. Weight: 12 lb. Price: £49 (batteries extra).



**GRUNDIG (G.B.) LTD.,** 40 Newlands Park, Sydenham, London, S.E.26. Tel.: Sydenham 2211.



*Grampian Parabolic reflector*



*Metro-splicer*

**Sona Dia.** Designed to synchronise a tape recorder with automatic slide change projector. Recording sense: lower  $\frac{1}{4}$ -track. Power consumption 3W. Control Pulse Frequency 100 c/s. Price: £15 15s.

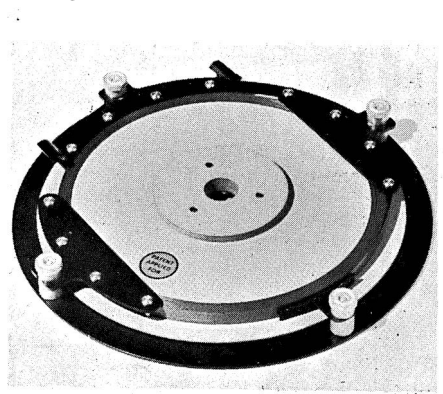


**GUY'S CALCULATING MACHINES LTD.** (General Engineering Division), Truro Road, Wood Green, London, N.22. Tel.: Bowes Park 2258. Cables: Guycalc, London.

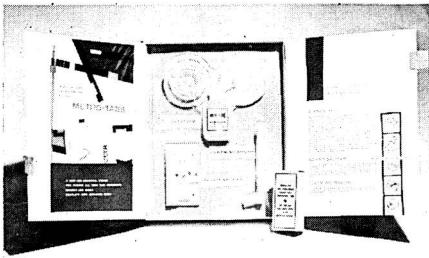
**Brittape Mk. 2.** Endless tape cassette providing up to 200 ft. of continuous tape, using long-play tape, and up to 400 ft., using special lubricated double-play tape. Fits all flat topped 7 in. spool tape recorders. Price: £6 6s.



**HARVEY ELECTRONICS LTD.,** 273 Farnborough Road, Farnborough, Hants. Tel.: Farnborough 1120. Cables: Harvelec, Farnborough, Hants.



*Guy's Brittape Mk 2*



*Metro Tape Kit*

A range of bulk erasers for 200-250V or 100-130V mains, 40-60 c/s. Smallest model will take 3¼ to 5 in. spools of ¼ in. tape, and the largest 3¼ to 12 in. spools of 1 in. tape. Prices, from £6 5s. to £15 10s.



**INDICORD.** H. P. Freedman, 13 Talbot Road, Twickenham, Middlesex.

**Indicord.** Tape Magnetisation Indicator. A fluid used in editing tapes and diagnosing defects in tape recorders, which, when applied to recording tapes, deposits black lines on the recorded portions, revealing track position and the extent of head to tape contact. Price (small bottle, approx. ¼ oz.): 5s. 6d. incl. postage; (large bottle, approx. 1 oz.): 9s. 6d. incl. postage.

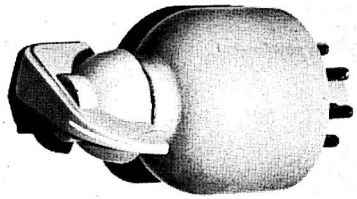


**LEEVEERS-RICH EQUIPMENT LTD.,** 319b Trinity Road, Wandsworth, London, S.W.18. Tel.: Vandyke 9054/6. Cables: Leemag, London, S.W.18.

**LeeRaser.** Junior ER30A; Standard ER31B; Senior ER32B. Ultra rapid demagnetisers for spools of tape and accessories. Price: £7 5s.; £9 15s.; £15.



*Grampian G.7 matching unit*



*Nusound Monitor*

**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.

**METRO-SOUND MANUFACTURING CO. LTD.,** 19a Buckingham Road, London, N.1. Tel.: Clissold 8506/7. Cables: Metrosound, London.

**Klenzatape.** Cleaning outfit for removing oxide deposits, dirt, etc., from tape heads in situ. Comprises a length of brushed velvet rubber-backed cleaning tape, two 3 in. spools and a bottle of cleaning fluid. Price: 13s. 6d.

**Metro-Tabs.** Set of coloured identifying tabs for affixing to recording tape. Visible on the wound spool and may be catalogued on the folder supplied. Price: 3s. 11d.

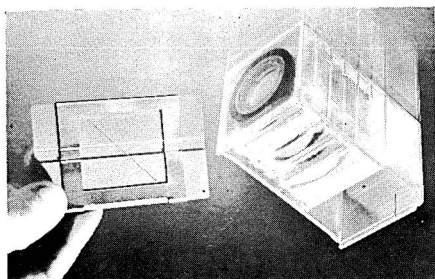
**Metro-Brush.** Made with specially angled Feathersoft Nylon for cleaning inaccessible places on tape decks, ciné cameras, projectors, etc. Price: 2s. 6d..

**Metro-Splicer.** Suitable for splicing tape and 8 mm. ciné film. Cuts at any angle. Non-magnetic blade. Price: 15s.

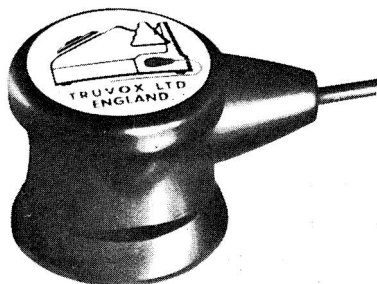


THE NEW TAPE RECORDER CLEANER

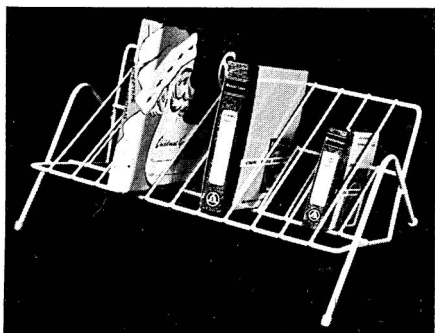
*Metro Klenzatape*



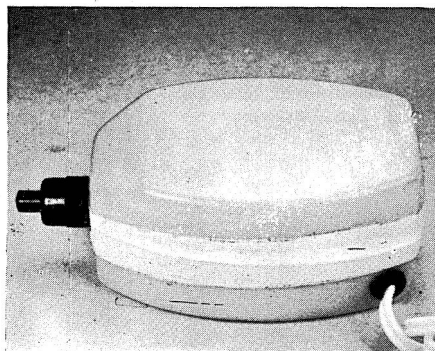
*Philips EL 1901/50 Splicing Kit*



*Truvox Telephone Unit TA 2*



*M.S.S. Tape-Rack*



*Instant Bulk Eraser*

**Metro-Stop.** Auto-stop actuator fluid. Should be applied to tape to actuate the auto-stop mechanism of the tape recorder. Special removing fluid is also supplied and the kit includes rod applicator for both Metro-Stop and remover. Price per set: 17s. 6d.

**Tape Accessories Set.** Contains Klenzatape, Metro-Splicer and Metro-Brush. Price: £1 7s. 6d.



**MINNESOTA MINING AND MANUFACTURING COMPANY,** 3M House, Wigmore Street, London, W.1. Tel.: Hunter 5522. Cables: Minnesota, London.

**Tape Calculator.** Giving playing times of standard, long play and double play tape. Free on request.

**Scotch Accessory Kit.** Contains Splicer, roll of No. 41 Splicing tape on dispenser, roll of No. 24 White Leader and Timing tape, cutter, 10 magnetic tape fastening clips. Price: £1 9s. 6d. Available separately: Tape clips. Price (per packet of 10): 2s. 6d. No. 24 Leader and Timing Tape. Price ( $\frac{1}{4}$  in.  $\times$  100 ft.): 6s. No. 41 Splicing Tape ( $\frac{1}{2}$  in.  $\times$  150 in.): 3s., ( $\frac{7}{32}$  in.  $\times$  66 ft.): 3s. 6d., ( $\frac{1}{2}$  in.  $\times$  66 ft.): 6s. 6d. No. 51 Sensing Tape. Price ( $\frac{7}{32}$  in.  $\times$  150 in.): 14s.



**M.S.S. RECORDING CO. LTD.,** Colnbrook, Bucks. Tel.: Colnbrook 2431 (8 lines). Cables: Emesco.

**M.S.S. Tape-Rack.** Plastic covered steel rack designed to hold 12 reels of tape, reel sizes from 3 to 7 inches dia. Price: 12s. 6d.

**Mastertape Splicing Kit.** Complete with leader tape, splicer, etc, and Tape Calculator. Price: £1 5s.



**MULTICORE SOLDERS LTD.,** Multicore Works, Hemel Hempstead, Herts. Tel.: Boxmoor 3636.

**The "Bib" Tape Splicer.** This splicer enables the tape to be joined easily and to be edited to the accuracy of a syllable. Supplied complete with razor cutter and mounted on flock-covered panel. Price: 18s. 6d.



The "Bib" Tape Accessory Kit contains "Bib" tape splicer. Tape reel labels, data card giving tape speeds. Splicing tape and spare cutters. Price: £1 8s. 6d.

"Bib" Tape Labels. Suitable for marking tape reels and boxes. Price: 2s. 6d.



**NUSOUND RECORDING CO.**, 93 Mortimer Street, Oxford Circus, London, W.1. Tel.: Museum 1219.

**Nukit 1.** Cleaning and oiling kit, suitable for most tape recorders. Contains hyperdermic oiler, special oil and cleaning agent, brush, cloth, etc. Packed in useful plastic container. Price: £1 (post free).

**Nusound Monitor.** Designed for use with Ferrograph recorders Model D, 2A, 3A, 4A and Series 4. Allows monitoring of the input signal through the internal loudspeaker. Price, black: £1 1s., grey: £1 5s.



**OSMABET LTD.**, 46 Kenilworth Road, Edgware, Middlesex. Tel.: Stonegrove 9314.

"Instant" Bulk Tape Eraser and Recording Head Demagnetizer. Operates from AC mains to provide rapid and complete erase of tapes prior to making quality recordings. Weight: 18 oz. Price: £1 5s.

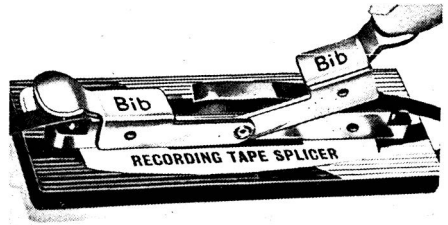


**PHILIPS ELECTRICAL LTD.**, Century House, Shaftesbury Avenue, W.C.2. Tel.: Gerrard 7777. Cables: Phillamps, London.

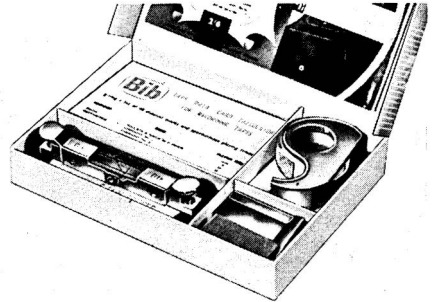
**EL3963/01.** Continuous tape cassette, containing approximately 200 ft. of tape. Allowing continuous playback. Price: £5.

**EL1901/50.** Complete tape splicing kit in transparent container. Includes tape splicing jig, four reels of coloured leader tape, 1 reel of metal switch foil, 1 reel of jointing tape, cutting blade and adhesive title labels. Price: £1 3s.

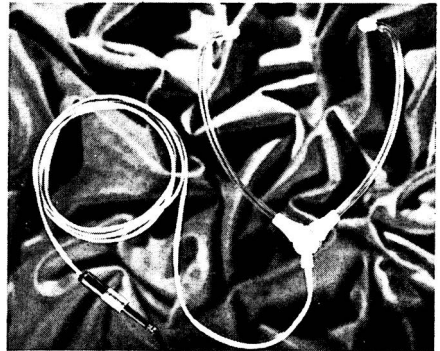
**EL3769.** Slide synchroniser. Can be operated with most tape recorders and automatic slide projectors having remote control facility. Enables slides to be changed by the tape, thus giving synchronisation between slides and commentary. No modification required to the tape recorder. Price: £15 15s.



*Bib Tape Splicer*



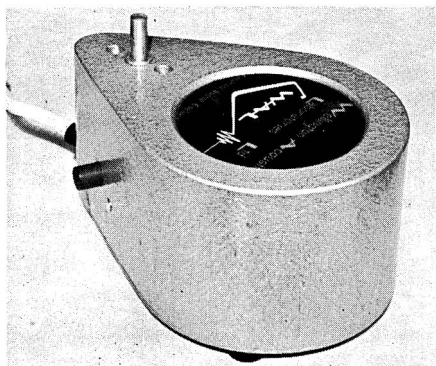
*Bib Tape Accessory Kit*



*Sound Stethoset*



*Scotch Accessory Kit*



*WAL Tape Eraser*

**S.T.C. LTD.**, Electromechanical Division, West Road, Harlow, Essex. Tel.: Harlow 21341.

**Stereo earphones.** Moving-coil. F.R. 30 c/s-15 Kc/s  $\pm 4$  dB. Sensitivity 1 dyne/volt +50 dB. Imp. 200 ohms. Transformer fitted. Sponge pads fitted. Price: £6 6s.



**STUZZI.** Recording Devices Ltd. Distributors: 44 Southern Row, Kensington, London, W.10. Tel.: Ladbroke 4775.

**Stuzzi Tape Tuner.** A.M. tuner variable tuning F.R. 190-550 m and 1,500 m preset. Powered by one PP3 battery. Printed circuit construction. Size:  $5\frac{3}{8} \times 4\frac{1}{8} \times 1\frac{7}{8}$  in. Price: £4 1s. 10d. (U.K. purchase tax 13s. 2d.).



*Stuzzi Tape Tuner*

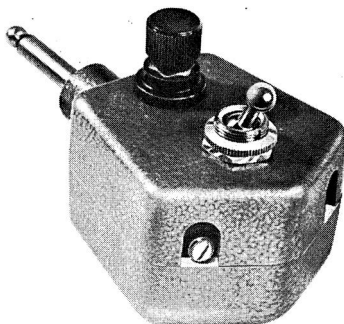
**SYMPHONY AMPLIFIERS LTD.**, 16 Kings College Road, London, N.W.3. Tel.: Primrose 3314.

**Model A Tape Timer Unit.** Contains special electric Time Unit with normal 12 hour dial. Neon Indicator. Fitted to take 13 amp or 15 amp socket for mains output on the back of the cabinet. Mains input is by flying lead. Price: £10 10s.

**Model B.** Similar to Model A, but in place of the neon indicator there is a special Process Timer with readings in one minute divisions up to 25 minutes. Price: £15 15s.



**TAPE HEADS LTD.**, High Street, Wollaston, Stourbridge, Worcs. Tel.: Stourbridge 6021.



*Truvox Radio Jack TA 3*

Cables: Electronics, Stourbridge. Registered office: Monarch Works, Powke Lane, Old Hill, Staffs.

**Simplex Tape Record Sound Heads.** Complete range of half-track, and combined R/P-erase quarter-track tape record heads. Details and prices on application.



**TAPE RECORDERS (ELECTRONIC) LTD.**, 784/788 High Road, Tottenham, London, N.17. Tel.: Tottenham 0811. Cables: Taperec.

**Sound Stethoset.** Lightweight headphones. Impedance 50 ohms. Weight:  $1\frac{3}{4}$  oz. Price complete with lead and screened plug: £2 10s.



**TELEFUNKEN.** Sole U.K. distributors: Welmecc Corporation Ltd., Lonsdale Chambers,

27 Chancery Lane, London, W.C.2. Tel.: Chancery 9944. Cables: Welmcors, London.

**Endless tape cassette.** Price: £2 10s.



**TRUVOX LTD.,** Neasden Lane, London, N.W.10. Tel.: Dollis Hill 8011. Cables: Truvoxeng, London.

**Telephone attachment TA 2,** for recording 2-way telephone conversations. Price: £1 1s.

**Stethoset TA 2000,** for use with any recorder with low imp. output socket. Price: £3 3s.

**Radio Jack TA 3.** Price Standard (M.W. only): £2 10s. (U.K. purchase tax 9s. 2d.).



**UHER.** Distributors: Bosch Ltd., 205 Great Portland Street, London, W.1. Tel.: Langham 1809.



*Wearite Defluxer*

**631 Midget Magnetic Earphones.** Price: £3 3s.

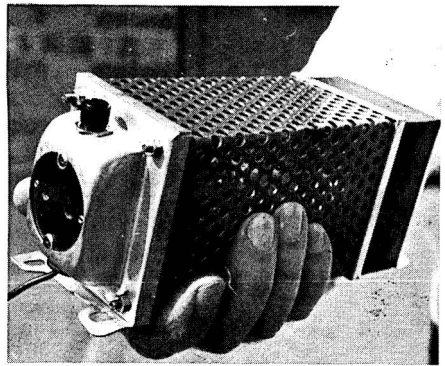
**646 Stereo Midget Magnetic Earphones.** Price: £7 10s.



**VALRADIO LTD.,** Browells Lane, Feltham, Middlesex. Tel.: Feltham 4837.

**D.C. Converter** for operating tape recorders, etc. from car battery or ship's supply 110DC. Prices from £6 10s.

**Type 12/35T.** Transistorised DC Converter, providing an output of 230V AC at up to 35W from a 12V input. Employs fully transistorised circuit. Built-in switch-socket complete with battery lead and fixing feet. Size:  $9\frac{1}{2} \times 3\frac{3}{4} \times 2\frac{3}{8}$  in. Weight: 4 lb. Price: £9 7s.



*Valradio Type 12/35T D.C. converter*

**WAVERLEY ELECTRONICS LTD.,** Waverley Road, Weymouth, Dorset. Tel.: Weymouth 3721.

**Telecon pickup.** For placing behind telephone (no actual connection) when telephone conversations are to be recorded or amplified. Price: £1 7s. 6d.



**WEIRCLIFFE.** See Amos of Exeter Ltd.

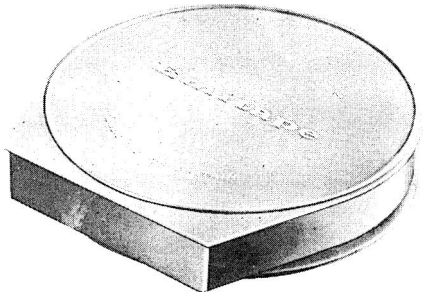


**WELLINGTON ACOUSTIC LABORATORIES LTD. (WAL).** See Elstone Electronics Ltd.



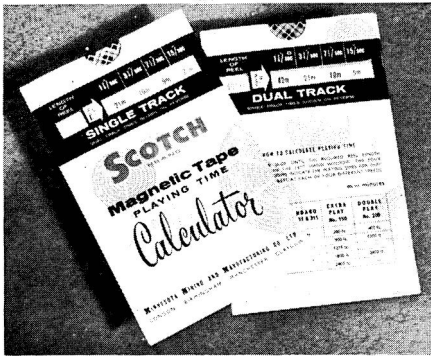
**WRIGHT & WEAIRE LTD.,** 84 Blackfriars Road, London, S.E.1. Tel.: Waterloo 1981. Cables: Writewea, S.E.

**Wearite Defluxer.** For depolarising heads of tape recorders and players. It ensures maximum signal/noise ratio from any tape recorder and protects recorded tapes from cumulative background noise and the gradual attenuation of the higher frequencies. Price: £2 10s.



*Emitape Plastic Spool Container*

**ZONAL FILM (MAGNETIC COATINGS) LTD.**, Zonal House, Westfields Road, Acton, London, W.3. Tel.: Acorn 6841. Cables: Zonagram, London, W.3.

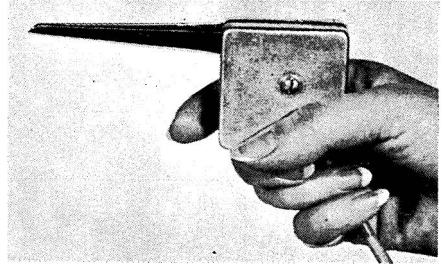


*Scotch Tape Calculator*

**Coloured leader and timing tape.**  $7\frac{1}{2} \times 3\frac{3}{4}$  in. timing marks. 100 ft. Price: 4s. 6d.

**Splicing tape.** 108 ft.  $\times \frac{1}{4}$  in. Price: 3s. 6d.

**Metallic Stop Foil.** 100 ft.  $\times \frac{1}{4}$  in. Price: 4s. 6d.



*WAL D-MAG*

# DIRECTORY OF MAGNETIC TAPE

**AGFA A. G.**, Leverkusen, W. Germany. Agfa Ltd., 27 Regent Street, London, S.W.1. Tel.: Regent 8581.

**PE31.** Long Play. Spool sizes: 3 in., 210 ft.; 4 in., 450 ft.; 4½ in., 600 ft.; 5 in., 900 ft.; 5½ in., 1,200 ft.; 7 in., 1,800 ft.; 8½ in., 2,400 ft.; 10 in., 3,280 ft. Price: 9s., 14s. 6d., £1 1s., £1 8s., £1 15s., £2 10s., £3 12s. 6d., £4 8s. 6d.

**PE41.** Double Play. Spool sizes: 3 in., 300 ft.; 4 in., 600 ft.; 4½ in., 900 ft.; 5 in., 1,200 ft.; 5½ in., 1,800 ft.; 7 in., 2,400 ft.; 8½ in., 3,600 ft.; 10 in., 4,600 ft. Price: 13s. 9d., £1 4s. 3d., £1 12s. 3d., £2 0s. 3d., £2 17s. 6d., £3 16s. 6d., £5 16s. 6d., £7 2s. 6d.

**PE65.** Triple Play. Spool sizes: 3 in., 450 ft.; 4 in., 900 ft.; 4½ in., 1,200 ft.; 5 in., 1,800 ft.; 5½ in., 2,400 ft.; 7 in., 3,600 ft. Price: £1 2s. 6d., £1 19s., £2 6s. 3d., £3 6s. 3d., £4 8s., £5 15s.

5, 5½ and 7 in. spools available in plastic library cassettes. Price: 2s. 6d.



**BASF CHEMICALS LTD.**, 51 Gillespie Road, London, N.5. Tel.: Canonbury 2011.

**LGS 52.** Standard Tape. Spool sizes: 3 in., 150 ft.; 4 in., 300 ft.; 5 in., 600 ft.; 5½ in., 900 ft.; 7 in., 1,200 ft.; 8½ in., 1,800 ft. Prices: 7s. 6d., 13s. 6d., £1 1s., £1 8s., £1 15s., £2 17s. 6d.

**LGS 35.** Long Play. Spool sizes: 3 in., 210 ft.; 4 in., 450 ft.; 4½ in., 600 ft.; 5 in., 900 ft.; 5½ in., 1,200 ft.; 7 in., 1,800 ft.; 8½ in., 2,400 ft.; 10 in., 3,600 ft. Prices: 9s., 14s. 6d., £1 1s., £1 8s., £1 15s., £2 10s., £3 12s. 6d., £4 15s.

**LGS 26.** Double Play. Spool sizes: 3 in., 300 ft.; 4 in., 600 ft.; 4½ in., 900 ft.; 5 in., 1,200 ft.; 5½ in., 1,800 ft.; 7 in., 2,400 ft. Prices: 14s., £1 5s., £1 10s., £2 2s., £2 15s., £3 17s. 6d.

**PES 18.** Triple Play. Spool sizes: 3 in., 450 ft.; 4 in., 900 ft.; 4½ in., 1,200 ft.; 5 in., 1,800 ft.; 5½ in., 2,400 ft.; 7 in., 3,600 ft. Prices: £1 2s., £1 19s., £2 9s., £3 6s., £4 10s., £5 15s.

**Tape Library Box.** Holds three tapes in swivel-open cassettes to provide easy reference.

Six sizes, pre-packed with BASF tape. Price (three 7 in. LP tapes): £7 10s.; (one 7 in. LP tape): £3 2s. 6d.; (three 5½ in. LP tapes): £7 10s.; (one 5½ in. LP tape): £2 3s. 9d.; (three 5 in. LP tapes): £4 4s.; (one 5 in. LP tape): £1 15s.; (three 4½ in. DP tapes): £4 10s.; (three 4 in. DP tapes): £3 15s.; (three 3 in. DP tapes): £2 2s.



**C.B.S. TAPES**, 190 Palace Chambers, Bridge Street, London, S.W.1. Tel.: Whitehall 1851.

**CIP.** Standard play. Acetate base. Price (3 in. spool, 150 ft.): 5s. 6d.; (4 in. spool, 300 ft.): 9s. 6d.; (5 in. spool, 600 ft.): 17s. 6d.; (5½ in. spool, 900 ft.): £1 3s.

**CIP-12PR.** Professional. 7 in. spool, 1,200 ft. Price: £1 7s. 6d.

**LP.** Long play. Acetate base. Price (5 in. spool, 900 ft.): £1 1s.; (5½ in. spool, 1,200 ft.): £1 5s.; (7 in. spool, 1,800 ft.): £1 15s.

**CMXP.** Double play. Mylar base. Price (3 in. spool, 300 ft.): 10s.; (5 in. spool, 1,200 ft.): £1 14s.; (5½ in. spool, 1,800 ft.): £2 5s.; (7 in. spool, 2,400 ft.): £2 16s.

**CIM.** Standard play. Mylar base. Price (5 in. spool, 600 ft.): £1 1s.; (7 in. spool, 1,200 ft.): £1 15s.

**CMLP.** Long play. Mylar base. Price (5 in. spool, 900 ft.): £1 5s.; (5½ in. spool, 1,200 ft.): £1 12s.; (7 in. spool, 1,800 ft.): £2 7s.

**CMXPX.** Extra-Long play. Mylar base. Price (5 in. spool, 1,200 ft.): £2 2s.; (5½ in. spool, 1,800 ft.): £2 15s.; (7 in. spool, 2,400 ft.): £3 8s.

Full range of Triple-Play tape available shortly.



**DE VILLIERS (ELECTRONIC WORLD) LTD.**, 16-20 Strutton Ground, Westminster, London, S.W.1. Tel.: Abbey 5960.

**Standard Play.** PVC base. Spool sizes: 3 in., 150 ft. Price (four spools): 18s., (1 doz. spools): £2 8s.; 4 in., 300 ft. Price (four spools): £1 6s.; 5 in., 600 ft. Prices (two spools): £1 6s.; 5½ in., 900 ft. Price: 16s.; 7 in., 1,200 ft. Price: 19s.

**Double Play.** Pre-stressed polyester base. Spool sizes: 3 in., 375 ft. Price (two spools): £1, (1 doz. spools): £5 8s.; 4 in., 600 ft. Price (two spools): £1 10s.; 5 in., 1,200 ft. Price: £1 7s.; 5½ in., 1,800 ft. Price: £1 15s.; 7 in., 2,400 ft. Price: £2 5s.

**Long Play.** Pre-stressed polyester base. Spool sizes: 3 in., 225 ft. Price (four spools): £1 2s., (1 doz. spools): £3; 4 in., 450 ft. Price (two spools): £1 1s.; 5 in., 900 ft. Price (two spools): £1 15s.; 5½ in., 1,200 ft. Price: £1 4s.; 7 in., 1,800 ft. Price: £1 11s.

**Triple Play.** Pre-stressed polyester base. Spool sizes: 3 in., 475 ft. Price (two spools): £1 6s. 6d., (1 doz. spools): £7 10s.; 3½ in., 650 ft. Price: 17s.; 4 in., 900 ft. Price: £1 3s. 6d.; 5 in., 1,700 ft. Price: £2; 5½ in., 2,300 ft. Price: £2 12s. 6d.; 7 in., 3,300 ft. Price: £4.

All "Electronic World" tapes are sold by mail order direct from De Villiers Ltd., and the prices given are post free.



**ELECTRO - TECHNO - DYNAMICS,** 101 Leadenhall Street, London, E.C.3. Tel.: Avenue 6982.

**Ferrodynamic Brand 5.** Acetate base. Spool sizes: 5-in., 600 ft., 16s.; 5 in., 800 ft., 18s. 6d.; 5½ in., 1,200 ft., £1 3s. 6d.; 7 in., 1,200 ft., £1 5s.; 7 in., 1,800 ft., £1 15s. Mylar Dupont: 3 in., 300 ft., 13s.; 5 in., 1,200 ft., £1 17s. 6d.; 7 in., 1,200 ft., £2; 7 in., 1,800 ft., £2 4s.; and 7 in., 2,400 ft., £3. Super quality Mylar Dupont 7 in., 2,400 ft., £3 10s.



**E.M.I. TAPE LTD.,** Blyth Road, Hayes, Middx. Tel.: Hayes 3888. Cables: Emitape, London.

**"44".** Cellulose acetate. Standard play. Spool sizes: 3½, 5, 5½, 7 in. Price: 6s. 9d., 18s., £1 4s. 6d., £1 10s.

**"77".** PVC. Professional 'pen-tested' grade. Standard play. Spool sizes: 5, 5½, 7, 8½, 10½, 11½ in. Price: £1 10s., £1 15s. 6d., £2 8s., £3 13s. 6d., £5 4s. 9d., £4 19s. 6d.

**"88".** PVC. Standard play. Spool sizes: 3, 3½, 4, 5, 5½, 7, 8½, 10½, 11½ in. Price: 7s. 6d., 7s. 6d., 10s. 6d., £1 1s., £1 8s., £1 15s., £2 17s. 6d., £3 18s. 9d., £3 13s. 6d.

**"99".** PVC. Long play. Spool sizes: 3, 3½, 4, 5, 5½, 7, 8½, 10½ in. Price: 9s. 6d., 9s. 6d., 14s. 6d., £1 8s., £1 15s., £2 10s., £3 12s. 6d., £5 10s.

**"100".** Polyester. Double play. Spool sizes: 3½, 4, 5, 5½, 7 in. Price: 17s., £1 5s., £2 5s., £2 17s. 6d., £4.



**A. C. FARNELL LTD.,** Vicar Lane, Leeds 2. Tel.: Leeds 35111.

**Irish 195.** Acetate. Standard play. Spool sizes: 3, 5, 5½, 7 in. Price: 4s. 11d., 17s., £1 3s., £1 7s. 6d.

**Irish 196.** Acetate. Long play. Spool sizes: 5, 5½, 7 in. Price: £1 4s. 6d., £1 7s., £1 19s. 6d.

**Irish 231.** Mylar. Standard play. Spool sizes: 5, 7 in. Price: £1 6s., £2 5s.

**Irish 241.** Mylar. Long play. Spool sizes: 3, 5, 5½, 7 in. Price: 9s., £1 8s., £1 15s., £2 10s.

**Irish 251.** Tensilized Mylar. Double play. Spool sizes: 3, 4, 5, 5½, 7 in. Price: 13s. 9d., £1 5s., £2 5s., £2 12s. 6d., £4.



**FERRANIA,** Milan. Sole U.K. distributors: Neville Brown & Co. Ltd., Electrin House, 93/97 New Cavendish Street, London, W.1. Tel.: Langham 7161.

**R42.** Cellulose acetate. Standard play. Spool sizes: 3, 3½, 5, 5½, 7 in. Price: 5s. 6d., 8s. 6d., 18s., £1 4s. 6d., £1 10s.

**LD3.** Cellulose acetate. Long play. Spool sizes: 3, 3½, 5, 5½, 7 in. Price: 7s. 6d., 12s. 6d., £1 5s., £1 12s., £2 10s.

**MLD3.** Polyester. Long play. Spool sizes: 3, 3½, 5, 5½, 7 in. Price: 8s. 6d., 12s., £1 8s., £1 15s., £2 10s.

**MDD4.** Polyester. Double play. Spool sizes: 3, 3½, 5, 5½, 7 in. Price: 12s., £1 2s., £2 5s., £2 17s. 6d., £4.

**High Output.** Cellulose acetate. Standard play. Spool sizes: 3, 3½, 5, 5½, 7 in. Price: 7s. 6d., 12s. 6d., £1 5s., £1 12s., £2 10s.

**PR4.** Professional cellulose acetate. Spool size: 10½ in. Price: £4 10s.

**GEVAERT LTD.**, Great West Road, Brentford, Middx. Tel.: Isleworth 2131. Cables: Artoveg, Brentford-Hounslow.

**Gevasonor Type M.** Acetate. Standard play. Spool sizes: 3, 4, 5, 5½, 7, 8¼, 10 in. Price: 5s. 6d., 10s. 6d., 18s., £1 3s. 6d., £1 10s., £2 3s. 6d., £2 15s.

**Gevasonor Type LR.** Acetate. Long play. Spool sizes: 3, 4, 5, 5½, 7, 8¼, 10 in. Price: 8s., 13s. 6d., £1 4s., £1 8s. 6d., £2 2s., £2 15s., £4.

**Gevasonor Type LRP.** Tensilized polyester. Long play. Spool sizes: 3, 4, 5, 5½, 7, 8¼, 10 in. Price: 9s. 6d., 16s., £1 8s., £1 15s., £2 10s., £3 5s., £4 15s.

**Gevasonor Type DP.** Tensilized polyester. Double play. Spool sizes: 3, 4, 5, 5½, 7 in. Price: 17s., £1 5s., £2 5s., £2 15s., £4.

**Gevasonor Type TRP.** Tensilized polyester. Triple play. Spool sizes: 3 in (450 ft.), 3 in (600 ft.), 4 in (900 ft.), 5 in (1,800 ft.). Price: £1 1s. 6d., £1 7s. 6d., £1 18s. 6d., £3 5s. 6d.

★

**ILFORD LTD.**, Ilford, Essex. Tel.: Ilford 3000.

**Ifotape.** Long Play. PVC. Spool sizes: 5, 5½, 7 in. Price: £1 8s., £1 15s., £2 10s.

★

**IRISH.** See A. C. Farnell Ltd.

★

**KODAK LTD.**, Kodak House, Kingsway, London, W.C.2. Tel.: Holborn 7841.

**T100.** Standard play. Triacetate base. Price (5 in. spool, 600 ft.): 18s.; (5½ in. spool, 900 ft.): £1 4s. 6d.; (7 in. spool, 1,200 ft.): £1 10s.

**V150.** Long play. PVC base. Price (3¼ in. spool, 300 ft.): 11s.; (5 in. spool, 900 ft.): £1 8s.; (5½ in. spool, 1,200 ft.): £1 15s.; (7 in. spool, 1,800 ft.): £2 10s.

**P200.** Double play. Pre-stretched polyester base. Price (3¼ in. spool, 400 ft.): 17s.; (5 in. spool, 1,200 ft.): £2 5s.; (7 in. spool, 2,400 ft.): £4.

**P300.** Triple play. Ultra-thin tensilized polyester base. Price (3 in. spool, 450 ft.):

£1 1s. 6d.; (3¼ in. spool, 600 ft.): £1 7s. 6d.; (5 in. spool, 1,800 ft.): £3 5s. 6d.; (7 in. spool, 3,600 ft.): £5 15s.

**LEE PRODUCTS (GREAT BRITAIN) LTD.** —(Concessionaires of Audio Devices Inc. (U.S.A.)), 10-18 Clifton Street, London, E.C.2. Tel.: Bishopsgate 6711. Cables: Leprod, London.

**Audiotape.** A range of 8 grades and thicknesses for amateur and professional use. Spool sizes: 3, 3¼, 4, 5, 5½, 7 in.

★

**MINNESOTA MINING & MANUFACTURING COMPANY**, 3M House, Wigmore Street, London, W.1. Tel.: Hunter 5522. Cables: Minnesota, London.

**Scotch 111.** Acetate base. Standard play. Spool sizes: 4 in., 300 ft.; 5 in., 600 ft.; 5½ in., 850 ft.; 7 in., 1,200 ft. Prices: 9s., 18s., £1 4s. 6d., £1 10s.

**Scotch 175.** Polyester base. Standard play. Spool sizes: 5 in., 600 ft.; 5½ in., 850 ft.; 7 in., 1,200 ft. Price: £1, £1 6s. 6d., £1 12s. 6d.

**Scotch 150.** Polyester base. Long play. Spool sizes: 3 in., 300 ft.; 4 in., 450 ft.; 5 in., 900 ft.; 5½ in., 1,200 ft.; 7 in., 1,800 ft.; 8¼ in., 2,400 ft. Price: 9s. 6d., 13s. 6d., £1 6s. 6d., £1 12s. 6d., £2 4s. 6d., £3 12s. 6d.

**Scotch 200.** Tensilized polyester. Double play. Spool sizes: 3 in., 400 ft.; 4 in., 600 ft.; 5 in., 1,200 ft.; 5½ in., 1,800 ft.; 7 in., 2,400 ft. Price: 15s. 6d., £1 2s. 6d., £2 1s., £2 11s. 6d., £3 12s. 6d.

★

**MSS RECORDING COMPANY LTD.**, Colnbrook, Bucks. Tel.: Colnbrook 2431.

**MSS Standard.** Spool sizes: 3 in., 150 ft.; 4 in., 300 ft.; 5 in., 600 ft.; 5½ in., 900 ft.; 7 in., 1,200 ft. Price: 4s. 6d., 8s., 15s., £1, £1 5s.

**MSS Long Play.** Spool sizes: 3 in., 225 ft.; 4 in., 450 ft.; 5 in., 900 ft.; 5½ in., 1,200 ft.; 7 in., 1,800 ft.; 8¼ in., 2,400 ft. Price: 6s., 11s., £1, £1 5s., £1 15s., £2 8s.

**MSS Double Play.** Spool sizes: 3 in., 300 ft.; 4 in., 600 ft.; 5 in., 1,200 ft.; 5½ in., 1,800 ft.; 7 in., 2,400 ft. Price: 9s., 17s., £1 13s., £2 4s., £2 15s.

Length of tape in feet	Type of spool	Maximum playing times in hours and minutes												
		1 Track				2 Tracks				4 Tracks				
		15 i/s	7½ i/s	3¾ i/s	1½ i/s	15 i/s	7½ i/s	3¾ i/s	1½ i/s	15 i/s	7½ i/s	3¾ i/s	1½ i/s	
3,600	8¼" DP	48	1 36	3 12	6 24	1 36	3 12	6 24	12 48	1 36	3 12	6 24	12 48	25 36
2,400	7" DP 8¼" LP	32	1 4	2 8	4 16	1 4	2 8	4 16	8 32	2 8	4 16	8 32	17 4	
1,800	5" TP 7" LP 8¼" S	24	48	1.36	3.12	48	1.36	3.12	6.24	1.36	3.12	6.24	12.48	
1,700	5¾" DP	22	47	1 30	3 1	45	1 30	3 1	6 2	1 30	3. 1	6 2	12 5	
1,200	5" DP 5¾" LP 7" S	16	32	1 4	2 8	32	1 4	2 8	4 16	1 4	2 8	4 16	8 32	
900	4" TP 5" LP	12	24	48	1 36	24	48	1 36	3 12	48	1 36	3 12	6 24	
850	5¾" S	11	22	45	1 30	22	45	1 30	3 1	45	1 30	3 1	6 2	
600	4" DP 5" S	8	16	32	1 4	16	32	1 4	2 8	32	1 4	2 8	4 16	
450	3" TP 4" LP	6	12	24	48	12	24	48	1 36	24	48	1 36	3 12	
400	3¼" DP	5	10	21	42	10	21	42	1 25	21	42	1 25	2 50	
300	3¼" LP 4" S	4	8	16	32	8	16	32	1 4	16	32	1 4	2 8	
200	3¼" S	2½	5	10	21	5	10	21	42	10	21	42	1 25	
150	3" S	2	4	8	16	4	8	16	32	8	16	32	1 4	

Note: The 4 tape thicknesses are listed as S (Standard), LP (Long Play), DP (Double Play) and TP (Triple Play).



**PHILIPS ELECTRICAL LTD.**, Century House, Shaftesbury Avenue, London, W.C.2. Tel.: Gerrard 7777. Cables: Phillamps, London.

**Philips Standard Play.** Green PVC. Spool sizes: 4, 5, 5½, 7 in. Price: 10s. 6d., £1 1s., £1 8s., £1 15s.

**Philips Long Play.** Red PVC. Spool sizes: 3, 4, 5, 5½, 7 in. Price: 9s., 14s. 6d., £1 8s., £1 15s., £2 10s.

**Philips Double Play.** Blue PVC. Spool sizes: 3, 4, 5, 5½, 7 in. Price: 14s., £1 5s., £2 2s., £2 15s. 6d., £3 17s. 6d.

**Philips Triple Play.** Grey. Spool sizes: 3, 4, 5 in. Price: £1 2s., £1 19s., £3 6s.



**R.C.A. GREAT BRITAIN LTD.**, Lincoln Way, Windmill Road, Sunbury-on-Thames, Middx. Tel.: Sunbury-on-Thames 5511.

**R.C.A. Red Seal Professional.** ¼ in. tape. 1.0 mil. Long Play. Acetate base. Spool sizes: 5, 7, 10½ in. Price: £1 7s. 6d., £2 4s. (£4 for NAB hub spool), £5.

**1.5 mil. Professional Grade.** Acetate. Spool sizes: 3, 5, 7, 10½ in. Price: 6s., 19s., £1 10s. (£3 5s. for NAB hub), £4 2s. 6d.

**Snap-Load Cartridge Mylar.** Polyester base. 560 ft., £2 2s. 6d.

**0.75 mil. Tensilized Extra-long Play Mylar.** Polyester base. Spool sizes: 3, 5, 7, 10½ in. Price: 14s., £2 5s., £4, £9 10s.

**0.5 mil. Extra-long Play Mylar.** Polyester base. Spool sizes: 5, 7 in. Price: £2, £3 10s.

**1.0 mil. Long Play Mylar.** Polyester base. Spool sizes: 3, 5, 7, 10½ in. Price: 9s., £1 10s., £2 10s., £5 17s. 6d. (£4 17s. 6d. for NAB metal hub).

**1.5 mil. Professional Grade Mylar.** Polyester base. Spool sizes: 5, 7, 10½ in. Price: £1 5s., £2, £5 5s. (£4 5s. for NAB metal hub).

**1.0 mil. Long Play Mylar.** ½-in. Polyester base. 10½ in. spool with NAB metal hub. 3,600 ft. Price: £12 15s.

NAB spools have 3 in. centre holes.

**SCOTCH.** See Minnesota Mining & Manufacturing Co.



**SONOCOLOR.** Distributors: Tape Recorders (Electronics) Ltd., 784/788 High Road, Tottenham, London, N.17. Tel.: Tottenham 0811. Cables: Taperec, London.

**Sound Sonocolor WHS.** PVC base. Standard play. Spool sizes: 3, 3½, 4, 4½, 5, 5½, 7, 9½ in. Price: 8s., 9s. 6d., 13s. 6d., 16s. 6d., £1 1s., £1 8s., £1 15s., £3 15s.

**Sound Sonocolor WSM.** PVC base. Long play. Spool sizes: 3, 3½, 4, 4½, 5, 5½, 7, 9½ in. Price: 9s. 6d., 14s. 6d., 16s. 6d., £1 0s. 6d., £1 8s., £1 15s., £2 10s., £5 5s.

**Sound Sonocolor WDT.** PVC base. Double play. Spool sizes: 3, 3½, 4, 4½, 5, 5½, 7 in. Price: 14s., £1 1s., £1 5s., £1 11s. 6d., £2 2s., £2 12s. 6d., £3 17s. 6d.

**Super Synchro-Cine.** Black lines printed on yellow backing for synchronising cine films. 5 in. spool with mirror £2 15s.; without mirror £2 10s.

The above Sonocolor tapes are distributed in N. Ireland by **Topco Enterprises**, 101 Sydenham Avenue, Belfast 4. The prices differ and are available on application.



**SONY.** Tellux Ltd., Avenue Works, Gallows Corner, Colchester Road, Romford, Essex. Tel.: Ingrebourne 43971.

**MY Long Play.** Polyester base. Spool sizes: 3 in, 260 ft; 5 in, 900 ft.; 7 in., 1,800 ft. Prices on application.



**SOUNDCRAFT MAGNETICS LTD.**, Haddenham, Bucks. Tel.: Haddenham 384 & 422.

**Standard.** Standard play. Tri-acetate base. Spool sizes: 3, 5, 5½, 7 in. Price: 5s. 11d., 18s., £1 4s. 6d., £1 9s. 9d.

**Standard 50.** Long play. Tri-acetate base. Spool sizes: 3, 5, 5½, 7 in. Price: 7s. 6d., £1 4s. 6d., £1 7s., £1 19s. 6d.

**Plus 50.** Long play. Mylar base. Spool sizes: 3, 5, 5½, 7 in. Price: 9s., £1 6s. 6d., £1 12s. 6d., £2 4s. 6d.

**Plus 100X.** Double play. Mylar base. Spool sizes: 3, 5, 5½, 7 in. Price: 13s. 6d., £2 1s., £2 11s. 6d., £3 12s. 6d.

★

**SYNCHROTAPE.** Sole distributors: Adastra Electronics Ltd., 167 Finchley Road, Swiss Cottage, London, N.W.3. Tel.: Maida Vale 8164.

**Standard Play.** PVC. Spool sizes: 3 in., 150 ft.; 5 in., 600 ft.; 5½ in., 900 ft.; 7 in., 1,200 ft. Price: 4s. 9d., 15s., 18s. 6d., £1 2s. 6d.

**Long Play.** PVC. Spool sizes: 3 in., 225 ft.; 4 in., 450 ft.; 5 in., 900 ft.; 5½ in., 1,200 ft.; 7 in., 1,800 ft. Price: 6s. 3d., 12s., 18s. 6d., £1 2s. 6d., £1 8s. 6d.

**Double Play.** Tensilised Mylar polyester. Spool sizes: 3 in., 300 ft.; 4 in., 600 ft.; 5 in., 1,200 ft.; 5½ in., 1,800 ft.; 7 in., 2,400 ft. Price: 8s. 9d., 18s., £1 9s., £1 16s., £2 8s.

Except for 3 in. reels, all Synchrotapes have Double Leader and Double Stop-Foils.

★

**TELEFUNKEN.**—Sole U.K. distributors: Welmet Corporation Ltd., Lonsdale Chambers, 27 Chancery Lane, London, W.C.2. Tel.: Chancery 9944. Cables: Welmcot, London.

**Telefunken Long Play.** PVC. Spool sizes: 5, 5½, 7 in. Price: £1 8s., £1 15s., £2 10s.

**Telefunken Double Play.** PVC. Spool sizes: 5, 5½, 7 in. Price: £2, £2 10s., £3 15s.

★

**UHER.** Distributors: Bosch Ltd., 205 Great Portland Street, London, W.1. Tel.: Langham 1809-1800.

**Long Play.** Spool sizes: 5 in., 900 ft.; 5½ in., 1,200 ft.; 7 in., 1,800 ft. Price: £1 8s., £1 15s., £2 10s.

★

**ZONAL FILM (Magnetic Coatings) LTD.,** Zonal House, Westfields Road, Acton, London, W.3. Tel.: Acorn 6841. Cables: Zonogram, London, W.3.

**Zonatape.** PVC Standard play. Spool sizes: 3, 3½, 4, 5, 5½, 7, 8½, 10½ in. Price: 5s. 9d., 7s. 6d., 10s. 6d., £1 1s., £1 8s., £1 15s., £2 17s. 6d., £3 18s. 6d.

**Zonatape.** Polyester base. Extra play. Spool sizes: 3, 3½, 4, 5, 5½, 7, 8½, 10½ in. Price: 9s., 12s., 14s. 6d., £1 8s., £1 15s., £2 10s., £3 12s. 6d., £5 8s.

**Zonatape.** Polyester base. Double play. Spool sizes: 3, 3½, 4, 5, 5½, 7, 8½ in. Price: 13s. 6d., 17s., £1 5s., £2 5s., £2 17s. 6d., £4, £6.

# DIRECTORY OF TEST TAPES & DISCS

**AMPEX (G.B.) LTD.**, 72 Berkeley Avenue, Reading, Berkshire. Tel.: Reading 55341. Cables: Videotape, Reading.

**31334-01.**  $3\frac{3}{4}$  i/s, 200  $\mu$ Sec. characteristic tape.

**31331-01.**  $3\frac{3}{4}$  i/s. 120  $\mu$ Sec. characteristic tape.

**31321-01.**  $7\frac{1}{2}$  i/s. NAB characteristic tape.

**31321-04.**  $7\frac{1}{2}$  i/s. NAB characteristic tape, for four-track recorders.

**31323-01.**  $7\frac{1}{2}$  i/s. CCIR characteristic tape.

**31336-01.**  $3\frac{3}{4}$  i/s. flutter test tape.

**31326-01.**  $7\frac{1}{2}$  i/s. flutter test tape.

All these tapes are priced at £8.



**BASF CHEMICALS LTD.**, 5a Gillespie Road, London, N.5. Tel.: Cannonbury 2011.

**Calibration Tape 19.**  $7\frac{1}{2}$  i/s, 100  $\mu$ Sec. characteristic. Azimuth alignment section included, also an unrecorded section for adjustment of bias, etc. Price: £8.

**Calibration Tape 9.**  $3\frac{3}{4}$  i/s, 120  $\mu$ Sec. (high) and 3-180  $\mu$ Sec. (low) characteristics. Other details as for Tape 19. Price: £8.

**Calibration Tape 38.** 15 i/s. 35  $\mu$ Sec. characteristic. Other details as for Tape 19. Price: £8.



**DECCA RECORD CO. LTD.**, Decca House, 9 Albert Embankment, London, S.E.1. Tel.: Reliance 8111.

**LXT 5346.** 12 in. mono (lateral) frequency test disc covering the range 30 c/s to 18 Kc/s, with fixed bands on one side and gliding tone on the other. Follows RIAA curve, with level reduced by 6 dB above 10 Kc/s. Price: £1 17s. 6d.

**45-71123.** 7 in. mono (lateral) frequency test disc. covering the range 50 c/s to 10 Kc/s in fixed bands. Price: 6s. 8d.

**SXL 2057.** 12 in. stereo (45/45) frequency test disc covering the range 40 c/s to 12 Kc/s in fixed bands, with left-hand channel only on side A and right hand on side B. Follows RIAA curve. Crosstalk at 1 Kc/s better than -20 dB. Price: £1 17s. 6d.



**DEUTSCHE GRAMMOPHON (G.B.) LTD.**, 12/13 Rathbone Place, Oxford Street, London, W.1. Tel.: Langham 8156/7/8/9. Cables: Gramdisc, London, W.1.

**SNH 220497.** 7 in. stereo test disc for setting-up purposes. Side A carries signals permitting adjustments for correct balance, response and speaker phasing. Side B carries demonstration recordings of a tramcar, train, aircraft and dance orchestra. Price: 6s. 8d.



**EMI ELECTRONICS LTD.**, Hayes, Middx. Tel.: Hayes 3888. Cables: Emidata, London.

**SRT13.** Professional frequency test tape,  $7\frac{1}{2}$  i/s, 100  $\mu$ Sec. CCIR characteristic. 10 Kc/s-40 c/s, with 10 Kc/s tone for azimuth alignment. 3 Kc/s band for wow and flutter checking has total wow and flutter contents better than 0.08% RMS. Length of tape with strobe markings for speed check included. Price: £10.

**SRT14.** Professional frequency test tape,  $3\frac{3}{4}$  i/s, 120  $\mu$ Sec. characteristic as proposed by I.E.C. (British  $3\frac{3}{4}$  i/s pre-recorded tapes use this). Other details as for SRT13, but no strobe section. Price: £10.

**SRT15.** Professional frequency test tape,  $3\frac{3}{4}$  i/s, 200  $\mu$ Sec. characteristic. 6 Kc/s-40 c/s, with 6 Kc/s tone for azimuth alignment and 4 Kc/s for equaliser setting. 3 Kc/s wow and flutter band. Price: £10.



**EMI LTD.**, Tape Record Department, Hayes, Middx. Tel.: Hayes 3888. Cables: Emitron, London.

**Type TBT 1.** Full track tape,  $7\frac{1}{2}$  i/s, 100  $\mu$ Sec. CCIR characteristic. Range 40 c/s-10 Kc/s, with 8 Kc/s Azimuth alignment band. Price: £3.

**E.M.I. RECORDS LTD.,** E.M.I. House, 20 Manchester Square, London, W.1. Tel.: Hunter 4488. Cables: Emirecord, Wesdo, London.

**TCS 101.** 12 in. stereo (45/45) frequency test disc covering the range 30 c/s to 20 Kc/s, with fixed bands on alternate left and right channels. Follows RIAA curve, with level reduced by 6 dB above 10 Kc/s. 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.

★

**MINNESOTA MINING & MANUFACTURING CO. LTD.,** 3M House, Wigmore Street, London, W.1. Tel.: Hunter 5522. Cables: Minnesota, London.

**Scotch CCIR Calibration and Test Tape.** Two tracks,  $7\frac{1}{2}$  i/s. Track 1 carries frequencies to CCIR standard; track 2 has 7.5 Kc/s tone for head alignment. Price: £2 9s. 6d.

★

**TUTCHINGS ELECTRONICS LTD.,** 14 Rook Hill Road, Friars Cliff, Christchurch, Hants. Tel.: Highcliffe 2019.

**Test Tape No. 1.** Pure tone, 40 c/s-10 Kc/s, CCIR 100  $\mu$ Sec. characteristic  $7\frac{1}{2}$  i/s.

**Test Tape No. 2.** Pure tone, 60 c/s-7,500 c/s, CCIR 200  $\mu$ Sec. characteristic  $3\frac{3}{4}$  i/s.

**Test Tape No. 3.** White-noise test tape. Third octave bands, 100  $\mu$ Sec. characteristic,  $7\frac{1}{2}$  i/s.

**Test Tape No. 4.** White-noise test tape. One octave bands, and full range unfiltered noise,  $7\frac{1}{2}$  i/s.

**Test Tape No. 5.** Four-track azimuth and vertical head alignment tape. Full track white-noise with Track 3 blank. Can be used without test equipment at all tape speeds.

All tapes are on  $3\frac{3}{4}$  in. reels. Price: £1 19s. 6d. each plus 6d. postage.

## DIRECTORY OF CONSTRUCTIONAL KITS

**AVELEY ELECTRIC LTD.**, South Ockendon, Essex. Tel.: South Ockendon 3444. Cables: Avel, Ockendon.

**F.M. Dynatuner FM-1.** See Tuner section.

**Dynakit PAM-1 Mono Control Unit.** See Amplifiers section.

**Dynakit PAS-2 Stereo Control Unit.** See Amplifiers section.

**Avel-Dynaco Mk. IV Amplifier.** See Amplifiers section.

**Avel-Dynaco "Stereo 70" Amplifier.** See Amplifiers section.



**HEATHKIT.** Manufactured by Daystrom Ltd., Bristol Road, Gloucester.

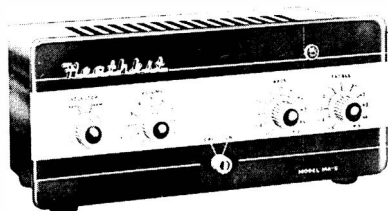
●**S-99.** Stereo amplifier kit. Output 9W, 3 or 15 ohms, per channel. Distortion 0.2% at 1 Kc/s, 0.35% at 4 Kc/s, 0.42% at 40 c/s. F.R. 30 c/s-20 Kc/s  $\pm 0.5$  dB. Feedback 26 dB. H. and N. pickup 1 (magnetic) -55 dB; pickup 2 (crystal) -55 dB; Aux. (microphone, etc.) -60 dB; radio, tape -65 dB. Inputs: pickup 1, 4 mV, 100 K continuously variable; pickup 2, 180 mV, 47 K continuously variable; Aux, 20 mV, 500 K linear; radio, tape 100 mV. 350 K linear. P.s.n. 100-125, 200-210, 220-230, 240-250V, 50-60 c/s. 100W. Printed circuit boards for easy assembly. High sensitivity to suit all types of pickups. Variable filter. Price: £27 19s. 6d.; (assembled): £37 19s. 6d.

●**S-33.** Stereo amplifier kit. 3W per channel. Distortion 0.3%. Input 100 mV at 1 megohm. Bass, treble, balance, volume. Price (kit): £13 7s. 6d.; (assembled): £18 18s.

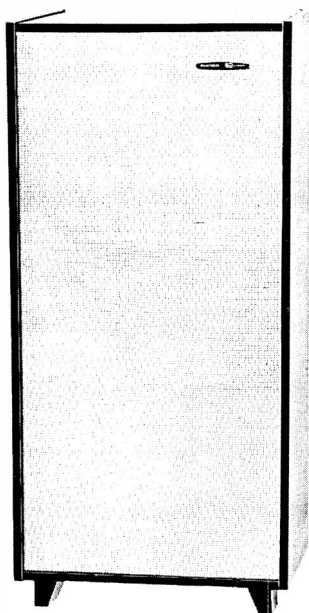
●**S-33H.** Stereo/mono amplifier. Output 3.5W. Distortion, less than 0.6% at 1,000 c/s for 3W. H. and N. gram -55 dB, radio -60 dB (referred to 3W). Sensitivity: gram 50 mV (high imp), aux. 150 mV, radio 100 mV. P.s.n. 100-125, 200-210, 220-230, 240-250V AC 40-60 c/s. Size:  $11\frac{3}{4} \times 5\frac{1}{4} \times 10$  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



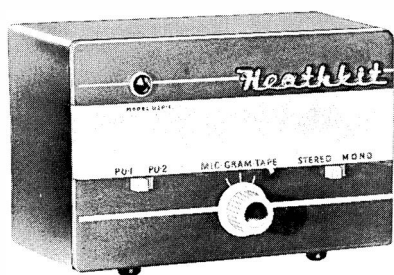
*Heathkit S-99 stereo amplifier*



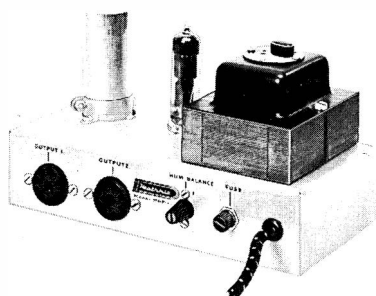
*Heathkit MA-5 monaural amplifier*



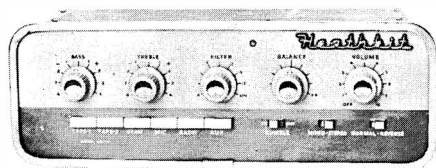
*Heathkit Cotswold MFS*



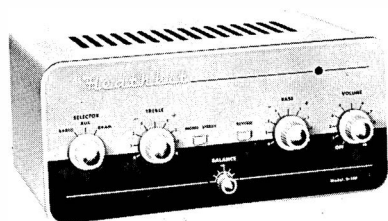
Heathkit USP-1 booster amplifier



Heathkit MGP-1 power unit



Heathkit USC-1 stereo control unit,



Heathkit S-33H stereo amplifier

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 1,000 c/s; less than 1% at 5 Kc/s. Sensitivity: radio 200 mV, 0.5 megohms; gram 200 mV, 0.5 megohms. Rec. impedance 2-4 and 14-16 ohms. H. and N. less than -60 dB referred to 5W. Output stages: ECC83, EZ81, 2 × EL84. P.s.n. 100-110, 200-210, 220-230, 240-250V AC 40-60 c/s. Size: 11 × 6 $\frac{5}{8}$  × 4 $\frac{3}{4}$  in. Panel 11 $\frac{3}{4}$  × 5 $\frac{1}{4}$  in. Suitable for most crystal pickups. Provision for connection of radio tuner or tape recorder. Price: £10 19s. 6d.; (assembled): £15 10s.

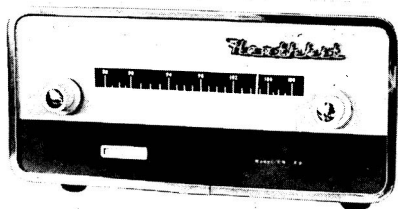
**MA-12.** Mono amplifier. Output 10W rms (12W max.) between 30 c/s and 10 Kc/s. Distortion: less than 0.1% at 10W, 1 Kc/s; less than 0.2% at 10W, 5 Kc/s; less than 0.4% at 10W, 40 c/s. F.R. 20 c/s-30 Kc/s ±1 dB. Feedback main loop 26 dB, subsidiary loop 6 dB. H. and N. -85 dB at 10W. Input 120 mV for 10W output. Output imp. 2-4, 8-11, 14-16 ohms. Valves, EF86, ECC83, EL84 (2), GZ34. P.s.n. 100-117V, 200-250V AC, 40-60 c/s, 100W. Size: 11 $\frac{1}{8}$  × 6 $\frac{1}{2}$  × 5 $\frac{1}{2}$  in. Weight: 12 $\frac{1}{2}$  lb. Price: £11 18s.; (assembled): £15 18s.

● **USC-1.** Stereo pre-amplifier. Inputs: pickup 1, 3-4 mV 50 K; pickup 2, 150 mV 1 megohm; tape 1, 2.5 mV 80 K CCIR, tape 2, 150 mV 100 K; 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 R.M.S. Price: £19 10s.; (assembled) £26 10s.

**UMC-1.** Mono control unit. Inputs: mag pu. 9 mV, 100 K, RIAA; crystal pu. 50 mV variable, 1 megohm linear; Aux. 120 mV, 500 K linear; mic. 4 mV, 130 K linear; radio 100 mV variable, 330 K linear. Output up to 0.25V. Controls: sel., bass, treble, filter, volume on/off. Low pass filter. H. and N. -65 dB P.s.n. 180-300V, 3 mA DC, 6.3V, 0.6 amps AC. Suitable for free standing or cabinet installation. Price: £8 12s. 6d.; (assembled): £13 12s. 6d.

**USP-1.** Booster amplifier. Suitable for stereo and monaural sources of low sensitivity, e.g. pickups, tape heads or microphones. Input sensitivity 2-20 mV. Output adjustable from 20 mV to 2V. Maximum gain 100. Power requirements 180-250V, 3.5 mA; 6.3V 0.5 amps. Price: £7 7s. 6d.; (assembled): £10 9s. 6d.

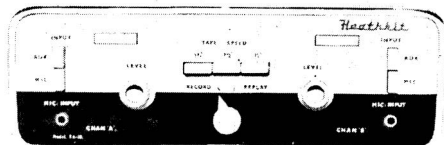
**TA-1M.** Pre-amplifier. Inputs. Mic. 0.5 mV. Radio 250 mV. Switched controls, record/replay, bias, level, mic., radio. H.D. <0.1% for 500 mV H. and N. -60 dB for 500 mV. Power supply required 290V 20 mA DC 6.3V 1 amp per channel. Size:  $4\frac{1}{2} \times 13\frac{1}{2} \times 12$  in. Price: £19 18s.; (assembled): £28 18s.



*Heathkit FM tuner*

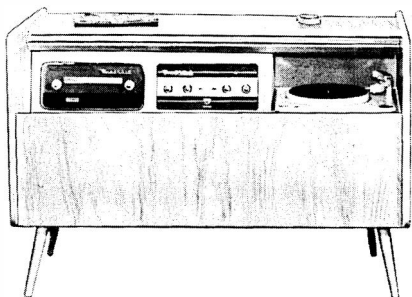
● **TA-1S.** Stereo version of TA-1M. Price: £25 10s.; (assembled): £35 18s.

**TA-1C.** Conversion Unit for TA-1M to convert to TA-1S. Price: £6 15s.



*Heathkit TA-1M tape amplifier*

**V-7A.** Valve voltmeter kit. Printed circuit. Measures AC volts (0.1-5, 5, 15, 50, 150, 500, 1,500) R.M.S., 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)  $\times 1, 10, 100, 1,000, 10\text{ K}, 100\text{ K}, 1\text{ megohm}$  0.1 ohms to 1,000 megohms with internal battery. Input resistance 11 megohms. Meter 200 micro-amps. Full scale deflection. Accuracy  $\pm 3\%$  full scale. Price: £13 18s. 6d.; (assembled): £19 18s. 6d.



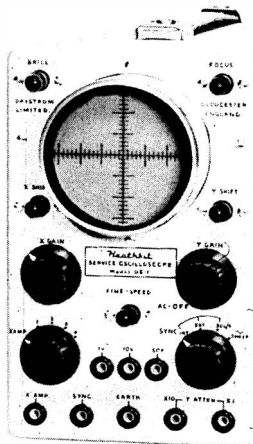
*Heathkit Gloucester cabinet*

**IM-13.** Laboratory valve-voltmeter kit. Printed circuit. Gimballed mounting, for viewing from any angle. Measures AC volts (0.1-5, 5, 15, 50, 150, 500, 1,500 R.M.S.); 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 $\mu$ A meter movement. Deflection accuracy  $\pm 3\%$ , full-scale. Price (kit): £18 18s.; (assembled): £26 18s.

**MGP-1.** Power supply unit. 200, 250, 270V, 120 mA; 6.3V, 2.5 amps. Price: £5 2s. 6d.; (assembled): £6 12s. 6d.

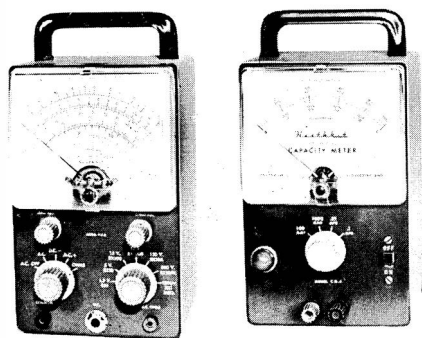
**OS-1.** Service oscilloscope kit.  $2\frac{3}{4}$  in. C.R. tube. Printed circuit. Vertical bandwidth 10 c/s to 2.5 Mc/s. Built-in calibrator. "Y" sensitivity 10 mV R.M.S. per cm. "X" sensitivity 1V R.M.S. per cm. Price: £21 18s.; (assembled): £29 8s.

**IO-12U.** General purpose oscilloscope kit. 5 in. flat face C.R. tube. Printed circuits. Vertical band-width 3 c/s to 4.5 Mc/s. Built in 1V calibrator. Y-sensitivity 10 mV R.M.S. per cm at 1 Kc/s, X-sensitivity 50 mV R.M.S. per cm at 1 Kc/s. Price (kit): £32 12s. 6d.; (assembled): £41 10s.



*Heathkit OS-1 oscilloscope*

**S-3U.** Electronic Switch (oscilloscope trace doubler). Converts a single beam oscilloscope



(left) Heathkit V-7A valve voltmeter  
(right) Heathkit CM-1U capacitance meter

to double-beam. Switching rates 150, 500, 1,500, 5,000 and 15,000 c/s. Signal frequency response 0-100 Kc/s  $\pm$  1 dB. Signal input range 0.1 to 1.8V R.M.S. Price: £12 18s.

