

JUNE 1967

2¹/₂

TAPE

RECORDING MAGAZINE

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LOOKING AT
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The Art of
Microphone Placing

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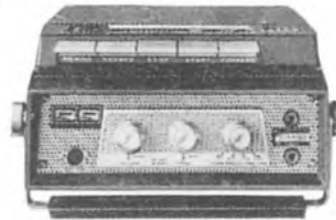
THE Centre for AKAI

● These superb machines are all immediately available from us on INTEREST FREE TERMS.



AKAI 1710

Fabulous 4-track stereo machine, completely self-contained. Two 7" x 5" built-in speakers, freq. response 40-18000 c.p.s., 5W. per channel output. Combining advanced specification, with clean modern styling and Akai precision finish. **79 gns.** deposit £27.19.0 and 12 monthly payments of £4.11.8.



AKAI X4

Fully transistorised stereo/mono battery/mains portable recorder. 4-track; 4-speeds; Crossfield heads; superb low-speed frequency response. Mains-rechargeable battery. 5" reels. Weighs only 11.2lb. **131 gns.** Deposit £47 11s. 0d., 12 monthly payments of £7 10s. 0d.



AKAI 910

A mono recorder, available in 4 or 2-track form. Clean practical styling; 2 speeds; 3.2 watts output. Built in P.A. system and mixing facilities. **67 gns.** Deposit £22 2s. 0d., 12 monthly payments of £3 11s. 8d.



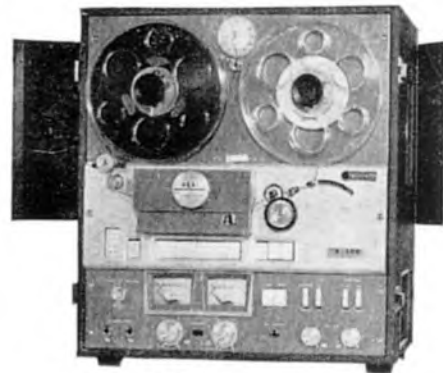
AKAI X300

A studio type 3-speed 4-track stereo/mono recorder of professional quality. Fully solid state. 20 watts per channel amplifier; Crossfield heads; 10 1/2" reels; keyboard controls, and many other features. **190 gns.** Deposit £66 10s. 0d., 12 monthly payments of £11 1s. 8d.



AKAI M8

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AKAI X355

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At the Audio Fair they all said these are the best value for money

Why not listen to the evidence?

Don't settle for insipid sound any more. Rush to your dealer for a demonstration of these top-value machines. You'll hear every exciting high note, every resounding low note. No doubt your dealer will enthuse about the renowned Telefunken specifications, but you've got the real proof . . . the evidence of your own ears.



M.300

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TELEFUNKEN



M.204E

It's got everything. 4 tracks, stereophonic record and playback, with ample volume for every occasion from an output of 6 watts per channel. Full mixing and transcription facilities. Operates either vertically or horizontally. Fully transistorised, separate level controls and VU meters for each channel. Frequency response up to 18000 c/s. Complete with reel of tape, audio lead and empty reel. *106 gns.

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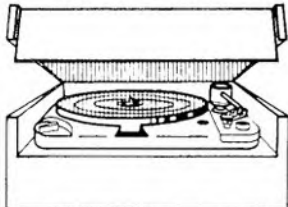
THIS IS IT!



system 20 by Wharfedale

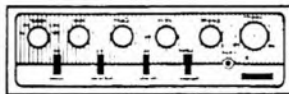
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standards that will satisfy the most critical professional but it is simplicity itself to operate.

SYSTEM 20 comprises:

Wharfedale WHF-20 transistorized stereo amplifier (20 watts per channel).

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A hi-fi, fully transistorised stereo record & playback system

Features:

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- *BASS & TREBLE Tone Controls.
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- *INTERNATIONAL CONNECTORS i.e. Phono and DIN and Standard Jack Sockets.
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- *INTERNAL SPEAKERS.

Specification:

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Power Consumption: 58-100 Watts
Recording System: 4 or 2 track stereo
Tape Speeds: 7½ ips, 3¾ ips, 1¾ ips.
Speed Tolerance: Better than 1.5%
Reels: 7" Max.
Internal Loudspeakers: Two 7" x 4" Goodmans 2 x 3 Watts
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 7½ ips: Better than .15%

3¾ ips: Better than .2%
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Signal/noise Ratio:

4 track 55 dB
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At max. recording level
 Recording Amp: 0.5%
 Playback Amp: 2 x 10 Watts 0.5%

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Power Amp. 10 Watts per channel, continuous power.

Pre Amp: 5 K ohm/0.75V

Centre Channel: 50 m1W (3.3V over 200 ohm)

Input Impedance & Sensitivity (Max. Volume):

Mike: 2 x 200 ohm/0.15V

2 phono contacts per channel:

High level: 1 M ohm/75mV.

Low level: 0.1 M ohm/7.5mV.

2 x 5 pin DIN contact:

High level (Phono)

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Dimensions and Weight:

Cabinet model: 15¾" x 7½" x 11¾" 23lbs.

Case model: 15¾" x 7½" x 12" 26.5lbs.

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Series 12, 2 track 105 Gns.

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Please send me full details on the Tandberg

SERIES 12

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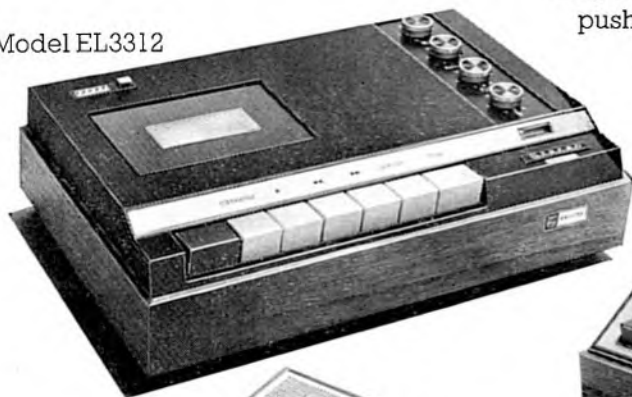
Model EL3301T is a 27 gn play-anywhere battery portable that travels in a carrying case, has simple controls including a remote stop/start switch, and can even be mounted in your car. The 35 gn Mains/Mono Model EL3310 has a teak-finished cabinet, exclusive hinged 'Sound Mirror', Automatic Recording Control

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Model EL3312 is a superb

Mains/Stereo recorder at 48 gns, with two Hi-Fi speakers extra at 10 gns plus 3/1 P.T. surcharge each. All prices cover many useful accessories.

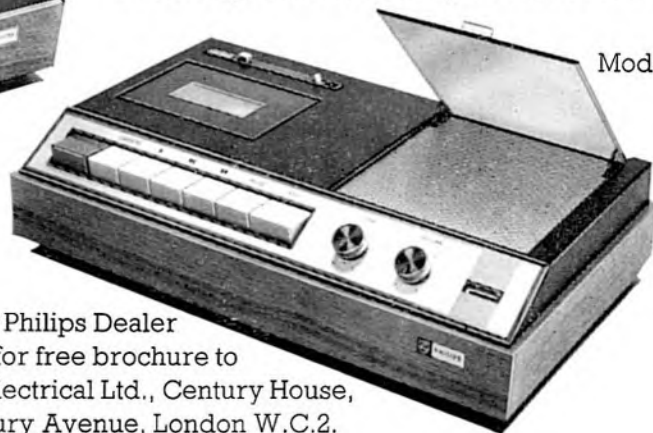
Model EL3312



Model EL3301T



Model EL3310



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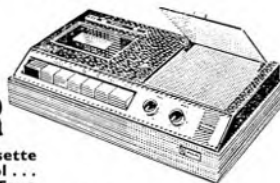
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9 gns. deposit and 12 monthly payments of £1.1s. 6d. Carr., Pkg., Ins., 10/6

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P. and P. 2/9 per order



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Philips 3586	27 gns.
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Stella 472	27 gns.
Telefunken 300	49 gns.
Telefunken 301 4 Tr.	54 gns.
Uher 4000L	103 gns.

*Microphone extra

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Prices subject to alteration as announced by manufacturers

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Hammond Condenser M100	29 gns.
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TRANSISTOR MIXER, TM-1 Kit. £11.16.6



Transistor Stereo Amplifier Kit AA-22U from £39.10.0 less cabinet



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TAPE DECKS from £13.10.0 to £36.15.0



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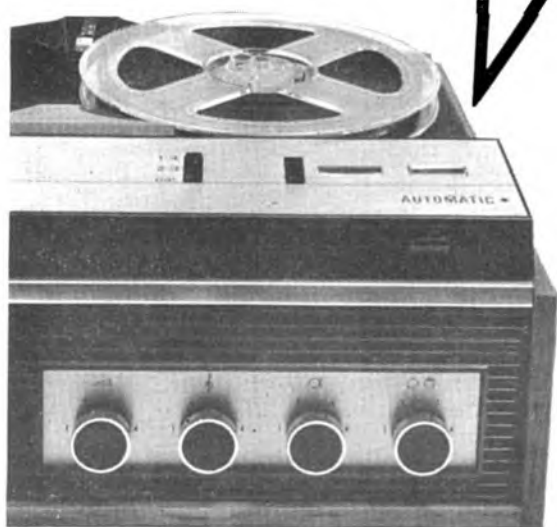
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Full details of Model(s)
 Name
 Address
 (Block capitals please)

T.5

**"Jo mange
 Tu manges
 Il mange
 Nous mangeons
 Vous mangez
 Ils mangent"**



"Eh?"

Many schools now use tape recorders as teaching aids. But while they are very careful about their choice of recorder, they often pay far less attention to the tape they use in it.

Fuzzy tape means fuzzy teaching. And until you've tried Ilford Zonatape on the latest member of your staff, you may not realise what clarity it is capable of.

Zonatape is made to the highest standards—and must pass many searching tests to make sure it comes up to them. Film companies and television studios use little else—which is testimonial enough.

Try Ilford Zonatape. You may well find that the lessons become a good deal clearer to everyone.



Ilford Limited, Motion Picture & Magnetic Products Division,
 201/203 Wardour Street, London W.1.

NEW

Did you hear the 'Ditton 15' at the Audio Fair?

The 'Ditton 15' is Celestion's new 3 element compact loudspeaker enclosure. Although only 1 cubic foot in size, this full-range 15 watt system gives improved bass performance over simple closed boxes because of a new concept in design—ABR (Auxiliary Bass Radiator).

ABR gives the following advantages:

- extended low frequency response down to 30 Hz
- high sensitivity ■ lower distortion

In addition, the 'Ditton 15' employs an entirely new 8" bass unit, plus the famous HF1300 Mark II high frequency unit. See and hear the 'Ditton 15' at your nearest High Fidelity Dealer or complete the coupon below for illustrated leaflet and further details.

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 of Celestion know-how
 and enthusiasm**



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Please send me the 'Ditton 15' leaflet and details of the 'Studio Series' loudspeakers.

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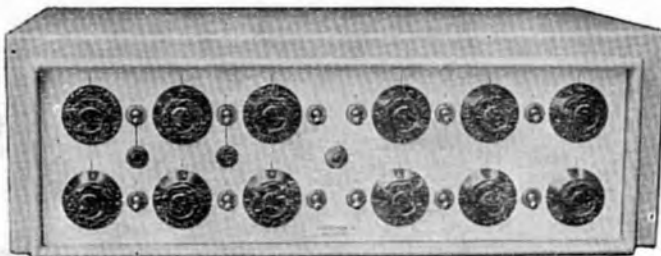
GD818

—Vortexion

12-WAY ELECTRONIC MIXER

quality equipment

The 12-way electronic mixer has facilities for mixing 12 balanced line microphones. Each of the 12 lines has its own potted metal shielded microphone transformer and input valve, each control is hermetically sealed. Muting switches are normally fitted on each channel and the unit is fed from its own metal shielded mains transformer and metal rectifier.



FOUR-WAY ELECTRONIC MIXER

This unit provides for 4 independent channels electronically mixed without "spurious break through," microphone hum and background noise have been reduced to a minimum by careful selection of components. The standard 15-50 ohm shielded transformers on each input are arranged for balanced line, and have screened primaries to prevent H.F. transfer when used on long lines.

The standard 5 valve unit only consumes 18.5 watts. H.T. is provided by a selenium rectifier fed by a low loss, low-field transformer in a screening box. The ventilated case gives negligible temperature rise with this low consumption assuring continuance of low noise figures.

20,000 ohms is the standard output impedance, but the noise pick-up on the output lines is equivalent to approximately 2,000 ohms due to the large amount of negative feedback used.

For any output impedance between 20,000 ohms and infinity half a volt output is available. Special models can be supplied for 600 ohms at equivalent voltage by an additional transformer or 1 milliwatt 600 ohms by additional transformer and valve.

The white engraved front panel permits of temporary pencil notes being made, and these may be easily erased when required. The standard input is balanced line by means of 2 point jack sockets at the front, but alternative 3 point connectors may be obtained to order at the rear.

Mixer for 200-250 V AC Mains	...	...	...	£40 8 6
Extra for 600 ohm output model	...	...	...	£1 18 6
Extra for 600 ohm 1 milliwatt output	...	...	...	£3 0 6
Size 18½ in. wide × 11½ in. front to back (excluding plugs) × 6½ in. high. Weight 22 lb.				

THREE-WAY MIXER and peak programme meter for recording and large sound installations etc.

This is similar in dimension to the 4-Way Mixer but has an output meter indicating transient peaks by means of a valve voltmeter with a 1 second time constant in its grid circuit.

The meter is calibrated in dB's, zero dB being 1 milliwatt-600 ohm (.775 V) and markings are provided for +10 dB and -26 dB. A switch is provided for checking the calibration. A valve is used for stabilising the gain of this unit. The output is 1 milliwatt on 600 ohms for zero level up to +12 dB maximum. An internal switch connects the output for balance, unbalance, or float. This output is given for input for 40 microvolts on 15 ohm.

