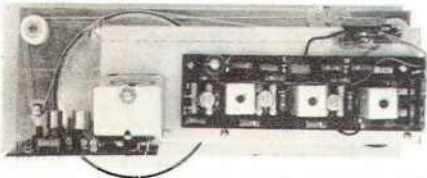


AMATEUR TAPE RECORDING

AUDIOVIEW REPORTS ON THE 1965 AUDIO FESTIVAL

FREE EXHIBITION PLAN

News of the latest audio developments including this MARTIN F.M. TUNER built from a kit of parts.



ELIMINATING HUM IN AMPLIFIERS

More video news from Norman Rutherford and F.C. Judd with latest reports from America





only MALLORY could improve the world's most powerful standard size batteries

Leakproof Mallory Manganese Batteries have already proved their superior long life, fade free performance in photographic equipment, tape recorders and radios throughout the world.

Now, with their pioneering ability, Mallory have *improved* this outstanding performance. A newly developed construction technique provides lower internal resistance, higher flash currents, a greater ability to withstand heavy, continuous loads. Result—more reliability than ever before in a wider range of high power applications.

For the extra performance your equipment deserves, choose Mallory power next—and every—time.

MALLORY

for new ideas in batteries

MALLORY BATTERIES LIMITED CRAWLEY SUSSEX *Crawley 26041*

AMATEUR

TAPE RECORDING

VIDEO & HI-FI

Vol. 6 No. 10 May 1965

Page	Feature	Text
Cover	Part of the Sound and Vision recording workshop of ATR	Editor F. C. Judd
10	Something is Rotten	Kim Cook
13	Tape and Transistors	Gordon J. King
16	The Things You Say	ATR
18	Video Picture Quality	F. C. Judd
20	Television Tape Recording	N. Rutherford
28	Copyright	ATR
29	Elimination of Hum	E. A. Rule
32	Audio View	ATR
34	Audio Fair Exhibitors	ATR
35	Audio Fair Plan	ATR
38	Introduction to Stereo	H. Burrell Hadden
43	Tape Recorders in the Making	F. C. Judd
47	Recording Diary	ATR
48	Loudspeakers	D. J. Barnett
54	Tape Club News	Kim Cook
65	Classified Advertisements	

AUDIO FESTIVAL — BUT WHAT ABOUT VIDEO ?

Over the years the Audio Festival has gradually embraced tape recording as part and parcel of its purpose in demonstrating sound reproduction at its best to the enthusiast. The tape recorder has in fact become a high fidelity sound source in its own right and is much in evidence not only at the Audio Festival but of course in the shop windows of every hi-fi dealer up and down the country. One might say that audio and tape recording are jointly well established and enjoy the prestige they so rightly deserve.

Now what of video recording ? How long before it too becomes completely domesticated and a subject for discussion when ever magnetic tape is mentioned ? The closed circuit television exhibition held in February by the Audio Visual Aids Society clearly showed the vast potential of video outside of conventional home television. With the growing interest in video tape recording among enthusiasts and the fact that equipment for amateur and domestic use is now becoming available, it may not be very long before a 'Video Festival' will be needed. Why not combine the two and have an Audio-Video Festival ? We ask the question — perhaps someone can supply the answer. F.C.J.

Publishers: Clive Labovitch, Michael Heseltine. Editor: F. C. Judd, A.Inst.E. Assistant Editor: Kim Cook. Art Editor: Robert Morley. Production Director: Denis Curtis. Advertisement Director: Lindsay Masters. Advertisement Manager: E. McKeown. Circulation Manager: David Hughes. Editorial, Advertising and Subscriptions: Amateur Tape Recording, Haymarket Press Ltd, 86/88 Edgware Road, London W2. Ambassador 3200. Amateur Tape Recording is published by Haymarket Press Ltd., (C) 1965. Printed by Athol Press, Douglas, Isle of Man. Title registered at Stationers' Hall. Subscription Rates throughout the world 30s. 0d. Post Paid for twelve issues.



ANOTHER BRILLIANT DESIGN from BRENELL

The STB2 is a masterpiece in mechanical engineering and electronic circuitry. It is a versatile mono/stereo tape recorder and has been designed with high fidelity stereo installations particularly, in mind.

SPECIFICATION (STB2/5/2)

It has all the standard Brenell features of 4 tape speeds, frequency correction at all speeds, three Papst outer rotor motors, pause control, monitoring and superimposing, $8\frac{1}{2}$ " dia. reels, fast rewind, etc., plus—adjustable attenuators on all input channels to ensure perfect matching with all auxiliary equipment • dual concentric recording level and playback level controls • cathode follower output four channel mixing on mono programme sources • twin recording and twin playback pre-amplifiers • comparison of original and recorded signal • adjustable bias level • recording facilities for 1/2 and 2/2 track • playback facilities for 1/2, 2/2, 1/4 and 2/4 track sound-on sound facilities • two edgewise meters for recording level, tape output level and bias level • optional extra:- stereo power amplifiers and monitoring speakers.

ALTERNATIVE MODEL STB2/510/2 has special deck to accommodate $10\frac{1}{2}$ " N.A.B. reels.

Please write for full details to the sole manufacturer :-

INTERNATIONAL AUDIO FAIR
STAND No. 12
DEMONSTRATION ROOM 337



BRENELL ENGINEERING CO. LTD.

231/5 Liverpool Road, London, N.1.
 Telephone: NORTH 8271 (5 lines)

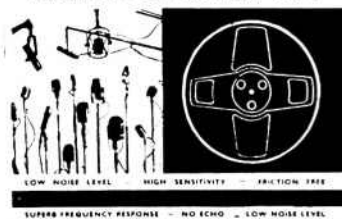
GD 958



900 FEET

1 MIL L.P.

MAGNETIC RECORDING TAPE



WITH EVERY ONE
OF THESE MUSIC
TAPES YOU GET
A FREE 5" REEL OF
POLYESTER RE-
CORDING TAPE

MONO 40/-
2-TRACK 45/-
STEREO 45/-
4-TRACK 42/6
STEREO 42/6

All at 3 3/4 i.p.s.

TWO TAPES FOR THE PRICE OF ONE



TAPECRAFT
brings you
examples of
recording
techniques,
cycles per
second,
frequency
response,
equalisation,
balance and a
host of other
information
which cannot
be learned in

any other way. All there is to know
about tape—on tape. Mono only. 35/-



**SOUND
ADVENTURE**
provides a
unique
glance into
the way
sound is put
to work for
the benefit
and pleasure
of mankind,
it deals with
intensity,
Doppler
effect,

Echo, Reverberation, Fundamentals and
Overtones, and a host of other things
of interest to the amateur recordist.
Mono only. 27/6

You get 62/6 value for 30/-

FREE! 900 ft REEL OF 1 mil TAPE



Dutch Band Organ is
different, the particular
instrument is the pride
of Amsterdam and
brings such favourites
as Cuddle Up a Little
Closer; Tennessee Waltz;
Pretty Baby; Blue Tan-
go; Under the Double
Eagle, and seven others.
Tape No. R902.



Stan Getz — every jazz
enthusiast has a soft
spot for this man's
saxophone playing. He
brings Indian Summer;
The Lady in Red;
There's a Small Hotel;
I've Got You Under
My Skin; Too Marvel-
lous for Words and six
others, equally famous.
This is Getz at his
greatest.
Tape No. MP.7256.



The Wurtemberg Sym-
phony Orchestra brings
Wagner's Flying Dutch-
man Overture; The
Good Friday Music from
Parsifal; Sibelius's Valse
Triste, and three others
equally well loved.
Forty-five minutes of
magnificent music.
Tape No. 505.



Larry Moreton on a
Hammond, with a fabu-
lous rhythm accompani-
ment, brings Heatwave;
That Old Black Magic;
Lullaby of Broadway,
and seven other won-
derful numbers. Twenty
six minutes of fascinat-
ing playing and fabulous
recording.
Tape No. 239.



No one can fail to be
attracted to these ar-
rangements of such
lovely songs as Tender-
ly; Over the Rainbow;
September Song; Laura;
Begin the Beguine, and
five others equally well
known. The world's
most beautiful songs
played in a lush and
fascinating way.
Tape No. 238.



The London Brass En-
semble with a double
percussion section.
Sparkling and unusual
arrangements of every-
body's favourites. Mood
Indigo; Orchids in the
Moonlight; Among My
Souvenirs and seven
others. Twenty-six min-
utes of entertaining
music that's fabulous in
Stereo.
Tape No. 231.



The Genius of George
Wright at the mighty
Wurlitzer Organ — this
tape sold nearly a million
in the U.S.A. George is
the greatest ever of the
Theatre Organists. Her-
nando's Hideaway; Song
of the Islands; Tea for
Two; Strike up the Band,
and eight others you
simply must hear.
Tape R.713.



The Original Ray Char-
les, the fabulous Negro
who has become one of
the "immortals" on the
international music hori-
zon. Here he brings
Ain't That Fine; Honey
Honey; Can Anyone
Ask For More; Sittin'
On Top of the World
and eight more you
simply must have.
Tape No. MTR24.

This special **BONUS OFFER** is made to enable you to sample the outstanding quality of **RECO-TAPE** Magnetic Recording Tape and at the same time enjoy the entertainment of the **RECO-TAPE** Music Tapes without extra cost. The retail value of the reel of Recording Tape is 24/6d., the pre-recorded tapes offered are priced at 40/-, thus you get 64/6d. value for your 40/-

Take this coupon to your usual dealer today, pay him, we will post the tapes to you. If he has no stock or is too tired to post the coupon, send it direct to us with your remittance. We'll post your tapes by return.

HAND THIS COUPON TO YOUR DEALER

Dealer should deduct normal Trade Discount from all remittances

To order, just write the **NUMBER** of the
tapes selected in the appropriate box
below.

Insert Tape No. here

RML ☐ MONO

2RSL ☐ 2 Track Stereo

4RSL ☐ 4 Track Stereo

Put an X if you require

Tapecraft and Sound Adventure ☐

To: Esoteric Productions Limited,
10 Wells Avenue, Southend on Sea, Essex

Please send to me, at the address given below, the tapes noted
in the box at the side of this order. I enclose £
which includes 1/6 postage and packing for each set ordered.

NAME

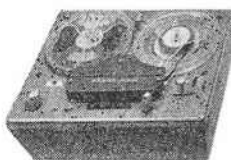
ADDRESS

EVERY TAPE UNCONDITIONALLY GUARANTEED

"WHENEVER THE DEMAND IS FOR PRECISION RELIABILITY AND NATURAL SOUND REPRODUCTION —THE CHOICE MUST BE TANDBERG"

SERIES

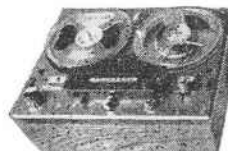
6



Model 64 4 track
Model 62 2 track
Price 110 gns. each.
Semi-professional
Stereo/mono tape
recorders with cathode
follower output. Three
speeds — Three heads
— Four amplifiers —
"Sound on Sound"
etc.

SERIES

7



Model 74 4 track
Model 72 2 track
Price 93 gns. each

Build-it-in or carry-it-around. Complete stereo/mono record and playback with own power amplifiers and speakers. Three speeds — dual record indicators — output for hi-fi pre-amps — centre channel for language teaching or cine work.

SERIES

8

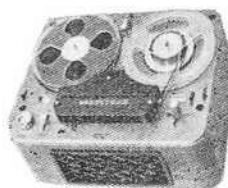


Model 823 2 track (teak case) 54 gns.
Model 822 2 track (Portable with lid) 57 gns.
Model 843 4 track (teak case) 59 gns.
Model 842 4 track (Portable with lid) 62 gns.

High class monaural tape recorders suitable for home, business, education, photo sound, etc. ($3\frac{1}{2}$ and $1\frac{1}{2}$ i.p.s. speeds — 7" reels).

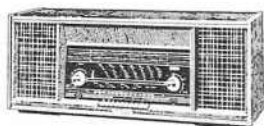
SERIES

9



Model 92 2 track only (teak case) 69 gns.
High class monaural 3 speed ($7\frac{1}{2}$, $3\frac{1}{2}$, $1\frac{1}{2}$ i.p.s.) tape recorder, with quality comparable to the famous stereo models. Extremely reliable machine, recommended for all home and educational purposes, etc.

HULDRA RADIO



MODEL 7-41 without speakers 80 gns.
MODEL 7-42 with speakers 87 gns.
Incorporates stereo amplifiers (for Series 6 recorders) and outstanding radio performance so necessary in Scandinavia. F.M. and L.W., M.W., S.W.1, S.W.2, A.M. bands. Novel "Baby Sitter" circuit.

TRANSISTOR RADIO



Model
TTR/AUTO
49 gns.

Covers L.W., M.W., S.W. and F.M. bands. Special facilities for car radio (special car accessories available). Handsomely styled in walnut. Fine performance and quality sound reproduction, separate bass and treble controls.

LOUDSPEAKERS



Model
Speaker 8
13 gns.
Dimensions:
 $14\frac{1}{2} \times 10\frac{1}{2} \times 5\frac{1}{2}$ " deep
Also Model Hi-Fi 3
22 gns.
 $22 \times 10\frac{1}{2} \times 5\frac{1}{2}$ " deep)

In handsome teak cabinets specially designed for use with Tandberg Tape Recorders and Radios. Can justly claim to be High Fidelity reproducers.