**CM-1U.** Direct-reading capacitance meter. Uses a 4½ in. meter with four ranges as follows: 100 picofarads, 1,000 picofarads, 0.01 microfarads, and 0.1 microfarads. Price: £15 15s.

**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: £10 10s.

**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 c/s. Uses a 4½ in. meter. Cathode follower output. Price: £16 10s.

**309-CU.** RF probe. Extends the range of a valve voltmeter to 100 Mc/s. Uses a printed circuit board. Price: £1 13s. 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: £17 5s.

**AG-9U.** Audio signal generator. Range 10 c/s to 100 Kc/s. Distortion less than 0.1% from 20 c/s to 20 Kc/s. Decade switching over 8 voltage ranges from 3 mV to 10V monitored. Uses 4½ in. meter. Price: £22 10s.

**AFM/1.** AM/FM tuner. Variable tuning. FM frequency range 88-108 Mc/s. 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: 10½ × 11½ × 4½ in. Price: £26 10s. (for both units.)

**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 Mc/s. Sensitivity 2.5 microvolts for 20 dB quieting. Price: £15 18s. (for both units).

**SSU-1.** Speaker system kit. Comprises 8 in. and 4 in. matched drive units, and ducted-port bass reflex cabinet. Response 40-16,000 c/s  $\pm$  5 dB, crossover frequency 3,000 c/s. Imp. 15 ohms. Size: 23 × 11½ × 11½ in. Available for horizontal or vertical mounting. Price complete: £11 12s., without legs: £10 17s. 6d.

**Cotswold.** High fidelity three speaker system. Drive units are 12 in. bass, 8 × 5 in. elliptical, and pressure tweeter. Range 30-20,000 c/s. Two volume controls. Celotex lined enclosure. In white wood ready cut and drilled. Dimensions 26 × 23 × 14½ in. Price complete with crossover unit, etc.: £23 4s.

**Cotswold MFS.** Almost identical to the Cotswold, but specially designed to occupy minimum floor space. Slight reduction in output below 40 c/s with smaller source area. Recommended for small rooms. Dimensions: 36 × 16½ × 14 in. plus two legs. Price: £23 4s.

**Gloucester.** Cabinet for hi-fi equipment. Space available to house records, tapes, etc. Mk. I accommodates tape deck or record player, F.M. tuner, and stereo amplifier. Mk. II accommodates both tape deck and record player, F.M. tuner and stereo amplifier. Dimensions: length 46½, height 30, depth 21 in. Price Mk. I: £17 3s. 6d. Mk. II: £18 10s.

**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: £18 1s.

**Transistorised Electronic Organ GD-232RE.** 12 tone-generators, variable Bass Pedal Volume, variable Vibrato, 12 in. pedal controls. Repeat, percussion. Two 37-note keyboards. 20W p-p amplifier. Cabinet: 34½ × 39½ in. wide × 21½ in. deep. Price (kit): £187 10s. including duty. Matching bench £14 10s. extra.



**HENRY'S RADIO LTD.**, 303 Edgware Road, London, W.2. Tel.: Paddington 1008/9.

**Hi-Fi 10.** Transistorised amplifier kit. Two models: TPA3, TPA15:

**TPA3.** Output 10W at 400 c/s. Distortion 0.25% at 10W. Response 30 c/s-20 Kc/s. Feedback 60 dB. N.L. -70 dB. Input 100 mV into 33 K from 10 K (or less) source. L.S. matching 3-4 ohms. Output stages: matched OC35s, Class B. P.s.n. 24V DC, 15 mA (static), 300 mA (average for 10W). To operate with pre-amp. Model MP2 (mono) or SP4 (stereo). Size:  $4 \times 2\frac{1}{2} \times 1\frac{1}{8}$  in. Printed circuit and  $4 \times 4 \times 1$  in. radiator for output pair. Price (kit): £5 10s.; (assembled) £5 19s. 6d. Mains Unit Kits (mono): £2 9s. 6d.; (stereo): £3 15s. (Post and packing 2s. 6d. per item).

**TPA15.** L.S. matching 15-16 ohms. P.s.n. 40V DC, 12 mA (static), 150 mA (average for 10W). Price (kit): £5 19s. 6d.; (assembled): £6 10s. Other details as for TPA3.

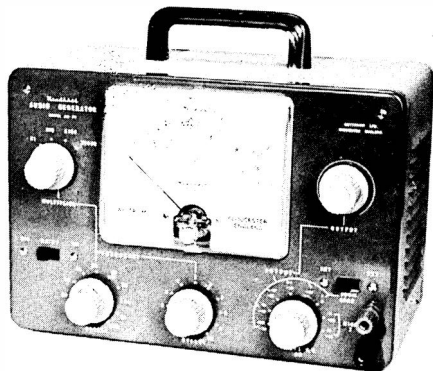
**Model MP2.** Transistor mono pre-amplifier. Inputs: (pickups) 5 mV, 6 K; 100 mV, 100 K; 250 mV, 400 K; correction for microgroove and 78 rpm; (tuners) 150 mV, 100 K; 5 mV, 1 K; 50 mV, 50 K; (tape) 2.5 mV, 1 K, corrected for  $7\frac{1}{2}$  i/s; (mic.) mag. and crystal 1.5 mV, 1 K. Controls: bass, treble, switched low-pass filter, volume, input selector. Filters: low-pass 4 Kc/s, 6 Kc/s, 10 Kc/s, 20 Kc/s; high-pass, roll-off below 40 c/s. Response: flat, but with standard correction for records and tape. Noise -70 dB with controls level; no hum. P.s.n. 9/12, 18/24, 35/45V DC at  $2\frac{1}{2}$  mA nominal. Printed circuit. For use with TPA3 or TPA15 amplifiers. Dimensions:  $9 \times 2\frac{1}{2} \times 1\frac{1}{4}$  in. Price (kit): £4 19s. 6d.; (assembled): £5 10s.; (front panel 8s. 6d. extra).

**Transistorised FM Tuner.** Geared slow motion full tuning. Range 87-105 Mc/s. A.G.C., A.F.C. Ratio detector. Multiplex adaptor. Aerial imp. 75 ohms. Output max. 80 mV for 100µV aerial; min.  $2\frac{1}{2}$  mV for 1µV aerial. P.s.n. 9V, 9 mA. Size:  $3\frac{1}{2} \times 2\frac{1}{4} \times 4$  in. Price (kit): £8 19s. 6d.

★

**JASON ELECTRONIC DESIGNS LTD.**, 23 Wardour Street, London, W.1. Tel.: Gerrard 3977/8.

**F.M.T.I. Standard F.M. tuner kit.** 4 valves only are used, giving an aerial sensitivity of better than 100 microvolts. A ratio detector is



*Heathkit audio signal generator*

combined with a limiter for low distortion and good noise rejection. Price without valves and power supply: £5 19s. Power Pack kit: £2 14s.

**F.M.T.2.** This is the same unit as the F.M.T.1., but built into a shelf mounting case. Price, less valves, but with power supply: £8 15s.

**F.M.T.3.** A fringe F.M. tuner with automatic frequency control. Two limiters combat the effects of aeroplane flutter and car interference. Price with case but less seven valves required: £9 19s.

**Argus A.M. tuner.** Manual tuning. Frequency range 186-530, 1,200-1,800 metres. P.s.n. one 9V battery. Size:  $9 \times 2\frac{1}{2}$  in. Price: £7 10s.

**EM10.** Valve voltmeter. A four valve bridge circuit, gives good stability. May be used as a general purpose meter. 23 ranges including DC current range. Price: £23.

**AG10.** Audio Generator. A capacity tuned Wien bridge covers from 10 c/s to 100 Kc/s with excellent stability and low distortion while the output is held constant within 1 dB. Output impedance is 600 ohm from a cathode follower and the Attenuator uses resistors of 1% accuracy. The rise time on square waves is better than 2 microseconds. Price kit: £15 19s.

**CC10.** Crystal Controlled Calibrator. The exact frequency of a generator may be found by connecting the output to this crystal calibrator when the self-contained audio section and loudspeaker allow marker pips to be heard

directly. These marker pips are generated at 10 Mc/s, 1 Mc/s, 100 Kc/s and 10 Kc/s so that generators in the range of 10 Kc/s to 250 Mc/s may be checked. The basic accuracy of 0.01% comes from a 1 Mc/s crystal oscillator. Price kit: £19 19s.

**OG10.** 2½ in. oscilloscope has a sensitivity of 10 mV/cm with a bandwidth of 2 c/s-2 Mc/s. Sweep linearity is good and push-pull amplifiers are used on both X and Y. Price kit: £22 10s.

**JTL.** Stereo amplifier kit (see Tape Amplifier section). Price: £21.

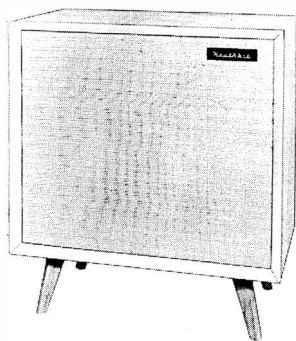
**JTV2.** Tuner kit. See details of built model. May be built for £14 19s. Four extra valves required.

**Mercury 2.** Tuner kit. See details of Monitor. May be built for £10 14s. Three extra valves required.



**MARTIN ELECTRONICS LTD.,** 154-155 High Street, Brentford, Middx. Tel.: Isleworth 5885/1161.

**Models A to D** are tape recorder kits, using ready-wired amplifiers. Prices include case, speaker, deck, amplifier, etc.



*Heathkit Cotswold speaker*

**Model A.** ¼-track. BSR Monardeck. Speed 3½ i/s. M.E. Inputs for radio, mic., pu. Extension speaker outlet. Price: £25 4s.

**Model B.** ½-track. Other details as for Model A. Price: £22 1s.

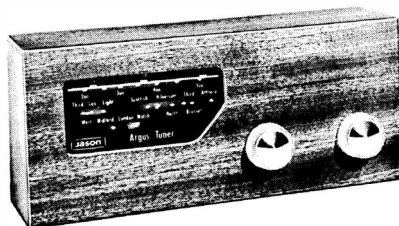
**Model C.** ½-track. Magnavox Studio deck. Speeds: 7½, 3½, 1⅞ i/s. M.E.; Tape position

indicator. F.R. 7½ i/s, 80 c/s-12 Kc/s ±3 dB. Inputs for mic., radio, pu. Extension speaker outlet. Price: £29 18s. 6d.

**Model D.** ¼-track. Other details as for Model C. Price: £35 14s.

**Model E.** Add-on unit, containing Pre-amp. 8312-CP, Magnavox Studio deck ½-track, polished wood cabinet. Price: £27 16s. 6d.

**Model F.** Add-on unit, containing Pre-amp. 8312-CP, Magnavox Studio deck ¼-track, polished wood cabinet. Price: £33 12s.



*Jason Argus AM tuner*

**Model G.** Drop-in assembly kit, containing Pre-amp. 8312-CP, Magnavox Studio deck ½-track, accessory kit 8312-CKD. Price: £23 2s.

**Model H.** Drop-in assembly kit, containing Pre-amp 8312-CP, Magnavox Studio deck ¼-track, accessory kit 8312-CKD. Price: £28 17s. 6d.

**Model L.** Drop-in assembly kit, containing Pre-amp 8312-BP, BSR deck ½-track. Price: £17 17s.

**Model M.** Drop-in assembly kit, containing Pre-amp 8312-BP, BSR deck ¼-track. Price: £21.

**8312-BP.** Pre-amplifier kit, for BSR Monardeck ½-track, complete with valves, leads, screws, etc. Price: £8 8s.

**8312-4-BP.** Pre-amplifier kit, for BSR Monardeck ¼-track, complete with valves, leads, screws, etc. Price: £9 9s.

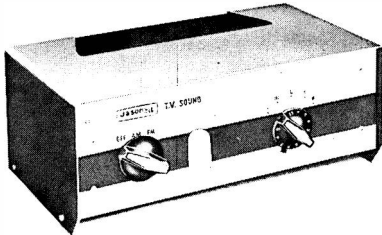
**8312-CKD.** Drop-in accessory kit for use with Magnavox deck, when building deck and pre-amp into existing cabinet. Price: £1 11s. 6d.

**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 Kc/s. Response 45 c/s-20 Kc/s. H. and N. -70 dB. P.s.n. 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: £5 10s.

**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: £11.

**Audiokit 1/2.** Transistorised mono control unit. Inputs: from 3 mV according to signal input requirements; RIAA correction on pu input. Output 200 mV. Controls: sel. switch



Jason JTV2

(tape head, mag. pu, crystal pu, radio, aux, mic.) Response 40 c/s-20 Kc/s. H. and N. -70 dB. P.s.n. 9-15V DC. Easily adapted to stereo. To operate with Audiokit 5. Size:  $5\frac{3}{4} \times 3\frac{1}{4} \times 1\frac{3}{4}$  in. Price: £4 5s.

**Audiokit 1/2/S.** Transistorised stereo control unit. Details as for 1/2. Size:  $5\frac{3}{4} \times 3\frac{1}{4} \times 3\frac{3}{4}$  in. Price: £9 10s.

**Audiokit 5.** Transistorised mono amplifier. 10W. H.D. 0.25%. Response 40 c/s-20 Kc/s. Feedback 60 dB. N.L. -85 dB. Input 100 mV. L.S. matching 3 ohms. P.s.n. 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: £5 12s. 6d.

**Audiokit 3/4.** Transistorised mono 3-channel pre-amplifier/mixer. Plug-in adaptors available to match almost any input. Output 200 mV, 8 K. F.R. 45 c/s-20 Kc/s. Controls: one per channel plus bass, treble, vol. P.s.n. 9-15V DC. Size:  $11\frac{3}{8} \times 2\frac{1}{8} \times 3\frac{1}{2}$  in. Price: £8 7s. 6d.

**Audiokit 3/4/S.** Transistorised stereo 3-channel pre-amplifier/mixer. Details as for 3/4. Price: £16 15s.

**Audiokit 2/3.** Transistorised mono 3-channel pre-amplifier/mixer. Plug-in adaptors to match almost any input. Output 200 mV, 8 K. F.R. 45 c/s-20 Kc/s. Controls: one per channel plus

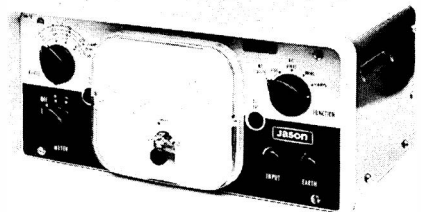
volume. P.s.n. 9-15V. Size:  $11\frac{3}{8} \times 2\frac{1}{8} \times 2$  in. Price: £7 2s. 6d.

**Audiokit 2/3/S.** Transistorised stereo 3-channel pre-amplifier/mixer. Details as for 2/3. Price: £14 5s.

**8311-V.** Tape record/replay amplifier.  $\frac{1}{4}$ -track mono. Inputs: mic. 3 mV,  $\frac{1}{2}$  megohm; radio/gram 400 mV, 1 megohm. Output 3 ohms, 3W. F.R. 80 c/s-12 Kc/s. Bias oscillator 52 Kc/s. Equalisation for CCIR,  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. M.E. Controls: vol., tone, monitor. Self-powered. Designed for building into existing cabinets. Suitable for Magnavox deck, Bradmatic  $\frac{1}{4}$ -track or Michigan or Marriott  $\frac{1}{4}$ -track heads. Size:  $7\frac{1}{2} \times 3\frac{1}{2} \times 2\frac{3}{4}$  in. Price: £11 11s.

**8311-4-V.** Tape record/replay amplifier.  $\frac{1}{4}$ -track mono. Details as for 8311-V. Price: £12 12s.

**8312-4-CP.** Mono Tape Record/replay amplifier. Inputs: mic. 3 mV, 470 K; radio/gram 400 mV, 1 megohm. Output 250 mV, 10 K. F.R. 30 c/s-12 Kc/s. Bias oscillator 52 Kc/s. Equalisation for CCIR,  $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  i/s. M.E. Volume control. Self-powered. Designed for building into existing cabinet. Suitable for  $\frac{1}{4}$ -track Magnavox, Marriott or Michigan heads. Size:  $6\frac{3}{8} \times 2\frac{3}{4} \times 2\frac{3}{8}$  in. Price: £9 9s.



Jason EM10 valve voltmeter

**8312-CP.** Details as for 8312-4-CP, but suitable for  $\frac{1}{2}$ -track Magnavox, Bradmatic heads. Price: £8 8s.



**MICROKIT.** Distributors: Chateau Productions Ltd., 4 Manchester Street, London, W.1. Tel.: Hunter 2353.

**Condenser microphone.** Substantially omnidirectional but cardioid on axis of capsule.

Response flat from 20 c/s-20 Kc/s. Sensitivity 150 mV, but suitable for any amplifier or tape recorder with a "radio" or high imp. input. Imp. 600 ohms (cathode-follower). Complete with power supply and all cables. Price (assembled) £26 5s.; (kit): £21.



**RADFORD ELECTRONICS LTD.**, Ashton Vale Estate, Bristol 3. Tel.: Bristol 662301/2.

**CIMA 15.** Mono Amplifier. Details as for IMA 15 (see Amplifiers section). Price: £18 10s.

**CIMA 25.** Mono Amplifier. Details as for IMA 25 (see Amplifiers section). Price: £25.

**CISTA 15.** Stereo Amplifier. Details as for ISTA 15 (see Amplifiers section). Price: £32 10s.

**CISTA 30.** Stereo Amplifier. Details as for ISTA 30 (see Amplifiers section). Price: £54.

**CISTA 60.** Stereo Amplifier. Details as for ISTA 60 (see Amplifiers section). Price: £68.



**H. L. SMITH & CO. LTD.**, 287/289 Edgware Road, London, W.2. Tel.: Paddington 5891/7595.

See Amplifier section for details of the following kits:

**Cooper-Smith Bantam Combined Amplifier and Control Unit.**

**Cooper-Smith Mk. II Control Unit.**

**Cooper-Smith B.P.I. Amplifier.**

**Cooper-Smith Prodigy Combined Amplifier and Control Unit.**

● **Cooper-Smith Stereo Control Unit.**

● **Cooper-Smith Stereo Amplifier.**



**STERN-CLYNE LTD.**, 109 Fleet Street, London, E.C.4. Tel.: Fleet Street 5812-3. 23 Tottenham Court Road, London, W.1. Tel.: Museum 6128-9.

**Type C Mk. II Tape pre-amplifier.** To Mullard design (see Tape Amplifier Section). Price: £11; power supply unit £3 extra.

**HF/TR3 Mk. II Tape amplifier.** To Mullard design (see Tape Amplifier Section). Price, including power supply unit, £13 13s.

**Mullard 2 Valve Pre-amplifier Tone Control Unit.** (See Amplifier Section). Price: £6 6s.

**Mullard 3-Valve Pre-amplifier.** (See Amplifier Section). Price: £10.

**Mullard "5-10" Power Amplifier.** (See Amplifier Section). Price: £10.

**Mullard "10-10" Power Amplifier.** (See Amplifier Section). Price: £16.; with passive control unit £4 extra.

**Mullard Dual Channel Pre-Amplifier.** (See Amplifier Section). Price: £12 10s.

**2H Mullard 4-channel electronic mixer.** (See Tape Amplifier Section). Price: £8 8s. Alternative model **1L**. Price: £10 5s.

**STP-1 Stereo pre-amplifier.** (See Tape Amplifier Section). Price: £22.

**Mullard 3-Valve 3W Power Amplifier Series II.** (See Amplifier Section). Price: £8 8s.

**JL10 Power Amplifier.** (See Amplifier Section). Price: £11 11s.

**Dual Feature Pre-Amplifier.** (See Amplifier and Tape Amplifier Sections). Price: £17.

If JL10 and Dual Feature Pre-Amp. are purchased together, the inclusive price is £27 10s.



**TECHNICAL SUPPLIERS LTD.**, Hudson House, 63 Goldhawk Road, Shepherds Bush, London, W.12. Tel.: Shepherds Bush 2581/4794. Cables: Teknika, London.

**F.M. TSL. Tuner Kit.** Fully transistorised. Variable tuning. Range 87.5-108.5 Mc/s. A.F.C. Sensitivity 0.6µV. Selectivity 350 c/s band-width. Powered by one 9V and one 3V battery. Size: 8 × 2½ × 7¼ in. Weight: 3 lb. Price: £17 19s. 3d. (U.K. purchase tax 17s. 9d.).

**International Mk. IV FM Tuner.** See Tuner section. Price (kit): £13 19s. 6d. (U.K. Purchase tax 9s. 1d.).

# MICROPHONES AND THEIR USES

by Ralph West

**I**N our search for perfection in this fascinating world of Hi-Fi, the amplifier has got nearer to the goal than any other component. Next comes the microphone. Of course not all microphones are good enough, nor are all amplifiers good enough for *all* purposes. This is probably the key phrase, and this is how we shall look at the bewildering array of microphones costing as little as £1 and ranging up to something like £250. Not all of these could be classed as high-fidelity microphones, but our interest may well extend somewhat beyond that range. If we record speech for the information therein, rather than for the beauty of the spoken word, then we do not need an expensive microphone. If every word is heard clearly, and any inflexion of the voice conveyed accurately, then as long as the sound is reasonably free from unpleasant distortion and gross coloration, anything better would really be wasted, for that particular job.

On the other hand, if we wish to record live music to a fidelity standard comparable with a good average disc played on good average equipment, then we shall need something better than the cheapest microphone. Not only that, we shall also need something better than the cheapest tape recorder, *and a lot more care taken over the actual recording.*

## Experiment with Position

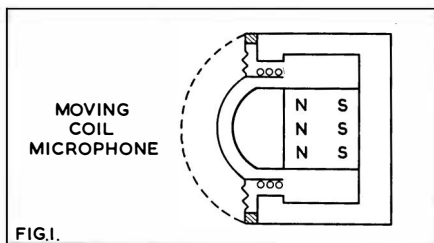
We must find the right microphone *position*. Without experience, this may take quite a bit of experimenting, but a good position must be found, as it is one link in the chain. The microphone leads must be in good condition and correctly earthed so as to be free from crackles and hum. The machine should be looked over, its heads wiped clean and demagnetised, and a tape chosen that is known to suit that machine. Expensive professional

machines have enough adjustments to enable them to be suited to almost any tape. Most other machines are not adjustable and though they work reasonably well with any good tape, the slight differences, magnetic or mechanical, between different tapes justifies the idea of searching for and then sticking to the brand of tape that gives the best results. Lastly, the recording must be done at as high a modulation level as possible to produce an acceptable signal-to-noise ratio. That, in simple language, means an almost inaudible background, rather than the constant 'shush' too often heard. No microphone is given a proper chance unless these things are right.

## Four Types of Microphones

There are four types of microphone in common use: moving-coil or dynamic, ribbon, crystal and condenser, but they belong to three families only. The first family are electromagnetic devices and generate an electrical signal when the vibrations of the sound-wave move an electrical conductor lying in a strong magnetic field. They operate on the same principle as a dynamo. Structurally the moving-coil microphone is a tiny moving-coil loud-speaker (**fig. 1**). *Tweeter* would be a nearer for size, and there is usually no visible cone, only a tiny metal or plastic dome rising from the edge of the voice coil. Its moving parts are made as small and light-weight as possible for acoustic reasons, mainly in the interests of high frequency response and efficiency. This scaling down, as in pickups, leads to a smaller electrical output, so a compromise has to be made. The output voltage is very low and the coil impedance also low, about 50 ohms is typical, so it is usually connected to a valve amplifier by a 100 : 1 step-up transformer. A

lower ratio, or even none at all, would be needed for a transistor amplifier. If leads are short, this transformer can be in the microphone case (fig. 2a), but it is better to fit it, suitably screened, in the recording amplifier or mixer. With balanced lines between the microphone and transformer, 100 ft. leads present no difficulties (fig. 2b). The back of the diaphragm may be totally enclosed except for a very small leak hole, in which case it is omnidirectional. That is, it picks up signals equally



well from all directions. It responds to the difference in pressure between the air trapped inside and that outside. This is not quite true for all dynamics for all frequencies; most show some increase in high frequency response when speaking facing the diaphragm.

### A Cardioid Response

If the rear of the diaphragm is open to the air via suitably designed air passages, it has a cardioid directional response. In simple language this means the pick-ups from front and sides are nearly equal, but pick-up from the rear is considerably reduced. 'Uni-directional' is not really the right description, but it is often used. The ability to discriminate between wanted and unwanted sounds and reflections is obviously very useful; unless, however, the rear air passages are quite complex (and costly) the cardioid response only holds for the higher frequencies, and becomes omnidirectional at the lower frequencies.

Moving-coil microphones are probably the sturdiest of all, and with quality good to very good, they are fine all-rounders, close up, or distant, indoors or out of doors.

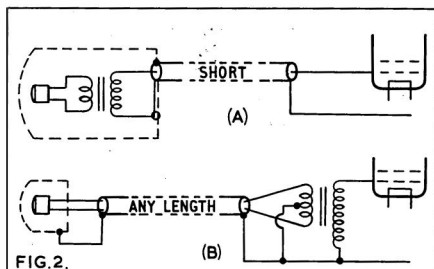
The ribbon microphone has the simplest of all moving parts—a very light aluminium or alloy ribbon, often corrugated, about  $\frac{1}{8}$  in. wide and 2 in. long lying in a transverse magnetic field (fig. 3). The air vibrations act directly on the generating member in this case, and due to its extreme lightness and relatively simple mechanical behaviour it can, for a given cost, easily produce far and away the best sound quality. Due to the difficulty of producing enough magnetic flux in so long a gap, its electrical output (sensitivity) is gener-

ally a little lower than moving-coil types. Its output voltage is so very low, and its impedance too, that it always has a step-up transformer built into it and a final output impedance the same as moving-coil types. Circuit-wise it is thus interchangeable with the moving-coil microphone.

As the ribbon is usually open back and front, only pressure differences between the two ribbon faces can move it. It is thus often called a pressure gradient type. Sounds originating in the plane of the ribbon produce equal pressures and hence are not picked up at all. This is a real null, and there are obviously two such directions. Having also two directions of maximum pickup, it could be described as a bi-directional type. The ribbon is so thin and light (1-2 microns—about 0.00005 in.—is common) that it effectively moves with the air particle vibrations and hence is often called a velocity microphone.

### Unsuitable for Outdoor Working

It is not suitable out of doors as it is so easily moved by quite light breezes, unless fitted with a very efficient wind shield; neither should it be used very close up for speech—for the same reason. Another effect when used close up is emphasis of low frequencies. For frequencies where the microphone is closer than a quarter of a wavelength from the source there is a progressive boosting of output. Anything closer than two feet will show up on speech, and closer than 12 in. will need bass cut. Some modern ribbons have an acoustic pad fitted on one side of the ribbon; this will

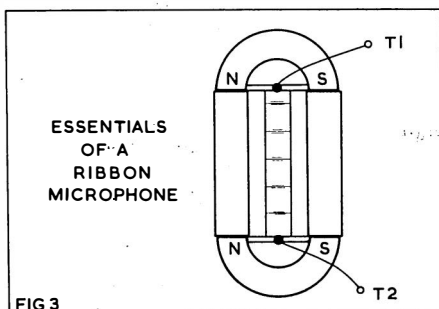


give real protection for close speech and, if of a more sophisticated design, will give almost cardioid characteristics over a useful frequency range.

A straight ribbon microphone is the amateur's best bet for indoor recording of all music except crooning—outdoors too, on the rare occasions when the air is really still! And, don't lay either of these magnetic types on your precious tapes.

The next class, numerically the largest, is the crystal microphone. Here a small square thin

sandwich of Rochelle salt is anchored at three corners and the free corner is fastened to the centre of a tiny aluminium cone or diaphragm. Normally only one side of the diaphragm is open to the air and sound pressure moving it will thus also bend the crystal plate (fig. 4). The crystal material is so cut that mechanical distortion causes electrical charges to appear on its faces. These latter are coated with metallic paint and connected to the output terminals. Mass production has made such microphones remarkably cheap, but the big attraction is the relatively large output voltage



and hence the need for at least one less amplifying stage compared with almost all other types.

Whilst high quality types have been made, few crystal microphones would be classed as of high fidelity standard. For speech, however, they are quite adequate, and perfectly satisfactory. Electrically they are very high impedance devices, i.e. they will not deliver very much current. They are thus at their best driving a valve grid with a high value of grid-leak. Unless the grid-leak is large, there will be serious bass loss, which of course does not matter for speech recording. With a high enough value of grid leak, however (10-20 M), it is surprising what a good bass response quite a number of inexpensive crystal microphones can produce.

Connection to the amplifier must be by a well screened lead, preferably short. A longer lead does not upset the *response*, except to reduce it, but it does increase the risk of *hum* when operating anywhere near a mains supply. A battery portable out in a field can hardly suffer from this trouble. While the crystal microphone is essentially very light indeed, it is often fitted into a heavy case to reduce its sensitivity to noises when its lead rubs against clothing, etc.

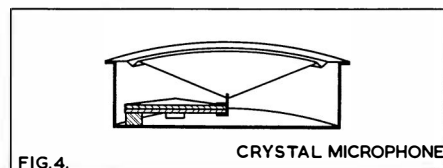
The last type of microphone consists of a flexible conducting membrane very close to, and insulated from, a flat fixed metal plate.

energy into electrical energy, but acts as a variable capacitor, producing a changing voltage from a fixed charge given to its plates. Thus it needs charging up in the first place—and keeping charged to offset the inevitable leakage (fig. 5). Whilst its moving parts have a simplicity comparable with the ribbon, its diaphragm can vibrate and resonate in a few more undesirable (high frequency) ways, and consequently a first-class design is rather complicated to make and therefore costly. The very best studio microphones made and used are almost exclusively of this type. Only a few Continental manufacturers make condenser types in the lower price classes. They are all characterised by exceptionally clean and natural speech quality.

Electrically they are very similar to crystal types, but the latter do need a polarising supply, so they are not exactly interchangeable. Some of the Continental tape machines cater for them with three-pin sockets. The third pin will be connected to the HT supply via a high value resistor, 5M or more most probably. The studio condenser microphones usually incorporate an amplifier, built into the case, so that they may be operated with long leads to cover the studio floor.

### Two in One Case

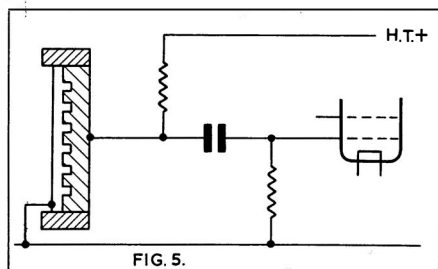
For stereo a pair of *directional* microphones angled at 90° (or adjustable) are often built into a single case, but equally good results can be obtained with two similar single microphones mounted close together, say 4-6 in. apart and angled preferably at 90°. Stereo of course, can be had by using two identical omni-directional microphones spaced some



6-8 ft. (or more) apart; though it tends to give the 'hole-in-the-middle', it is still generally more pleasant than mono.

Probably the most important thing in the use of microphones is position, particularly distance from the source of sound. Close up, direct sounds are largest and swamp reflected sounds and general reverberation. Close up, sounds are louder too, so less gain is needed and hence less amplifier hum and noise is likely to obtrude. Further away, in contrast, higher gain is needed, all the odd little room and audience noises can be heard, and reverberation is greater.

One has to make up one's mind whether one wishes to record the artists, or the artists in that hall. Generally, the nature of the event makes the choice straightforward. Thus a small ensemble—which could very well play together



in one's own front room—would best be recorded grouped closely round the microphone. On the other hand, for choirboys singing Christmas carols in a church, it would be wicked to lose the lovely reverberation by sticking the microphone right close up to them.

The amount of reverberation in the recorded sound is not only a function of the microphone's distance, but also of its directional characteristics. Thus an omni-directional type, as it picks up from all directions, will generally show most, a ribbon, less, and a cardioid least. Thus, in general, one would expect to place an omni-directional moving-coil, crystal, or condenser, rather closer than the others for comparable results.

Too much reverberation with a mono recording often leads to a blurred or confused sound. This is especially so in small rooms as the reflected sounds follow so closely the original direct sounds. Standing waves also boost certain frequencies and loose others, giving a badly coloured sound—even with good microphones. In these conditions, only really close microphone technique, with the appropriate precautions, is likely to succeed.

For stereo recording, one can generally move further away and enjoy more reverberation, if it is appropriate; as much of this extra reverberant sound is now directional, the ear-cum-brain can sort it out more easily. Coincident microphones are best placed at a distance such that the width of the *sound stage* subtends  $90^\circ$  at the microphone. For a full symphony orchestra, this would be the width of the orchestra, for a smaller group not filling the whole width of the platform, the 'sound stage' still comprises the whole platform and the side walls too in all probability. For an organ the sound stage is not the width of the organ, but the width of the whole building.

So we could go on, there is much to be learnt and enjoyed. Oh, two last points—don't fiddle with the volume control during a recording—it is very obvious unless done very, very slowly—and try and fade the microphone up just before the recording and down again at the end. It is so very much better than starting and finishing with a plop!

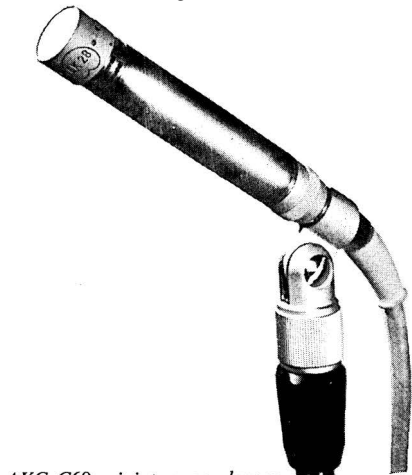


# DIRECTORY OF MICROPHONES

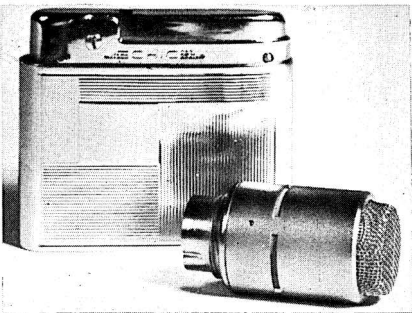
★ In these abridged specifications, the following abbreviations are used: **Imp.**—microphone source impedance. **Rec. load imp.**—recommended load impedance, and sensitivity is given in dB with reference to 1 volt/dyne/cm<sup>2</sup>, unless otherwise stated. ■ Stereo.



AKG D19E Moving Coil



AKG C60 miniature condenser



AKG D58 Moving Coil

**AKG (Akustische und Kino-Geräte Ges. m.b.H.).** Sole U.K. agents: Politechna (London) Ltd., 3 Percy Street, London, W.1. Tel.: Langham 6236. Cables: Polindust, London. Telex No. 23894.

**C12.** Professional condenser. Sel. switch gives choice of 9 polar characteristics. Response 30-15,000 c/s  $\pm 3$  dB. Sensitivity -60 dB. Imp. 50 and 250 ohms. Price: £170

**C12A.** Professional condenser. Variable pattern. Remote selection (may be located up to 300 ft. from mic.); Control gives a choice of different directional characteristics. Selection can be made during programme pick-up. Response 20 c/s-20 Kc/s. Imp. 50 and 200 ohms. Price: £139.

● **C24.** Stereo condenser. Sensitivity 1 mV/bar. Imp. 200 or 50 ohms. Response 30-20,000 c/s. 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: £230.

**C28A.** Condenser studio. Cardioid or omni-directional. Response 30 c/s-30 Kc/s. 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 C29A, C30A. Price (including N12 power unit, 20 m. cable and cable for the LF output) C28A: £110; C29A: £118; C30A: £125 10s.; C28/29/30A: £130 10s.

**C60.** Miniature professional condenser. Response 20-30,000 c/s. Imp. 50 or 200 ohms. Available with mains power unit or rechargeable battery supply unit. Price (mains): £92 10s.; (battery): £79 10s.

**D7A.** Moving coil. Omni-directional. Response 80 c/s-13 Kc/s  $\pm 5$  dB. Sensitivity -74 dB (200 ohms), -52 dB (50 K). Imp. 200

ohms or 50 K available from built-in transformer. Price: £3 15s.

**D11N.** Moving coil with cardioid directional pattern. Response 80-12,000 c/s. Imp. 200 ohms or 50 K ohms. Fitted with collapsible stands and 5 ft. screened cable. Price: £6 10s.

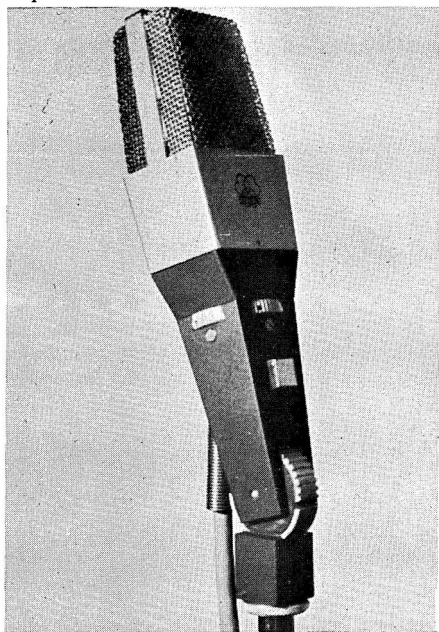
**D12.** Moving coil with cardioid directional pattern. Response 40-12,000 c/s  $\pm 4$  dB. Front to back ratio 15 dB. Sensitivity  $-77$  dB. Imp. 60 ohms, or to order. Price: £34.

**D17.** Moving coil with cardioid pattern. Response 50 c/s-15 Kc/s  $\pm 3$  dB. Front to back ratio 18 dB. Imp. 200 ohms. Price (including flexible shaft adaptor): £24 10s.

**D19C.** Restyled version of the D19 finished in grey with silver grill. Moving coil with cardioid directional pattern and bass cut switch. Response 40-16,000 c/s, Imp. 60 or 200 ohms. Price: £17 10s.

**D19E.** Moving coil with cardioid directional pattern. Response 40 c/s-16 Kc/s. Built-in transformer provides 3 different impedances: 50, 200 ohms, 50 K. Price: £21 10s.

**D58.** Moving coil, close-talk microphone. Response 50-12,000 c/s. Sensitivity 0.1 mV/bar. Imp. 200 ohms. Price: £11 10s.



AKG C12A Condenser

●**D77A.** Stereo microphone. Moving coil with cardioid directional pattern. Response 80 c/s-13 Kc/s, flat between 200 c/s-10 Kc/s. Imp. 200 ohms. Upper and lower halves of microphone detachable for A-B use. Both halves with degree calibrations for altering the basic angle of the stereophonic pickup. Price: £15 10s.

**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: £12 10s.

**K58.** Microphone headset. Incorporates microphone D58 and headset K50 (see Tape Recorder Accessories). Price: £13 10s.

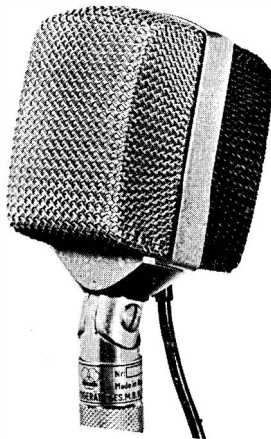


**BANG & OLUFSEN**, Struer, Denmark. Sole U.K. Importers: Avey Electric Ltd., South Ockendon, Essex. Tel.: South Ockendon 3444. Cables: Aersale.

**BM3.** Ribbon. Response: music 30-13,000 c/s  $\pm 2.5$  dB, speech bass cut below 1,000 c/s (2 position switch). Impedance 50 ohms. Price: £14 14s.

**BM4.** As BM3 with variable output impedance, 50, 250, and 40,000 ohms. Price: £15 15s.

●**Stereophonic Microphone Assembly.** Comprises two B & O ribbon microphones, plus stereophonic baffle assembly. Price: £34 5s., with type BM3. £37 5s., with type BM4.



AKG D12 moving coil

●**SM5.** Stereo microphone. Response 30-13,000 c/s  $\pm 2.5$  dB. Imp. 200 ohms per channel. Price: £21.

**SM5/BM4.** Mic. floor stand. Price: £6 6s.

**SM5/BM4.** Mic. desk stand. Price: £1 15s.

**SM5/BM4.** Connectors plus cable. Price: 16s.



**BEYER.** Distributors: Fi-Cord International, 40a Dover Street, London, W.1. Tel.: Hyde Park 3448. Cables: Fi-Cord, Piccy, London.

**8260.** Ribbon, Cardioid. Response 50 c/s-18 Kc/s  $\pm 2.5$  dB. Sensitivity 0.08 mV/microbar. Imp. 200 or 37.5 ohms. Transformer available, Type KTR147C (200 ohms to 50 K) with 12 ft. lead and GPO jack. Rear sensitivity -20 dB at 120° angle. Price (with KTR147C): £24 10s. 5d.

**M160.** Double ribbon. Cardioid. Response 40 c/s-18 Kc/s  $\pm 2.5$  dB. Sensitivity 0.07 mV/microbar. Imp. 200 ohms. Transformer available, 200 ohms to 50 K, with 12 ft. lead and GPO jack. Price (incl. transformer, lead and plug): £48 14s. 5d.

**M61.** Moving-coil. Cardioid. Response 70 c/s-12 Kc/s  $\pm 3$  dB. Sensitivity 0.2 mV/microbar. Imp. 200 ohms or 37.5 ohms. Transformer available, Type KTR147C (200 ohms to 50 K) with 12 ft. lead and GPO jack. Price: £15 15s.; (with KTR147C): £19 1s. 9d.

**M51.** Moving-coil. Omni-directional. Response 100 c/s-8 Kc/s  $\pm 3$  dB. Sensitivity 0.12 mV/microbar at 200 ohms. Imp. 200 ohms or 50 K (to order). Price: £4 10s. 9d.

**M119.** Moving-coil. Omni-directional. Response 50 c/s-16 Kc/s  $\pm 2.5$  dB. Sensitivity 0.22 mV/microbar. Imp. 200 ohms. Transformer available, type KTR147C (200 ohms to 50 K) with 12 ft. lead and GPO jack. Very low hand noise. Price: £15 15s.

**M100.** Moving-coil. Omni-directional. Response 40 c/s-18 Kc/s  $\pm 2.5$  dB. Sensitivity 0.1 mV/microbar. Imp. 200 ohms. Transformer KTR147C. Price: £44 5s.

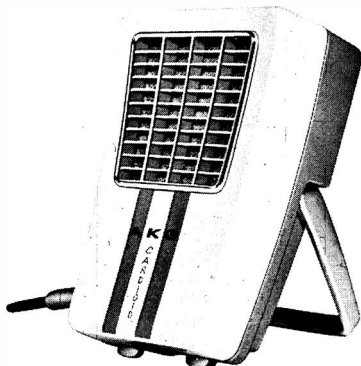
**M62.** Moving-coil. Cardioid. Response 70 c/s-12 Kc/s  $\pm 3$  dB. Sensitivity 0.2 mV/microbar. Imp. 200 ohms or 50 K (to order). Incorporates snap-out stand. Hand or table mic. Price: £6 16s.

**M219.** Moving-coil. Omni-directional. Response 50 c/s-16 Kc/s  $\pm 2.5$  dB. Sensitivity 0.1 mV/microbar. Imp. 200 ohms. Transformer KTR147C (200 ohms to 50 K) with 12 ft. lead and GPO jack. Of robust construction. Price: £16 10s. 1d.

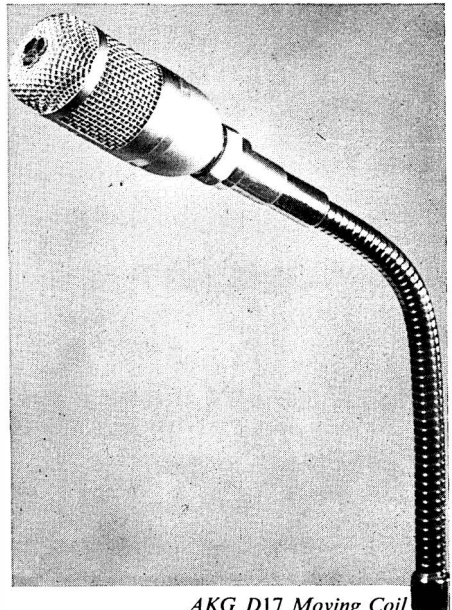
**Microphone stands:** 201 (heavy base): £6 19s. 2s.; 211 (boom): £5 4s. 8d.; 202B (folding): £4 15s. Beyer stands suitable for all microphones.



**CADENZA.** See Simon Equipment Ltd.



AKG D11N moving coil



AKG D17 Moving Coil

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

**Acos Mic. 39-1.** Crystal. Response 40-15,000 c/s  $\pm 6$  dB. Sensitivity -60 dB. Imp. equals capacity of 800 pF. Rec. load imp. not less than 4.7 megohm. 8 ft. cable. Desk or floor stand adaptor available. Price: £3 3s.

**Acos Mic. 40.** Ceramic. Response 30-6,000 c/s. Sensitivity -60 dB. Imp. 2.5 megohms. Price: £2. Crystal details as for Mic. 45. Price: £1 15s.

**Acos Mic. 45.** Crystal. Response 30-6,000 c/s. Sensitivity -50 dB. Imp. 2.5 megohms. Price: £2.

● **Acos Stereo Mic. 44.** Crystal. Response 50-12,000 c/s. Directional Pattern (Dual Fig. 8) Fig. 8). Sensitivity -70 dB. Imp. 2.5 megohms. Price: £6 6s.

**Acos Mic. 39 Dynamic.** Moving coil. Omni-directional. Response 80 c/s-10 Kc/s  $\pm 3$  dB. Sensitivity -80 dB (200 ohms), -54 dB (50 K). Transformer fitted, dual impedance. Price: £7 10s.

**Acos Mic. 55.** Crystal. Response 20 c/s-10 Kc/s. Sensitivity -58 dB. Rec. load imp. not less than 1 megohm. Price: £2 2s.

**Acos Mic. 60.** Crystal. Response 20 c/s-10 Kc/s. Sensitivity -58 dB. Rec. load imp. not less than 1 megohm. Price: £2 2s.

★

**DERRITRON LTD.** See Reslosound.

★

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

**DM.16HL.** Moving-coil. Cardioid. Response 40 c/s-15 Kc/s. Sensitivity -62 dB. Imp. 500 ohm (low), 50 K (high). Transformer fitted. Built-in high/low impedance switch. Price: £7 7s.

**MC70.** Crystal. Omni-directional. Response 50 c/s-12 Kc/s  $\pm 3$  dB. Sensitivity -75 dB. Price: £2 19s. 6d.

**UD.19HL.** Moving-coil. Unidirectional cardioid. Range 100 c/s-14 Kc/s. Sensitivity -75 dB  $\pm 3$  dB at 600 ohm; -55 dB  $\pm 3$  dB at 50 K. Imp. 600 ohm (low), 50 K (high). Transformer fitted. Price: £14 14s.

● **S.M.D100 Stereo.** Moving-coil, with two units angled at 90°. Response 50 c/s-15 Kc/s. Sensitivity -60 dB. Imp. 50 K. Built-in transformers. Stereo/mono switch. Price: £9 9s.

★

**ELECTROVOICE.** See K.E.F. Electronics Ltd.

★

**ELIZABETHAN (TAPE RECORDERS) LTD.,** Crow Lane, Romford, Essex. Tel.: Romford 64101. Cable address: Elizabethan, Romford.

**Elizabethan.** Ribbon. Response 50-12,000 c/s. Sensitivity -56 dB. Imp. 50,000 ohms. Built-in transformer. Price: £7 17s. 6d.

★

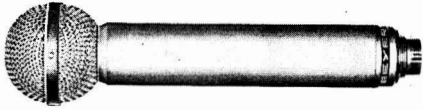
**FILM INDUSTRIES LTD.,** 90 Belsize Lane, London, N.W.3. Tel.: Hampstead 9632/3. Cables: Troosound, London, N.W.3.

**M7.** Moving coil. Response 60-9,000 c/s. Imp. 20 ohms. 12 ft. twin screened cable standard, other lengths if required. Table desk and floor stands available. 4 in. flexible mounting. Internal leads. Price: £7 15s. With on/off switch: £9 7s. 6d.

**M8.** Ribbon. Response 50-13,000 c/s. Figure of eight polar diagram. Imp. 30 ohms. Can be fitted with transformer up to 60 K. Plug and socket joint between microphone head and flexible, fitted with 12 ft. of twin-screened cable, other lengths if required. Table, desk and floor stands available. Price, all impedances: £8 15s. With on/off switch: £10 7s. 6d.

**M8A.** Ribbon. Unit as type M8 but without plug and socket connection between mic. head and flexible, this being one unit. A small desk stand is provided, which is removable, enabling other stands to be used. Available in all impedances up to 60 K. Price: £8.

**Microphone Stands.** Desk, table and floor stands. Grey Hammer finish with cast iron bases, stems in satin chrome. Price from £1-5s.



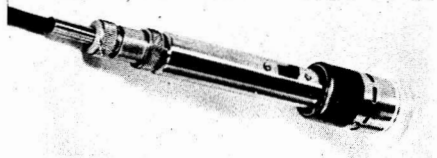
*Beyer M160 Double Ribbon*



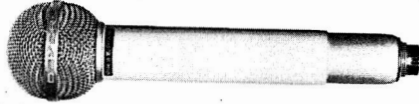
*Eagle UD 19HL Moving Coil*



*Beyer M100 Moving Coil*



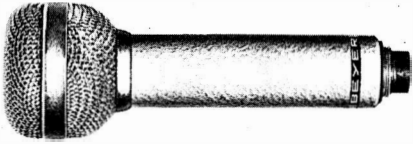
*Reslo CD dynamic*



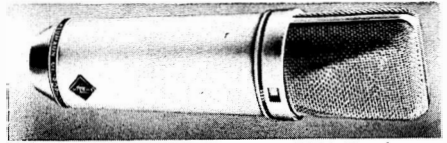
*Beyer M260 Ribbon*



*AKG C24 stereo*



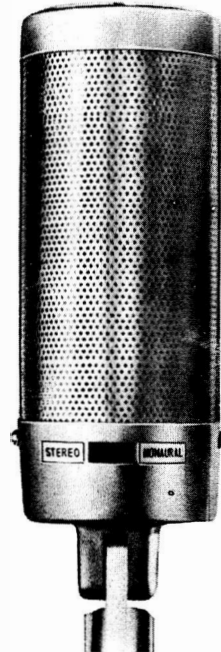
*Beyer M61 Moving Coil*



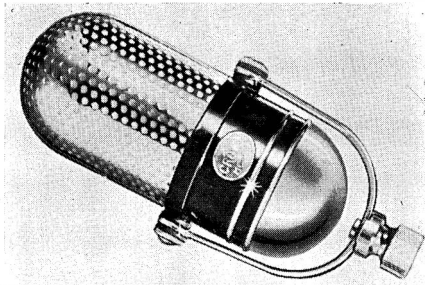
*Neumann U67 Condenser*



*Eagle DM 16HL Moving Coil*



*Eagle SM.D100 Stereo*



*Eagle MC70 Crystal*

**Matching Transformer.** Enclosed in Mu-metal screening case and moulded plastic outer case for fitting into microphone lead. Impedance ratio: 30 ohms to 60 K ohms. Price: £3 5s.

**Microphone Switch Assembly.** To be used in conjunction with Type M7, M8 microphones. Price on application.

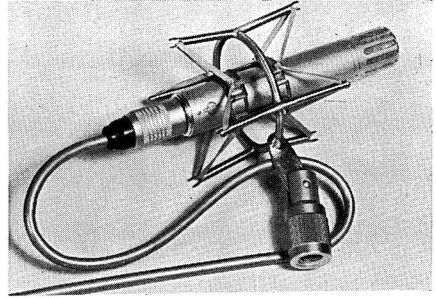


**GRAMPIAN REPRODUCERS LTD.,** Hanworth Trading Estate, Feltham, Middx. Tel.: Feltham 2657/8. Cables: Reamp, Feltham.

**DP4/H.** Moving coil. Response 50-15,000 c/s. 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: £9; low impedance: £8.

**DP6.** Moving coil. Omni-directional. Response 200 c/s-15 Kc/s. Sensitivity -87 dB (25 ohms), -75 dB (200 ohms), -50 dB (h00 ohms), -52 dB (50 K). Built-in transformer fitted to all but low impedance model. Price (low impedance): £8; (other three models): £9.

**GR1.** Ribbon. Unequal figure of eight. Response 40 c/s-15 Kc/s. Sensitivity -90 dB (25



*Neumann KM54a Condenser*

ohms), -81 dB (200 ohms), -76 dB (600 ohms), -58 dB (50 K). Imp. 25, 200, 600 ohms, 50 K. Built-in transformer. Easily replaceable ribbon. Price (including lead, swivel holder, case): £11 10s.

**GR2.** Details as for GR1, but equal figure of eight response.

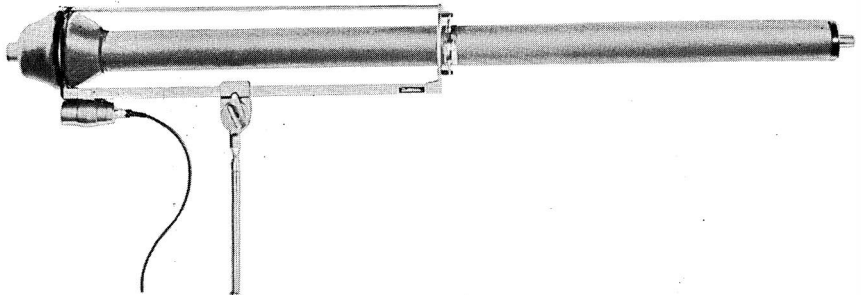


**GRUNDIG (GREAT BRITAIN) LTD.,** Newlands Park, Sydenham, S.E.26. Tel.: Sydenham 2211.

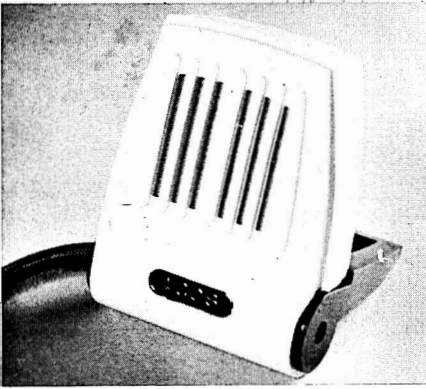
**GDM18.** Moving coil. Response 100-11,000 c/s. Sensitivity 2.2 mV per micro bar. Source imp. 55 K ohms. Built-in transformer. Price: £7 7s.

**GDSM202.** Moving coil. Figure of eight. Response 80 c/s-13 Kc/s  $\pm 5$  dB. Sensitivity -54 dB. Imp. 50 K. Transformer fitted. Transformers integral with plugs, each unit may be detached and used independently. Price: £14 14s.

**GDM 12.** Moving coil. Omni-directional. Response 100 c/s-11 Kc/s  $\pm 5$  dB. Sensitivity 0.15 mV per microbar at 200 ohms, 2.2 mV per microbar at 55 K. Imp. 200 ohms and 55 K. Price: £7 7s.



*KEF Electro-Voice 643 Moving Coil with Windscreen*



*Acos Mic. 40 ceramic*

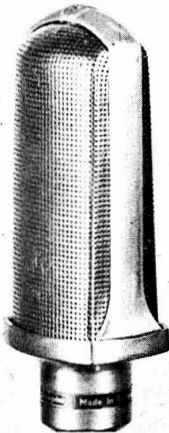
**GDM121.** Moving-coil. Omni-directional. Wide range. Response 50 c/s-16 Kc/s  $\pm 2$  dB. Sensitivity 0.3 mV/microbar, 200 ohms; 3 mV/microbar, 40 K. Imp. 200 ohms, 40 K. Transformer fitted. Price: £22 1s.

**GBM125.** Ribbon. Cardioid, back to front ratio at 1 Kc/s: 12 dB. Response 50 c/s-15 Kc/s  $\pm 2$  dB. Sensitivity 0.1 mV/microbar, 200 ohms, 200 K. Transformer fitted. Price: £24 3s.

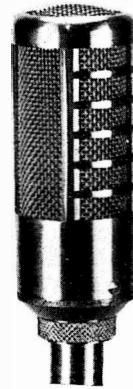
**GDM300.** Moving-coil. Omni-directional. Response 150 c/s-11 Kc/s. Sensitivity 0.35 mV/microbar, Imp. 4 K. For use with TK6 tape recorder. Price: £4 4s.



**KEF ELECTRONICS LTD.,** Tovil, Maidstone, Kent. Tel.: Maidstone 55761. Cables: KEF.



*Grampian GR2 ribbon*



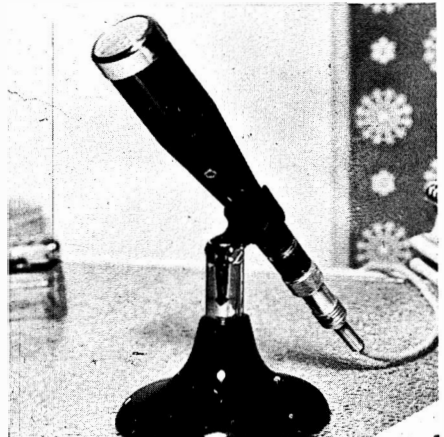
*Film Industries M8*

**Electro-Voice 642.** Moving coil. Cardiline, unidirectional. Response 30 c/s-10 Kc/s. Sensitivity -68 dB. Imp. 50, 150 and 250 ohms. Transformer fitted. Cardioid up to 500 c/s, sharply directional above. Price: £88.

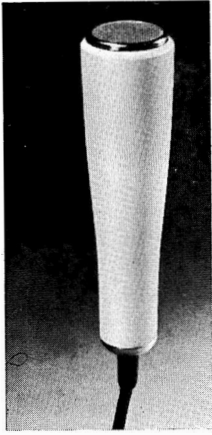
**Electro-Voice 655C.** Moving coil. Omni-directional. Response 40 c/s-20 Kc/s. Sensitivity -77 dB. Imp. 50, 150, 250 ohms. Transformer fitted. Very slim design with non-reflecting finish for TV work. Price: £45.

**Electro-Voice 635.** Moving coil. Omni-directional. Response 70 c/s-10 Kc/s. Sensitivity -57 dB. Imp. high or 150 ohms. Transformer fitted. Price: £18 10s.

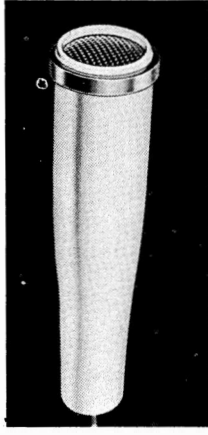
**Electro-Voice 666.** Moving coil. Cardioid. Response 40 c/s-15 Kc/s. Sensitivity -75 dB. Imp. 50, 150, 250 ohms. Transformer fitted. Slim cardioid with single moving element. Price: £57 10s.



*Grampian DP4/H moving coil*



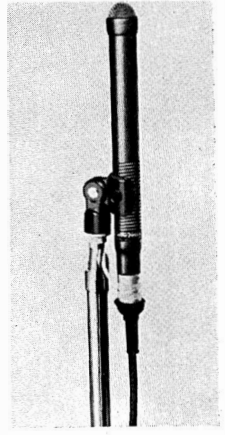
*Acos Mic 39-1*



*Acos Mic 60*



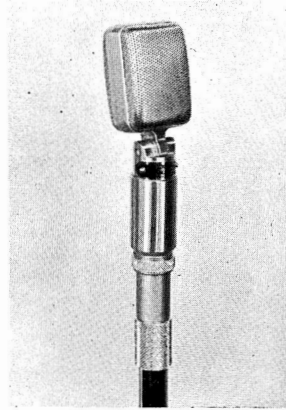
*Grampian DP/6*



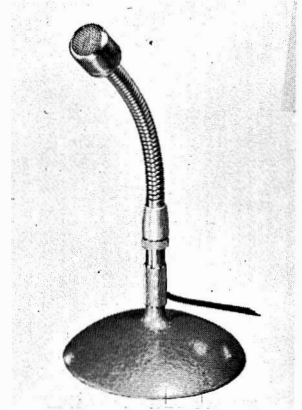
*Electro-Voice 655C*



*Lustraphone VR64*



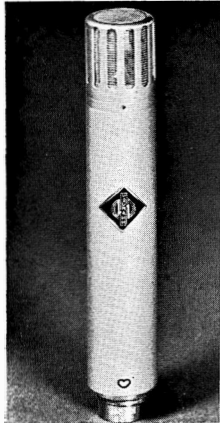
*Reslo Type VRT*



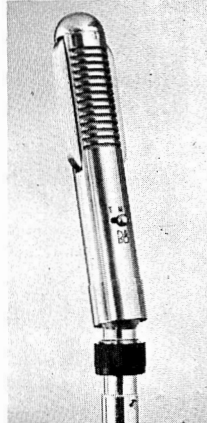
*Trix G7852/F*



*Film Industries 8A*



*Neumann Condenser*



*B and O BM3*



*B and O SM5*



**Electro-Voice 649B.** Moving coil. Omni-directional. Response 100 c/s-9 Kc/s  $\pm 3$  dB. Sensitivity -81 dB. Imp. 50-250 ohms. Transformer fitted. Only  $1\frac{1}{2}$  oz. less cable. Price: £24.

**Electro-Voice 668.** Moving coil. Cardioid. Response 30 c/s-16 Kc/s. Sensitivity -78 dB. Imp. 50, 150, 250 ohms. Transformer fitted. Specially designed for boom operation. Price to be announced.

**Electro-Voice 652.** Moving coil. Omni-directional. Response 100 c/s-7 Kc/s. Sensitivity -80 dB. Imp. 50, 150, 250 ohms. Transformer fitted. Semi-rigid tube microphone. Price: £27.

**Electro-Voice 643.** Moving coil. Super cardiline. Response 30 c/s-10 Kc/s. Sensitivity -67 dB. Imp. 50, 150, 250 ohms. Transformer fitted. Super directional with inbuilt 100 c/s high-pass filter. Long range pickup. Price: £395.



**LEE PRODUCTS (G.B.) LTD.,** 10-18 Clifton Street, London, E.C.2. Tel.: Bishopsgate 6711. Cables: Leprod, London.

**M66.** Moving coil. Cardioid. Source imp. 15/30 ohms. Price: £9 9s.

**B-72/1110.** Crystal. Response 80-16,800 c/s. Source imp. 100 K ohms. Price: £5 12s. 6d. With table stand.

**B-92/1110.** As above but with Floor stand. Price: £9.



**LUSTRAPHONE LTD.,** St. Georges Works, Regents Park Road, N.W.1. Tel.: Primrose 8844. Cables: Lustraphon, London.

**Lustrette LD/61 Series.** Moving coil. Response 70-12,000 c/s. Source imp. low, line and high. Built-in trans. when required. 6 ft. cable. Price: £3 7s. 6d.

**Master C51.** Moving coil. Response 50-8,000 c/s. Source imp. low, line and high. Built-in trans. for line and high. 3-pin moulded mic. plug. Stand as required. Price, low: £5 5s.; line and high: £5 15s. 6d.

**Master C48 and C48/S with Switch.** Moving coil. Response 50-8,000 c/s. Source imp. 20 ohms. 3-pin moulded mic. plug. 6 ft. cable. Price C48: £6 6s.; C48/S: £7 7s.

**Hand Pencil LFV/H59.** Moving coil. Response 100-14,000 c/s. 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 8s.

**Full-Vision LFV/59.** Moving coil. Response 100-14,000 c/s. 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: £8 18s. 6d.

**Lavalier LV/59.** Neck halter moving coil. Response 100-14,000 c/s. Low, line and high imp. Price: £8 18s. 6d.

**LD/66.** Moving coil. Response 70-12,000 c/s. Sensitivity -88, -75, and -52 dB, for low line and high imp. respectively. Price: £4 2s. 6d., low imp.; £4 12s. 6d., line and high £4 2s. 6d., low imp.; £4 12s. 6d., line and high imp.

**Tubular Hand TH59/SB.** Moving coil with switch. Response 100-14,000 c/s. Sensitivity -88 dB at 25 ohms, -75 dB at 600 ohms, and -54 dB at 50,000 ohms. Transformer as required. Price: £8 18s. 6d.

**Studio VR/53.** Ribbon velocity. Response substantially flat to 14,000 c/s. Source imp. low, line and high. Built-in trans. 3-pin moulded mic. plug. 6ft. cable. Stand as required. Price: £9 19s. 6d.

**Ribbonette VR/64.** Ribbon. Response substantially flat 50 to 13,000 c/s. Source imp. low, line and high. Built-in transformer. 20 ft. cable for low and line. 9 ft. for high. Table base. Price: £7 17s. 6d.

● **Stereomic VR/65.** Dual head ribbon. Response 50-13,000 c/s. Sensitivity Stereo -90 dB at 20 ohms. Source imp.  $2 \times 20$  ohms. Internal transformer. Price: £31 10s.

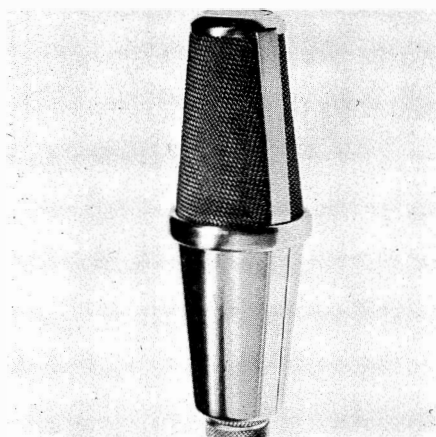
● **Stereolus VR/65NS.** Dual head ribbon. Response 50-13,000 c/s. Sensitivity stereo -90 dB at 20 ohms. Price: £15 15s.

· **Lapel Mic. LP/62.** Electro-Magnetic. Response, substantially maintained up to 6,000 c/s. Source imp. 30 and 1,000 ohms. 6 ft. cable. Price: £3 7s. 6d.

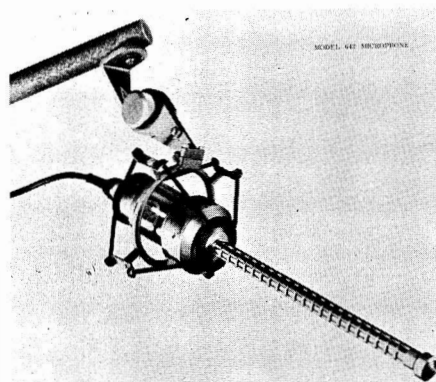
**Chest Harness D159/B.S.** Moving coil. Response, substantially flat from 100-14,000 c/s. Source imp., low, line, high. 6 ft. cable. Price: £11 11s.