An additional input marked "Ext. Mxr." will accept the output of the 4-Way Mixer converting the unit into a 7-Way controlled unit. This input will also accept the output of a crystal pick-up but no control of volume is available.

The standard input is balanced line by means of 3 point jack sockets at rear but alternative 2 point connectors may be obtained to order at the front or rear as desired.

The 8 valves and selenium rectifier draw a total of 25 watts.

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TAPE

RECORDING
MAGAZINE

Vol. 11

No. 6

June 1967

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COVER PHOTOGRAPH: A corner of one of the testing rooms at the Wharfedale works in Bradford. The technician is completing production tests on three, 10 in. Bronze speakers by establishing bass resonance, which is then clearly marked on every individual speaker cone. Other testing processes are also marked in the same way so that the history of every single production unit can be seen at a glance. Much of the equipment used in the test rooms has been specially designed by Wharfedale's own engineers.

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Tape trends and tape talk

By Douglas Brown

THE OPPORTUNITY awaited so keenly by so many amateur recording enthusiasts is at hand—in a few named cities, at least. The BBC, now busily setting up the first local radio stations, has indicated that it is extremely interested in the possibilities of co-operation with amateurs.

John Bradley, of the Federation of British Tape Recording Clubs, has been very much on the ball. When the names of the first local stations were announced he was in touch with the BBC immediately. He was invited to meet Mr. A. W. Coysh, Deputy General Manager of Local Radio Development at Broadcasting House, and was given the fullest information about the Corporation's plans.

John Bradley tells the rest of the story in an announcement in the Federation's Summer Bulletin: "The Station Manager would have the services of radio journalists and professional interviewers and could call upon BBC programmes in the 'bank' when the need arose. The main emphasis, however, would be local in approach and this is where the amateur recording enthusiast comes into the picture.

"Material submitted would not normally attract a fee, although it is possible that certain out-of-pocket expenses could be met. . . . If work of first-class quality emerges, further items may well be commissioned and these would attract fees in the normal way."

I would add only two comments to John Bradley's admirable summary. The first is that while it may be helpful for a number of club members or other individuals to co-operate in collecting recorded material, one person only should be put in charge of editing and presentation. No committee ever produced a work of art.

The second is that I suspect a lot of amateurs are going to be disappointed, at least initially, when they discover the difficulty of reaching the standard required by the BBC. But the opportunity is there, it will now be possible for amateurs to measure their efforts against those who get *similar work* broadcast, and I have no doubt that the more talented minority among the amateurs are going to find their work regularly "on the air." (See also *Cross Talk*, page 228.—Ed.).

* * *

THE BBC TAPE RECORDING COMPETITION, already mentioned in this column, is also providing a big opportunity for the amateur. Tapes, not exceeding five minutes, on the theme "On the Move" are invited before September 30, addressed to BBC Tape Recording Competition, Broadcasting House, Piccadilly, Manchester 1.

I am very happy that there is a five-minute limitation. In all the contests I have helped to judge,

I do not recollect a case in which a judge commented that a tape would have been improved had it been longer; on the contrary, very many entries would have been immensely improved by shortening. Nothing is so difficult for the creative artist as the deliberate sacrifice of material which may have been put together with loving care and which has a great personal significance. But anyone who is going to reach professional standards must be prepared to trim and cut and reshape endlessly.

Back to the BBC Contest: there will be a £50 first prize, and a second of £25. There will be an additional prize of £25 for the best entry from a competitor living in the North of England.

In its guidance notes the BBC says: "The object is to find evidence of the imaginative use of the tape recorder and the theme 'On the Move' can be interpreted broadly to cover a great many different subjects, demonstrating character and atmosphere. The judges will look for imagination in the composition of the tape as well as for technical quality; extreme technical skill, unaccompanied by imaginative effort, is unlikely to succeed."

The judges will be the same as those for the first competition last year—Colin Shaw, who is Planning Manager of BBC Television; Timothy Eckersley, Assistant Head of Central Programme Operations (Recording); David Scase until recently Director of Productions at Liverpool Playhouse; and myself.

* * *

BECAUSE I DOUBLE the roles of publisher of this magazine and President of the Federation of British Tape Recording Clubs, it is entirely appropriate that I should be subjected to considerable pressure from local clubs who would like to see their activities fully reported in our pages.

Unfortunately the pressure on our editorial space is so heavy that it is difficult to establish a clear case for publication of any other than news of unique and novel activities—and they, to be brutally frank, are few and far between. The pattern of most club activity is well established.

If your club is really breaking new ground, however, write to me about it and I will see that your ideas are made available to other readers.

We are now preparing a new edition of *Tape Recording Yearbook* and this will contain a full list of club secretaries. Please write the necessary information about your club *on a postcard*, and send it, within the next fortnight, to Tape Recording Yearbook, 14-18 Holborn, London, EC1. In this way you will ensure that any would-be club members in your area will know whom to contact when they consult the standard reference book.

COMPATIBILITY is a subject which has been in the news—and will continue to be in the news—for a very long time. Our multiplex stereo broadcasts, such as they are, are fully compatible. The transmissions can be received and interpreted as a monophonic signal on existing mono equipment. Similarly, colour television will be compatible, meaning that reception by a black and white receiver will give a black and white picture, although a colour receiver operating from the same signal source will give us colour.

Compatibility is, however, not always so straightforward as that. A $\frac{1}{4}$ -track stereo tape cannot be reproduced on a $\frac{1}{2}$ -track machine, mono or stereo, although a $\frac{1}{2}$ -track tape can be reproduced on a $\frac{1}{4}$ -track machine. A little thought on track dispositions will quickly reveal the reason why.

In reproduction from disc an equally anomalous situation exists. A mono disc can be reproduced on existing stereo equipment, but, so we have been told at least, a stereo disc should not be reproduced on purely mono equipment. This was always the warning sternly delivered by manufacturers of both records and gramophone equipment alike

Behind the scenes we all knew that the situation was far more complex than it appeared to be on the surface. At the Audio Fair several experts, notably those from the continent, were heard to comment that there is no longer any argument between mono and stereo—there is only stereo. With this in mind certain continental record manufacturers offer for sale so-called “compatible stereo” discs. These are really stereo discs with a groove so cut that it could be tracked successfully by existing mono cartridges. Like most compromises it proved to be remarkably unsuccessful, and to my knowledge no British manufacturer has been tempted to follow suit.

Instead, a minor bombshell has been dropped in the disc world by an announcement from E.M.I. that, as from July of this year, their long-playing records of classics will be released in stereo only. The decision as to whether “pop” LPs should be issued in stereo only will be taken later in the year. What does this mean to the record playing public?

Quoting verbatim from E.M.I.’s statement they say: “This move does not make obsolete the mono record player. In fact, by using any modern lightweight record player pickup the stereo-only LP can be played on the mono record player. But E.M.I. point out that for best results they recommend the use of a stereo pickup cartridge—now marketed at a reasonable price—to convert the mono record player. True stereophonic reproduction

ON THE FRINGE . . .

CONFUSION CONCERNING

COMPATIBILITY

DENIS GILBERT Reports

will, of course, be obtained only from a complete stereo reproducer.”

This statement was picked up by the national press and the report in the *Daily Telegraph*, dated Thursday, 13th April, closed with the words: “A spokesman said that by using any modern lightweight record player pickup the stereo only LP could be played on a mono record player.” Whilst not suggesting that E.M.I. have deliberately misrepresented their case by over-simplification, the national publicity given to their statement could result in a complete misunderstanding of the true position on the part of the ordinary user.

A stereophonic gramophone record is capable of imparting information on two (reasonably) separate channels. The stylus in a stereo cartridge responds to lateral movement for one signal source, and to vertical movement for the other. The walls of the groove in the record are cut at an angle of 45 degrees, and vertical movement in the stylus occurs in relation to the distance between the two walls of each groove. When that distance is reduced the stylus is “squeezed up,” and where the walls are further apart the stylus follows a downward direction. It therefore follows that a stereo cartridge has to permit movement of the stylus in these two directions; laterally, or back and forth, and vertically, or up and down.

What happens if we now follow E.M.I.’s advice and use any modern, lightweight record pickup fitted with a mono cartridge? Firstly, the term lightweight is relative. To the hi-fi enthusiast it might mean anything from between one to five grammes tracking force. On the commercial radiogram it might mean something less than about twelve grammes; one could almost say that on older commercial equipment it could mean anything. But if we accept almost any reasonably low tracking weight, then the precise weight is quite irrelevant in this context. What really matters is the compliance of the cartridge.

Now if that cartridge is of the mono-only variety, the stylus will have been designed to move in one direction only, laterally in the horizontal plane. When we apply this stylus to a stereo disc, the grooves in the

record will attempt to move the stylus up and down against its will. The result? Firstly, and inevitably, damage to the record. This will occur more quickly at heavier tracking weights, and when it does it will be permanent. Secondly, and equally inevitably, there will be an increase in distortion in the sound heard. It is for these reasons that we regard E.M.I.’s statement as dangerously misleading.

Many people owning mono equipment have no wish to go to the expense of a complete stereo conversion. For them there is only one satisfactory way out. The existing mono-only cartridge in the tone arm must be changed, preferably for a “compatible mono” model. By this is meant a mono cartridge having a reasonable vertical compliance, so that the stylus will respond to vertical forces instead of literally ploughing its way through the fabric of the disc. When replacing the cartridges in existing equipment it is always necessary to check that the same input impedance load is required for the new cartridge as with the old.

A conventional stereo cartridge could be used equally well, but this is likely to be more expensive than the simpler, compatible mono model. Whichever cartridge is used the resultant mono signal will be reasonably complete, although reproduction will naturally lack the breadth of stereo.

Manufacturers of cartridges are, of course, aware of the position. In our New Products section this month will be found a description of a new Acos cartridge specifically designed with this requirement in mind. Other manufacturers, amongst them Decca and Philips, also make compatible mono cartridges.

The booklet published by Decca under the title, “The Decca Deram,” gives a detailed, illustrated explanation of some of the problems involved, and is strongly recommended.

Nevertheless, we have taken the trouble to enquire of authoritative sources for an intelligent guess as to the proportion of existing mono installations which might be regarded as dangerous for the reproduction of stereo discs. The figures, which we would stress are no more than guesses, are interesting. One source suggested that 99 per cent of existing mono record players would damage stereo discs—another source put the figure more conservatively at 96 per cent.

We can only conclude that the vast majority of existing mono record playing equipment will have to be modified by replacing the cartridge. Alternatively the reproduction of gramophone records monophonically will, within the next year or two, be so poor as to make a change to tape as a medium inevitable.

THE announcement appearing elsewhere in these pages reporting the co-operative attitude of the BBC with regard to the possible future use of amateur recordings in local broadcasting services is of the greatest significance. At long last the opportunity exists for amateurs to put their knowledge and experience to practical use. But the overriding factor will always be the quality of the recording. In this sense "quality" must be taken to relate to both the content and the recorded sound.

Last month I described an actual recording session. What took place could easily be repeated by any group of amateurs anywhere. Perhaps the equipment available would be less comprehensive or less expensive than that used in our own brass recording. This need deter no one.

For example, let us suppose that condenser microphones are out of the question. What alternative could be used? The reduction in quality that might be anticipated by the use of a £10 or £12 microphone, instead of one costing upwards of £100, will not be anything like as great as the difference in price. There are large numbers of microphones available, all of them costing less than £20, which are capable of producing a standard of quality that would be wholly acceptable for broadcast material. The problem resolves itself into one of the practical use of the microphone, which is always more important than the particular type of instrument employed.

Even if we were to use the most sophisticated and expensive microphones, recordings could still be far from satisfactory. The man is always more important than the equipment.

It is dangerous to formulate hard and fast rules for microphone placing. Every case must be judged on its merits. Nevertheless, a few guiding principles will assist in putting one on the right lines.

We have already discussed the directional patterns of microphones, and what is said here should be regarded as an extension of that information. In any recording project the engineer always has to answer one simple question: "Where should the microphone be placed in relation to the sound source?" In arriving at the answer he has to take into account the kind of microphone he is using, the character of sound source itself and the "colour," or "sound perspective," he hopes to achieve in his final recording.

As a general principle we can say that the nearer the microphone is placed to the sound source the greater will be the sense of presence from that sound. At all times surprisingly small differences of microphone position can result in considerable changes in recorded sound.

If we were to imagine a piano in a church hall, and then think of all the possible microphone positions, we would find that these could vary from the back of the hall, just as far away from the piano

TAPE RECORDING TECHNIQUES

BY DENYS KILLICK

MICROPHONE PLACING



The pattern of sound waves generated by a piano in a small room or hall is very complex. Reflected sound is bounced back from all four walls as shown in the diagram, but in addition it will also rebound from the ceiling and floor. Heavy, continuous lines indicate original sound, broken lines the reflections.

as we could get, to a position where the microphone head is actually inside the piano itself no more than an inch or so away from the strings. The finest way of finding the answer to problems of this kind is by practical experiment. Try recording a piano, any piano, in any room. Vary the microphone position between the two extremes mentioned. Study recorded quality on playback very carefully—always relating it to the actual sound of the piano in the room. Such an investigation will teach more than all the books or articles that could ever be read on the subject.

The results of such an experiment will be surprising. At once it will become obvious that the further the microphone is separated from the sound source the more will that sound be influenced by room acoustics. From the rear of the room, or hall, a very unpleasant, bathroom-like acoustic is likely to prevail. When so far from the sound it is probable that the record gain control will have had to be advanced considerably. Extraneous, unwanted noise, from the street or from other rooms, will also have been recorded.

Because sound is a wave form it follows the "inverse square" law. The intensity of sound at the microphone is not directly proportional to the distance between the sound source and the mike, but is inversely proportional to the square of that distance.