Tandberg

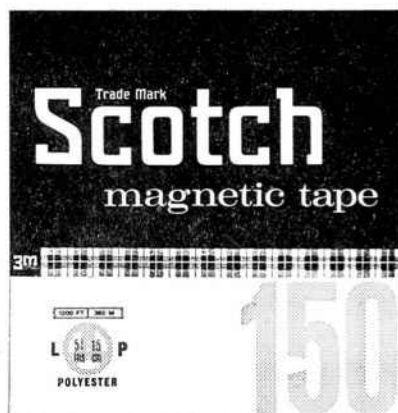
For further information and specifications please write to:

Elstone Electronics Limited, Edward Street, Templar Street,
Leeds 2. Telephone: Leeds 3-5111 (7 lines)



What's the new coating 'SCOTCH' Magnetic Tapes all wound up about?

Superlife



It's the revolutionary coating on all SCOTCH Polyester backed Magnetic Tapes that binds oxide to backing better than ever before.

"*Superlife*" eliminates rub-off on recording heads and lengthens the life of both tape and recorder by drastically reducing wear.

The flawless mirror-smooth surface on the recording side of the tape ensures intimate head to tape contact, with improved frequency response.

On or off the reel, tapes with "*Superlife*" are easily recognised for their shiny black recording surface. Now you can tell at a glance when you have the most advanced audio tape in the world.



Minnesota Mining and Manufacturing Co. Ltd., 3M House, Wigmore Street, London, W.1. 3M & SCOTCH are trademarks of Minnesota Mining and Manufacturing Company

May, 1965

7

**SPECIAL
OFFER!**

**TODAY'S
TOP
TAPE**

Mastertape
Magnetic Recording Tape

**FREE
TAP
W/**

FREE!
**600ft. of
TAPE**
ON 3" SPOOL
SAVE 24/9

FREE!

**600 ft of
TAPE**

**LOOK FOR THE
Mastertape TRIANGLE
AT YOUR LOCAL STOCKIST**

A Free 600 ft. Tape with every $5\frac{3}{4}$ " 1200 ft.
LONG PLAY MASTERTAPE YOU BUY.

SAVE 24/9 WHILE STOCKS LAST



Mastertape

**TODAY'S
TOP
TAPE**

Manufactured in England by

Mastertape (MAGNETIC) LIMITED, COLNBROOK, SLOUGH, BUCKS.

Ferrograph

SERIES 6



SERIES 6 FEATURES

NEW CASE STYLE

Combines clean design with added strength and durability.

THREE OPERATIONAL SPEEDS

$1\frac{7}{8}$, $3\frac{3}{4}$ and $7\frac{1}{2}$ i.p.s., $3\frac{3}{4}$, $7\frac{1}{2}$ and 15 i.p.s.

SYNCHRONOUS BALL-RACE CAPSTAN MOTOR

Extremely smooth running. Designed to give long maintenance-free service.

MODEL 631 $1\frac{7}{8}$ $3\frac{3}{4}$ $7\frac{1}{2}$ i.p.s. monophonic **88 gns.**

MODEL 631H $3\frac{3}{4}$ $7\frac{1}{2}$ 15 i.p.s. monophonic **92 gns.**

MODEL 632 $1\frac{7}{8}$ $3\frac{3}{4}$ $7\frac{1}{2}$ i.p.s. stereophonic **115 gns.**

MODEL 632H $3\frac{3}{4}$ $7\frac{1}{2}$ 15 i.p.s. stereophonic **120 gns.**

The "Manual of the Ferrograph"—a fifty-page, fully bound volume—is made available at the cost of £1. As well as detailed information on recording techniques available with the Ferrograph it contains technical information, circuitry and component parts lists.

When you purchase a Ferrograph the cost of the manual will be refunded to you.

THE FERROGRAPH CO. LTD.

84 Blackfriars Road, London, S.E.1.

Please send me a copy of the "Manual of the Ferrograph" for which I enclose £1.

Please send me a copy of the free Ferrograph leaflet.

NAME.....

ADDRESS

SOMETHING IS ROTTEN

Something is rotten in the State of Denmark — so wrote the Bard some three centuries ago. Today it isn't the State of Denmark, it's the world of tape recording. Just what is going wrong, and what cures there are, if any? To thrash this problem out, ATR brought together three people who have the future of tape recording very much at heart — Timothy Eckersley, who is well known as a judge of the British Amateur Tape Recording Contest, John Bradley, the Publicity Officer of the Federation of British Tape Recording Clubs, and Kim Cook, our own Assistant Editor and Club News Editor. All three have very strong opinions on the subject, and comments were pretty blunt, as this report of the conversation shows.

TIMOTHY ECKERSLEY: Before getting embroiled in this discussion I must emphasise that although I'm probably known to your readers as a member of the BBC, I'm not here in that capacity. Both as a judge of the BATRC and as a private individual, I'm immensely bothered by the apparent lack of enthusiasm shown by tape recordists in this country in making creative use of their tapes.

JOHN BRADLEY: Anybody who thinks about the situation at all must be concerned. When you consider that there are an estimated 1½-2 million tape recorder owners in the country, and that under 200 entered last year's BATRC Contest, and even less entered the ATR competition, it's very disappointing.

KIM COOK: It makes you wonder why on earth people buy recorders in the first place.

T.E.: Precisely! I suppose there must be loads of reasons why someone buys a recorder, but I doubt if any but a very small minority buy specifically for creative purposes.

J.B.: Gimmick is, I think, the main reason. It's the old old story of buying a novelty, toying with for a while, and then stacking it away and forgetting it.

T.E.: But this is so trivial. They record perhaps the children's Christmas party, perhaps some music off the radio, or Dad scrunching an apple if they're adventurous, and that's it.

J.B.: And why they record the music anyway I don't know.

K.C.: You can understand some people recording music — folk music fans for example — or recording a performance that involves a personal friend, but not the kind of music that most people put on tape.

J.B.: Why listen to an inferior recording? If you're a music fan you want the best possible recording, so you go out and buy the L.P., or if you're a recording fan, then surely the answer is to try something a little more adventurous; either way this kind of taping doesn't make sense.

K.C.: I think the main problem here is portability. If only people could wake up to the vast creative potential of the portable recorder they'd never relegate their machines to the bottom of the wardrobe.

T.E.: But even when people do have portables they don't seem to get out and about with them. Look at the number of people you see out in the streets with cameras slung over their shoulders. But how many do you see with recorders?

K.C.: Surely this is a question of the traditional British reserve. With a camera you can get around taking as many photographs as you wish without getting involved with anyone else. If you snap anyone you don't have to go up to them and talk to them first. An almost silent click and that's it.

J.B.: It's true that reserve plays a big part in this general reluctance, but only on the part of the recordist. I'm always out and about with my portable, and I've never yet been rebuffed by anyone I've approached.

K.C.: But nevertheless, the amateur recordist seems to think that the general public will be unwilling to cooperate. It's a mistaken impression, but it's there.

T.E.: And surely there's the question of the general prestige of the hobby. When you consider the prestige attached to photography for example, the money spent on every aspect of it, particularly advertising, you just can't compare it with recording. Why should this be?

J.B.: Well of course, recording is a much more recent hobby. It hasn't had as long to get established.

K.C.: But with developments moving as quickly as they do these days, you'd think that in fifteen years we'd have got a little further than this.

J.B.: True, the time aspect may be part of the reason, but there must be other factors. This question of advertising and publicity for instance. With one big film tape and camera company advertising fantastic prizes, holidays abroad and all that kind of thing in their latest camera competition, tape recording seems to be very much the poor relation.

K.C.: And the big combines as well. They advertise their radios, electric razors, cameras, adhesive tape and cleaning pads umpteen more times than their recorders and/or tape. We seem to lose out on that angle right from the start.

J.B.: True. Amateur recording at the moment needs a push that no-one seems particularly willing to give.

K.C.: And even when the manufacturers do advertise, few of them plug the creativity angle. Certainly, I watch our own advertisements in particular, and off-hand I can think of only one recorder manufacturer who has really made any effort to put over the creative angle of getting out and about with a recorder. A picture of a machine sitting in the middle of a page, with a few well chosen words about its capabilities will never convey to the reader the versatility of the machine.

T.E.: This is a very good point. If the manufacturers would put over this angle more, they'd arouse much more interest, and in the long run do themselves more good.

K.C.: But even this isn't half the story. Even if someone does manage to make a really worthwhile tape, apart from personal satisfaction, what does he get for it? Those who do enter competitions complain that they don't learn anything from it.

J.B.: This isn't quite a valid complaint as far as the BATR Contest is concerned though. We do go to a lot of time and trouble recording the judges' comments at the time, saying why the winning tape won, and why the runner-up just missed. Naturally this will be extended if there is evidence of a demand for it.

K.C.: But this is just two tapes in each section and I'm sure most tapers feel that they haven't an earthly of being one of the elite few. Now, if they felt there was some way of their small voice being heard on a larger scale...

T.E.: ... and this is where the BBC come in. Or, more strictly speaking, where the BBC doesn't come in. If there was more evidence of originality and imaginative use of tape by amateurs, the BBC would probably sit

up and take more notice. But with less than 200 entries for the BATRC, you could hardly call that sufficient evidence.

K.C.: Which brings us round full circle. People won't try unless there's some incentive, and the incentive won't be provided for people who don't try. So somewhere along the line we've got to break the vicious circle.

J.B.: The problem is how? Recording people must in some way bring themselves to the notice of bodies like the BBC before they can expect to get any allocation of broadcasting time. Now Tim, I know you're not here as a member of the BBC, but knowing them as you do, what would you suggest?

T.E.: Well there are some programmes that use contributions from outside. Not many mind you, but programmes like "Today" and "Home This Afternoon" might be interested.

J.B.: But how would the individual get his tape into such a programme?

T.E.: Well, firstly the tape itself must be of good quality, comparable to the quality of such recordings made by our own men in the field. Secondly, there's no point in sending in a recording of some great national or international event—it's our job to cover these. The real kind of thing is the sparkling interview—not anyone famous, but someone with a touch of colour. A personality that makes the tape crackle with vitality, or old people, perhaps, remembering—you've only got to listen to programmes like "Today" to get a picture of the kind of material used.

K.C.: So the idea is, if you've got a tape that you think is worth airing on radio, send it in?

T.E.: Unfortunately no. The BBC certainly doesn't want to be inundated with little tapes on a diversity of subjects that might not even be of the recording standard they require. They couldn't spend their time listening to them if that was going to be the case.

J.B.: What is the answer then?

T.E.: Well, it really needs some sort of filter, a clearing house so to speak. And of course the BTRC is the filter at the moment. Somewhere there ought to be someone with the time and the technical knowledge to assess the value of a tape. Then, and only then, if the quality is high enough, the subject interesting enough, and the time length suitable, should a tape be sent to the BBC.

K.C.: So at the moment there is nobody at the BBC who could do this job, but if time proved it worthwhile they might consider setting someone up for this purpose?

T.E.: It's possible. Once they felt there was sufficient material to warrant it, they'd use their own assessor.

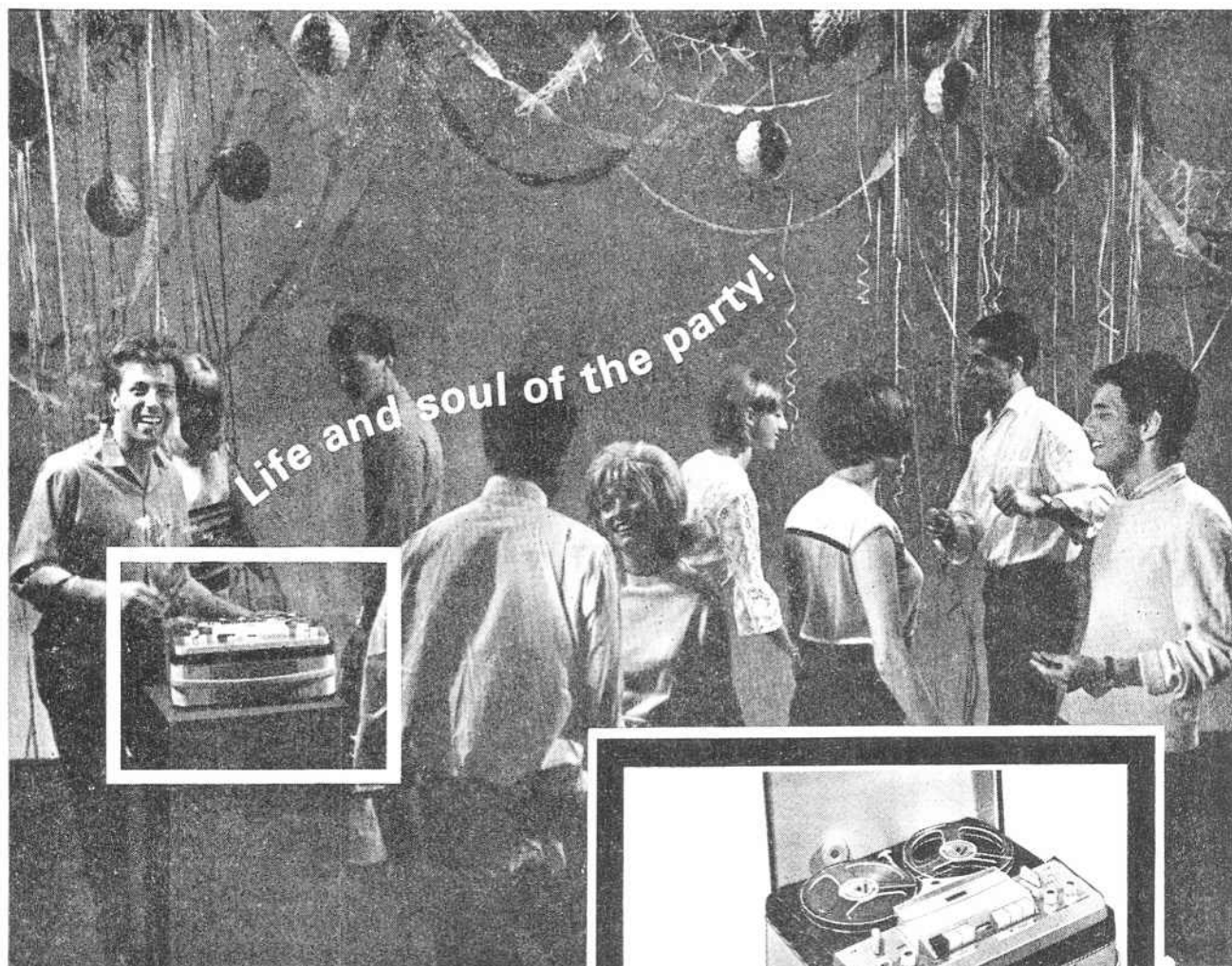
J.B.: But meanwhile it's up to the BTR Contest, people like the Federation and ATR to act as filters...