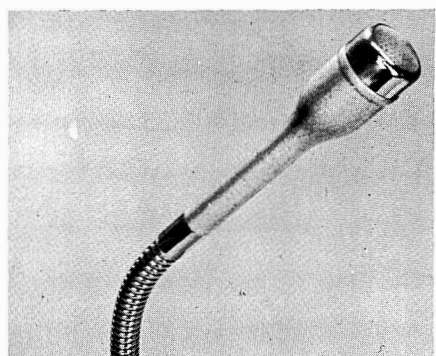
*Grundig GDM 18 moving coil*



*Lustraphone LD/66 moving coil*



*Electro-Voice 642 moving coil*



*Lustraphone LFV/59 moving coil*



*Acos Mic. 45*



*Reslo PRL ribbon*

**Velodyne VC52/THSB.** Noise cancelling moving coil with switch. Response rising to 1,700 c/s, flat to 3,500 c/s then falling. Source imp. 25 ohms or as required. Transformer as necessary. Price: £8 18s. 6d.

**Micridyne Model VR/70.** Ribbon velocity. Figure of eight. Response substantially flat 50 c/s-14 Kc/s. Sensitivity: Low impedance, 90 dB; high impedance, 56 dB. Imp. as required. Transformer as required. Very small model. Price: £12 12s.

**Micridyne "Lavalier" Model VR/70L.** Details as for VR/70. Adjustable neck halter. Price: £15 15s.

**Contadyne Model CMC/68.** Moving coil. Small contact microphone with noise cancelling feature. Imp. 20 ohms at 1 Kc/s. Price: £8 18s. 6d.

★

**MICROKIT.** See Constructional Kits section.

★

**NEUMANN GmbH,** West Germany. Sole U.K. Agents: F.W.O. Bauch Ltd., Chaddlewood, Cockfosters Road, Cockfosters, Barnet, Herts. Tel.: Barnet 3170.

**Type M49b.** Condenser. Remote-controlled: omni-directional, cardioid, figure-of-eight. Response 40 c/s-16 Kc/s  $\pm 2$  dB. Sensitivity across 1 K: 0.7 mV/dyne/cm.: Imp. 50 and 200 ohms. Built-in transformer. Remote-controlled pressure-gradient mic. Price (incl. power supply unit, mic. cable, output plug): £132 16s.

**Type M50b.** Condenser. Omni-directional. Response 40 c/s-16 Kc/s  $\pm 2$  dB. Sensitivity across 1 K: 1.5 mV/dyne/cm.: Imp. 50 and 200 ohms. Built-in transformer. Pressure mic. Price (incl. power supply unit, mic. cable, output plug): £131 15s.

**Type KM56.** Condenser. Switchable: omni-directional, cardioid, figure-of-eight. Response 40 c/s-15 Kc/s  $\pm 2$  dB. Sensitivity across 1 K: 0.9 mV/dyne/cm.: Imp. 50 and 200 ohms. Built-in transformer. Miniature pressure-gradient type mic. Price (incl. power supply unit, mic. cable, output plug): £114 10s. 6d.

**Type KM53a.** Condenser. Omni-directional. Response 40 c/s-15 Kc/s  $\pm 2$  dB. Sensitivity across 1 K: 1.2 mV/dyne/cm.: Imp. 50 and

200 ohms. Built-in transformer. Miniature pressure-type mic. Price (incl. power supply unit, mic. cable, output plug): £103 1s.

**Type KM54a.** Condenser. Cardioid. Response 40 c/s-15 Kc/s  $\pm 2$  dB. Sensitivity across 1 K: 1 mV/dyne/cm.: Imp. 50 and 200 ohms. Built-in transformer. Miniature pressure-gradient type mic. Price (incl. power supply unit, mic. cable, output plug): £107 11s.

**Type SM2.** Stereo condenser. Both systems separately remote-controlled: omni-directional, cardioid, figure-of-eight. Response 40 c/s-15 Kc/s  $\pm 2$  dB. Sensitivity across 1 K: 1 mV/dyne/cm.: Imp. 50 and 200 ohms. Built-in transformer. Miniature mic. Price (incl. power supply unit, mic. cable, output plug): £205 3s.

**Type M269.** Condenser. Remote-controlled: omni-directional, cardioid, figure-of-eight. Response 30 c/s-16 Kc/s  $\pm 2$  dB. Sensitivity across 1 K: 1.55 mV/dyne/cm: in cardioid; 1 mV/dyne/cm: in omni-directional and figure-of-eight. Imp. 50 or 200 ohms. Built-in transformer. Special sensitivity and bass-cut switches. Price (incl. power supply unit, mic. cable, output plug): £130 9s. 6d.

**Type U67.** Condenser. Switchable: omni-directional, cardioid, figure-of-eight. Response 30 c/s-16 Kc/s  $\pm 2$  dB. Sensitivity across 1 K: 2 mV/dyne/cm: in cardioid; 1.2 mV/dyne/cm: in omni-directional and figure-of-eight. Imp. 50 and 200 ohms. Built-in transformer. Special sensitivity and bass-cut switches; printed circuits. Price (incl. power supply unit, mic. cable, output plug): £105 18s.-6d.

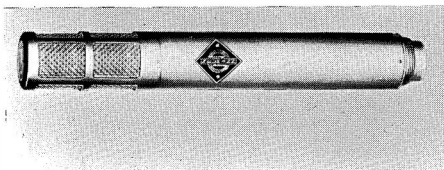
★

**PEARL.** Distributors: C. Hammond & Co. Ltd., 296 Kensington High Street, London, W.14. Tel.: Western 4343.

**EC61.** Condenser. Figure-of-eight. Response 30 c/s-18 Kc/s. Sensitivity -50 dB. Imp. 50, 200, 600 ohms. Fitted with transformer, self-contained amplifier. Price (incl. mains power supply unit or battery power supply unit): £42.

**LD14.** Moving coil. Omni-directional. Response 95 c/s-18 Kc/s. Sensitivity -54 dB. Output imp. 30-200 ohms. Transformer fitted. Price: £12 18s.

**LD18.** Moving coil. Omni-directional. Response 80 c/s-18 Kc/s. Sensitivity -54 dB. Output imp. 30-200 ohms. Transformer fitted. Price: £14 6s.



*Neumann SM2 Stereo Condenser*

**RD16.** Moving coil. Cardioid. Response 50 c/s Kc/s. Sensitivity -54 dB. Output imp. 30-200 ohms. Transformer fitted. Price: £14 14s.

**RD34.** Moving coil. Cardioid. Response 30 c/s-20 Kc/s. Sensitivity -54 dB. Output imp. 30-200 ohms. Transformer fitted. Price: £15 15s.

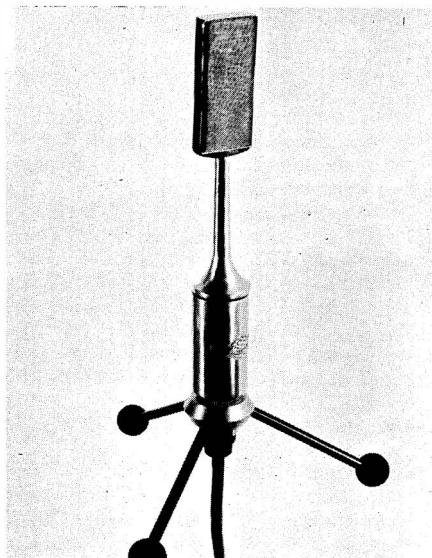
**RD32.** Moving coil. Cardioid. Response 60 c/s-18 Kc/s. Sensitivity -55 dB. Output imp. 30-200 ohms. Price: £29 5s.

**C2.** Condenser. Response 20 c/s-18 Kc/s. Sensitivity -55 dB. Output imp. 200 ohms. complete with power supply unit Type E. 3000. Price: £82 19s.

**C12.** Condenser. Response 100 c/s-16 Kc/s. Sensitivity -50 dB. Output imp. 200 ohms. complete with power supply unit Type E. 3000. Price: £77 14s.

**CK.** Condenser. Response 20 c/s-18 Kc/s. Sensitivity -55 dB (Cardioid) -60 dB; (Omnidirectional). Output imp. 200 ohms. Complete with power supply unit Type E. 3000. Price: £82 19s.

**Flexible Swan-neck connectors.** For dynamic microphones. Model 1903 less switch. 3 pole connector. Length 175 mm. Price: £3 17s. 4d.



*Lustraphone VR70 ribbon*



**PHILIPS ELECTRICAL LTD.,** Century House, Shaftesbury Avenue, London, W.C.2. Tel.: Gerrard 7777. Cables: Phillamps, London.

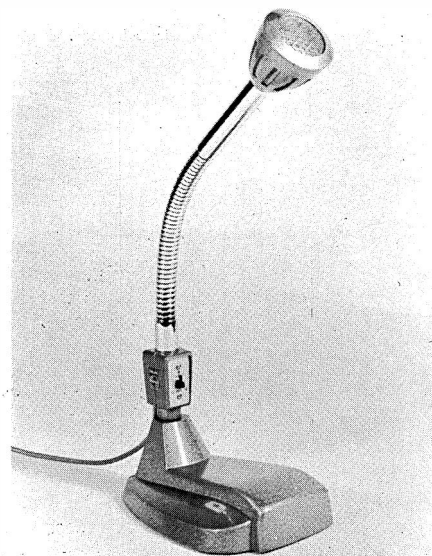
**EL6014/00.** Moving coil. Response 100-10,000 c/s. Sensitivity -74 dB or -57 dB. Source imp. 500 ohms or 25,000 ohms. Price: £8.

**EL6021.** Moving coil. Response 60-15,000 c/s. Source imp. 50, 500, 10,000 ohms. Price: £14.

**EL6031.** Hypercardioid moving coil. Response 70-15,000 c/s. Sensitivity -74 dB or -58 dB. Source imp. 500 ohms or 25,000 ohms. Price: £17.

**EL6040.** Moving coil. Response 60-20,000 c/s. Source imp. 50, 500 and 25,000 ohms. Price: £27.

**EL6050/01.** Condenser. Cardioid or omnidirectional. Response 50 c/s-10 Kc/s  $\pm 3$  dB.



*Philips EL6031 moving coil*

Sensitivity  $-64$  dB (50 ohms),  $-58$  dB (200 ohms). Imp. 50, 200 ohms. Transformer fitted. Mic. insert fitted with swivelling head. Wind shield supplied. Price: £135.

**ET1045.** Miniature moving coil. Halter. Omni-directional. Response 150 c/s-10 Kc/s  $\pm 3$  dB. Sensitivity  $-88$  dB. Imp. 50 ohms. 15, 30, 60 feet extension cables available. Quick release attachment of cable. Price: £13; cable extra.

**EL3753/00.** Crystal. Omni-directional. Output voltage 1.57 mV/ $\mu$ Bar at 1 Kc/s. Imp. 200 K. Price: £3 6s.

**EL3755/00.** Moving coil. Cardioid. Response 150 c/s-10 Kc/s. Output voltage 0.34 mV/ $\mu$ Bar at 1 Kc/s. Imp. 500 ohms. Price: £3 10s.

● **EL3784/00.** Stereo moving coil. Cardioid. Output voltage 0.2 mV/ $\mu$ Bar at 1 Kc/s. Imp. 500 ohms (per insert). Two inserts at  $90^\circ$  for stereo recording. Price: £10 10s.

**EL3782/00.** Moving coil. Cardioid. Response 150 c/s-10 Kc/s. Output voltage 0.22 mV/ $\mu$ Bar at 1 Kc/s. Imp. 500 ohms. Speech/music switch, bass cut in speech position. Price: £5.

**EL3756/00.** Moving coil. Omni-directional. Response 150 c/s-10 Kc/s. Output voltage 0.26 mV/ $\mu$ Bar at 1 Kc/s. Imp. 500 ohms. Price: £3 10s.

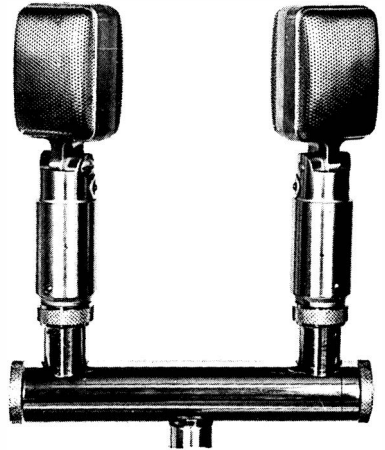
**EL3750/00.** Moving coil. Cardioid. Response 150 c/s-10 Kc/s. Output voltage 1.2 mV/ $\mu$ Bar at 1 Kc/s. Imp. 25 K. Transformer fitted. Speech/music switch, bass cut in speech position. Price: £5.

● **EL3752/00.** Stereo moving coil. Cardioid. Output voltage 1.2 mV/ $\mu$ Bar at 1 Kc/s. Imp. 25 K (per insert). Transformer fitted. Two inserts at  $90^\circ$  for stereo recording. Price: £10 10s.

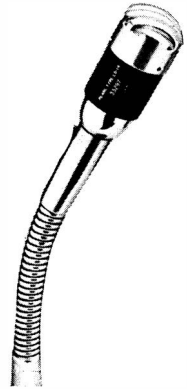
★

**RESLOSOUND LTD.**, 24 Upper Brook Street, London, W.1. Tel.: Hyde Park 2291. Cables: Derritron, London.

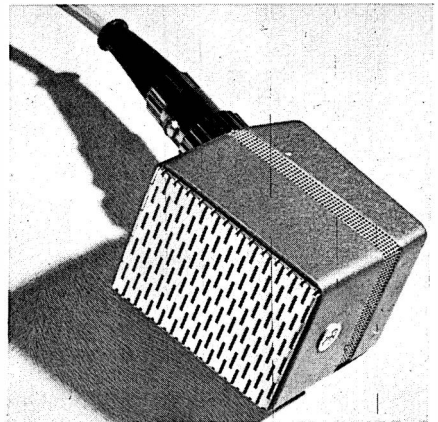
**Reslo Type PR.** Pencil ribbon. Response (nominal)  $\pm 3$  dB, 70-12,000 c/s. Sensitivity 60 dB below at 40 K ohms. Source imp. PRL 30-50 ohms; PRM 250 and 600 ohms; PRH 30-50 and 35 K ohms. Built-in transformer. (M. and H. tapped dual impedance). Price PRL: £8 8s.; PRM and PRH: £8 18s. 6d.



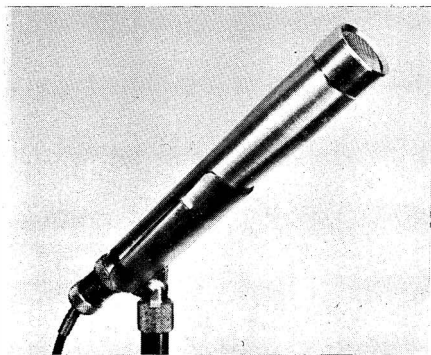
*A pair of Reslo RBT/L*



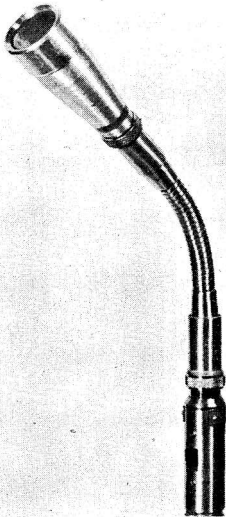
*Pearl LD14 Moving coil*



*STC Type 4113 Ribbon*



*Reslosound Pencil Dynamic Type PD*



*Reslosound Type MPD*



*Shure 55S Small Unidyne*

**Accessories:** Type **GE1**. Transistor coupler unit, for use between any impedance microphone (unbalanced) and the high impedance (nominal 100,000 ohms) microphone input of tape recorder or power amplifier. Response within 1 dB 40-20,000 c/s. Price: £7 7s.

**Reslo SR1 Studio.** Studio quality ribbon. Figure of eight, but can be modified by filter pad provided for high quality speech. Response 30 c/s-20 Kc/s  $\pm 2$  dB. Sensitivity 73 dB below for 300 ohms model SR1/M. Imp (SR1/L) 30-50 ohms, (SR1/M) 300 ohms. Transformer included in tubular base. Price: £38 17s. (including accessories).

**Reslo VRT Broadcasting.** Miniature high-quality ribbon. Figure-of-eight, can be modified by filter pads. Response 40 c/s-16 Kc/s  $\pm 2$  dB. Sensitivity 81 dB below for 300 ohm model VRT/M. Imp. (VRT/L) 30-50 ohms, (VRT/M) 300 ohms. Transformer included in tubular base. Small size, realistic quality, able to change characteristic by fitting optional acoustic filter pads. Price: £15 15s. (including cable set and other accessories).

**Reslo RBT Series.** High quality miniature ribbon. Figure of eight, modified as required by filter pads. Response 30 c/s-16 Kc/s  $\pm 3$  dB. Sensitivity 58 dB below for high impedance model (nominal 40 K). Imp. (Model L) 30-50 ohms, (Model M. dual impedance) 250 and 600 ohms, (Model H dual impedance) 30-50 ohms and 40 K. Transformer in base casting. Model TS (with switch) also available. Price RBT/L: £10 2s.; RBT/M & H: £10 12s. 6d.; Model TS: £2 5s. extra.

**Reslo CD.** Moving coil, cardioid. Response 100 c/s-10 Kc/s  $\pm 5$  dB. Sensitivity 49 dB below for Model H (nominal 40 K). Imp. (Model L) 40 ohms, (Model M) 250 and 600 ohms, (Model H) 30-50 ohms and 40 K. Transformer in medium and high impedance models. Optional perspex ring for speech presence. Price CD/L: £10 15s. 6d.; CD/M and CD/H: £11 6s.

A "Hand" model with switch is also available, model CDHS. Price CDHS/L: £13 2s. 6d.; CDHS/M & H: £13 13s.

**PD.** Pencil mic. Moving coil. Omni-directional, when vertical; rear response -18 dB at 11 Kc/s, when horizontal. F.R. 50 c/s-15 Kc/s (-4 dB at 100 c/s, +2 dB at 14 Kc/s. Sensitivity 88 dB below 1V/dyne/cm: (30/50 ohms). Imp. 30/50 ohms (PDL); 250 or 600 ohms

(PDM); 30/50 ohms or 40 K (PDH). Transformer fitted. Melanex diaphragm. Suitable for high quality music recording. Price (incl. stand holder) PDL: £10 10s.; PDM: £11 11s.; PDH: £11 11s.

**MPD.** Miniature pencil mic. Moving coil. Omni-directional, when vertical; rear response  $-18$  dB at 11 Kc/s, when horizontal. F.R. 50 c/s-15 Kc/s ( $-20$  dB at 50 c/s; response hinging at 300 c/s  $+2$  dB at 14 Kc/s.) Sensitivity 88 dB below 1V/dyne/cm.: Imp. 30/50 ohms. Melanex diaphragm. Suitable as lavalier or stand mic. Price (incl. lavalier attachment MPDL): £9 9s.

**Type CR.** Ribbon; cardioid. Response 15-20 dB front to back discrimination over range 1,800 c/s-12.5 Kc/s, 30 dB at 5-6 Kc/s,  $-5$  dB at 60 c/s,  $+4$  dB at 16 Kc/s. Sensitivity  $-58$  dB. Imp. (CRL) 30-50 ohms; (CRM) 250, 600 ohms; (CRH) 30-50 ohms and high. Built-in transformer. Useful for difficult acoustic conditions. Price (CRL): £10 2s.; (CRM, CRH): £10 12s. 6d.

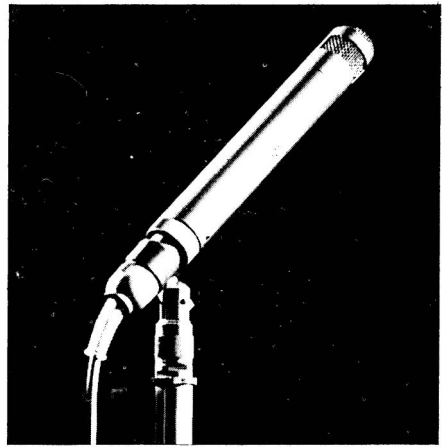
**Type LTU1.** Line coupling transformer unit, for use between a low impedance microphone (15 to 50 ohms) and the high impedance (nominal 100,000 ohms) microphone input of tape recorder or power amplifier. Response  $\pm 1$  dB, 50-15,000 c/s. Price: £4 4s.

Types **MT101** and **MT102.** Line coupling transformer for chassis or unit mounting, for use between a low impedance microphone (MT101 for 15-50 ohms, MT102 for 250-600 ohms) and the high impedance (nominal 100,000 ohms) microphone input of tape recorder or power amplifier. Response  $\pm 2$  dB, 50-15,000 c/s. Price, MT101: £2 12s. 6d.; MT102: £2 18s.

**TMI.** Stereo mic. mount with 10 yards of cable for each mic. Knurled locking rings fix each mic. in optimum position. Price: £6 6s.

**TSA.** Switch adaptor. For all non-switched microphones. Price: £2 10s. 6d.

Microphone stands: **Floor model.** Fixing to base by collar and nut. Min. height 38 in.; max. height 60 in. Weight 12 lb. Price: £6 15s. 6d. **Table model.** Min. height 16 in.; max. height 26 in. Weight  $2\frac{1}{2}$  lb. Price: £3 17s. 6d. **Desk model (round).** Height  $5\frac{1}{2}$  in. Base dia.  $6\frac{3}{4}$  in. Weight 22 oz. Price: £1 17s. **Desk base model (optional switch).** **Type SR.** Pressure Mazak die-casting arranged with cable slot and recessed to accept Reslo standard 3 pin external



*S.T.C. 4108 condenser*



*S.T.C. 4037-A moving coil*



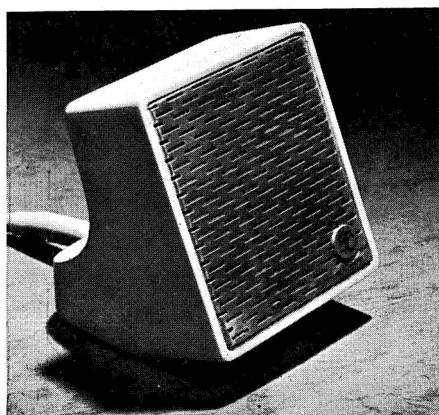
*Shure 545 Unidyne III*



*Simon Cadenza crystal*



*S.T.C. 4033 moving coil and ribbon*



*STC Type 4114 Moving Coil*

run plug. Size:  $4\frac{1}{2} \times 3\frac{1}{4}$  in. Price: £1 9s. Type SF supplied with alternative silent cushioning in place of rubber feet fitted to SR model. Price: £1 14s. Slide switch for muting when microphone is permanently fitted to desk base, price: 13s.

Other accessories available include mounting units, cables, reducers, adaptors etc.



**RONETTE.** Distributors: H. K. Harrison & Co. Ltd., 1-3 Jacobs Well Mews, George Street, London, W.1. Tel.: Welbeck 9453/9606. Cables: Empirian, Audley.

**Ronette MM-65.** Crystal. Omni-directional. Response 30 c/s-10 Kc/s. Imp. 5 megohms. 300 pF. Small and rugged. Price: £2 5s.



**SCHOEPS.** Distributors: C. Hammond & Co. Ltd., 296 Kensington High Street, London, W.14. Tel.: Western 4343.

Condenser microphone system, consisting of power supply, body and various screw-in capsules:

**M221B.** Mic. body. Price: £33 10s.

**N20B.** Power supply unit. Price: £41 10s.

**MK24** capsule. Cardioid. Price: £30 18s.

**MK22.** Omni-directional. Price: £27 12s.

**MK23.** Omni-directional. Has slight treble lift. Price: £27 12s.

**MK240.** Cardioid. Has slight bass cut. Front to back ratio 1,000 c/s better than 31-dB. Price: £30 18s.

**MK26.** Cardioid/bi-directional/omni-directional. Price: £40 16s.

**MK28.** Bi-directional. Price: £30.

**M934B.** Cardioid/omni-directional. Price: £39.

Full range of accessories available.



**SENNEHEISER ELECTRONICS.** Distributors: Inpectron Ltd., Inpectron House, 125



Gunnersbury Lane, Acton, London, W.3. Tel.: Acorn 8762.

A range of Sennheiser microphones is available. Details on application.



**SHURE ELECTRONICS LTD.**, 84 Blackfriars Road, London, S.E.1. Tel.: Waterloo 6361.

**55S Small Unidyne.** Cardioid moving coil. Response 50-15,000 c/s. Sensitivity -57 dB at high impedance. Sourceimps. 35-50, 150-250 ohms, and high. Switched transformer built-in. Price: £27 13s. 4d.

**535 Slendyne.** Moving coil. Response 60-13,500 c/s. Sensitivity -61 dB. Sourceimps. 50-250 ohms and high. Switched built-in transformer. Price: £24 6s. 8d.

**545 Unidyne III.** Cardioid moving coil. Response 50-15,000 c/s. Sensitivity -55 dB. Source impedance 25-250 ohms and high. Built-in transformer. Price: £28 6s. 8d.

**Sonodyne II Model 540S.** Moving coil microphone. Response 60-15,000 c/s variable. High output. High and low impedance. Price: £16 13s. 4d.



**SIMON EQUIPMENT LTD.**, 48 George Street, Portman Square, W.1. Tel.: Welbeck 2371. Cables: Simsale, London.

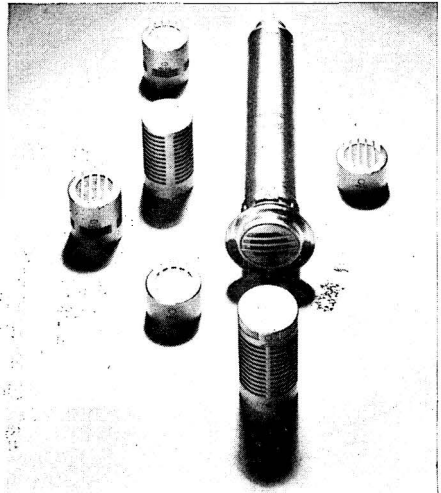
**Cadenza Ribbon.** Response 50-12,000 c/s. Sensitivity, high impedance -58 dB, low impedance -93 dB, or with suitable line transformer -58 dB. Source imp. 30 ohms and 80 K ohms. Price: £8 18s. 6d.; with tripod desk stand and 11 ft. cable: £10 10s.

**Cadenza Crystal.** Response 30-8,000 c/s. Sensitivity -47 dB. Optimum load 10 megohms. Minimum load 1 megohm. Price: £3 13s. 6d.

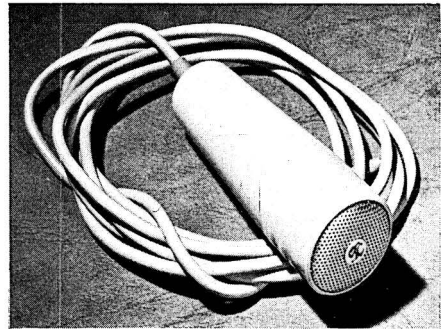


**S.T.C. LTD.**, Electromechanical Division, West Road, Harlow, Essex. Tel.: Harlow 21341.

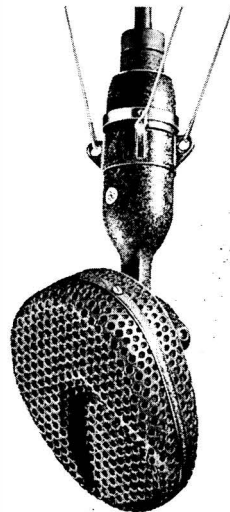
**4021-J.** Spherical omnidirectional moving coil. Flat response 30-15,000 c/s. Impedance 30 ohms. Sensitivity -80 dB. Price £16 10s.



*Schoeps Condenser Microphone System*



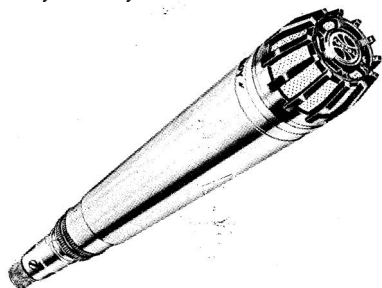
*STC Type 4118 Moving Coil*



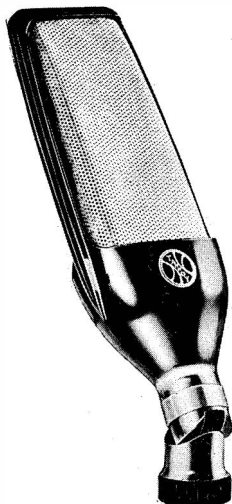
*S.T.C. 4038 A ribbon*



*Tannoy Slendalyne ribbon*



*Tannoy Slendalyne moving coil*



*Tannoy Velocity Ribbon*

**4032-G.** Moving coil hand microphone. Flat response 40-10,000 c/s. Impedance 30 ohms. Sensitivity -78 dB. Windshield available. Price: £16 10s.

**4033-A.** Cardioid microphone. Moving coil and ribbon elements which can be used individually or in combination. Flat response 30-10,000 c/s. Impedance 50 ohms. Sensitivity 80 dB. Front to back ratio 15 to 20 dB. Price: £54.

**4037-A.** Moving coil unobtrusive "Pencil" microphone. Flat response 30-15,000 c/s. Impedance 30 ohms. Sensitivity -84 dB. Price: £22 (long model).

**4038-A.** Studio ribbon microphone. Accurate figure-of-eight polar response. Flat response 30-15,000 c/s. Impedance 30 ohms. Sensitivity -85 dB. Non-linear distortion 0.1%. Controlled transient response. Price: £43 10s.

**4104-B X C.** Commentator's lip microphone. High degree of noise cancellation. Flat response 70-10,000 c/s. Impedance 30 ohms. Output -82 dB ref. 1V for 10 dynes/cm<sup>2</sup>. Price: £70.

**4105-A.** Cardioid moving coil. Flat response 60-10,000 c/s. Impedance 30 ohms. Sensitivity -82 dB. Front to back ratio 15 to 20 dB. Price: £22 10s.

**4108.** Condenser. Cardioid. Response 30 c/s-20 Kc/s. Sensitivity -60 dB. Imp. 30 or 300 ohms. Transformer fitted. Small directional studio microphone. Price: £96.

**4118.** Moving coil. Omni-directional. F.R. 100 c/s-15 Kc/s  $\pm 4$  dB. Sensitivity -80 dB (200 ohms), -60 dB (50 K with transformer). Neck halter and desk stand available. Price: £4 19s. 6d.

**4113.** Ribbon. Cardioid. F.R. 60 c/s-15 Kc/s  $\pm 3$  dB. Sensitivity -87 dB. Imp. 30 ohms. Desk stand available. Price: £11 11s.

**4114.** Moving-coil. Omni-directional. F.R. 100 c/s-8 Kc/s  $\pm 4$  dB. Sensitivity -80 dB. Imp. 200 ohms. Transformer available to order. Price on application.



**TANNOY PRODUCTS LTD.,** West Norwood, London, S.E.27. Tel.: Gipsy Hill 1131. Cables: Tannoy, London.

**Slendalyne. Single Element Ribbon.** Cardioid. Response 50 c/s-12 Kc/s  $\pm 3$  dB. Sensitivity -82 dB. Imp. 600 ohms. Transformer fitted. High front to rear discrimination 15 dB. Price: £25.

**Slendalyne. Moving Coil.** Omni-direction'al. Response 30 c/s-12 Kc/s  $\pm 3$  dB. Sensitivity -75 dB. Imp. 600 ohms. Transformer fitted. High quality applications under most adverse conditions. Price: £14 10s.

**Slendalyne. Velocity Ribbon.** Figure-of-eight. Sensitivity -76 dB. Imp. 600 ohms. Transformer fitted. Good damping and shock resisting. Price: £10 10s.



**TECHNICAL SUPPLIERS LTD.,** Hudson House, 63 Goldhawk Road, Shepherds Bush, London, W.12. Tel.: Shepherd's Bush 2581/4794. Cables: Teknika, London.

**Studio Mark 2.** Moving coil. Spherical lobe. Response 45 c/s-14 Kc/s  $\pm 2$  dB. Sensitivity 1 mV per microbar at 1 Kc/s. Imp. 50 K. Transformer fitted. Price: £3 19s. 6d.



**TRIX ELECTRONICS LIMITED,** 1-5 Maple Place, London, W.1. Tel.: Museum 5817. Cables: Trixadio, Wesdo, London.

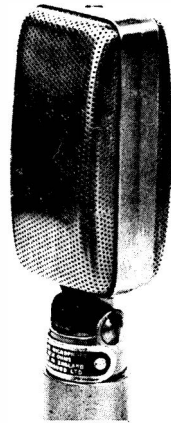
**G7823.** Ribbon. Response 50-12,000 c/s. Source imp. 30 ohms. 18 ft. cable, 3 pin locking type plug. Stands as required. Price: £9 12s. 6d.

**G7852.** Moving coil. Response 50-9,000 c/s. Source imp. 30 ohms. Cable and connector, G7975/H hand type, or G7976/S stand fitting. G7977/N neck sling attachment. Price, microphone: £7 15s.; G7975/H: £1 10s.; G7976/S: £1 10s.; G7977/N: 12s. 6d.

**G7852/F.** Moving coil. Similar to G7852 but incorporating flexible stem. Cable and connection G7976/S for stand fitting. Price, microphone: £8 5s.; G7976/S: £1 10s.

**M88.** Moving coil. Omni-directional. Response 50-17,000 c/s. Source imp. 30 ohms. Price: £26 10s.

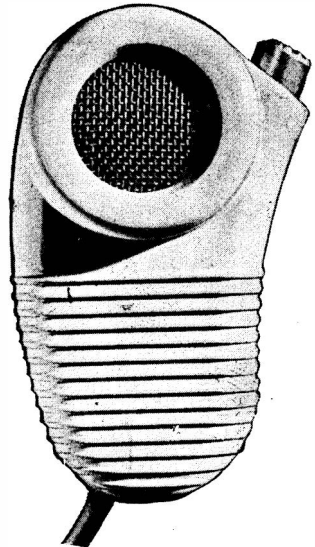
**G7854.** Moving coil. Response 100 c/s-11 Kc/s. Imp. 30 ohms. Hand-type, complete with cable. Price: £7 7s. Can be used with neck sling attachment G7977/N, also with stand fitting with swivel clip attachment G7979/C: 18s. 6d.



*Reslo Studios SR1 ribbon*



*Trix G7854 moving coil*



*Vitavox B50 moving coil*

**M76A.** Moving coil. Cardioid. Response 100 c/s-15 Kc/s. Sensitivity -63 dB. Imp. 30 ohms. Attenuation—rear to front, -20 dB. Price: £19 15s.

**G7871/D.** Moving coil. Response 50 c/s-8 Kc/s. Source imp. 30 ohms. 18 ft. cable, with switch. Stands as required. Price: £7 15s.



**UHER.** Distributors: Bosch Ltd., 205 Great Portland Street, London, W.1. Tel.: Langham, 1809.

**M131.** Moving coil. Omni-directional. Response 80 c/s-10 Kc/s. Imp. 200 ohms. Has own stand. Price: £4 4s.

**M152.** Moving coil. Omni-directional. F.R. 50 c/s-10 Kc/s. Imp. 200 ohms. Record/Stop/Start/Rewind control. Price: £10 10s.

●**M581.** Stereo microphone. Moving coil with cardioid directional patterns. F.R. 80 c/s-14 Kc/s. Imp. 200 ohms. Price: £21.

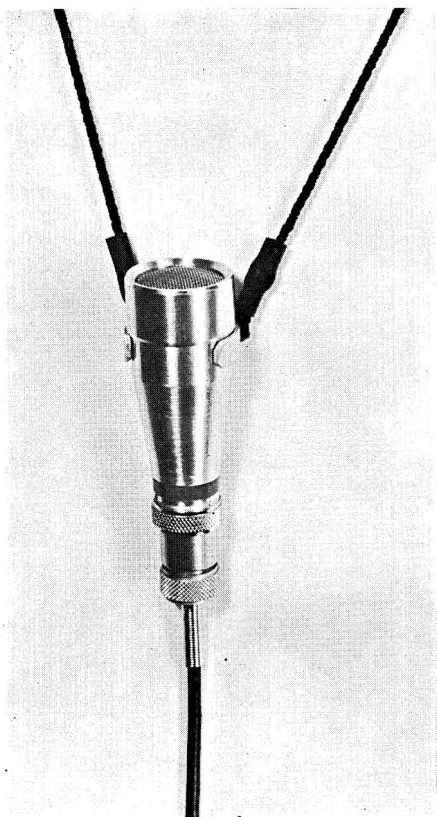


**VITAVOX LIMITED,** Westmoreland Road, London, N.W.9. Tel.: Colindale 8671. Cables: Vitavox, Hyde, London.

**B50.** Moving coil. Response 60-8,000 c/s. Sensitivity -85 dB. Source imp. 25 ohms. 6 ft. cable. Price, with control switch: £6 10s.

**B51.** Crystal. Response 60-8,000 c/s. Sensitivity -50 dB. Source imp. 1 megohm. 6 ft. cable. Price, with control switch: £5 10s.

**B54.** Moving coil. Response 60-8,000 c/s. Sensitivity -85 dB (excluding transformer).



*Reslosound Type MPDL*

Source imp. according to built-in transformer 200, 500, 10,000, 100,000 ohms. Price, complete with control switch: £8.

**Type A.** Moving coil. Response 60-8,000 c/s. Sensitivity -68 dB. Source imp. 25 ohms. Rec. load imp. 25 ohms. Price: £9 9s.

# SELECTING A SPEAKER

by Rex N. Baldock

**A**LTHOUGH many speakers have appeared over the years advertised as 'faultless', 'distortionless', 'perfect' and so on, their designers usually seem to find it necessary to replace them with 'better' models, sometimes after a short period of manufacture. As a consequence, potential buyers must sometimes wonder if these speakers are possibly not quite as good as claimed, at the same time feeling somewhat hazy regarding the true performance.

## Most difficult of All

Choosing a speaker system must surely be the most difficult part of assembling an audio chain as so many factors have to be taken into account, not least being that of personal preference regarding the type of music to be reproduced. Further, when installed the appearance should be compatible with other furniture without undue sacrifice of acoustic performance. All this gives wide scope for new ideas, and in the pages following this article there will be found a bewildering variety of drive units and complete systems, each having some attractive feature such as low price, efficiency, small size, good appearance or quality of output. Unless it is known in just which direction the intending buyer is looking, it is impossible to give definite advice, but some general pointers may make the decision easier.

## The final Assessment

In spite of all the elaborate tests that can be carried out on speaker performance, the overall value of the results can only be finally assessed by the human ears and brain. Some may find this surprising until it is borne in mind that the ultimate aim is the satisfaction of this complicated receptor. Measurements can be very useful to verify general design, but even

if accurate in themselves they are never *sufficient* to describe results completely, particularly regarding *musical* value. One effect of these limitations is that speaker systems having similar measured performances can sound quite different, even though working under the same acoustic conditions. Again, a system having only a modest specification may be preferred on listening tests to another measured as near faultless. This only emphasises what has often been said in the past—one listens to sounds not specifications!

Some people find it difficult to make acoustic judgements without being influenced by the cost of the speaker system, and to avoid prejudice the only fair test is given by a direct comparison, in the same acoustic environment, with speakers concealed and without listeners (including, preferably, the demonstrator) being aware of which is in operation. Ideally, each system should be fed with an equalised drive best suiting its characteristics and so arranged that similar output levels are obtained. The differences then heard will be those that are *really* significant.

## Effects of Room Acoustics

Proper comparisons as described above are seldom heard because in most instances the driving equipment and acoustic conditions are not common to the systems under test. Many people do not realise just how much room acoustics can affect speaker performance until they happen to use theirs in fresh surroundings. Allied with these difficulties is the fact that it is the easiest thing in the world to make a high quality speaker sound appalling: merely feed it with inferior programme material.

To compensate for these variables the listener must make the necessary allowances, but of greater importance would seem to be the

approach to the whole subject of sound reproduction. There is quite a sizeable proportion of the 'hi-fi' public who, notwithstanding the fact that they have never attended a concert, consider themselves competent to judge what constitutes natural music reproduction. Even worse, a few speaker designers also fall into this category and present the public with systems giving superficially spectacular but basically unnatural results. If only these people would take an evening off to attend a concert, they might become less complacent about the 'perfection' of their contrivances. Fortunately such products are now much rarer than formerly, but examples giving 'one note bass' and very peak upper-middle output still appear occasionally. Assuming that the buyer is interested in obtaining as natural a reproduction of music as possible, then a useful asset will be a relatively fresh memory of the type of sounds heard in the concert hall.

### Mono or Stereo?

Possibly the first consideration should be whether the final system will be mono or stereo. If the former, then the choice of speaker may turn out to be less suitable for subsequent use with stereo signals. Most people prefer a speaker to give as large an apparent source as possible for mono music use, using either reflection principles or multiple units, but this may not be the best choice for stereo. There can be little doubt now that stereo of equivalent *quality* gives results superior to mono on nearly every type of signal, but this does not mean that mono, particularly double, need be 'dull and flat', as is sometimes suggested when justifying stereo. Many mono signals can and do give life-like results, especially where only solo or a few instruments are involved. Speech, particularly, can be accurately positioned and is easier to keep natural. Where stereo scores is in the separation of instruments from each other and their reverberation, so giving the brain greater opportunity to explore the sound field and observe inner detail. But just how well this may be accomplished depends very much on the speakers and their placing under particular room acoustics.

### Size and Appearance

For many people the overriding considerations in selecting a speaker will be size (or lack of it) and appearance. Designers are now obtaining very good results from systems which only a few years ago would have been regarded as quite inadequate in volume for extended bass performance. Coupled with this reduction in volume, much greater thought is now put into the finished appearance and some

are now accepted as attractive additions to existing furnishing schemes. Enclosure proportions have gradually evolved from a more or less cubic shape to a slim appearance, with other dimensions chosen to give a pleasing outline. How this affects apparent volume is illustrated in **fig. 1** showing how 8 cu. ft. may be disposed, starting with (a) the older obtrusive box, through (b) and (c) to (d)—the present and probably future trend toward the panel system, only inches thick and tending to merge with the wall.

### Good Bass from Small Enclosures

For a long time there has been a tendency to equate bass performance with enclosure size; using a given drive unit this is to a large extent reasonable since, if the available air volume is utilised intelligently, the low frequency coverage will be extended by an octave if enclosure dimensions are doubled (eight times volume). But small systems can also be made to perform well at low frequencies, using adequate diaphragm area and movement at the expense of electro-acoustic efficiency.

The bass loading arrangements used with speakers may be classed into doublet (no baffle), flat or folded baffle, true 'infinite' baffle, acoustic suspension (closed), labyrinth, reflex (vented), column and horn. All are capable of good results and the buyer should avoid thinking one principle is necessarily better than another. Results can depend a lot on the designer's success in reducing unwanted secondary effects. Differences in damping, harmonic generation and response range will be noticed, but the major contrast will usually lie in acoustic output and electro-acoustic efficiency.

### Consider the Amplifier

This latter property, taking the whole frequency spectrum into account, may lie inside a range of 30 : 1 with commercially available speakers, and therefore the associated amplifier rating must be decided accordingly. In general, there is no harm in using an amplifier whose output is rated at several times the continuous figure quoted for the speaker, as the *average* power encountered with music is nearly always many times less than the peak. Most speakers will not suffer if overdriven excessively for short periods up to a few seconds. For domestic listening conditions a *peak* amplifier power rating in watts of about  $\frac{40}{(\text{speaker } \% \text{ efficiency})}$

should be adequate. However, one disadvantage here is that it is usually very difficult to obtain reliable values of speaker efficiency. As a general guide, the 'average' hi-fi speaker system appears, from subjective comparisons, to

have an efficiency under normal domestic conditions of between 3 and 5%, so an amplifier rating of about 10W would be desirable. Because of the high peak/mean ratios found in music (and almost all audio signals) it would be perfectly safe to use such an amplifier with a speaker rated at only 3W continuous.

### The ears and dB

Some speakers are rated to handle 50W or more, but this is often associated with an electro-acoustic efficiency of 1% or less, so the final acoustic output is not necessarily enormous. In addition, the wattage referred to is sometimes that related to square rather than sine-wave testing, so giving a boost of 3 dB, or twice the rating. Actually, the audible result of doubling power at comfortable levels is only mildly noticeable, and something nearer ten times is needed to give a striking subjective change. This is because the ear is sensitive to pressure changes which are proportional to the square root of power changes; not only this, but the effects of pressure changes are compressed by the ear's logarithmic behaviour. The result is that switching over to an amplifier rated at, say 20W, will only give a slight audible margin as compared with another rated at 10W, *provided both give equal quality performance at their respective ratings*. In the past, larger amplifiers have often seemed to give very worthwhile increases in apparent power output, but this could usually be traced to a much improved performance as regards distortion and damping factor.

Very few speakers will handle their full rated input at low frequencies without generating appreciable distortion in some form. Most people can detect small amounts of distortion at middle frequencies, but below about 80 c/s their discrimination is often marred by unfamiliarity with the sound of pure tones and they mistake harmonic effects for true bass. This may not be too important for single tones, but when several are present together the consequent intermodulation products can give a roughness and lack of definition. If only of moderate degree this can pass unnoticed, though the listener may suffer from fatigue and diminishing interest, seldom noticed at a concert.

### Distortion

A good speaker system will only give an atmosphere of bass when it should be present; systems giving an unnatural warmth should be considered suspect, although it is important to be sure that the room is not contributing excessive resonance. This can be difficult to distinguish from speaker resonance in the bass region and is an important factor to bear in mind when attempting to compare systems situated in different rooms. Balance should be noted in different positions, also bearing in mind that extreme reproduction becomes difficult in small rooms. Another point influenced by unhappy experiences with resonances from earlier speakers is the rejection by some of any speaker giving even a proper degree of warmth and roundness. They would

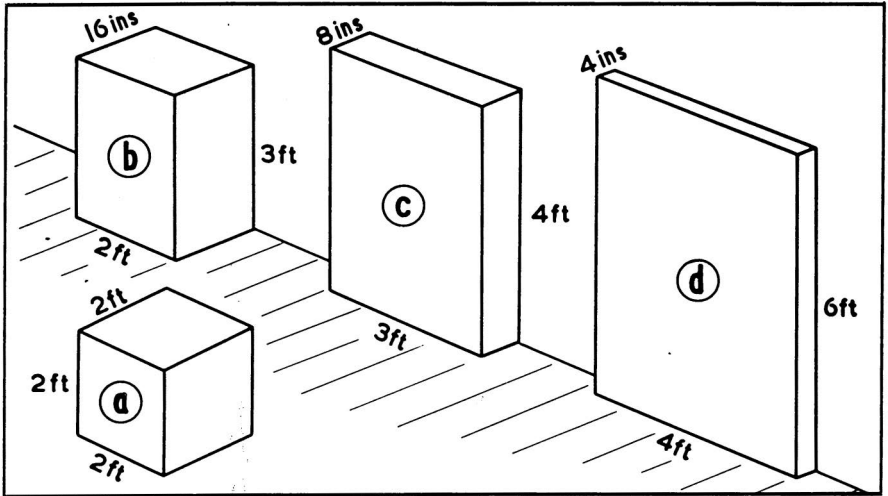


Fig. 1. Each of these shapes encompasses the same volume and could therefore be used to offer the same acoustic loading to a speaker unit (in theory). The present trend in design is toward the slimmer enclosure.

do well to hear again just how much is produced by a bass fiddle played in a small hall!

In the past the need to use considerable amounts of bass boost was looked on with disfavour and the speaker regarded as incorrectly designed. With most of the latest very compact systems, however, it is not only *beneficial* to use such boost, but theoretically *necessary* because of their acoustic construction, and if adequately rated and used with a suitable amplifier, overall performance can be excellent. Once again, the ears know best and tone controls should always be set for optimum balance. Even better, if the required corrections can be incorporated separately as a permanent feature, the tone controls may then be used normally to cope with changes in programme material.

### The Middle Frequencies

Judging the performance of speakers at middle frequencies is rather easier, although the room can still upset results to a considerable extent. Even so, it becomes increasingly easier with frequency to separate aurally coloration duets room and unit/enclosure. This is not usually shown up by the frequency response. Many speakers having a satisfactory smooth *steady* response exhibit marked coloration, mainly due to 'ringing' after the signals are removed. This is really the consequence of energy storage and interchange in and amongst the system components. In theory any 'hang-over' in a speaker is undesirable. Nevertheless, all speaker systems are deficient to some extent in one or more respects and the presence of a suitable proportion of what might be termed 'acceptable coloration' can give audible improvement in some cases. Such effects as apparent source-area are the subject of much controversy in audio circles and there are some who maintain that if only effectively small diaphragms are employed, then judicious and carefully damped additions of panel vibration

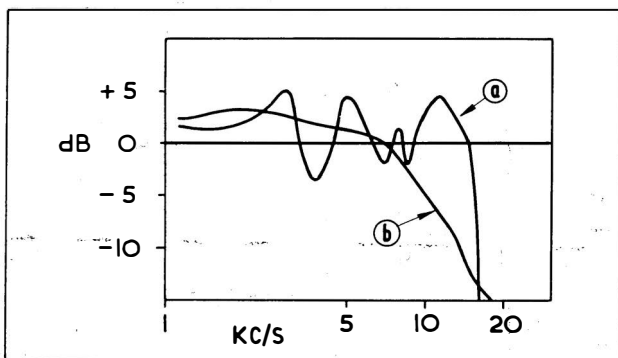
can improve results at middle and low frequencies. So buyers need not look askance if an enclosure's panels appear too thin. It all depends on the design; thick and massive panels are not *always* the answer.

### Shrillness and Brightness

In the upper-middle range around 2 Kc/s the general opinion favours a smooth and well damped response for high quality results. This is a region where many large paper cone units introduce a false brightness due to resonances and breakup into spurious modes, often mistaken for efficiency. Unfortunately, some tweeters of smaller but basically similar design merely evince such behaviour in the 2 to 10 Kc/s range, thereby adding 'shrillness' to 'brightness'. It needs a fair experience of listening to live music to detect with ease high frequency reproduction that is smooth in all respects, but a study of steady-state response curves can yield some information. For instance, on specification requirements alone the high frequency response shown in **fig. 2(a)** might be claimed as being within  $\pm 5$  dB up to 15 Kc/s. In comparison, curve (b) looks inferior *on paper*, but would almost certainly sound smoother in practice. It would lack apparent balance compared with (a) (at least on axis) but this could be restored using treble boost and the overall result would then be superior.

### The Higher Frequencies

It is in the middle and lower treble ranges that electrostatically driven or sandwich foam diaphragms can show marked improvements in clarity and smoothness as the result of more predictable operation, but for the highest frequencies the system with least effective mass per unit area tends to give the finest performance. It would be more correct to refer to *waveform* here, and for sudden changes the ribbon unit takes first place amongst commer-



**Fig. 2.** Response (a) is well maintained compared with (b), but it will sound less pleasant than (b) when the latter is flattened by means of electrical treble lift.



cially available products, with the best electrostatic units a close second. Following these are the small diaphragm moving-coil units, either as part of a twin or triple cone unit or as a separate tweeter. Although capable of excellent results, this type of high frequency radiator is very difficult to design and can introduce a certain 'fizziness' due to edge reflections. On speech this can give a reproduction that is 'too real'—fascinating at first but slightly irritating over a long period. Even an 8 in. single cone unit can be made to behave quite efficiently and nicely if it vibrates in a graded fashion. This means that its effective radiating area reduces with frequency, until at high frequencies only the coil, former and central parts of the cone are operative. One bonus from this decoupling action is that radiation of high frequencies is less 'beam like' than would otherwise occur.

This last point introduces another aspect of speaker performance. Assuming the designer has overcome the numerous problems involved in radiating uniformly a 1,000 : 1 range of frequencies from any transducer with low amplitude distortion and adequate damping, there remains the task of distributing the acoustic energy in the listening room. The introduction of domestic stereo some years ago highlighted the need for more research into polar response. Many a speaker having a 'flat' axial response will be found to give one severely attenuated at high frequencies 60° off axis (fig. 3(a)), whereas others, although suffering from a falling axial response, may show little degradation off axis (b). Given treble boost the latter will achieve a satisfactory omnidirectional (or all-round) response and the direct radiation will be similar for all listeners.

### Sound Distribution

For monophonic signals most people preferred (and still prefer) a sound-source giving either very wide distribution at all frequencies,

or else covering a limited but sufficient listening angle, the frequency and polar response being uniform within this angle. One advantage of the latter type is that, although difficult to design, it minimises the excitation of room coloration and on many signals this shows to advantage.

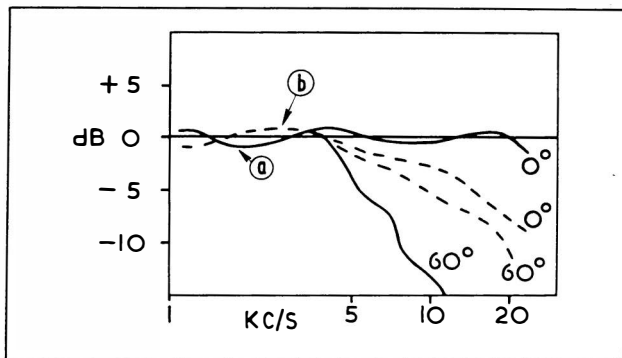
The use of either of these systems for stereophonic reproduction may or may not be considered suitable and it is in this aspect that most differences of opinion arise. The protagonists of these and other systems all have strong arguments to show that their particular ideas are correct; but on closer questioning it is usually found that they favour enhancement of one facet of musical enjoyment to the detriment of another.

Briefly, the 'omnidirectional' camp maintain that, using such speakers, unpleasant effects due to interference phenomena when simulating single images will be minimised, and that sufficiently accurate positioning is obtained, at least as far as music is concerned. In contrast, the 'controlled forward radiation' camp assert that good stereo is not possible with omnidirectional speakers and that to achieve accurately defined and placed images, forward radiating vertical strip units are essential, having specially tailored polar characteristics giving minimum image shifting for off-axis listeners.

### Speaker Resonance

There seems to be little doubt that the ideals of both groups are justified, although at present all commercial speakers can only offer a compromise solution. That which is best will rest on the buyer's musical preferences, but any speaker which becomes very directional at high frequencies is not likely to be acceptable on either mono or stereo. Because of the highly personal arguments surrounding the subject of distribution, the buyer should choose the system which gives him the best reminder of those

**Fig. 3.** This shows how two speakers may differ in their off-axis high frequency response. Speaker (a) may look theoretically better on axis, but (b) will be much less changeable with listening position and may consequently be better in practice.



qualities which *he* enjoys at a concert and ignore sales talk about 'complete realism' etc.

Yet another aspect of speaker design is that of apparent height of the sound image, primarily in the middle/treble range. Apart from the desirability of avoiding treble absorption by furnishings on its journey to the listeners, there is a subtle effect observed with stereo when the sources are above ear level, in that more distantly recorded sounds appear to emanate from a greater height than those close to. As normal orchestral layout gives a similar effect, a raised speaker system sounds, fortuitously, more natural; always provided the listeners are accustomed to stalls rather than seats behind the orchestra! With forward radiating speakers the source height for a single speaker will be that of the unit centre, or, if containing several units, those handling the treble output. Using speakers employing reflection principles, either internally or by walls, the apparent source may be higher than the unit or enclosure, the actual increase depending on the particular form of reflector and its separation from the drive unit.

#### **The Compromise**

Here again, an arrangement suitable for mono using, perhaps, a speaker spaced several

feet from a reflecting corner, would probably be less appropriate for stereo, the high proportion of indirect radiation confusing the stereo image. For many people a compromise solution using a combination of 'omnidirectional' and forward radiation may prove most acceptable. Obviously, there is an almost endless variety of possible arrangements, some favouring one type of musical performance, some another, and this is why it is important to hear a system reproduce a selection of musical items before passing judgement.

#### **Direct Comparisons**

There is, of course, a great variety of other factors affecting speaker performance, and heated discussions regarding the merits of such things as multiple drive units or enclosure bracing will probably continue for a long time. For those merely trying to choose a speaker from the commercial array, it is suggested they avoid being overawed by enthusiastic (but sometimes ill-informed) talk about flux density, frequency range or type of loading and concentrate on the sounds that *actually* come forth from a fancied speaker. They can't be perfect; but at least make sure they are pleasant!



# 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: **H.C.**—handling capacity; **F.R.**—frequency range; **c/o**—cut-off; **v.c.i.**—voice coil impedance; **r.c.f.**—recommended crossover frequency (and in Part 2) **Rec.**—recommended units; Height by Width by Depth are the order of printed dimensions.

## PART I—DRIVE UNITS

**RICHARD ALLAN Radio Ltd.**, Bafflette House, Taylor Street, Batley. Tel.: Batley 1123/1308/4033. Cables: Acoustics, Batley.

**New Bronze Eight.** 8 in. Paper cone. Paper or fabric surround. Voice coil 1 in. Gap flux 12,500 gauss. Total flux 50,000 maxwells. H.C. 5 watts. v.c.i. 15 ohms. F.R. fabric surround 45-10,000 c/s, paper surround 60-10,000 c/s. r.c.f. Full range unit. With tweeter inner cone. Aluminium voice coil. Range extends to 17,000 c/s. Price, paper surround £2 15s. (U.K. purchase tax 8s. 10d.); foam surround £3 (U.K. purchase tax 9s. 7d.).

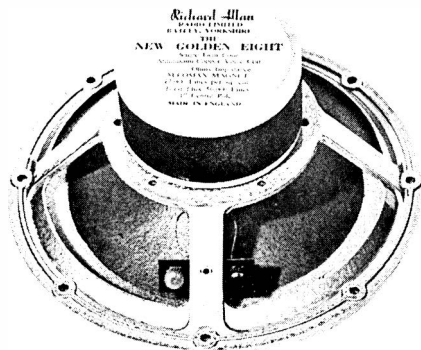
**New Golden Eight.** 8 in. Paper cone. Paper or fabric surround. Voice coil 1 in. Gap flux 14,000 gauss. Total flux 56,000 maxwells. H.C. 6 watts. v.c.i. 15 ohms. F.R. fabric surround 45-10,000 c/s, paper surround 60-10,000 c/s. r.c.f. Full range unit. With tweeter inner cone and aluminium voice coil, range extends to 17,000 c/s. Price, paper surround £3 7s. 6d. (U.K. purchase tax 10s. 10d.); foam surround £3 12s. 6d. (U.K. purchase tax 11s. 7d.). Aluminium or copper voice coil available.

**Bronze Ten.** 10 in. Paper cone. Voice coil  $1\frac{1}{2}$  in. Gap flux 12,500 gauss. Total flux 73,000 maxwells. H.C. 8 watts. v.c.i. 15 ohms. F.R. 40-5,000 c/s (bass cone) or 40-9,000 c/s (wide range cone). Price, standard surround, £4 10s. (U.K. purchase tax 14s. 5d.); foam surround £4 17s. (U.K. purchase tax 15s. 7d.).

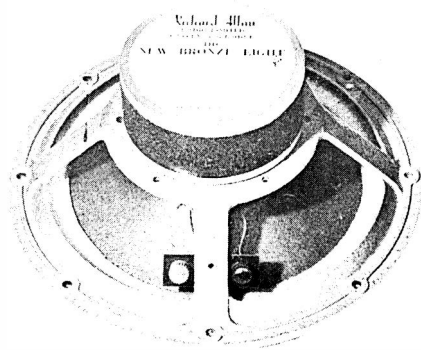
**Golden Ten.** 10 in. Paper cone. Voice coil  $1\frac{1}{2}$  in. Gap flux 14,000 gauss. Total flux 82,000 maxwells. H.C. 8 watts. v.c.i. 15 ohms. F.R. 40-5,000 c/s (bass cone) or 40-9,000 c/s (wide range) cone. Price, standard surround, £5 5s. (U.K. purchase tax 16s. 10s.); foam surround £5 12s. (U.K. purchase tax 17s. 11d.).

**410T. Tweeter.** 4 in. Paper cone and surround. Voice coil  $\frac{3}{8}$  in. Gap flux 10,000 gauss. Total flux 15,000 maxwells. H.C. 3 watts. v.c.i. 15 ohms. F.R. 2,000-17,000 c/s. r.c.f. 5,000 c/s. Price £1 5s. (U.K. purchase tax 4s.).

**610.**  $6\frac{1}{2}$  in. Paper cone. Foam surround. Voice coil  $\frac{3}{4}$  in. copper. v.c.i. 5 or 15 ohms. Gap flux 10,000 gauss. Total flux 25,000 max-



Richard Allan New Golden 8



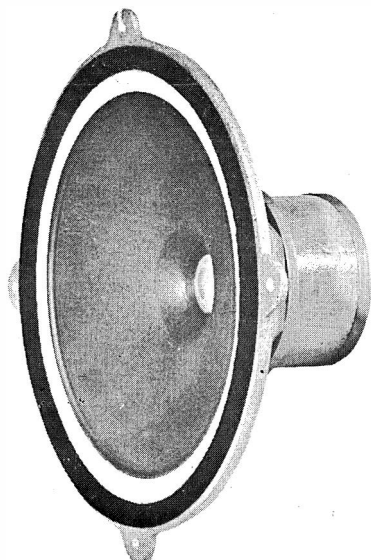
Richard Allan New Bronze 8



*Richard Allan type 1014*



*Richard Allan type 610*



*Bakers Sellhurst 15 in/CS*

wells. H.C. 4 watts. F.R. 80 c/s-12 Kc/s. Price £1 10s. 6d. (U.K. purchase tax 4s. 11d.).

**1014.** 10 in. Paper cone. (Twin cone available.) Foam or paper surround. Voice coil 1 in. copper or aluminium. v.c.i. 15 ohms. Gap flux 14,000 gauss. Total flux 56,000 maxwells. H.C. 8 watts. F.R. Twin cones: with foam surround 40-17,000 c/s, with standard cone 55-17,000 c/s. Single cone: with foam surround 40-10,000 c/s, with standard cone 55-10,000 c/s. r.c.f. 5,000 c/s. Price (paper) £4 7s. 6d. (U.K. purchase tax 14s.); (foam) £4 12s. 6d. (U.K. purchase tax 14s. 10d.). Tweeter cone 5s. 0d. (U.K. purchase tax 10d.).

**CB12.** 12 in. Single paper cone. Doped fabric surround. Voice coil  $1\frac{1}{2}$  in. (copper). v.c.i. 8 or 15 ohms. Gap flux 12,000 gauss. Total flux 73,000 maxwells. Ceramic magnet. H.C. 8 watts. F.R. 20 c/s-5 Kc/s. r.c.f. 1,000 c/s. Price £8 12s. 6d.

**CB12T.** 12 in. Paper cone+tweeter inner. Doped fabric surround. Voice coil  $1\frac{1}{2}$  in. (copper). v.c.i. 8 or 15 ohms. Gap flux 12,000 gauss. Total flux 73,000 maxwells. Ceramic magnet. H.C. 8 watts. F.R. 25 c/s-15 Kc/s. Price £9.

**CG12.** 12 in. Single paper cone. Doped fabric surround. Voice coil  $1\frac{1}{2}$  in. (copper). v.c.i. 8 or 15 ohms. Gap flux 14,000 gauss. Total flux 82,000 maxwells. Ceramic magnet. H.C. 10 watts. F.R. 25 c/s-5 Kc/s. r.c.f. 1,000 c/s. Price £9 7s. 6d.

**CG12T.** 12 in. Paper cone+tweeter inner. Doped fabric surround. Voice coil  $1\frac{1}{2}$  in. (copper). v.c.i. 8 or 15 ohms. Gap flux 14,000 gauss. Total flux 82,000 maxwells. Ceramic magnet. H.C. 10 watts. F.R. 25 c/s-15 Kc/s. Price £9 15s.



**BAKERS "SELHURST" Radio**, 523 London Road, Thornton Heath, Surrey. Tel.: Thornton Heath 7798.

**12 in. de-luxe** fibre curvilinear cone, bakelised apex. Foam surround. Voice coil  $1\frac{1}{2}$  in. Gap flux 15,000 gauss. H.C. 15 watts. v.c.i. 3 or 15 ohms. F.R. 20-16,000 c/s. Price £9 9s.

**12 in. Ultra de-luxe** fibre curvilinear cone, bakelised apex. Foam surround. Voice coil

1½ in. Gap flux 17,000 gauss. Peak H.C. 20 watts. v.c.i. 15 ohms. F.R. 20-18,000 c/s. Price £15 15s.

**Ultra Twelve.** 12 in. fibre curvilinear cone, bakelised apex. Foam surround. Voice coil 1½ in. Gap flux 17,000 gauss. Aluminium voice coil and drive. H.C. 20 watts. v.c.i. 15 ohms. F.R. 20-20,000 c/s. Price £16 16s.

**15 in./CS Auditorium.** Fibre cone, bakelised apex. Foam surround. Voice coil 2 in. Gap flux 15,000 gauss. H.C. 15 watts. v.c.i. 8 or 15 ohms. F.R. 20 c/s-13 Lc/s. r.c.f. 5,000 c/s. Also supplied with normal roll surround rated at 35 watts. Price £18 18s.



**BANG & OLUFSEN**, Struer, Denmark. Sole U.K. Importers: Avey Electric Ltd., South Ockendon, Essex. Tel.: South Ockendon 3444.

**B & O Toroidal Tweeter.** Omni-directional. Comprising 2 moving coil units facing inwards on to a double cone reflector. Response: 2,000-20,000 c/s. Series capacitor incorporated. Size 4½ in. high, 3 in. diameter. Price £6 6s. (U.K. purchase tax £1 1s.).