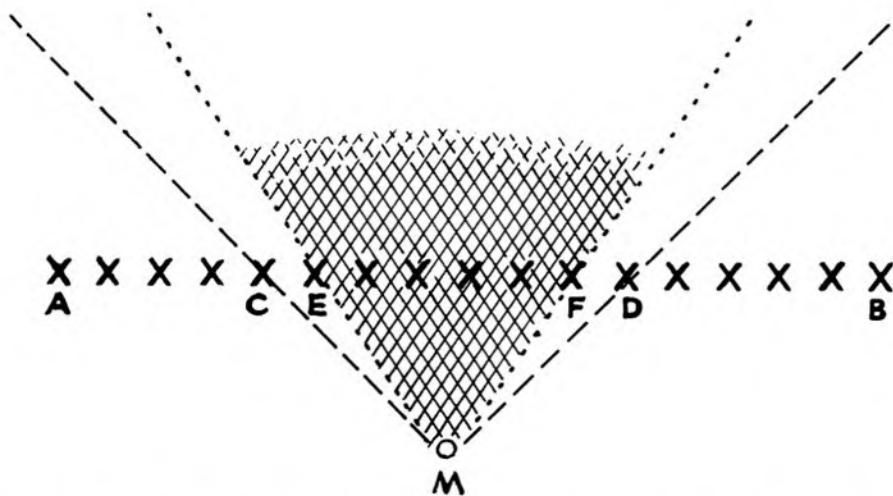
In practical terms this means that a small variation between subject and microphone distance leads to large differences in the recording.

If we pursue our experiments with the piano we will find that as the microphone approaches the piano strings sound intensity increases rapidly, the presence, or reality, in the recording is improved, and record gain controls must be lowered. If we approach too close the reality will be increased to the point where we are recording the mechanical noises produced by the hammers and other moving parts, probably to the detriment of overall quality.

We will also find that the microphone *must* be placed directly in the sound path, without any intervening obstructions. In the case of a vocalist the sound obviously issues from the mouth, and so the microphone should be placed in front of the singer. With musical instruments the sound path is not always so obvious or so direct. The sound from a grand piano, for instance, is bounced forward from the surface of the reflector, or lid, which is held open at a critical angle by a hinged strut. With brass instruments the sound issues from the mouth, or bell, but this is not always directed towards the performer's front. We mentioned horns last month; the sound from these instruments is projected backwards because the bell is behind the player and pointing towards the rear.

All musical instruments produce sounds within a certain musical range. By this we mean the range of fundamental tones spanning from the lowest to the highest notes that can be played. In addition, the instrument will produce overtones, or harmonics, of frequencies very much higher than those of the fundamentals. We have already discussed in previous articles the need for recording the harmonics, since these are the components that convey to the ear the quality (reality) of the sound. By the very nature of things it is always easier to record low frequencies, rather than high. If our microphone were to be so arranged as to accept a full range of sounds without discrimination it is likely that we should find that the important high frequencies were dominated by sound from lower down the musical scale. Result, a loss of quality.

To guard against such eventualities it is usual to place a microphone in such a position that it favours the high frequency part of a sound source. Returning to our example of the piano, we find we have the low notes at the left-hand end of the keyboard, and the highest notes at the right. If, therefore, we position our microphone nearest to the treble end we shall favour the



The diagram represents a sound source ranged along the line AB. The microphone is placed at M. If the microphone were to be cardioid in directional pattern, a sharp cut-off would occur at about points C and D. Those components of the sound source within the spaces AC and DB would be completely "off mike." As a cardioid microphone usually betrays some change in frequency response away from its central axis, it is usual to work to a rather conservative angle of acceptance. Although performers within the line CD would be covered, for quality work it would be necessary to reduce the line as shown at the points E and F. If the sound source were now to be rearranged, moving AE and FB behind EF, within the shaded area, we would have a reasonable proposition for single microphone recording. Note that if the microphone had been omni-directional a poor, unbalanced recording would result from the original arrangement. Sound components at A would be about twice the distance from the microphone as a sound at E. Rearrangement could be as for the cardioid microphone described above, or an alternative would be a semi-circular group with radius EM. The shaded area between M and EF represents very dangerous territory indeed. Small advances into this space will make considerable differences to overall balance.

high notes (frequencies) deliberately, and, if this is done carefully, we should find on playback that we have a correct balance within the full audio span of the instrument's range.

A little thought will show that this principle is universally adopted in the arrangement of choirs and orchestras. When a choir is performing, the highest pitched voices are always ranged nearest the audience; the lower, bass voices are placed further away. Similarly, orchestral instruments producing loud, deep tones are usually to be found in the rear seats. So if we were recording a choir instead of a piano we would position our microphone to favour the sopranos, and we might then move the bass voices either backwards or forwards until a correct balance is achieved. The same principle applies when recording an instrument such as a violin. The microphone should be to the instrumentalist's right, not to the left.

All rules were made to be broken, and we can now begin to use these principles to actually improve, or apparently improve, the standard of performance. The violin is a good example. In unskilled hands the instrument can produce a very raucous, squeaky tone. If we have such a subject to deal with we can cheat a little by placing the microphone in what is, strictly speaking, an incorrect position; that is to the left of the instrumentalist. By doing this we are favouring the low frequencies at the expense of the high. As most of the unpleasant sound is of high frequency this will tend to be proportionately reduced. In such ways the microphone can be made to work for us, instead of against us.

When positioning microphones we must always bear in mind the physical dimensions

of the sound source. We may be dealing with a single instrumentalist or vocalist—or on the other hand our sound source could be a choir some hundred or two strong, or even a full symphony orchestra. When working out microphone positions we have to consider the angle of acceptance of the microphone if it is a directional model, as well as the internal balance between the various sound producing units of the performing whole.

A choir ranged in a perfectly straight line can be one of the most difficult subjects to record. If the line of the choir is too long it will be found that the microphone has to be placed too far back in the hall to remain roughly equidistant from all points of the line. The simplest solution is to rearrange the choir in greater depth (deepest voices at the rear) to shorten the front line. A semi-circular arrangement can often produce excellent results, particularly if an omni-directional microphone is centrally placed. If the microphone were cardioid it would have to be pulled back from the centre to bring the whole semi-circle within its angle of acceptance.

Soloists, in either choral or orchestral works, always produce their own complications. As I mentioned last month one should always attempt to work with as few microphones as possible—and if we can get away with just one we are really in luck. Not so very long ago I recorded a Mozart flute concerto. This is a major work for full symphony orchestra, but a proper balance must be struck between the entire orchestra and the single solo flautist. Of all instruments the solo flute can most easily be lost. In a concerto the soloist must be far enough in the foreground to be capable of dominating the rest of the orchestra.

The answer was very simple. By arranging the orchestra on a semi-circular stage we were able to place a single, omni-direction microphone at an optimum point. The soloist was then placed about three feet from the microphone and the resulting balance was as near perfect as could be obtained.

One of the most difficult aspects of microphone positioning lies in making considered judgments as to whether the recorded sound is right or wrong.

To form such an opinion it is necessary to compare the actual sound within the room, or hall, with the recorded sound as revealed by playback of the tape. When judging actual sound it must be remembered that this will vary according to the position one stands or sits in the room. Similarly, when listening to tape playback one must never forget that this will be influenced by the quality of the monitoring speaker and will also be coloured by the acoustics of the listening room in which the speaker is placed.

It is a grave mistake to rely upon poor, or inadequate, speakers for monitoring purposes. They should be as near perfect as possible so as to provide a real basis for quality judgments. Good monitoring speakers will immediately reveal the subtle differences in sound quality that occur when a microphone is moved an inch or two this way or that. In fact I would go so far as to say that it is more important to have a good quality monitor system than it is to use the best possible microphones.

When your recording is finished you will have the dubious pleasure of listening to other people's criticisms of it. Sensible, constructive, criticism is one of the most difficult things to obtain. The opinions of uninformed listeners are likely to range from meaningless condemnation to equally meaningless praise. The opinions to be valued are those expressed by disinterested persons who have a long experience of criticising mechanically reproduced sound. Never take too much notice of the performers' comments, since they will have been much too close to the actual sound to be able to properly assess balance. It usually happens that a musician will ignore what we call sound quality and will tend to criticise simply in terms of performance.

Whatever is said about your work always reserve to yourself the right to form your own opinions. Put the tape away for at least a week, forget all about it—then listen to it again with "innocent" ears. Don't expect perfection; try to pinpoint strategic errors and remember to remedy them on future occasions. And finally never forget the one supreme advantage you have over other, outside, listeners. You were there at the recording session and you know what the actual sound was really like—the other listeners don't!

In all the years I have been recording I have never yet refused an opportunity because of lack, or inadequacy, of equipment. I have always used what I had available and have produced a recording. The fact that many were bad, both from the performance and recording points of view, is immaterial. Practical experience is the only way to learn. We none of us, myself included, get enough of it.

One final exercise. Just take a paper and pencil and list all the functions and events that have taken place in your locality in the past twelve months. Include school concerts, church recitals, amateur operatic groups, etc., etc. Tick those you recorded live. Then just ask yourself, "What happened to the others?"

CROSS

TALK

By Audios

HAVING spoken my mind on the vexatious subject of the inadequacies of the BBC's multiplex stereo service, I am now delighted to be able to report a refreshingly open-minded attitude to the prospect of using amateur material in the new local broadcasting stations. Credit here must be given to the Federation of British Tape Recording Clubs, and to John Bradley in particular. Conscientiously pursuing the Federation's declared policy of safeguarding amateur interests, John Bradley has had a discussion with Mr. A. W. Coysh, Deputy General Manager, Local Radio Development, at Broadcasting House, on the very first day of full-time operation by this division. Congratulations John—by your vigilance you have shown the powers-that-be that amateurs are to be taken seriously.

Instead of brushing aside the suggestion that amateur material might be used in the new local broadcasting service, Mr. Coysh is reported to have welcomed the suggestion. Each station, and the first seven will be at Brighton, Merseyside, Sheffield, Leicester, Nottingham, Stoke-on-Trent and Manchester, will be in the charge of a Station Manager. Since the main emphasis will be local in approach there should be "slots" in the programme where ready-made items of a local nature could be inserted. The Station Manager would need a reserve of such items to draw upon at will. He will not have time to select and edit the material down to the length required, probably anything from 1½ to 15 minutes, so it must be supplied ready for instant use.

This column has repeatedly warned amateurs of the likelihood of this situation arising. I say warned, because the success or failure of amateur endeavour in this respect is going to depend upon the quality of the material submitted. If Station Managers are flooded with useless, amateur tapes, they are likely to reject all amateur offerings as a matter of course. No effort will be spared, either by the Federation or by *TAPE Recording Magazine*, to ensure that this situation does not arise.

As the national organisation, the Federation will be contacting local tape

recording interests to encourage the establishment of small panels for immediate consideration of items already existing. The Federation will give all the assistance and advice they can to both members and non-members alike. Minimum tape speed requirement is 7½ ips.

As a first step we would ask all interested amateurs in any of the named areas to contact either the Federation, or *TAPE Recording Magazine*, at once with their ideas. On no account should material be submitted directly, either to the BBC or the local station manager. By co-operating in this way we shall be able to co-ordinate all amateur interests and at the same time set acceptable quality standards, thus ensuring the favourable reception of our material.

* * *

TUCKED away in our Audio Fair retrospect last month was a little news item reporting reductions in the retail prices of Agfa-Gevaert recording tape. This column has repeatedly stated that recording tape is too expensive. Any move towards a reduction in price can only be welcomed.

Unfortunately the cost of tape is related to its consumption. It's cold comfort to know that prices could be lower if only more tape were to be used. We could equally well argue that as amateurs we cannot afford to purchase more than we do. Compared with some other countries our tape consumption, related to ownership of equipment, is pitifully low. Perhaps lower costs will help to change the situation.

* * *

AN interesting report appeared in the *"Financial Times"*. The Soviet Government newspaper, *"Izvestia"*, is quoted as stating that Soviet-made tape recorders are unsatisfactory, and inferior to foreign models. It adds that tape recorders are an important item to Soviet consumers if only because the absence of western records causes Russian youngsters to tape pop and jazz from western radio stations. It's encouraging to note that an official Soviet publication is now able to freely admit both an interest in "decadent" western culture in the same breath as it criticizes consumer goods of home manufacture. The establishment of taping contacts between this country and the Soviet Union could materially help in improving mutual understanding. The statement in *"Izvestia"* is a very hopeful sign.

* * *

IN the war between amateurs and officials the amateur usually loses. Not so in Barnsley, where the Postmaster-General, Mr. Edward Short, personally intervened to lift a ban on a three hour inter-town broadcast by amateurs to patients in about twelve hospitals in Barnsley and Hull. The Barnsley Y.M.C.A. Tape Recording Club had been told that they would not be allowed to use GPO landlines. Appeals were made by the club to Mr. Short and to the town's MP, Mr. Roy Mason. The decision of the local officials was overruled.

Moral—never take no for an answer!

* * *

THE Concord Supersonic Airliner project is so sophisticated in the techniques it employs that the mind really cannot absorb

the multitude of figures and their relationships. For instance, each one of the four Olympus 593 engines will develop the same power as the total engine thrust of all four engines in a Comet 4. Naturally, tape plays an important part in research. During testing, resistance wire strain gauges are attached to the blades, discs and shafts to provide electrical signals representing the vibratory stresses. These vibration signals are recorded and stored on 1 in. wide Scotch instrumentation tape. The recorded data is analysed by semi-automatic, electrical filter techniques, and information is available to the development engineers within hours of the completion of the engine test programme. By mid-1971 nearly 30,000 hours of engine testing will have been completed. I wonder how many years it would take to analyse results in any way other than by magnetic tape?

* * *

A report in the *Daily Telegraph* on the recent Young Socialists Conference in the Winter Gardens Theatre, Morecambe, is revealing. According to the *Telegraph* a call was made at the conference for guitars, music and amplifiers to be provided free by local authorities to would-be beat groups; a resolution was passed demanding state ownership of the pop music industry. Nationalisation of the recording companies under committees of youth and workers' cultural organisations "to make all records that young people wish to buy available at reasonable prices" was also demanded, besides evening classes in music with rent-free premises for groups to practice.

Needless to say the Young Socialists Conference is not recognised by the official Labour Party . . . !