K.C.: ... And of course basically it's still up to the individual to send material to be assessed.

T.E.: That's about it.

K.C.: But what about this year's BTR Contest? Is there any chance of the winning tapes being played over the air?

Continued on page 52.



Philips de luxe Hi-Fi Tape Recorder Model EL 3549: 62 gns

Supplied complete
with microphone,
7" reel L.P. tape,
empty spool and
connecting lead.

HERE'S a party that's going with a swing—thanks to Philips EL3549 Tape Recorder! The host recorded all the music needed to make this party a success, and now Model EL3549 is playing it back—superbly! And not only does it make things swing—it catches things on the swing, too! At just the touch of a button, Model EL3549 will record improvisations, songs—in fact, any sounds that are worth remembering. Find out about this and other Philips Tape Recorders—visit your Philips dealer today!

**SEE AND
HEAR**

the complete Philips range of tape and tape recorders on Stand No. 8 at
THE AUDIO FAIR, Hotel Russell, Russell Square, London, W.C.1. April 22-25.

ANOTHER ENTERTAINING PRODUCT FROM



PHILIPS—the friend of the family

(PTR0049A)

Amateur Tape Recording Video & Hi-Fi

TAPE AND TRANSISTORS

Gordon J. King

The output from the replay head due to a tape recording of constant magnetic induction over the audio spectrum is shown in fig.1. Previous articles in this series have shown the causes for this type of output which rises at the rate of 6dB per octave up to the "turnover frequency" when the output then starts to fall pretty rapidly. We have seen that the falling treble is equalised to some extent in the record channel where treble boost feeds a greater record current into the head beyond the turnover frequency. The remaining problem, then, is related to the constant rate of *bass attenuation* back from the turnover frequency.

WANTED—BASS LIFT

This problem is solved by equalising either at the front of the playback channel or at some intermediate stage within the channel. What is wanted is an overall response in the playback channel approximating that shown in fig.2. This gives equalisation for a tape speed of $7\frac{1}{2}$ in/sec. For other tape speeds different equalisation characteristics are required, of course, since the output from the playback head differs a little between different tape speeds. This is revealed in Fig.1, where head outputs at $7\frac{1}{2}$ in/sec. and $3\frac{3}{4}$ in/sec. are shown. At the higher speed the turnover frequency is higher and the 6dB/octave rise in output is maintained almost up to the turnover frequency. At the lower speed the 6dB/octave rise is not always sustained up to the turnover frequency. The reasons for this have already been expounded.

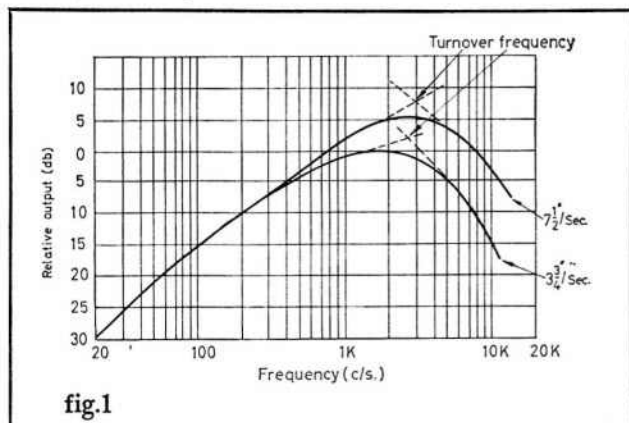


fig.1. The output from the playback head over the audio spectrum due to a tape of constant induction.

Valve playback amplifiers have a relatively high input impedance which means that the true e.m.f. induced into the head winding is in effect measured by the head amplifier. This results in an output from the amplifier which is equivalent to that of the head itself (fig.1). Clearly, then, some form of equalisation is needed in the amplifier itself to compensate for the falling bass. In a valve circuit this is invariably accommodated by frequency-selective negative feedback. A similar technique is also adopted in some transistor tape recorders, but with a transistor, it will be recalled, we require a current input into a low impedance load. The source impedance, i.e., the playback head, must also be low for maximum signal transference and the best signal/noise ratio. Generally speaking, therefore, the playback head of a transistor tape recorder is of lower impedance than that used in a valve recorder.

The idea is to couple as much signal current as possible into the transistor base circuit from the head. A playback head is mostly inductive in make-up. There are, of course, elements of resistance and capacitance, but these are small compared with the inductance. Thus, the impedance of the playback head increases with increase in signal frequency. This progressive increase in head impedance with frequency is useful, since it means that the signal current in the head must fall as the frequency increases.

SIMPLE EQUALISATION

This is really what we need to provide the necessary equalisation. Some transistor tape recorders exploit this

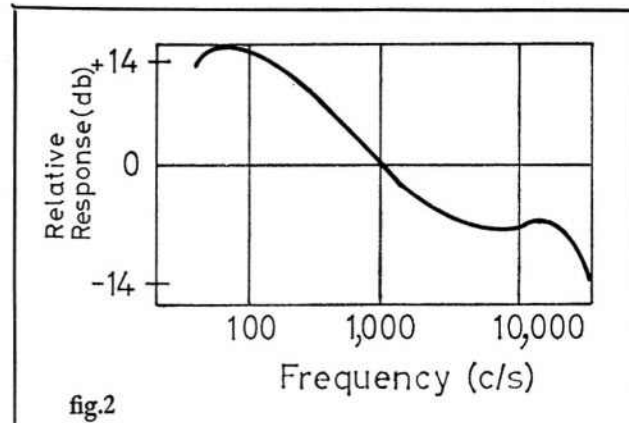


fig.2. An approximation of the response requirements of the playback channel. The necessary equalisation is often accomplished in the head amplifier circuits, which may be a single or dual transistor circuit.

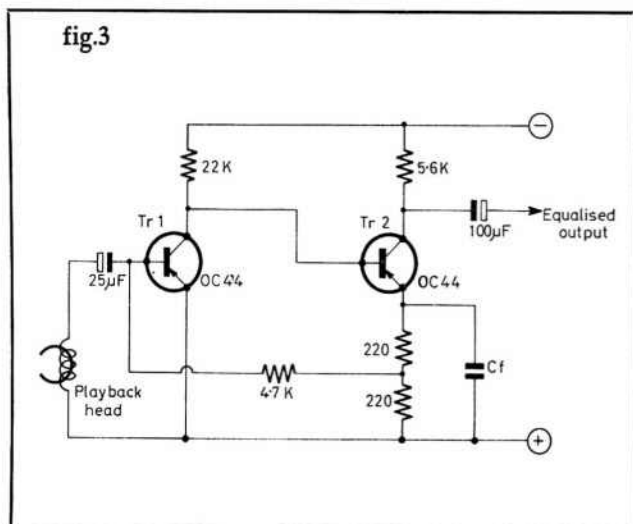


Fig.3. In this circuit the equalisation is accomplished partly by the increasing impedance of the head circuit selective feedback provided by capacitor C_f in Tr2 emitter circuit.

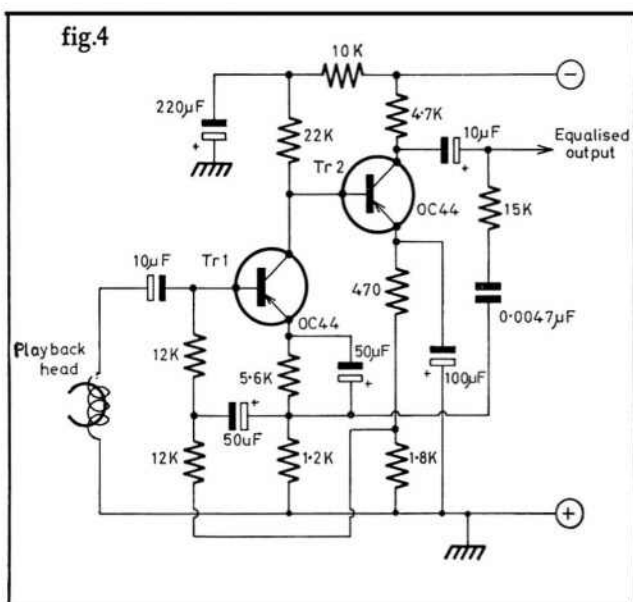


Fig.4. In this circuit, after J. Dinsdale, the impedance at the base of Tr1 is high (about 500k) due to feedback and equalisation is provided by frequency-selective feedback from the collector of Tr2 to the emitter of Tr1. D.c. feedback is from emitter of Tr2 to the base Tr1 and heavy a.c. feedback from the emitter to the base of Tr1. It is this latter which gives rise to the high impedance input of the amplifier.

TAPE AND TRANSISTORS *continued*

factor in terms of head impedance and first stage feedback so that the falling current in the head with rising frequency fully compensates for the rising e.m.f. induced in the head winding with increase in frequency. The output from the first stage is then constant over the major part of the audio spectrum.

By selecting the impedance of the head in relation to the input impedance of the first transistor stage, a useful degree of equalisation is possible even without feedback networks. And straight coupling from the head into the base, via a large value electrolytic capacitor, is utilised in some of the less exacting transistor tape recorders.

In machines of a higher price range, greater attention is given to the playback equalisation. Such equalisation is often given in terms of a time-constant (CR), and the CCIR standard in this respect for a tape speed of $7\frac{1}{2}$ in/sec. is $100\mu\text{S}$. This time-constant is related to the required bass boost based on a turnover frequency of 1.6 kc/s. Thus, we have:—

turnover frequency = $160/\text{CR}$ (kc/s), where CR is in μS
The time-constant for a tape speed of $3\frac{3}{4}$ in/sec. is, in accordance with the above, $200\mu\text{S}$, and this is a value often employed. However, it is worth noting that a time-constant of $120\mu\text{S}$ is used by some designers to match the American pre-recorded tapes which employ this value at $3\frac{3}{4}$ in/sec.

fig.3 shows a very useful transistor tape head equalised amplifier circuit, which could, in fact, be used to operate a monitor head (to feed a separate amplifier system) or to supply a suitably equalised signal from a tape head for feeding into the "auxiliary" input of a hi-fi amplifier or even into the pickup sockets of a radiogram.

COMPENSATING FEEDBACK

Here the head has an inductance of 0.5H and the e.m.f. induced into its winding is coupled to the base of Tr1 through the $25\mu\text{F}$ electrolytic capacitor. Tr1 collector is coupled direct to Tr2 base, and d.c. feedback, providing stabilisation of the operating point, is achieved by coupling the emitter circuit of Tr2 back to the base of Tr1, via the 4.7k resistor. The output is then extracted from the collector of Tr2, and is fed through the $100\mu\text{F}$ electrolytic to the reproducing amplifier. Signal feedback also takes place between the emitter of Tr2 and the base of Tr1 and this is made frequency-selective by C_f . C_f in fact reduces the amount of feedback with rise in frequency above the turnover frequency. In that way the drop in response does not continue beyond the turnover frequency. If it were allowed to continue beyond this point, of course, the treble boost applied during recording would be neutralised and there would be a serious loss of treble on playback. That is, if the self-compensating action of the head, as previously explained, was not controlled beyond the turnover frequency. Capacitor C in fig. 3 provides this control.

A different type of circuit is shown in fig.4. This is after a design in the *Wireless World* of January, 1965, by J. Dinsdale. Here we have a d.c. feedback amplifier

directly coupled between stages Tr1 and Tr2. Again the head signal is applied to the base of Tr1, via the 10 μ F electrolytic coupler. The signal at the collector of Tr1 is fed to the base of Tr2, at the collector of which transistor the amplified and equalised signal appears. This is fed through the 10 μ F electrolytic capacitor. The working point is fixed by the d.c. feedback from the emitter of Tr2 to the base of Tr1, through the two 12k resistors. For equalisation, frequency-selective feedback is applied from the collector of Tr2 to the emitter of Tr1. The frequency-selective components here are the 15k resistor in series with the 0.0047 μ F capacitor. This forms a time-constant which suits the equalisation requirements for 7 $\frac{1}{2}$ in/sec.