**DUODE Ltd.**, 16 Brunswick Road, Sutton, Surrey.

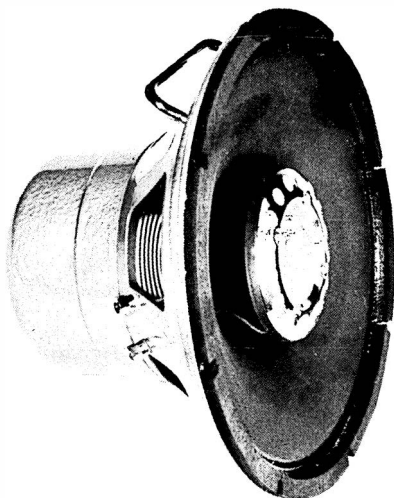
**Duode 12E.** 12 in. Linen moulded cone. Foamed plastic surround. Voice coil 1.5 in. Gap flux 17,000 gauss. Total flux 190,000 lines. H.C. 30-15 watts. v.c.i. 15-8-5 ohms. F.R. 20-16,000 c/s. Price £12.

**Duode 12D.** 12 in. Linen moulded cone. Foamed plastic surround. Voice coil 1.5 in. Gap flux 14,500 gauss. Total flux 130,000 lines. H.C. 15 watts. v.c.i. 30-15-8-5 ohms. F.R. 20-16,000 c/s. Price £9.

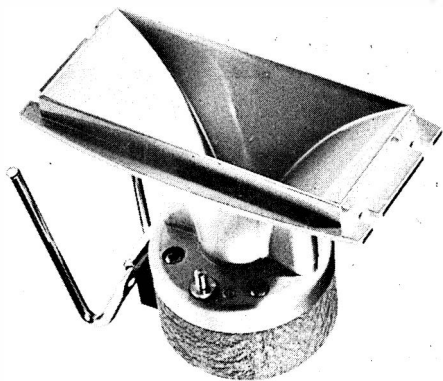


**EAGLE Products.** Distributors: B. Adler & Sons (Radio) Ltd., 32a Coptic Street, London, W.C.1. Tel.: Museum 9606. Cables: Reldab.

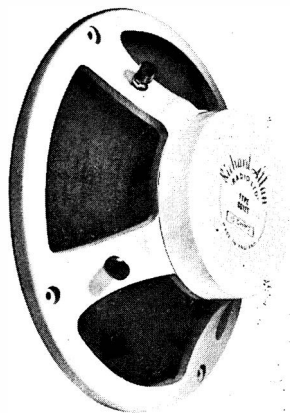
**CR12AE.** 12 in. coaxial. Paper cone, plastic treated surround. 2 in. aluminium voice coil. v.c.i. 16 ohms. Total flux 85,000 maxwells. H.C. 10 W. F.R. 30 c/s-16 Kc/s. c.f. 1,800 c/s. Price £8 8s.



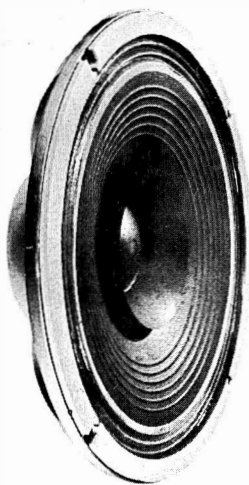
*Eagle CX 3000*



*Eagle HT20 Rectangular Horn Tweeter*



*Richard Allan CG12T*



*Eagle CR12AE*

**8A7.** 8 in. coaxial. Paper cone, plastic treated surround. 1 in. aluminium voice coil. v.c.i. 16 ohms. Total flux 53,000 maxwells. H.C. 6 W. F.R. 50 c/s-16 Kc/s. Price £3 7s. 6d. (U.K. Purchase Tax 11s. 3d.).

**CX300.** 12 in. coaxial. Paper cone, plastic treated surround. 3 in. aluminium voice coil. v.c.i. 16 ohms. Gap flux (woofer) 12,000 gauss; (tweeter) 10,500 gauss. Total flux (woofer) 200,000 maxwells; (tweeter) 18,000 maxwells. H.C. 15 W. F.R. 30 c/s-16 Kc/s. c.f. 2,500 c/s. Price £12 12s.

**CR30AE.** 12 in. coaxial with additional tweeter. Paper cone, plastic treated surround. 2½ in. aluminium voice coil. v.c.i. 16 ohms. Gap flux (woofer) 10,500 gauss; (tweeter) 11,000 gauss. Total flux (woofer) 15,000



*Eagle CT10 Horn Tweeter*

maxwells; (tweeter) 13,000 maxwells. H.C. 10 W. F.R. 30 c/s-16 Kc/s. c.f. 1,800 c/s and 5,000 c/s. Price £10 10s.

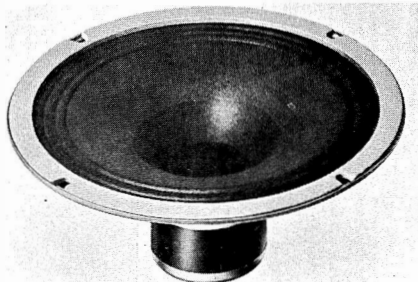
**CT10 Horn Tweeter.** 3¼ in. Aluminium cone and surround. Voice coil 1 in. (aluminium). v.c.i. 16 ohms. H.C. 10 W. F.R. 1,500 c/s-18 Kc/s. r.c.f. 3,000 c/s. Price £1 9s. 6d.

**HT20 Rectangular Horn Tweeter.** 4 × 2 in. Aluminium cone. Voice coil 1 in. (aluminium). v.c.i. 16 ohms. Gap flux 13,500 gauss. H.C. 20 W. F.R. 1,500 c/s-18 Kc/s. r.c.f. 3,000 c/s. Price £3 9s. 6d.



**ELAC. Electro Acoustic Industries Ltd.,** Stamford Works, Broad Lane, Tottenham, London, N.15. Tel.: Tottenham 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. v.c.i. 15 ohms. Gap flux 12,000 gauss. Total flux



*Elac Type 8N/148*

48,300 maxwells. H.C. 5 watts. F.R. 55 c/s-11 Kc/s (loaded conditions). r.c.f. High frequency crossover 8,000 c/s. Price £2 8s. (U.K. purchase tax 7s. 9d.).

**Elac 50/12 (Ceramic magnet).** 8 in. Exponential paper cone, plus inner cone. Paper-plasticised surround. Voice coil 1 in. copper. v.c.i. 3 ohms. Gap flux 10,000 gauss. Total flux 40,300 maxwells. H.C. 5 watts. F.R. 55 c/s-12 Kc/s. r.c.f. High frequency crossover 8,000 c/s. Price including tax £3 3s.



**EMI SOUND PRODUCTS Ltd.,** Hayes, Middlesex. Tel.: Hayes 3888. Cables: Emi-sound, London.

**92390 PAL.** 13½ × 8½ in. elliptical. Paper main-cone/aluminium centre-cone. Paper sur-

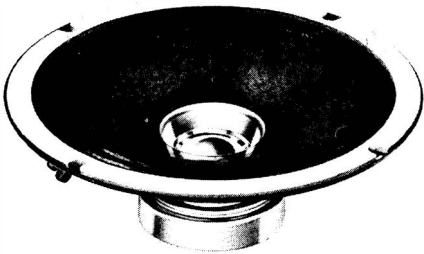
round. Voice coil 1 in. copper wire. v.c.i. 3 ohms. Gap flux 11,000 gauss. Total flux 43,500 maxwells. H.C. 10 W. F.R. 40 c/s-7 Kc/s. r.c.f. 6,000 c/s. Price £2 11s. 6d.

**92390 PBL.** Details as for PAL. v.c.i. 15 ohms.

**92390 PEL.**  $13\frac{1}{2} \times 8\frac{1}{2}$  in. elliptical. Paper main cone/aluminium centre cone. PVC surround. Voice coil 1 in. copper wire. v.c.i. 3 ohms. Gap flux 13,000 gauss. Total flux 69,000 maxwells. H.C. 10 W. (20 W. version also available). F.R. 20 c/s-5 Kc/s. r.c.f. 4,500 c/s. Price £5 19s.

**92390 PFL.** Details as for PEL. v.c.i. 15 ohms.

**92390 PE.** Combination loudspeaker:  $13\frac{1}{2} \times 8\frac{1}{2}$  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. v.c.i. 3 ohms. Gap flux 13,000 gauss. Total flux 69,000 maxwells. H.C. 10 W. F.R. 20 c/s-20 Kc/s. r.c.f. 5,000 c/s. L.C. filter is mounted on chassis. Price £8 5s.



*Elac Type 50/12*

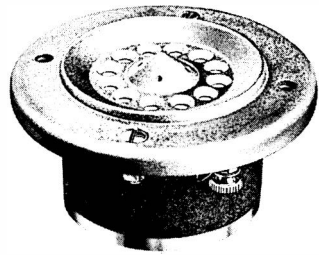
**92390 PF.** Details as for PE. v.c.i. 15 ohms.

**97492 J.**  $2\frac{1}{2}$  in. hard PVC cone. Voice coil  $\frac{1}{2}$  in. copper wire. v.c.i. 3 ohms. Gap flux 8,500 gauss. F.R. 5-15 Kc/s. r.c.f. 6,000 c/s. Price £1 (U.K. purchase tax 3s. 5d.).

**97492 E.** Details as for Model J. v.c.i. 8 ohms.

**97492 C.** Details as for Model J. v.c.i. 15 ohms.

**99110 N.**  $3\frac{3}{8}$  in. curved paper diaphragm. Paper surround. Voice coil  $\frac{1}{2}$  in. copper wire. v.c.i. 3 ohms. Gap flux 10,000 gauss. F.R. 3-20 Kc/s. r.c.f. 4,500 c/s. Price £1 7s. 6d. (U.K. purchase tax 4s. 9d.).



*Fane 301 H.F. Unit*

**99110 J.** Details as for Model N. v.c.i. 8 ohms.

**99110 M.** Details as for Model N. v.c.i. 15 ohms.

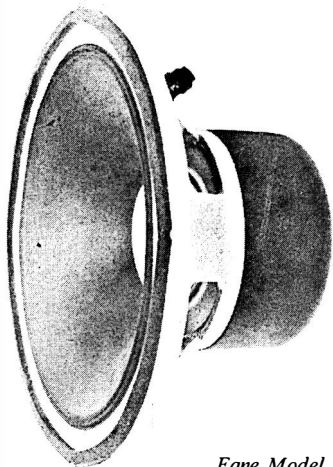


**FANE ACOUSTICS Ltd.**, Hick Lane, Batley, Yorks. Tel.: Batley 1578. Cables: Fane, Batley.

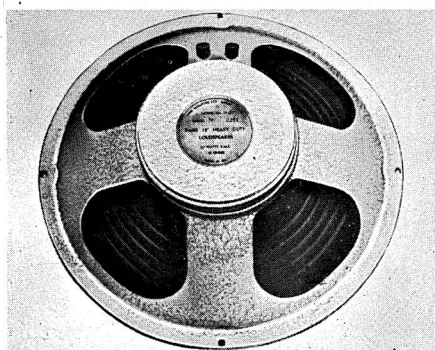
**Model 121.** 12 in. Paper cone. Foam surround. Voice coil 2 in. Gap flux 12,000 gauss. Total flux 160,000 maxwells. H.C. 20 watts. v.c.i. 15 ohms. F.R. 30-5,000 c/s. r.c.f. 2,000 c/s. Price £9.

**Model 121A.** Details as above, but aluminium voice coil. F.R. 30-10,000 c/s. r.c.f. 5,000 c/s. Price £9 9s.

**301 High Frequency Unit.** Aluminium cone. Voice coil  $\frac{3}{4}$  in. Gap flux 17,000 gauss. H.C. 12 watts. v.c.i. 15 ohms. F.R. 1,500-17,000 c/s. r.c.f. 2,000 c/s. Price £3 15s.



*Fane Model 121A*



Fane Model 152/17

**Model 151.** 15 in. loudspeaker. Paper cone. Foam surround. Voice coil 3 in. Gap flux 14,000 gauss. Total flux 361,000 maxwells. H.C. 35 watts. v.c.i. 15 ohms. F.R. 20-3,500 c/s. Price £18.

**Model 122/12.** 12 in. Paper cone. Foam rubber surround. Voice coil 2 in. (copper). v.c.i. 15 ohms. Gap flux 12,000 gauss. Total flux 160,000 maxwells. H.C. 15 watts. F.R. 20 c/s-5 Kc/s. r.c.f. 2,000 c/s. Price £7 10s.

**Model 122/14.** 12 in. paper cone. Foam rubber surround. Voice coil 2 in. (copper). v.c.i. 15 ohms. Gap flux 14,000 gauss. Total flux 187,000 maxwells. H.C. 20 watts. F.R. 20-5,500 c/s. r.c.f. 2,000 c/s. Price £9.

**Model 122/17.** 12 in. Paper cone. Foam rubber surround. Voice coil 2 in. (copper). v.c.i. 15 ohms. Gap flux 17,000 gauss. Total flux 227,000 maxwells. H.C. 25 watts. F.R. 20 c/s-7 Kc/s. r.c.f. 4,000 c/s. Price £12.

**Model 153.** 15 in. (Ceramic magnet.) Heavy duty paper cone. Foam rubber surround. Voice coil 3 in. (copper). v.c.i. 15 ohms. Gap flux 14,500 gauss. Total flux 375,000 maxwells. H.C. 35 watts. F.R. 20-2,500 c/s. r.c.f. 1,500 c/s. Price £16 10s.

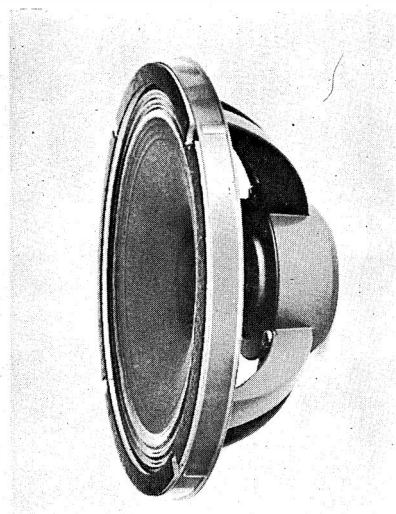
**Model 152/12.** 15 in. Paper cone. Paper surround. Voice coil 2 in. (copper). v.c.i. 15 ohms. Gap flux 12,000 gauss. Total flux 160,000 maxwells. H.C. 20 watts. F.R. 25 c/s-4 Kc/s. r.c.f. 2,000 c/s. Price £10.

**Model 152/14.** 15 in. Paper cone. Paper surround. Voice coil 2 in. (copper). v.c.i. 15 ohms. Gap flux 14,000 gauss. Total flux 187,000 maxwells. H.C. 25 watts. F.R. 25 c/s-5 Kc/s. r.c.f. 2,000 c/s. Price £12.

**Model 152/17.** 15 in. Paper cone. Paper surround. Voice coil 2 in. (copper). v.c.i. 15 ohms. Gap flux 17,000 gauss. Total flux 227,000 maxwells. H.C. 30 watts. F.R. 25 c/s-6 Kc/s. r.c.f. 3,000 c/s. Price £15.

**Model 183.** 18 in. Paper cone. Voice coil 3 in. Gap flux 14,500 gauss. Total flux 375,000 maxwells. H.C. 60 W. F.R. 20 c/s-3 Kc/s. r.c.f. 2,000 c/s. Price £25.

**Model 122/10.** 12 in. Paper cone. Paper surround. Voice coil 2 in. copper. v.c.i. 15 ohms. Gap flux 10,000 gauss. Total flux 100,000 maxwells. H.C. 20 W. F.R. 30 c/s-5 Kc/s. r.c.f. 3,500 c/s. Price £5 5s.



Goodmans Axiom 10



Goodmans Audiom 61



**Model 122/10A.** 12 in. Dual paper cones. Paper surround. Voice coil 2 in. aluminium. v.c.i. 15 ohms. Gap flux 10,000 gauss. Total flux 100,000 maxwells. H.C. 20 W. F.R. 30 c/s-15 Kc/s. Price £6 6s.

**Model 851.** 8 × 5 in. mid-range speaker. Paper cone. Paper surround. Copper voice coil. v.c.i. 15 ohms. Gap flux 15,000 gauss. Total flux 30,000 maxwells. H.C. 15 W. in mid-range. F.R. 800 c/s-5 Kc/s. r.c.f. 800 and 3,500 c/s. Price £3 (U.K. purchase tax 9s. 10d.).



**GOODMANS INDUSTRIES Ltd.,** Axiom Works, Wembley, Middx. Tel.: Wembley 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. H.C. 6 watts. v.c.i. 15 ohms. F.R. 40-15,000 c/s. Price £4 11s. (U.K. purchase tax 14s 7d.).

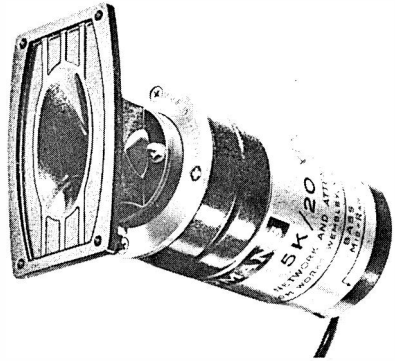
**Axiom 10.** 10 in. Paper cone. Plastic treated surround. Voice coil 1 in. Gap flux 13,500 gauss. Total flux 53,000 maxwells. H.C. 10 watts. v.c.i. 15 ohms. F.R. 40-15,000 c/s. Price £5 8s. 6d. (U.K. purchase tax 17s. 5d.).

**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. H.C. 6 watts. v.c.i. 15 ohms. F.R. 20-20,000 c/s. Price £17 10s. (U.K. purchase tax £2 16s. 3d.).

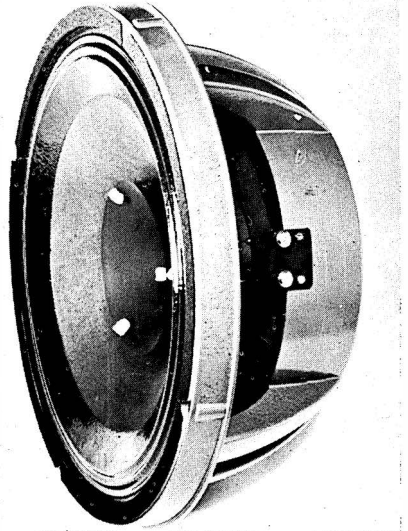
**Trebax.** Horn-loaded pressure tweeter. Aluminium diaphragm. Voice coil 1 in. H.C. suitable for inclusion in systems of up to 25 watts. v.c.i. 15 ohms at 10 Kc/s. F.R. 2,500-20,000 c/s. r.c.f. 5 Kc/s. Price £6 4s.

**Trebax 5K/20XL.** Horn loaded pressure tweeter. Built in L/C crossover (5,000 c/s) and attenuator. Suitable for inclusion in systems of up to 20 watts. Dispersion angle 90°. Price £7.

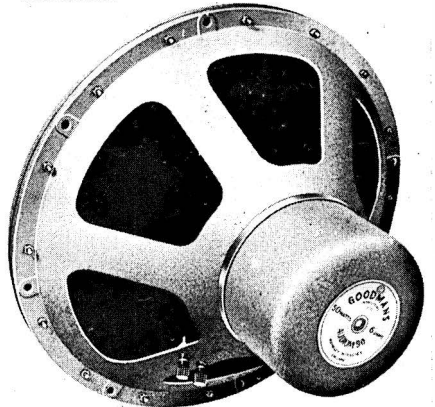
**Midax 650.** Horn loaded pressure unit. Resin impregnated linen diaphragm. Die-cast horn. Voice coil 1½ in. H.C. suitable for systems up to 25 watts. v.c.i. 15 ohms. F.R. 650-8,000 c/s. r.c.f. 950 and 5,000 c/s. Price £9 10s.



*Goodmans Trebax 5K/20 XL*



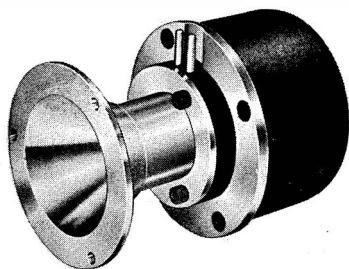
*Goodmans Axiom 101*



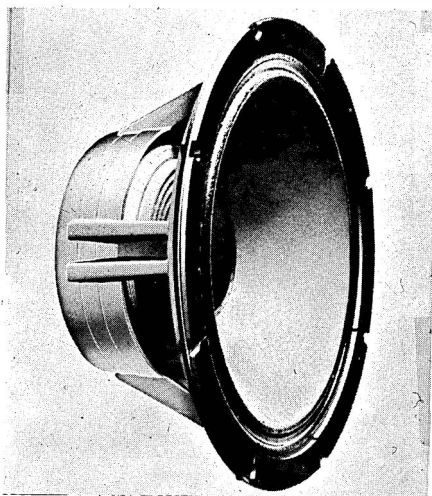
*Goodmans Audiom 90 Bass*



*Goodmans Axiette 8*



*Goodmans Trebax H.F. unit*



*Goodmans Audiom 81*

**Audiom 51 bass.** 12 in. Paper cone. Voice coil  $1\frac{3}{4}$  in. (4.4 cm.). v.c.i. 15-16 ohms. Gap flux 13,000 gauss. Total flux 87,500 maxwells. H.C. 15 watts. Fundamental resonance 35 c/s. Price £8 14s.

The Audiom 51 is available in three versions: Audiom 51 bass—details as above, for use as bass unit in high fidelity systems. Audiom 51 (75 c/s) – for particularly arduous conditions. Audiom 51 (55 c/s) – for special applications.

**Audiom 61 bass.** 12 in. Paper cone. Voice coil  $1\frac{3}{4}$  in. (4.4 cm.). v.c.i. 15-16 ohms. Gap flux 16,500 gauss. Total flux 185,000 maxwell. H.C. 20 watts. Fundamental resonance 35 c/s. Price £13 14s.

The Audiom 61 is available in three versions: Audiom 61 bass – details as above, for use as bass unit in high fidelity systems. Audiom 61 (75 c/s) – for particularly arduous conditions. Audiom 61 (55 c/s) – for special applications.

**Axiom 201.** 12 in. Twin diaphragm paper cone. Plastic treated surround. Voice coil  $1\frac{3}{4}$  in. (4.4 cm.) (aluminium). v.c.i. 15-16 ohms. Gap flux 13,000 gauss. Total flux 87,500 maxwells, H.C. 15 watts. F.R. 30 c/s-16 Kc/s. Built-in mechanical crossover at 5,000 c/s. Price £10 7s.

**Axiom 301.** 12 in. Twin diaphragm paper cone. Plastic treated surround. Voice coil  $1\frac{3}{4}$  in. (4.4 cm.) (aluminium). v.c.i. 15-16 ohms. Gap flux 16,500 gauss. Total flux 185,000 maxwells. H.C. 20 watts. F.R. 30 c/s-16 Kc/s. Built-in mechanical crossover of 5,000 c/s. Price £14 10s.

**Audiom 81 bass.** 15 in. Paper cone. Plastic treated surround. Voice coil 3 in. (7.6 cm.). v.c.i. 15-16 ohms. Gap flux 14,000 gauss. Total flux 269,000 maxwells. H.C. 25 watts. Fundamental resonance 25 c/s. Price £25.

The Audiom 81 is also available in 60 c/s version for special purposes.

The Audiom 81 bass (details above) with 25 c/s 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 90 bass.** 18 in. Paper cone. Voice coil  $2\frac{1}{2}$  in. (6.35 cm.). v.c.i. 15-16 ohms. Gap flux 14,500 gauss. Total flux 267,000 maxwells. H.C. 50 watts. Fundamental resonance 35 c/s. Price £29 15s.

**GRAMPIAN REPRODUCERS Ltd.**, Hanworth Trading Estate, Middx. Tel.: Feltham 2657/8/9. Cables: Reamp, Feltham.

**Grampian 1255/15.** 12 in. Paper impregnated cone and surround. Voice coil  $1\frac{1}{2}$  in. Gap flux 14,500 gauss. Total flux 130,500 maxwells. H.C. 10 watts. v.c.i. 15 ohms. F.R. 35-15,000 c/s. Price £10.

★

**ISOPHON-Werke**, Berlin-Tempelhof. U.K. Distributors: Britimpex Ltd., 16/22 Great Russell Street, London, W.C.1. Tel.: Museum 7600.

**Orchester.** 12 in. dual concentric. Voice coil  $1\frac{1}{2}$  in. v.c.i. 4/16 ohms (switchable). Gap flux (LF) 11,000 gauss, (HF) 10,000 gauss. Total flux (LF) 104,000 maxwells, (HF) 8,000 maxwells. H.C. 10-20 W., dependent on mounting. F.R. 25 c/s-20 Kc/s. Price (incl. tax) £19 19s.

★

**JORDAN-WATTS.** Distributors: Boosey & Hawkes (Sales) Ltd., Sonorous Works, Deansbrook Road, Edgware, Middx. Tel.: Edgware 5581.

**Jordan-Watts Modular.** 6 in. square frame. Aluminium diaphragm with plastic surround. Voice coil  $1\frac{1}{2}$  in. ceramic magnet. Imp. matching  $7\frac{1}{2}$ -16 ohms. H.C. 12W. F.R. 25 c/s-20 Kc/s. Price (inc. tax): £10 10s.

★

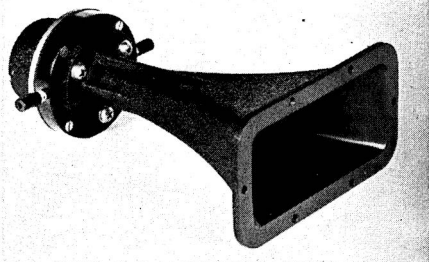
**KEF ELECTRONICS Ltd.**, Tovil, Maidstone, Kent. Tel.: Maidstone 55761. Cables: Kef, Maidstone.

**K1 Baffle.** Three units. Baffle size  $26\frac{3}{8} \times 16\frac{3}{8}$  in. Unit 1:  $18 \times 14$  in.; Exp. polystyrene cone. Plastic coated cloth surround. Voice coil 2 in. Gap flux 12,700 gauss. Total flux 165,000 maxwells. Unit 2:  $6 \times 4$  in. Tri-ply cone. Plastic coated cloth surround. Voice coil 1 in. Gap flux 12,000 gauss. Total flux 47,000 maxwells. Unit 3:  $1\frac{1}{2}$  in. Melinex dome. Melinex roll surround. Voice coil  $1\frac{1}{2}$  in. Gap flux 15,000 gauss. Total flux 53,500 maxwells. H.C. 25 watts rms 50 watts peak. v.c.i. 8-16 ohms. F.R. 20-375 c/s; 375-3,000 c/s; 3,000 upwards. r.c.f. 375-3,000 c/s. Price £28 complete.

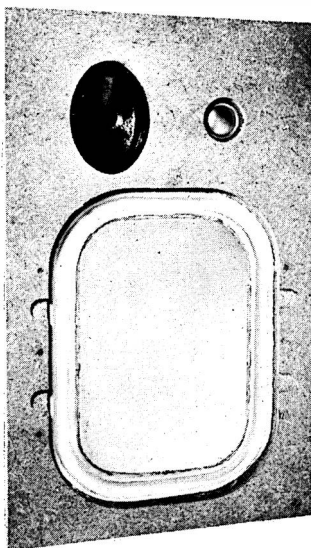
**B139.**  $13 \times 9$  in. Exp. plastic and aluminium cone. Plastic coated fabric surround.



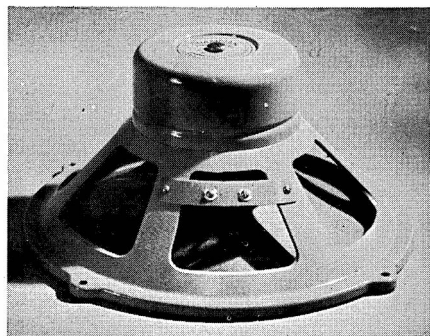
Goodmans Axiom 301



Goodmans Midax 650



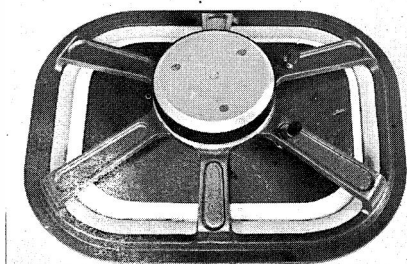
KEF K1 Baffle



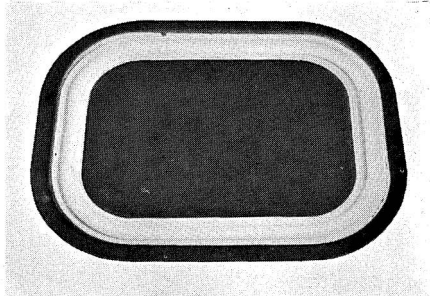
*Grampian 1255/15*



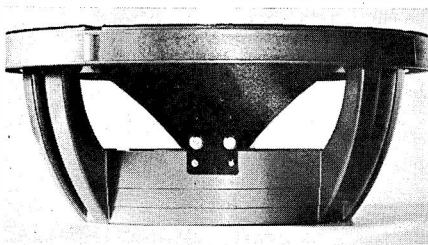
*Isophon Orchester 12 in. Dual Concentric*



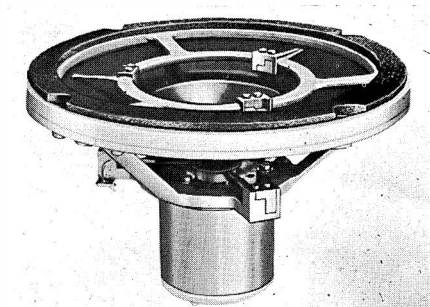
*KEF B1814 (rear view)*



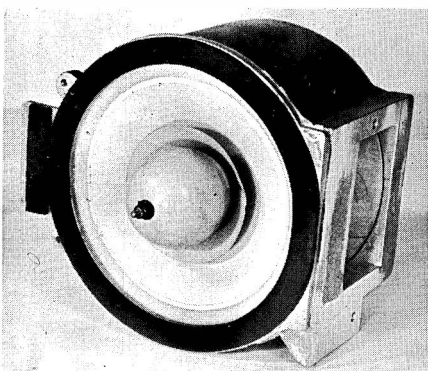
*KEF B1814 (front view)*



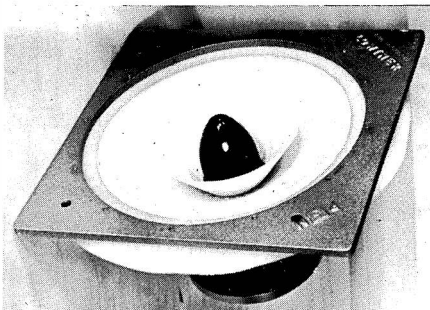
*Goodmans Audiom 51 Bass*



*Goodmans Axiom 80*



*Lowther PM3*



*Lowther PM2 Mk. 1*

Voice coil 2 in. (copper). v.c.i. 8-16 ohms. Gap flux 10,500 gauss. Total flux 137,000 maxwells. H.C. 15 watts. F.R. 30 c/s-4 Kc/s. r.c.f. 1,000 c/s. Price £11 10s.

**T15 tweeter.** 1½ in. Melinex dome. Melinex surround. Voice coil 1½ in. (aluminium). v.c.i. 8-16 ohms. Gap flux 15,000 gauss. Total flux 53,500 maxwells. H.C. 15 watts. Treble only. F.R. 600-15,000 c/s. r.c.f. 1,000 c/s. Price £6.

**B1814.** 18 × 14 in. Exp. plastic and aluminium cone. Plastic coated cloth surround. Voice coil 2 in. copper. v.c.i. 8-16 ohms. Gap flux 12,700 gauss. Total flux 165,000 maxwells. H.C. 25 W. F.R. 20 c/s-2 Kc/s. r.c.f. 500 c/s. Price £19.

**K2 Baffle.** Two units. Baffle size 22½ × 13½ in. Unit 1: 13 × 9 in.; plastic and aluminium cone; plastic coated cloth surround; voice coil 2 in. copper. Gap flux 10,500 gauss; total flux 137,000 maxwells. Unit 2: 1½ in. Melinex dome; Melinex surround; voice coil 1½ in. copper; gap flux 15,000 gauss; total flux 53,500 maxwells. Both units: v.c.i. 8-16 ohms; H.C. 15 W. F.R. 40 c/s-15 Kc/s. r.c.f. 1 Kc/s. Price £22.



**KELLY Acoustics Ltd.,** Romagna, Bycullah Avenue, Enfield, Middx. Tel.: Enfield 7890.

**Kelly Ribbon H.F. Speaker Mk. 2.** Horn loaded. Ribbon dimensions 6 × 1 cm. H.C. 10 watts. v.c.i. 15 ohms through transformer supplied. F.R. 2,000-20,000 c/s. r.c.f. 3,000 c/s. Price £11 10s.

**L.F. Driver Mk. 3.** Exponential form cone with foam surround. Gap flux 14,000 gauss. Total flux 125,000 maxwells. H.C. 20 watts. v.c.i. 15 ohms. F.R. 30-5,000 c/s. Price £11 10s.

**Mark IV.** 12 in. treated fibre cone. Foam surround. Voice coil 1½ in. v.c.i. 15 ohms. Gap flux 10,000 gauss. Total flux 85,000 maxwells. H.C. 10 W. F.R. 40 c/s-5 Kc/s. r.c.f. 3,000 c/s. Price £8 10s.

**Mark V.** 12 in. treated fibre cone. Roll surround. Voice coil 2 in. v.c.i. 15 ohms. Gap flux 14,000 gauss. Total flux 225,000 maxwells. H.C. 15 W. F.R. 20 c/s-5 Kc/s. r.c.f. 3,000 c/s. Price £14 10s.

**Mark VI.** 12 in. treated fibre cone. Roll surround. Voice coil 2 in. v.c.i. 15 ohms. Gap flux 17,000 gauss. Total flux 340,000 maxwells. H.C. 35 W. F.R. 20 c/s-5 Kc/s. r.c.f. 3,000 c/s. Price £18.

**Mark VII.** 15 in. treated fibre cone. Roll surround. Voice coil 2 in. v.c.i. 15 ohms. Gap flux 17,000 gauss. Total flux 340,000 maxwells. H.C. 50 W. F.R. 20 c/s-8 Kc/s. r.c.f. 4,500 c/s. Price £20.

**Mark VII G.** 15 in. treated fibre cone. Plastic surround. Voice coil 2 in. v.c.i. 15 ohms. Gap flux 17,000 maxwells. Total flux 340,000 maxwells. H.C. 120 W. peak. F.R. 40 c/s-6 Kc/s. Price £20.



**LORENZ.** See Technical Supplies Ltd.



**LOWTHER MANUFACTURING Co.,** Lowther House, St. Mark's Road, Bromley, Kent. Tel.: Ravensbourne 5225. Cables: Lowther, Bromley.

**P.M.6.** 6 in. Selected paper cone. Plastic surround. Voice coil 37 mm. Gap flux 17,500 gauss. Total flux 196,000 maxwells. H.C. 6 W.; 20 W. programme material. v.c.i. 16 ohms. F.R. 30-18,000 c/s. Price £18 18s.

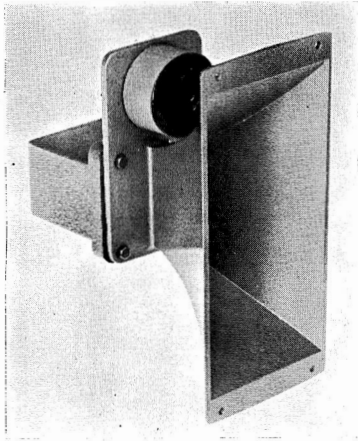
**P.M.2 Mk. I.** 6 in. Selected paper cone. Plastic surround. Voice coil 37 mm. Gap flux 21,000 lines per sq. cm. Total flux 281,000 maxwells. H.C. 6 W.; 20 W. programme material. v.c.i. 15 ohms. F.R. 30-20,000 c/s. Price £30.

**P.M.2 Mk. II.** 6 in. Selected paper cone. Plastic foam surround. Voice coil 37 mm. Gap flux 23,000 gauss. Total flux 350,000 maxwells. H.C. 6 W.; 20 W. programme material. v.c.i. 15 ohms. F.R. 25-22,000 c/s. Price £40.

**P.M.2 Mk. III.** Details as P.M.2 Mk. I but with special bracket for securing within Acousta-Twin Enclosure.

**P.M.3.** 6 in. Selected paper cone. Plastic surround. Voice coil 39 mm. Gap flux 22,000 gauss. Total flux 307,750 maxwells. H.C. 6 W.; 20 W. programme material. v.c.i. 15 ohms. F.R. 20-20,000 c/s. Not sold separately from enclosure type T.P.1.

**P.M.4.** 6 in. Selected paper cone. Plastic surround. Voice coil 37 mm. Gap flux



*Kelly Mk 2 Ribbon*

24,000 gauss. Total flux 385,000 maxwells. H.C. 6 W.; 20 W. programme material. v.c.i. 16 ohms. F.R. 25-24,000 c/s. Price £48.



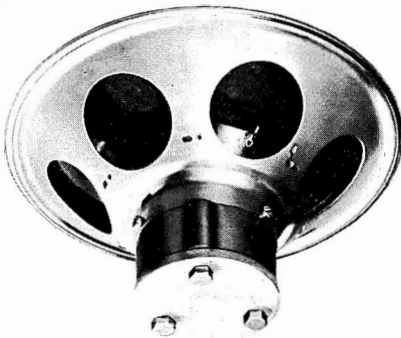
**MORDAUNT Sound Reproducers**, 1-3 Stanley Road, Napier Road, Bromley, Kent. Tel.: Ravensbourne 9212. *MM*

**Audistatic Tweeter.** Push-pull electrostatic. Forward facing unit with crossover and mains supply. r.c.f. 1,500 c/s. F.R. 2-20 Kc/s. Size 12 × 11¼ × 5 in. Price £15 15s.



**PHILIPS ELECTRICAL Ltd.**, Century House, Shaftesbury Avenue, W.C.2. Tel.: Gerrard 7777. Cables: Phillamps, London.

**9710M.** 8 in. Dual cone. Paper corrugated surround. Voice coil 1 in. Gap flux 8,000 gauss. Total flux 97,000 maxwells. H.C. 10 watts. v.c.i. 7 ohms. F.R. 40-18,000 c/s. r.c.f. 500-1,000 c/s. Price £4 19s. 6d. (U.K. purchase tax 16s.).



*Philips 9710 M*

**AD5200M.** 12 in. Dual cone. Paper corrugated surround. Voice coil 1¼ in. Gap flux 11,000 gauss. Total flux 134,000 maxwells. H.C. 20 watts. Price £10 10s.



**ROLA CELESTION Ltd.**, Ferry Works, Thames Ditton, Surrey. Tel.: Emberbrook 3402-6.

A full range of units will be in production later in 1964, but at the time of going to press details were not available.

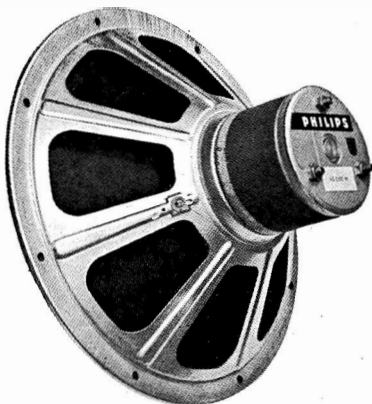


**STENTORIAN.** See Whiteley Electrical.



**TANNOY PRODUCTS Ltd.**, West Norwood, London, S.E.27. Tel.: Gipsy Hill 1131. Cables: Tannoy, London.

**Direct radiator.** 12 in. Moulded fibre cone. Plastic treated surround. Voice coil 2 in. Gap flux 14,000 gauss. H.C. 15 watts. v.c.i. 20 ohms. F.R. 40-16,000 c/s. Price £14 14s.



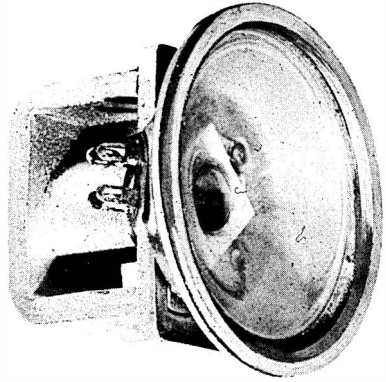
*Philips AD 5200 M*

**III LZ.** 12 in. dual concentric. Moulded fibre cone. Plastic impregnated surround.

Gap flux (L.F.) 10,000 (H.F.) 15,000 gauss.  
H.C. 10 watts. F.R. 23-20,000 c/s. r.c.f.  
(supplied) 1,300 c/s. v.c.i. 15 ohms. Price  
£22 10s.

**Monitor "Twelve"**. 12 in. Moulded fibre  
cone. Plastic treated surround. Voice coils  
(H.F. and L.F.) 2 in. Gap flux (L.F.) 11,500  
(H.F.) 15,000 gauss. H.C. 30 watts. F.R.  
25-20,000 c/s. r.c.f. 1,700 c/s (supplied).  
Price £30 15s.

**Monitor "Fifteen"**. 15 in. Moulded fibre  
cone. Plastic treated surround. Voice coils  
(H.F. and L.F.) 2 in. Gap flux (L.F.) 13,500  
(H.F.) 18,000 gauss. H.C. 50 watts. F.R.  
23-20,000 c/s. r.c.f. 1,000 c/s (supplied).  
Price £37 10s.



*TSL-Lorenz LPH 65 H.F. Unit*

**Direct radiator** for electronic instruments.  
15 in. Moulded fibre cone. Plastic treated  
surround. Voice coil 2 in. v.c.i. 7.5 ohms.  
Gap flux 14,000 gauss. H.C. 40 W. F.R.  
25 c/s-14 Kc/s. Price £22.



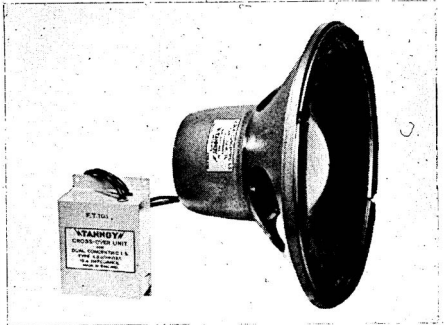
**TECHNICAL SUPPLIERS Ltd.**, Hudson  
House, 63 Goldhawk Road, London, W.12.  
Tel.: Shepherds Bush 2581/4794.

**TSL-Lorenz LP. 215.** 8 in. Reinforced  
paper cone. Permafex surround. Voice coil  
1 in. H.C. 8 watts, peak load 12 watts. v.c.i.  
4.5 ohms. F.R. 35-12,000 c/s. Price  
£4 19s. 6d. (U.K. purchase tax 16s.).

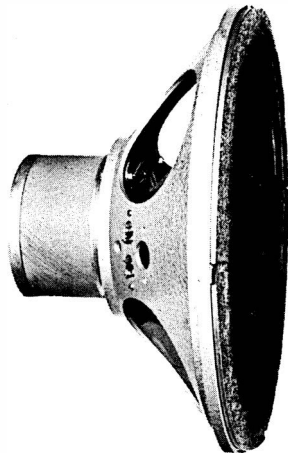
**LP. 312-2.** 12 in. Reinforced ribbed paper  
cone. Permafex surround. Voice coil  $1\frac{1}{2}$  in.  
H.C. 29 watts. v.c.i. tapped 4, 8, 16 ohms.  
F.R. 20 to above 17,000 with 2 type LPH65  
treble speakers in a fitted bridge assembly.  
r.c.f. 3,000-5,000 c/s. Price £14 19s. 6d.

**TSL-Lorenz Tweeter LPH 65.**  $2\frac{1}{2}$  in.  
Special plastic cone. Plastic surround. Voice  
coil  $\frac{1}{2}$  in. H.C. 2 watts (H.F. only). v.c.i.  
5.5 ohms at 800 c/s. F.R. 2,000 to above  
17,000 c/s. r.c.f. 3,000-5,000 c/s. Price  
£1 8s. 6d. (U.K. purchase tax 4s. 7d.).

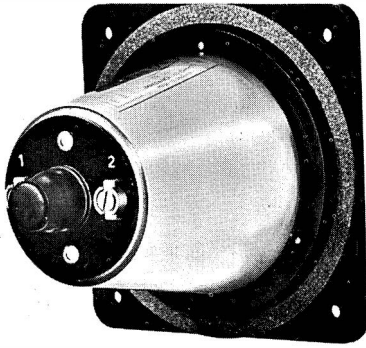
**TSL-Lorenz LP45F.**  $1\frac{1}{2}$  in. Special com-  
pound cone. Permafex surround. Voice  
coil  $1\frac{1}{2}$  in. Gap flux 9,500 gauss. H.C. 300  
milliwatts. v.c.i. standard low impedance.  
F.R. 120-14,000 c/s. Price £1 1s. 2d. (U.K.  
purchase tax 3s. 7d.).



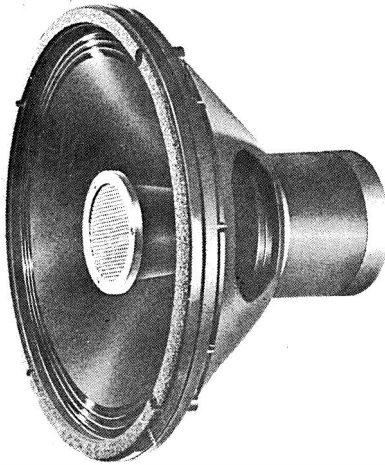
*Tannoy Monitor "Twelve"*



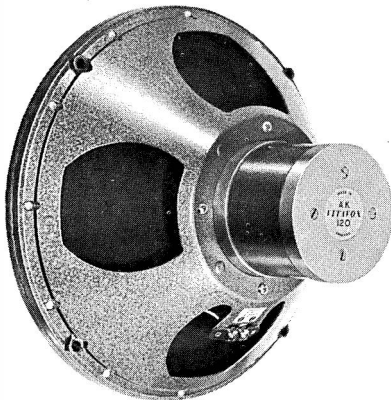
*Tannoy 12 in direct radiator*



*Vitavox TR 30 H.F. Unit*



*Vitavox DU 120 Duplex Coaxial*



*Vitavox AK120*

**VITAVOX Ltd.**, Westmoreland Road, London, N.W.9. Tel.: Colindale 8671. Cables: Vitavox, Hyde, London.

**Duplex Coaxial DU 120.** 12 in. and 3 in. Paper and polyester film cones and surround. Voice coil (L.F.) 1.78 in. (H.F.) 0.65 in. Gap flux (L.F.) 14,000 (H.F.) 12,000 gauss. Total flux (L.F.) 160,000 (H.F.) 15,000 maxwells. H.C. 15 watts. v.c.i. 15 ohms. F.R. 40-15,000 c/s nominal. Price £19 10s.

**A.K.120.** 12 in. Paper cone. Paper surround. Voice coil 1.78 in. Gap flux 14,000 gauss. Total flux 160,000 maxwells. H.C. 15 watts. v.c.i. 15 ohms. F.R. 40-12,000 c/s. r.c.f. 1,000 c/s. Price £14.

**K15/40.** 15 in. Paper cone. Paper surround. Voice coil 2.25 in. Gap flux 14,000 gauss. Total flux 260,000 maxwells. H.C. 40 watts. v.c.i. 15 ohms. F.R. 50-8,000 c/s. r.c.f. 500 c/s. Price £25.

**T.R. 30.** 3 in. cone. Gap flux 12,000 gauss. Total flux 15,000 maxwells. Suitable for a 15 W speaker system. F.R. 1,000-15,000 c/s. v.c.i. 15 ohms. Crossover frequency 2,000 c/s. Price £6 10s.

**S2 High Frequency Pressure Unit.** Diaphragm, pressure formed from lightweight aluminium alloy 3 in. diameter. Voice coil in gap flux of 16,000 gauss. H.C. above 200 c/s, 10 watts. Nominal F.R. 200-16,000 c/s. r.c.f. 500 c/s. Price £35.

**High Frequency Dispersive Horn.** Designed for use with S2 Pressure units. Cast in aluminium alloy, non-resonant. Cut off frequency 300 c/s. Price £17.

★

**WHARFEDALE Wireless Works Ltd.**, Idle, Bradford. Tel.: Idle 1235-6. Cables: Wharfedale, Idle, Bradford.

**8 in. Bronze/RS/DD.** 8 in. full range unit. Paper double diaphragm cone. Fabric roll surround. Voice coil 1 in. aluminium. v.c.i. 12-15 ohms. Gap flux 10,500 gauss. Total flux 41,500 maxwells. H.C. 4 W. F.R. 50 c/s-20 Kc/s. Price £3 5s. (U.K. purchase tax 10s. 10d.).

**10 in. Bronze/RS/DD.** 10 in. full range unit. Paper double diaphragm cone. Fabric roll surround. Voice coil 1 in. aluminium. v.c.i. 12-15 ohms. Gap flux 10,500 gauss. Total



flux 41,500 maxwells. H.C. 6 W. F.R. 35 c/s-10 Kc/s. Price £3 19s. 6d. (U.K. purchase tax 13s. 3d.).

**Golden 10/RS/DD.** 10 in. Double diaphragm assembly. Roll surround. Voice coil 1 in. Gap flux 14,500 gauss. Total flux 60,000 maxwells. H.C. 8 watts. v.c.i. 12-15 ohms. F.R. 30-20,000 c/s. Price £6 15s. (U.K. purchase tax £1 2s. 5d.).

**Super 10/RS/DD.** 10 in. Paper (double diaphragm) cone. Roll surround. Voice coil 1 in. Gap flux 16,000 gauss. Total flux 85,000 maxwells. H.C. 10 watts. v.c.i. 12-15 ohms. F.R. 30-20,000 c/s. Price £9 7s. 6d. (U.K. purchase tax £1 11s. 2d.).

**Super 12/RS/DD.** 12 in. Double diaphragm assembly. Roll surround. Voice coil  $1\frac{3}{4}$  in. (aluminium). Gap flux 17,000 gauss. Total flux 190,000 maxwells. H.C. 20 watts. v.c.i. 12-15 ohms. F.R. 25-20,000 c/s. Price £17 10s.

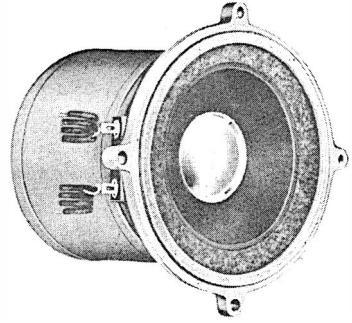
**W15/RS.** 15 in. Paper cone. Roll surround. Voice coil 2 in. Gap flux 13,500 gauss. Total flux 180,000 maxwells. H.C. 20 watts. v.c.i. 12-15 ohms. F.R. 25-2,000 c/s. r.c.f. 800 c/s. Price £17 10s.

**Super 3.** 3 in. Bakelised paper cone with integral dome. Foam plastic surround. Voice coil 1 in. (aluminium). Gap flux 14,500 gauss. Total flux 60,000 maxwells. H.C. 6 watts above 1,000 c/s. v.c.i. 2-3 or 10-15 ohms. F.R. 1,000-20,000 c/s. r.c.f. 4,000 c/s. Price £5 (U.K. purchase tax 16s. 8d.).

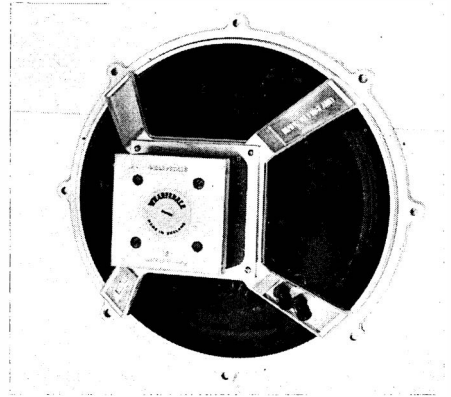
**Super 8/RS/DD.** 8 in. Double diaphragm paper cone. Roll surround. Voiced coil 1 in. (aluminium). v.c.i. 10-15 ohms. Gap flux 14,500 gauss. Total flux 60,000 maxwells. H.C. 6 watts, 12 watts peak. F.R. 40 c/s-20 Kc/s. Price £5 15s. (U.K. purchase tax 19s. 2d.).

**PST/4.** 4 in. Paper and polystyrene cone. Cloth surround. Voice coil  $\frac{3}{4}$  in. v.c.i. 10-15 ohms. Gap flux 11,500 gauss. Total flux 28,800 maxwells. H.C. 5 watts, 10 watts peak. F.R. 300 c/s-15 Kc/s. r.c.f. 300 c/s. Price £2 15s. (U.K. purchase tax 9s. 2d.).

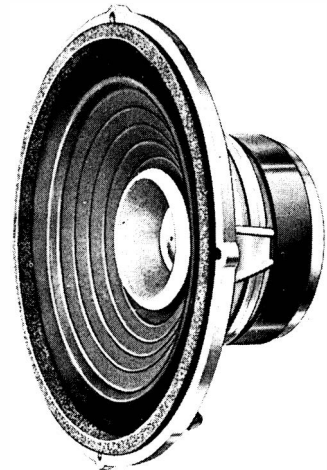
**W12/RS/PST.** 12 in. Paper and polystyrene cone. Roll surround. Voice coil  $1\frac{3}{4}$  in. (copper). v.c.i. 15 ohms. Gap flux 14,000 gauss. Total flux 156,000 maxwells. H.C. 15 watts, 30 watts peak. F.R. 25 c/s-4 Kc/s. r.c.f. 3,000 c/s. Price £10 15s.



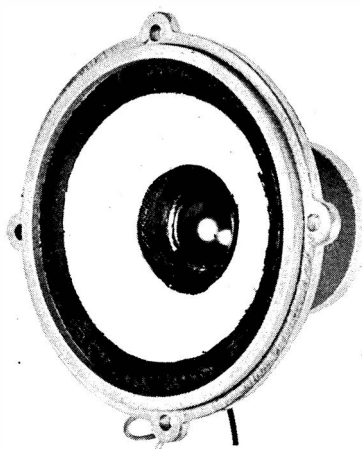
*Wharfedale Super 3 H.F. Unit*



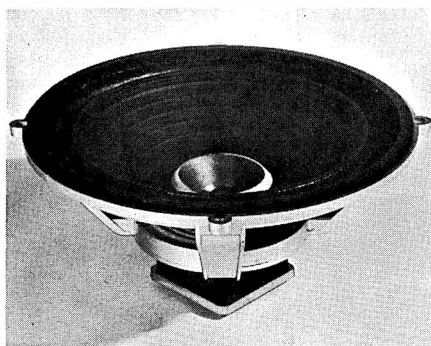
*Wharfedale W15/EG*



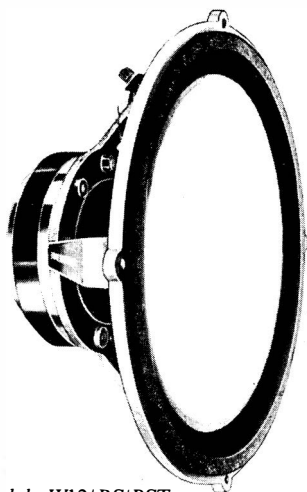
*Wharfedale Super 8/RS/DD*



*Wharfedale PST/4 H.F. Unit*



*Wharfedale 10 in. Bronze RS/DD*



*Wharfedale W12/RS/PST*

**RS/12/DD.** 12 in. Paper cone. Roll surround. Voice coil  $1\frac{3}{4}$  in. (aluminium). v.c.i. 15 ohms. Gap flux 14,000 gauss. Total flux 156,000 maxwells. H.C. 15 watts, 30 watts peak. F.R. 25 c/s-17 Kc/s. Price £11 10s.

**W12/EG.** 12 in. full range unit. Paper double diaphragm cone. Corrugated paper surround. Voice coil  $1\frac{3}{4}$  in. copper. v.c.i. 12-15 ohms. Gap flux 14,000 gauss. Total flux 156,000 maxwells. H.C. 15 W RMS, 30 W peak. F.R. 40 c/s-17 Kc/s. Price £10 10s.

**W15/EG.** 15 in. Paper cone. Corrugated paper surround. Voice coil 2 in. copper. v.c.i. 12-15 ohms. Gap flux 13,500 gauss. Total flux 180,000 maxwells. H.C. 20 W RMS, 40 W peak. F.R. 35 c/s-5 Kc/s. r.c.f. 1,000 c/s. Price £17 10s.



**WHITELEY ELECTRICAL Radio Co. Ltd.,** Victoria Street, Mansfield, Notts. Tel.: Mansfield 1762-5. 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. H.C. 5 watts. v.c.i. universal (3, 7.5 and 15 ohms). F.R. 50-12,000 c/s. Price £3 2s. 4d. (U.K. purchase tax 10s. 5d.).

**Stentorian Clumber.** 9 in. Paper cone. Paper surround. Voice coil 1 in. Gap flux 12,000 gauss. Total flux 47,400 maxwells. H.C. 9 watts. v.c.i. 15 ohms. F.R. 100-13,000 c/s. Price £11 0s. 2d. (U.K. purchase tax £1 17s. 1d.).

**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. H.C. 6 watts. v.c.i. universal 3 ohms, 7.5 ohms and 15 ohms. F.R. 50-14,000 c/s. Price £5 2s. 7d. (U.K. purchase tax 17s. 5d.).

**H.F.817.** 8 in. Paper cone. Cambric surround. Voice coil 1 in. Gap flux 17,000 gauss. Total flux 67,000 maxwells. H.C. 10 watts in cabinet. v.c.i. 15 ohms. F.R. 60-22,000 c/s. Price £8 10s. 2d. (U.K. purchase tax £1 8s. 7d.).

**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. H.C. 7 watts. v.c.i. universal (3, 7.5 and 15 ohms). F.R. 40-13,000 c/s. Price £3 6s. (U.K. purchase tax 11s.).

**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. H.C. 10 watts. v.c.i. universal 3 ohms, 7.5 ohms and 15 ohms. F.R. 30-14,000 c/s. Price £3 14s. 10d. (U.K. purchase tax 12s. 8d.).

**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. H.C. 10 watts. v.c.i. 3, 7.5 and 15 ohms. F.R. 30-15,000 c/s. Price £5 19s. 9d. (U.K. purchase tax £1 0s. 3d.).

**H.F.1016 Major.** 10 in. Paper cone. Cambric surround. Voice coil 1 in. (aluminium). v.c.i. 15 ohms. Gap flux 16,000 gauss. Total flux 64,000 maxwells. H.C. 10 watts. F.R. 60 c/s-16 Kc/s or 30 c/s-16 Kc/s (depending upon cabinet). Price £7 13s. 7d. (U.K. purchase tax £1 5s. 11d.).

**10 in. Concentric Duplex.** Composite (paper and cambric) cone. Cambric surround. Voice coil 1 in. Gap flux (L.F.) 12,000 (H.F.) 13,000 gauss. Total flux 47,400 maxwells. H.C. 10 watts. v.c.i. 15 ohms. F.R. 30-14,000 c/s. r.c.f. 3,000 c/s built-in. Price £10 2s. 1d. (U.K. purchase tax £1 13s. 11d.).

**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. H.C. 15 watts. v.c.i. 15 ohms. F.R. 25-14,000 c/s. Price £10 5s. 6d.

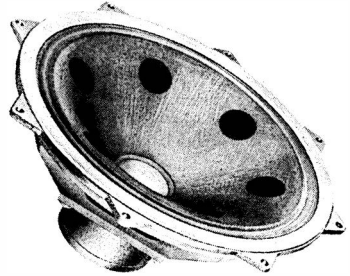
**H.F.1216.** Composite (paper and cambric) cone. Cambric surround. Voice coil 1½ in. Gap flux 16,000 gauss. H.C. 15 watts. F.R. 20-16,000 c/s. Price £15 15s.

**15 in. Concentric Duplex.** Composite (paper and cambric) cone. Cambric surround. Voice coil 2 in. Gap flux (L.F.) 14,000 (H.F.) 17,000 gauss. Total flux 350,000 maxwells. H.C. 25 watts, v.c.i. 15 ohms. F.R. 20-18,000 c/s. r.c.f. 3,000 c/s built-in. Price £45.

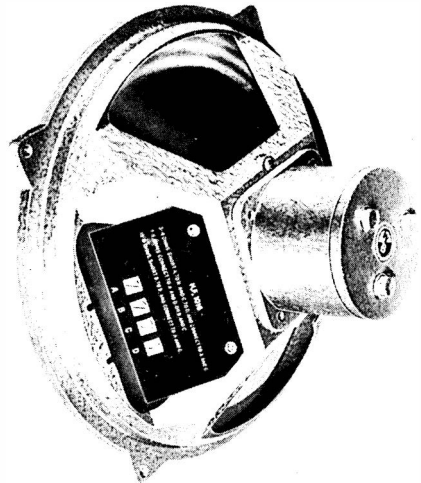
**H.F.1514.** 15 in. Composite (paper and cambric) cone. Cambric surround. Voice coil 2 in. Gap flux 14,000 gauss. Total flux



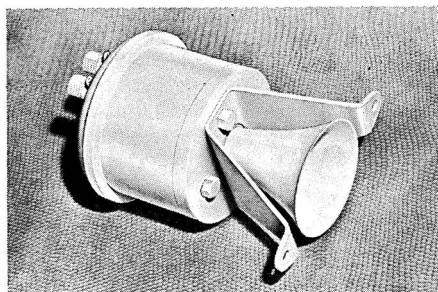
*Wharfedale W12/EG*



*Whiteley H.F. 1514*



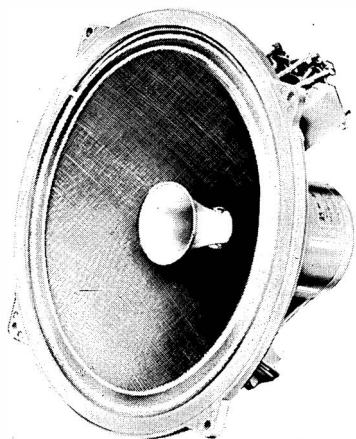
*Whiteley H.F. 1016*



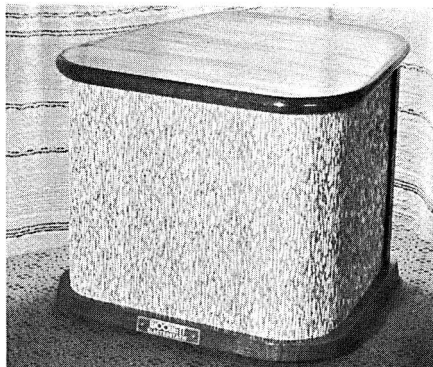
*Whiteley T10 H.F. Unit*



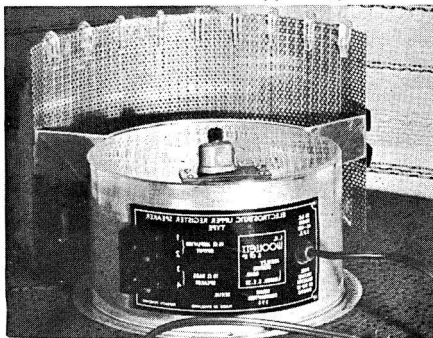
*Whiteley T 359 H.F. Unit*



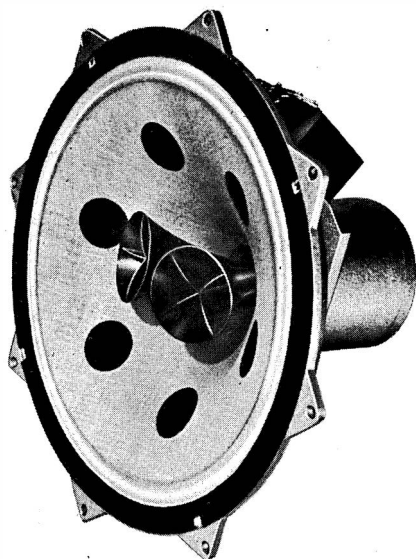
*Whiteley 10 in. Concentric Duplex*



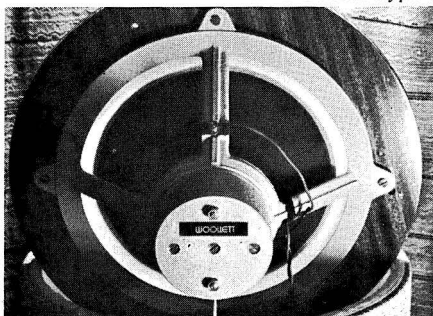
*Woollett Leven Upper Register Unit*



*Woollett Electrostatic Chassis Type 3*



*Whiteley 15 in. Concentric Duplex*



*Woollett 12 in. Bass Unit*

178,000 maxwells. H.C. 25 watts. v.c.i. 15 ohms. F.R. 25-5,000 c/s. r.c.f. 1,500-3,000 c/s. Price £26.

**T.10 Tweeter.** Aluminium cone and surround. Voice coil 1 in. Gap flux 14,000 gauss. Total flux 44,000 maxwells. H.C. 5 watts. v.c.i. 15 ohms. F.R. 2,000-14,000 c/s. r.c.f. 3,000 c/s. Price £4 8s. 3d.

**T.12 Tweeter.** Aluminium cone and surround. Voice coil 1.5 in. Gap flux 17,000 gauss. Total flux 110,000 maxwells. H.C. 12 watts. v.c.i. 15 ohms. F.R. 2,000-17,000 c/s. r.c.f. 3,000 c/s. Price £13 4s. 6d.

**T.816.** 8 in. Paper cone and surround. Voice coil 1 in. Gap flux 16,000 gauss. Total flux 63,000 maxwells. H.C. 15 watts. v.c.i. 15 ohms. F.R. 1,500 to 17,000 c/s. r.c.f. 1,500 c/s. Price £4 17s. 2d. (U.K. purchase tax 16s. 4d.).

**T.359.** 3½ in. Paper cone and surround. Voice coil 0.625 in. Gap flux 9,000 gauss. Total flux 14,900 maxwells. H.C. 15 watts

with crossover. v.c.i. 5 or 15 ohms. F.R. 3,000-17,000 c/s. r.c.f. 3,000 c/s. Price £1 6s. 1d. (U.K. purchase tax 4s. 5d.).



**L. G. WOOLLETT & Co. Ltd.,** 21 Anerley Station Road, London, S.E.20. Tel.: Sydenham 9003.

**Bass drive unit.** 12 in. Foam surround. As used in Thirlmere and Lomond. Price £11 18s.

**Leven Electrostatic Upper Register Speaker.** Mains polarising and matching included. Variable H.F. attenuator. H.C. 15 W. F.R. from 1,500 c/s upwards. Built-in crossover integrated. In mahogany cabinet. Price £15 15s.