* * *

THE winner of the "Guess the Sounds" Competition held by the 3M Company, manufacturers of Scotch brand recording tape, in their demonstration room at the Audio Fair is announced as Mr. B. Sinclair, of Little Chalfont, Buckinghamshire. Mr. Sinclair was correct with 10 out of 13 answers, and although this was equalled by several other competitors Mr. Sinclair was more exact in his description of the sound effects. He has chosen as his prize the Bang & Olufsen Model 1500 tape recorder which was used as part of 3M's demonstration . . .

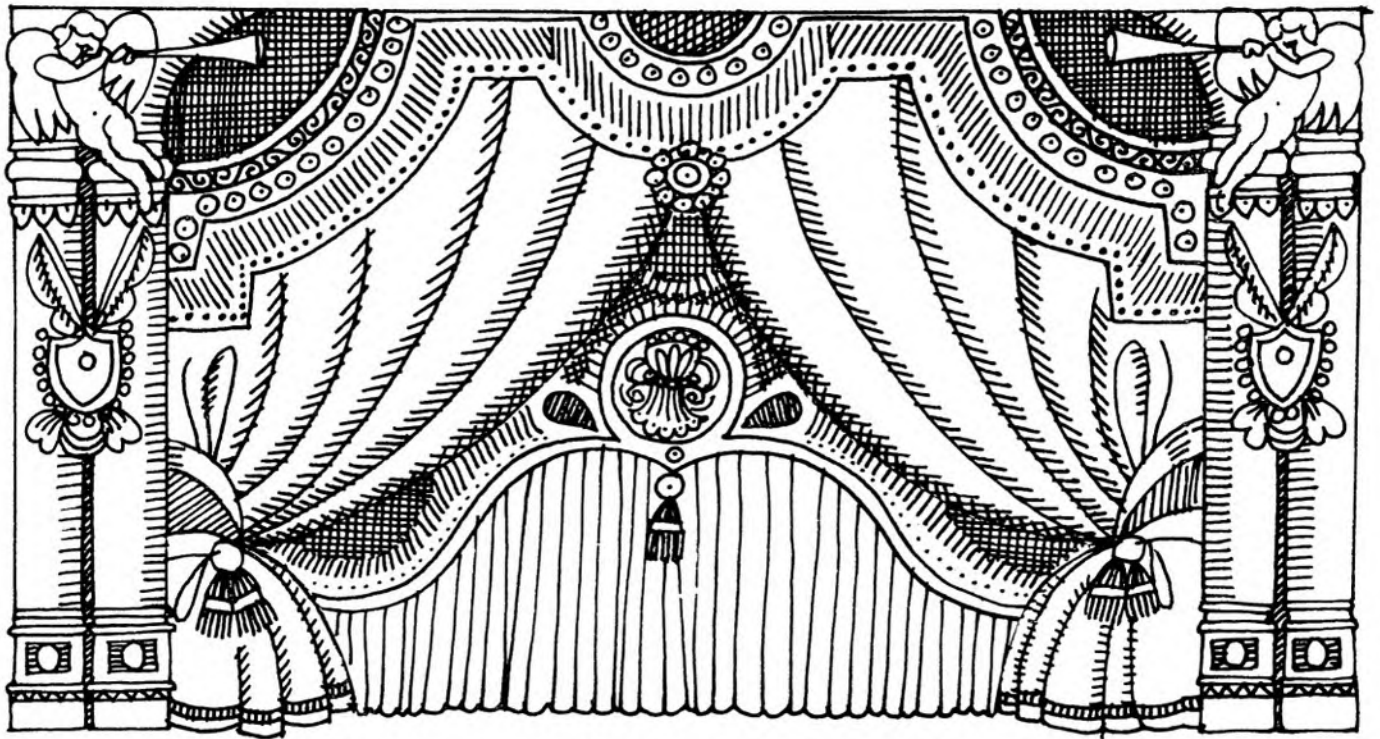
The competition organised by Pullin Photographic Limited relating to the Akai exhibit at the Audio Fair has been won by Mr. J. E. M. Proctor of the Isle of Wight. Mr. Proctor's entry listed what he regarded to be the most important features of Akai tape recorders in an order of importance nearest to that suggested by the judges. His prize will be an Akai Model M8 tape recorder.

* * *

LAST month I suggested a study of local dialect as a fruitful source of recording activity. I now see that the School of English at Leeds University has carried out a survey. Naturally their investigators used a tape recorder as they toured isolated hamlets talking to the older inhabitants. There is a grave danger that much local dialect will be lost for ever unless it is recorded now. What are we waiting for?

* * *

OVERHEARD from a telephone conversation between a very enthusiastic owner and the manager of a service department. ". . . and I'm quite sure the heads are clean because I go over them regularly with emery paper . . . !"



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GRUNDIG

The manufacture of Audio Equipment is big business today.

How does a traditional British firm meet the challenge?

A CLOSE LOOK AT

WHARFEDALE

BY LAURENCE GRAHAM



The deft fingers of long-service employee, Doris Hall, soldering pigtail leads on to 12-inch speaker cones. This delicate job requires a great deal of experience. One slip with the hot iron and the cone would be ruined. There is bound to be a great deal of repetition work in any modern factory, and the Wharfedale works are no exception. But every operative here has the opportunity of using his or her personal skills as a contribution to a product of which they are all proud. Bradford was at one time an important centre of the British textile industry. Today new techniques and new products rely upon the same gentle touch from the people who really matter—the workers on the shop floor.

TWO of the most famous names in the audio world are those of G. A. Briggs and Wharfedale. Many of the leading firms in the industry came into being through the enthusiasm, drive and initiative of one single personality. To call Mr. Briggs simply an enthusiast would be a gross understatement. Like many of his contemporaries in the 1920s, he was as fascinated with problems of audio reproduction as he was dissatisfied with the then currently available commercial loudspeakers.



At one time coils were laboriously wound by hand. The latest, high-speed machine is here seen in use producing voice coils for 12-inch bass speakers. These require 114 turns of 32-gauge enamelled copper wire in two layers.

This must have been a most exciting time. Audio reproduction was in its infancy; mechanically reproduced sound was universally accepted, but the standard of quality offered by domestic equipment was pathetic. The weakest link in the reproduction chain was—and indeed still is today—the loudspeaker. There is no such thing as perfection in loudspeaker design and manufacture. Well aware of this inescapable fact, Mr. Briggs determined to design, manufacture and sell loudspeakers capable of producing better quality sound than any others then available. So was born the firm of Wharfedale, which today still holds a dominant position as manufac-

turers of fine loudspeakers which are now exported to the four corners of the globe.

Modern commercial conditions make it very difficult for small, privately owned, firms to survive against the competition of the giant combines. Consequently Wharfedale became a part of the Rank Organisation several years ago. Too often today "take-overs" imply that a respected and well known product has virtually disappeared, the name being perpetuated as a label on inferior, mass-produced, goods, bearing no relation at all to the craftsmen-built articles on which the reputation was first established. So I travelled to Bradford to find out if this sad fate had overtaken the fine old name of Wharfedale.

In Bradford I found the answer. The Wharfedale works are a living testimony to the advantages of combining traditional British pride in craft skills with the requirements of modern industrial technology. The new Managing Director, Mr. Peter Dye, proudly showed me the office where Mr. G. A. Briggs still attends, as a consultant director, to keep an interested eye on the business. Mr. Dye added, with a rueful smile, that he still speaks his mind as forcefully as ever he did. During my tour of the factory I was impressed by the large number of long-service employees to whom I was introduced. At least one started with Mr. Briggs in his original tiny works, way back in the 1930s.

Such continuity of employment is important. With it comes an assurance of the continuation of the trading and manufacturing policies upon which the Company's reputation was founded. For the consumer it means that the familiar trade name can be trusted at least as much in the future as it was in the past.

Compared to the intricate and complex products of many other industries, a loudspeaker can only be regarded as a simple, perhaps even a crude, mechanism. Its essential parts, a magnet, a voice coil and a cone, have seen little fundamental change through the years. One could easily be misled into imagining that this must be a fairly simple, straightforward kind of product to manufacture. I suppose that given the right bits and pieces almost anyone could assemble a loudspeaker in their own back-room at home. And it would probably work. But that is a far cry from producing a transducer which, when properly mounted or enclosed, will give us the closest possible representation of original sounds. This was the aim of the Wharfedale factory, back in the 30s, and it is still their aim today.

Although I have watched every individual manufacturing process I would not presume to describe them in detail. My tour of the factories, there are three of them, left me with an impression of a large number of highly skilled people doing intricate and delicate jobs.

Even the cabinet work for the enclosures is made on the premises in one of the Bradford factories. A specially imported Portuguese chipboard, called Tabopan, is used for construction. Both the design of the speaker enclosure, and the material from which it is made, will have a profound effect on the sound heard by the listener. After a great deal of research it was found that the Portuguese chipboard was one of the few materials that was dense enough to meet the desired specification, but also, equally important, its density was regularly maintained throughout every sheet. Its use ensures that every cabinet on a production run will have identical acoustic properties.

Every loudspeaker is thoroughly tested,

A CLOSE LOOK AT

WHARFEDALE

BY LAURENCE GRAHAM

quickly and efficiently, in the test department. As I watched minor adjustments were made to voice coils to bring them to optimum performance level. Out in the despatch yard a transportation container was being loaded with a couple of *thousand*, twelve-inch speaker units. Without leaving the container these were destined for delivery to Long Island, USA, in eighteen days' time, door to door. One such load leaves the factory every fortnight.

A glance around the despatch department revealed the breadth of the Wharfedale markets. Cases were marked for despatch to Thailand, Australia, India, Canada—yes and to Hong Kong as well, which is one of Wharfedale's largest export markets.

The quality of sound revealed by modern production loudspeakers would leave the enthusiast of the 30s gasping in astonishment. But progress is not something that stops dead at any given point. In Bradford Wharfedale are strenuously engaged in improving their products still further, and at the same time they are launching out into completely new fields.



Super 3 cone assembly. Cloth surrounds are being fitted to these small tweeters. Many different kinds of adhesives are used for different stages of assembly.

Electronics and loudspeaker manufacture have an obvious affinity for each other. For two years Wharfedale have produced a public address system with its own, built-in, amplifier which was made on the premises. The next logical step was to extend the electronics side of the business to produce amplifiers and tuners that would match the quality of the speakers. Only this year we have seen, for the very first time, the Wharfedale "System 20" range of fully transistorised hi-fi equipment.



The latest Wharfedale venture: System 20 Hi-Fi equipment in the making. All the girls on this production line underwent a period of intensive training. The quality of workmanship achieved in the wiring of these components could serve as a model for any electronics manufacturer.

Essentially modern in design and construction, System 20 is not being offered as just another tuner and amplifier. It is part of a master plan to produce high quality audio products for people who want hi-fi without mumbo-jumbo. The aim is to produce hi-fi equipment in such a form that it can immediately be used by the ordinary man or woman. Two cleverly designed cabinets, made on the premises in Bradford of course, enclose the tuner and amplifier, together with a choice of gramophone transcription turntables. All the owner needs to do is to plug into the mains and connect a couple of speakers. This not only makes it easier for the customer but it also makes it possible for the large multiple stores, who do not have specially trained staff, to handle the very best equipment and to demonstrate it adequately.

High fidelity is no longer something mysterious, to be enjoyed only by the select few. Wharfedale believe passionately in its universal application and by manufacturing their system 20 range of equipment they are really following the same precepts that guided Mr. Briggs when he established the first Wharfedale factory those thirty-odd years ago. Just as he achieved his objectives then, so will Peter Dye and his fellow executives achieve theirs now.

A glossary of tape terms—part 14

BY HARRY MACK

TAPE TRANSPORT. Section of deck used to move the tape past the recording and playback heads, and to achieve fast spooling. Very many different methods are employed, using belt drive, idler wheel drive, a combination of these, or a direct drive with controlled motors to achieve speed variation.

Early machines, particularly battery portables, relied upon the pull of the take-up spool, sacrificing constant speed drive in the cause of economy. The current method of achieving fixed speed is to drive a flywheel on which a capstan spindle, machined to a close tolerance, is mounted, and employ either a balanced tension spooling system to "take-up the slack" or a clutch device. The tape is held in tension with the revolving capstan by a spring-loaded pressure or pinch wheel. The pressure roller is generally free running.

Tape speed depends on the angular velocity of the flywheel, and method of speed changing depends on the tape transport system being used. Mechanical isolation between drive motor and flywheel is achieved by the idler coupling or belt drive, and in former case there are two principle methods of speed changing. Either the single idler wheel is ramped to engage steps of different diameter on the motor pulley (see Fig. 1), or separate idler wheels slide in fixed brackets to engage their appropriate steps. Examples of the former type are the Magnavox Studio, BSR, Brenell, Thorn, Robuk etc., and of the latter type, Ferrograph, Truvox and some Philips models.

Belt drive is widely employed by Grundig and Philips, amongst others, and speed changing often consists of transferring the running belt to alternative pulleys, either coupled to the motor spindle or mounted on it. The important factor is that running belt systems usually have to be speed-changed when in motion, whereas idler systems are interlocked to prevent this, and the ramp movement is effected when the drive system is at neutral. There are numerous variations; it is impossible to draw up set rules. Interesting exceptions are the belt drive methods used by Ampex and Tandberg, the first depending on the swing of the pulley bracket to achieve direction of rotation, and the latter having a crossed belt, overlapping in common pulleys. Telefunken and B & O use a swivelled ramp to throw the belt to its appropriate step, and other variations on this theme are used by Grundig and Philips.

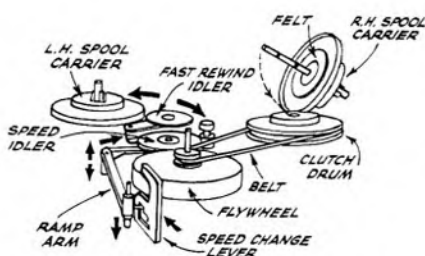


Fig. 1. Combination of belt and pulley drive used in the BSR TD-10 deck. The right-hand spool carrier is shown removed, revealing the felt disc that provides the slipping friction for gravity clutching. Also of interest is the simple speed change system.