HIGH INPUT IMPEDANCE

An interesting aspect of the circuit is the very heavy a.c. feedback between the emitter and base of Tr1 taken via the 50 μ F electrolytic capacitor from the emitter circuit to the 12k resistor connected to the base.

This feedback effectively increases the input impedance of Tr1 up to about 0.5 megohm, and thus makes the stage suitable (via switching and equalisation modifications, etc.) for programme inputs other than tape. It is well worth remembering that negative feedbacks applied to a common-emitter stage serve to increase the input impedance without the need for connecting an extra resistance or impedance in series with the signal to the base. This keeps the signal/noise ratio high since the base of Tr1 can be "loaded" to the earth line via the impedance of the playback head. This high input impedance ensures that the overall response remains independent of the inductance of the playback head, an attribute which is not shared by the circuit in fig.3, as we have seen.

To provide equalisation over two (or more) tape speeds, switching would be employed to change the ratio or values of the RC (15k and 0.0047 μ F) network in the frequency-selective feedback loop.

The amount of feedback depends upon the overall impedance of this loop, the smaller the impedance, the greater the feedback and the smaller the gain of the composite stage. The C element has an impedance (more accurately "reactance") which decreases with increase in frequency. Thus, as the frequency rises the feedback increases and the gain decreases, which is the requirement for a gain which rises with *decrease* in frequency. The R element fixes the frequency at which the feedback is no longer frequency-selective. Without the C element, therefore, the R element would control the feedback at a constant level over the entire audio spectrum.

NEXT MONTH

So much, then, for the most important part of the playback channel. Next month we shall look at the remainder of the playback channel and finalise this series with a discussion on the transistor tape recorder as a whole.

Gordon J. King.

win a tape recorder



the new akai x-4

This superb new portable, which costs 131 gns., is being offered by AMATEUR TAPE RECORDING as the prize for a simple competition. All you have to do is place in your order of importance nine design points. (Full details and entry form will be found in the leaflet inside this issue). Then add another feature that you think makes this tape recorder an outstanding model. You can see this wonderful prize on the ATR stand (No. 50) at the Audio Fair — April 22nd to 25th.



THE THINGS YOU SAY

ATR SOUND TOUR

What an excellent idea this is – just what we have been waiting for!

I have already paid my deposit to Clarksons and should be grateful for further details. In particular, I should like to know the recorder that you propose to issue on loan, its speed(s) and maximum spool size. This will enable me to become conversant with the machine before the holiday and save any mistakes! Will spare batteries be available please, or shall we take our own? How much and what type of tape will be issued, and how much time will be allowed before this has to be returned after the trip? Finally, can you suggest car parking facilities in London for the six days?

Birmingham

M. DAGNALL

The recorder on loan will be the Fi-Cord 202, speeds $3\frac{1}{2}$ and $7\frac{1}{2}$ i.p.s., spool size 4 ins. Batteries, which will take up to 30 hours *solid* use, properly used, should last the tour, and one 4-inch reel of B.A.S.F. standard play tape will be issued. The tape you may keep, but the recorder must be handed back on the return to London.

Finally garaging – always a problem in the London area. However, we do have details of a number of garages and car parks in London, some open, some under cover, at prices ranging from 32/6 a week to 5 gns. a week. Anyone wanting these details should send a stamped, addressed envelope to us, and we'll pass on the necessary information. The Automobile Association also publishes a leaflet giving details of garaging facilities near Victoria Station. Alternatively, if any other ATR reader has any garage space to spare, I'm sure offers will be more than welcome!

WHAT ABOUT TAPE?

In every copy of your excellent journal readers receive sound advice on new tape recorders to guide us in our choice of our first – and second – tape recorder. Your personal comments and those of your colleagues – all experts – are appreciated.

But what about tape – the 'be all and end all' of the science? Do we get any words to guide us? I have not seen any. Having embarked on this interesting hobby, I wish to purchase more tape and what do I find? For $5\frac{1}{4}$ " LP tape, Messrs. Wow & Flutter ask 35/-, Messrs. Rumble & Hum 30/-. On another page of ATR I am only asked 25/-, and one one more page only 24/-. Compare our prices and see the difference! Top price to lower price, the difference is 11/-. Quite a figure.

One 'old hand' tells me 'pay top price and you can't go wrong,' while another says 'I never pay more than 25/-.'

As every detergent on the market is superior to every other brand, it only costs a few shillings to experiment and find out for oneself. But not so with tape. How will tape A stand up to tape B over the months? Will I have wasted time, money and effort with recordings of classical music?

Please can someone guide us? Or is this a subject deliberately shunned by all recording magazines?

Harrow, Middx.

W. H. LLOYD

Questions such as this often come our way, and the brief answer is this. Modern methods in tape making are such that the differences between major brands are almost undistinguishable. In fact, so much expensive equipment would be needed to test the tape in such a way that these small differences could be recorded, that the results would not justify the cash out-

lay. Provided that you stick to the well-known and well-tried brands you should have no difficulties, and if for reasons of finance or pure whim you find that one of these particularly meets with your approval, so much the better.

TOKYO OLYMPICS

After recording each day's radio and television transmissions from the Tokyo Olympics, I made a stupid recording mistake and failed to record the closing Ceremony.

As this is of course an essential to complete the recording, I would be very grateful if any ATR readers could help me in obtaining a copy of this. I would of course be willing to cover any expenses and postage incurred.

Eastbourne, Sussex

R. R. PACK

THE MINSTREL SHOW

I am very fond of the Black and White Minstrel Show, and often record it for my personal pleasure. However, I missed their broadcasts last summer, and am wondering if any reader of ATR could loan me the recordings to dub them for me if I forward the tape. Naturally, I would be prepared to pay postage, etc., and even travel to collect them myself if necessary.

Crowborough, Sussex

G. E. TOWNER

Any replies to Mr. Pack or Mr. Turner c/o ATR will be forwarded.

RECORDING LIBRARIES

I keep a large selection of popular music on my tape recorder, some of which is recorded from radio and television. I would now like to record from discs, specially long players, and wondered if there are such things as record libraries from which I could borrow records, tape them, and subsequently return them. I would naturally be prepared to pay a small fee for this, and I am sure many others would too if they knew such a service was available.

Weybridge, Surrey

J. HOLMES

Many local authorities now include with the central branch of the public library a very comprehensive record section. To obtain records from them, you will first have to join the book library, and it is also likely that you will be required to pay a deposit of about £2 to be held against any possible damage to the records. This deposit is usually refunded when the subscription is cancelled. We know of no private company which performs the same service.

One word of warning however—recording direct from disc whether for personal pleasure only, or for any other reasons, is not permitted, unless the appropriate copyright fee has been paid. We advise you to contact one of the copyright organisations, who will be able to tell you what you may record and what copyright fees pertain to any particular work.

G.P.O. RULES

Regarding the correspondence about 'Fair Postal Play' (January ATR) may I bring the following to your notice.

Page 97 of the 1964 Post Office Guide reads as follows:

'Sound Recordings'—Packets containing recordings on disc, tape or wire which include a current and personal message are chargeable at the letter rate of postage, and are subject to the general conditions applicable to the letter post.'

PS. I am not a postman!

Colne, Lancs.

T. DUCKWORTH

Guess that about sums it up!

ANY SOUNDS AT HOME?

I have followed with interest Mr. Bob Danvers Walker's articles on travelling with a tape recorder. There must be many readers like myself who, much though they'd like to follow his example, simply can't afford the time or the money. Surely there must be places in this country that have events worth taping? How can I find out about them?

Epsom, Surrey

A. J. DOUGLAS

The British Travel and Holidays Association publishes a quarterly list of forthcoming events in the British Isles. This is available from them, price 5/-. However, you will note that this month sees the start of a new feature in ATR which is just what you are looking for. Called 'Recording Diary,' you'll find it on page 47.

ANOTHER BOUQUET

Your correspondent in the January issue of ATR, K. J. Brammer gives a well-deserved bouquet to Ferrograph and letters such as his help to restore our faith in the industry. At the same time, I should rather expect service for an instrument in the price range of the Ferrograph.

What do you think of my experience? I bought a tape recorder from Messrs. Lasky's Radio at less than half its list price . . . a very good instrument indeed, at a real bargain price. After its long journey here it had developed faults.

I advised Messrs. Lasky's and in their prompt reply they apologised for the inconvenience, offered to repair the recorder free of charge or, alternatively, to supply me without charge with the necessary parts to effect the repairs myself.

A bouquet, therefore to Messrs. Lasky's for a fine example of fair trading.

Cosheston, Pembrokeshire

R. C. GOUZENS

A very fair commendation. But have we become so accustomed to slap-dash service that we find this kind of treatment remarkable?

What do other readers think?

PRACTICAL DOMESTIC VIDEO RECORDING

PICTURE QUALITY

by F. C. JUDD

Assessment of television picture quality can be obtained by (a) measurement and (b) observation. For the amateur it is easier to estimate the quality with the aid of "test cards" which can be made for direct use with one's own video camera or use the BBC or ITA test card transmissions. The latter are broadcast frequently enough, together with continuous music or tones running on the sound channel. The BBC and ITA are at present using Test Card "D" for 405 lines, and a modified version of Test Card "C" for 625 lines. Later they will be switching to Test Card "E" for 625 lines. The test card "D" is similar to the earlier test card "C" which it supersedes and takes into account recent improvements in television equipment. It provides a better overall check on the performance of the television chain from studio to receiver and could be of value in domestic video recording.

A complete photograph of the BBC test card "D" is shown in fig.1. Particular characteristics of a TV system can be checked by reference to different features of the test card as follows:—

Aspect Ratio: The central concentric black and white circles should appear truly circular when the width and height of the picture are adjusted to the standard aspect ratio of 4:3 (width and height).

Picture Size: The limits of the transmitted picture are indicated on the test card by the points of the opposing arrowheads in the border of the test card and by the outer edges of the white squares in each corner. As most receivers have a display area with an aspect ratio of approximately 5:4, it is usual to adjust the receiver so that the top and bottom edges of the display area coincide with the arrowheads and the side castellations of the test card just appear in the display area of the receiver. In this way the correct aspect ratio of the picture is obtained.

Contrast: At the centre of the test card is a column of five squares having a contrast range of about 30:1 between the top and bottom squares. The brightness difference between any two adjacent squares, should be

constant on a correctly adjusted receiver. Within the top and bottom squares are small lighter spots; white or black "crushing" is shown by the merging of the top or bottom spot into its surrounding square. The areas of the test card which are at 'peak white' include the spot in the top square of the contrast pattern and the white background. This does not include the 'white' vertical line in the black surround and the 'white' surround of the black vertical line.

Resolution and Bandwidth: At the sides of the contrast pattern are six 'frequency gratings' consisting of vertical stripes designed to produce (after gamma correction) signals of approximately *sine wave* form corresponding to the following frequencies in Megacycles (Mc/s.).

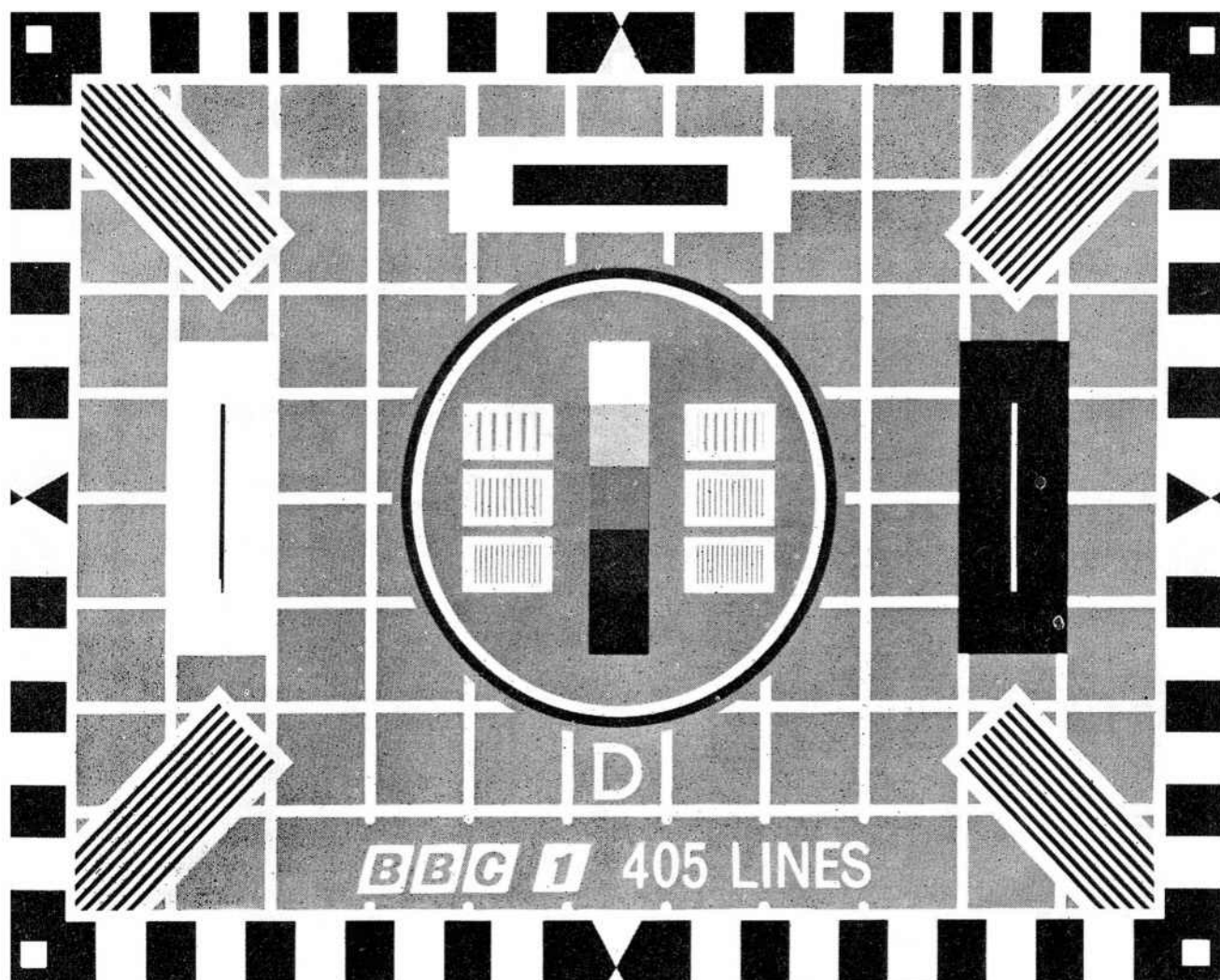
1.0	1.5
2.0	2.5
3.0	2.75

(as they appear on the test card).