**Electrostatic chassis Types 3 & 4.** Modified velocity system. H.C. 15 W. F.R. 1,500 c/s-20 Kc/s. Integral ¼-section crossover, 1;500 c/s. Contains mains polarising supply 95-260 V. H.F. attenuator 12 dB variation. LS matching 15 ohms. Available by special arrangement. Price on application.

## DIRECTORY OF SPEAKER ACCESSORIES

**RICHARD ALLAN Radio Ltd.,** "Bafflette House", Taylor Street, Batley. Tel.: Batley 1123/1308/4033. Cables: Acoustics, Batley.

**CN.104 Crossover Unit.** A two-way half-section parallel network. Crossover frequency 5,000 c/s. All terminations 15 ohms. Price £2 2s.

**CN.1284 Crossover Unit.** A three-way crossover with main crossover operating from half wave parallel network and subsidiary crossover capacity fed. Crossover frequencies 1,100 and 5,000 c/s. All terminations 15 ohms. Price £6 5s.



**EMI Sound Products Ltd.,** Hayes, Middlesex. Tel.: Hayes 3888. Cables: Emisound, London.

**XO/4500/4 or 15.** Crossover frequency 4,500 c/s. Rate of attenuation 12 dB per octave. L.S. matching 3 or 15 ohms. Price £6 6s.

**GOODMANS INDUSTRIES Ltd.,** Axiom Works, Wembley, Middx. Tel.: Wembley 1200. Cables: Goodaxiom, Wembley.

**XO/5000-Crossover Unit.** A two-way half-section crossover network, operating at 5,000 c/s. All termination 15 ohms. Price £1 19s.

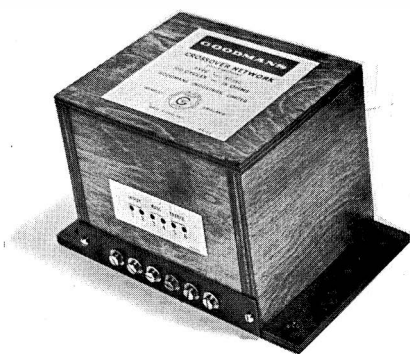
**XO/950-Crossover Unit.** A two-way half-section, crossover network, operating at 950 c/s. All terminations 15 ohms. Price £5 5s. 8d.

**XO/950/5000. Crossover Network.** A multiple crossover network comprising four half-section L.C. filters. Crossover frequencies are 950 c/s and 5,000 c/s. All attenuation rates are 12 dB/octave. All terminations 15 ohms. Price £7 0s. 6d.

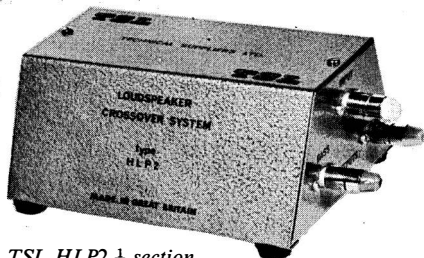
**ARU Units.** These units combine both reflex port and acoustic resistance in one complete unit. The port area and resistance are calculated to suit a particular cabinet volume and speaker cone resonance, thus being usable with a variety of cabinet designs and driving units. Price £2 19s. 6d. to £4 4s.



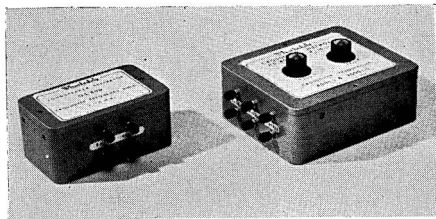
Goodmans 950/5000



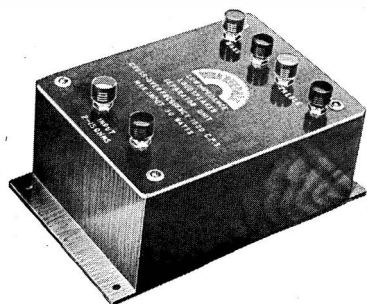
Goodmans XO/950



TSL HLP2  $\frac{1}{4}$  section



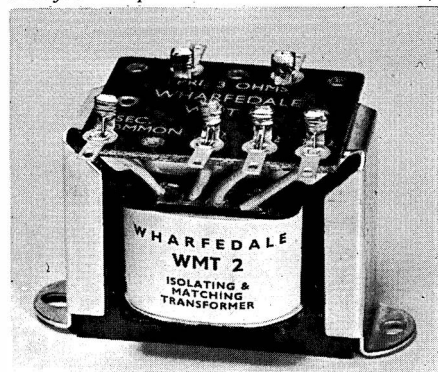
Wharfedale QS/800 and HS/400/2/3



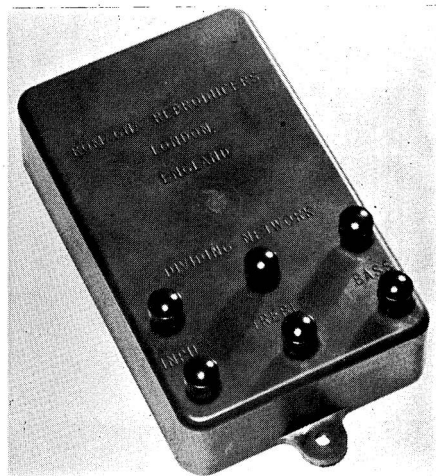
Wharfedale Separator Unit



Goodmans X05000



Wharfedale WMT2



Kelly CO/1/15 Crossover Network

**KELLY Acoustics Ltd.**, Romagna, Bycullah Avenue, Enfield, Middx. Tel.: Enfield 7890.

**CO/1/15. Crossover Network.** 3 Kc/s crossover frequency for 15 ohm speakers. Low-pass section, constant-impedance 12 dB/octave. High-pass section is a "variable slope" multi-stage network. Crossover has initial attenuation of 12 dB/octave, rising to 24 dB/octave. Infinite rejection at 700 c/s. Low-pass filter (18 dB/octave) at 25 Kc/s to eliminate HF breakthrough, bias, etc. Potted in impact polystyrene case. Price £3.

★

**TECHNICAL SUPPLIERS Ltd.**, Hudson House, 63 Goldhawk Road, London, W.12. Tel.: Shepherds Bush 2581. Cables: Teknika, London, W.12.

**HLP2 Crossover Unit.** Frequency of crossover 3,000 c/s.  $\frac{1}{2}$  section. Rate of attenuation 6 dB per octave. LS matching, 15 ohm. Price £2 7s. 6d.

★

**WHARFEDALE Wireless Works Ltd.**, Idle, Bradford, Yorks. Tel.: Idle 1235-6. Cables: Wharfedel, Idle, Bradford.

**Loudspeaker Separators.**  $\frac{1}{2}$  section type. Operating at 1,000 or 3,000 c/s. 8 units available to cover from 2-16 ohms impedance. Slope 6 dB/octave. Size  $7 \times 4 \times 3\frac{3}{4}$  in. Weight 2-2 $\frac{1}{2}$  lb. Max. input 30 watts. Price from £2 11s. to £4 17s. 6d. depending on type.

**HS/CR3/2.**  $\frac{1}{2}$  section 3-way separator unit with crossover at 800 and 5,000 c/s. Max. input 30 watts. Slope 12 dB/octave. Size  $9 \times 6 \times 5$  in. Weight 6 $\frac{1}{2}$  lb. 2 models. Price, 2-6 ohms, £11; 7-16 ohms, £8 10s. Also available with crossover at 400 and 5,000 c/s. 7-16 ohms only. Price £10.

**QS/800.** Crossover frequency 800 c/s.  $\frac{1}{4}$ -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 £2 17s. 6d.

**HS/400/2/3.** Crossover frequency 400 c/s and 5,000 c/s.  $\frac{1}{2}$ -section 3-way. Rate of attenuation 12 dB per octave. LS matching 7-16 ohms. Size  $7 \times 5 \times 3$  in. Weight 2 lbs. Price £6 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 20-15,000 c/s  $\pm 1$  dB. Handling capacity 15 watts. 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 $\frac{1}{2}$  ozs. Price 13s. 6d.

**WMT2 Isolating and Matching Transformer.** Similar to WMT1, but having separate windings with heavy insulation. Response 20 c/s-15 Kc/s  $\pm 1$  dB. H.C. 15 W. 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 1762-5. Cables: Whitebon, Mansfield.

**CX500 Crossover Unit.** A two-way half-section crossover network operating at 500 c/s. All terminations 15 ohms. Price £1 7s. 3d.

**CX1500 Crossover Unit.** As CX500, but operating at 1,500 c/s. Price £2.

**CX3000 Crossover Unit.** As CX1500, but operating at 3,000 c/s. Price £1 11s. 6d.

★

**L. G. WOOLLETT & Co. Ltd.**, 21 Anerley Station Road, London, S.E.20. Tel.: Sydenham 9003.

**XS2 Transformer** permitting the use of one bass speaker with two electrostatic upper register speakers in a stereo system. Converts a 3 ohm speaker to 15 ohms or a 3 ohm amplifier to 15 ohms. Enables sensitivity of speaker to be reduced by 6 or 12 dB whilst maintaining a 15 ohm load on amplifier and heavy damping of speaker. F.R. 16-20,000 c/s  $\pm 0.3$  dB. H.C. 15 watts. Size  $3\frac{1}{2} \times 3\frac{1}{4} \times 2\frac{1}{2}$  in. Weight 2 lb. 9 oz. Price £2 18s. 6d.

## PART 2—SPEAKER ENCLOSURES

**ABBOTT & RICHARDSON**, 7 Agnew Road, Forest Hill, London, S.E.23.

**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  $\frac{1}{4}$ -section crossover network. Size  $31 \times 17\frac{1}{2} \times 10\frac{1}{2}$  max. to  $7\frac{1}{2}$  in. min. Price (with specified units) £23.



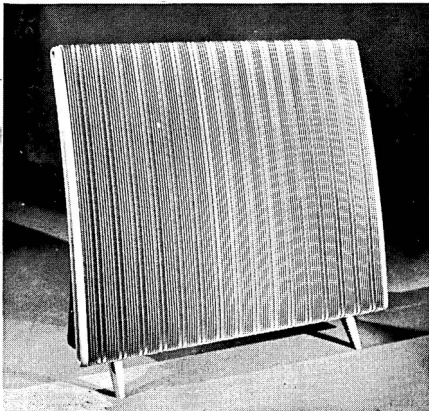
**ACOUSTIC Research Inc.**, 24 Thorndike Street, Cambridge 41, Mass., U.S.A. Sole U.K. Importers: Avey Electric Ltd., South Ockendon, Essex. Tel.: South Ockendon 3444.

**AR-3.** Totally enclosed speaker system. F.R. 20 c/s-25 Kc/s. Input required 25 W. Incorporates 12 in. bass unit, 2 in. mid-range dome radiator,  $1\frac{3}{8}$  in. high frequency dome radiator. Size  $14 \times 25 \times 11\frac{3}{8}$  in. Finished in oiled walnut or teak. Price £99.



**ACOUSTICAL Manufacturing Co. Ltd.**, St. Peter's Road, Huntingdon, Hunts. Tel.: Huntingdon 361 and 574. Cables: Acoustical.

**Quad Electrostatic Loudspeaker.** Full range doublet covering 45 c/s to 18 Kc/s. Attenuation outside band asymptotic to 18 dB/8ve. Total integrated radiation at max.



*Quad Electrostatic*

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 Impedance 30-15 ohms, 40 c/s to 8 Kc/s falling above 8 Kc/s. Designed for use with standard Quad II Amplifier or equivalent. Suitable for A.C. supplies 100-120 or 200-250 V. 50-60 c/s. Free standing unit requires no enclosure or cabinet. Weight 35 lb. Price £52 complete.



**AKAI.** Distributors: The Pullin Optical Co. Ltd., Ellis House, Aintree Road, Perivale, Greenford, Middx.

**SS70 Stereo Speaker System.** 8 in. coaxial. F.R. 50 c/s-16 Kc/s. H.C. 10 W. Weight 28.7 lbs. per pair. Price (for two speakers) £38 17s.

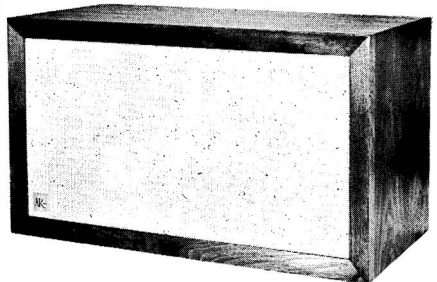
**SS50 Stereo Speaker System.** 8 in. mechanical two-way. F.R. 50 c/s-16 Kc/s. H.C. 8 W. Weight 23 lbs. per pair. Price (for two speakers) £31 10s.

The above speaker systems are primarily for use with Akai tape recorder.



**RICHARD ALLAN Radio Ltd.**, Bafflethe House, Taylor Street, Batley, Yorks. Tel.: Batley 1123/1308/4033. Cables: Acoustics, Batley.

**Type 840.** Reflex forward facing unit. Designed for shelf or floor mounting. Two drive units. 8 in. bass and 4 in. tweeter. Rec. Golden Eight and 410T. F.R. 45-17,000 c/s. Size  $24 \times 10 \times 12$  in. Weight 26 lb. Price £9.



*Acoustic Research AR-3*



**AUDIO SERVICES (Hi-Fi) Ltd.**, 82 East Barnet Road, New Barnet, Herts. Tel.: Barnet 6605.

**Dyna-static.** Infinite baffle. Forward facing. Two units: 13 × 8 in. bass unit; push-pull constant-charge electrostatic treble unit. Crossover 1,200 c/s. F.R. 30 c/s-20 Kc/s. Size 35 × 19½ × 14 in. Weight 60 lbs. Price £45.

**Dyna-sonic Model 4T.** Forward-facing. Five units: 13 × 8 in. bass unit, four 2½ in. tweeters. Crossover 2 Kc/s. F.R. 30 c/s-18 Kc/s. Size 34 × 18 × 12 in. Price £32.

**Dyna-sonic Model 2T.** Forward-facing. Three units: 13 × 8 in. bass unit, two 2½ in. tweeters. Crossover 2 Kc/s. F.R. 40 c/s-17 Kc/s. Size 31 × 18 × 12 in. Price £25.



**BURNE-JONES & Co., Ltd.**, 18 Brunswick Road, Sutton, Surrey.

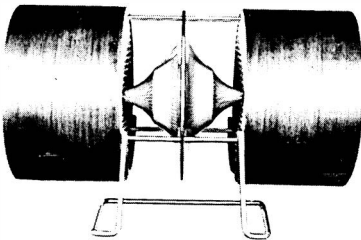
**B.J. Treble 20.** Omni-directional multi-horn. One 4 in. unit. Crossover built-in. Response 1,000-18,000 c/s. Size 6 × 5 in. Weight 1½ lb. Price £3 15s. plus tax.

**B.J. Treble Twin.** Omni-directional horn. Two 4 in. drive units. Crossover included. Response 900-18,000 c/s. Size 9 × 4¾ × 6 in. Weight 2 lb. Price £7 2s. 9d. plus tax.



**CLARKE & SMITH Manufacturing Co., Ltd.**, High Fidelity Components Division, Melbourne Works, Wallington, Surrey. Tel.: Wallington 9252. Cables: Electronic, Wallington.

**CSI 619.** Infinite baffle. Complete system. Forward-facing. Three units: bass 13½ × 8½ in. (92390 PFL); pair of tweeters 3¾ in. cone



*B. J. Treble Twin*

(99110J). Crossover (Type 99970F) 4,500 c/s. F.R. 50 c/s-18 Kc/s. Size 24 × 13 × 11½ in. Finish: natural walnut veneer, matt finished. Price £26 5s.



**DECCA Radio & Television**, Ingate Place, Queenstown Road, S.W.8. Tel.: Macaulay 6677.

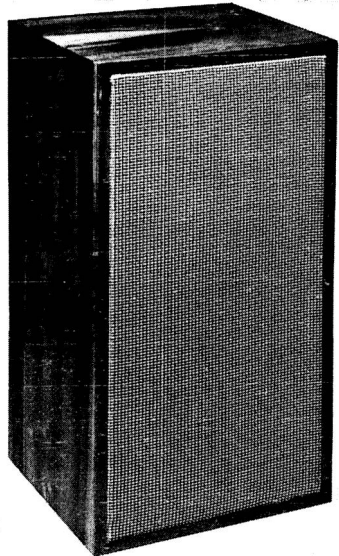
**Stereo Decola "Separates".** Bass reflex, treble stacked and angled arrays. One bass 12 × 8 in. elliptical, six treble 2½ in. dia. circular units. Crossover 400 c/s. F.R. 30 c/s-20 Kc/s. Size 30½ × 20½ × 20½ in. Price (complete) £53 11s.



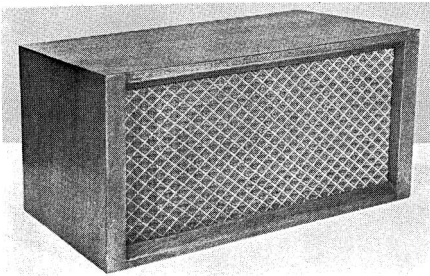
**DESIGN FURNITURE Ltd.**, Calthorpe Manor, Banbury, Oxfordshire. Tel.: Banbury 4341.

**GD8.** Approved by Goodman Industries Ltd. for Axiette 8. 8 in. loudspeaker. Size 31½ × 17½ × 8½ in. Can be used vertically or horizontally. Walnut, sapele mahogany or teak finish. Price £11 10s.

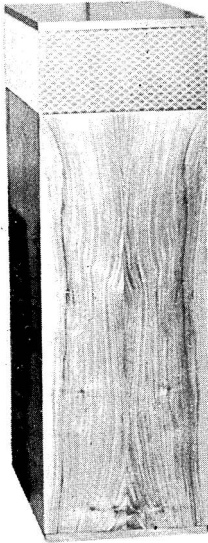
**GD10.** Approved by Goodman Industries Ltd. for Axiom 10. Size 29 × 18 × 11½ in. Can be used vertically or horizontally. Walnut, sapele mahogany, teak or rosewood finish. Price £12 5s.



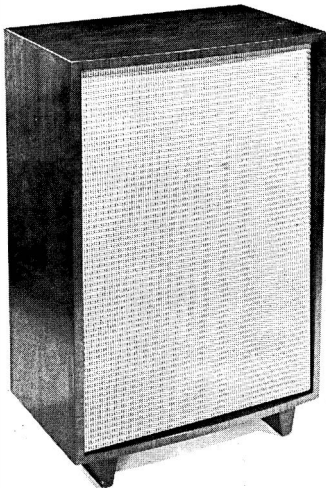
*Clarke and Smith CSI 619*



*Expert Gramophones Bookcase Enclosure*



*Expert Acoustic Column*



*Design Furniture GD 12*

**GD12.** Approved by Goodman Industries Ltd. for Axiom 201, Axiom 301, Triaxiom 1215 and 1220, Audiom 51 Bass and Audiom 61 Bass. Size  $22\frac{1}{2} \times 35\frac{1}{4} \times 14\frac{1}{8}$  in. Walnut, sapele mahogany, teak or rosewood finish. Price £14. (Acoustic Resistance Unit £3 5s. 6d. extra).



**EXPERT GRAMOPHONES Ltd.,** Audio Works, 197 Laleham Road, Staines, Middx. Tel.: Staines 53761.

**Acoustic column.** Two units, 12 in. bass, separate tweeter. F.R. 35 c/s-18 Kc/s. Size  $44 \times 13\frac{3}{4} \times 13\frac{3}{4}$  in. Price (complete) £33; (without units) £12.

**Everest.** Forward facing. Three units, 16 × 12 in. bass unit, 6 × 4 in. elliptical mid-range unit, spherical dome H.F. radiator. F.R. 20 c/s-20 Kc/s. Size  $32 \times 11\frac{1}{2} \times 18\frac{1}{2}$  in. Price (complete) £44 2s.; (without units) £12.

**Olympus.** Forward facing. Two units, 12 in. shallow cone, spherical dome H.F. radiator. F.R. 35 c/s-20 Kc/s. Size  $32 \times 11\frac{1}{2} \times 18\frac{1}{2}$  in. Price (without units) £12. (complete) £29 8s.

**Bookcase.** Forward-facing. Two units:  $13\frac{1}{2} \times 8$  in. elliptical bass;  $3\frac{3}{8}$  in. dia. tweeter. F.R. 50 c/s-20 Kc/s. Size  $18 \times 9 \times 9$  in. Weight 18 lbs. Price (with specified units) £15. Price (without units) £5.



**FANE ACOUSTICS Ltd.,** Hick Lane, Batley, Yorks. Tel.: Batley 1578. Cables: Fane, Batley.

**Trio.** Cabinet-baffle, forward facing. Three drive units. 12 in., 8 in., and H.F. unit. Fane units rec. Crossover included. Response 40-17,000 c/s. Size  $24\frac{1}{2} \times 24 \times 8\frac{1}{2}$  in. Weight 13 lb. Price £17 10s.

**Quartet.** Cabinet-baffle, forward facing. Four drive units. 12 in., 8 in., and two H.F. units. Size  $25\frac{1}{2} \times 25\frac{1}{2} \times 8\frac{3}{4}$  in. Weight 32 lb. Price £35. Cabinet only not supplied.



**GOODMANS INDUSTRIES Ltd.,** Axiom Works, Wembley, Middlesex, England. Tel.: Wembley 1200. Cables: Goodaxiom, Wembley.

**Eleganzia.** Acoustically sealed enclosure, exceptionally slim. Forward facing. Two units, 12 in. bass unit especially designed for this enclosure, employing Goodmans Super-foam diaphragm, and one back-loaded mid-range and H.F. unit. Crossover unit 900 c/s. F.R. 35 c/s-15 Kc/s. H.C. 15 watts. Impedance 15/16 ohms. Size  $27 \times 20 \times 6\frac{1}{4}$  in. Weight 42 lb. Price £25 4s.

**Maxim.** Infinite baffle. Forward facing. Incorporates two units specially designed for this box. Crossover included. F.R. 45 c/s-20 Kc/s. H.C. 8W. Imp. 15 ohms. Size:  $10\frac{1}{2} \times 5\frac{1}{2} \times 7\frac{1}{4}$  ins. Weight approx. 7 lbs. Price: £15 (U.K. purchase tax: £2 10s. 6d.).



**HAMPSTEAD HIGH FIDELITY** (Allegro Sound Equipment), 91a Heath Street, Hampstead, London, N.W.3. Tel.: Hampstead 6377.

**Hampstead RS1.** Sand-filled reflex enclosure, complete with units. Forward-facing and can be stood on floor or horizontally on bookshelf. Two units: 4 in. HF unit, and  $8\frac{1}{2} \times 5\frac{1}{2}$  in. LF unit with high-flux ceramic magnet. Crossover 3 Kc/s. F.R. 50 c/s-17 Kc/s. Size  $24 \times 8\frac{1}{2} \times 11\frac{1}{4}$  in. Weight 38 lbs. Price £18 18s.

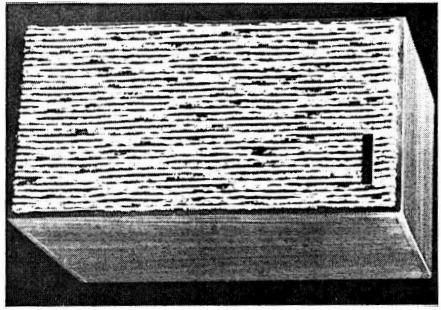


**ISOPHON-Werke**, Berlin-Tempelhof. U.K. Distributors: Britimpex Ltd., 16/22 Great Russell Street, London, W.C.1. Tel.: Museum 7600.

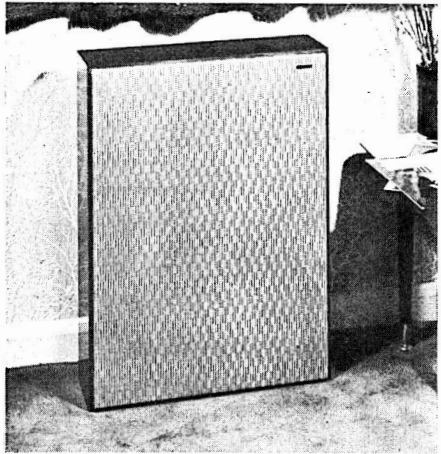
**HSB10.** Two-speaker system. Totally closed box damped internally. Forward-facing. Two units: 7 in. bass unit and  $3 \times 5$  in. mid-range/HF speaker. H.C. 10 W. Crossover 1,000 c/s. F.R. 50 c/s-20 Kc/s. Size  $19\frac{3}{4} \times 9 \times 6\frac{1}{8}$  in. Weight 14½ lbs. Price (with units) £18 7s. 6d. (incl. tax).

**HSB20.** Three-speaker system. Totally closed box damped internally. Forward-facing with switch at back to amplify high-midrange. Three units: 8 in. bass unit and two  $3 \times 5$  in. midrange/HF speakers. H.C. 20 W. Crossover 1,500 c/s. F.R. 35 c/s-23 Kc/s. Size  $24\frac{3}{8} \times 11 \times 8\frac{5}{8}$  in. Weight 24½ lbs. Price (with units) £32 11s. (incl. tax).

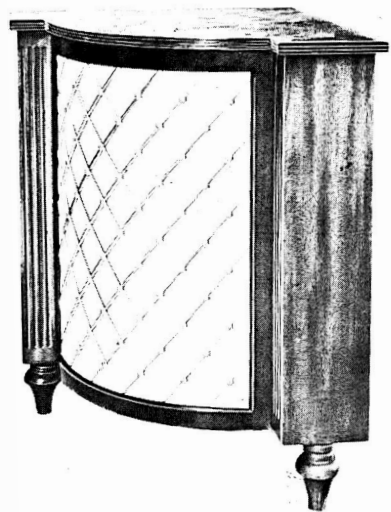
**HSB45.** Three-speaker system. Totally closed box damped internally. Forward-facing with control at the back adjusting level +3-7



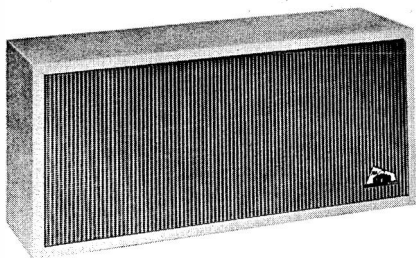
*Goodmans Maxim*



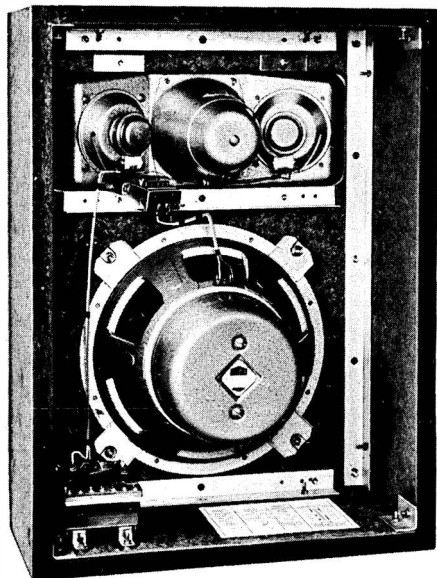
*Goodmans Eleganzia*



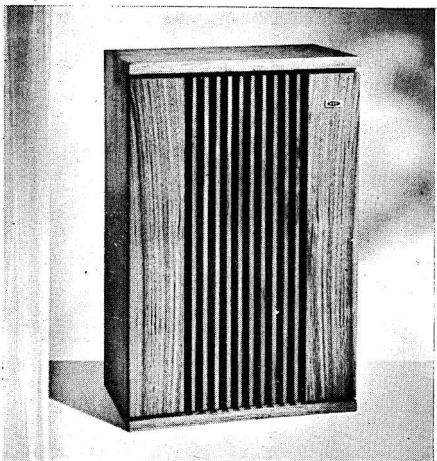
*Decca Decola Separates*



*Isophon HSB10 Two-speaker System*



*Isophon G3037*



*KEF Duette*

dB to room conditions. Three units (arranged angularly for wide radiation): 10 in. bass unit and two 3 × 5 in. midrange/HF speakers. H.C. 45 W. Crossover 1,500 c/s. F.R. 25 c/s-23 Kc/s. Size 25 $\frac{3}{8}$  × 13 $\frac{1}{2}$  × 11 $\frac{1}{4}$  in. Weight 39 $\frac{3}{4}$  lbs. Price (with units) £61 19s. (incl. tax).

**G3037.** Folded horn diffuser. Four-speaker system 12 in. bass unit mounted in bitumenised soundproof case, wide angle diffuser, two 4 in. tweeters. H.C. 15 W. F.R. 30 c/s-18 Kc/s. Size 23 $\frac{3}{8}$  × 17 $\frac{3}{4}$  × 7 $\frac{7}{8}$  in. Weight 29 $\frac{1}{4}$  lbs. Price (with units) £33 ls. 6d. (incl. tax).



**JORDAN-WATTS.** Distributors: Boosey & Hawkes (Sales) Ltd., Sonorous Works, Deansbrook Road, Edgware, Middx. Tel.: Edgware 5581.

**Mini 12.** Infinite baffle. Power handling 12W. Forward facing. Shelf or wall mounting. Incorporates one Jordan-Watts Modular unit. F.R. 80 c/s-20 Kc/s. Size: 13 $\frac{1}{4}$  × 8 × 4 $\frac{1}{2}$  ins. Weight: 13 lbs. Price (inc. tax): £16 12s. 6d.

**A12.** Reflex enclosure. Power handling 12W. Forward facing. Incorporates one Jordan-Watts Modular unit. F.R. 40 c/s-20 Kc/s. Size: 24 $\frac{1}{2}$  × 12 $\frac{1}{2}$  × 5 $\frac{1}{2}$  ins. Weight: 17 lbs. Price (inc. tax): £22.

**A25.** Reflex enclosure. Power handling 25W. Forward facing. Incorporates two Jordan-Watts Modular units. F.R. 35 c/s-20 Kc/s. Size: 30 × 13 $\frac{1}{2}$  × 7 $\frac{1}{2}$  ins. Weight: 25 lbs. Price (inc. tax): £36 15s.

**B50.** Reflex enclosure. Power handling 50W. Forward facing. Incorporates four Jordan-Watts Modular units. F.R. 35 c/s-20 Kc/s. Size: 34 × 15 × 10 $\frac{1}{2}$  ins. Weight: 48 lbs. Price on application.



**KEF ELECTRONICS Ltd.,** Tovil, Maidstone, Kent. Tel.: Maidstone 55761. Cables: Kef, Maidstone.

**K1 Slimline.** Pure acoustical resistance load. Forward facing. Three drive units, 18 × 14, 6 × 4, 1 $\frac{1}{2}$  dia. in. Crossover 375 c/s and 3,000 c/s. Size 27 × 17 × 6 $\frac{3}{4}$  in. Weight 40 lb. Price £39.

**K1 Monitor.** Pure acoustical resistance load. Forward facing. Three drive units,

18 × 14, 6 × 4, 1½ dia. in. Crossover 375 c/s and 3,000 c/s. Response 20-15,000 c/s. Size 39½ × 17 × 14 in. Weight 70 lb. Price £52.

**Celeste.** Totally enclosed. Forward facing. Two drive units 13 × 9 in. and 1½ in. dia. Crossover 1,000 c/s. Size 18 × 10¼ × 6¼ in. Weight 24 lb. Price £24 19s.

**Portable Celeste.** Totally enclosed. Forward-facing. Two units: B139 13 × 9 in.; T15 1½ in. dia. Crossover 1,000 c/s quarter-section. Size 20 × 12½ × 7½ in. Weight 26 lbs. Price on application.

**Duette.** Totally enclosed. Forward-facing. Two units: B139 13 × 9 in.; T15 1½ in. dia. Crossover 1,000 c/s half-section. F.R. 40 c/s-15 Kc/s. Size 24 × 15 × 9½ in. Weight 40 lbs. Price £39 19s.

★

**KELLY Acoustics Ltd.,** Romagna, Bycullah Avenue, Enfield, Middx. Tel.: Enfield 7890.

**Tallboy Reproducer.** Infinite baffle. Forward facing. Flat for mid-wall mounting. Two drive units, Kelly Mk. I bass unit and Mk. II ribbon. Crossover included. Response 35-20,000 c/s. Size 33 × 18 × 12 in. Weight 55 lb. Price complete £39.

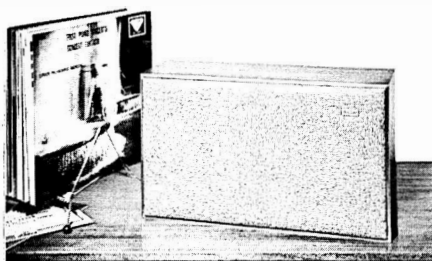
**Parva Enclosure.** Imp. 15 ohms. H.C. 15 watts. 2 units: Mk. II ribbon, Mk. V bass. F.R. 50 c/s-18 Kc/s ± 2 dB. 25 c/s-20 Kc/s ± 4 dB. Sapele mahogany or Walnut. Fabric: Tygan. Size 30 × 25 × 12 in. Weight 60 lb. Price £42.

**Mini.** Infinite baffle. Complete enclosure. Bookshelf or wall mounting. Three units: 12 in. Mark III, 10 × 6 in., 4 in. tweeter. Crossover 2,500 c/s. F.R. 60 c/s-12 Kc/s ± 2 dB. Size 23 × 13½ × 7½ in. Weight 40 lbs. Price (with units) £21.

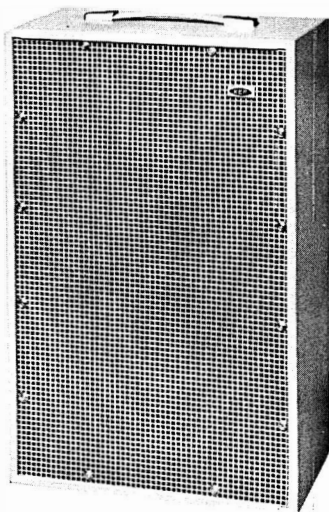
★

**LANSING ROLLS Ltd.,** 50 Foxdell Way, Chalfont-St. Peter, Bucks. Tel.: Chalfont-St. Giles 3444.

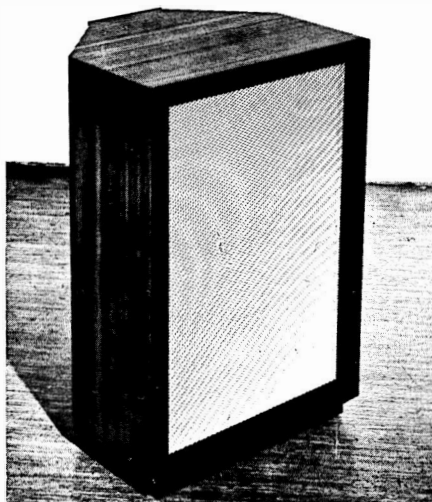
**Lansing Rolls.** Horn-type. Bass 12 in., mid-range 8 × 5 in. elliptical, H.F. 2-2½ in. Crossover 950 and 5,000 c/s. Imp. 15/16 ohms. F.R. 30 c/s-20 Kc/s. H.C. 30 W. Size 31 × 19½ × 16 in. Finish: sapele, mahogany. Price £67 10s.



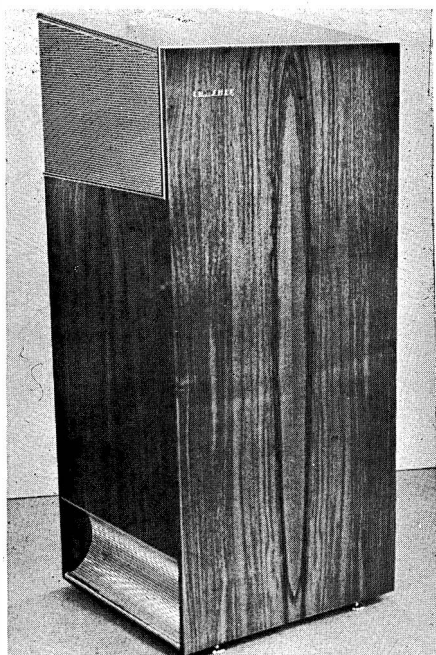
*KEF Celeste*



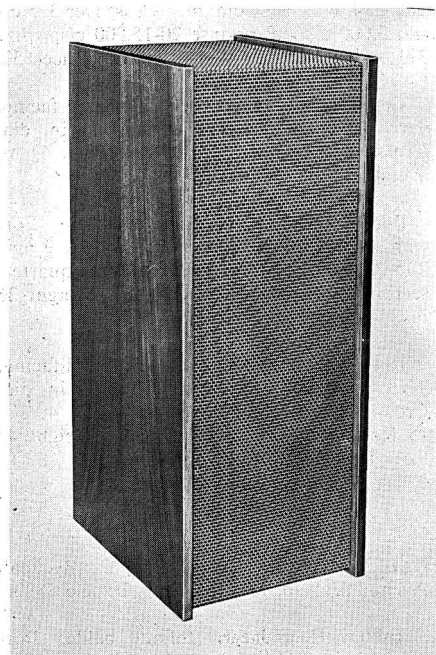
*KEF Portable Celeste*



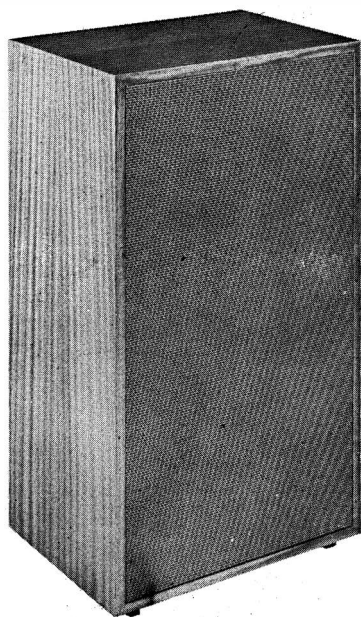
*Lansing Rolls Horn-type Speaker*



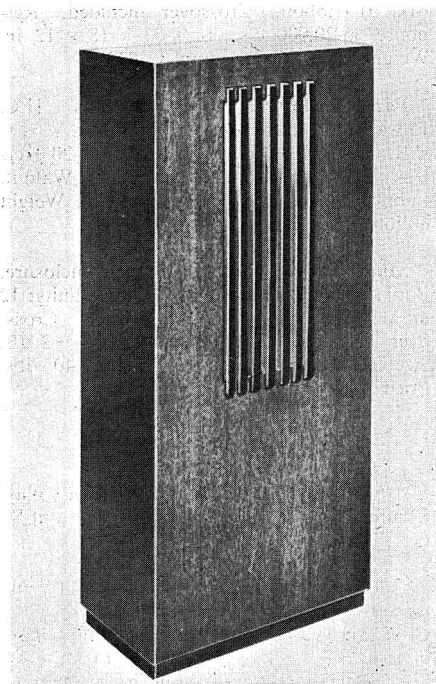
*Lowther Acousta Twin*



*Hampstead RS1 Enclosure*



*Audio Services Dynastatic*



*Jordan-Watts A25 Reflex Enclosure*

**H. J. LEAK & Co. Ltd.**, 57-59 Brunel Road, East Acton, London, W.3. Tel.: Shepherds Bush 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. Size 26 × 15 × 12 in. Weight 45 lb. Price £39 18s.



**LOCKWOOD & Co. (Woodworkers) Ltd.**, 63 Lowlands Road, Harrow, Middx. Tel.: Byron 3704.

**Mini-slim.** Reflex, forward facing. 12 in. units. Rec. Tannoy 12 in. dual concentric, Tannoy III LZ dual concentric, Rola GL 12 and HF 1300 tweeter. Size 27½ × 19 × 9½ in. Price (with specified units) £51 15s., £43 10s., £36 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 33½ × 20 × 11½ in. Price (with specified units) £62 10s., £55 15s., £48 10s., £41 10s.

**Major Slim.** Reflex, forward facing. 12 or 15 in. units. Rec. Tannoy 12 in. and 15 in. dual concentric, Rola GL12 and HF1300 tweeter. Size 38 × 24 × 11½ in. Price £68 10s., £61 15s., £46 10s.

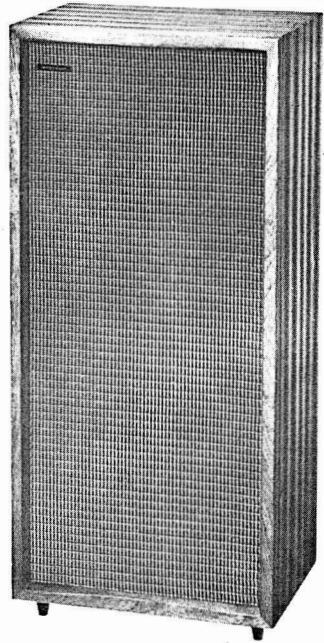
These reproducers can also be supplied complete with units by Goodmans, K.E.F., Vitavox, Stentorian and Wharfedale. Prices on application.



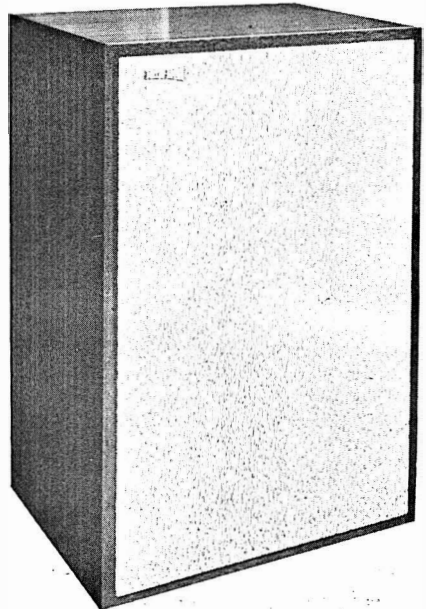
**LOWTHER MANUFACTURING Co.**, Lowther House, St. Mark's Road, Bromley, Kent, England. Tel.: Ravensbourne 5225. Cables: Lowther, Bromley.

**Corner Reproducer TP1.** Folded bass horn/direct h.f. horn type. One specially designed 6 in. pressure unit PM3. Acoustical crossover. Response 40-22,000 c/s. Size 47 × 32 × 31 in. from corner. Weight 70 lb. Price of standard Model A £98. Model B £106 approx.

**Acousta Cabinet.** Models FH/V, FH/H. Folded horn type, forward facing, with rear

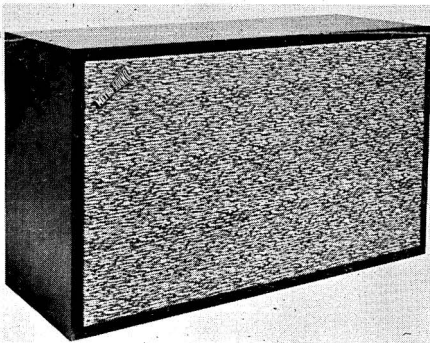


*Mordaunt Arundel, Warwick or Sterling*

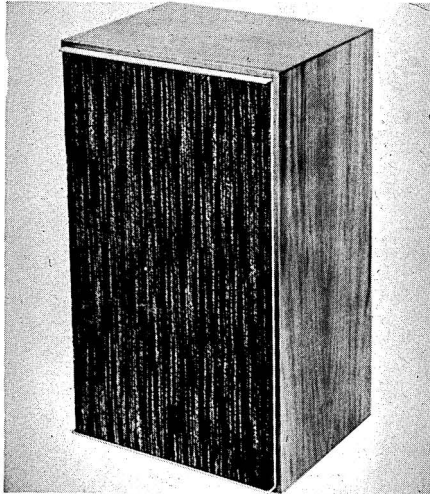


*Metro-sound Classic M.1*

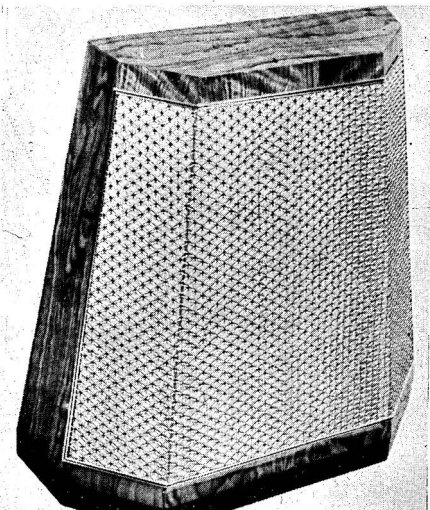




*Metro-sound Classic M.2*



*Leak Sandwich*



*Fane Quartet*

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 c/s. Size  $32 \times 18\frac{1}{2} \times 14\frac{1}{2}$  in. Weight 60 lb. Price without unit £19 19s.

This enclosure is also available in a "Do-it-yourself" kit form. Price £14 14s. ex works.

**Audiovector.** Compound horn. Upward facing mid- and high-frequency horn with rear folded horn. One 6 in. unit. Acoustic crossover. Range 40-22,000 c/s. Rec. PM2 PM2 Mk. 11 or PM4. Size  $26\frac{1}{2} \times 19 \times 34$  in. Price with specified units £96, without units £48.

**Acousta-twin.** Dual folded horn. Side facing and rear folded horn system for mono and stereo reproduction. Two PM6 or PM2 Mk. 3 6 in. drive units. Acoustic crossover. Response 40-18,000 c/s. Dimensions  $40 \times 16\frac{1}{2} \times 18$  in. Price £35 enclosure only. £72 16s. or £95 complete.

**Corner Acousta.** Folded horn. Rearward facing into corner. Bass outlets coupling into corner of room. One 6 in. high flux unit. Rec. Lowther PM6. F.R. 40 c/s-18 Kc/s. Size  $32 \times 9\frac{1}{2} \times 18$  in. Price (without unit) £19 19s.



**METRO-SOUND Manufacturing Co. Ltd.,** Bridge Works, Wallace Road, London, N.1. Tel.: Canonbury 8641. Cables: Metrosound, London, N.1.

**Classic M.1.** Complete system. Reflex. Forward-facing. Incorporates Cor-reflex system for increased frequency response. Two units: 12 in. bass, 5 in. treble. Crossover 1 Kc/s. F.R. 28 c/s-17.5 Kc/s. Size  $24 \times 14 \times 12\frac{1}{2}$  in. Price £36.

**Classic M.2.** Infinite baffle. Complete system. Forward-facing. Incorporates Cor-Reflex (as M.1). Two units:  $13 \times 8$  in. bass, 3 in. treble. Crossover 5 Kc/s. Response 35 c/s-18.5 Kc/s. Size  $10\frac{3}{4} \times 18\frac{1}{2} \times 7\frac{1}{4}$  in. Price £17 10s.



**MORDAUNT Sound Reproducers,** 1-3 Stanley Road, Napier Road, Bromley, Kent. Tel.: Ravensbourne 9212.

**Arundel Mark II.** Totally enclosed. Forward facing. Two units, 12 in. bass, ribbon



tweeter. Crossover 2,750 c/s. F.R. 30 c/s-25 Kc/s. H.C. 12/15 watts. Size 33 × 15 × 11 in. Weight 44 lb. Price £40 19s.

**Warwick.** Totally enclosed. Forward facing electrostatic/dynamic. Two units, 12 in. bass, push-pull electrostatic tweeter. Crossover 2 Kc/s. F.R. 50 c/s-20 Kc/s. H.C. 6/10 watts. Size 31 × 15 × 11 in. Weight 40 lb. Price £35 14s.

**Conway.** Totally enclosed. Forward facing. Two units, 12 in. bass, ribbon tweeter. Crossover 2,750 c/s. F.R. 25 c/s-25 Kc/s. H.C. 12/15 watts. Size 36 × 26½ × 12 in. Weight 50 lb. Price £51 9s.

**Edinburgh.** Totally enclosed. Forward facing. Four units, two 12 in. bass units, two ribbon tweeters. Crossover 2,750 c/s. F.R. 25 c/s-25 Kc/s. H.C. 25/30 watts. Size 36 × 26½ × 12 in. Weight 70 lb. Price £81 18s.

**Stirling.** Totally enclosed. Forward-facing. Two units: 12 in. bass, 1½ in. treble. Crossover 1,500 c/s. F.R. 40 c/s-16 Kc/s. Size 29 × 15 × 11 in. Price (with units) £30 9s.

**Bookcase.** Infinite baffle. Totally enclosed.



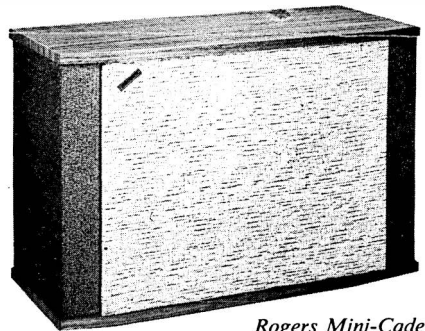
**MUSICRAFT Audio Products Ltd.,** 13 King Street, Richmond, Surrey. Tel.: Richmond 6798.

**F.E.H.** 6 ft. folded horn. Forward facing. Two units: 8 in. drive unit, 3 in. H.F. unit. Rec. Goodmans Axiette 8 in., Wharfedale Super 3 in. Crossover 5,000 c/s. F.R. 30 c/s-17 Kc/s. Size 36 × 20 × 20 in. Price £40 19s. (complete with speakers).

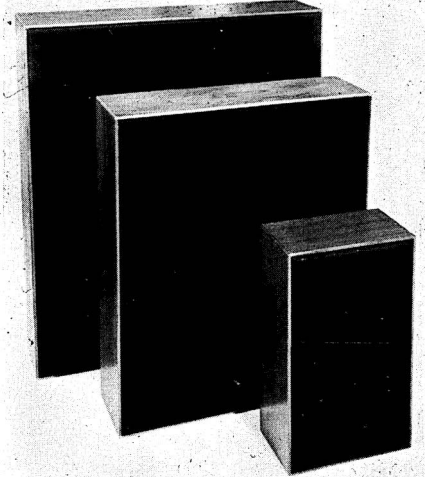
**Modular.** Complete forward-facing system, using double reflex enclosure principle for bass loading. Designed to match Modular tape and equipment cabinets. Two units: 8 in. bass, 3 in. treble. Crossover 3,000 c/s. F.R. 30 c/s-18 Kc/s. Price £19 19s.



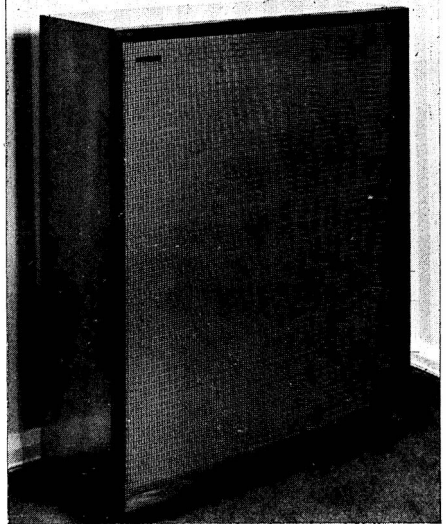
**PAMPHONIC REPRODUCERS Ltd.,** Westmoreland Road, London, N.W.9. Tel.: Colindale 7131.



*Rogers Mini-Cadet*



*Radford B.L.S., S.L.S. and A.L.S.*



*Mordaunt Edinburgh or Conway*



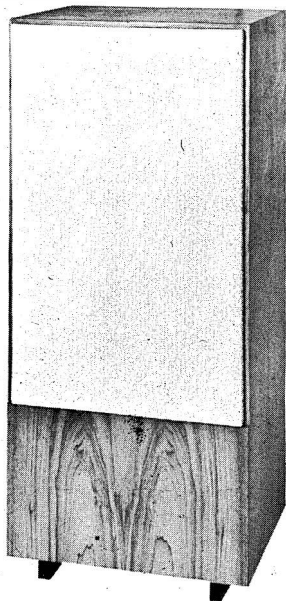
*Pamphonic S1*

**Pillar Type 778.** Tuned column. Forward facing H.F. unit and upward facing L.F. unit, 6½ in. (L.F.), 4 in. (H.F.). Crossover 1,000 c/s single section. Response 35 c/s to 12 Kc/s. Size 37½ × 12 × 12 in. Price £14 12s. 3d. (U.K. purchase tax £2 8s. 8d.).

**S.1.** Cabinet type, forward facing. Elliptical 10 × 6 in. concentric cone unit. Size 15 × 12 × 11 in. Price £9 (U.K. purchase tax £1 10s.).



**PYE LIMITED**, High Fidelity Division, P.O. Box 49, Cambridge. Tel.: Cambridge 58985. Cable: Pyrad, Cambridge.



*KEF Monitor*

**Mozart Minor HF9BS.** Distributed vent reflex. Two drive units, 12 in. bass and 10 × 6 in. elliptical. Air coupled in pat. arrangement. Crossover included. Response 50-15,000 c/s. Size 28 × 13 × 10¼ in. Price £20 9s. 6d.



**RADFORD Electronics Ltd.**, Ashton Vale Estate, Bristol 3. Tel.: Bristol 662301/2.

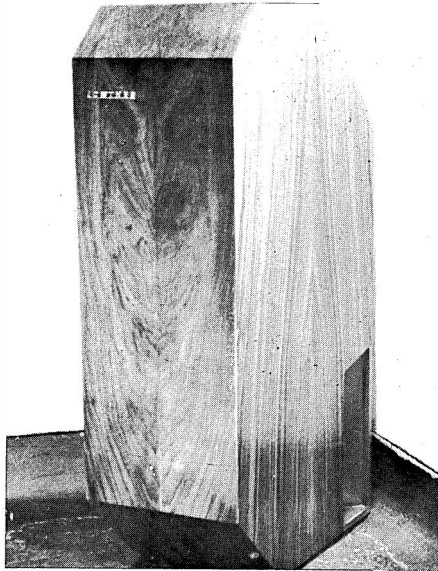
**B.L.S.** Bookshelf model. Sealed acoustic enclosure. Forward-facing. Two units: bass, KEF Type B139, rectangular flat piston; treble, Celestion HF1300. Imp. 8 or 16 ohms. H.C. 25 W. Response 80 c/s-15 Kc/s. Size 20 × 11½ × 7⅞ in. Weight 28 lbs. Price (complete with units) £24.

**S.L.S.** Studio model. Acoustic transmission line loading. Forward-facing. Three units: bass, KEF Type B139, rectangular flat piston; 2 × treble, Celestion HF1300. Imp. 8 ohms. H.C. 30 W. Response 30 c/s-15 Kc/s. Size 30 × 24 × 8 in. Weight 70 lbs. Price (complete with units) £42 10s.

**A.L.S.** Auditorium model. Details as for S.L.S. Size 36 × 30 × 8 in. Weight 105 lbs. Price £75.



**RECORD HOUSING**, Brook Road, London, N.22. Tel.: Bowes Park 7487.



*Lowther Corner Acousta*

**Nordyk.** Reflex forward facing. One drive unit. Rec. 8-in. Goodmans and Wharfedale. Response 40-15,000 c/s. Price, cabinet only, £7 7s.

**Viking.** Reflex forward facing. Two drive units. 8 or 10-in. tweeter. Response 40-15,000 c/s. Size 32 × 19 × 12 in. Price, cabinet only, £11 11s.

**Strauss.** Reflex forward facing. Two drive units. 10 in. plus any tweeter. Rec. Goodmans Axiom 10. Response 40-15,000 c/s. Size 32 × 18 × 11 in. Price £11 19s.

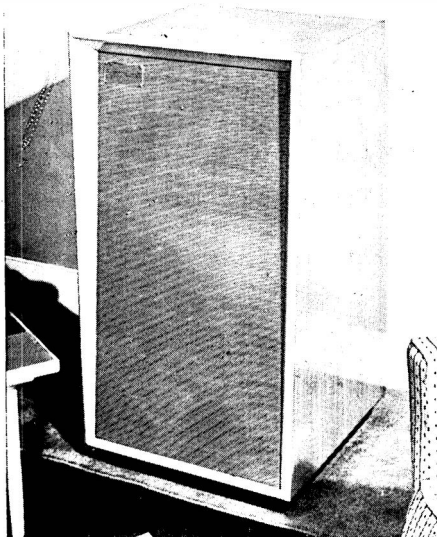
**Quarterwave.** Folded horn. Forward facing. Two units: 12 in. bass unit; Kelly ribbon speaker. Crossover included. F.R. 30 c/s-16 Kc/s. Size 32 × 18 × 11 in. Price approximately £37 16s.

**Lowline.** Folded Horn Enclosure. Forward facing. One 8 in. unit. Rec. Goodmans Axiote 8 or Wharfedale Super 8. Price to be announced.

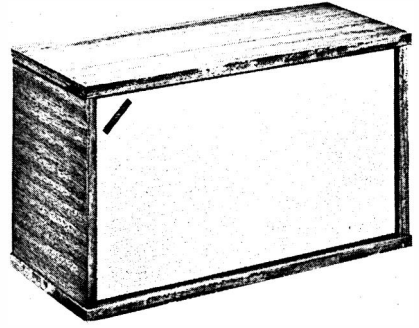


**ROGERS DEVELOPMENT (Electrical) Ltd.,** 4-14 Barmeston Road, Catford, London, S.E.6. Tel.: Hither Green 7424/4340. Cables: Rodevco, London, S.E.6.

**Cadet Mk. II Horn Speaker.** Folded horn gives rear loading on 8 × 5 in. main unit.



Musicraft FEH



Tannoy III LCZ

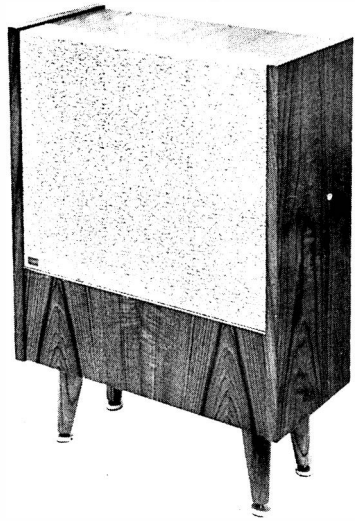
Middle frequencies from front of elliptical unit and highs from 3 in. unit. Crossover at 4 Kc/s. Response, 50 c/s-15 Kc/s. Impedance 15 ohms. Size 33½ × 20½ × 8½ in. Price £20 5s. (U.K. purchase tax £3 9s.).

**Mini-Cadet.** Infinite baffle. Complete system. Forward-facing. Two units: 12 in. bass, 3⅜ in. tweeter. Crossover included. F.R. 40 c/s-18 Kc/s. Size 20 × 13½ × 8½ in. Price £21.



**ROLA CELESTION Ltd.,** Ferry Works, Thames Ditton, Surrey. Tel.: Emberbrook 3402. Cables: Voicecoil, Thames Ditton.

A range of new speakers should be in production later in 1964, but at the time of going to press details were not available.



Lockwood Mini-Slim

**THE SOUNDCRAFT Co.**, 1 Stanley Road, Bromley, Kent. Tel.: Ravensbourne 5673.

**Stanley.** Forward facing folded horn. One 8-in. drive unit. Size  $31\frac{1}{2} \times 12 \times 13\frac{3}{4}$  in. Price, cabinet only, £13 13s.

**Langdon.** Forward facing folded horn. One 8-in. drive unit. Size  $33 \times 15 \times 16$  in. Price, cabinet only, £17 17s.

**FH12.** Forward facing folded horn. Two drive units, 8 in., 10 or 12 in. and tweeter. Size  $32\frac{1}{2} \times 14$  in. Depth according to speaker fitted. Price, approx. £15 15s.

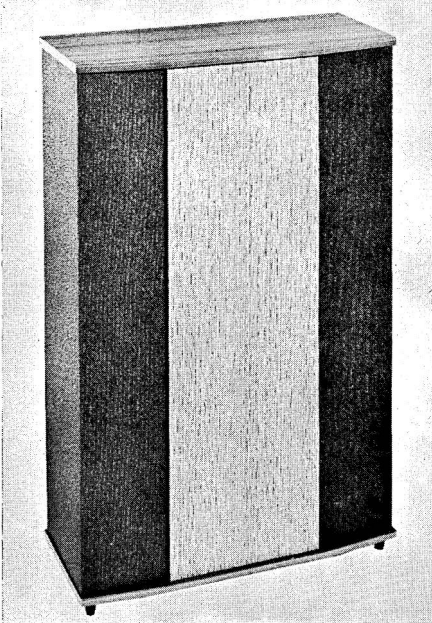
★

**STENTORIAN.** See Whiteley Electrical.

★

**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. Omnidirectional  $360^\circ$ . 15 ohms impedance at 400 c/s. One unit, 8 in. foam surround with H.F. dome. 812/FS recommended. Response 40-12,000



*Rogers Cadet Mk. II*

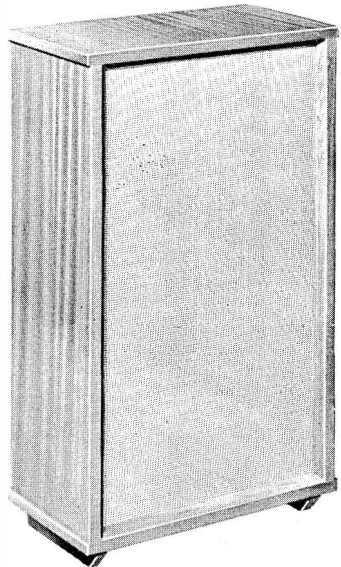
c/s. Size  $36 \times 11\frac{1}{2}$  in. max. dia. Weight 17 lb. Price, enclosure, £10 8s. 9d.; 8 in. unit for above 812/FS £2 1s. 3d. (U.K. purchase tax 7s. 4d.).

**Connoisseur Craftsman Major.** Column reflex with upward facing ports. Omnidirectional  $360^\circ$ . 15 ohms impedance at 400 c/s. One 8 in. foam surround unit, one 3 in. tweeter. G8/FS and LPH/65 recommended. Capacitor filter. Response 30-17,000 c/s. Size  $43 \times 14\frac{1}{2}$  in. max. dia. Price, enclosure only, £15 10s. 8d.; G8/FS £2 15s. (U.K. purchase tax 9s. 9d.); LPH/65 £1 8s. 6d. (U.K. purchase tax 5s. 1d.).

**Connoisseur "Junior".** Column reflex. Upward facing port, omnidirectional  $360^\circ$ . One unit: 3 or 15 ohm available.  $6\frac{1}{2}$  in. foam surround. F.R. 50 c/s-12 Kc/s. Size  $26 \times 9$  in. max. diam. Weight 10 lbs. Price (with unit) £7 6s. 10d.

**Connoisseur Minor Mk. II.** Column reflex. Upward facing ports, omnidirectional  $360^\circ$ . One unit: 8 in. foam surround with H.F. dome. Imp. 15 ohms at 400 c/s. F.R. 40 c/s-12 Kc/s. Size  $34 \times 10\frac{1}{2}$  in. Weight 18 lbs. Price (enclosure only) £9 11s. 6d.; (unit) £2 7s. 6d. (U.K. purchase tax 7s. 10d.).

**Connoisseur Major Mk. II.** Column reflex. Upward facing port, omnidirectional  $360^\circ$ . Two units: 8 in. foam surround,  $2\frac{1}{2}$  in. HF



*Record Housing Strauss*

unit. Imp. 15 ohms at 400 c/s. Filter capacitor. F.R. 30 c/s-17 Kc/s. Size 40 × 13 × 13 in. Weight 28 lbs. Price (enclosure only) £12 12s.; (8 in. drive unit) £3 (U.K. purchase tax 10s.); (2½ in. HF unit) £2 (U.K. purchase tax 6s. 8d.).



**SYMPHONY AMPLIFIERS Ltd.**, 16 Kings College Road, London, N.W.3. Tel.: Primrose 3314/5.

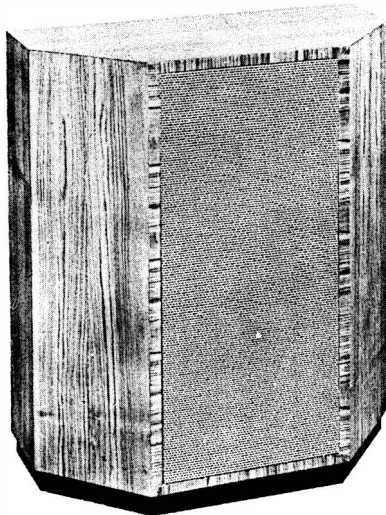
**Symphony Bass Reflex Cabinets.** A range of forward facing systems to take 8, 10 or 12 in. units. Price, ready built, £5 10s. to £12 10s. Also available in Kit form.

**Symphony Infinite BaDe.** Forward facing. One 8 in. unit. Rec. Wharfedale Super 8RS/DD. F.R. 35 c/s-30 Kc/s. Size 24 × 12 × 12 in. Weight 12 lb. Price, in white wood, £5 10s. Veneered wood £3 extra.



**TANNOY PRODUCTS Ltd.**, West Norwood, London, S.E.27. Tel.: Gipsy Hill 1131. Cables: Tannoy, London.

**Guy R. Fountain Autograph.** Folded horn. Front and rear horn-loaded unit, forward facing for corner placing. 15 in. dual concentric unit. Response 20-20,000 c/s. Size 58½ × 43 × 26½ in. Price £165.



Kelly Parva

**Chatsworth II.** Aperiodic enclosure for corner placing. One Monitor 12 drive unit. Size 36½ × 20 × 12¾ in. 4 in. legs. Price £49 15s.

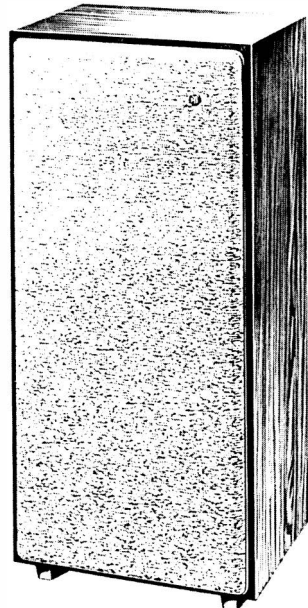
**Rectangular Chatsworth.** Infinite baffle. Forward-facing. Complete with 12 in. dual concentric unit (Monitor 12). Crossover 1,700 c/s. F.R. as for speaker units. Size (front to back) 10 × 15½ × 33 in. Price £49 15s.

**Canterbury.** Reflex, with forward facing unit, dual throated ports, for corner placing. One 12 in. dual concentric unit, or direct radiator. Size 37 × 25 × 17 in. Price, with dual concentric, £57 15s.