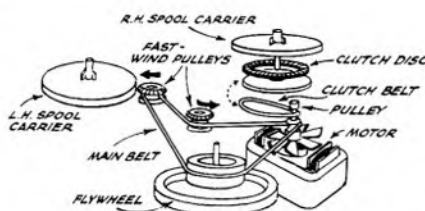


Fig. 2. Belt drive system used in Philips EL-3552. The clutch is of the gravity friction type, and the clutch drum is driven by its own small belt from the motor pulley. Fast wind pulleys are mounted on sliding brackets.

(Figs. 3 and 4 opposite.)

An important part of the transport system is the clutch arrangement to ensure a regular take-up of the tape after it has passed the head channel, pulled by the pressure between pinch roller and capstan. It is vital that the tension be exact, otherwise tape speed will vary. Gravity clutches use various arrangements of slipping discs, felt pads, rubber inserts, etc., to allow the weight of the tape and spool to regulate the downward pressure and thus the gripping action, as in Fig. 3. The lower clutch section is thus constantly driven by idler or belt, (see Figs 1 and 2). An alternative arrangement employs a rubber-backed nylon belt, a flat ribbon in effect, which slips on the polished motor pulley and grips the take-up

spool with sufficient tension to take up the slack. Spooling off the feed side may be controlled by reverse drive and a similar clutch arrangement, as with common belt systems, or by a light braking action to keep the tape fairly taut. Excessive grip at this point will cause wow.

Fast winding can be achieved by locking the upper and lower sections of these clutches for direct drive, as with Philips and Grundig designs. Other methods are based on separate drive to the upper spool carrier section, again by an idler wheel, imposed by lever and spring action.

Three-motor designs employ the stalling action of induction motors to regulate tension, the spool motors being put in a series-parallel circuit for take-up and driven at full power for fast winding. Refinements include reduced power switching, as employed by Repts in one version of the R10 which used the Collaro Studio deck, back tension braking, as featured by Revox and Robuk and the insertion of a jockey in the main drive to vary the effective length of the belt, as in the latest Van der Molen machines.

These are only a few of the interesting drive systems we may meet. It is hoped at a later date to go into much greater detail, particularly with reference to their peculiarities, and service procedure.

* * *

TELEPHONE PICK-UP. Induction coil device for attachment to a telephone handset or cradle to give a small signal suitable for application to the low level input of a tape recorder. Direct connection to telephone lines is not allowed by the GPO.

* * *

TELEVISION INTERFERENCE. Tape recorder users living near powerful transmitters often complain of "background music" which generally comes through the playback amplifier, but is occasionally recorded on the tape. The unwanted pick-up comes in via the frequency-conscious, low-level input circuits, or by the tuned circuit of which the playback head is a vital part, or, in rare cases, via the loud-speaker leads where these are part of a negative feedback loop.

The high frequency signals can be bypassed with a small capacitor in many cases. Across microphone inputs or across the playback head, for example, a 50 pf. capa-

(Please turn to page 235)

Fig. 3. Exploded view of the clutch used in the Akai M-7 and M-8 recorders. Friction is provided by felt discs; gripping tension is derived from a light spring.

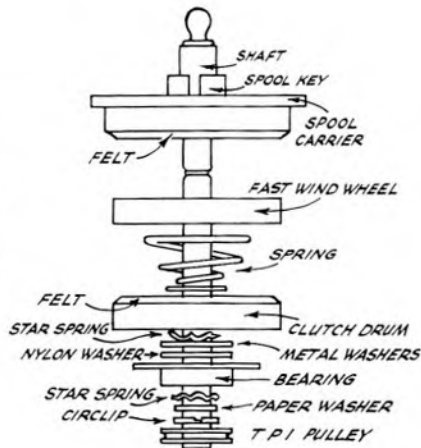
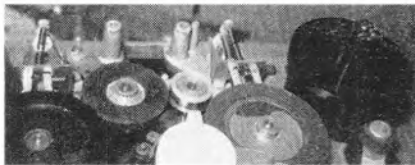


Fig. 4 (below): Part of the drive system used by Reps in the Mark III version of the popular R-10, using a special idler to drive the upper section of the right hand spool carrier. Also shown is the motor pulley and the puck wheel from this pulley to the left side for rewinding. The small rubber wheel in the right foreground is part of the braking system.



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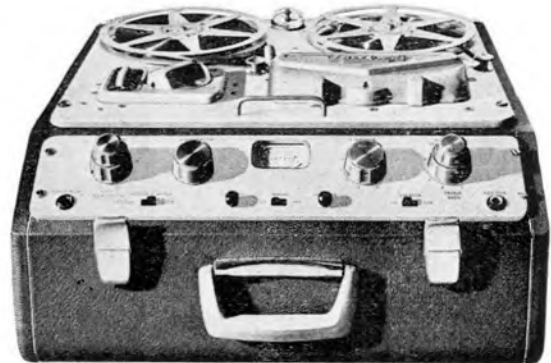
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the incomparable tape recorder



ELTRA 1001

INVESTIGATED BY R. HIRST AND D. KILLICK

MANUFACTURER'S SPECIFICATION

Mains Voltage: 220/240 volts AC.
 Power Consumption: 60 watts.
 Tape Speeds: 1½, 3¼ and 7½ ips.
 Tracking: ½-track mono.
 Reel Sizes: Up to 7 in.
 Maximum Rewind Time: 1,200 feet 5 minutes.
 Amplifier: Valve with DIN connections throughout.
 Mixing: 2-channel with individual controls, plus separate monitor and playback volume controls.
 Tone Controls: Separate Treble and Bass.
 External Speaker: DIN socket. Better than 6 watts at 5 per cent harmonic distortion.
 Record Indicator: Magic eye with slow return.
 Bias Frequency: 55 kHz ± 2 kHz.
 Tape Drive Motor: Modified BSR TD 10.
 Frequency Response, Playback DIN 45513 Standard Tape:
 7½ ips 50-14,000 ± 3 dB
 3¼ ips 50-12,500 ± 3 dB
 1½ ips No standard provided yet.
 Signal/Noise: 7½ ips -54 dB weighted.
 Wow: 7½ ips better than 0.25 per cent, 3¼ ips better than 0.25 per cent, 1½ ips better than 0.35 per cent.
 Microphone Input: Sensitivity better than 300 microvolts across 1 megohm.
 Dimensions: 7¾ inches high, 11¼ inches deep and 16¼ inches wide.
 Weight: 24¼ lb., less accessories and reels.
 Price: 49 guineas.
 Distributor: C. E. Hammond Ltd., 90, High Street, Eton, Windsor, Berks.

ELTRA 1001 TEST CHART

	Overall Response dB		Playback Only dB	Signal/Noise Ratio dB	Distortion
Frequency Hz	7½ i.p.s.	3¼ i.p.s.	1½ i.p.s.	7½ i.p.s.	
40	-11	-12	Not Measured.	-10	
50	-4.4	-7.6		-3	
60	-2.7	-3.5		-2.4	
100	-4.3	-1.7		-3	
250	+1	-1.6		+1	
500	+1	-2		+1	
1000	0	0		0	2.7%
2000	+1.4	-1.2		+1	
4000	+1.4	-2.4		+1.2	
6000	+1.3	-4		+1.3	
8000	+1.4	-5.6		+1.3	
10000	+0.4	-12		+0.3	
12000	+0.4			-0.3	
14000	0			-0.5	
Wow and Flutter	0.23%	0.25%	0.36%		

NOTES.—The Overall Response figures relate to record and playback. Playback Only relates to the reproduction of a 70 microsecond test tape at 7½ i.p.s. (C.C.I.R.). For Signal-to-Noise Ratio the tape was recorded at peak level and then the input signal was removed from the record amplifier. By reference to the signal level recorded and the resultant tape noise, the noise voltage was read off, with the tape still in motion. Distortion is quoted against a 1,000 Hz signal recorded at the correct maximum level as indicated by the manufacturers, and the figure is an R.M.S. value. Wow and Flutter is also R.M.S., the test frequency being 3,000 Hz. Test equipment used includes: Bruel and Kjaer Signal Generator, B. & K. Frequency Analyser Type 2107, B & K. Level Recorder Type 2305, Marconi Distortion Factor Analyser and Gaumont—Kaylee Wow and Flutter Meter.

IN presenting machine reviews it is our endeavour to evaluate with the strictest possible impartiality, being equally fair to reader and manufacturer alike. We must, therefore, report that the first Eltra 1001 machine received for review was found to be faulty.

When registering peak levels on the record level indicator the actual recording on the tape was about 20 dB below full modulation. The fact that a faulty piece of equipment was received for review could be interpreted in one of two ways. It could be assumed either that

the equipment was generally subject to such breakdowns, or alternatively one could say that here is a transparently honest manufacturer—in this case distributor—who genuinely offers a stock machine without giving it any special checks.

Our first action after noting an obvious fault in a review machine is to advise the manufacturer, and then to carefully check a number of other samples to see if the fault persists in those. In the present case your reviewers are satisfied that the first machine submitted was not

representative of the stock held by C. E. Hammond Ltd., and our investigations therefore proceeded on a second machine. We are reporting this incident as a matter of strict review policy, but we regard it as of little significance, other than perhaps proving that review machines are invariably offered quite sincerely, ex stock, without being subjected to any special treatment.

The Eltra 1001 tape recorder is a half-track, mono, machine, for AC mains operation. Manufactured in Denmark, the styling is of the advanced "furniture look" type, and shows evidence of careful thought. For instance, the table protectors at the rear

turn out to be a pair of little wheels, so arranged as to facilitate tipping the machine into its vertical position to expose the power lead. This is stored in one of the neatest concealed compartments we have come across. The carrying handle is not only very secure and comfortable, but it retracts into the cabinet when not in use. Although the dust cover is plastic it is unusually substantial.

Our test chart shows that under laboratory investigation the replay characteristics at $7\frac{1}{2}$ ips hold to the manufacturer's specification, but the overall record/replay curve reveals some deviation, particularly at $3\frac{1}{2}$ ips. We have recently noticed a reluctance on the part of manufacturers to specify the kind of tape recommended for use with their equipment. The cover photograph to the handbook with the machine illustrates a box of Scotch 150 tape, but the text does not advise on this point. The setting of a correct bias level is an essential feature of the distortion content, recording level and frequency response; if the new owner is unaware of the tape for which the bias of his machine has been set he may well obtain results which fall short of the optimum performance figures quoted in the manufacturer's specifications. This is intended as a general remark, and is not specific only to the Eltra.

The distortion figure of 2.7 per cent total RMS is regarded as highly satisfactory when compared to professional equipment. Frequency checks were made at the speaker output terminals, and with the tone controls in the flat position the overall response followed very closely the pattern indicated in the tables. The range of tone compensation was excellent; the lift points were correctly arranged, that is to say the treble and bass controls had a minimal effect in the middle frequency band but were very selective in their respective regions. Both controls provide lift and cut over a wider range than would normally be required for tonal correction.

Summarising the results of our laboratory investigations we were surprised to note such satisfactory figures in what is, after all, a machine in a fairly modest price bracket. From the technical point of view the Eltra can be regarded as a thoroughly good investment offering a highly creditable performance.

In the user tests that followed we recorded and played back from a number of sound sources. Although this machine is an import from Denmark it is interesting to note that it uses a British BSR deck. It is very encouraging to find British engineering associated with such a high standard of continental design. It was also pleasing to note how smoothly and efficiently the deck operated in all its functions. A joy-stick control is provided to select run and fast-wind in either direction. A separate lever at the side of the raised deck control panel also has three positions, labelled: "Bremse Fri" (brake release or normal), "Moment Stop" (brief pause), "Motor Stop".

We were impressed with the functioning of this control which operates cleanly and well: in the brief pause and motor stop positions the pinchwheel is withdrawn from the capstan and these two members only come into contact when the main joystick lever is brought into the run function. Speed selection, $1\frac{1}{2}$, $3\frac{1}{2}$ or $7\frac{1}{2}$ ips, is also smooth and clean with automatic equalisation switching. On the left of the panel is a simple, positive, switch selecting either the record or playback function.

In use the deck mechanism emits a steady whirring sound which one of your reviewers

took to be a little on the obtrusive side but the other felt to be wholly acceptable. There was a marked absence of "clanks" or "clonks." It was agreed that certain other, more expensive decks are both more noisy, less smooth and certainly less convenient to use, although fast wind is unusually slow.

Connections are by standard DIN sockets, the pair on the left being Microphone In and Radio In/Out, the single socket on the right is a standard DIN extension speaker connection. Controls are neatly grouped on the front vertical panel, those on the right comprising the pair of tone controls, one each treble and bass, the playback volume control and a push-button On/Off switch. On the left we have separate controls for the two input sockets, which can be used in conjunction with each other for mixing, together with an independent monitor control which permits the "before record" monitoring of the signal through the internal speaker at any desired level independent of record level. On the front horizontal edge of the equipment are two electronic indicators, the one on the right, green in colour, operates during playback and when the power is on, the one on the left is the record level indicator in red. In practical use it was found that the record level indicator, a pair of horizontally moving red beams, operated extremely well and enabled record levels to be precisely set.

Recordings of music dubbed off the air, VHF, reproduced faithfully the original sound source. At $7\frac{1}{2}$ ips this machine is certainly capable of top quality recording worthy of the best associated hi-fi equipment, although the quality of the built-in speaker is unusually good. At $3\frac{1}{2}$ ips the fall in high frequency would be apparent to the critical listener unless appropriate top boost were to be applied at the tone controls. The recommended Eltra dynamic microphone was used for live recordings. This instrument is available as an extra, costs 4 gns., and is supplied complete with desk stand and lavalier neck band. It functioned well and gave quite pleasant voice recordings. Although it does possess some slight rear discrimination it should be regarded generally as an omni-directional microphone.

During the user tests we were particularly pleased to note that provision has been made for tape editing. The tape can be inched past the playback head with the amplifier in circuit and the resulting sound may be clearly heard through the internal speaker. This is the professional method of tape editing and it is sufficiently accurate to enable even single syllables or notes to be removed or inserted at will. Unfortunately only the rear half of the head cover is a simple, pull-off, plastic moulding. This makes it inconvenient to accurately mark the rear of the tape with chinagraph. However this is a minor criticism which could easily be overcome by the user. The value of including this facility—which is more usually found only on more expensive semi-professional equipment—far outweighs the minor practical inconvenience of its use.