The range of brightness in the gratings is the same as that from the top of the centre square of the contrast pattern. The brightest parts of the stripes have the same brightness as that of the area surrounding them.

Scanning Linearity: The background of white lines should be reproduced in all parts as enclosing equal squares and the central black and white rings should appear truly circular.

Line Synchronization: The border of the test card is a pattern of alternate black and white rectangles. The left and right sides of this border serve as a test signal to check the line synchronization of receivers. Faulty line synchronization shows as horizontal displacement of



The BBC television test card 'D'.

those parts of the picture on the same level as the white rectangles in these sides; it will also give the central circles an appearance of 'cog-wheels'.

Low-frequency Response: Low-frequency response can be checked by means of the black rectangle within the white rectangle at the top centre of the test card. Poor low-frequency response shows as streaking at the right hand edges of the black and white areas and also of the border castellations.

Reflections: The 'white' vertical line with the black surround and the black vertical line with the 'white' surround should appear free from displaced images (ghosts). If there are reflections of the television signal, from hills or large buildings, these may result in displace 'ghost' images of any significant feature of the picture. This effect will be most readily seen as displaced positive or negative images of the 'white' and black vertical lines. The lines represent pulses having a duration of 0.3 microseconds.

Uniformity of Focus: In each corner of the test card there is a diagonally disposed area of black and white stripes; the focus of these areas and of the central area of the test card should be uniform. The stripes correspond to a fundamental frequency of about 1 Mc/s.

These test cards can be valuable to those who take up television tape recording and before long we shall probably need special test cards to use in conjunction with amateur video cameras. Whether these will be provided by video camera manufacturers remains to be seen but undoubtedly they will prove a valuable asset to home television recording.

Meantime I have carried out further tests with the Wesgrove VKR500 which has now been modified to bring it up to date. This has left no time in which to obtain photographs from the display and which I had hoped to show this month. However, you will find further information about the VKR500 elsewhere in Video News.

TELEVISION TAPE RECORDING N. RUTHERFORD.

PART 3 SOME MORE FUNDAMENTALS

In my last article we discussed some of the fundamental processes of magnetic tape recording in detail, and analysed various aspects rigorously. I hope that these explanations did not prove too technical for some readers, but the reader should be able to grasp the final conclusions which were simple in concept.

Before going on to some more basic performance factors I feel it would be well worth re-capitulating on the conclusions, which apply to any direct recording system.

(1) The output from the replay head rises in proportion to the frequency of the output. That is, the output rises at 6 dB per octave.

(2) The output from the replay head is proportional to the head current when recording, (assuming an ideal tape with a linear characteristic).

(3) The amplitude response of the tape is not linear and some method of linearisation must be used.

(4) At short recorded wavelengths the output from the replay head will fall to zero when the recorded wavelength equals the replay head gap length.

Before it is possible to predict the nature of a system capable of recording a complete video signal (the requirements for which were discussed in my first article) one or two other fundamental limitations must be explained.

We will first consider further losses in performance which are experienced in any magnetic tape system at short recorded wavelengths (high packing densities) and high frequencies.

We have already discussed the limiting effect of gap length, which is a factor dependent on wavelength. Other wavelength dependent factors also affect the limiting performance of the system. We may deal with these in the categories—wavelength dependent losses and the separation between tape and head.

SEPARATION

This most important loss is a factor which dictates to a large extent the layout of the tape path in any high performance tape transport system. It can be shown that the loss in decibels where there is a spacing between the tape and gap of d and the recorded wavelength is λ ,

is equal to $55 \frac{d}{\lambda}$ dB. Recording a maximum of 2 mc/s at 120 inches per second, the recorded wavelength will be equal to

$$\frac{120}{2} \times 10^{-6} = 60 \times 10^{-6} \text{ inches.}$$

If, whilst the tape is running through the transport it should, for any reason, lose contact with the head by an amount equal to one thousandth part of an inch, we may calculate the resulting loss of output thus:

$$\text{loss} = 55 \times \frac{10}{60} \simeq \text{dB.}$$

It can be seen therefore, that head to tape contact is a point of extreme importance in mechanical design. Loss of contact between gap and tape may be avoided (a) by having a high contact pressure between the gap and the surface of the tape and (b) by having a high standard of surface finish on the pole pieces.

TAPE THICKNESS

From the above one would expect the contributions to

the replay head from the surface of the magnetic coating to be considerably less than that from the depth of the coating.

At short wavelengths the lines of flux which leave the surface of the tape have extremely short excursions, and the layers deep within the coating make no appreciable contribution to the external field. Since it is the external field or surface induction which produces output in the replay head, the recording of very short wavelengths is very much a surface effect.

DE-MAGNETISATION

De-magnetisation loss is the loss in recorded intensity which takes place immediately after the tape has left the recording head. The subject is a very difficult one to analyse since the tape coating does not consist of an amorphous magnetic surface. The tape coating actually consists of a suspension of separate magnetic particles. Various theories have been put forward in an attempt to describe de-magnetisation loss in terms of the nature and shape of the particle. It has been found that de-magnetisation losses are small where the recorded wavelength is very much longer than the coating thickness. These losses become appreciable in video recording processes where the head gap length may be almost in the order of L_0 smaller than the tape coating thickness.

HEAD ALIGNMENT

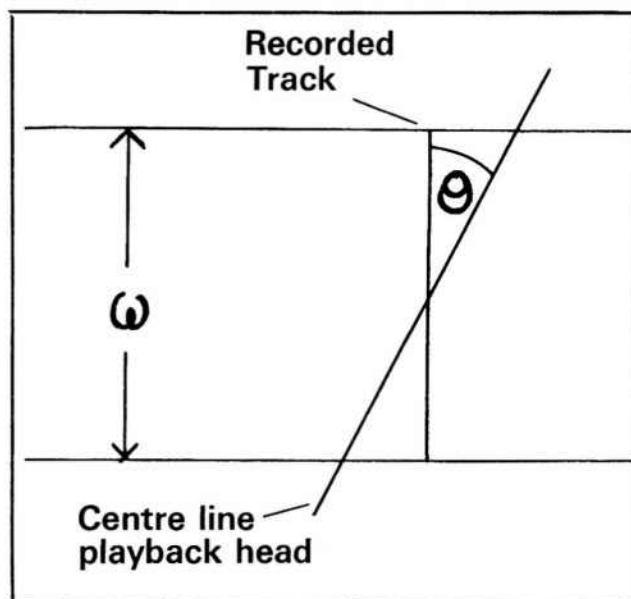
This is a most critical and important factor in high resolution magnetic recording. The reproducing head will not work at maximum efficiency at any wavelength unless both edges of its gap are correctly aligned with the trailing edge of the recording gap. If however, the gap edges are not aligned as shown in diagram a loss in output due to this mis-alignment will result. An expression for this loss can be given as follows:

$$L = \frac{\sin \left(\frac{\pi W \Theta}{\lambda} \right)}{\frac{\pi W \Theta}{\lambda}}$$

where W = track width, Θ = angle between gaps, and λ = recorded wavelength.

In the example of the 120 inch per second and 2 mc/s system mentioned earlier one would expect a loss of 3 decibels at 2 mc/s for an angular mis-alignment in the order of 0.01° , an extremely small angle.

To build equipment where mis-alignment losses may be neglected requires working to extremely high standards of mechanical accuracy. In low cost equipment this difficulty has been overcome by the practice of aligning the replay gap to the recorded track by examination of the re-produced signal. In television recording equipment the action of alignment of the replay gap simply has the effect of a 'focus' control.



FREQUENCY DEPENDENT LOSSES

All the losses we have discussed to date have been a function of recorded wavelengths. Other losses exist which are not wavelength dependant but frequency dependant. These losses exist for the most part in the head core and are due to eddy current or hysteresis. We will discuss these losses in detail in future articles when describing the construction of practical recording and replay heads for video signals. In my next article I intend to start by briefly discussing methods of linearisation of tape response, followed by a discussion of the basic design for a simple video recorder, utilising all the factors of requirement and limitation we have discussed to date.

VIDEO NEWS REVIEW

From a report recently issued by a USA news service it seems likely that various home video recorders will shortly be available over there. Philips expect to put a domestic video recorder on the market for about £620 and Par Limited of Clifton, New Jersey, has reached the 98% development stage of its home V.T.R. which may retail at between £140 and £170.

Winston Research Corp. may have their V.T.R. on the market within a year at about £150 but Ampex seem uncertain although it is known that they are developing a machine for the domestic market. Loewe-Opta of Western Germany showed a prototype V.T.R. last year but at the moment expect their machine to retail at about £1,000 which is of course too high for amateur or domestic use. It is also known that the Minnesota Mining Co. (Scotch Tape) are researching into special tape for home video recording and we know of at least two other large tape manufacturers who are doing the same.

WESGROVE ELECTRICS VKR500

The latest from Wesgrove is a

modified version of the original VKR500 (not in kit form) which has a control panel at the front similar to some sound recorders (below left). Provision is made for TV receiver and camera inputs and for record and playback levels etc. The manufacturers have announced that a video recording level meter will soon be a feature of these recorders.

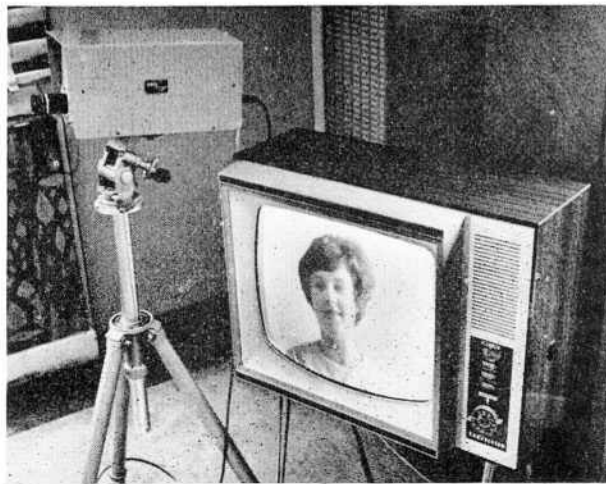
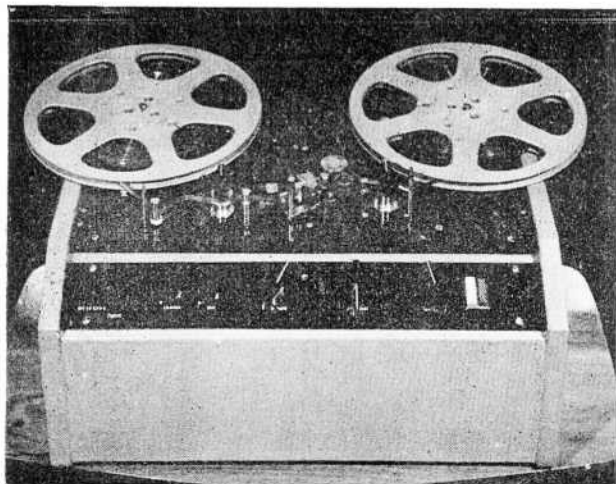
CAMERAS

A visit to the recent Closed Circuit Television Exhibition at the National Audio Visual Aid Centre in South London revealed the surprising number of video cameras available at present. At the top of course were the professional cameras by E.M.I. and others but coming down from the high price range into a bracket nearer that likely to attract the amateur we found a Grundig video camera at about £275 and lower still those marketed by Beulah Electronics Limited of 126 Hamilton Road, West Norwood, London, SE27. The Beulah D.50 transistorised camera is shown right and note that the picture on the TV screen is direct from the camera. This camera can be built from the

"Beukit" which costs £40 less the vidicon tube and lens. A vidicon tube and a suitable lens can be supplied and cost £16 and £13. 19s. 6d. respectively. The complete and ready to use D.50 camera costs £82. 19s. 0d. Other cameras available are the D.80 at £140, the D.80/LL at £130, the D.80/V/R at £150 and D.80/HR at £160. These have various applications but further details will be supplied on request.