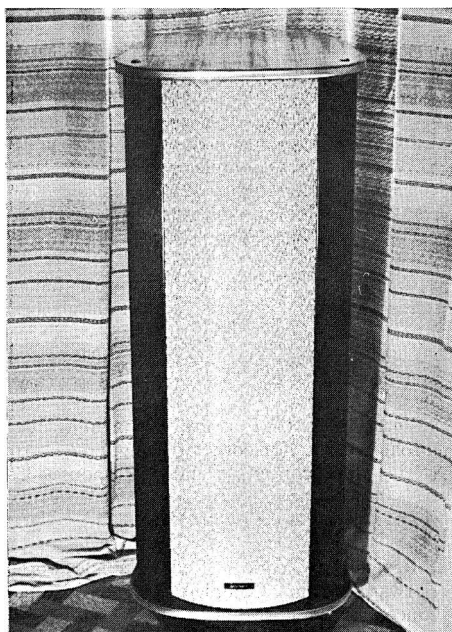
**York.** Reflex. Forward facing unit, dual throated ports, for corner placing. 12 in. or 15 in. dual concentric unit. Response 35-20,000 c/s. Size 45½ × 32 × 22½ in. Price, with 12 in. unit, £66; with 15 in. £75.

**Rectangular York.** Reflex (single port). Forward-facing. Complete with 15 in. dual concentric unit (Monitor 15). Crossover 1,000 c/s. F.R. as for speaker units. Size (front to back) 15 × 23½ × 42 in. Price £75.

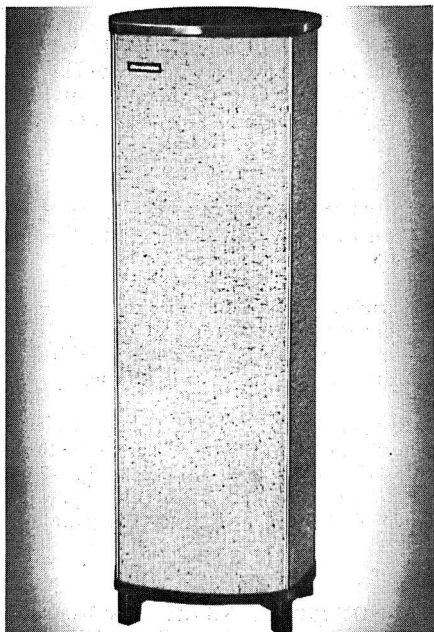
**G.R.F.** Folded horn. Rear horn loaded, forward facing unit, for corner. One 15 in. dual concentric unit. Response 20-20,000 c/s. Size 48 × 38 × 29 in. Price £122.



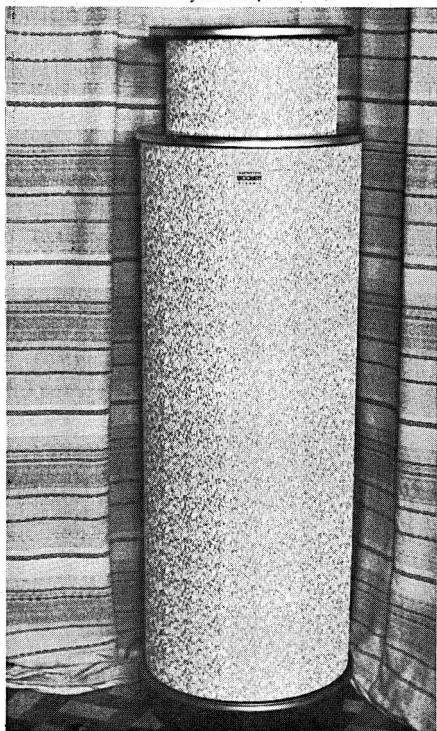
Pye Mozart Minor HF9BS



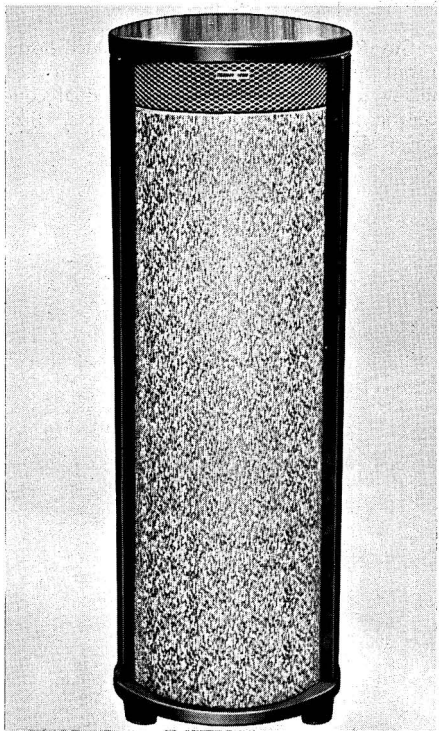
*Woollett Lomond Dynamic Bass*



*Sugden Connoisseur "Junior" Enclosure*



*Woollett Thirlmere Electrostatic-Dynamic*



*Sugden Craftsman Major*

**Rectangular GRF.** Single folded horn. Forward-facing with front exits. Complete with 15 in. dual concentric unit (Monitor 15). Special crossover 1,000 c/s. F.R. as speaker unit. Size (front to back)  $17\frac{1}{4} \times 23\frac{1}{2} \times 42$  in. Price £105.

**III LZC.** Infinite baffle forward facing. Tannoy III LZ dual concentric unit. Response 30-20,000 c/s. Size  $14 \times 10\frac{3}{4} \times 23\frac{1}{4}$  in. Price £32 10s.



**VITAVOX Ltd.**, Westmoreland Road, London, N.W.9. Tel.: Colindale 8671. Cables: Vitavox, Hyde, London.

**Klipschorn.** Double channel horn system. Folded L.F. horn with K15/40 drive unit. Forward facing H.F. horn with S.2 pressure unit. Crossover at 500 c/s with incorporated divided network. Response 30-15,000 c/s. Size  $51 \times 30 \times 27$  in. Weight 210 lb. Price, complete with drive unit, £165.



**C. W. WALKER**, 33 Piper's Lane, Hoole, Chester.

**Walker One/8.** Small speaker with wrap-round grille material. One 8 in. unit. Rec. Wharfedale Super 8RS/DD. Size  $24 \times 13\frac{1}{2} \times 9$  in. Finish: walnut or mahogany. Price (with unit) £15 2s. 2d.; (without unit) £8 8s.



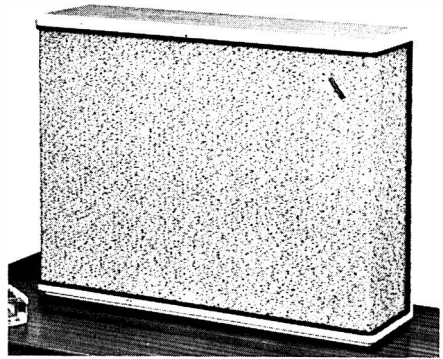
**WESTREX Company Ltd.**, 152 Coles Green Road, Cricklewood, London, N.W.2. Tel.: Gladstone 5401. Cables: Westelcol.

**Westar 100 Reflex.** Two units, H.F. 3 in. diaphragm, L.F. 15 in. Crossover and equaliser 750 c/s. H.F. radiator is associated with a slant-plate acoustic lens to spread the sound horizontally. Size 38 in. high, 18 in. deep, front 24 in. wide, back  $16\frac{1}{2}$  in. wide. Weight 100 lb. Price (industrial 2326A) £85; (Teak veneer finish 2326B) £95.

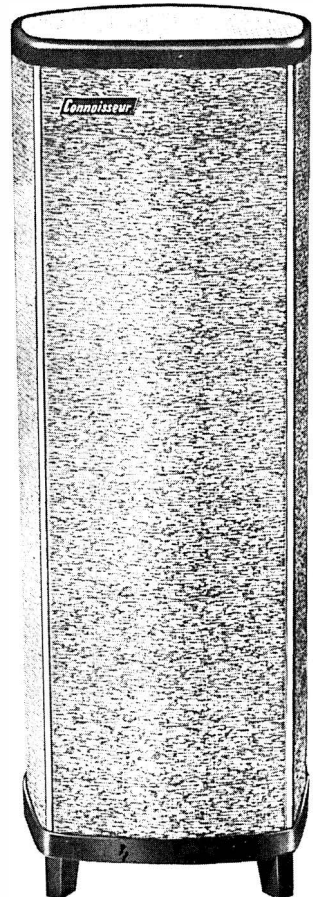


**WHARFEDALE Wireless Works Ltd.**, Idle, Bradford. Tel.: Idle 1235-6. Cables: Wharfedel, Idle, Bradford.

**PST/8.** Damped reflex, forward facing. One 8 in. drive unit. Rec. Super 8/RS/DD or

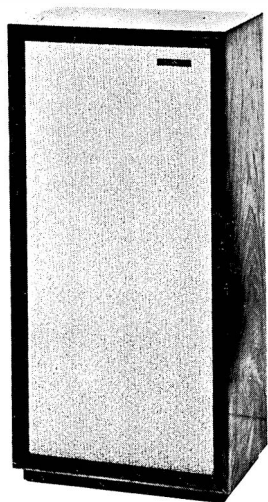


*Wharfedale Slimline 2*

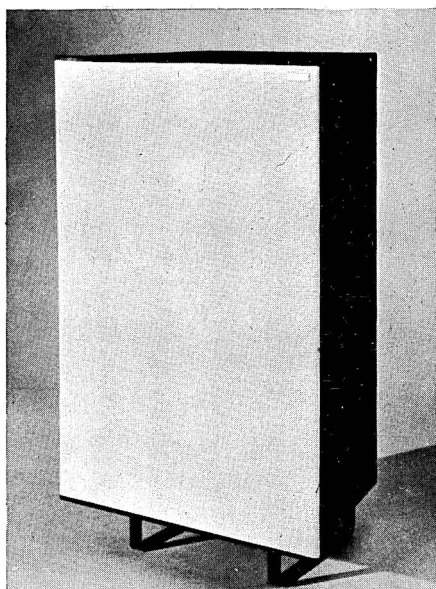


*Sugden Connoisseur Major Mk II*

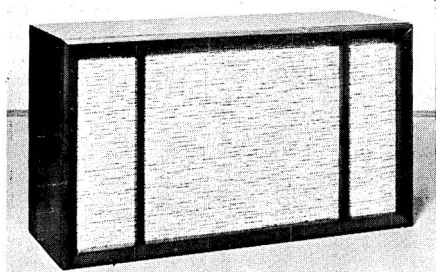




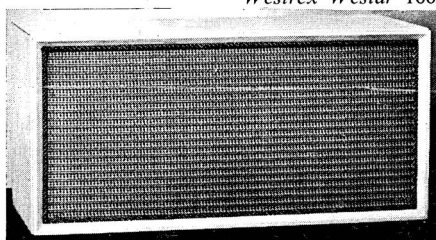
*Tannoy Rectangular Chatsworth*



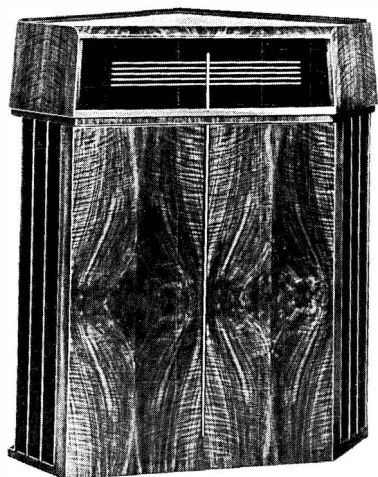
*Westrex Westar 100*



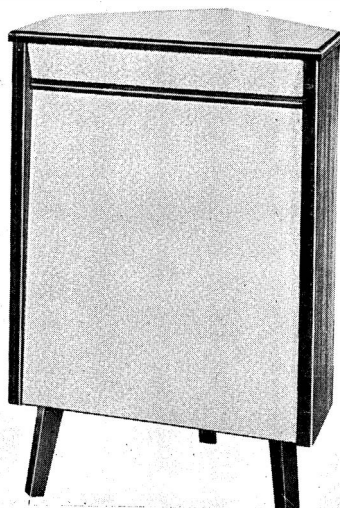
*Wharfedale Bookshelf 2*



*Wharfedale PST 18*



*Vitavox Klipshorn*



*Whiteley Thoresby Bass Reflex*



8 in. Bronze FS/AL. Size  $24 \times 12 \times 12$  in. Weight 17 lb. Price, without unit £7 10s whitewood, or £10 10s. veneered and polished.

**Slimline 2.** Reflex. Two speaker system with crossover. 12 in. and  $4\frac{1}{2}$  in. units. Size  $25 \times 20 \times 7$  in. Weight 31 lb. Price £22 10s.

**W2.** Two-speaker system, incorporating WLS/12 and Super 5 with vol. control. Crossover 1,000 c/s. Size  $23\frac{1}{2} \times 14 \times 12$  in. Price, veneered, complete, £29 10s.

**W3.** Three-speaker system, incorporating WLS/12, a 5 in. Bronze, and Super 3. Separate vol. controls for the two H.F. units. Crossover 1,000 c/s. Size  $28 \times 14 \times 12$  in. Price, veneered, complete, £39 10s.

**W4.** Four-speaker system, incorporating WLS/12, two 5 in. Bronze, and Super 3. H.F. units are arranged for omni-directional radiation and have independent mid and treble vol. controls. Size  $35 \times 24 \times 12$  in. Price veneered, complete, £49 10s.

**Airedale Reflex.** Omni-directional. Three units, 15 in. bass, 8 in. middle, 3 in. treble. Crossovers 400 and 5,000 c/s. F.R. 20 c/s-20 Kc/s. Size  $39 \times 28\frac{1}{2} \times 14$  in. Weight 91 lb. Price £65.

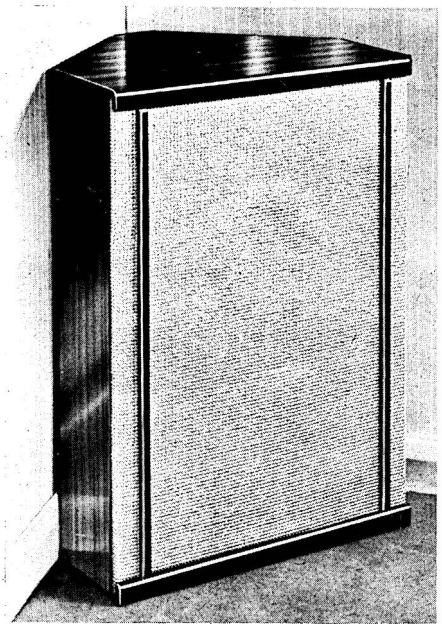
**Bookshelf 2.** Infinite baffle. Forward-facing. Two units: 10 in. polystyrene diaphragm unit; 5 in. mid-range and treble unit. Crossover 1,000 c/s. F.R. 60 c/s-12 Kc/s. Size  $19 \times 11 \times 6\frac{3}{4}$  in. Weight 18 lb. Price (complete with units) £16 10s.



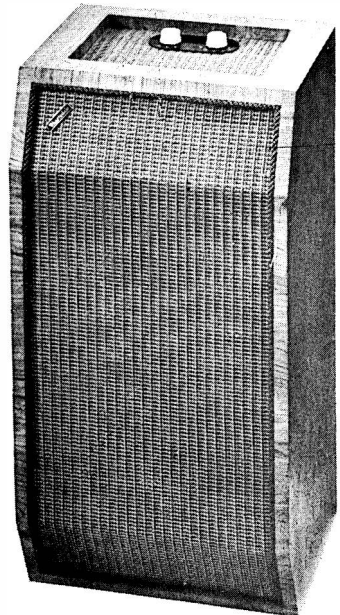
**WHITELEY ELECTRICAL Radio Co. Ltd.,** Victoria Street, Mansfield, Notts. Tel.: Mansfield 1762/3/4/5. Cables: Whitebon, Mansfield.

**Stentorian Junior Console.** Bass reflex for corner position. 1 or 2 drive units. Rec. HF816 or HF1012 with T10 tweeter, if required. Crossover 3,000 c/s. Response HF816. 50-14,000 c/s; HF1012 and T10 30-14,000 c/s. Size  $33 \times 22\frac{1}{2} \times 18\frac{1}{2}$  in. Price, without units, £10 10s.

**Stentorian Senior Corner Console.** Bass reflex for corner position. 10 in. or 12 in. drive unit with tweeter, if required. Crossover 3,000 c/s. Response with HF1012 and T10 30-40,000 c/s; with HF1214 and T12 25-17,000 c/s. Size  $35 \times 30 \times 19$  in. Price, without units, £12 12s.



*Whiteley Junior Corner Console*



*Wharfedale W.2*

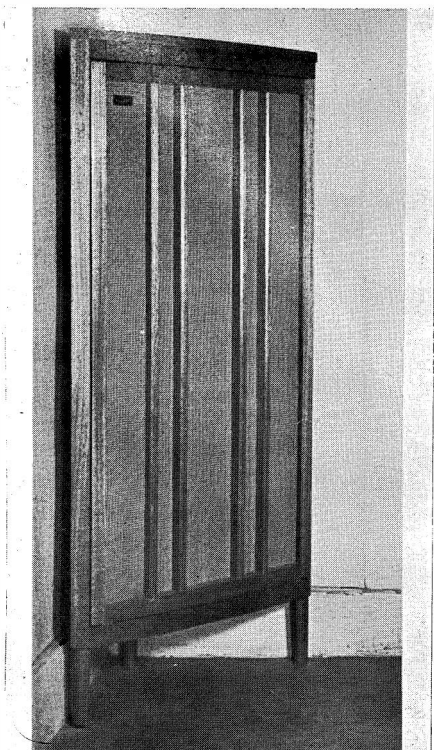
**Stentorian Sloping Dual Front.** Tweeter housing, reversible, either forward or rear facing. One 8 in. unit. Rec. T816. Response 1,000-17,000 c/s. Size  $13 \times 10\frac{1}{2} \times 7\frac{1}{2}$  in. Price, without unit, £4 ls. 6d.

**Stentorian Prelude Horn Loaded.** Folded horn, forward facing. One 8 in. drive unit. Rec. HF817. Response 60-22,000 c/s. Size  $35 \times 18\frac{3}{4} \times 16\frac{3}{4}$  in. Price, without units, £20.

**Stentorian Junior Column.** Reflex upward facing omni-directional. One 6 in. unit. Rec. HF610. Response 100-11,000 c/s. Size  $36 \times 9 \times 9$  in. Price, without unit, £11.

**Stentorian Senior Column.** Reflex upward facing omni-directional. One 8 in. unit. Rec. HF816. Response 60-14,000 c/s. Size  $57 \times 13\frac{1}{2} \times 13\frac{1}{2}$  in. Price, without unit, £20.

**Thoresby Reflex.** Forward facing. One 8 in. or 10 in. unit + tweeter. Rec. HF816, HF1012, HF1016. Price (with HF1012 + T10 + CX3000) £23 9s. 3d.; (without units) £12 12s.



**Thoresby Slimline.** Reflex enclosure. Forward-facing. One 8 in., or 10 in. unit + tweeter. Rec. HF816; HF1012 or HF1016 + T359 or T10. Crossover 3,000 c/s. Size  $31 \times 20 \times 9\frac{1}{4}$  in. Price without units £8 15s.

**Thoresby Bass Reflex Corner Console Enclosure.** Forward-facing. One 8 in., or 10 in. unit + tweeter. Rec. HF816; HF1012 or HF1016 + T10 or T359. Crossover 3,000 c/s. Size  $31 \times 19\frac{3}{8} \times 18$  in. Price £11.



**L. G. WOOLLETT & Co. Ltd.,** 21 Anerley Station Road, London, S.E.20. Tel.: Sydenham 9003.

**Thirlmere Electrostatic-Dynamic.** Full range loudspeaker system incorporating dynamic bass speaker (loaded by an inherently rigid, cylindrical, indirect radiator, infinite baffle system) and an electrostatic mid and upper frequency unit. Response 25 c/s-20 Kc/s. Price 46 4s.

**Lomond Dynamic Bass.** Primarily for use with Leven electrostatic upper register. Inherently rigid cylindrical infinite baffle. Indirect radiator 360° dispersal. For use with separate tweeters. One 12 in. unit incorporated. F.R. 25 c/s-5 Kc/s. Size  $17 \times 17 \times 44\frac{3}{8}$  in. Price £36 15s.



**WORDEN Audio Developments Ltd.,** 54 Chepstow Road, London, W.2. Tel.: Bayswater 4996.

**Panasonic Reproducer.** Double horn, with central diffusing chamber. Corner reproducer, designed for omni-directional radiation from one 10 in. unit. Available in two versions: Model A,  $54 \times 24 \times 14\frac{1}{2}$  in. to corner; F.R. from below 30 c/s to over 17 Kc/s. Price (enclosure) £31. Wharfedale special drive unit with 16,000 gauss magnet, £9 7s. 6d. (U.K. purchase tax £1 11s. 2d.). Model B,  $48 \times 21\frac{1}{2} \times 12\frac{1}{2}$  in. to corner. F.R. 30 c/s-15 Kc/s. Price (enclosure) £28. Wharfedale special drive unit with 14,500 gauss magnet, £5 15s. (U.K. purchase tax 19s. 2d.).

Choice of finish: light or dark mahogany or walnut, waxed or polished.

# 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.

## LONDON AREA

AUDIO SERVICES, 82 East Barnet Road, New Barnet, Herts.  
BERRY'S RADIO, 25 High Holborn, W.C.1  
CHELSEA RECORD CENTRE, 203 Kings Road, S.W.3  
CITY & ESSEX TAPE RECORDER CENTRES, 228 Bishopsgate, E.C.2, 2 Maryland Station, Stratford, E.15, 205 High Street North, East Ham, E.6, 282 East India Dock Road, Poplar, E.14  
CUSTOM HIGH FIDELITY, 371 Green Lanes, Palmers Green, N.13  
DAVENSTED RADIO, 2 Burnt Ash Parade, Lee Green, S.E.12  
H. NORMAN DAVIES, 91 The Broadway, Mill Hill, N.W.7  
DICKINSONS OF PALL MALL, 11 Royal Opera Arcade, Pall Mall, S.W.1  
FRANCIS OF STREATHAM, 169-173 Streatham High Road, S.W.16  
C. C. GOODWIN, 7 The Broadway, Wood Green, N.22  
HAMPSHIRE HIGH FIDELITY, 91 Heath Street, Hampstead, N.W.3  
HAMPTONS OF KENSINGTON, 7 Kensington High Street, W.8  
H. C. HARRIDGE, 8 Moor Street, Cambridge Circus, W.1  
THOMAS HEINITZ, 100 Queensway, W.2  
ALFRED IMHOF, 112-116 New Oxford Street, W.C.1  
LARGES OF HOLBORN, 76/77 High Holborn, W.C.1  
LASKY'S RADIO, 207 Edgware Road, W.2, 33 Tottenham Court Road, W.1, 152/3 Fleet Street, E.C.4  
LEE ELECTRONICS, 400 Edgware Road, W.2  
LEWIS RADIO, 100 Chase Side, Southgate, N.14  
MAGNEGRAPH RECORDING COMPANY, 1 Hanway Place, W.1  
MASSEY'S CENTRE OF SOUND, 121-123 High Road, Chiswick, W.4  
MODERN ELECTRICS, 120 Shaftesbury Avenue, W.1  
NEWBURY RADIO, 305 Romford Road, Forest Gate, E.7  
NORTHERN RADIO SERVICES, 16 Kings College Road, N.W.3  
NUSOUND RECORDING COMPANY, 93 Mortimer Street, W.1  
R. E. W. EARLSFIELD, 266 Upper Tooting Road, S.W.17  
R.T.M. (RADIO & TELEVISION) SERVICE, 387b Mares Street, E.8  
RIMINGTON VAN WYCK, 42/3 Cranbourne Street, W.C.2  
SHEEN TAPE RECORDER CENTRE, 8 Station Parade, Sheen Lane, S.W.14  
H. L. SMITH, 287-289 Edgware Road, W.2  
STERNE-CLYNE LTD., 9 Camberwell Church Street, S.E.5, 309 Edgware Road, W.2, 109 Fleet Street, E.C.4, 18 Tottenham Court Road, W.1, 23 Tottenham Court Road.  
STUDIO 99, 57 Fairfax Road, Swiss Cottage, N.W.6  
TELERADIO, 189 Edgware Road, W.2  
TELESONIC, 92 Tottenham Court Road, W.1  
TELETAPE LTD., 33 and 59a Edgware Road, W.2, 84-88 Shaftesbury Avenue, W.1  
TEL-LEE-RADIO, 220 The Broadway, Wimbledon, S.W.19  
THE RECORDER CO., 188 West End Lane, Hampstead, N.W.6

## BASINGSTOKE

THE BASINGSTOKE CAMERA & HI-FI CENTRE, 44a Wote Street

## BATH (SOMERSET)

C. MILSOM & SON, Northgate

## BERKHAMPSTEAD (HERTS)

NORMAN CLARKE LTD., 163-167 High Street

## BEXLEYHEATH

BROADWAY RADIO, 228 Broadway

## BIRMINGHAM

NORMAN H. FIELD ELECTRONICS, 68 Hurst Street, 5  
GRIFFIN RADIO, 94 Bristol Street, 5  
REEVES SOUND SERVICE, 416 Moseley Road, 12  
COLIN G. TURNER, 39 York Road, Kings Heath, 14

## BLACKBURN (LANCS)

HOLDINGS AUDIO CENTRE, 39-41 Mincing Lane

## BLACKPOOL

F. BENFELL LTD., 17 Cheapside  
METCALF RADIO STORES, 121 Whitegate Drive  
TAPE RECORDER CENTRE (BLACKPOOL)—C. BRADDOCK LTD., 266 Waterloo Road

## BOGNOR REGIS

TANSLEY & COOKE, Television House, Sandymount Avenue, 3/4 Odeon Building, 46 Aldwick Road

## BOLTON (LANCS)

HARKER & HOWARTH (MUSIC) LTD., The Arcade, and Goodwin Street  
H. D. KIRK, 150 High Bridge Street  
MAXTONE HIGH FIDELITY, 247 Church Street, Westhoughton

## BOURNEMOUTH

NATIONAL RADIO SUPPLIES, 66 Holdenhurst Road

## BRACKNELL

PACK'S LTD., High Street

## BRADFORD (YORKSHIRE)

CHRISTOPHER PRATT & SONS, 33 North Parade, 1

## BRIGHTON

JOHN KING (FILMS) LTD., East Street  
LANES RADIO, 11 Gardner Street  
LYON & HALL LTD., 92 Western Road

## BRISTOL

BRISTOL & WEST RECORDING SERVICE, 6 Park Row, 1  
STERNE-CLYNE, 28 Merchant Street

## BROMLEY (KENT)

HOWARD TAPE RECORDERS, 218 High Street

## CAMBRIDGE

ADAMS & DELLAR LTD., Regent Street  
H. GEE, 94a Mill Road  
UNIVERSITY AUDIO, 1/2 Pease Hill  
UNIVERSITY RECORDING COMPANY, 16/17 Burleigh Place & Regent street

your final choice



**REVOX**

C. E. HAMMOND & CO. LTD.  
90 High Street, Windsor, Eton, Berks.

**CARDIFF**

J. GOUGH & CO. LTD., 148-154 North Road

**CARLISLE**

MISONS, Citadel Row

**CHELTENHAM**

MODERN RADIO (CHELTENHAM) LTD., 40-42 St. James Street

RAY ELECTRICAL (CHELTENHAM) LTD., 287 High Street

**CHICHESTER**

SORRYS OF CHICHESTER LTD., 83 North Street

**COVENTRY**

R.E.S. (COVENTRY) LTD., 13 City Arcade

**CRAWLEY (SUSSEX)**

KIRKMAN, 40 The Broadway

**CREWE (CHESHIRE)**

MILLER & PALIN LTD., 11 Delamere Street

**CROYDON**

COVENTRY CO-OPERATIVE SOCIETY, Corporation Street

SPALDING ELECTRICAL LTD., 352-354 Lower Addiscombe Road

STERN-CLYNE LTD., 12 Suffolk House, George Street

**DERBY**

VICTOR BUCKLAND LTD., 41-49 London Road

**DORKING (SURREY)**

THE HIGH FIDELITY CENTRE, 61 West Street

**DUNDEE**

LARG & SONS (DUNDEE) LTD., 16-24 Whitehall Street

**EDINBURGH**

HI-FI CORNER (W. G. GRAHAM), 1 Haddington Place, 7 Jeffrey's Audio House, 6-8 Bread Street, 3

**EXETER**

GAPPER & HEXT, 18 Clinton Avenue

WESTERN RADIO, 99 Fore Street

**GLASGOW**

JAMES KERR & CO. LTD., 435 Sauchiehall Street, C.2 LLOYD & KEYWORTH LTD., 26-27 Downing Street

**GOODMAYES (ESSEX)**

UNIQUE RADIO LTD., 6 The Facade, High Road

**GORLESTON**

L. C. SHREEVE, 64 High Street

**GRIMSBY**

JOHN ANGLIN, 385 Cleethorpe Road

**HALIFAX**

TAPE RECORDER CENTRE (HALIFAX)-TREVOR FANTHROP LTD., 30 King Cross Street

**HAMPTON HILL (MIDDLESEX)**

MELFORD RADIO SERVICE, 58 Windmill Road

**NORTH HARROW (MIDDLESEX)**

CITY ELECTRONICS LTD., Broadwalk, Pinner Road

**HENLEY-ON-THAMES**

G. O. MOORHEN, 190 Reading Road

**HIGH WYCOMBE (BUCKS)**

M. W. KEEN LTD., Chantry Studios, Pauls Row

**HITCHEN (HERTS)**

THE RECORD SHOP, 31 Hermitage Road

**HORSHAM (SUSSEX)**

TANSLEY & COOKE LTD., 37 West Street

**HOVE**

RECORD ROUNDUP, 154 Portland Road

**HUDDERSFIELD**

M.R.W. ELECTRONICS, 222 Wakefield Road, Moldgreen

RADIO CRAFT (HUDDERSFIELD) LTD., 38 King Street

J. WOOD & SONS LTD., 67 New Street

**HULL**

A. BROWN & SONS LTD., 24-28 George Street

**IPSWICH (SUFFOLK)**

R.C.S. 61 Fore Street

**KEIGHLEY (YORKS)**

J. S. RAMSBOTTOM & CO LTD., Bow Street

**KIDDERMINSTER (WORCS)**

F. W. LONG, AUDIO HOUSE, 14 Mill Street

**KINGSTON (SURREY)**

R. K. APPELBY LTD., 30 London Road

**LEAMINGTON SPA**

REGENCY ELECTRONICS, 29 Regent Street

TYSONS SOUND ENGINEERS, 41 Russell Street

**LEATHERHEAD (SURREY)**

MAURICE RICHARDS, Radio House, The Crescent

**LEEDS**

ELECTRONIC SERVICE (LEEDS), 59 Street Lane, 8

VALLANCE & DAVISON, 20 New Market Street, 1

**LEICESTER**

DALTON & SONS, 76 Granby Street

HI-FI RECORD BAR, 13 Applegate Street

LEICESTER CO-OPERATIVE SOCIETY (HI-FI DIVISION), High Street

**LITTLEHAMPTON**

TANSLEY & COOKE, 61 High Street

**LIVERPOOL**

BEAVER RADIO (LIVERPOOL), 60-62 Whitechapel Road

COGHLAN & CO., 88 Lark Lane, 17

**LOUGHTON (ESSEX)**

SOUND SUPPLIES (LOUGHTON) CO. LTD., 42 Smarts Lane

**LUTON (BEDS)**

S. FARMER & CO. LTD., 15-17 Upper George Street

**MACCLESFIELD**

HI-FI HOUSE, 123 Chestergate

**MAIDENHEAD (BERKS)**

NORMAN GREVILLE, 7 High Street

**MAIDSTONE**

HIGH FIDELITY (MAIDSTONE) LTD., 57 King Street

**MALVERN**

RANFORD RADIO LTD., Barnards Green

**MANCHESTER**

DIXONS ELECTRONICS, Grosvenor Bldgs., Deansgate, 3

GODLEY'S, 2-10 Shudehill, 4

LANCASHIRE HI-FI LTD., 8 Deansgate, 3

RARE RECORDS LTD., 5-7 Barton Sqdare, 2

STERN-CLYNE LTD., 10 Wichey Grove, 4



high definition  
RECORDING TAPES

are now available in  
beautiful, permanent, easy-access

# LIBRARY CASSETTES\*

(5", 5 $\frac{3}{4}$ ", and 7" spools: P.E. 31 Long play,  
P.E. 41 Double play and P.E. 65 Triple play)

\*If not obtainable from your  
local dealer, please write to  
**AGFA LTD Deer Park Road Wimbledon SW19**  
giving his name and address.

**MIDDLESBROUGH**

AUSTIN KYME LTD., 67 Corporation Road  
PALMERS OF MIDDLESBROUGH, 106 Newport Road

**MITCHAM (SURREY)**

HOME RADIO (MITCHAM) LTD., 187 London Road

**NEWCASTLE (STAFFS)**

GREEN'S SOUND SERVICES, 11 West Brampton

**NEWTON ABBOT**

D. COLES LTD., 13 Courtenay Street

**NORTHAMPTON**

RADIO & SOUND EQUIPMENT LTD., 220-224 Wellingborough Road

**NOTTINGHAM**

NOTTINGHAM TAPE RECORDERS, 11 Burton Street  
THE PHOTO CENTRE, 28-30 Pelham Street

**OXFORD**

HORNS, 6 South Parade  
L. WESTWOOD, 46 George Street

**PAIGNTON**

PAUL PINCH LTD., Victoria Street

**PERTH**

GEORGE BROWN, 61 Kinnoull Street

**PETERBOROUGH**

CAMPKIN'S RECORD SHOP, 15 Long Causeway

**PLYMOUTH**

ALBERT E. FORD LTD., 84 Cornwall Street  
TOM MOLLAND LTD., 102 Cornwall Street

**PORTSMOUTH**

TANSLEY & COOKE LTD., 161 Albert Road Southsea

**RHYL**

MYRTLE ELECTRICS, The Vac. Shop, 24 Water Street

**RICHMOND (SURREY)**

MUSICRAFT HI-FI CENTRE, 13 King Street

**ST. ALBANS (HERTS)**

BOLD & BURROWS LTD., Verulam Road

**SALISBURY**

J. F. SUTTON, 15-18 Queen Street

**SHEFFIELD**

AUDIO CENTRE, 56 West Street, 1  
PHILIP CANN LTD., Chapel Walk, Fargate, 1

**SOUTHAMPTON**

HAMILTON ELECTRONICS (SOUTHAMPTON) LTD.,  
35 London Road  
J. F. SUTTON, 421 Shirley Road

**STOKE-ON-TRENT**

HIGH FIDELITY SOUND EQUIPMENT, 116 Birches  
Head Road, Hanley

**STOCKPORT**

FAIRBOTHAM & CO. LTD., 47 Lower Hillgate

**STOURBRIDGE (WORCS)**

E. J. BENTON LTD., 144 High Street

**SUNNINGDALE (BERKS)**

PACK'S LTD., 1-3 Broomfield Hall Buildings, London  
Road

**TRURO**

EDMUND FORD, 9 Pydar Street

**TUNBRIDGE WELLS**

GOULDEN & CURRY, 59-61 High Street  
PERCY POWELL RADIO, 54 High Street

**WARRINGTON**

WESTERN SOUND RECORDERS LTD., 90 Chorley  
Street

**WESTHOUGHTON (LANCS)**

MAXTONE HI-FI, 247 Church Street

**WINDSOR**

AUDIOCRAFT LTD., 89-90 High Street, Eton

**WOLVERHAMPTON**

FENWICK RADIO STORE, Great Brickkiln Street  
M. R. WARNER & SON, 26 Chapel Ash

**WORCESTER**

JOHNSONS SOUND SERVICE, 9 Sidbury

**WORTHING**

BOWERS & WILKINS, 1 Becket Buildings, Littlehampton  
Road  
CRAY OF WORTHING, 132 Montague Street  
JOHN KING (FILMS) LTD., 1 High Street  
J. W. MANSFIELD, 8-12 Liverpool Road  
TANSLEY & COOKE, 11 Chapel Road and 187 Montague  
Street

**YEOVIL**

YEOVILS' RADIO HOUSE, 19 Princes Street

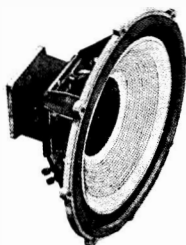
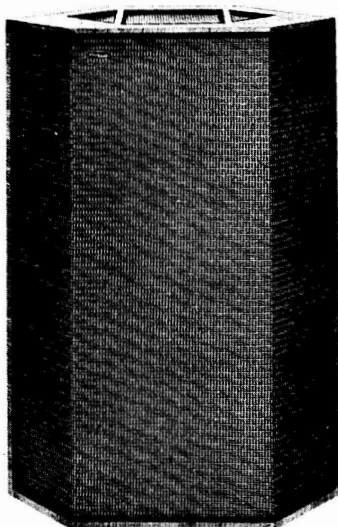
**YORK**

CUSSINS & LIGHT, 34 Walmgate  
CUSSIN & LIGHT LTD., King's Square

# THE AIREDALE

*The "move-anywhere"*  
**FREE STANDING SPEAKER  
 ASSEMBLY**

For many years the Wharfedale omni-directional 3-speaker Corner System has been recognised as a superbly natural reproducer, and has frequently stood the difficult test of comparison with live musical performances. The AIREDALE is a free standing version of this speaker, suitable for corner or along the wall location. Cabinet resonance is avoided by sand filling the front panel and fitting ceramic tiles to rear side panels. Some idea of the solid construction is given by the fact that the total weight exceeds  $\frac{1}{4}$  cwt. Fitted with castors for ease of movement.



## IN THE AIREDALE

*L.F. output is produced by a 15" unit-type W15|RS, fitted with heavy cone and impregnated cloth roll surround for minimum distortion.*

## THE AIREDALE

*Size: 39" x 28½" x 14"  
 Weight: 91 lb. complete  
 Impedance: 12/15 ohms only  
 Max. Input: 20 watts  
 Individual controls for middle and treble response are located in the rear panel. £65.0.0 fully finished with a choice of polished walnut or mahogany veneers, or oiled teak. Oak finish available to special order. £64.0.0 unpolished. Fully descriptive literature free on request.*

**Wharfedale**

## WHARFEDALE WIRELESS WORKS LIMITED

Idle Bradford Yorkshire  
 Tel. Idle 1235/6  
 Grams. 'Wharfedel', Idle, Bradford





ASSOCIATION OF PROFESSIONAL  
RECORDING STUDIOS

## THE ASSOCIATION OF PROFESSIONAL RECORDING STUDIOS LTD.

*Incorporated 1951*

An Association to promote and protect the interests of Members and stimulate interest in the use of electrical recording.

Professional recording studios are invited to apply for Membership—others concerned with recording may be elected as Associates.

**Write for information to the General Secretary,  
34a, Arterberry Road, London, S.W.20**

### DIRECTORY OF MEMBERS AND ASSOCIATES

Studio	Telephone No.	Address
<b>LONDON AREA</b>		
Advison Ltd.	GROsvenor 3342/4	82/83, New Bond Street, W.1.
Bishop Sound & Electrical Co. Ltd.	TEMple Bar 7484	48, Monmouth Street, W.C.2.
The British Homophone Co. Ltd.	NEW Cross 2080	Excelsior Works, Rollins Street, S.E.15.
Central Sound Studio	TEMple Bar 6061	6, Denmark Street, W.C.2.
Custom High Fidelity	PALmers Green 5228	371, Green Lanes, Palmers Green, N.13.
Dubreg Studios Ltd.	GLArdstone 0047	15, Cricklewood Broadway, N.W.2.
T. H. Eaglestone	CUNningham 0364	162, Shirland Road, W.9.
Electrical & Musical Industries Ltd. (Retail Division)	MAYfair 1240	363, Oxford Street, W.1.
Garland Bros. Ltd.	TIDeway 4412	Chesham House, Deptford Broadway, S.E.8.
Griffiths Hansen (Recordings) Ltd.	MUSEum 2771 & 6375	24/25, Foley Street, W.1.
John Hassell Recordings	RIVerside 7150	21, Nassau Road, S.W.13.
Keepnet Recording Service	LEE Green 3310	1, Knighton House, Manor Way, S.E.3.
Levy's Sound Studios Ltd.	MAYfair 8521	73 & 104, New Bond Street, W.1.
Location Sound Services Ltd.	SHEpherds Bush 4000	Goldhawk Studios, Godolphin Road, W.12.
Magnagraph Recording Co. Ltd.	LANgham 2156	1, Hanway Place, Oxford Street, W.1.
R. G. Mander Ltd.	TEMple Bar 1107	53, Monmouth Street, W.C.2.
Olympic Sound Studios	HUNter 1635	Carton Street, W.1.
Rapid Recording Service	COPpermill 3889	The Chestnuts, 21, Bishops Close, Church La., E.17.
Recorded Productions (London) Ltd.	LARKswood 7889	
Recorded Sound Ltd.	TRAFalgar 2618/9	Morris House, 1, Jermyn Street, S.W.1.
Regent (B. & E.) Sound Ltd.	GROsvenor 4634 & 3726	27/31, Bryanston Street, Marble Arch, W.1.
Leslie Robinson	TEMple Bar 6769	4, Denmark Street, W.C.2.
Sonotape Ltd.	TIDeway 5028	120, Barriedale, New Cross, S.E.14.
Sound Enterprise (and Gregorian Recordings)	GERard 8464	18, Soho Square, W.1.
Sound Level Studio	HILLSide 7612	2, Singleton Scarp, Woodside Park, N.12.
Sound News Productions	PUTney 0766	28, Putney Hill, S.W.15.
Sound Recording Ltd.	REGent 2745	10, Cliford Street, New Bond Street, W.1.
	GIPsy Hill 5394	Canterbury Grove, West Norwood, S.E.27.

Studio	Telephone No.	Address
Star Sound Studios Ltd. Tannoy Products Ltd. Universal Programmes Corporation Ltd. Leonard Wadsworth & Co. Ltd. Warren Recordings	LANgham 2201 GIPay Hill 1131 LANgham 2000 WIMbledon 9871/2/3 SUNnyhill 0306	Rodmarton Street, Baker Street, W. I. Norwood Road, West Norwood, S.E.27. 35, Portland Place, W. I. Bank Buildings, 47, Wimbledon Hill Road, S.W.19. 59, Hendale Avenue, Hendon, N.W.4.
Associates Tony Pike Music Ltd. C. A. Wolfe	PUNey 4928 FITroy 4808	31, Dryburgh Road, S.W.15. 3, Park Road, Crouch End, N.8.

## HOME COUNTIES

Audio Transcriptions Clementswood Recordings Conway Sound Recordings Hayton Recording Co. Ltd. Ilford Sound Recording Service J & B Recordings (Morden) R. G. Jones (of Morden) Ltd.	Downland 4870 ILFord 0929 MUNicipal 3257 Sellindge 3195 CREscent 8947 MITcham 9952 MITcham 3668	13, Chaldon Way, Coulsdon, Surrey. 101, Grange Road, Ilford, Essex. 27, Chisholm Road, East Croydon, Surrey. Hayton Manor, Stanford, Nr. Ashford, Kent. 63, Aintree Crescent, Barking, Essex. 14, Willows Avenue, Morden, Surrey. Morden Park Sound Studios, London Road, Morden, Surrey.
Livingston Recordings Ltd. D. R. Neale Omega Recording Co. Soundwork Services	HADley Green 1161/2 Tring 3135 Potters Bar 6428 UPLands 7667	32, East Barnet Road, New Barnet, Herts. Park Street Lodge, Tring, Herts. 112, Sunny Bank Road, Potters Bar, Middlesex. Soundwork House, Station Approach, Coulsdon, Surrey.
Studio Republic Ltd. Associates A. M. Andrews Carwal Ltd. Glen Music Lockwood & Co. (Woodworkers) Ltd. Tape Sound	Pinner 6114 West Drayton 3119 WALLington 6611/12 BUCKhurst 2457 BYRon 3704	Church Farm, High Street, Pinner, Middlesex. 51, Cherry Orchard, West Drayton, Middlesex. 85, Manor Road, Wallington, Surrey. 33, Monkham Avenue, Woodford Green, Essex. Lowlands Road, Harrow, Middlesex. 13, Island Road, Mitcham, Surrey.

## SOUTH

Arco Sound Recording Unit County Recording Service J. R. T. Davies A. R. Ifter John King Films Ltd. MJB Recording & Transcription Service M.S.S. Recording Co. Ltd. Personal Recordings Ltd. Transacord Ltd. Trio Recordings	Crawley 20695 Bracknell 1935 Burnham 381 Burnham 1208 Brighton 25918/9 Maidenhead 25630 Colnbrook 284 Worthing 9160 Princes Risborough 518 Crawley 22729	23, Gossops Drive, Crawley, Sussex. "Braeside", London Road, Binfield, Bracknell, Berks. 1, Walnut Tree Cottage, Burnham, Bucks. 99, Green Lane, Burnham, Bucks. Film House, East Street, Brighton. 7, High Street, Maidenhead, Berks. Poyle Close, Colnbrook, Bucks. 22, New Broadway, Tarring Rd. W. Worthing, Sx. Bledlow Rd., Princes Risborough, Aylesbury, Bucks. 32, Southgate Drive, Southgate, Crawley, Sussex.
Associates Audio Recordings W. A. D. Hinde Lawrence Recordings Saracen Sound Services J. S. Wright	Amesbury 2011 Shrewton 233 Portsmouth 31083 Windsor 63894	65, Solstice Rise, Amesbury, Wilts. Shrewton House, Shrewton, Nr. Salisbury. 41, Festing Road, Southsea, Hants. Netherfield House, Marcham, Abingdon, Berks. 63, Alma Road, Windsor, Berks.

## SOUTH MIDLANDS

Isis Recording Studios Snellgrove's Associate A. T. Robbins	Oxford 42858 Cumnor 2733 Henley-on-Thames 1040	6, Brewer Street, St. Aldgate's, Oxford. 3, Third Acre Rise, Botley, Oxford. Sebring, Walton Avenue, Henley-on-Thames, Oxon
--	--	---

## EAST

Granta Records Jack Bryant Jaybee (TV) Ltd. University Recording Co.	Cromer 2150 Ipswich 56187 Cambridge 54947	6, St. Vincent's Close, Girton, Cambridge. Church Square, Cromer, Norfolk. 75, Bramford Road, Ipswich, Suffolk. 16, Burleigh Place, Cambridge.
---	---	---

## WEST & SOUTH-WEST

Bristol & West Recording Service Ltd. Fidelity Recording Studio Record Centres (Bristol) Ltd.	Bristol 20763 Weston-s-Mare 6702 Bristol 21534	6, Park Row, Bristol, I. 49, Westbrook, Weston-super-Mare. Marsh Street, Bristol, I.
Associate South Somerset Recording Service	Yeovil 2366	8, Brimsmore, Yeovil, Somerset.

**Studio****Telephone No.****Address****MIDLANDS**

The Sound of Davlan Ltd.  
 Hollick & Taylor Recording Co. Ltd.  
 N. Marshall Ltd.  
 Midland Sound Recordings  
 Millar Thomson  
 Northampton Sound Recording Service  
 Victor Buckland Ltd.

Coventry 75403  
 Birchfields 4246  
 Nottingham 77077  
 Highbury 1314  
 Northampton 33933  
 Derby 46292

Craven Street, Coventry.  
 16, Grosvenor Rd., Handsworth Wd., B'ham, 20.  
 Maville Works, Beech Avenue, Nottingham.  
 111, Sewall Highway, Coventry.  
 112, Alcester Rd. Sch., King's Hth., B'ham, 14.  
 36a, Spring Gardens, Northampton.  
 36/39, London Road, Derby.

**NORTH-EAST**

The Calder Valley  
 Sound Recording Service  
 Peter Dearden  
 Electronic Services (Leeds) Ltd.  
 Excel Services  
 Fairbank, Harding Ltd.  
 Hulland Studio Reproducers  
 Mortonsound (G. L. Morton & Co. Ltd.)  
 Northern Sound Services Ltd.  
 Sound Recording & Equipment Hire  
 Sunderland Sound Services

Hebden Bridge 108  
 Darlington 68768  
 Leeds 661058  
 Shipley 55779  
 Pudsey 2558/3635  
 Dewsbury 3031  
 Newcastle 2-6902  
 Leeds 26192  
 Sunderland 57032

'Glenbraes', Mytholm, Hebden Bridge., W. Yorks.  
 19, Post House, Wynd, Darlington.  
 59, Street Lane, Leeds, 8.  
 49, Bradford Road, Shipley, Yorks.  
 6a, Lowtown, Pudsey, Yorks.  
 Red Gables, Northfield Road, Dewsbury, Yorks.  
 12, Oxford Street, Newcastle-upon-Tyne.  
 Broad Chare, Quayside, Newcastle-upon-Tyne.  
 Wade Buildings, 21, Wade Lane, Leeds, 2.  
 28, Wetherby Ter., Fulwell, Sunderland, Co. Durham.

Associates  
 Henry Askwith  
 Cestrian Sound Services  
 Malconi Disc Recording Co.  
 Mobile Recording Services

Leeds 663612  
 Willerby 56975  
 Shotley Bridge 185

83, Shaftesbury Avenue, Leeds, 8.  
 32, Melville Street, Chester-le-Street, Co. Durham.  
 1, Trafford Road, Willerby, E. Yorks.  
 21, Ashfield Rd., Shotley Brgd., Consett, Co. Durham

**NORTH-WEST**

J. H. Darley  
 Deroy Sound Service  
 Distagraph Recordings  
 "Erica" Sound Recording Services  
 Harker & Howarth (Music) Ltd.  
 A. Oliver & Son Ltd.  
 P. F. Phillips  
 Rendezvous Records  
 R. H. Sound Recording Service  
 W. D. Welsby  
 Western Sound Recorders Ltd.

St. Helens 5752  
 Hest Bank 2444  
 CHE 3220  
 Altrincham 6688  
 Bolton 6247  
 Cloughton 4023  
 Anfield 5297  
 Rusholme 6868  
 Whitefield 2755  
 Rainhill 143  
 Warrington 2553

15, Robin's Lane, St. Helens, Lancs.  
 52, Hest Bank Lane, Hest Bank, Lancaster.  
 58, Cheetham Hill Road, Manchester, 4.  
 34, Ashley Road, Altrincham, Cheshire.  
 7, The Arcade, Bradshawgate, Bolton.  
 13, Wellington Road, Oxton, Birkenhead, Cheshire.  
 38, Kensington, Liverpool, 7.  
 9, Blackfriars Street, Manchester, 3.  
 3, Kings Avenue, Whitefield, Manchester.  
 26, View Road, Rainhill, Lancs.  
 11, Wilson Patten Street, Warrington.

Associates  
 J. V. H. Cookson  
 Glen Recording

LONGton 2280  
 Whitefield 2856

Hugh Barn, New Longton, Preston, Lancs.  
 11, Wavell Drive, Unsworth, Bury, Lancs.

**WALES**

Acoutape  
 Ron Clough  
 Colbeck-Lewis Recordings  
 Welsh Recordings

Llandudno 76533  
 Llanddulas 378  
 Cardiff 33251  
 Llanely 3198

26, St. David's Road, Llandudno.  
 Carrog Lodge, Belgrano, Abergele, Denbighshire.  
 14, Kyveilg Street, Cardiff.  
 Marble Hall Road, Llanely, Carmar.

Associate  
 Unicorn Productions

7, Penylan Place, Roath Park, Cardiff.

**SCOTLAND**

Alexander Biggar Ltd.  
 Grampian Sound Service  
 Jeffreys (George Jeffrey Ltd.)  
 R. C. Miller  
 "Studio 82"

Douglas 8774  
 BRidgeton 1202  
 Fou 8389  
 DOU 1791

271-5, Sauchiehall Street, Glasgow, C.2  
 15, Broompark Drive, Dennistoun, Glasgow.  
 6-8, Bread Street, Edinburgh, 3.  
 136, Crown Street, Aberdeen.  
 82, Buccleugh Street, Glasgow, C.3.

**NORTHERN IRELAND**

Fantasia Recordings

Belfast 77181

8, Donegall Park Avenue, Belfast.

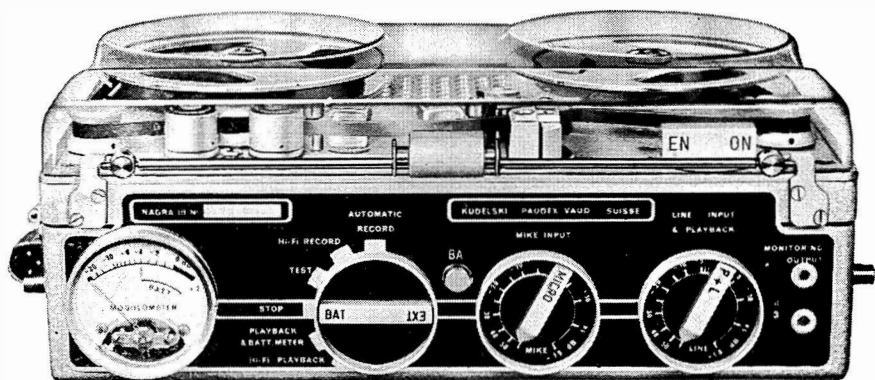
**IRELAND**

Audiofare  
 Peter Hunt Recording Studio Ltd.  
 Stapleton Studios

Dublin 62215  
 Dublin 54014 & 54952  
 Dublin 66327

59, Merrion Square, Dublin.  
 130, St. Stephen's Green, Dublin.  
 Merrion Court, Merrion Row, Dublin.

# STUDIO QUALITY IN A 14lb BOX!



Sound effects, music and dialogue on location *anywhere* can now be recorded to full studio standards by the outstanding NAGRA 111B portable tape recorder. This superb little machine is engineered to the highest possible standards with complete professional facilities:—Servo loop controlled capstan giving standard tape speeds of 15", 7½" and 3½" per sec. Wow and flutter  $\pm 0.1\%$  approx. Frequency response at 15" per sec.  $\pm 1.0$  db from 30 c/s to 18 Kc/s with an overall signal to noise ratio better than 60 db. Full track recording, CCIR equalisation with separate recording, play-back and erase heads. Fully transistorised, for mains or self-contained battery operation with microphone and line inputs as standard and an optional 4-channel mixer available. The NAGRA 111 NP version utilises an extra head to provide synchronization of film and recorded sound. The Neopilot technique used enables "lip sync." to be easily achieved.

Price of NAGRA 111B: £317 Duty Paid  
(including leather carrying case)

## NAGRA<sup>III</sup>

Represented in the U.K. by

## LIVINGSTON

LABORATORIES LTD  
31 CAMDEN ROAD · LONDON N.W.1  
Tel: GULiver 4191 · Telex: 21830



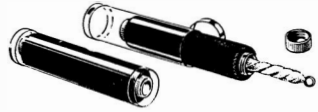


# Record Cleaning and Maintenance Equipment

---

## THE DISC PREENER *for your new records*

- Plush pile penetrates each groove.
- Ideal groove conditions for ultra-light stylus pressures.
- Quieter background.

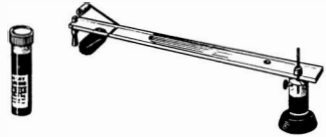


Price 6/9d plus 1/2d P.T.

---

## THE DUST BUG *removes static and dust as the record is playing*

- Easy and quick to fit.
- Suitable for all records.
- Reduces surface noise and wear.

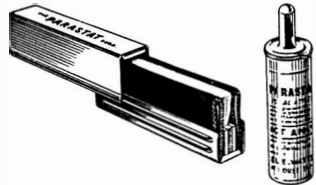


Price 17/6d plus 2/11d P.T.

---

## THE MANUAL PARASTAT *restores fidelity to older records*

- Nylon brush tips get right down into the groove bottom.
- Plush sleeves pick up all residues and foreign particles.
- Parastatic treatment when heavier stylus pressures are employed.



Price 45/-d plus 7/6d P.T.

---

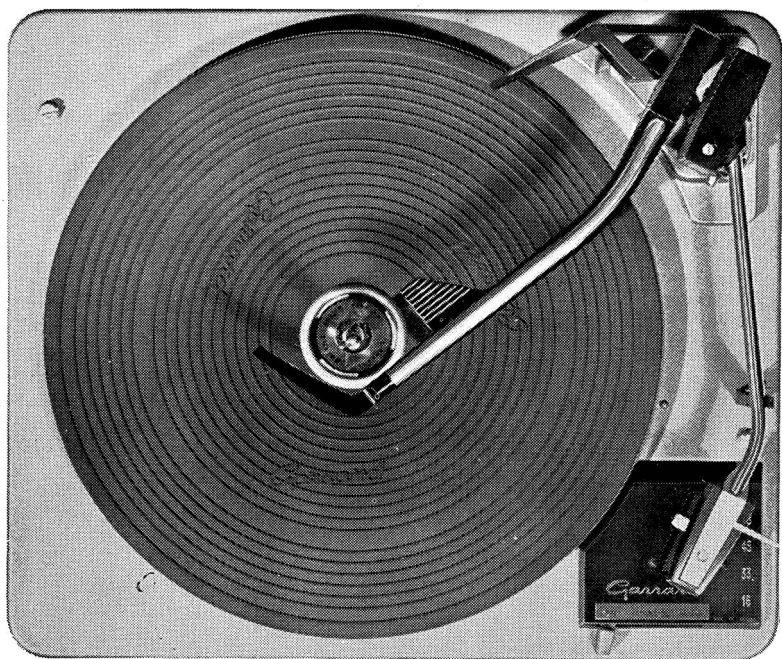
## CECIL E. WATTS LTD.

**Consultant and Engineer in Sound Recording and Reproduction**

Specialized tuition, research facilities and lecture service in all matters pertaining to disc recording and sound reproduction. Microscope Examination of Record grooves and styli. Photomicro and Interferometer graphs of record grooves and surfaces.

**DARBY HOUSE · SUNBURY-ON-THAMES · MIDDLESEX**

# **garrard 1st again**



® Garrard — as Hi-Fi enthusiasts know — have always been leaders in the field of record turntables and changers : a success achieved by quality of performance based on quality of design and construction.

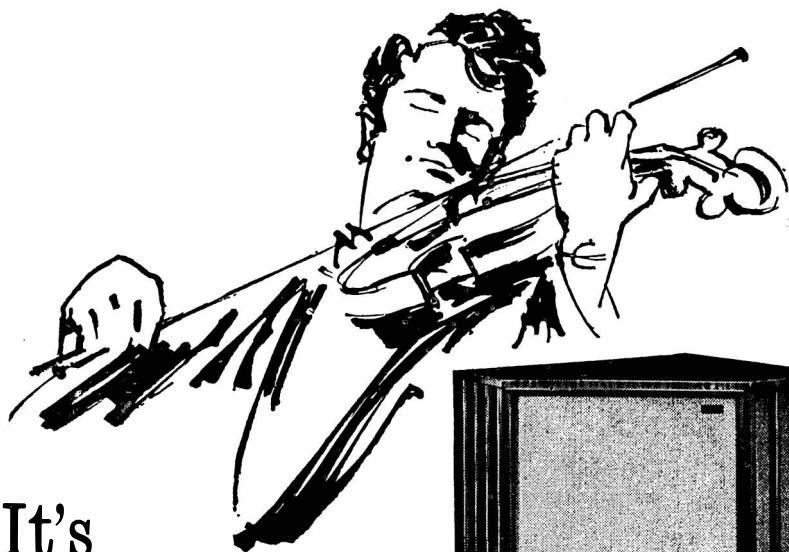
Now Garrard are first again — this time with the new low-mass pick-up arm on the Garrard Model 3000 LM. Tracking is so light with the new pick-up that record wear is reduced to the minimum — and the performance is really impressive. Automatic change and selection of up to eight 7 in, 10 in, or 12 in records. Switch off is automatic, too. Specifically designed for use with the very highest quality stereophonic pick-up cartridges having low tip mass and high stylus compliance.

Garrard have the widest range of models to suit the enthusiast who wants reliability as well as top-class performance. The whole Garrard range of record playing units is well worth your careful attention. Why not write for full details ?

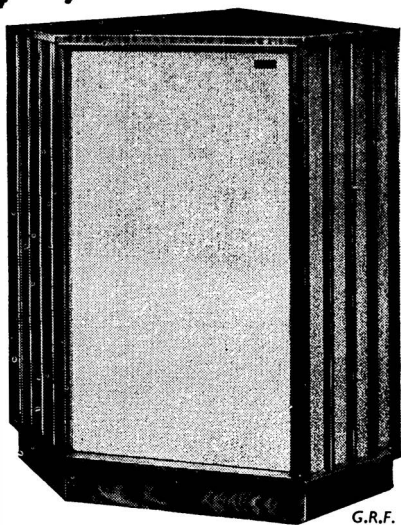
**Garrard**

**Garrard Engineering Ltd.**  
(Dept. HFY)  
Swindon · Wiltshire

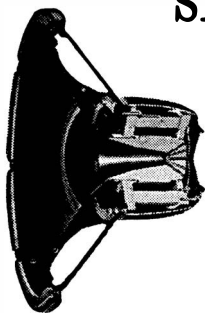
 G21



It's  
the sound  
that counts  
...not the  
size!



G.R.F.  
enclosure



The Dual Concentric Loudspeaker System in its various forms has been in continuous production for 17 years. This fact, together with its increasing adoption as a quality Monitor by Professional users throughout the World, is an indication of the exceptionally high standard of this original design.

There is a growing tendency for the compactness of a Loudspeaker to be regarded as a prime criterion of its excellence; this is most misleading. Generally speaking, the larger the Loudspeaker and its associated Enclosure, the better it sounds. For this reason professional users choose, where possible, Loudspeakers of high power handling capacity, used in conjunction with generously proportioned Enclosures. The necessity occasionally arises for choosing small Loudspeakers due to lack of space, but remember, a large Loudspeaker System can accurately recreate a small intimate sound, but a small Loudspeaker System can never accurately recreate the sound of a large combination of instruments or voices, even with Stereo!



*the BIG*

*name in Quality Loudspeakers*

TANNOY PRODUCTS LTD · WEST NORWOOD · LONDON · S.E.27 · GIPSY Hill 1131

Any time  
is the  
right time

▶ **INTEREST FREE  
TERMS** (over 9 months)

▶ **LOWEST DEPOSITS**

# to PART EXCHANGE your HI-FI EQUIPMENT with R · E · W

Generous part-exchange facilities, immediate delivery, the latest hi-fi equipment, friendly, efficient service, modern, spacious showrooms—put all these features together and you arrive at R.E.W. (Earlsfield). That, we might add, is a very good idea because people who arrive at R.E.W. (Earlsfield) know they are guaranteed a better deal! If, however, you cannot visit us, a fast and friendly Mail Order Service takes care of all your requirements.

## Motors, Pick-ups and Accessories by

DECCA B & O KEF  
GOLDRING PICKERING  
S.M.E. GARRARD

## Speakers and Enclosures by

GOODMANS KEF LEAK  
WHARFEDALE W.B. STEN-  
TORIAN MORDAUNT  
QUAD LOWTHER ROMAGNA  
WOOLLETT ELECTROSTATIC

In fact an unrivalled selection of makes and models all available for on-the-spot demonstration and comparison plus . . .

**FREE CARRIAGE & PACKING  
FREE INSURANCE  
IMMEDIATE DELIVERY**

## Comprehensive stocks

of all leading makes including:

### ROGERS

Cadet Mk II Stereo  
Control and Amp. £26 15 0  
Stereo HG88  
Integrated Amp. ... £40 0 0

### CHAPMAN

F.M. 1000 V.H.F./F.M.  
Tuner ... £26 0 0  
306 Integrated Stereo  
Amplifier ... £37 0 0  
F.M. 1005 A.M./F.M.  
Tuner ... £36 12 0

### QUAD

F.M. Tuner ... £24 18 9  
A.M. Tuner ... £28 10 0  
Stereo 22 Cont. Unit ... £25 0 0  
Power Amplifier ... £22 10 0

## LEAK Range

The new restyled  
F.M. Troughline 3 ... £29 7 6  
Varislope Mono ... £15 15 0  
Varislope 2 Stereo ... £25 0 0  
Stereo 30  
(Transistorised) ... £49 10 0  
TL 12/Plus ... £18 18 0

**CASH FOR YOUR TAPE  
RECORDER or HI-FI**  
Highest cash offers for good  
equipment . . . get in touch  
today!

**TAILOR-MADE HI-FI**  
Let us have a note of your  
requirements and we can quote  
you immediately for a specialist-  
built installation complete in  
every detail.

. . . everything you need in Hi-Fi from the leading Mail Order Specialist!

**R · E · W**  
(EARLSFIELD) LTD.

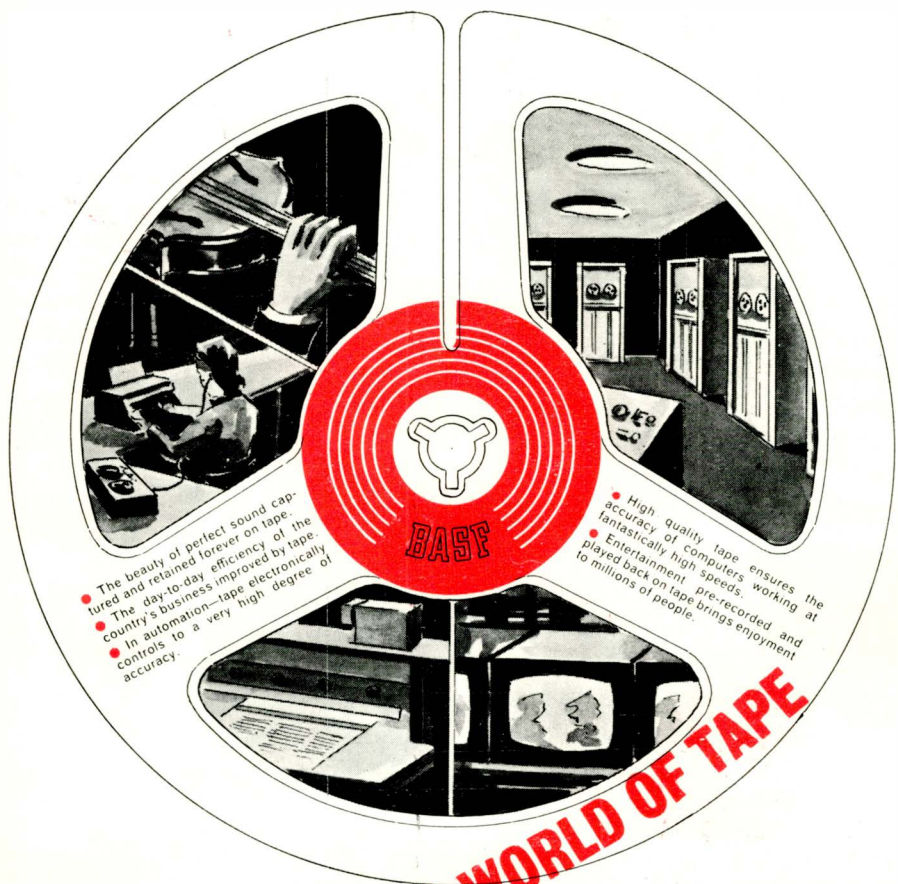
(Dept. HFYB)

266/268 Upper Tooting Road, London, S.W.17

Tel.: BAL 9174-5

100 yds. from Tooting B'way Stn.