The Eltra 1001 is well designed, well manufactured and well presented. Within its price range it offers recording and playback facilities to an unusually high standard, together with features formerly associated with more expensive equipment. Your reviewers have no hesitation in recommending this machine as unusually good value in performance, styling and manufacture. If the overall frequency response curve could be improved, fast wind speeded up and a more comprehensive, adult instruction booklet provided, this machine would be far outside its class.

GLOSSARY — from page 232

citor can often improve matters. In the inductive circuits, an r.f. choke, whose size depends on the offending wavelength, can be made quite simply from 18 s.w.g. wire, wound round a pencil to form a self-supporting air cored choke. These small chokes can be fitted in the loudspeaker leads at the amplifier end, and in the grid circuits of the voltage amplifiers, as near the actual grid pin of the valve as possible.

The length of the wire should be as follows for the Band 1 channels (which are the most often the cause of this type of interference): Channel 1, 67 in.; Channel 2, 59 in.; Channel 3, 53.5 in.; Channel 4, 49 in.; and Channel 5, 45.25 in. In latter stages, an anti-parasitic resistor in the grid circuit, again connected at the grid pin and of a value about one-tenth of the existing grid leak, will probably be quite sufficient.

* * *

TENSILE STRENGTH. As applied to tape, denotes the resistance to a pulling or stretching force. Although the operating tension exerted by a tape transport system is seldom more than a few ounces, tensile strengths may be measured in pounds. A typical value for acetate tape is as much as 5.5 lbs. But tape is more easily broken when nicked or curled, and can stretch before breaking to spoil recordings and cause wow and flutter effects, especially when ageing.

* * *

TEST TAPES. Specially produced recordings with controlled ranges of frequency, modulation level, noise level and recording standards. The playback response and other factors such as signal-to-noise ratio and distortion factor can be assessed by playing through a standard test tape. The usual method of test tape production is to record a series of tones, identified by a voice announcement or printed leader, the level of the recording being at a set amount below peak recording level, at a given surface induction and to a standard characteristic. Output from the tape recorder amplifier when replaying the test tape can be plotted to produce the graph of frequency response. The waveform of the recorded signal on the test tape is pure, and observation of the waveform produced by the playback amplifier gives information on the distortion.

White noise test tapes are also made to test the azimuth alignment of playback heads, and are also useful for setting up stereo systems. (See also WHITE NOISE).

For four-track head alignment, test tapes are produced with track 3 erased. Erasure is very carefully controlled under laboratory conditions, giving a "blank track" 43 thou wide to match the standard head. Replay should give silence on track 3 when the head is properly aligned as to height and azimuth. Inverting the tape allows an instant track comparison test for equal output.

LAATEST developments in the Musicassette market are the first releases on the 12th May of EP cassettes and material from the attractive CBS repertoire which will be distributed by Philips.

EP cassettes will retail at 14s. 6d. and will offer four hit tunes for less than the price of two singles. The eight artistes featured are: Dusty Springfield, The Walker Brothers, The Four Seasons, Harry Secombe, Spencer Davis, Dave Dee, Dozey, Beaky, Mick and Titch and Manfred Mann.

MUSICCASSETTE REVIEWS

MARCHING WITH THE BEATLES; Band of the Irish Guards, conducted by Major C. H. Jaegar. Columbia TC-SCX6087, 40s.

Take generous helpings of Lennon and McCartney tunes, allow Arthur Wilkinson to stir thoroughly and then hand to the Irish Guards for serving *à la brass*. The enthusiastically optimistic record notes suggest that this mixture could cause a complete revolution in the field of military band music. Come, come! This recipe might not have been compounded of Beatle music before, but this is surely only the most recent of a long line of "arrangements for brass"—all of which manage to arrive with deadly accuracy at wholly similar sound patterns.

Following, then, in this well-worn tradition, we now have: *From me to you, Things we said today, Michelle, It's for you, I want to hold your hand, Help!, She loves you, Yesterday, I'll keep you satisfied, Can't buy me love, A hard day's night and All my loving*. Recording is excellent if you like that sort of thing. Brass instruments can offer a new sound and an exciting listening experience—but I found this particular cake to be stodgy and indigestible.

LES GRANDS SUCCÈS DE CLAUDE CIARI; Pathé MCP6008, 50s.

This import from France, one of a series, is a delightful collection of finger-style guitar music. Reminiscent of Chet Atkins, but with a less flamboyant display of virtuosity, Claude Ciari coaxes delightful sounds from his instrument. The collection of favourites, which really have been given a new look by this treatment, includes: *La playa, The ballad of Cat Ballou, La fille de Brasilia, The tiger and the snake, Srinata Ajaccina, La danse de Zorba, Dis-moi d'ou vient le vent, Jamais personne avant toi, Blowin' in the wind, File la Laine, Blue bolero and Manuel Benitz "El Cordobes."*

Particularly appreciated were the dance from the film, *Zorba the Greek*, and *The Ballad of Cat Ballou*. But all the rest were thoroughly enjoyable and offered very pleasant listening. This collection is strongly recommended.

BLUE HAWAIIAN SKIES, Big Ben Hawaiian Band with the Mike Sammes Singers. Columbia TC-SCX3547, 40s.

When in April we reviewed "Hi-fi in Hawaii," Columbia TC-SCX3258, we commented that recording was brilliant, performance was good, and the sound was very much further up the hi-fi scale than some might care to admit. The same remarks could be attached to this very pleasant little recording. Both the sound and the music is essentially languorous in feeling. How very fortunate are those who can actually travel to the South Seas, lie on the sunbaked sands and enjoy the real thing. For the rest of us the recorded alternative induces such a delightful indolence as to make even writing this review hard physical labour!

The items within the album include: *Sweet Leilani, Moonlight and Roses, Hawaiian War Chant, Bali Ha'i, Harbour Lights, Red Sails in the Sunset, Blue Hawaii, When you dream about Hawaii, Now is the*

Hour, Trade Winds, Blue Tango and Hawaiian Village. This delightful collection makes the most pleasant, effortless listening, and as such is a merciful change from the thumping beat of certain pop groups which now seems destined to be on the way out. None will say thank goodness with more fervour than I.

VIVALDI. The Four Seasons. I Musici with Felix Ayo, violin. Philips CPC0002, 45s.

As recently as last February we reviewed a version of this work on a 7½ ips, four-track, stereo tape, Angel ZS35877. It was therefore particularly interesting to investigate this cassette recording of a completely different performance.

Is it fair to compare the cassette to the 7½ ips stereo tape? Whether it was fair or not the comparison has been made and the cassette comes out very favourably indeed. In the terms of performance there are essential differences between the two versions. The I Musici interpretation takes the work at a slower, more pedestrian, rate, and I find this change of tempo wholly acceptable. The acoustic colouration of the two versions is completely different, and in this respect I prefer the cassette version to the Angel tape.

I can now tell you that next month, July, *TAPE Recording Magazine* will be featuring a direct comparison between LP gramophone records and their Musiccassette equivalents. Vivaldi's *The Four Seasons* will be one of the works so examined.

Perhaps of all the classical Musiccassettes I have heard this is the most successful as yet. It's a pity it should be priced at 5s. dearer than the popular issues. But perhaps Philips are afraid that there will be insufficient sale for them. I can only suggest that if anyone doubts the validity of the Musiccassette system then they should make a point of listening to this particular recording, which I strongly recommend to all with an interest in Baroque music.

JOHANN STRAUSS. Favourite Waltzes. The Vienna Concert Orchestra conducted by Kurt Richter. Philips CPC0001, 45s.

The waltz has not always been accepted socially as a dance form, as the record notes remind us. Considered by some to be indecent, it was denounced in print and from the pulpit. As might be expected the effect of these attacks was wholly beneficial; not only did the waltz rapidly attain a growing popularity, but this was greater, and has lasted longer, than that of any other dance form.

In this album we have a thoroughly satisfactory collection of well known tunes including on side 1: *Vienna Blood, Roses from the South, Artist's Life, Treasure Waltz, Morning Papers and Wine, Women and Song*. On side 2 we find: *The Blue Danube, Tales from the Vienna Woods, You and You, Acceleration Waltz, Voices of Spring and The Emperor Waltz*.

Sound quality is round and smooth. Very critical listening confirms some loss of high frequency in the strings as compared to conventional tape or gramophone record. This, however, is a minor loss—unless one has the misfortune to be the most pedantic of purists. But they are not the sort of people who are likely to buy a collection of Strauss waltzes anyway!

The only snag about this album is that most people will already possess within their music collections at least some of these famous Strauss melodies. If they should be on disc and have been played a number of

times it would be interesting to compare them to the quality on this Musiccassette. Such a comparison is likely to be most revealing.

IN THE WIND. Peter, Paul and Mary. Warner Bros., CWF650, 40s.

Singing in the popular folk idiom, the voices of Peter, Paul and Mary have a delightful foreground presence in this album. This trio have travelled a very long way along the road to success, and I am only too glad because their distinctive, melodic, sound is amongst the very best we hear from the current vogue of folk singers.

The items performed are: *Very Last Day, Hush-a-bye, All my Trials, Rocky Road, Tell it on the Mountain, Polly Von, Stewball, Long Chain On, Don't think twice, it's alright, Freight Train, Quit your low down ways, and Blowin' in the Wind*. Inside the cardboard sleeve the usual record notes are omitted; instead we have a rather smudgy black and white picture of Peter, Paul and Mary. This is nothing but laziness on the part of the publishers; there could have been included some very interesting notes on the origins and histories of the individual items of the programme. And if Warner Brothers are forgiven their transgression it is only because this is such a good collection, well recorded and well performed. But please don't dodge the sleeve notes in future!

Of the recorded items my favourite is No. 6 on side 2, the title piece, *Blowin' in the Wind*. Particularly impressive is the stereophonic image, which on this cassette compares more than favourably with that produced from other, conventional sound reproduction media. I think this is the first Warner Brothers cassette I have heard, and I sincerely hope it will not be the last.

TRINI LOPEZ AT P.J.'s. Reprise CRP355, 40s.

If I admit that I found this to be one of the most intriguing Musiccassettes I have handled it might be something of an anticlimax when I tell you that my interest was largely centred around a loose piece of ironmongery imprisoned within the cassette itself. When shaken it rattled. Having never before dared to break apart the neat little plastic container I decided this was an excellent excuse. Easily taken apart by removing the five fixing screws, the cause of the trouble was found to be a spare screw bouncing around inside. It took a little while to put the two halves together correctly, but at least it shows that this can be done. I should add that the Musiccassette played quite satisfactorily both before the screw was removed, and, even more remarkably, afterwards!

The Trini Lopez collection includes: *La Bamba, Granada, Unchain my Heart, This Land is your Land, What'd I Say, America, If I had a Hammer, Bye Bye Blackbird, Cielito Lindo and a Popular Medley*. A studio recording would have been rather dull—however good the beat, too much of it can become boring. This album was recorded in P.J.'s, the well known Hollywood nightspot, and we have plenty of audience participation. This helps to create a thoroughly happy party atmosphere, and this album can be thoroughly recommended for such domestic occasions. So if you aspire to convert your small back room into a second swinging Hollywood landmark you couldn't do better than start with a copy of this album; alternatively if you just wanted a less pretentious gathering I am sure it would go down equally well.

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MUSIC ON TAPE

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BERLIOZ. La Damnation de Faust. Complete. Directed by Igor Markevitch with the Lamoureux Orchestra Ampex S8099 4-track stereo 7½ ips. 179s. 4d.

In this recording of the complete opera the part of Marguerite is sung by Consuelo Rubio, Faust by Richard Verreau, Méphistophélès by Michel Roux and that of Brander by Pierre Mollet. The set comprises two seven inch spools in a single box, together with a fifty page illustrated booklet giving the complete libretto in both French and English, together with copious notes.

We must make the point that opera—and indeed ballet as well—is an art form which manifests itself in two planes; there is the music in one and the dramatic spectacle in the other. Only in live, theatrical presentation can the two merge together to offer a complete experience for the listener. Just as soon as we take the music out of the opera house and imprison it on disc, on tape or squeeze it through the ether in the form of radio waves, we lose all the spectacle and most of the drama. So a complete opera on tape or disc is, in fact, most incomplete. There is just no substitute for live performance, and any recording can only hope to be a pale reflection of the real thing.

Nevertheless there are certain advantages in listening to recorded versions. There is the obvious convenience of being able to reproduce from tape at any time, and, for serious study, to stop the machine and repeat any desired sections at will. Equally important is the ability to concentrate upon both words and music without the distraction of the visual spectacle. This may appear to be a contradiction—to refer to the theatrical content as a distraction. In a recording, or should I say in a *good* recording, one can listen to, and hear every word from every artist. Sitting at ease at home one can follow the libretto word for word, together with its translation if necessary. This cannot be done in the theatre. Neither, unfortunately, could one say that every word is distinct and intelligible to all the audience in a theatrical production. The ideal, of course, is to listen to and study a recorded performance, but then always to follow it up with a visit to the real thing. In this way the maximum benefit will be obtained from both.

Listening to the reproduction of a recording of a complete opera can be a gruelling business. Lack of spectacle can easily lead to boredom; complex dialogue can be rendered meaningless. Not so with this album. The music is enthralling; the vocalists' diction is perfect, and the whole offers a genuine, operatic experience. At the end of the performance I was left with the feeling of having visited the opera house. Higher praise than this can hardly be given to any recording of any opera.

As a subject the legend of Faust has inspired no fewer than fourteen operas by different composers. It only too clearly interprets civilised mankind's attitudes towards good and evil. Perhaps in the uncivilised civilisation of to-day it is time for a new Faust. By to-day's standards is the apotheosis of Marguerite into Heaven either

fair or reasonable? A latter-day version might place all the blame fairly and squarely on our heroine's shoulders and condemn her to eternal perdition, whilst raising Faustus to heavenly forgiveness—that is always assuming we could tell the one from the other. . . .