VIDEO FLASH

It has been announced that Sony domestic television tape recorder will be available here next spring. Although specifications have not yet been released, we understand that the Videocorder 2000 will employ revolving heads, have a tape speed of 7½ ips giving 63 minutes playing time. Weighing 33-34 lbs. it will be about the same size as a home tape recorder. Adjustments to a TV set to accommodate the Videocorder are expected to cost £10, and the machine itself will retail at £198 in Japan (about £250 in UK). Initial production is estimated at 2-3,000 per month.





R104 Four-Track Recorder

This recorder cost £45,000 (it's yours for 79 gns.)

PD104 Stereo Tape Unit



This is the new TRUVOX Series 100 Recorder—the result of years of extensive research and development. We're convinced the money has been well spent as we have achieved a unique combination of professional performance and simplicity of operation at a thoroughly realistic price.

The Series 100 all-transistor Recorders and Stereo Tape Units are completely compatible with any make of amplifier, pick-up, tuner and loudspeaker—not forgetting our own TSA 100 amplifier and LS 100 speaker enclosure. Recorders have a power output of 5 watts; Tape Units have four independent pre-amplifiers. True V.U. meters guarantee the correct recording level and three heads on all models enable you to monitor while recording.

Tape Recorders (Monaural)
R. 102 Two-track 76 gns.
R. 104 Four-track 79 gns.

Stereo Tape Units
PD. 102 Half-track 93 gns.
PD. 104 Quarter-track 89 gns.

Write to Ken Smith for illustrated leaflet and complete technical specification.

TRUVOX

TRUVOX LTD NEASDEN LANE · LONDON · NW10 · Tel: DOLlis Hill 8011

May 1965

AKAI quality tape recording equipment is now available in this country. Substantial orders have been placed for their exciting 1965 range, to give immediate delivery from stock. Every machine will be tested before delivery and offers the enthusiast the highest possible standards in precision built tape recording equipment.

RANK Organisation's subsidiary Company Pullin Photographic Limited, will be fully backing the new Akai range of tape recording equipment with publicity in trade magazines, point of sale material and selected audience demonstrations throughout the country.

SERVICE facilities will be of the highest standard and carried out quickly and efficiently by skilled Rank technicians at their Servicing Department, 52a Goldhawk Road, Shepherds Bush



Servicing Enquiries—
Write or telephone
Pullin Photographic Limited
52A Goldhawk Road,
Shepherds Bush.

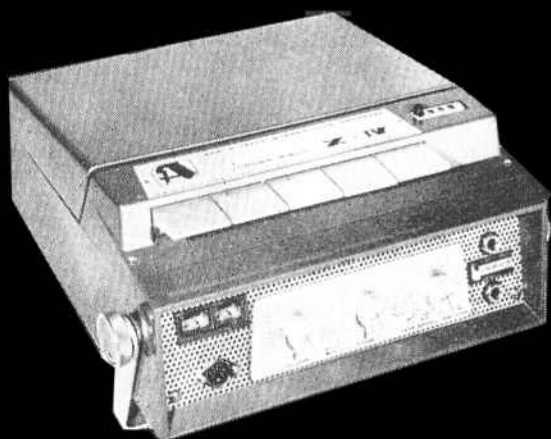
For further information write or telephone
Pullin Photographic Limited
11 Aintree Road Perivale Middlesex
Alperton 1541.
A Company Within the Rank Organisation



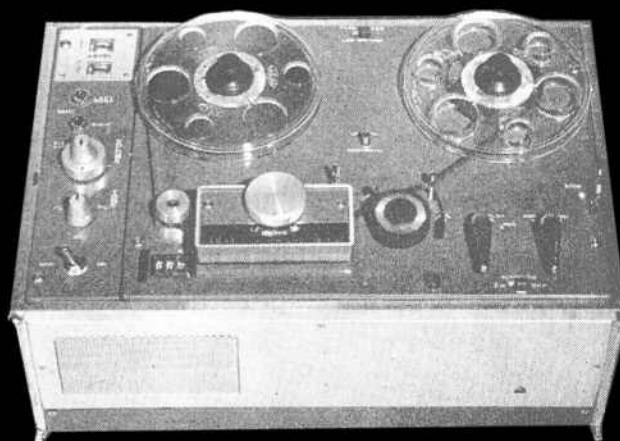
Akai 345 Designed for the perfectionist. The most expensive in the Akai range, the 345 is produced for the discerning and demanding amateur/professional. Every possible feature is included making this the most advanced model for the recording enthusiast. It offers every possible Akai feature including:— exclusive cross field head/three independent hysteresis wound motors/three independent heads, erase, record, play recording monitor/Dual stabilizer giving constant tape speed/Automatic reverse/Auto repeat/Auto shut off/ Provision for remote control/Dual self contained speakers/ professional VU meters/Vertical or Horizontal operation/All mains voltage selector/Tape speed $3\frac{3}{4}$ " and $7\frac{1}{2}$ " per second/



Akai M8 For the enthusiast wishing to achieve professional standards in recording, the M8 offers fantastic performance at a realistic price. This machine can do everything that the professional machine can do, and has these exciting features:— Cross field head/vertical centre speakers/sound on sound/ two speed synchronous motor/unique cooling system/built in tape cleaner to eliminate hiss/3 speeds/4 track stereo-mono/2 large VU meters/automatic stop and complete shut off/



Akai X-4 Unique in every way, this new world-leader portable (Weights only 12½ lbs) gives true Hi-Fi quality. Never before has such a machine been available, gives over 6 hours playing time on its own batteries, which can be charged from the mains. Delivered complete with two microphones and charging unit, it offers all these exciting Akai features:— completely transistorised 6 hours running time on internal battery/ rechargeable on any AC mains voltage/4 speeds $\frac{1}{8}$, $1\frac{1}{8}$, $3\frac{3}{4}$, $7\frac{1}{2}$ IPS/16 hours playing time available with 5" tape/4 track stereo/mono/exclusive Akai cross field head/ price to include 2 microphones, batteries and battery charging unit which will operate on all A.C. voltages/

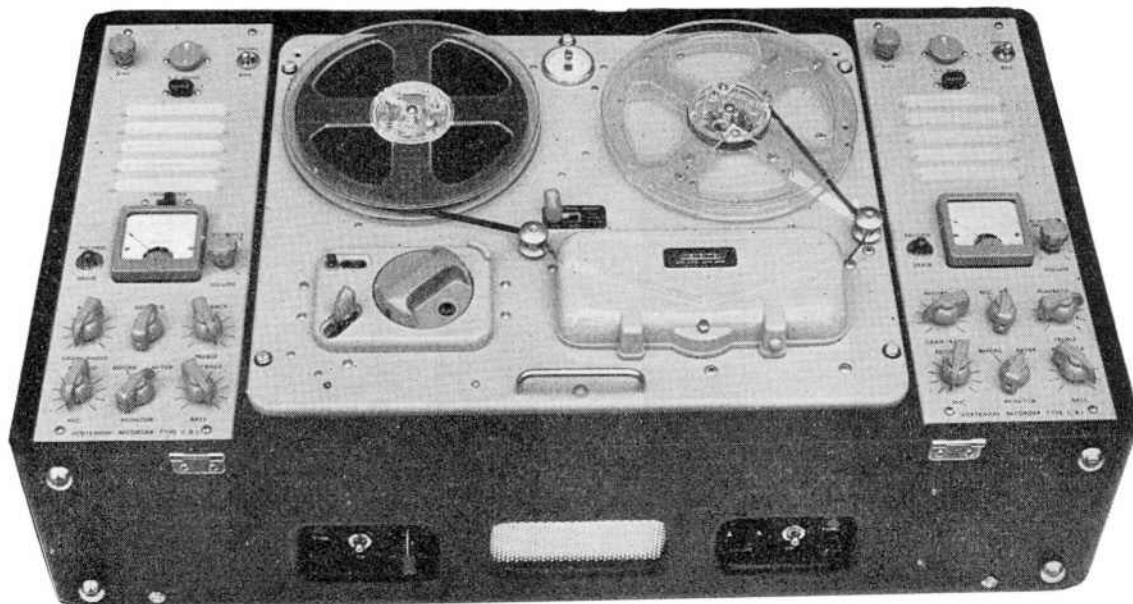


Akai 44s Ruggedly built, competitively priced. For the enthusiast who demands quality, top engineering with rugged construction. This superbly built machine with exceptional value offers the following Akai quality features:— Precision Micro-gap head giving superb performance at $1\frac{7}{8}$ IPS/Vertical or horizontal use/3 speeds, $7\frac{1}{2}$, $3\frac{3}{4}$, $1\frac{1}{8}$ IPS/ 2 illuminated VU meters/all metal case/powerful stereo main amplifier/automatic stop control/provision for stereo headphones/special ventilation device/

The Crossfield Head is undoubtedly one of the greatest single developments since the inception of magnetic recording systems. The bias current normally fed to the recording head to eliminate background noise partially erases the higher frequencies in the recording signal. The Crossfield System feeds the bias current to a separate head placed before and on the opposite side to the recording head in such a way that the bias current can no longer interfere with the recording head. The normal maximum audio frequency at one centimetre per second tape speed is 790 c.p.s. The Crossfield Head system for the same speed makes possible a signal frequency of 2750 c.p.s.

Vortexion
quality equipment

TYPE C.B.L. TAPE RECORDER



Here is a versatile Stereophonic Recorder which has no equal in its price group.

IT CAN record monaurally or stereophonically with its own mixed inputs from Gram., Radio or other sources and from high grade low impedance balanced line microphones. With good microphones, etc., the result is a suitable master for disc manufacturers. "Before and After" monitoring is provided, together with adjustable metered bias for perfection.

IT CAN also make a recording on one track and then transfer it to the other track while measuring and listening to it and adding one or two more signals also metered.

IT CAN repeat the process and transfer this combined signal to the first track with one or two more signals. Composers use it for this purpose. One track may have music or commentary and the other cueing signals or commentary, and either may be altered without the other.

IT CAN play back stereophonically or monaurally with its own amplifiers of $3\frac{1}{2}$ watts each. **Price £160 0s. 0d.**

The **Vortexion W.V.B.** is a high quality monaural machine with "Before and After" monitoring. The recording inputs are a high sensitivity socket for moving coil or ribbon microphone and a high impedance socket for radio, etc., either of which can be selected by a switch. Superimposing and echo work can be done, and the playback has reserve gain for abnormal requirements. This model cannot be converted for stereo playback, but it is a thoroughly reliable machine for the engineer specialising on monaural work. **Price £110 3s. 0d.**

The **Vortexion W.V.A.** is a monaural machine which has a performance equal in sound quality to the other models. It possesses all the features of the W.V.B. except for "Before and After" monitoring, Dubbing and Echoes. The recording being made can be heard on the internal loudspeaker, as in the W.V.B. and C.B.L. The controls are uncomplicated. **Price £93 13s. 0d.**

All tape recorders have adjustable bias controls, low impedance mic. inputs for unlimited lengths of cable, highly accurate position indicators and meters to measure recording level and bias.

International Audio Festival and Fair. Hotel Russell, London, W.1.
DEMONSTRATION ROOM 204. BOOTH 27

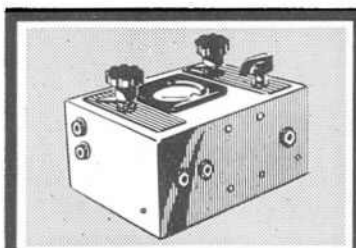
VORTEXION LIMITED, 257-263 The Broadway, Wimbledon S.W.19

Telephone: LIBerty 2814 and 6242-3-4

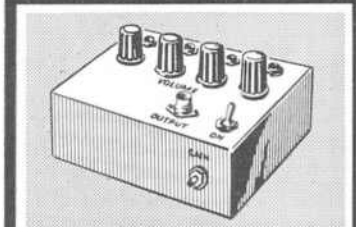
Telegrams: "Vortexion London, S.W.19"

FREE INSIDE Practical Electronics

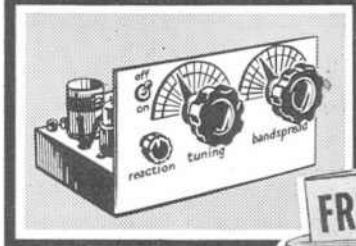
DOUBLE-SIDED 2 BLUEPRINTS TO BUILD



1 AUDIO OSCILLATOR & OUTPUT METER



2 MICROPHONE MIXER



3 SIMPLE SHORT-WAVE RECEIVER

Also in the May issue:

SPORTS EVENT TIMER

Full details for constructing a large clock-face indicator and the electronic unit that drives it.

BUILDING BLOCKS

Details of the theoretical functions of basic electronic circuits.

MAY ISSUE
OUT APRIL 15th - 2/6



**NEW IDEAS • NEW METHODS
LATEST CONSTRUCTIONAL KNOW-HOW**



YOUR TAPE RECORDER IS WASTED

if you aren't using its facilities to record and reproduce the wonderful source of quality sound that radio broadcasts offer. This can be simply done by adding an Armstrong tuner, which is designed for use not only with our own high fidelity amplifiers such as model 222, but also to match any good tape recorder or amplifier.