- The beauty of perfect sound captured and retained forever on tape.
- The day-to-day efficiency of the country's business-tape improved by tape.
- In automation-tape electronically controls to a very high degree of accuracy.

- High quality tape ensures the accuracy of computers working at fantastically high speeds.
- Entertainment high speeds played back on tape brings enjoyment to millions of people.

# THE WONDERFUL WORLD OF TAPE

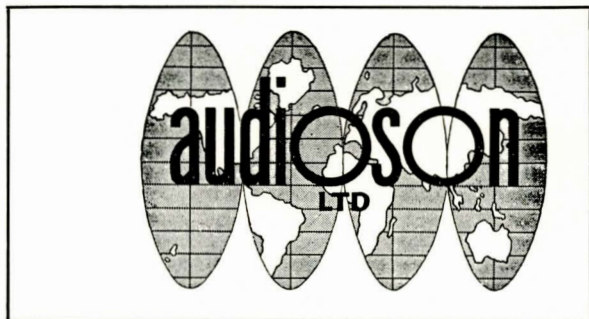
BASF—first to produce magnetic recording tape, so opening up channels which affect every one of us. Today, the imagination, initiative and craftsmanship which made this possible are invested in maintaining BASF tapes at a standard of technical perfection unequalled throughout the world. BASF magnetic recording tapes are recognized for qualities of dimensional and magnetic stability, full frequency response, negligible print through and mirror finish surface. The wide range ensures that there's a BASF tape for every type of machine and every possible requirement—INCLUDING YOURS.



—SYMBOL OF AUTHENTIC SOUND

**BASF CHEMICALS LIMITED**

5a Gillespie Road, London N.5. TEL : CANonbury 2011



brings you



**SPECIFICATION**

Frequency Response 10-30,000 cps  
 Output 0.9 mV/cm/sec per channel  
 D.C. Resistance 1100 ohms per channel  
 Impedance 1100 ohms per channel  
 Input load any value above 5,000 ohms  
 Tracking force 0.7-6 grams  
 Stylus mass 0.3 Milligram  
 Stylus 0.6 thou. diamond  
 Compliance  $30 \times 10^{-6}$   
 Channel separation 30 dB



The 'IMPERIAL' tracer beam stereo cartridge

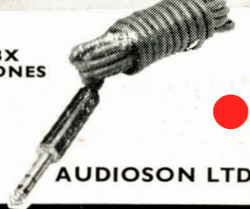
**Koss STEREOPHONES AND REMOTE CONTROL LISTENING STATION**

The T-5 Junction Box can be placed in the most convenient spot for enjoyable listening. Separate gain controls for each channel allow the listener to adjust the balance and volume precisely to suit his individual taste. Stereo jacks are provided for two sets of KOSS STEREOPHONES. The On-Off speaker switch makes possible complete listening privacy when desired.



MODEL SP-3X STEREOPHONES

Extremely sensitive  $3\frac{1}{2}$ " sound reproducers mounted in each earpiece. Soft sponge foam ear and head cushions provide light-weight comfort for extended periods of listening. Frequency Response 10-15,000 cps. Impedance 4-16 ohms.



AUDIOSON LTD

# AMERICA'S FINEST HI-FI EQUIPMENT

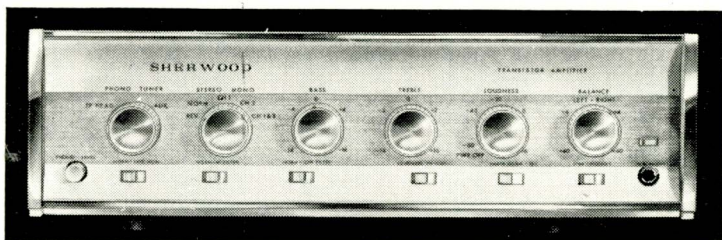
## MODEL S-9300 36 WATT TRANSISTOR AMPLIFIER

Quality-engineered transistor amplifier offers cooler operation, instant warm-up, extremely low hum and noise and much lower power consumption than a comparable tube amplifier.

Six high-level and four low-level inputs are provided for

phono, tape play-back, tuner and tape recorder monitoring. All pre-amp and control amplifier stages feature silicon transistors mounted on epoxy circuit boards. Large black anodized aluminium heat dissipators for the output transistors permit continuous operation without overheating. Special direct-coupled transformerless power amplifier circuitry provides improved transient response damping factor and overall stability.

Front-panel controls and switches include ganged stereo bass, treble, loudness, balance, selector, mode, phono level, scratch filter, loudness contour, tape monitor, and switched headphone jack. Music power output: 18 watts per channel at 8 and 4 ohms. Utilizes 20 transistors, 2 diodes and 2 rectifiers.



# SHERWOOD

## MODEL S-5500 III 80 WATT STEREO AMPLIFIER

As a stereo pre-amp, stereo control centre, and power amplifier, the Sherwood S-5500 III offers a number of professional-quality features which makes it ideally suited for use in home music systems with tape decks, phonographs and tuners.

Front panel features include a phono-gain control, a stereo normal/reverse switch, a phase-invert switch and a tape monitor switch. Bass and treble controls may be adjusted, independently or simultaneously, and are held in place by friction locks. Front panel light identify stereo or mono modes of operation.

*Write, call or telephone for further details of any of these products*

UK DISTRIBUTORS  
FOR SHERWOOD  
KOSS AND GRADO

ORCHARD HOUSE · ORCHARD ST · LONDON · W1 Telephone MAY 5431



# hi-fi books

## **CINE YEAR BOOK . . .**

The only comprehensive survey in one complete volume of the cine market for the cine user. The reference book for the professional, the enthusiast, and the photo dealer. This valuable book follows the unique pattern set and maintained by the "Hi-Fi Year Book"—separate and detailed directories for every product group.

**Price 11s 6d post paid.**

## **HI-FI FOR BEGINNERS . . .**

The ideal book for everyone who has just started, or is about to start the hobby. The various chapters deal with Loudspeakers, Amplifiers, Pickups, Turntables, Radio Tuners, Stereo and Installing Hi-Fi. Readers whose particular interests lie with tape will find that Chapter 7 alone will make the book worthwhile.

**Price 8s 3d post paid.**

## **STEREO FOR BEGINNERS . . .**

For those who are confused or not wholly converted by Stereo reproduction this book gives all the answers. The author, B. J. Webb, explains in clear language what stereo is, and how best to obtain it, whether from disc, tape or radio. Advice and guidance on the purchase, installation and maintenance of suitable equipment; a six page glossary, many illustrations and special drawings are included.

**Price 8s 3d post paid.**

## **EXPERIMENTAL RECORDING . . .**

This book presents in convenient form the series of articles by A. Tutchings on "Twenty Practical Experiments in Magnetic Recording" and full introductions for "Building a Fully Portable Recorder", using a clockwork motor and transistor amplifier.

**Price 5s 9d post paid.**

## **SOUND & CINE FOR BEGINNERS . . .**

An up-to-date guide for the beginner by Richard Golding with an introduction to some advanced methods including the latest means of producing experimental soundtracks. Contents include making up separate tape tracks; sound stripe; optical sound-on-film; special recording apparatus; recording sessions; with photographs and line illustrations.

**Price 8s 3d post paid.**

## **CABINET MAKING . . .**

This book gives you all the necessary information for building your own Hi-Fi cabinet. Subjects covered include designing, timber, marking out, tools, materials, joints and finishes. The many photographs and diagrams help to make this book indispensable not only for Hi-Fi applications but also for general cabinet work.

**Price 8s 3d post paid.**

**MILES HENSLOW YEAR BOOKS LTD. 99 MORTIMER ST., LONDON, W.1**

# ACOS

## progress

Acos products are made by experienced electronics and acoustics experts for music lovers with an ear for impeccable sound and an eye for keen price. With the 1964 range of cartridges and accessories for record players, microphones and other equipment for tape recording, Acos once again offers you Acos progress that is ahead of its day—superb, dependable Acos quality. The range includes :

**GP 81-1 Ceramic Stereo Cartridge**

Fits all arms and gives the finest reproduction of all.

**GP 83-2 Crystal Stereo Cartridge**

New this year. Ideal for small amplifiers and reproducers.

**GP 73 Crystal Stereo Cartridge**

The pioneer stereo cartridge with turn-under stylus mechanism, and still going strong.

**GP 67 Crystal Mono Cartridge**

The mono cartridges most widely recommended by dealers, and most widely used.

Acos Sapphire Styli to fit Acos and all other makes of cartridges and heads. Individually tested, yet retailing at much the same price as others.

Acos Diamond Styli to get the best results from your pick-up cartridge.

**MIC 39 Microphone**

The famous stick microphone, available in two versions : crystal and dynamic.

**MIC 60 Microphone**

A new stick microphone available in 3 versions—crystal, ceramic and magnetic.

**MIC 40 Fold-away hand-microphone**

In crystal, ceramic and magnetic versions. One of the most popular microphones in the world!

Accessories include Stethosets, Magnetic Earpieces, Stylus Pressure Gauges, Lavaliers, etc.

Watch for a new range of dynamic microphones, which will extend the current Acos range during 1964.

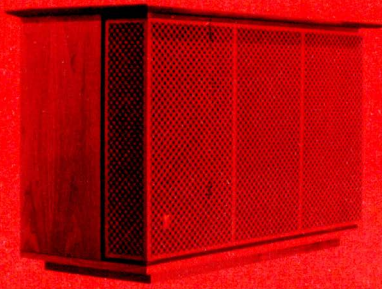


COSMOCORD LIMITED

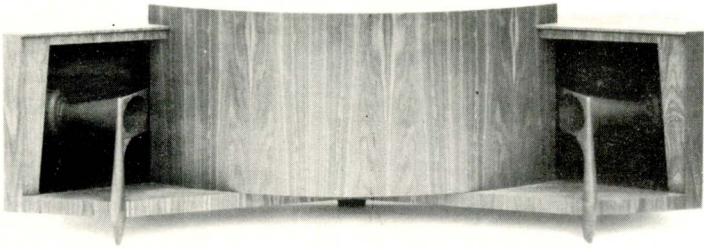
Waltham Cross

Hertfordshire

Telephone : Waltham Cross 27331



FOR THE WORLD'S  
MOST PRIVILEGED  
AUDIENCE



The goal of high fidelity is the perfect re-creation of a total musical experience. Precision loudspeakers and loudspeaker systems made by James B. Lansing Sound, Inc. approach this ideal as closely as is possible at the present state of the art. The Olympus (upper photograph) is JBL's finest system of the "infinite baffle" type. The larger Paragon is a unique horn-loaded stereophonic reproducer which generates integrated three-dimensional sound across the full width of its curved refractor panel. JBL also makes individual loudspeaker components in a wide variety of sizes and types. Each bears the symbol of the triangle and circle, with the initials "JBL." Each is a true precision transducer, the finest of its kind which can be made.

**JAMES B. LANSING SOUND, INC. / LOS ANGELES 39, CALIFORNIA**



*For a complete catalogue of JBL products, call or write:*

*Audioson, Ltd.      Orchard House      London, W. 1  
                                 Orchard Street      Mayfair 5431*





**MAGNETOPHON 98 STEREO.** Highest quality twin-track stereo, 3 speeds, with a range of 30-18,000 c.p.s. at 7½ i.p.s. Three half-track stereo heads give you near-studio quality and all the trick effects you associate with quarter track machines. 95 gns



LET THE EXPERTS GUIDE YOUR SELECTION

**MAGNETOPHON 97 STEREO.** Quarter-track stereo, 3 speeds, printed circuits, PM speaker in lid for full stereo effect playback. Excellent machine for stereo-tape playback without auxiliary equipment. 95 gns



**MAGNETOPHON 96** Quarter-track perfected! Wide frequency range, 3 speeds, Full inter-track transcription offering ideal effects for cine-enthusiasts. No limit to trick effects that can be achieved with this machine. Can be used for stereo playback utilising stereo amplifier or radio. 62 gns



**MAGNETOPHON 85 de-luxe** Two-speed half-track with excellent frequency response: New-styled case and plenty of exciting new features and refinements including built-in splicing groove, remote control connection, new-style magic-eye recording level. 83 gns



Top sound-studios everywhere use Telefunken recording equipment exclusively. Reason why? Telefunken made the world's first tape recorder, and with that head-start they've been way ahead in research and development for years. Telefunken's wide range gives you a superb choice of equipment that integrates perfectly with your set-up, yet sounds great on its own. Whatever model you buy you'll know you bought the best... Telefunken, the machine the professionals use at home! Telefunken has sound quality taped.

*All prices excluding microphones*

**MAGNETOPHON 55** Latest addition to the famous family bringing high-quality tape-recording into a lower-priced field. Elegantly styled, the smart wooden case ensures good sound reproduction. Two-speed half-track performance gives amazing frequency range for a machine in this class. 43 gns



For further details and illustrated catalogue giving details of Telefunken tape-recorders and accessories write to:

**WELMEC Corporation Ltd**  
27 Chancery Lane  
London WC2

# TELEFUNKEN

# LEAK

## "Sandwich" an astonishingly improved loudspeaker system

The revolutionary LEAK "Sandwich" cone diaphragm weighs the same as conventional cones, but is hundreds of times stiffer, and will support the weight of a man. We have thus overcome the major weakness of the moving-coil system—lack of diaphragm rigidity—for there has been no improvement of practical significance in rigidity during the 36 years since Rice and Kellogg introduced the original "R-K" design in 1925.

The immense stiffness of the new LEAK "Sandwich" cone gives, for the first time in history, a direct-radiator loudspeaker diaphragm which behaves in the theoretically ideal manner of a rigid piston and reproduces the signal applied to the speech coil without flexing and free of break-up distortions.

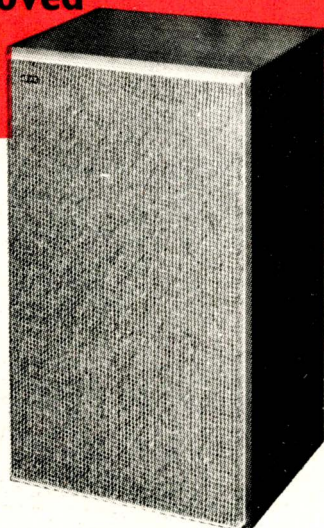
Price £39 . 18 . 0

### "The group unequivocally voted for the LEAK "Sandwich"

"An extended series of direct comparison tests with three current designs of commercial loudspeakers, was undertaken with a listening panel of mixed sex and age. Two of the speakers cost approximately the same as the Leak, and the third model was much more expensive. After all tests on speech and music, from records and radio, the group unequivocally voted for the Leak "Sandwich". The superiority on speech tests was particularly marked . . .

**SUMMARY:** We gave the Leak "Sandwich" loudspeaker the full treatment. It is difficult to fault it. This design must be regarded as a breakthrough of fundamental and far-reaching importance."

*Quoted from the Test Report by Donald Aldous and David Philips. "Audio and Record Review" October, 1961.*



### "LEAK Speakers won the day"

"This occasion proved a most stringent test as we were listening to a stereo recording of a very recent orchestral and operatic performance we had enjoyed either as audience or performer. By way of experiment other pairs of speakers were switched in, but the very smooth response of the Leak speakers won the day."

*Quoted from the Test Report by Ralph West, B.Sc. M.Brit. I.R.E. The full report appeared in "Hi-Fi News", August 1961.*

World - wide demand for



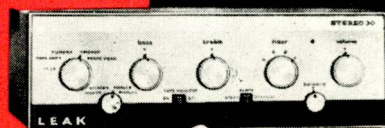
Every LEAK instrument is craftsman-built and is engineered to give the same high quality performance as LEAK equipment supplied to the world's leading broadcasting and recording studios. The world-wide demand keeps the LEAK Organisation fully and efficiently employed and enables studio quality equipment to be sold at reasonable prices.

LOWEST PRICES  
HIGHEST QUALITY



**NOW...**  
 another  
 milestone in  
 audio engineering  
 by

**LEAK**



# STEREO 30

*Transistorised* **INTEGRATED AMPLIFIER**

*... superb styling, faultless performance and a breakthrough in price and reliability by LEAK the First Name in High Fidelity ...*

Reprinted from "WIRELESS WORLD" Editorial May 1963

"... Last autumn, during his presidential address to the British Sound Recording Association, H. J. Leak demonstrated a prototype high-quality transistor amplifier which gave results indistinguishable from those of his valve amplifiers ..."

"People sometimes ask why there is any necessity to change to transistors. The elimination of the output transformer is, in our view, sufficient reason now that solutions of the problem of linearity in the response of the rest of the transistor circuit have been found. As additional bonuses we get smaller size, cooler running and the prospects of longer life."

Compared with its equivalent valve amplifier the "Stereo 30" gives results which are indistinguishable and it offers these important advantages—

- It is 48% of the weight.
- It is 43% of the size.
- It is 89% of the price.
- It has greater reliability (estimated to be 500% better) because the heat rise within the case is negligible (12°F) and because the maximum voltage is less than 50.

★ How can the valve possibly survive in view of the above comparisons?

★ Dimensions: 13" × 4½" × 9" deep. Weight- 14 lb. Price £49.10.0d.

Write now for fully illustrated brochure

**LEAK**

**H. J. LEAK & CO. LTD.**

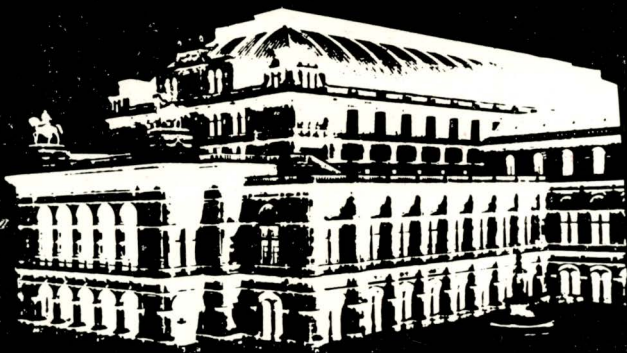
BRUNEL ROAD, WESTWAY FACTORY ESTATE, LONDON W.3

Tel. SHEpherds Bush 1173

Telegrams: Sinusoidal, Ealux, London

Vienna State Opera

Microphones  
pioneered  
in Vienna

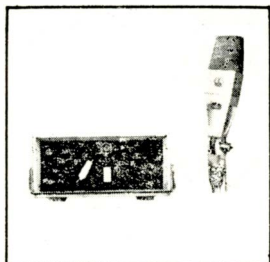


AKG microphones are shipped all over the world. Here, in the "Home Town of Music" scientists and designers work together to meet the challenge of the world's most critical audience.

## C 12 A

The C 12 A condenser microphone is the latest addition to the AKG Condenser Mike line. The stabilized power supply has built-in remote control for the 9 polar pattern controllable during actual programme pick-up. Can be located up to 300 ft. from the microphone itself. The exceptionally flat frequency response (30-20,000 cps) extends beyond the limits of human audibility. Microphone C 12 A and new power supply N 12 A are extremely small. No tubes are used, only 1 Nuvistor and 1 Transistor.

Price: £139.0.0



This is the  
sign  
to look  
for in  
microphones



**POLITECHNA (LONDON) LTD.**

LONDON W.1

3 PERCY STREET

Telephone: Langham 6236 Telex: 23894 Cables: Polindust, London

Amalgamated Wireless (Australasia) Ltd., Sydney, Wellington—  
Connoisseur Records Ltd., Dublin—International Aeradio (East Africa)  
Ltd., Nairobi—David Pollock (Pty) Ltd., Johannesburg—A. Rajab  
& A. Silsilah, P.O. Box 203, Jeddah—Soundrite Ltd., Singapore,  
Penang, Kuala Lumpur—The China Engineers Ltd., Hongkong—  
Caldwell A-V Equipment Co. Ltd., Toronto 5 Ontario Canada.

# microphones

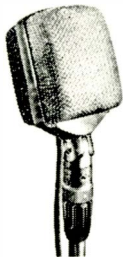


AKG of Vienna has specialized in the development and manufacture of high quality microphones of the dynamic and condenser types and headphones. In broadcasting, recording, and film studios, as well as for in semiprofessional applications you will find AKG microphones in use the world over.

16 anechoic chambers with the associated expensive measuring equipment, AKG's own analog computers for research and development, a new demonstration polaroscop equipment for instant pattern and many other highly scientific facilities ascertain that AKG products are the most advanced in their field.

## D 12

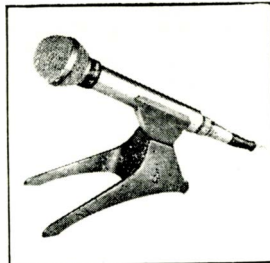
The D12 dynamic microphone with cardioid characteristics has less tendency for developing feedback when loudspeakers are located near the microphone. And if you want more brilliancy, fuller bass, crystal clear transparency and higher volume ask for the D 12. Excellent sensitivity and magnetic shielding. Frequency response 40-15,000 cps. 18 db front-back ratio. Price: £28.0.0



## D 24 B

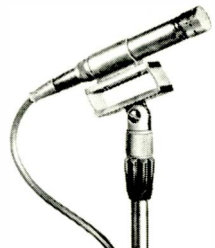
The dynamic cardioid microphone D 24 B has been designed for use in professional BC, television, and sound film studios as well as in electro-acoustic installations.

It combines very wide frequency response (30-16,000 cps) with excellent front-to-back ratio (20 db)  
Price: £54.10.0

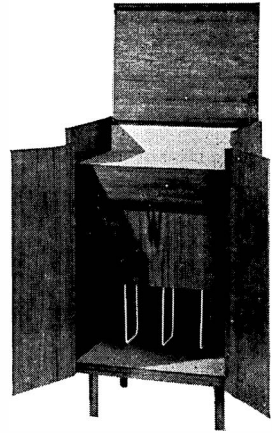
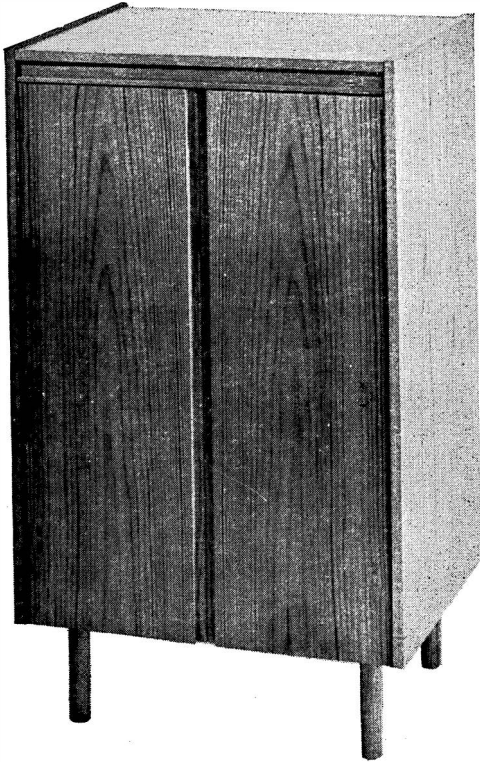


## C 60

The C 60 miniature condenser microphone is a breakthrough in price and sound. It combines highest professional quality with light weight and small dimension. No peaks between 20 and 20,000 cycles. No instability, performs in all climates, with full 25 db front-back ratio at all frequencies. No residual noise, 19 db spl or better.  
Price: £84.0.0



# cabinets by DESIGN



## AMPLIFIER EQUIPMENT CABINET EQC 10

This unique cabinet designed by Paul D. Read des. R.C.A. is available in medium walnut, medium mahogany and teak, oiled natural colour. The record storage and equipment compartments are easily interchangeable and the record dividers are removable if this compartment is required for another purpose. The inner top shelf, well and storage compartment shelf are lined in grey Suwide.

### Dimensions:

Cabinet 27" wide, 21" deep, 48 $\frac{3}{4}$ " high (inc. 8 $\frac{1}{2}$ " legs).

Inner top shelf 25 $\frac{7}{16}$ " x 18 $\frac{7}{16}$ ". Depth 5".

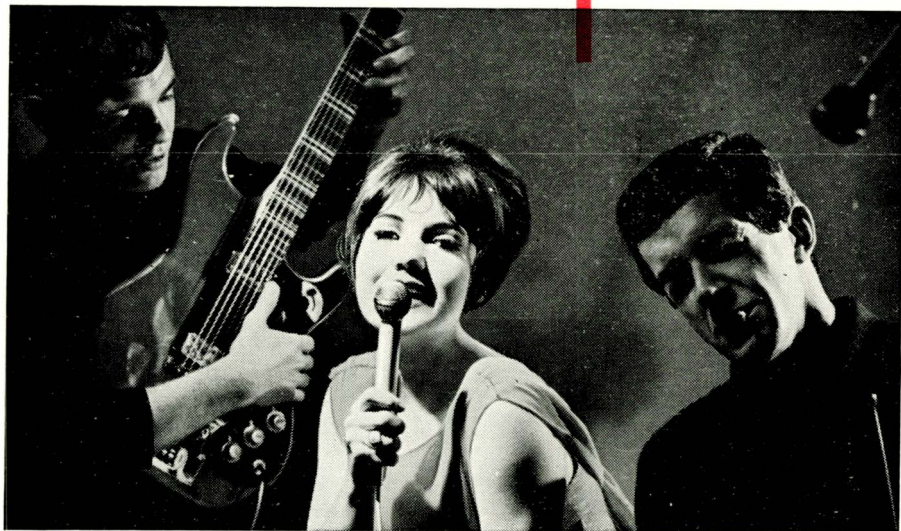
Control panel 25 $\frac{15}{32}$ " x 13 $\frac{3}{4}$ ".

*Send for our free brochure illustrating equipment cabinets, record cabinets and speakers.*

**Design Furniture Ltd., Calthorpe Manor, Banbury, Oxon.**  
Banbury 4341



# SOUND RECORDINGS SOUND THE BETTER FOR A BEYER MICROPHONE



Whether recording the cry of a fledgeling or the latest Mersey Beat, quality depends on the microphone. Used by Broadcasting and Recording Companies all over the world. Beyer microphones from West Germany have the highest technical specifications.

There is a top-performance microphone for every purpose—moving coil or ribbon, directional or omni-directional, and also a complete range of headset and floor stands. Here are four examples of Beyer directional microphones:—

## M.61



Extremely small, robust, directional and with moving coil. No feed-back trouble with loud speaker and conference equipment. Well suited to floor stand or boom.

## M.160



Small, beautifully made, with double-ribbon transducer giving near-perfect clarity. Its size and cardioid noise suppression characteristics make it ideal for film and T.V. studios.

## M.66



Strongly directional. Picks up sounds eight times better from front than behind. Can be placed a long way from the sound without interference. Ideal for broadcasting and T.V. transmissions.

## M.260



Directional, feather-light ribbon transducer giving absolute clarity and brilliance of reproduction. Effectively suppresses nearby sound reflections. Perfect for solo instrument and voice.

For information and literature on the full Beyer range of equipment please contact:—

**FI-CORD INTERNATIONAL**

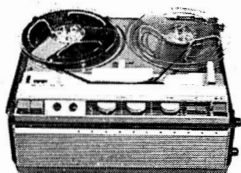
40A DOVER STREET, LONDON, W.1. HYDe Park 3448

# SONY SOUND



**SONY TC500** A magnificent Recorder offering 4-track, 2-speed stereo-mono facilities. Two VU meters, twin dynamic microphones frequency response 30-18,000 c.p.s. Separate level controls. Complete with 2 full-range satellite speakers with all accessories 106 gns.

**SONY TC464** Beautifully engineered—4-track, 2-speed, with facilities for stereophonic, sound on sound or parallel track recording. Used extensively in language labs. throughout the world. Complete with dynamic microphone 64 gns.



**SONY TC777A** Professional 2-track, 2-speed machine, fully transistorised, incorporating remote control giving instant start, stop, forward and reversing facilities. Frequency response 30-18,000 c.p.s. Three-head system giving tape monitor through separate internal amplifier. Complete with microphone and all accessories 159 gns.



**SONY TC200** The outstanding Recorder of the year, this instrument offers a fully packaged 4-track, 2-speed stereo-mono system with first-class specification, complete with 2 dynamic microphones and 2 satellite speakers. Inclusive of all accessories 79 gns.

Further details of the Sony range are given on page or may be obtained from the U.K. sole concessionaires of Sony.

## SONY®

RESEARCH MAKES THE DIFFERENCE

### TELLUX LIMITED

HIGH FIDELITY DIVISION, GALLOW'S CORNER,  
ROMFORD, ESSEX. TELEPHONE: INGREBOURNE 43971

# -SUPREME





**WE SERVE THE WORLD**

**STOCKISTS OF  
EVERYTHING THAT MAKES  
HI-FI WORTH WHILE**

TAPE EQUIPMENT  
AMPLIFYING EQUIPMENT  
LOUDSPEAKERS  
PICK-UPS AND MOTORS  
TUNERS  
BINSON ECHOREC UNITS  
ACCESSORIES

**PERSONAL EXPORT SERVICE WITH MINIMUM OF FUSS AND FORMALITY**

**MODERN ELECTRICS LTD.**

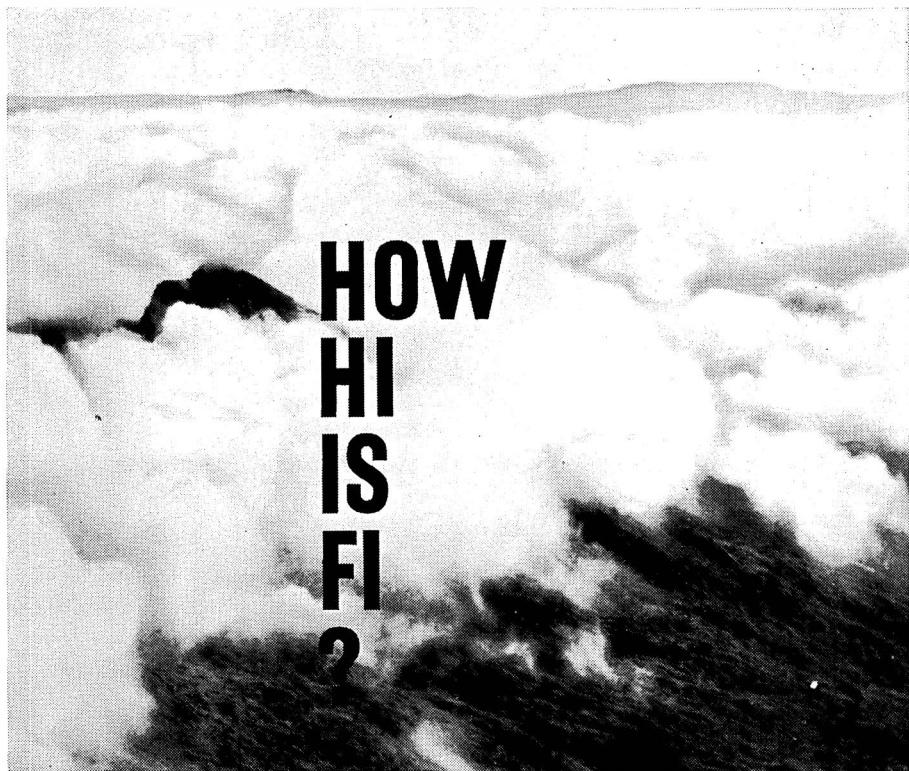
120 SHAFTESBURY AVENUE, LONDON, W.1

*(Four minutes from Piccadilly Circus and opposite Columbia Cinema)*

Telephones:  
GER 9692 & TEM 7587

Cables:  
**MODCHAREX,**  
LONDON





# HOW HI IS FI ?

One man's high fidelity is another man's hiss—it all depends on how sharp their hearing is. But, leaving aside the fanatics who drag you in to listen to a recording of pure nothing, all that most people require is faithful reproduction of every sound: reproduction that takes nothing away from the original sound, adds no unwanted noises of its own. And that is exactly what Philips equipment sets out to do. Choose from anywhere in the range: a loud-speaker, a pick-up head, a complete tape recorder, a record player, a reel of tape—you'll find that each one gives almost faultless sound reproduction. Which is what hi-fi is all about. Ask your Philips dealer for full technical information on Philips equipment for hi-fi, or write today to the address below.



**PHILIPS** equipment for the hi-fi enthusiast

**TAPE RECORDERS**  **LOUDSPEAKERS**  **RECORD PLAYERS**  **MAGNETIC TAPE**  **PICK-UP HEADS**

PHILIPS ELECTRICAL LTD., CENTURY HOUSE, SHAFTESBURY AVENUE, LONDON, WC2  
(PTR4376)

**HIGH QUALITY  
INSTRUMENTS**



**FOR TEST AND  
LABORATORY USE**

## Instruments for all purposes at Lowest possible prices



**MM-1U**

**MULTIMETER Model MM-1U**  
Measures wide range of voltage, current, resistance and dB in over 20 ranges. Sensitivity 20,000 ohms/volt D.C. and 5,000 ohms/volt A.C. 0-1.5, 1,500 volts A.C. and D.C. 0-150  $\mu$ A, 15A D.C. Resistance 0.2 ohms to 20 megohms.  $4\frac{1}{2}$ " meter, 50  $\mu$ A f.s.d.  
**Kit £12 18 0**

**VALVE VOLTMETER Model V-7A**  
7 voltage ranges D.C. volts to 1,500, A.C. 1,500 r.m.s. and 4,000 peak to peak. Resistance 0.1  $\Omega$  to 1,000 M $\Omega$  with internal battery. Input resistance 11 M $\Omega$ . dB measurement has centre zero scale. Complete with test prods, lead, and standardising battery.  
**Kit £13 18 6**



**V-7A**

**5" OSCILLOSCOPE Model 10-12U**

Has wide-band amplifiers, essential for TV servicing, F.M. alignment, etc. Vertical frequency response 3 c/s to over 5 Mc/s, without extra switching. T.B. covers 10 c/s to 500 kc/s in 5 ranges.  
**Kit £32 12 6**

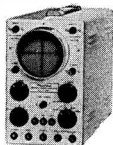


**10-12U**

**ELECTRONIC SWITCH Model S-3U**  
Enables a single beam oscilloscope to give simultaneous traces of two separate and independent signals. Switching rates approx. 150, 500, 1,500, 5,000 and 15,000 c/s. Separate gain controls and sync. output.  
**Kit £12 18 0**

**2 $\frac{1}{2}$ " SERVICE SCOPE Model OS-1**

A light, compact portable oscilloscope, ideal for servicing and general laboratory work. Y amplifier sensitivity 10 mV/cm; response  $\pm 3$  dB 10 c/s-2 Mc/s. Time base 15 c/s-150 kc/s. Uses printed circuit board. (Mu-metal screen £1.0.0 extra.)  
**Kit £21 18 0**



**OS-1**

**AUDIO WATTMETER Model AW-1U**  
Power range 5 mW-50 W f.s.d. Frequency response 10 c/s to 250 kc/s  $\pm 1$  dB. Internal load resistors. Power ratings 25 watts continuous, 50 watts intermittent.  $4\frac{1}{2}$ " 200  $\mu$ A meter.  
**Kit £17 5 0**

**RESISTANCE/CAP. BRIDGE Model C-3U**

Measures resistance 100  $\Omega$  to 5 M $\Omega$ , capacity 10 pF to 1,000  $\mu$ F and Power Factor. Test voltages 5-450 V with automatic safety switch.  
**Kit £10 10 0**



**C-3U**

**AUDIO SINE-SQUARE WAVE GENERATOR Model AO-1U**  
Covers 20 c/s-150 kc/s in 4 ranges, with choice of sine or square waves, the latter up to 50 kc/s.  
**Kit £14 15 0**

**6" VALVE VOLTMETER Model IM-13U**

Measures A.C. (R.M.S.) and D.C. volts 0-1.5, 5, 15, 50, 150, 500, 1,500. Resistance 0.1  $\Omega$  to 1,000 M $\Omega$  with own battery.  
**Kit £18 18 0**

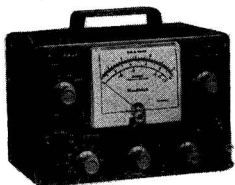


**IM-13U**

**R.F. SIGNAL GENERATOR Model RF-1U**  
Provides R.F. up to 100 Mc/s on fundamentals, 200 Mc/s on harmonics. Up to 100 mV output all bands. Accuracy  $\pm 2\%$ .  
**Kit £13 8 0**

**AUDIO GENERATOR Model AG-9U**

Frequency range: 10 c/s to 100 kc/s. Frequency is selected by the two decade switches times the multiplier. Output constant over the whole frequency range  $\pm 1$  dB and is variable from 3 mV f.s.d. to 10 V f.s.d.  $4\frac{1}{2}$ " 200  $\mu$ A mc. meter.  
**Kit £22 10 0**



Prices include free delivery in the U.K. Deferred terms available over £10 00.

★ Most models also available assembled, prices on request  
Full specification leaflet on any model available

**DAYSTROM LTD.** DEPT. HY  
GLOUCESTER ENGLAND

A member of the Daystrom Group, manufacturers of  
THE LARGEST SELLING ELECTRONIC KITSSETS IN THE WORLD

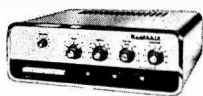
**HI-FI  
AMPLIFIERS**



**CABINETS  
SPEAKER SYSTEMS**

# Hi-Fi equipment for the most discriminating

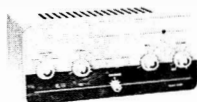
World famous kit sets anyone can build.



**S-99**

Printed circuit board, ganged controls, U/L push-pull-out, 0.2% distn. at 9 W/chan. **Kit £27 19 6**

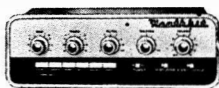
**HI-FI STEREO AMPLIFIER Model S-33**  
Attractively styled, completely self-contained. Printed circuit board. Only 0.3% distortion at 2½ W/Chan. 20 dB N.F.B., sensitivity 200 mV U/L output, ganged controls. **Kit £13 7 6**



**S-33H**

Deram pick-up. Two-tone perspex front panel. **Kit £15 17 6**

**STEREO CONTROL UNIT Model USC-1**  
Push-button selection, accurately matched ganged controls. Negative feed back, rumble and variable low-pass filters. Printed circuit boards. Accepts inputs from most tape heads and any stereo or mono pick-up. **Kit £19 10 0**



**USC-1**

**MONO CONTROL UNIT Model UMC-1**  
Ideal for use with any amplifier req. 0.25v or less for full output. **Kit £8 12 6**

**PACKAGED DEALS. Send for full details of Money Saving 'Packaged Deals'.**

**HI-FI STEREO AMPLIFIER Model S-99**  
Within its power rating this is the finest stereo amplifier available regardless of price.

**AM/FM TUNER**

Available in two units. Tuning heart (AFM-TI **£4 13 6** inc. P.T.). IF amplifier (AFM-AI **£21 16 6**) range 88-108 Mc/s (FM) 16-50, 200-550, 900-2,000 metres. Printed circuit board; own power supply; 8 valves; consecutive FM limiting **Kit Total £26 10 0**



**AM/FM TUNER**

**FM TUNER KIT**

For your convenience available in two units. Tuning Unit (FMT-4U **£2 15 0** inc. P.T.) with 10-7 Mc/s. IF output, and Amplifier Unit (FMA-4U **£13 3 0**). Built in power supply; 7 valves. Attractively styled. **Total Kit £15 18 0**



**FM-4U**

**MONAURAL AMPLIFIER Model MA-5**

5 W output with distortion less than 0.5%. Inputs for Gram and Radio; presentation and dimensions (11" x 5½" x 4½" high) as S-33. **Kit £10 19 6**

**TAPE AMPLIFIER UNITS Models TA-1M and TA-1S**

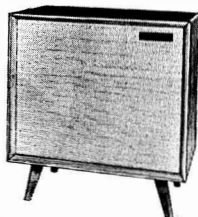
Special features include the provision of a bias level control; easy to read 'thermometer-type' recording level indicators; large printed circuit boards. Both models have identical presentation.



**TA-IS**

Models: TA-IS **Kit £25 10 0**

TA-1M **Kit £19 18 0**



**COTSWOLD SPEAKER SYSTEMS**

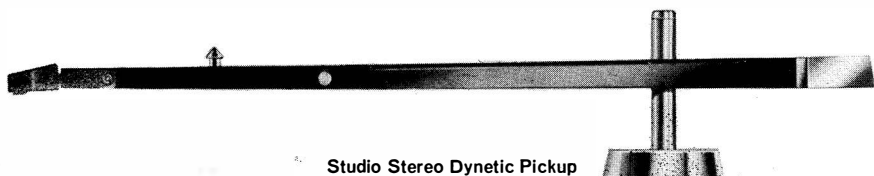
An acoustically designed enclosure 26" x 23" x 14½" housing a 12" bass speaker, elliptical middle speaker, pressure unit to cover the full frequency range of 30-20,000 c/s. Also available, 'MFS' Model 36" x 16½" x 14" deep, of similar performance to standard model. Either Model **Kit £23 4 0**

★ Send for FREE catalogue covering all models!

**DAYSTROM LTD.** DEPT. HY  
GLOUCESTER ENGLAND

OVER 50 DIFFERENT MODELS TO CHOOSE FROM

# connoisseurs of audio equipment eagerly acclaim Shure components



Studio Stereo Dynetic Pickup

Shure audio components and microphones are world acclaimed for sound reproduction and re-creation of the very highest order. They are made only for the discriminating listener with the experienced ear to appreciate their true quality. If you seek nothing but the finest in audio equipment, you will want to write at once for the current Shure catalogue of pickups, cartridges or microphones.



Model 545  
'Unidyne III'

**SHURE**

**SETTING THE WORLD'S STANDARD IN SOUND**

SHURE ELECTRONICS LIMITED  
84 BLACKFRIARS ROAD · LONDON SE1 · Telephone: WATerloo 6361

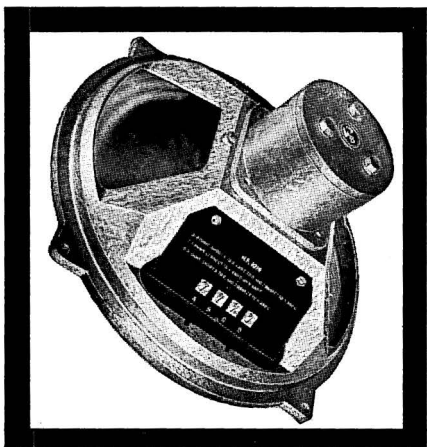
# Stentorian

## THE SOUND OF TODAY

### MODEL H.F.1012 SPEAKER

10in. die-cast unit, incorporating 12,000 gauss magnet. Fitted with cambric cone and universal impedance speech coil providing instantaneous matching at 3, 7.5 and 15 ohms. Handling capacity 10 watts. Frequency response 30 c.p.s. to 14,000 c.p.s. Bass resonance 35 c.p.s.

Price: £4.12.0



### THORESBY SLIM-LINE CABINET

This enclosure has been designed to accommodate any of the Stentorian range of 8in. or 10in. units. Provision is made for the addition of either pressure or cone type tweeter and a crossover may be used.

The cabinet is substantially constructed and acoustically proportioned to give a balanced reproduction with the chosen units. Available in mahogany or walnut. Height 31in. x Width 20in. x Depth 9½in.

Price: Mahogany £10.5.0 Walnut £10.10.0

#### BASS REFLEX CONSOLE CABINETS

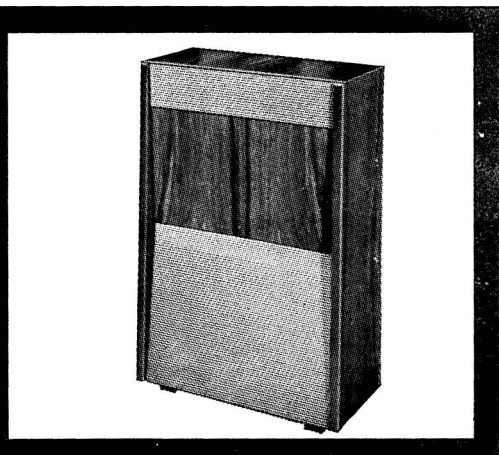
Height 31in. x Width 19½in. x Depth 18in.

Price: Mahogany £12.17.6. Walnut £13.5.0

#### HI/FI EQUIPMENT CONSOLES

Height 31in. x Width 19½in. x Depth 18in.

Price: Mahogany £15.0.0 Walnut £15.10.0



### T.359 CONE TWEETER

Provides a very high standard of reproduction when used in conjunction with 'Stentorian' 10in. or 12in. units. Incorporates High Sensitivity 9,000 gauss magnet, special cone and lightweight coil.

Frequency response: 3,000-15,000 c.p.s. Overall size: 3in. dia. x 2in. deep. Voice coil impedance: 15 ohms or 5 ohms. Power handling capacity: 15 watts when used with a 3,000 c.p.s. crossover.

Price: £1.12.3

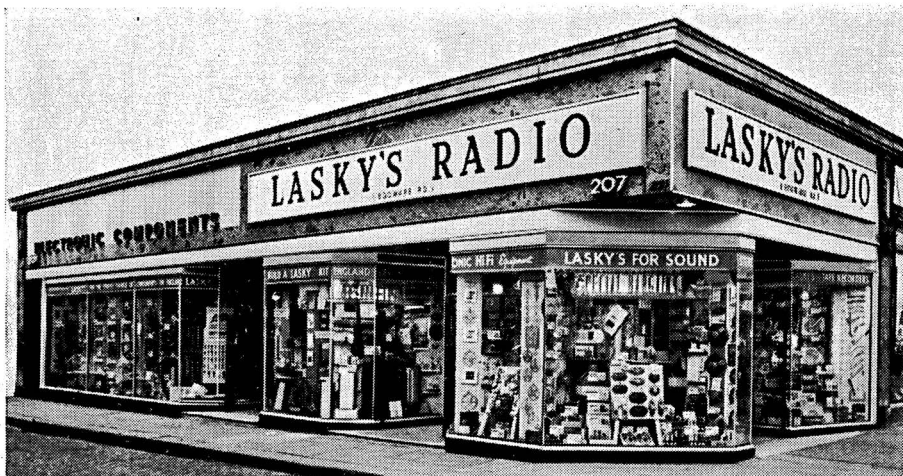


Supplies of leaflets on all  
Whiteley products available  
on request.

WHITELEY ELECTRICAL RADIO CO LTD · MANSFIELD · NOTTS.

# LASKY'S RADIO

## the home of HI-FI



See and hear the very latest in hi-fi in our comfortable Demonstration Studios, or make use of our expert and efficient postal service—which has given full satisfaction to many thousands of home and overseas customers. We operate the "purchase tax-free plan" for overseas visitors. If you cannot pay us a visit send us details of your proposed installation and we shall be pleased to quote without obligation.

### H.P. TERMS AVAILABLE

- STEREO AND MONAURAL AMPLIFIERS
- CONTROL UNITS
- PICKUPS
- LOUDSPEAKERS
- SPEAKER SYSTEMS
- RECORD PLAYERS
- AUTOCHANGERS
- TRANSCRIPTION TURNTABLES
- AM/FM TUNERS
- TAPE DECKS
- TAPE RECORDERS
- MICROPHONES
- CABINETS AND SPEAKER ENCLOSURES
- TRANSISTOR AUDIO EQUIPMENT

*Plus Great Britain's Speediest Mail Order Service*

**207 EDGWARE ROAD, LONDON, W.2**

PADdington 3271/2 Few yards from Praed Street.

**33 TOTTENHAM COURT ROAD, W.1**

MUSEum 2605 Nearest Station, Gooch Street.

Both open all day Saturday. Early Closing Thursday. Mail Orders to Dept. AF., Edgware Road

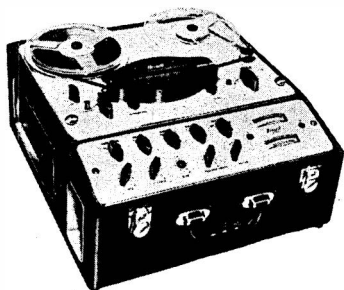
**152/3 FLEET STREET, LONDON, E.C.4**

FLEet Street 2833 Near Daily Express Building.

Open all day Thursday. Early Closing, Saturday

# 3 TAPE RECORDERS

## by Brenell



### THE STB 1

This new stereo tape recorder from Brenell contains many new features which will appeal to the discriminating amateur and professional alike. It is beautifully designed both mechanically and electrically and some idea of the versatility of this new machine will be gathered from this very brief specification:—

4 speeds  $1\frac{7}{8}$ ,  $3\frac{3}{4}$ ,  $7\frac{1}{2}$  and 15 i.p.s.—mixing—superimposing—sound-on-sound—immediate comparison of original and recorded signals—2 edgewise meters—replay facilities for  $\frac{1}{2}$ ,  $2/2$ ,  $\frac{1}{4}$  and  $2/4$  track pre-recorded tapes.

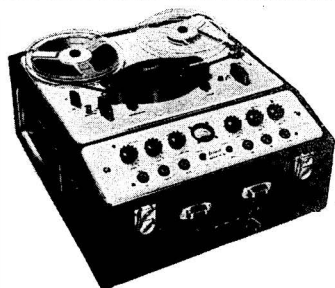
£120

### THE MARK 5 Type M

A high class semi-professional machine, the Type M has earned itself an enviable reputation for quality and reliability—just consider this brief specification:—

4 speeds  $1\frac{7}{8}$ ,  $3\frac{3}{4}$ ,  $7\frac{1}{2}$  and 15 i.p.s.—separate record and replay heads and amplifiers—reels up to  $8\frac{1}{4}$ " dia.—fast rewind (1,200' in 45 seconds)—mixing—superimposing—recording level meter—adjustable rotary tape guide.

88 gns.

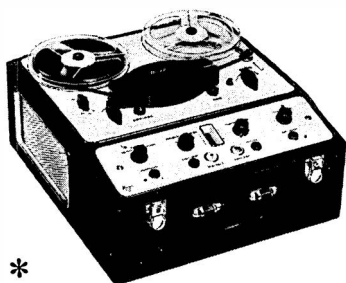


### THE MARK 5 Series 2

This new machine replaces the MARK 5 and offers a number of improvements both in appearance and electrically. The amplifier has been redesigned to give an improved frequency response at all speeds on both record and playback. The output remains the same at 4 watts.

Specification: 4 speeds  $1\frac{7}{8}$ ,  $3\frac{3}{4}$ ,  $7\frac{1}{2}$  and 15 i.p.s.—3 independent motors (synchronous drive to capstan motor)—instant stop without spillage—pause control—monitoring—superimposing—up to  $8\frac{1}{4}$ " reels—fast rewind (1,200' in 45 seconds).

69 gns.



\*

Sole Manufacturers

**Brenell**

\* The Mark 5 Series 2 deck, amplifier and power unit are available separately for installation in your own Hi-Fi system.

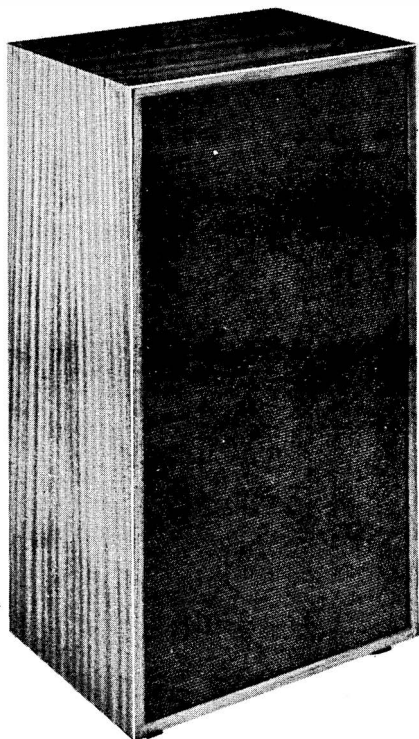
**BRENELL ENGINEERING CO. LTD.**

1a Doughty Street, London, W.C.1.

Telephone: HOLborn 7356 (3 lines)

# AUDIO SERVICES

*The specialists with the HI-FI know how*



Manufacturers of the famous

## DYNA-STATIC

and the

## DYNA-SONIC SPEAKERS

PRICES FROM £25 to £45

### AGENTS FOR:

ACOS, BANG & OLUFSEN, CONNOISSEUR,  
DECCA, GOLDRING, GOODMAN'S, LEAK,  
LENCO, ORTOFON, QUAD, RECORD HOUSING,  
ROGERS, SME, TANNOY, WB, WHARFEDALE,  
WOOLLETT, etc.

### ACCREDITED AGENTS FOR:

ARMSTRONG, HMV HI-FI EQUIPMENT, PYE  
HI-FI EQUIPMENT, TANDBERG & THORENS.

## LIVING ROOM DEMONSTRATIONS

Few High-Fidelity enthusiasts are able to use their equipment under conditions that resemble an acoustically perfect demonstration studio. Indeed, speaker systems in particular can be disappointing when heard in an average lounge.

Audio Services are under no illusions when it comes to satisfying their customers. They are constantly demonstrating the new Dyna-Static, the Quad Electrostatic and other leading designs, under truly average conditions—a normal living room.

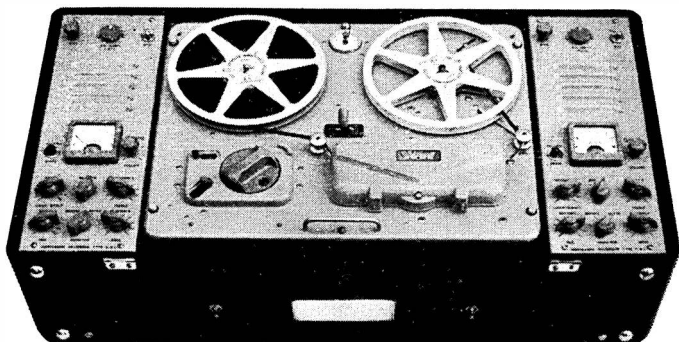
Come and hear for yourself—Ring Barnet 6605

## AUDIO SERVICES (HI-FI) LTD

82 EAST BARNET ROAD, NEW BARNET, HERTFORDSHIRE



# Vortexion Quality Equipment



TYPE C.B.L.

**THE VORTEXION "B" RECORDER** is noted for its very high audible quality and professional standards. The microphone input can have over a quarter-mile of ordinary twin flex for outdoor use and will load from normal voice at a distance of 20 feet, being of 30/50 ohm balanced line needing only 8 micro-volts. The radio input can accept any signal from 17 m.v. to 10 volts on 0.5 megohm. Monitoring after record facilities are provided with A-B switch for comparing the before and after quality whilst recording, and the erase head may be switched out, the bias reset and monitored on the meter for superimposing and adding echoes, etc. The handbook contains the accurate meter bias settings for various makes of tape, and  $3\frac{1}{2}$  watts of power heavily damped by negative feedback on 15 ohm is available. **THE W.V.A. RECORDER** is similar except for the "B" type monitoring.

The C.B.L. stereo programme building recorder can transfer signal from one track to the other with two more mixed inputs each time.

The Vortexion 30/50 Amplifier can deliver 50 watts of speech and music or over 30 watts of continuous sine wave and the main amplifier has a response of 30 to 20,000 cps within 1db at 0.1 per cent. distortion and outputs for 4, 7.5, 15 ohm and 100 volt line. Models are available with two, three or four mixed inputs which may be low impedance balanced line microphones, P.U. or Guitar inputs.

The 120/200 watt Amplifier can deliver its full audio power at any frequency in the range of 30 to 20,000 cps for which the response is accurate within 1db with less than 0.2 per cent. distortion at 1,000 cps. It can be used to drive mechanical devices, i.e. synchronous capstan or projector motors, etc., for which the power is over 140 watts on continuous sine wave. The input is for 1 m.w. 600 ohms, the output for 100-120 volts or 200-240 volts and additional matching transformers for other impedances are available.

Other items of our manufacture are:

- 4 way Mixer with 10 watt output and tone controls.
- Record and Playback Mixer.
- 2 x 5 way Stereo Mixers.
- 12 way Mixers.
- 3 way Mixer and Peak Programme Meter.
- 4 way Mixers.
- 2 way 30/50 ohm in and out stud type Mixers.
- Erase Fader unit for our recorders.

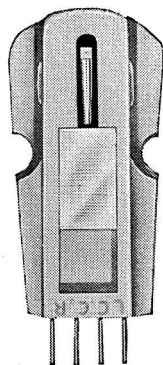
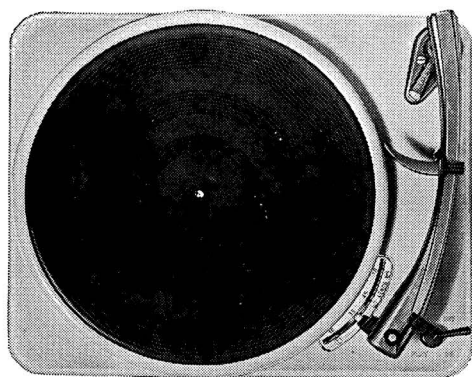
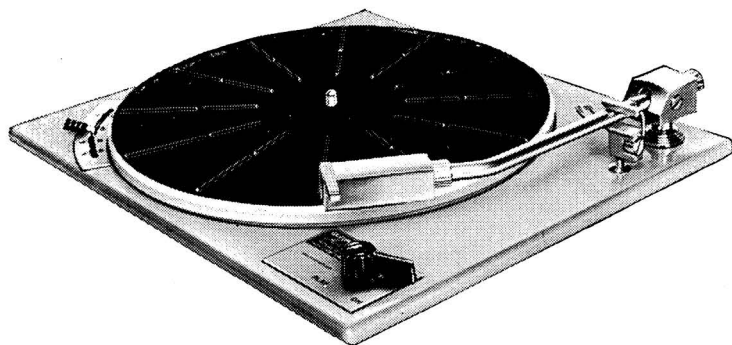
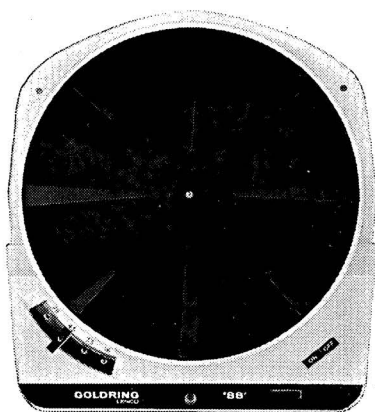
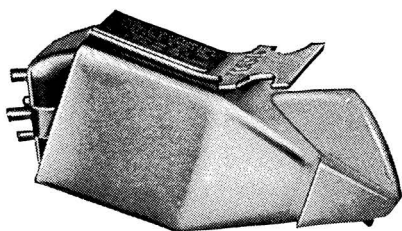
## VORTEXION LIMITED

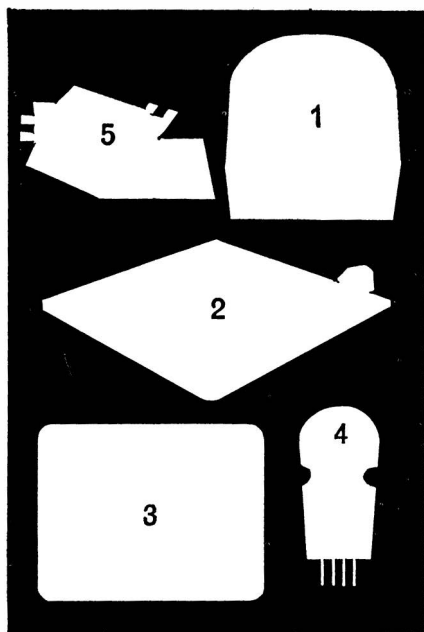
257-263 The Broadway, Wimbledon, London, S.W.19

Telephones: LIberty 2814 and 6242-3.

Telegrams: "Vortexion, Wimble, London"

# The shapes of sound





### Goldring-Lenco Transcription Units

All Goldring-Lenco transcription units are powered by the now famous Lenco 4-pole constant velocity motor and have the unique vertical drive system which permits continuously variable speed from above 80 r.p.m. to below 30 r.p.m. and from 15 to 18 r.p.m. with adjustable click-stops for the four standard speeds. There is less than 1% speed change for 13% mains voltage change. Wow and flutter—0.2% maximum. Rumble and hum are negligible.

**1. The '88'** For use with separately mounted transcription arms. 8 lb. die-cast, accurately machined non-magnetic turntable. The press-button on/off switch, linked to a neon pilot light, also engages and disengages the drive. Price £16.5.6 (plus P.T. £2.12.11).

**2. G.L.70** Incorporating the superb Swiss-engineered L.70 transcription arm with interchangeable shell which will house virtually any hi-fi cartridge. Wired for stereo and/or mono. Machined die cast 8 lb. non-magnetic turntable. The on/off switch is linked to a pick-up lowering device. Price £23.12.6 (plus P.T. £3.16.10) or, mounted on box-type base, £26.12.6 (plus P.T. £4.6.7).

**3. G.L.58** The much-praised 'budget' transcription unit, with integral transcription arm taking virtually any hi-fi cartridge on an ingenious and interchangeable nylon slide-in 'platform'. Wired for stereo or mono. Turntable weighs 3½ lbs. The on/off switch is linked to a pick-up lowering device. Price £14.14.0 (plus P.T. £2.7.9) or, mounted on box-type base, £17.4.0 (plus £2.15.11).

**4. C.S.90 Stereo Ceramic Special** A ceramic cartridge with the characteristics of a top quality magnetic! Can be loaded straight into an amplifier with a sensitivity of 100mV or more. Tracks at 1½–3 grammes. Fitted with .0005" replaceable diamond stylus. Price £4.4.0 (plus P.T. 13/8d.).

**5. Pickering 380A Cartridge** One of the most acclaimed stereocartridges in the world. The moving magnet 380A, of hermetically sealed construction, features the exclusive "V-Guard" push-in diamond stylus assembly and tracks at 2 grammes giving faultless reproduction from even the most exacting recorded material. Price £12.12.0 (plus P.T. £2.0.11).

**Other Goldring Cartridges include** the well-known variable reluctance "600" (mono) and "700" (stereo).

... and, of course, there is a Goldring guaranteed replacement stylus—diamond or sapphire—for virtually every modern pick-up cartridge.

## HI-FI EQUIPMENT BY **GOLDRING**



**GOLDRING MANUFACTURING CO. (G.B.) LTD**  
486-488 High Road, Leytonstone London E11 Phone: LEYtonstone 8343

# ELAC

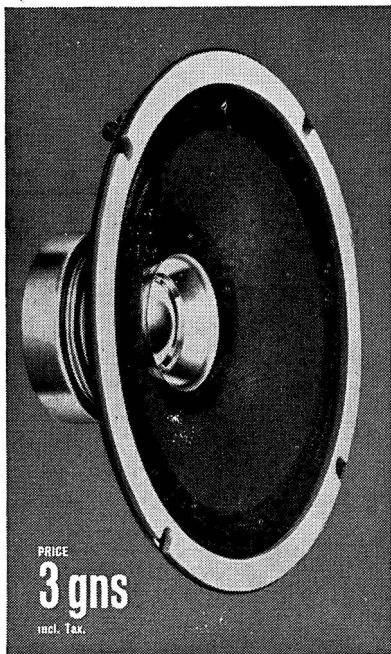
## 8 inch Hi-Fi unit MODEL 50/12

This modern reproducer with Ceramic (10,500 gauss) Magnet and wide range 50 to 12,000 cps, twin low resonance diaphragm provides the answer for the enthusiast who needs first-class reproduction from medium power amplifier.

- HIGH FLUX CERAMIC MAGNET
- ALUMINIZED PLASTIC CENTRE CONE
- PLASTICISED SURROUND
- WIDE RANGE RESPONSE (50-12,000 cps)
- HIGH SENSITIVITY



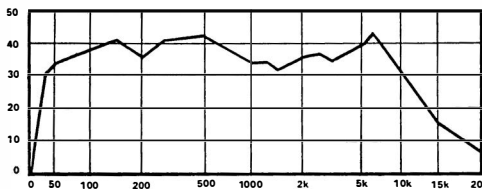
ELECTRO ACOUSTIC INDUSTRIES LTD.,  
Stamford Works, Broad Lane, London, N.15.  
Telephone: TOTtenham 0505



PRICE  
**3 gns**  
incl. Tax.

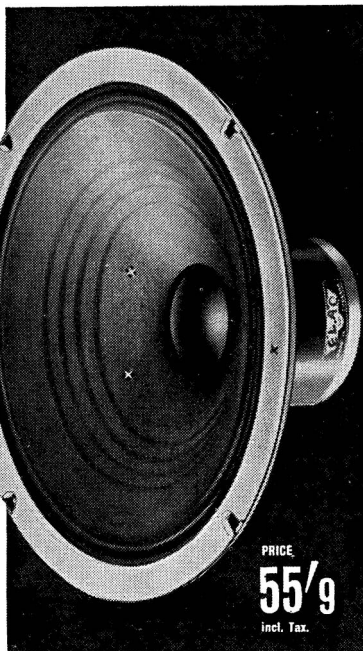
## ELAC TYPE 8N/148 (N/832)

Specially Recommended for R. M. Baldock's  
TRICOLUMN & PARALINE Loudspeaker enclosures



Frequency response for 8N/148 (N/832)

This high flux (13,000 gauss) robustly constructed unit incorporating a rising frequency characteristic which will provide above average fidelity from the smaller enclosure or column. Specially recommended by R. M. Baldock in 'Hi-Fi News' for use with his Tricolumn and Paraline designs but it is equally suitable for other enclosures where high notes are deflected to obtain polar distribution.



PRICE  
**55'9**  
incl. Tax.