This is not such a digression as one might imagine. Such a work as Berlioz's *Damnation of Faust* is intended to set the mind working, which is exactly what this very excellent recording does. Although it is expensive it is cheaper than certain other mental stimuli, and for me at least, far more effective.

* * *

ALBAN BERG. Wozzeck. Complete. Choir and Orchestra of the Deutschen Oper, Berlin, directed by Karl Böhm. Ampex DGP8991 4-track stereo 7½ ips. 119s. 4d.

In this complete performance of the opera *Wozzeck* on a single, 7 inch, spool, leading parts are sung by Dietrich Fischer-Dieskau, Helmut Melchert, Evelyn Lear and Alice Oelke. As is usual with Ampex, a comprehensive booklet, lavishly illustrated, is enclosed in the tape box. It gives both German and English version of the complete libretto, together with notes both on the opera itself and on the philosophy behind this particular recording. Ampex really are to be congratulated on providing such interesting and detailed information.

In its original form *Wozzeck* was a play written by Georg Büchner. Far from being an ordinary play, it was remarkable for many reasons. Written in the early part of the nineteenth century it is a superb presentation of that eternally universal figure, the poor, proletarian soldier who finds all the world is against him and who can do no right. Essentially the tragic comedian, he was later to be immortalised as Schweik and other literary figures through whom the established order of things has been denounced, laughed at and rejected. What is remarkable about *Wozzeck* is that it should have been written on such a theme as early as the 1830's.

The original manuscript was lost for nearly a century. Totally illegible, the words were only deciphered by the use of chemicals when it was first published in 1879. The composer, Alban Berg, first saw the play on the stage in Vienna, just before the outbreak of the first world war.

The effect of the play upon Berg was profound. Although according to the time scale this was now nearly one hundred years since it had first been written, Berg appreciated how far ahead of its time it really was. He determined to set it to music in operatic form, strongly against the advice of his contemporaries. In so doing he produced a score that was not only as equally remarkable, but was equally ahead of its time. He is described in the record notes as "pioneering an entirely new territory in music, far beyond the limits of the twelve tone music of the contemporary Viennese school (Arnold Schoenberg, Anton von Webern). Berg left on the new music of our time its most apparent fundamental mark." I cannot do better than quote these words, as they adequately summarise Berg's new music.

Appropriately, extracts from *Wozzeck* have been performed in London within the last few weeks. Not only is Berg still very much in the forefront of the musical world, but he is still far from universally understood.

Although recording is in every way exemplary—the article “Thoughts on a recording of *Wozzeck*” by Otto Gerdes included in the booklet with the tape throws much light on the problem of producing a purely gramophonic version of an opera—it must at once be admitted that this is not a recording for everyday listening by everyone. It needs an open, and, dare I say it, advanced, mind to be appreciated. Not to be recommended for any who find modern music incomprehensible; strongly recommended to those students of social behaviour and contemporary art forms who feel the need to acquire more than a superficial understanding.

THE MIKADO. Complete. Pro Arte Orchestra with Glyndebourne Festival Chorus conducted by Sir Malcolm Sargeant. Angel Y2S3573 4-track stereo 3½ ips. 120s.

This album, on a single 7 inch spool, offers a total programme duration of just over one hour and thirty minutes, running at a tape speed of 3½ ips. Most 7½ ips tape records are roughly the equivalent of 33½ rpm long-playing gramophone records, having approximately twenty minutes' programme time on each side. The timings of this recording are: Overture and Act I on side 1, 54 minutes, 25 seconds, and on side 2, Act II, 36 minutes, 18 seconds.

One great advantage of tape as a medium for commercial recording is the possibility of such extended programme timings, but it will be noted that to achieve this end the slower tape speed has had to be used. I must point out, however, that it is quite feasible to use thinner tapes and so achieve this long programme time on a single 7 inch spool, running not at 3½ ips but at 7½ ips. We recently reviewed a Sibelius album (Ampex DGK 8974) where the timings were 44 minutes, 7 seconds on side 1 and 52 minutes, 9 seconds on side 2. This was a 7½ ips quarter-track recording.

The slower speed requires less tape, and therefore enables the manufacturer to produce his recording more cheaply. Unfortunately the customer loses because he is denied the benefit of the extended frequency response and improved signal-to-noise ratio that is always evident when working at the faster speed. It is to be hoped that we can look forward to the day when all high quality, stereo, spool-to-spool recordings are standardised at 7½ ips quarter-track. When this happens, as I believe it inevitably must, it will finally establish beyond all doubt the very high quality that can be obtained from tape as a medium for commercial music.

With apologies for the digression, let us turn to the *Mikado*. We have heard a great deal of Gilbert and Sullivan since these works recently came out of copyright. Not only have there been productions on television and sound radio, but almost every amateur operatic group in the country has avidly seized the opportunity and produced something out of the Gilbert and Sullivan repertoire.

With so much interest and activity around, it is perhaps not a bad thing to establish standards of performance by reference to recorded versions by artistes who really do know what Gilbert and Sullivan is all about. In this album the cast is impressive, including Owen Brannigan, Richard Lewis, Geraint Evans, Ian Wallace, John Cameron, Elsie Morison, Marjorie Thomas, Jeannette Sinclair and Monica Sinclair. The accolade

for the best performance must be awarded to Monica Sinclair, contralto, for her interpretation of Katisha. In singing this role she produces some really delicious sound. I found Richard Lewis, tenor, as Nanki-Poo, the least effective member of the cast. His weakness in delivery and dramatic interpretation shows up against the performance of his colleagues.

Having already commented upon the slow tape speed I can only say that recorded quality is at least as good, if not a little better, than might be expected. At 7½ ips we would have had the advantage of greater realism which the Pro Arte Orchestra well deserve.

Renowned as we are for taking our fun seriously, this recording could either be regarded as pure, shameless enjoyment, or as a subject for serious study, depending entirely upon the listener's needs or temperament. Whatever the approach I can assure you that this recording is jolly good fun to listen to—and as typically British as Gilbert and Sullivan should be.

TCHAIKOVSKY BALLET SUITES. Swan Lake and The Sleeping Beauty. Philharmonia Orchestra conducted by Herbert von Karajan. Angel ZS35740 4-track stereo 7½ ips, 75s.

This is essentially a popular album, containing as it does selections of the best loved items from what must be the two most well-known ballets in the repertoire. Items from *Swan Lake* include *The Swan Theme*, *Waltz in A Major from Act I*, *Dance of the Little Swans*, *Introduction and Second Dance to the Queen of Swans* and *The Hungarian Dance*.

There is a danger that “listening” to music at this level of popularity might too easily degenerate into the mere passive absorption of sound. True listening demands a conscious effort and the establishment of a bond of understanding between the listener and the sound. Several visitors to my home, all professed lovers of the ballet, expressed great interest in this recording and asked to hear it. Without exception they quickly lost personal contact with the music, began to start quiet irrelevant side conversations, and at the end of the tape politely remarked on how much they had enjoyed it.

I mention this point because *Swan Lake* is typical of the music that is likely to suffer abuse in this way. Real listening is always rewarding; to treat this collection as mere background sound is deplorable. The performance of the Philharmonia Orchestra, under Herbert von Karajan, leaves little to be desired. Overall recorded quality is excellent, but to be hypercritical one could question the occasional lack of balance between the strings and the rest of the orchestra. Also there is an occasional tendency towards muddiness in the lowest registers. Neither of these two blemishes are so obtrusive as to detract from the enjoyment of this recording.

On side 2 the suites from *Sleeping Beauty* include: *Introduction and Lilac Fairy*, *Pas d'Action*, *Pas de Caractère*, *Panorama* and *Valse*. I was interested to note that the listeners' attention was more easily held by the music on this side of the tape. The record notes suggest that no more melodic or colourful score has ever been composed for the dance. I would prefer to dilute the extravagance of that claim by simply stating that within this album we do have some of the finest ballet music ever written. As such this tape can be strongly recommended—but I do hope those who buy it will listen to it.

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TWO new tape recorders from Ultra are announced by the British Radio Corporation. Model 6214 is a twin-track machine with a single speed of 3½ ips. The maximum reel diameter is 5½ inches and features include an accurate tape position indicator, a quoted frequency range of from 60 to 10,000 Hz, a claimed audio output of three watts (speech and music rating), a high sensitivity 7 x 3½ inches elliptical speaker and pause control.

Inputs are provided for microphone, radio and pick-up and access to the unselected track is available for stereophonic playback.

Finished in black PVC with leather-grain effect, the machine has a teak veneered speaker grille and detachable lid of transparent smoke-grey Diakon. The recommended retail price is 27 guineas.



Of similar appearance, model 6216 is a four-track machine with speeds of 1½ and 3½ ips. The claimed response at the slower speed is 60 to 6,000 Hz and at 3½ ips 60 to 10,000 Hz. Signal-to-noise ratio is claimed to be 40 dB.

The 6216 provides an accessory socket facility for foot switch remote pause control, an auxiliary DC power supply outlet, monitoring with high impedance headset and access to the unselected track.

Recommended retail price of the 6216 is 35 guineas.

British Radio Corporation, 284 Southbury Road, Enfield, Middlesex.

**QUALITY CLAIMS
FROM ROGERS**

ANOTHER piece of equipment seen for the first time at the recent Audio Fair is the Rogers Ravensbourne 25-watt integrated stereo amplifier/control unit which employs silicon transistors throughout and is designed for use in home stereo systems where high standards of performance are required.

Remarkable technical performance figures are claimed for this equipment, which the manufacturers state is so good that it is audibly better than any comparable amplifier currently available. 1M distortion is quoted as less than .5 per cent at 25 watts, total harmonic distortion less than .1 per

cent at 25 watts and signal-to-noise ratio -80 dB relative to 25 watts. The full power output is said to be available at 15 ohms impedance.

As well as all the usual facilities, full provision has been made for stereo record and replay from portable and built-in tape recorders. The input selector incorporates a tape monitor facility for tape recorders having separate replay channels. Connections are via a 5-way DIN panel socket or four phono sockets at the rear of the chassis.



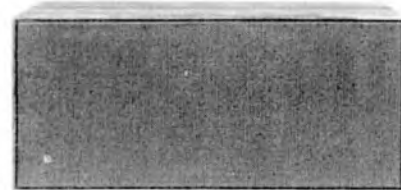
Available as from the end of May this year the price of the chassis model will be £59 10s., the case model £64. An additional external, transistorised, pre-amplifier unit is available to convert the auxiliary input socket for tape head replay, microphone or second disc input at an additional cost of £6.

Rogers Developments (Electronics) Limited, 4/14, Barmeston Road, Catford, London, S.E.6.

**NEW
B & O SPEAKER**

BANG & OLUFSEN announce the release of a newly designed loudspeaker. Designated the Beovox 1500, it replaces the Type S and follows the B & O pressure chamber principle.

Dimensions are 25 inches high, 11 inches wide and 12 inches deep, and the weight is 27½ lbs. Employing three separate units to handle the bass, mid-range and high frequencies, power handling capacity is stated to be 15 watts RMS at 4 to 8 ohms impedance. Claimed overall frequency response is 45 to 20,000 Hz and the cross-over frequencies are 800 and 5,000 Hz for the mid-range and high frequency units respectively.



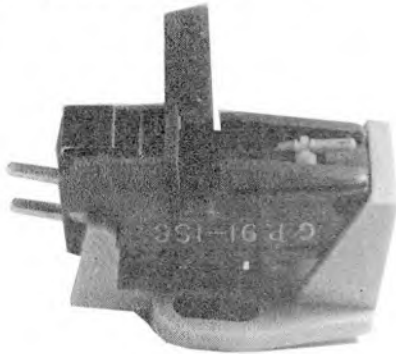
Special features are the inclusion of a high position attenuator fitted to the mid-range unit enabling all acoustic conditions to be accommodated. An additional external treble speaker socket is provided for use where an additional high frequency unit might enhance or broaden the stereo image when used as a pair. Alternative finishes are teak or rosewood and the recommended retail price is 25 guineas.

Bang & Olufsen UK Sales Division, Mercia Road, Gloucester.

COMPATIBLE ACOS CARTRIDGE

THIS item in New Products relates particularly to our editorial feature on page 225 regarding compatibility of pick-up cartridges.

Cosmocord Limited are now marketing a crystal pick-up cartridge specifically designed to meet a situation where it is necessary to replay a stereo disc on mono equipment. The cartridge is available in two versions, the Acos GP 91-1SC (medium output) and the GP 91-3SC (high output). Both can be used on stereo or mono LPs and on 78s, and can have either diamond or sapphire styli.



The medium output model has a claimed frequency response of from 40 to 12,000 Hertz, the recommended tracking pressure is 3/6 grammes and the recommended load impedance is 1 M Ohm. The high output version tracks at rather higher weights, from 5/10 grammes, the frequency response is claimed to be from 40 to 11,000 Hertz and the recommended load is again 1 M Ohm.

Prices are 27s. 6d. plus 4s. 10d. purchase tax with sapphire stylus or 36s. 1d. plus 6s. 5d. purchase tax with diamond stylus.

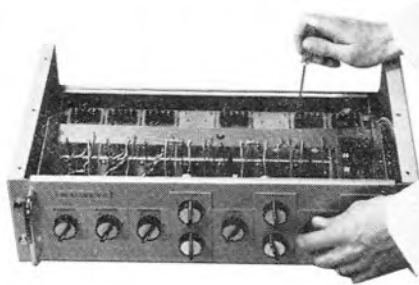
Cosmocord Limited, Eleanor Cross Road, Waltham Cross, Hertfordshire.

NEW MIXER MODULAR DESIGN

AN entirely new modular mixer of great flexibility is announced by Magneta (BVC) Limited.

The master unit and power pack will accept up to 50 modules; the basic frame unit provides space for one master unit, power pack and six modules. Further frames can be stacked to provide additional inputs. Input modules are available to match microphone, gramophone, tape, radio or projector outputs.