Both tuners, (there are two to choose from) are self-powered, and only need the addition of an Armstrong Multiplex Decoder for stereo broadcast reception.

Tuning is by meter, there is complete freedom from drift, and outputs are suitable for virtually any tape recorder or amplifier.

The units may be built into your own cabinet, or housed in our handsome case.

For full details and technical specifications of all models, plus list of over 300 stockists, post coupon or write, mentioning SATR65

AM-FM TUNER (illustrated) £28-15-0 FM TUNER £22-10-0
OPTIONAL CASE (as shown) TEAK & VINYL HIDE £3-10-0

name
address
SATR65

Armstrong



ARMSTRONG AUDIO LTD., WARLTERS RD., LONDON N7. Tel. NORTH 3213

COPYRIGHT

As many readers are experiencing difficulty in coping with the provisions of the 1956 Copyright Act, we are reproducing here in its entirety an explanatory leaflet issued by the Performing Rights Society.

The provisions of the Copyright Act, 1956, as regards the right to make and use records of *musical works* can be very simply stated. A copyright musical work may not lawfully be recorded without the permission of the owner of the reproduction right, i.e., the composer of the musical work or anyone who has acquired from the composer the right to reproduce the work on records. This rule holds good no matter what may be the form of reproduction, e.g., tape recorders, gramophone records (discs or cylinders), films, magnetic wire, etc. Except for what is called 'fair dealing for purposes of research or private study' or for class instruction in schools, *the prohibition is absolute, even if the recording is made only for private entertainment.* The copyright in musical works endures for the lifetime of the composer and for fifty years after his death.

The Performing Rights Society is not directly concerned with the copyright in gramophone records and in broadcasts, as distinct from the copyright in the musical works which are the subject thereof, but desires that the differences between these copyrights should be fully understood and appreciated.

COPYRIGHT IN GRAMOPHONE RECORDS

Under Section 12 of the Copyright Act, 1956, the maker of a gramophone record has a copyright in his record, which may not lawfully be copied even for private purposes unless the maker's permission has been obtained.

SOUND AND TELEVISION BROADCASTING PROGRAMMES

Under Section 14 of the Copyright Act, 1956, the BBC and the ITA have a copyright in their sound and television programmes, and these programmes may not lawfully be recorded or copied without their permission unless the record or copy have been made solely for private purposes. It must be emphasized again, however, that, except for 'fair dealing' or with the copyright owner's permission, no records or copies may lawfully be made, even for private use, of any copyright musical works that may be incorporated in the BBC's or ITA's programmes. The performers also have certain rights in respect of the copying of their recorded performances - see Dramatic and Musical Performers' Protection Act, 1958.

PUBLIC PERFORMANCE

A copyright musical work may not lawfully be performed in public without the permission of the owner of the copyright, and this applies whether it is performed by live performers, by means of a gramophone record, tape recording, etc., or by means of a radio or television set. The sole material point is that the licence of the copyright owner must be obtained if the performance is in public, that is, outside the domestic circle, except as regards certain limited performances in children's schools.

In addition, gramophone records, tape recordings, etc., may not in certain circumstances be used for performances in public without the permission of the makers. Nor may television programmes be publicly shown to a paying audience without the permission of the BBC or the ITA, as the case may be. The copyright in records and in broadcasting is somewhat limited (see Sections 12 (7), 14 (4) (c), 14 (8), 41 (5) and 45 of the Copyright Act, 1956, but - except as regards schools - these do NOT apply to the copyright in the *MUSICAL WORKS* so recorded or broadcast.

SOUND EFFECTS RECORDS

Now available from Amateur Tape Recording

CASTLE, 7" 45 r.p.m. records, approximate playing time 5 minutes. Each contains selection of sound effects in separate tracks. Complete with sleeve and paper inner jacket. Sleeve includes description of each sound effect and playing time in seconds.

- A ABX/1-BELLS AND SIRENS** Price 7/6
Side 1—Fire engines with bells. Fire engine—alarm and sirens. S.S. Queen Mary siren. Factory siren. Telephone bell. Door bell.
Side 2—Clock chime. Alarm clock. Westminster chime. Bow bells.
- B AFX/1-WILD ANIMALS** Price 7/6
Side 1—Male and female Lions, Gibbons, Chimpanzees, Bell bird, Rattlesnake, Baboon, Viper, Emperor Geese, Fish Eagles, Mountain Lion (Puma), Kookaburra (Laughing Jackass).
Side 2—Elephants, Mississippi Alligator, Indian Tiger, Sea Lions, male Lion. In the jungle (a background of typical sounds).
- C BGX/1-BACKGROUND SOUND EFFECTS** Price 7/6
Side 1—Sea (breakers). Wind (howling—eerie). Thunder (light rain).
Side 2—Rain (heavy shower). Factory sounds (industrial). Traffic (busy street).
- D EFX/1-ELECTRONIC SOUNDS AND MUSIC** Price 7/6
Side 1—Space ship—take-off. Space vehicle—imaginary take-off. Space vehicle—imaginary landing. Ring modulation—tonal. Modulated tone glide (descending). Modulated tone glide (ascending). Sibilant—white noise (pitch octave low).
Side 2—Sibilant—white noise (pitch). Sibilant—white noise (pitch octave high). Three-tone modulation. Filtered noise Stridor (tonal). Ring modulation and sibilant.
- E EFX/2-ELECTRONIC THEMES AND MUSIC CONCRETE** Price 7/6
Side 1—Delta F Study in Sinesones.
Side 2—Sound object Montage.
- F HMX/1-HAUNTED HOUSE, MYSTERY SOUNDS AND MUSIC** Price 7/6
Side 1—Lion roaring. Twin piston aircraft landing. Building and debris fall.
Side 2—Spooks. Intruder. Creaks. Fright. Dungeon Ghosts. Ghouls. Maniac laughter.
- G MFX/1-AUTHENTIC HIGH-FIDELITY SOUND EFFECTS** Price 7/6
Side 1—Lion roaring. Twin piston aircraft landing. Building and debris falling. Road drills and compressor. Ship's siren. Steam train leaving station. Small steam loco and whistle. Cell door, keys and lock.
Side 2—Police car and bell, chase. Police launch and siren. Steam goods train and whistle. Car door slam, and starter. Storm at sea, thunder, wind and gulls. Tube train, stop, doors and start.
- H MFX/2-AUTHENTIC HIGH-FIDELITY SOUND EFFECTS** Price 7/6
Side 1—American police car with siren—arriving. American police cars with sirens—departing. American police car escort with sirens—passing. American police motor-cycle patrol with siren—stopping. Applause (hand clapping). Orchestra tuning up. Car crash. Glass breaking (repeat).
Side 2—City and Waterloo tube train—arriving. City and Waterloo tube—departing. Footsteps (continuous track), in subway (mixed), in narrow streets (female), on pavement (mixed), running in street (female), running in street (male), up and down wooden stairs. Workmen hammering and sawing.
- I MPX/1-MILITARY PARADE AND WARFARE SOUNDS** Price 7/6
Side 1—March past—Guards and crowd sounds, etc. Royal Salute—Parade commands and National Anthem. Drums and pipes—with parade commands.
Side 2—Aircraft—low-level attack (bombs, machine-gun fire, aircraft). Artillery—tanks—rifle fire, etc.
- J TFX/1-AUTHENTIC BRITISH TRAIN SOUNDS** Price 7/6
Side 1—Train departure—main line. Train arrival—main line. Express train passing—with whistle. Fast goods train passing—with whistle. Express train passing. Small tank loco—passing.
Side 2—Local passenger—arrive and depart. Fast goods train—passing. Central London tube train—arrive and depart. Train over points and crossing. Slow goods train passing—with whistle.
- K MFX/3-HORSES** Price 7/6
(10 effects). Trotting. Walking. Jumping. Composite recording of foxhounds, calls, horns, etc. Cows, Cats, Pigs, Blacksmith's shop.

Please send me the following records

Please indicate with a tick in the appropriate squares

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A	B	C	D	E	F	G	H
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
				I	J	K	

I enclose postal order/cheque for to cover the cost of record/s, plus 1/- post and packing for first record and 4d. for each additional record ordered.

NAME

ADDRESS

AMATEUR TAPE RECORDING, HAYMARKET PRESS LTD
86-88 EDGWARE ROAD, LONDON, W.2 ATR 5

ELIMINATION OF HUM

by E. A. Rule.

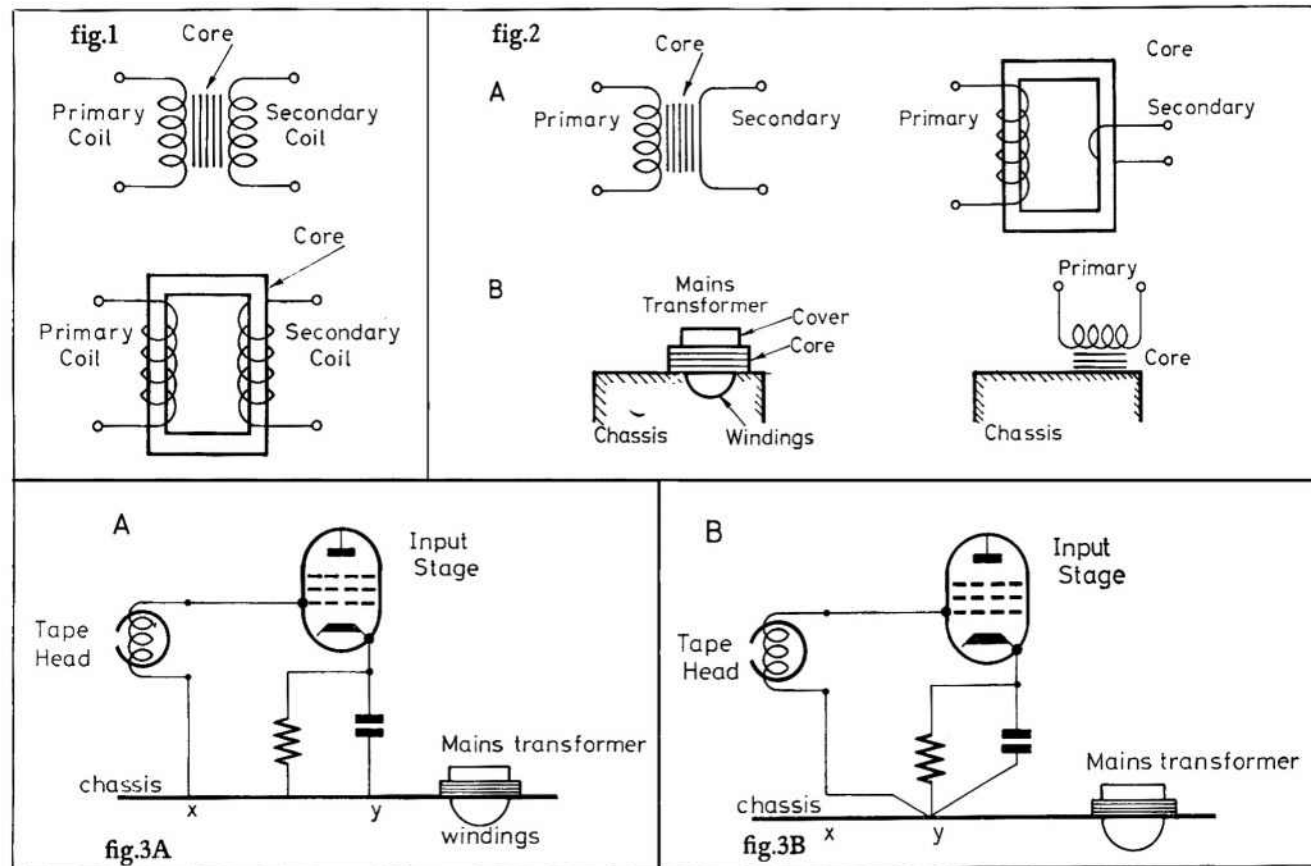
One of the most difficult problems encountered by designers and indeed users of audio amplifiers is how to eliminate 50 c/s. hum usually induced into chassis and wiring by mains transformers and similar inductive components such as tape recorder motors. In this article the author attempts to show some of the many causes and cures.