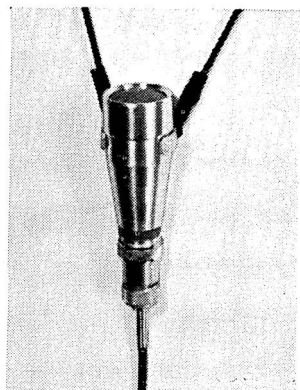
ELECTRO ACOUSTIC INDUSTRIES  
LTD.,  
Stamford Works, Broad Lane,  
London, N.15.  
Telephone: TOTtenham 0505

# New Reslo Pencil Dynamics

Pencil  
Dynamic  
Type PD



Mini  
Pencil  
Dynamic  
Type MPD



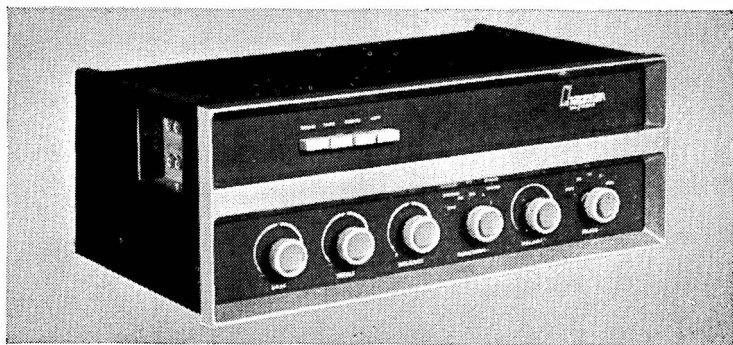
*Reslo*

sound has specialised for more than 30 years in the manufacture of ribbon and coil dynamic microphones which are in great demand for use with high quality tape recorders and in the entertainment industry generally.

---

## CHAPMAN domestic high fidelity equipment

306  
INTEGRATED  
STEREO  
AMPLIFIER



**DERRITRON RADIO LTD. (Chapman Division)** produce the widest range of British tuners from VHF. FM only to 6 stage AM bandspread and high gain FM. Illustrated is the "new look" 306-integrated 8 + 8 W Stereo Amplifier.

*Full technical details and price information on the complete matching range of Chapman equipment and Reslo microphones are available from:*

**DERRITRON LTD.**

24, Upper Brook Street, London, W.1.

HYDe Park 2291



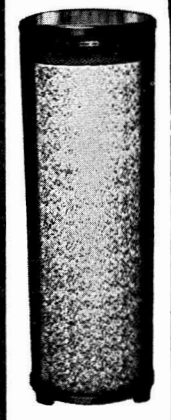


**Craftsman II**  
2 speed transcription turntable  
complete with plinth and  
SAUI pickup arm.  
Items also sold separately.

**Craftsman III**  
Variable 3 speed transcription turntable  
can also be supplied complete  
with plinth and  
SAUI pickup arm.



## *Connoisseur*



**Craftsman Speaker Series**  
**MAJOR & MINOR**  
supplied complete  
with Drive Units.

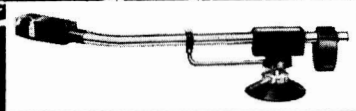


**MK II Speaker Series**  
**MK II MAJOR**  
**MK II MINOR**  
supplied complete  
with Drive Unit.



**Stereo Cartridge**  
Type SCUI  
Mono type also available

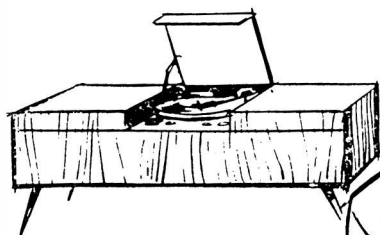
**SAUI Pickup Arm & Shell**  
Supplied with or  
without lifting device.



See classified section for specifications and prices Free leaflets available on request  
(state product) *A. R. Sugden & Co. (Engineers) Ltd.*, Market Street, Brighouse, Yorks.

# Hear it better at *University*

## **AUDIO**



If you're on the track of any piece of hi-fi equipment you must visit University Audio, where you'll find it sooner and hear it better. Find it sooner because everyone at University Audio is a specialist, enthusiastic about hi-fi and able to find quickly the right item at the right price. Hear it better because there's a mono-stereo comparator which enables you to hear and see how any piece of equipment works.

Demonstrations can be arranged for you of equipment on show at this year's Audio Festival. Don't you think it's a good idea to pay them a call?

**University Audio—hi-fi's second home**

## *University* **AUDIO**

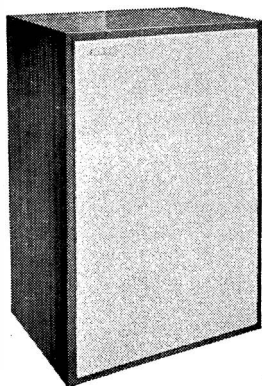
1, ST. MARY'S PASSAGE,  
CAMBRIDGE  
TELEPHONE 54237

12 BARGATE STREET,  
SOUTHAMPTON  
TELEPHONE 28547



# New products from the METRO-SOUND GROUP

## THE 'CLASSIC' M1



The Metro-Sound 'Classic' M1 loud-speaker has been designed and produced to match high quality amplifiers and pick-ups. This has been achieved by the use of a special 12-in. bass unit covering the middle and lower frequency range and incorporates a unique bass reflex system, thus ensuring fuller response from the lower frequency spectrum. A 5-in. diameter totally enclosed treble unit brilliantly reproduces the upper frequencies **Price £36.00**

## THE 'CLASSIC' M2

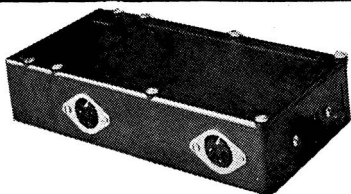
A further major advance in compact loud-speaker design. Available singly, or in matched pairs for true stereo reproduction. Attractively finished in Sapele Mahogany. The Metro-Sound 'Classic' M2 speaker enclosures are designed for bookshelf mounting or for use where space is limited. **Price £17.10.0**

*Incorporating the revolutionary new cor-reflex system (Patented)*

## METRO-SOUND STEREO PREAMPLIFIER MST/10

Designed and produced for use with low and medium output pickup cartridges and microphones, and has a performance unequalled within this price category. Frequency Response 30 c/s—30 kc/s substantially Linear Gain 40 db Plus \* Input Impedance Low and Medium Output Impedance Medium and High \* Battery Vidor V.T.4. or equivalent.

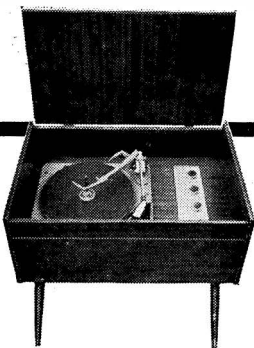
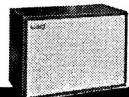
**Price Standard Model £7.10.0 De Luxe £9.10.0**



Look, Listen, Compare the all new

## CLASSIC

HI-FI STEREO REPRODUCER



Sapele Mahogany Cabinet with Ebony finished legs. Speakers also in Sapele Mahogany with Vynair fronts. This is the finest HI-FI value ever.

**Price £61.6.10**  
incl. Purchase Tax

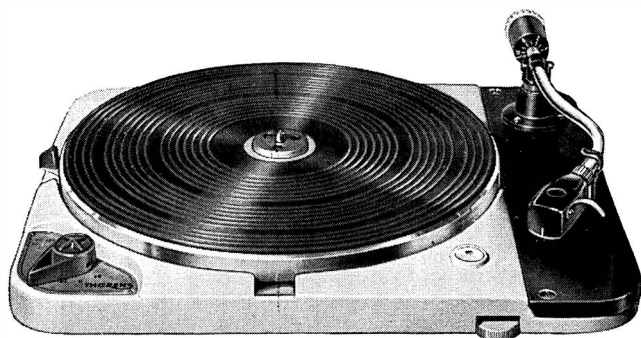
Look at the price. Listen to the superb reproduction. Compare with any other Stereo Equipment within this price range, and you'll agree that this is today's finest value. Specification. Garrard AT6 Autochange unit. The latest Sonotone 9T Cartridge with Transcription Diamond Stylus. Matched speakers each having separate bass and treble unit. Independent treble and bass controls. Stereo Balance control. Amplifier—integrated amplifier, combined output 6—7 watts. Dimensions. Reproducer Height 10 $\frac{1}{4}$ ". Width 22 $\frac{1}{2}$ ". Depth 14 $\frac{1}{4}$ ". Speakers Height 10 $\frac{1}{4}$ ". Width 14 $\frac{1}{4}$ ". Depth 8"

# METRO-SOUND

Manufacturing Co. Ltd.

BRIDGE WORKS, WALLACE ROAD, CANONBURY, N.1.  
CANONBURY 8641/4





**Illustration of THORENS UNIT TD.124  
fitted with Ortofon SMG.212 Pick-up Arm and SP-U/GT cartridge**

\*Nationally Advertised

\*Countrywide Demonstrations

# THORENS

## Ortofon

Regarded by technical experts as  
**THE FINEST PICK-UP  
IN THE WORLD**

### MODEL SPU-G/T STEREO CARTRIDGE

The only Hi-Fi cartridge with built-in transformers. Channel separation 20-25 d/b Frequency response 20-20,000 cycles. Stylus pressure—below 2 gms. Compliance  $10^5$  cm/dyne. Fitted low mass (1 mg.) Diamond Stylus. Price-£23.4.2 incl. P.T.

MODEL SPU-G without built-in transformers. Price £20.17.9 incl. P.T.

### PICK-UP ARM SMG.212

Friction free ball bearings, both horizontal and vertical action. Statically balanced arm with unique counter balance. The perfect component. Price £11.12.1 incl. P.T.

### NOW—THE SENSATIONAL ELLIPTICAL DIAMOND STYLUS

The elliptical diamond will give better tracking of the most difficult recorded passages, and a superb brilliance in reproduction.

Thorens transcription motors are products of the finest  
**SWISS PRECISION ENGINEERING**

**MODEL TD.124** with a host of outstanding features.

- \* Inertia controlled drive system
- \* Two step speed reduction
- \* Variable speed control ( $\pm 3\%$ ) acting on four speeds
- \* Precision inbuilt stroboscope
- \* Clutch action motor

Price £38.7.4. incl. P.T.

**MODEL TD.135** Special features include: Eddy current brake, 8 lb. non-magnetic turntable and the famous Thorens inertia controlled drive system with two step speed reduction including BTD-125 arm. Price £35.8.4 incl. P.T.

### INTRODUCING THE THORENS MASTERPIECE TD.224

Details on application.

Available at leading dealers. Write for illustrated leaflets to  
Sole distributors for the U.K. ORTOFON & THORENS products.

## METRO-SOUND

## METRO-SOUND (SALES) LTD.

Bridge Works, Wallace Road, Canonbury N.I.  
Tel. CANonbury 8641/4

---

# FOR FINE EQUIPMENT AND RECORDS

## THIS IS LONDON'S SPECIAL GRAMOPHONE SHOP

When recorded music is listened to to-day, it represents the ultimate in a chain of processes that places the good reproducing equipment virtually in the class of a precision instrument. Certainly that used in the making and playing of records is vastly elaborate.

Not that there is need to understand these processes in detail in order to enjoy a record. Many music lovers may not want to. However, they do want to be able to depend on the supplier from whom they buy. This is precisely the service which E.M.G. Handmade Gramophones Limited, is organised to render in the fullest possible way.

The Company operates in two main streams:

Firstly, there is the record shop where the lover of good music will find a treasure house of records from which to choose, and all records are meticulously examined to ensure their being perfect before sale. If choosing proves difficult, the staff (music enthusiasts themselves) can help. If you cannot call, there is "The Monthly Letter".

This remarkable critique of new record issues has served collectors continuously for over thirty years and occupies a position of trust such as no subsequent publication of its kind has ever attained. A year's subscription costs 15/- post free. Records can also be purchased by post.

Secondly, there is the technical department. Through it, the company sells its well-known Davey equipment in the form of high quality Reflector Loud-speakers and Playing-desks with amplifiers and tuners. Fine cabinet work is a strong feature here. This department deals also with installations to individual requirement and also the conversion and modernisation of existing domestic equipment.

E.M.G. then, offer a unique and comprehensive service to music lovers. It is as modern as the latest transistorised stereophonic techniques; it is backed by a long unbroken tradition of leadership in promoting better standards for listening to good music in the home. This is as true to-day as when the famous E.M.G. acoustic flared horn of pre-war days showed then just how well records should, and could, sound.

*Consult E.M.G. for everything good in sound reproduction.*

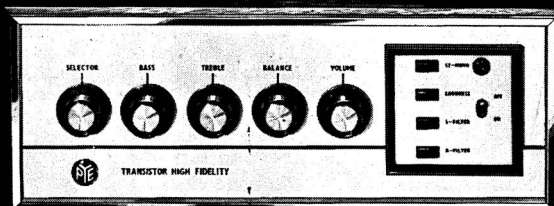
**E · M · G**

**HANDMADE  
GRAMOPHONES  
LTD.**

6 NEWMAN STREET, OXFORD ST., LONDON, W.1.

*Telephone: MUSeum 9971*

IMPROVED TRANSIENT  
RESPONSE • INCREASED  
RELIABILITY • STYLED  
FOR COMPACTNESS



**PYE CALL THEIR NEW TRANSISTORISED AMPLIFIER THE BRAHMS HFS30T**

## YOU'LL CALL IT BRILLIANT

ITS DESIGNERS CALL IT A MAJOR BREAKTHROUGH

Pye's new Brahms transistorised amplifier is one of the first transistorised stereo high fidelity amplifiers in production in Great Britain. Behind its supremely functional construction lie years of research into transistors and high fidelity reproduction by technicians and scientists of Pye's High Fidelity Division. During this time the technical controllers of this special Division have had at their disposal the vast and diverse resources of the Pye Group. A Group with the brains that built the precisely accurate Pye spectrophotometer, the minds that mastered the complexities of digital computers and the scientists that schemed many hundreds of precision instruments in guided missiles—the result—the finest amplifier yet produced.

The Brahms HFS30T has many advanced new features. Big improvements in transient response over normal valve amplifiers, thus giving distortion free reproduction at both very low and high frequencies. Hum and noise is inaudible and there is a minimum of heat dissipation. But the HFS30T's supremacy is not restricted to performance alone. The ingenious design combines preamp, power amplifier, power unit and controls into a single case—lightweight compact and very tough. There's a rather luxurious rosewoodcase version too. Write and we'll give you any more information you want. Or see your Hi-Fi dealer—you'll find him as equally enthusiastic about this new amplifier as Pye are themselves.

**BRIEF SPECIFICATION** · Main Amplifier · Power output: 15 watts per channel · Frequency response: 20-35,000 c/s  $\pm 1\frac{1}{2}$  dB · Signal to noise: -90 dB · Damping factor: better than 50 · Cross talk: better than -50 dB · Distortion: typically less than 0.5% at 1,000 c/s.

PYE LIMITED HIGH-FIDELITY



DIVISION P.O. BOX 49 CAMBRIDGE

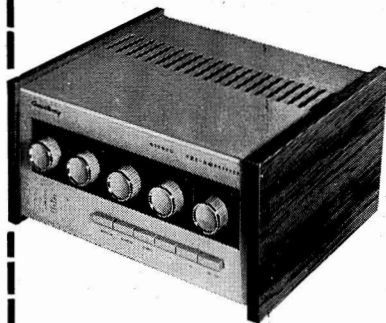


*Armstrong*

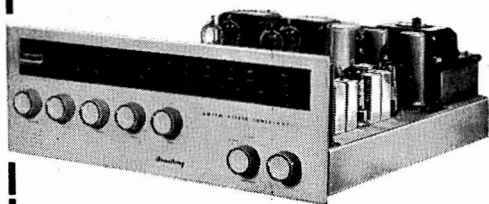
## TUNERS



## AMPLIFIERS



## TUNER-AMPLIFIERS



"A new range of tuners, amplifiers and tuner-amplifiers designed to meet every requirement of the music-lover in his own home. A superb performance, combined with elegance of styling, gives you a high fidelity system of enduring quality whether mounted in a cabinet with other equipment or in one of the optional shelf-mounting cases illustrated above, which are available for all models.

**ARMSTRONG AUDIO LTD.** Warlters Road, London, N.7. Telephone: NORTH 3213

# new exclusive hi-fi cabinets

Two new designs have now been added to Imhofs already extensive range of exclusive hi-fi cabinets, and bleached pine has been added as a new optional finish. You can see them ONLY at Imhofs store in New Oxford Street... you can buy them for shipment to anywhere in the world.

## HFU/12

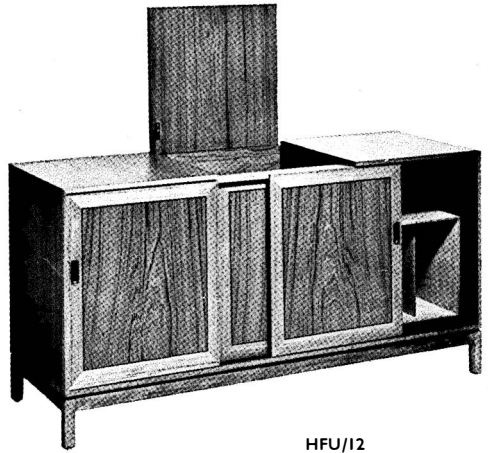
This new handsome cabinet is available in either teak, elm or afrosomia as standard but can also be supplied in a variety of other finishes to order. It will house transcription motor, tape deck, amplifier and tuner with ample storage space for over 250 records. The centre sliding door conceals the instrument panel. The cabinet is 60" wide by 22" deep and stands 30" high. Price £52.10.0—equipment extra according to choice. See it ONLY at Imhofs.

## HFU/1/L

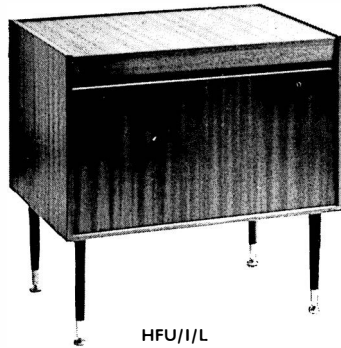
A new enlarged version of the ever popular HFU/1. This elegant cabinet is designed to enable a tuner to be fitted alongside of a transcription motor. Available in a wide choice of finishes including walnut, mahogany and bleached pine. It is 28" wide by 19" deep and is 26" high including 9" legs. Price £23.2.0—equipment extra according to choice. See it ONLY at Imhofs.

## TROLLEY TYPE L

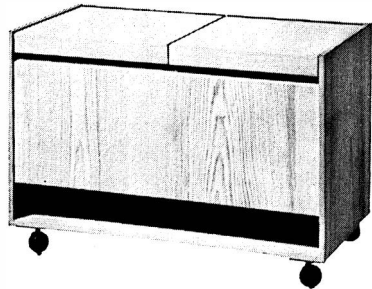
This is the trolley that was chosen for display at the Design Centre and is shown here in the new bleached pine finish. There is plenty of space for the latest equipment. Dimensions are 24" high (including castors), 18½" deep by 35½" wide. Other standard finishes include walnut, mahogany and rosewood, all light mahogany, all dark mahogany and (at a little extra cost) teak. Price of standard model £30.10.0—equipment extra according to choice. See it ONLY at Imhofs.



HFU/12



HFU/1/L



TROLLEY TYPE L

Details of many other exclusive Imhof hi-fi cabinets are shown in "This Year of Hi-Fi 1964"—send for your free copy today.

**ALFRED IMHOF LIMITED**  
Dept. AFC, 112-116 New Oxford Street  
London, W.C.1. Tel. MUSEum 7878

# FRANCIS OF STREATHAM

*invite all  
Hi-Fi and Recorder  
enthusiasts to their  
South London Showrooms*

**FOR LARGE AND UP-TO-DATE STOCKS  
OF EQUIPMENT BY LEADING  
MANUFACTURERS AS ADVERTISED  
IN HI-FI NEWS, TAPE RECORDER, ETC.**

- |              |               |
|--------------|---------------|
| ★ FERROGRAPH | ★ KELLY       |
| ★ BRENNELL   | ★ GRAMPIAN    |
| ★ COSSOR     | ★ QUAD        |
| ★ GRUNDIG    | ★ LEAK        |
| ★ PHILIPS    | ★ GARRARD     |
| ★ TELEFUNKEN | ★ LENCO       |
| ★ STELLA     | ★ RESLO       |
| ★ SONY       | ★ ARMSTRONG   |
| ★ VORTEXION  | ★ SHURE       |
| ★ SIMON      | ★ ORTOFON     |
| ★ AKG        | ★ THORENS     |
| ★ EAGLE      | ★ WHARFEDAILE |

**NO CHARGES FOR  
CREDIT FACILITIES**

★  
**LARGEST SELECTION  
OF LATEST MODELS**

★  
**TAPES • ACCESSORIES**

*Personal attention  
to all enquiries  
without obligation*

**WRITE ★ CALL ★ 'PHONE**

*Please mention Hi-Fi Year Book when writing*

## FRANCIS OF STREATHAM

**169-173, STREATHAM HIGH ROAD, LONDON, S.W.16**

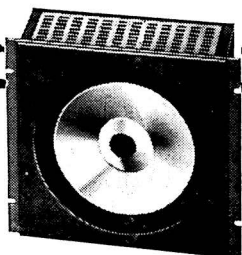
Between Streatham Station and St. Leonard's Church ★ Phone: STReatham 0466 & 0192

*(Please note this is our only address)*

# A NEW SPEAKER SYSTEM OF ASTONISHING PERFORMANCE

the

## JORDAN WATTS



### MODULAR SPEAKER

**THE MOST FUNDAMENTALLY  
CORRECT AND VERSATILE  
INSTRUMENT EVER MADE**

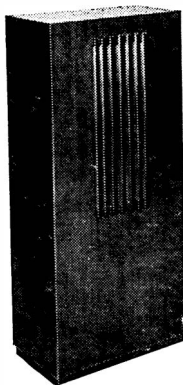
There is one basic loudspeaker of revolutionary design which can be used as a single loudspeaker, or in multiples to suit whatever amplifier power is required. It is in fact the smallest, or the largest, and most perfect sound reproducer in existence, built with watchmaker precision. Systems range from 12W miniature to 50W compact.

*Metal cone, unaffected by water—damp—temperature—insects. Frequency range 20 c/s to 20,000 c/s within  $\pm 6$  dB. Frequency range on axis 35 c/s to 17,000 c/s within  $\pm 3$  dB. Extremely low distortion levels. Polar response superior to any other known loudspeaker. Power handling 12 watts RMS per unit (24 watts U.S.A.)*

### A TRIUMPH FOR HI-FI REPRODUCTION

The Jordan-Watts approach lends itself superbly to the problems of domestic Hi-Fi reproduction because there is no size, power, or acoustic conditions that cannot be accommodated.

★ "The Jordan-Watts 'Building Brick' principle outdates all complex Hi-Fidelity loudspeaker systems—and does so at a fraction of their size and cost."



### SPECIALLY DESIGNED CABINETS

Illustrated is the two speaker cabinet; matching units are available for 1, 2 or 4 speakers.

Enclosure designs available for larger systems.

SEND FOR FULLY ILLUSTRATED AND DESCRIPTIVE LEAFLETS TO:—

WORLD DISTRIBUTORS

Telephone EDGware 5581

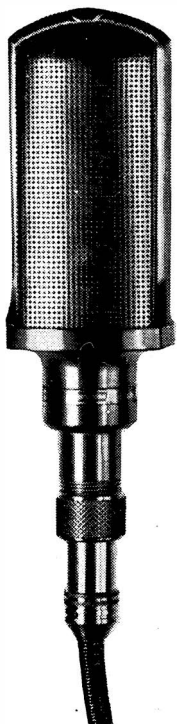
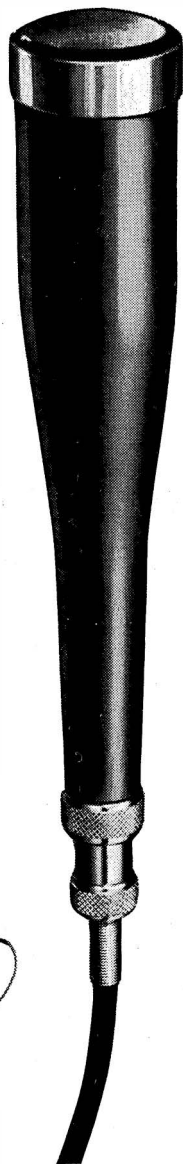
**BOOSEY & HAWKES (SALES) LTD.**  
**SONOROUS WORKS, DEANSBROOK RD., EDGWARE, MIDDX.**  
**MANUFACTURERS OF THE WORLD'S FINEST MUSICAL INSTRUMENTS**

# SUCCESS COMES IN PAIRS!

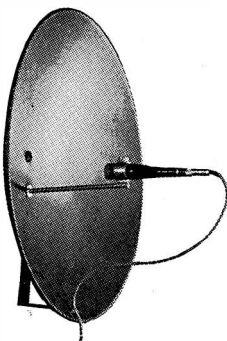
Two highly successful microphones in the Grampian range are the **DP4** and the Grampian ribbon microphone.

Take the **DP4**—enjoying world-wide popularity and usage because it has stood out in its field as wonderfully reliable and sensitive to an extremely wide range of sounds. Extremely versatile, it has a uniform frequency response from 50 to 15,000 c/s and is used by both the amateur and professional in high-quality broadcasting and public address. Low Medium and high impedance models complete with connectors and 18ft screened leads. Medium available.

As successful in its own field, the **Grampian Ribbon microphone** is ideal for studio and high-fidelity use. Two models are available each in three impedance sensitivities. **GR.1** has a semi-cardioid response and gives 10 db suppression to high frequencies at the rear face, being ideal for overcoming feed-back between microphone and speakers. **GR.2** has a figure of eight sensitivity pattern and discriminates against unwanted side-noise in both the vertical and horizontal planes. Available in attractive instrument case, complete with 18ft. screened lead swivel holder and connector.



*The Parabolic Reflector is the ideal partner for the DP4. It enables sound to be concentrated from a distant source onto a focal point—the microphone head. 2ft. dia., aluminium with matt green finish and complete with microphone holder*



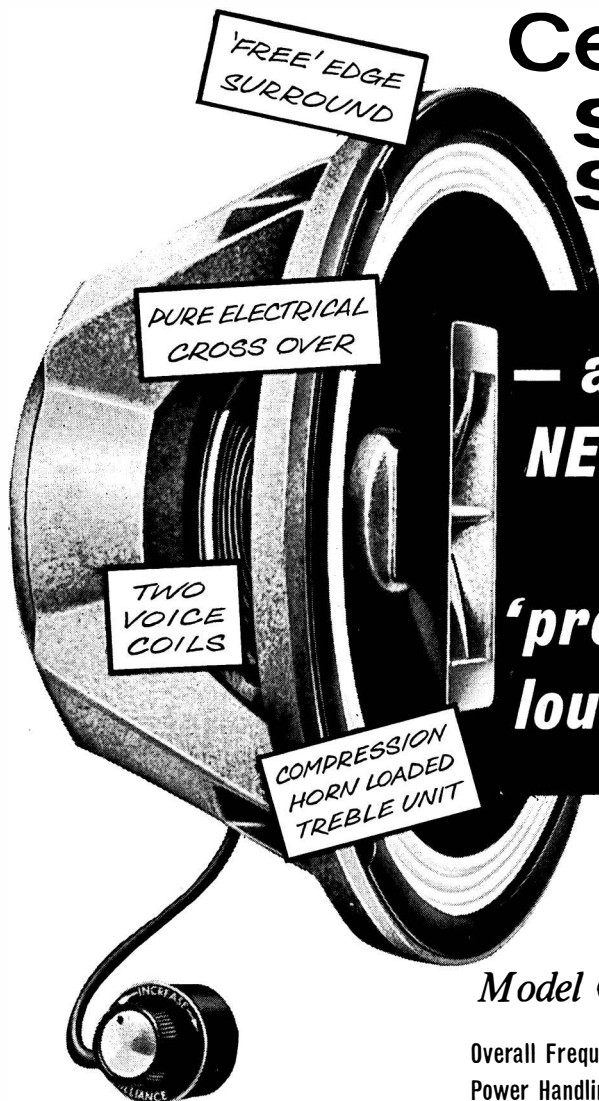
*Fullest details about these and other Grampian equipment from:*

## **Grampian**

**GRAMPIAN REPRODUCERS LTD**  
Hanworth Trading Estate, Feltham, Middlesex. Feltham 2657



# Celestion STUDIO SERIES



'FREE' EDGE  
SURROUND

PURE ELECTRICAL  
CROSS OVER

TWO  
VOICE  
COILS

COMPRESSION  
HORN LOADED  
TREBLE UNIT

— an entirely  
**NEW RANGE**  
of  
**'professional'**  
**loudspeakers**

**12" / 20w**

*Model CX2012* **De Luxe**

Overall Frequency Response	30-18,000 c/s
Power Handling Capacity	20 watts
Fundamental Resonance	35 c/s
Cross-Over Frequency	4 k/s
Impedance	15/16 ohms

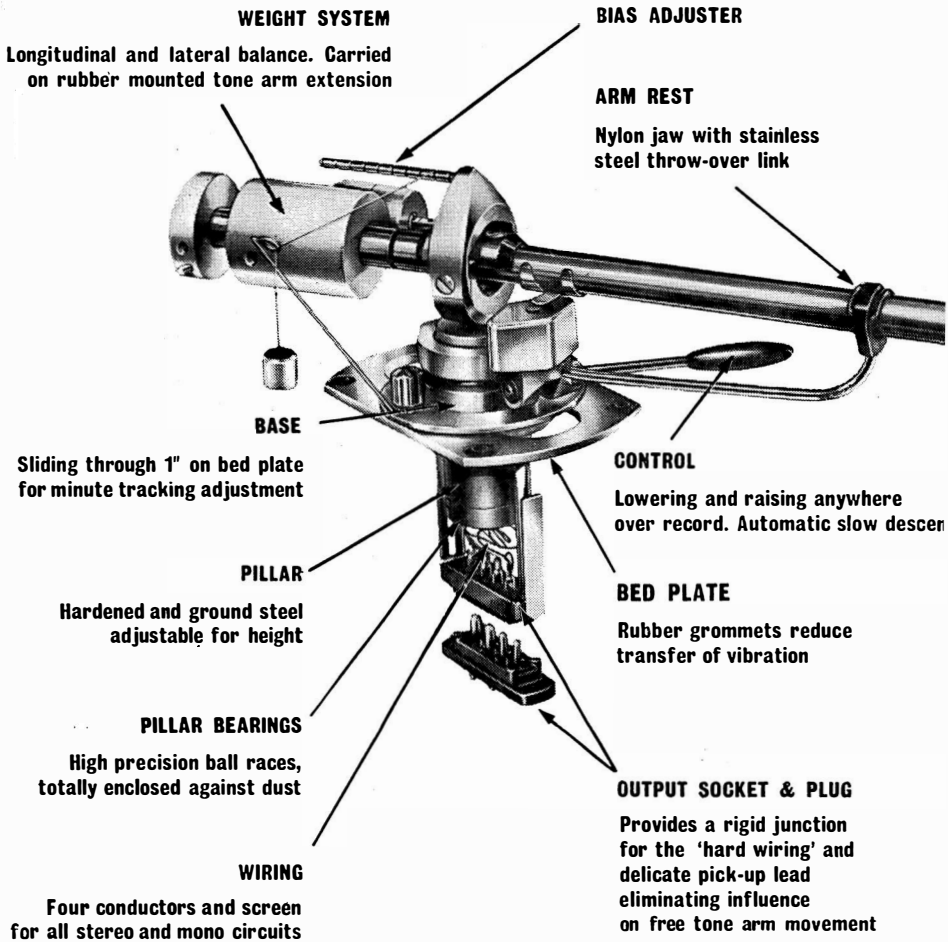
*Send for leaflets on the 12" Co-axial Models and the latest developments in the range.*

'Brilliance' control provides adjustment of High Frequency level to suit room conditions.

## Celestion

# STUDIO SERIES

CELESTION LTD. Thames Ditton, Surrey. EMBerbrook 3402

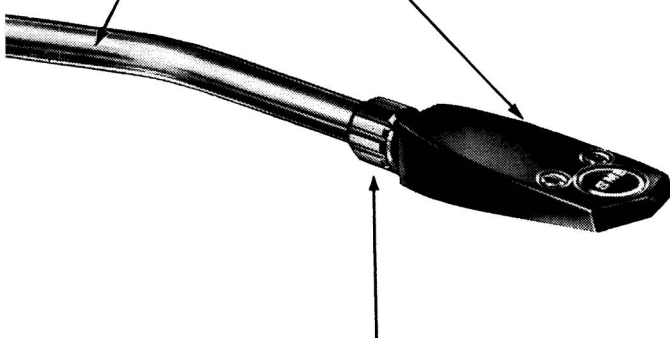


**TONE ARM**

Carried on virtually frictionless knife edges  
Resonance damped by wood lining

**SHELL**

Suitable for all standard cartridges  
Screw fixings at  $\frac{1}{2}$ " centres



International standard 4-pin socket  
(Suitable for Ortofon etc.)  
Also Decca with S.M.E. adaptor D.2.

*The best pick-up arm in the world*

# **The STEREO MASTER**

## **Ultimate in Tape Recorders from the Birthplace of the Art.\***

\* Denmark was the birthplace of Vaidemar Poulsen, the father of present-day magnetic recording techniques.



## **The Recorder of the Year**

### **A certain best seller . . . . .**

This Recorder has every possible facility combined with elegance, lightness and a High Fidelity performance. Available in an attractively styled teak cabinet (as illustrated) or as a suitcase model (weight only 33 lbs.). Both types available as 2 or 4 track models.

Other features include:—

Stereo or Mono ■ 8 watts per channel ■ 3 speeds

Mixing, monitoring, echo etc. ■ Separate record and replay heads

Separate record and replay amplifiers ■ Synchronous motor

Further details from:—

**AUDIO DIVISION**

**AVELEY ELECTRIC LTD. SOUTH OCKENDON, ESSEX**

TELEX: 24120 AVEL OCKENDON

TELEPHONE: SOUTH OCKENDON 3444

**ARE YOU IN THE KNOW?**

**YES - IF YOU VISIT**

**REGENCY ! ! !**

QUAD LEAK ROGERS CHAPMAN BRYAN  
TRIO EAGLE SCOTT DULCI ARMSTRONG

**HEAR THEM ALL AT REGENCY**

REFLECTOGRAPH VORTEXION SONY LUXOR  
GRUNDIG PHILLIPS STELLA BUTOBA  
SIEMENS FI-CORD SANYO TRUVOX  
LOEWE-OPTA TELEFUNKEN TANDBERG  
ELIZABETHAN ROBUCK

**OVER 100 RECORDERS**

**ALL IN STOCK AT REGENCY**

ACOUSTICAL LEAK GOODMAN'S WHARFEDALE  
STAN KELLY KEF LOWTHER

**And All The Components You Could Ever Want**

**AT REGENCY**

*TAPE TO DISC—WHILE YOU WAIT! Private Recordings*

**FOR SOUND IN THE MIDLANDS**

*VISIT*

**REGENCY ELECTRONICS LTD.**

**29 REGENT STREET, LEAMINGTON SPA**

Telephone: 22590

**Cabinets custom-built to suit your decor—expert advice  
with pleasure.**

**LARGE DISPLAY AND DEMONSTRATION ROOMS**

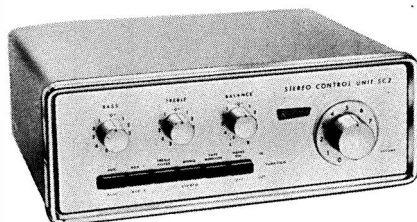
**“AT HOME” EVENINGS**

**“IF IT'S SOUND — IT'S REGENCY”**

# ARE YOU INTERESTED IN EQUIPMENT

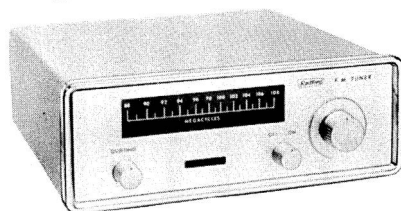
HAVING: SUPERB FINISH  
HIGHEST ATTAINABLE RELIABILITY  
WORLD'S FINEST PERFORMANCE  
SPECIFICATION—?

## PREAMPLIFIERS



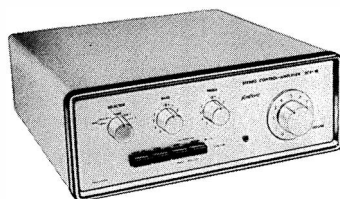
SC 2  
SC 5  
SC 6

## FM TUNER



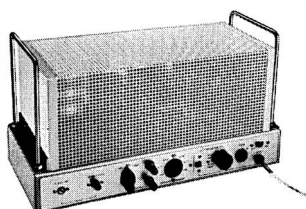
FMT 1

## INTEGRATED TRANSISTOR AMPLIFIER



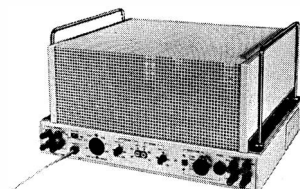
SC4-10

## MONO POWER AMPLIFIERS



IMA 15  
IMA 25

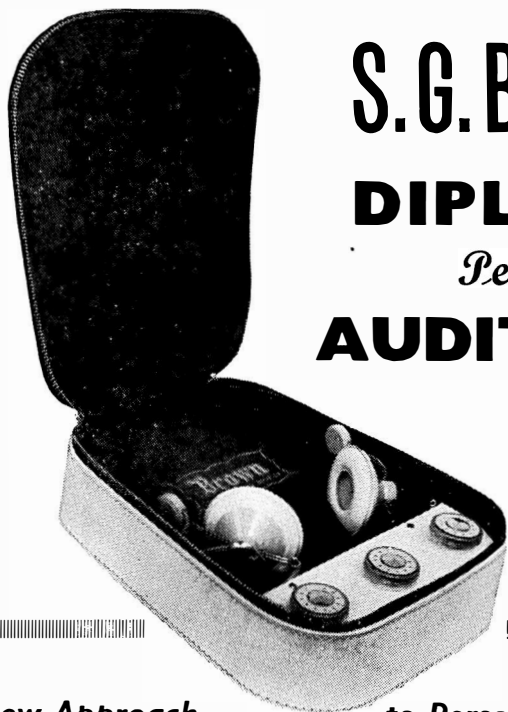
## DUAL POWER AMPLIFIERS



STA 15  
ISTA 15  
ISTA 30  
ISTA 60

AND OTHER INTERESTING ITEMS

**RADFORD ELECTRONICS LTD.**  
ASHTON VALE ESTATE, BRISTOL 3 Tel.: 662301/2



# S.G. Brown's DIPLOMAT *Personal* AUDITORIUM

## A New Approach . . . to Personalised Listening !

The DIPLOMAT Personal AUDITORIUM is your reservation to any seat at the performance, a new and fascinating approach to personalised listening in the home. It provides the ultimate in musical appreciation, which can be enjoyed by any member of the family.

You can enjoy a full symphony without disturbing the rest of the family . . . be carried away into a world of your own choosing without leaving the fireside.

The Diplomat headset has been developed to provide a lightweight and attractive instrument of advanced design—using new ceramic PIEZO—electric transducers. These possess an excellent response over a wide range of audio frequencies.

To extract the full benefit from these, the headset is teamed with a control unit, housed in a most attractive zip-topped carrying case. This provides control of parameters which are of prime importance for high fidelity reproduction particularly in the case of stereophonic equipment. It provides the following control facilities:

- (a) Independent control of sound level for each earpiece, providing balance and level adjustment on stereophonic and monophonic listening.
- (b) Channel mixing on stereophonic, which is essential when listening on headphones, if the full potentialities of such recordings are to be realised. The mixing control has a very wide range of adjustment and will give monophonic, true stereophonic, or two channel listening, as desired. The mixing control is only operative on stereophonic systems.
- (c) Switched selection of input impedance, giving matching to 15 ohms or 600 ohms per channel on stereophonic or 7.5, 30, 300 or 1200 ohms on monophonic depending upon method of connection, since the two channels can be wired in series or parallel when connected to monophonic equipment.

The Headset is exceptionally well engineered and elegantly styled, and has a general colour scheme of smoke grey. A 5ft. length of 4-way flexible cable is fitted for connection to the main equipment.

### PERFORMANCE

Frequency Response 20-17,500 c/s.  
Normal Input Signal 3.5 volts RMS for 95 Dbs. S.L. for less than 1% distortion.

Maximum undistorted Level 80Vs RMS. produces 120 Dbs SL for less than 3% distortion.

Input Impedance 15 ohms or 600 ohms per channel.

Normal Input Power 30 milliwatts.

Dimensions Approx 11" x 9" x 3½".

Case colours Black, Pigskin, Ivory.

Price: 15 gns.



S. G. BROWN LTD. KING GEORGE'S AVENUE,  
WATFORD, HERTS.

Telephone: Watford 23301 Grams: Radiolink,  
Watford · Telex: 23412 Radiolink Wtfd.



A  
HAWKER SIDDELEY  
COMPANY

---

# JEFFREYS — AUDIO HOUSE

## EDINBURGH

SCOTLAND'S LEADING HI-FI STOCKIST

### AMPLIFIERS

QUAD  
LEAK  
ROGERS  
ARMSTRONG

### TUNERS

QUAD  
DULCI  
ROGERS  
LEAK  
ARMSTRONG

### MOTORS AND PICK-UPS

GARRARD  
LENCO  
CONNOISSEUR  
DECCA  
E.M.I.  
ORTOFON

### TAPE RECORDERS

FERROGRAPH  
STELLA  
VORTEXION

Our Experienced Sales  
Staff is at your Disposal

---

# CRAIGHALL RECORDING STUDIOS

ONE OF BRITAIN'S FINEST

Private and Commercial Session Work

Tape to Disc Transfer Service

Acetate Master Cutting Service

Send for full details and charges

**JEFFREYS, 6-8 BREAD STREET, EDINBURGH 3**

Tel: FOU 8389

Hours: 9 a.m. to 6 p.m. Weds. 1 p.m.

Studios: 68 Craighall Road, Edinburgh 6. Tel: GRA 3685

---



no other portable  
tape recorder  
so versatile . . .



## UHER 4000 REPORT-S

PRICE  
**93**

GUINEAS  
Inc. microphone  
and L.P. Tape



Two tracks to international standard ■ reel size: up to 5" ■ four tape speeds:  $7\frac{1}{2}$  ips,  $3\frac{3}{4}$  ips,  $1\frac{7}{8}$  ips,  $\frac{3}{8}$  ips ■ frequency response ( $\pm 3$  db): 40-20,000 cps at  $7\frac{1}{2}$  ips, 40-17,000 cps at  $3\frac{3}{4}$  ips, 40-10,000 cps at  $1\frac{7}{8}$  ips, 40-4,500 cps at  $\frac{3}{8}$  ips ■ contrast ratio: 55db ■ wow and flutter:  $\pm 0.15\%$  at  $7\frac{1}{2}$  ips (audible frequencies only) ■ output power: 1 watt (push-pull power stage) ■ power supply: five flashlight cells (1.5 volts each) or "dryfit" storage battery model Z 211 or model UHER Z 111 mains-operated power unit and battery charger or an automobile battery via automobile adaptor cable ■ inputs: Micro 0.1 mV at approx. 2k $\Omega$ ; Radio 1 mV at 47k $\Omega$ ; Phono 25 mV at 1 megohm ■ outputs: 2 volts at 4 ohms; 1 volt at 15k $\Omega$  ■ operating time: intermittent operation of approx. 12 hrs; continuous operation and intermittent operation respectively from the "dryfit" storage battery —approx. 10 hrs. ■ dimensions approximately: 11" x 8" x 3" ■ weight without batteries approximately 6lbs.

Ask your dealer to demonstrate or write for further information to:

**BOSCH LIMITED Domestic Appliance Division**

205 Gt. Portland Street, London W.1 Telephone LANgham 1809

LOEWE  OPTA

# Hi-Fi

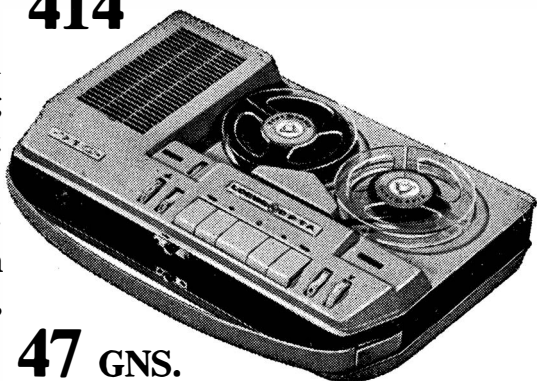
## Tape Recorders



**FOR PERFECTION IN SOUND**

### OPTACORD 414

With the first-ever high frequency motor ensuring long life and constant speeds. Unsurpassed for a portable tape recorder. Single speed  $3\frac{3}{4}$  i.p.s. Twin Track. For use on mains, batteries and car batteries.



**47 GNS.**

### OPTACORD 414 DIA

As the OPTACORD 414, with built-in Synchronisation to couple with any Automatic Slide Projector

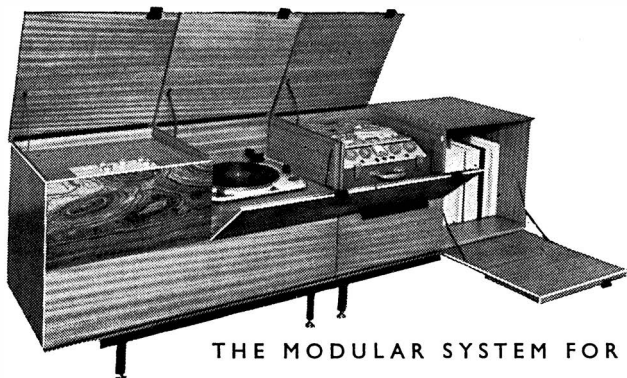
**57 GNS.**

## THREE-IN-ONE Mains · Batteries · Car Batteries

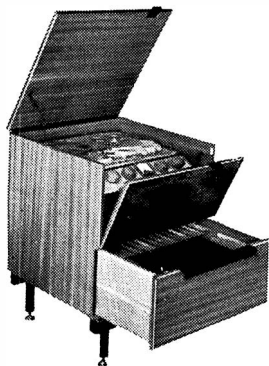
*See the complete range at our showrooms—or write for fully descriptive and illustrated brochure.*

**HIGHGATE ACOUSTICS**

71/73 GT. PORTLAND STREET, LONDON, W.1  
Telephone: MUSEum 2901-6



## THE MODULAR SYSTEM FOR HI FI



Here is a pleasing way to house your hi fi equipment. Add to your cabinets as you add to your equipment and gradually build up to a complete, uniform and compact system. Outside dimensions of all cabinets 20" x 20" x 20". All units are finished in attractive Rosewood and Mahogany.

The Tape Recorder cabinet has "pull-out" drawer for tape storage.

RECORD CABINETS 12 gns.

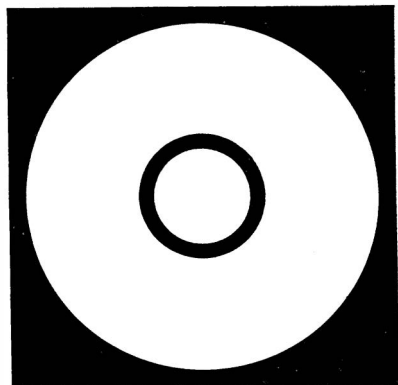
TAPE CABINETS 16 gns.

DOUBLE CABINETS 25 gns.

SINGLE LEG FRAME £3.0.0.

DOUBLE LEG FRAME £3.10.0.

Matching speakers available 22 gns complete with unit.



created and supplied by **Musicraft**

13 KING ST. RICHMOND, SURREY Richmond 6798  
 also at 20-22 HIGH ST., SOUTHALL, MIDDX. Southall 3828  
 Equipment by Quad, Leak, Rogers, Pye, Garrard, Revox,  
 Ampex, Brenell, etc.

**SPECIALLY APPOINTED AGENTS  
 FOR ALL RADFORD EQUIPMENT**

**SHEEN TAPE RECORDER AND HI-FI CENTRE** have three very good reasons why enthusiasts should consult them on any sound problems . . .



LEONARD G. FRANCIS . . . *A dynamic personality who has only one thought in mind when you enter his CENTRE . . . to satisfy your every want . . . whether it be sales, service or just a browse . . . his friendliness will put you at ease at once assisted by . . .*



JOHN P. KRAILING *a brilliant young technician will handle any of your service troubles "on the spot" if necessary . . . his know how is at your disposal with of course the usual SHEEN TAPE RECORDER AND HI-FI CENTRE courtesy.*



LEN FREEMAN . . . *not just a salesman but a keen enthusiast himself . . . who has been all his career in the sound business . . . he makes your problems a pleasure anytime anywhere.*

Friendly Help—Sales—Service.  
Approved Dealer for all Models & Repairs.

There is a very wide range of equipment and accessories at the Sheen Centre, the following are just a few . . .

Approved HEATHKIT stockists

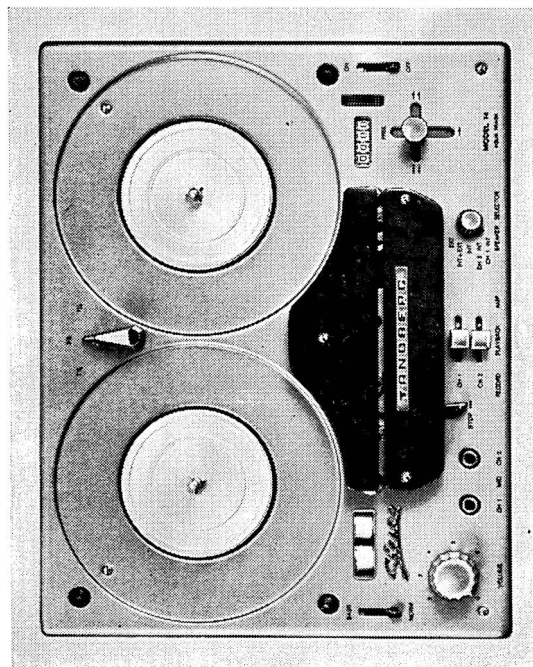


LOCKWOOD enclosures  
a speciality always on  
Demonstration

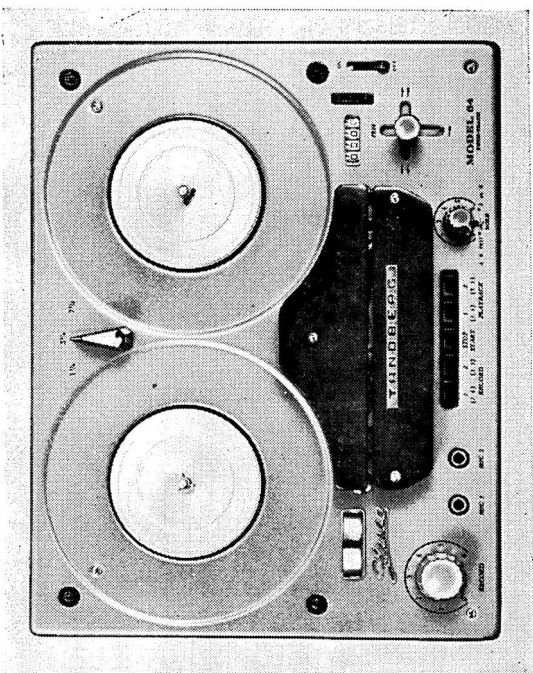
Philips	Grundig	Cossor	Stella
Sherwood	Telefunken	Truvox	A.K.G.
Luxor	Sanyo	Rogers	K.E.F.
Grampion	Vortexion	Reslo	
Revox	WyndSOR	Armstrong	Jason
Sony	Stuzzi	Pye	Garrard
Akai	Uher	Quad	Goldring
Tandberg	Fi-Cord	Leak	Thorens
Ferrograph	Butoba	Goodmans	Decca
Brenell	Loewe-Opta	Stentorian	Ortofon
Record Housing	Cabinets	Wharfedale	Tannoy

**SHEEN TAPE RECORDER AND HI-FI CENTRE**

8 Station Parade, Sheen Lane, S.W.14. Prospect 0985. 10 a.m.—7 p.m. everyday  
except Weds. 1 p.m.



Series 7 stereo tape recorder (2 or 4 track) 93 GNS.



Series 6 stereo tape recorder (2 or 4 track) 110 GNS.

# Tandberg

*For further information please write:—*

**Elstone Electronics Ltd., Edward Street  
Templar Street, Leeds 2  
Telephone 35111 (7 lines)**

# Emitape

magnetic recording tape—  
the finest in the world

Emitape	TYPE No.	SPOOL SIZE	APPROX. LENGTH Feet	PLAYING TIME PER TRACK				PRICE	
				½ IPS	1½ IPS	3½ IPS	7½ IPS		IN EMICASE
<b>100</b> extra-thin double-play tape. 100% more recording time than standard	*100/3	3"	400	1 25 20	42 40	21 20	10 40	17.0	—
	100/6	4"	600	2 8 0	1 4 0	32 0	16 0	£1. 5.0	—
	100/12	5"	1200	4 16 0	2 8 0	1 4 0	32 0	£2. 2.0	—
	100/18	5½"	1800	6 24 0	3 12 0	1 36 0	48 0	£2.15.6	—
	100/24	7"	2400	8 32 0	4 16 0	2 8 0	1 4 0	£3.17.6	—
<b>99</b> long-play tape on thin base. 50% more recording time	*99/3	3"	250	53 20	26 40	13 20	6 40	9.6	—
	99/4	4"	450	1 36 0	48 0	24 0	12 0	14.6	—
	99/9	5"	900	3 12 0	1 36 0	48 0	24 0	£1. 8.0	£1.10.6
	99/12	5½"	1200	4 16 0	2 8 0	1 4 0	32 0	£1.15.0	£1.17.6
	99/18	7"	1800	6 24 0	3 12 0	1 36 0	48 0	£2.10.0	£2.12.6
	99/24	8½"	2400	8 32 0	4 16 0	2 8 0	1 4 0	£3.12.6	—
<b>88</b> standard-play tape, maximum durability for general use	*88/3	3"	175	37 20	18 40	9 20	4 40	7.6	—
	88/4	4"	300	1 4 0	32 0	16 0	8 0	10.6	—
	88/6	5"	600	2 8 0	1 4 0	32 0	16 0	£1. 1.0	£1. 3.6
	88/9	5½"	900	3 12 0	1 36 0	48 0	24 0	£1. 8.0	£1.10.6
	88/12	7"	1200	4 16 0	2 8 0	1 4 0	32 0	£1.15.0	£1.17.6
	88/18	8½"	1800	6 24 0	3 12 0	1 36 0	48 0	£2.17.6	—
<b>44</b> acetate standard- play tape	*44/3	3"	175	37 20	18 40	9 20	4 40	6.9	—
	44/6	5"	600	2 8 0	1 4 0	32 0	16 0	18.0	—
	44/9	5½"	850	3 1 20	1 30 40	45 20	22 40	£1.4.6	—
	44/12	7"	1200	4 16 0	2 8 0	1 4 0	32 0	£1.10.0	—

The above figures are calculated times, and do not allow for slow- or fast-running motors or mechanical variations, etc.

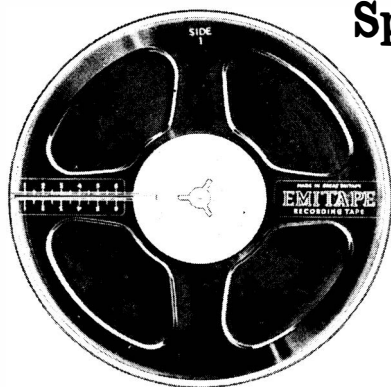
\*Also available on 3½" reels, same length and price. Add /N to the Type No.

Emitape 100 and 99 are recommended for 4-track and slow-speed operation.



E.M.I. TAPE LIMITED. HAYES, MIDDLESEX. TELEPHONE: HAYES 3888

# Special Emitape features



- \* Anti-static
- \* High sensitivity
- \* Low 'print-through' factor
- \* P.V.C. leader and trailer strip fitted to all but 'Message' spools
- \* In spool sizes for all tape recorders
- \* Metallic 'Auto Stop' foil fitted to all 44, 88 and 99 spools except 'Message'

## Emitape Accessories

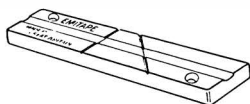
### JOINTING COMPOUNDS

AP 35 for C.A.-base Tape and  
AP 77 for P.V.C.-base Tape



Special jointing fluid to make a permanent welded joint when splicing either P.V.C. or cellulose acetate base magnetic recording tape. 7/6

### EMITAPE JOINTING BLOCK AP 123



The exclusive undercut channel holds the tape fast, enabling it to be cut cleanly at an angle of 45° or 90°. 10/6

### EMICASE

Polystyrene container. Solves storage problems, protects spools from dust and allows easy identification of leader tapes. 7" — 4/-, 5½" — 3/6, 5" — 3/6



### NON-MAGNETIC SCISSORS AP 39



These scissors, made from non-ferrous metal, enable recorded tape to be cut for splicing or editing purposes without magnetising the tape. This ensures a silent joint. 16/-

### P.V.C. LEADER TAPES AP 38/1 TO 38/6

With this range of coloured tapes, colour code references can be inserted for quick identification and indexing purposes in a reel of recorded tape. Colours: White, Red, Yellow, Blue, Orange, Green. 4/6 a reel.



### JOINTING TAPE

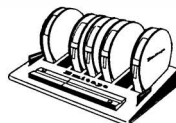
Specially prepared adhesive jointing tape for simple and quick splicing and editing of magnetic recording tape. AP 102 (7/32") 4/9. AP 103 (½") 7/6.



### METALLIC STOP FOIL AP 125

Sufficient for 50 tapes. In handy plastic container. 6/6

### ACCESSORY KIT AP 124

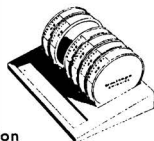


Holds 3 spools of leader, 1 spool of jointing tape, 1 spool of stop foil, Emitape jointing block, 2 cutters and full instructions. Packed in a plastic rack (room for 7 spools). Specially designed for the workbench. 37/6

### EMPTY PLASTIC SPOOLS IN CARTONS

AP 93 3"	...	...	3/-
AP 93N 3½"	...	...	3/-
AP 84 4"	...	...	3/6
AP 85 5"	...	...	4/-
AP 86 5½"	...	...	4/6
AP 87 7"	...	...	5/-
AP 88 8½"	...	...	8/6

### EMIGUIDES



6 demonstration tapes that pave the way to better recording.

- No. 1—Getting the Quality Right
  - No. 2—Microphone Technique
  - No. 3—Tape Editing
  - No. 4—Outdoor Recording
  - No. 5—Trick Recording and Sound Effects
  - No. 6—Producing Feature Tapes
- Set of 6 (in plastic rack) 51/-.  
Available separately 8/6 each.

ET89



E.M.I. TAPE LIMITED · HAYES · MIDDLESEX · TELEPHONE: HAYES 3888



## THIS IS RIDICULOUS Are we the only people who make Hi-Fi cabinets?

Public response leads us to believe that we are. We can indeed supply cabinets to suit every taste —tailor-made or "off the peg"—but remember that we also specialise in Hi-Fi equipment. Our expert staff are eager to help you find the equipment best suited to your home. Our showrooms and comparator make selection from our comprehensive range both easy and enjoyable.

Come to **LARGS** — *THE* centre for Hi-Fi

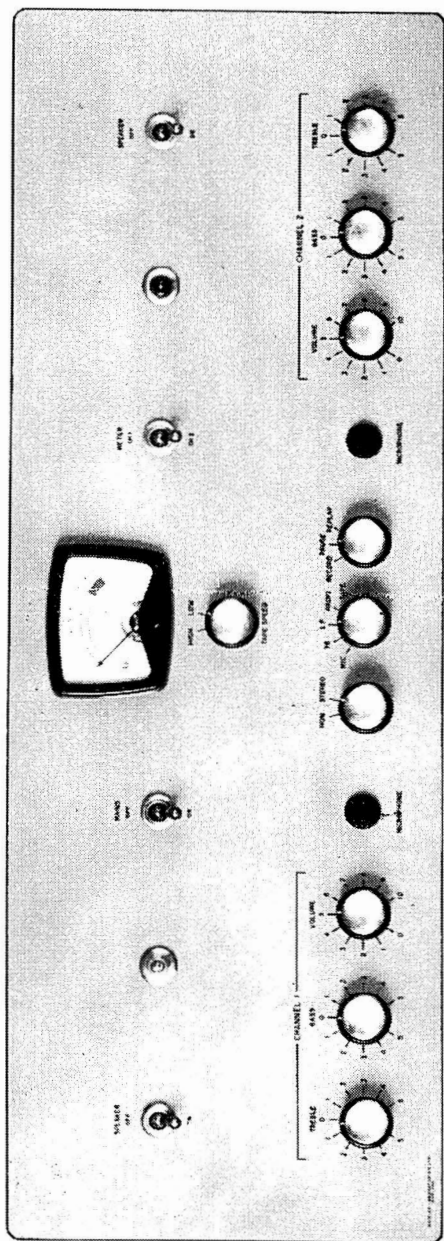
# LARGS

*of Holborn* for High Fidelity

76-77 High Holborn, London, W.C.1.

Telephone CHAncery 2626 (Private Branch Exchange).





TWA 1515

# SHIRLEY

LABORATORIES LTD

3 PROSPECT PLACE · WORTHING · SUSSEX

ELECTRONIC & ACOUSTIC ENGINEERS & CONSULTANTS

TELEPHONE WORTHING 30536

Write now for details of the TWA/1515 and other monaural and stereosonic equipment in the range, at prices from 22 gns.

# ADVERTISERS' INDEX

	<i>Page Front Cover</i>		<i>Page</i>
ACOUSTICAL MFG. CO. LTD. .. ..		GEORGE JEFFREY LTD. .. ..	304
AGFA LTD. .. ..	246	LARGS OF HOLBORN .. ..	312
ARMSTRONG AUDIO LTD. .. ..	292	LANSING .. ..	262
ASSOCIATION OF PROFESSIONAL RECORDING STUDIES .. ..	249, 250, 251	LASKYS RADIO .. ..	278
AUDIO SERVICES (HI-FI) LTD. .. ..	280	H. J. LEAK & CO. LTD. .. ..	264, 265
AVELEY ELECTRIC LTD. .. ..	300	LIVINGSTONE LABORATORIES LTD. .. ..	252
AUDIOSON LTD. .. ..	258, 259	METRO-SOUND (SALES) LTD. .. ..	288, 289
B.A.S.F. CHEMICALS LTD. .. ..	257	MODERN ELECTRIC (RETAIL) LTD. .. ..	272
BOSCH LTD. .. ..	305	MUSICRAFT LTD. .. ..	307
BOOSEY AND HAWKES LTD. .. ..	295	PHILIPS ELECTRICAL LTD. .. ..	273
BRENELL ENGINEERING CO. LTD. .. ..	279	POLITECHNA (LONDON) LTD. .. ..	266, 267
S. G. BROWN LTD. .. ..	303	PYE LTD. .. ..	291
COSMOCORD LTD. .. ..	261	RADFORD ELECTRONICS LTD. .. ..	302
DAYSTROM LTD. .. ..	274, 275	REGENCY ELECTRONICS LTD. .. ..	301
THE DERRITRON GROUP. .. ..	285	R. E. W. EARLSFIELD .. ..	256
DESIGN FURNITURE LTD. .. ..	268	S.M.E. LTD. .. ..	298, 299
E.M.I. TAPE LTD. .. ..	310, 311	SAGA RECORDS LTD. .. ..	Back Cover
E.M.G. HANDMADE GRAMOPHONES LTD. .. ..	290	SHEEN TAPE RECORDER CENTRE .. ..	308
ELECTRO ACOUSTIC INDUSTRIES LTD. .. ..	284	SHIRLEY LABORATORIES LTD. .. ..	313
ELSTONE ELECTRONICS LTD. .. ..	309	SHURE ELECTRONICS LTD. .. ..	276
FICORD INTERNATIONAL .. ..	269	A. R. SUGDEN & CO. LTD. .. ..	286
FRANCIS OF STREATHAM .. ..	294	TANNOY PRODUCTS LTD. .. ..	254
GARRARD ENGINEERING AND MFG. CO. LTD. .. ..	255	TELLUX LTD. .. ..	270, 271
GOLDRING MFG. CO. LTD. .. ..	282, 283	UNIVERSITY AUDIO .. ..	287
GRAMPIAN REPRODUCERS LTD. .. ..	296	VORTEXION LTD. .. ..	281
C. E. HAMMOND LTD. .. ..	244	C. E. WATTS LTD. .. ..	253
HI-FI BOOKS .. ..	260	WEBBS RADIO .. ..	256
HIGHGATE ACOUSTICS LTD. .. ..	306	WELMEC CORPORATION LTD. .. ..	263
ALFRED IMHOF LTD. .. ..	293	WHARFEDALE WIRELESS WORKS LTD. .. ..	248
		WHITELEY ELECTRICAL RADIO CO. LTD. .. ..	277

## NOTES

---

# NOTES

---

## NOTES

---

## NOTES

---

# This

## DANKWORTH and THE LONDON PHILHARMONIC



## COLLABORATION!

SEIBER-DANKWORTH : IMPROVISATIONS  
for Jazz Band & Symphony Orchestra  
STRAVINSKY : EBONY CONCERTO  
SALZEDO-LINDUP : RENDEZVOUS  
for Jazz Band & Symphony Orchestra

SAGA

STG 8059 STE 3053 (stereo)



STG 8063



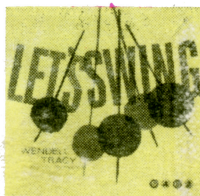
STG 8043

STE 3052 (stereo)



STG 8092

STE 3010 (stereo)



STG 8060

STE 3063 (stereo)



STG 8022

STE 3005 (stereo)



STG 8090

STE 3008

is a     tape record.

For those discriminating music-lovers who seek and value the original sound—Saga tape records are the answer. More permanently recorded, more precisely recorded, Saga tape records are the hi-fi devotee's only satisfactory answer. Saga tape records, mono (3½ i.p.s. and stereo 7½ i.p.s.) are the commonwealth's most accepted tape records.

Ask your nearest retailer for a SAGA tape catalogue.

Ask for     by name

SAGA RECORDS LIMITED, 127 KENSAI ROAD, W.10