Tone control modules are also available providing bass and treble lift and cut. This module is used between the input modules and the master unit so that individual inputs may be separately controlled, or one tone control module will control the entire mixer output. This arrangement is said to allow a very comprehensive mixer to be tailored exactly to individual requirements without the cost penalty associated with one-off specials. The approximate cost of the three



input Magneta modular mixer, with one tone control module, is quoted as about £60.

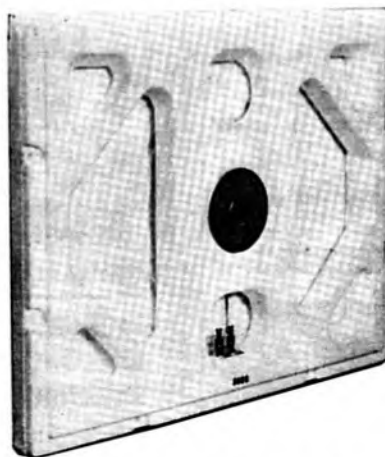
Output is either a nominal one volt at 5.6 k/ohms but a 600 ohm output can be supplied. Frequency response is said to be maintained within 3 dB from 30 to 40,000 Hz. Distortion is claimed to be below 0.2 per cent, rising to 3 per cent for 25 dB overload. Interaction and cross talk between channels is said to be negligible.

Magneta (BVC) Limited, Ackmar Works, Parsons Green Lane, London, S.W.6.

HOW THIN? VERY THIN!

AN original approach to loudspeaker design is incorporated in new wafer type models manufactured by Electronic Research Associates Incorporated, of New Jersey, USA, and now available from Ad Auriema Limited.

Known as Poly-Planar, they are extremely thin, being approximately one-fifth of the depth of an equivalent cone speaker handling the same power range. Examples quoted are Model P 20, which is said to be the equivalent to a 20 watt, 12 inch Woofer and Tweeter combination, is only 1 7/16 of an inch thick, whilst Model P 5, designed to replace the conventional 5 watt 6 inch cone speaker, is but 1/4 inch deep.



Claimed frequency response is from 40 to 20,000 Hz and the system is said to offer low distortion with high electromagnetic efficiency. Constructed almost entirely of expanded polystyrene, the speaker is said to be impervious to extremes of temperature, humidity, shock and vibration. It can be used un baffled for door, wall or cabinet mounting, or it may be incorporated into

acoustic enclosures, conventional or unconventional. It is said that the speaker has been operated continuously under water with no deterioration of performance or characteristics.

Prices from 60s.

Ad Auriema Limited, 125 Gunnersbury Lane, London, W.3.

SOMETHING FOR NOTHING?

THIS "New Product" is in fact a 50-page handbook measuring approximately 8 x 11 1/2 inches, beautifully prepared and presented between high quality glossy covers, the illustration from which is shown below.

Entitled, "Ferranti High Fidelity Audio Designs," the text deals comprehensively with this subject and describes a number of audio frequency circuits based on both Ferranti n-p-n and p-n-p silicon planar epitaxial transistors.



Sections are included on pre-amplifiers, 7, 15, 30 and 150 watt audio frequency amplifiers and associated power supply units, a tape playback pre-amplifier, a tape recording amplifier, a tape record level indicator, a tape erase/bias oscillator and an FM tuner. Notes on layout and assembly instructions for printed circuit boards are also provided. All the pre-amplifiers and main amplifiers described are completely compatible and may be mixed without regard to impedance levels or sensitivities.

The biggest surprise of all is that this beautiful publication is offered, free of all charge, upon application to the publishers, Ferranti Limited.

Ferranti Limited, Gem Mill, Oldham, Lancashire.



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PHILIPS EL 3536—4 track mono/stereo. Perfect condition. Original list £97	OUR PRICE	49gns.
GRUNDIG TK46—4 track stereo. Absolutely as new. 1 only. List £112	OUR PRICE	65gns.
UHER 4000S.—Superb 4 track. Battery mains portable. List £104. 1 only	OUR PRICE	75gns.
TELEFUNKEN 85KL—De luxe. Superb 2 track model. Brand new. List £95	OUR PRICE	69gns.
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5" 600'	21 -	16 10	4" 600'	25 -	20 -
5 1/2" 900'	28 -	22 6	4 1/2" 900' BASF	30 -	24 -
7" 1,200'	35 -	28 -	5" 1,200'	42 -	33 8
LONG PLAY			5 1/2" 1,800'	55 6	44 6
3" 210'	9 -	7 3	7" 2,400'	77 6	62 -
4" 450'	14 6	11 8	TRIPLE PLAY		
4 1/2" 600' BASF	21 -	16 10	3" 450'	22 -	17 8
5" 900'	28 -	22 6	4" 900'	39 -	31 3
5 1/2" 1,200'	35 -	28 -	4 1/2" 1,200' BASF	49 -	39 3
7" 1,800'	50 -	40 -	5" 1,800'	66 -	52 10
8 1/2" 2,400' } BASF	72 6	58 -	5 1/2" 2,400' } BASF	90 -	72 -
10" 3,600' } Only	95 -	76 -	7" 3,600' } Only	115 -	92 -

SCOTCH

STANDARD PLAY	LIST PRICE	OUR PRICE	DOUBLE PLAY	LIST PRICE	OUR PRICE
5" 600'	20 6	16 4	3" 400'	16 6	13 2
5 1/2" 900'	27 6	22 -	4" 600'	24 6	19 6
7" 1,200'	35 -	28 -	5" 1,200'	41 9	33 6
LONG PLAY			5 1/2" 1,800'	55 -	44 -
3" 300'	9 6	7 6	7" 2,400'	76 6	61 -
4" 450'	14 6	11 8	TRIPLE PLAY		
5" 900'	27 6	22 -	3" 600'	24 9	19 6
5 1/2" 1,200'	34 6	27 6	4" 900'	38 6	30 6
7" 1,800'	49 -	39 -	DYNARANGE (L/P)		
8 1/2" 2,400'	72 6	58 -	5" 900'	32 3	25 9
STANDARD (ACETATE)			5 1/2" 1,200'	40 6	32 6
5 1/2" 850'	24 6	19 6	7" 1,800'	57 6	46 -
7" 1,200'	30 -	24 -	8 1/2" 2,400'	83 6	66 6

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April 1967

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5 in. Standard play, 600 ft. PVC	8/6	Post 1/- per reel—4 reels & over Post Free	
5 in. Triple play, 1,800 ft. Mylar	35/-	Clear Plastic Spools (empty): 3" 1/6,	
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4" 300' 3/9	4" 450' 5/-	4" 600' 8/3	4" 900' 12/6
5" 600' 8/3	5" 900' 9/9	5" 1200' 15/3	5" 1800' 22/6
5 1/2" 900' 10/-	5 1/2" 1200' 12/3	5 1/2" 1800' 19/3	5 1/2" 2400' 28/6
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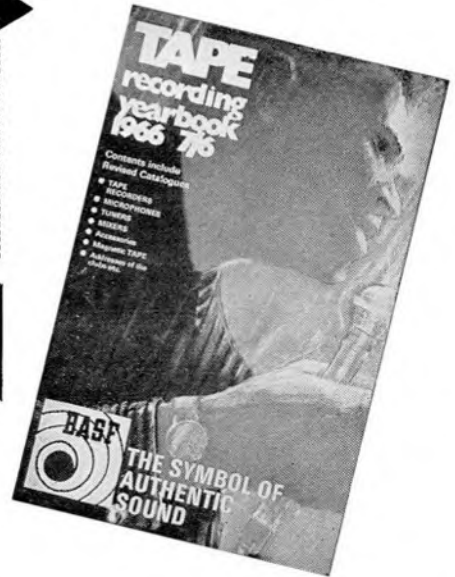
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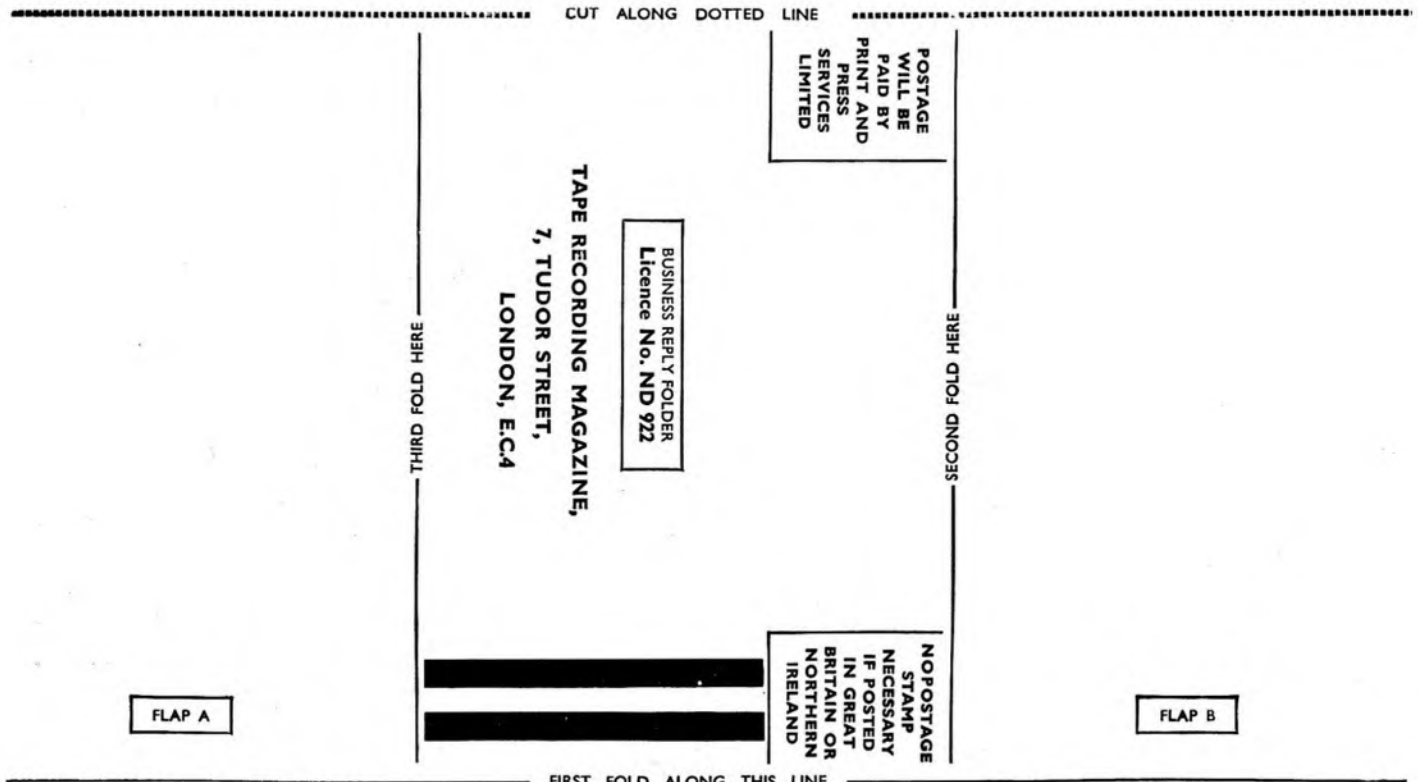


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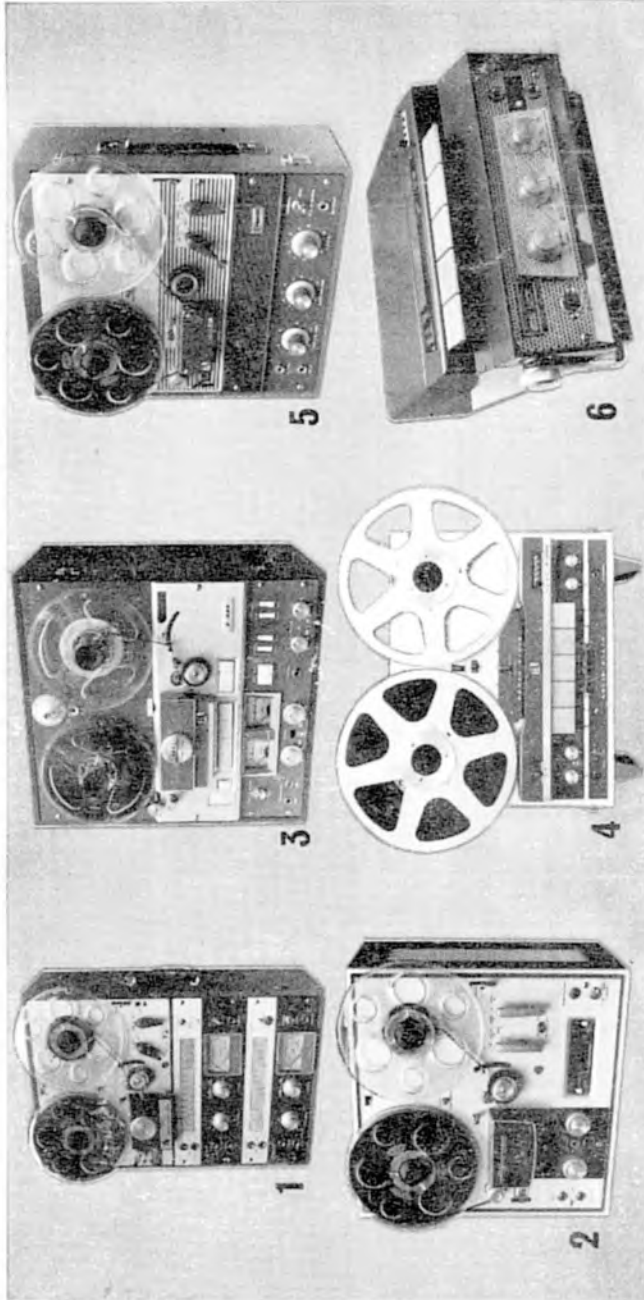
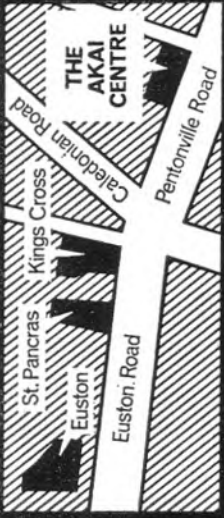
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