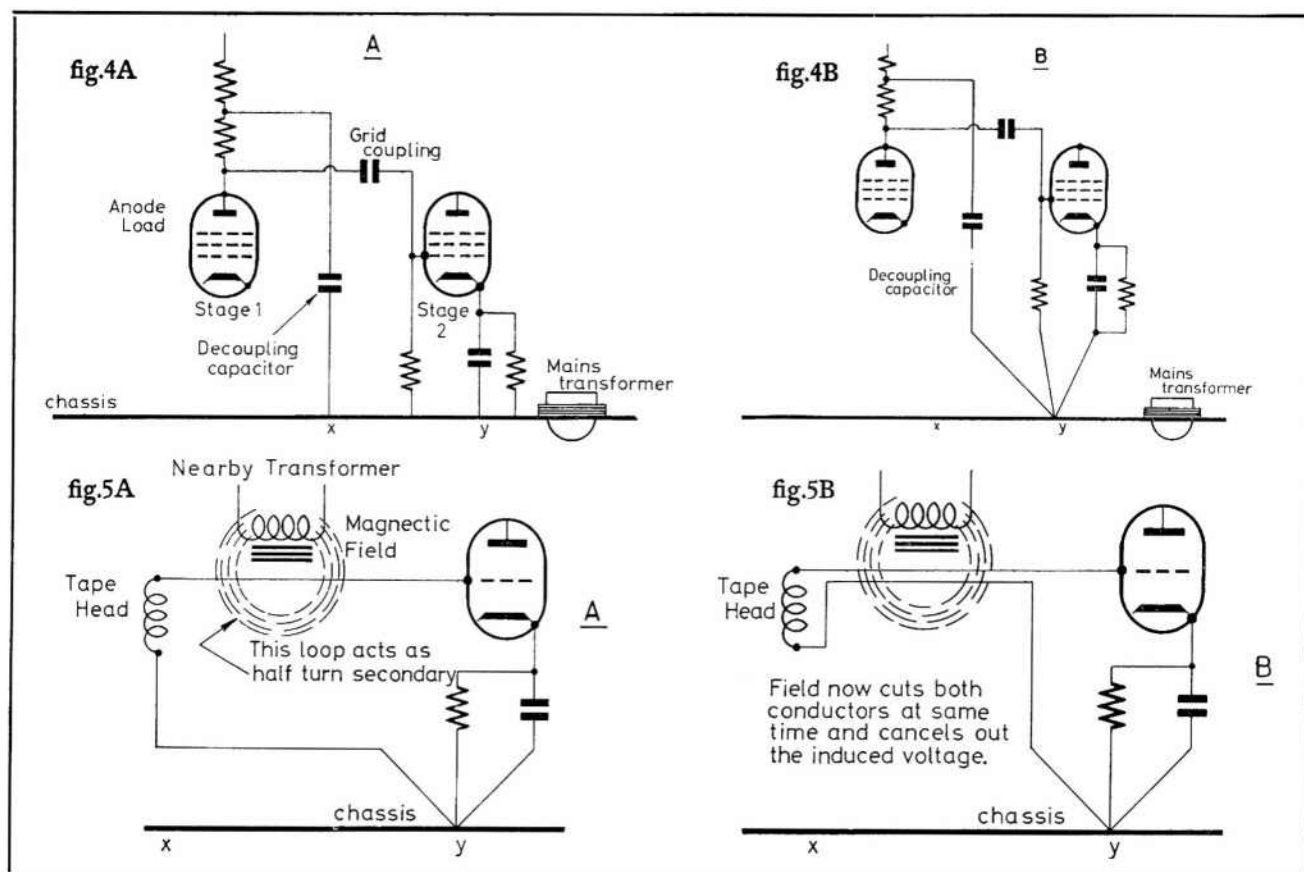
When an alternating current is passed through the primary winding of a transformer (fig.1) a similar current will be induced in the

secondary winding and an alternating voltage will therefore be available across the secondary terminals. The voltage available will depend on the turns ratio between primary and secondary and may therefore be higher or lower than the input voltage. With a secondary of only half a turn, as in fig.2, a voltage will be developed across the winding.

A metal chassis on which a transformer is mounted can also behave as a fractional turn secondary wind-

ing to the transformer and current will be induced into it (fig.2B). The resulting voltage can actually be measured by connecting an A.C. meter across the ends of the chassis. Now let's see how this voltage can reach certain parts of the amplifier circuit. Fig.3A represents the first amplifier stage of a tape recorder, the cathodes of the valve being earthed at point 'B' and the tape head at point 'A'. Any 50c/s. voltage developed between points 'A' and 'B' on the chassis will be





ELIMINATION OF HUM

continued

in series with the earth return lead from the tape head and will consequently be amplified along with signals from the head. The 50 c/s. voltage developed across a 'hum loop' as in fig.3A can amount to several milli-volts, even half a volt is not unknown. The usual method of eliminating hum induced in this way is to re-arrange the amplifier wiring as in fig.3B. In this case the grid and cathode circuits are returned to a common earthing point on the chassis.

A not so obvious type of earth loop is shown in fig.4A between the cathode in stage 2 and the anode decoupling capacitor in stage 1. The circuit should be re-arranged as in fig.4B. The same precautions should be followed even when using a thick copper wire 'bus bar' for earthing. As far as the alternating magnetic field is concerned, one conductor is the same as another and a hum voltage will be induced into a bus-bar just as easily as a chassis.

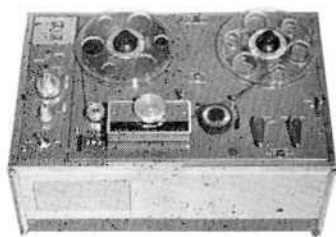
Amplifier wiring should always be arranged so that each stage has a common earth point for its grid and

cathode circuits. When the input socket is some distance from the first amplifier stage, the signal lead to the grid and its earth return must be close together. Failure to do this can result in a 'wiring loop' and hum could be induced in the same way as illustrated in fig.2. The circuit diagrams in figs.5A and 5B will serve to clarify this.

Yet another example of earth loops is shown in fig.6A. This often occurs in the wiring of negative feedback circuits and may be the cause of 50 c/s. hum voltage being fed back into the cathode of an earlier stage. Because the amplifier stages concerned are often at opposite ends of the chassis the hum voltage will be included with the normal signal feedback. One way of avoiding this is shown in fig.6B. When tracing hum loops in existing equipment it sometimes happens that eliminating an obvious loop increases the hum. In this case there may be other hum loops and it is actually possible for the hum created in one to cancel out that from another. The best way to trace hum

AKAI

TAPE RECORDERS



model 44S



model M8

We have now introduced the new range of AKAI Tape Recorders

model M8

Exclusive cross-field head • 4 speeds ($1\frac{7}{8}$, $3\frac{1}{2}$, $7\frac{1}{2}$ and 15 ips) • 4-track stereo/monaural record and playback • Easy sound on sound recording • Specially biased for recording of FM multiplex • New high speed fast forward/rewind (1,200 feet in only 75 seconds) • Automatic shut-off switch.

model 44S

3 speed, four-track stereo/monaural record and play back • Precision micro-gap head • 6 watt amplifier (3 watts per channel) • Two VU meters • 5" speaker for monitoring • Automatic stop and shut-off • Stereo headphone jack.

★ don't forget our unique repair and advisory service

MASSEY'S

CENTRE OF SOUND

121-123 CHISWICK HIGH ROAD · LONDON W4
telephone CHiswick 2082 9.30 a.m. to 6.30 p.m. every day except Thursday

fig.6A

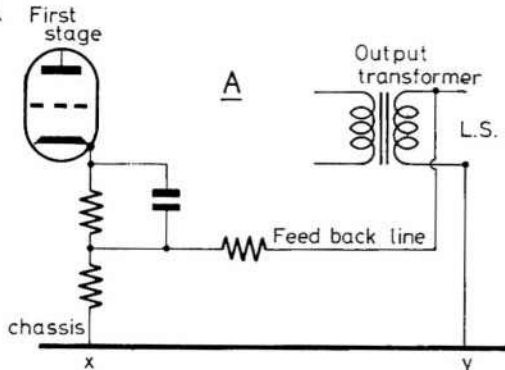
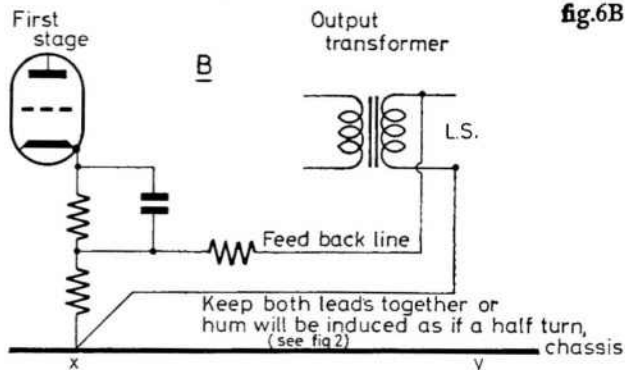


fig.6B



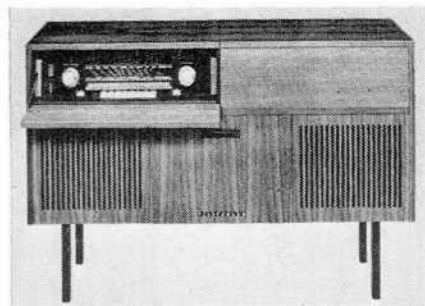
is to start at the output stage and work back towards the inputs. Mains hum can be introduced into amplifiers in various other ways, for instance by mutual coupling between a mains transformer and a tape head or pick up. The signal from a tape head may be only a few milli-volts and it is easy to induce a hum voltage of the same order from a nearby mains transformer or tape recorder drive motor. Re-positioning or orientation of the mains transformer will often reduce or completely eliminate hum induced in this way.

With a tape recorder motor this may not be possible of course and one may have to resort to using 'hum bucking' coils. These usually consist of a small coil of about 50-100 turns for a high impedance head or 10-20 turns for a low impedance head. The coils need only be about one inch in diameter and are connected in series with the earthy side of the tape head or pick up. The position or orientation of the coil is then adjusted until the hum is reduced to the lowest possible level. Incidentally the valve used for the first amplifier

stage should be mounted well away from nearby mains transformers and motors as the magnetic field from these can modulate the electron stream from the cathode. Hum introduced in this way can be very difficult to trace but the remedy is obvious.

Providing earth loops are avoided and all signal leads are screened, trouble with hum in audio amplifiers should never arise. Other possible sources of hum are of course H.T. smoothing and cathode heater leakage in valves.

AUDIOVIEW



NEWS OF TAPE RECORDERS AND HI-FI

The International Audio Festival is probably the one event of the year which triggers off a desire to 'go in for hi-fi' or to buy a new and more expensive tape recorder or perhaps an F.M. tuner. Whatever you seek you may well find at the Audio Festival.

Among the exhibitors are **Fi-Cord International**, with their new 202A portable recorder. This has the same basic specifications as the 202 (i.e., speeds of $3\frac{1}{2}$ and $7\frac{1}{2}$ i.p.s., frequency response 50 to 12,000 c.p.s. \pm 3dB. at $7\frac{1}{2}$ i.p.s., etc.), but incorporates many new features. It has a new battery testing system, redesigned control panel, a new Vu-meter, and a new colour scheme. The 202A, normally powered by mercury batteries, can, if desired, be operated by a 12-volt D.C. car battery, 105 to 240 volts A.C. mains, or accumulators which can be recharged with the aid of the Fi-Cord rechargeable battery unit.

Also from Fi-Cord are the first two microphones of their own make, the 801 and the 901. Both are studio quality dynamic moving coil microphones, the 901 being directional and the 801 omnidirectional.

If you happen to be looking for some hi-fi all in one box, listen to the **Telefunken 'Wein'**, which is a complete stereo radiogram and with provision for

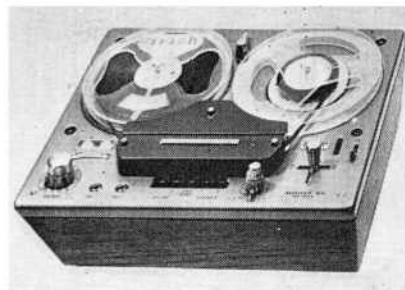
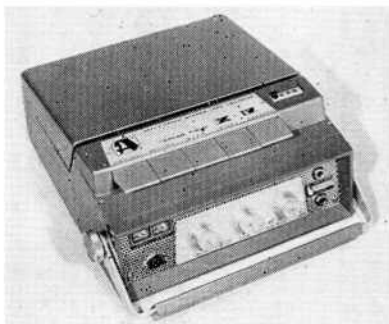
four wavebands — F.M. and short, medium and long. It has also provision for F.M. stereo broadcast reception and retails at 129 guineas (above). Telefunken are also showing a whole range of tuners, radio receivers, tape recorders and microphones.

C. E. Hammond will be unveiling two entirely new compact loudspeaker systems. The 'Europa' contains four units (two tweeters, one mid-range and one bass) built into a teak cabinet. The 'L7' is a single unit loudspeaker, $20" \times 13" \times 4\frac{1}{4}"$, for use where space is at a premium. Also new is the Hammond condenser microphone, which is a re-designed version of the Microkit. At 28 gns., it is the lowest priced condenser microphone in its class available in this country.

Sony will be displaying four of their recorders, the 'TC 500,' 'TC 200,' 'TC 777A' and the 'TC 600.' Also on display will be the 'TC 263D' precision stereo tape transport, and the 'SRA 3' complete stereo record pre-amplifier.

If you are looking for a hi-fi transcription unit visit **A. R. Sugden Ltd.** and see their Connoisseur range. The 3-speed Connoisseur Craftsman model shown above has a built-in stroboscope and performs to a very exacting specification. This and other Sugden products can be seen on Stand 34.

Amateur Tape Recording Video & Hi-Fi



Radford Electronics are showing two new loudspeakers. The "Series 3" super bookshelf loudspeaker incorporates two drive units, together with an acoustic corrector to provide a response previously unobtainable from dynamic systems. The "XLS" medium sized loudspeaker uses three drive units and is integrated by means of an eighteen element electrical network.

The **Ferrograph Company** have added their series 6 instruments to their existing range of hi-fi recorders. The series comprises the following models: The 631, at 88 gns., 631/H, at 92 gns., 632 at 115 gns. and the 632H and the 634 each at 120 gns. All have three speeds, the "H" models from $3\frac{1}{2}$ to 15 i.p.s., and others from $1\frac{1}{8}$ to $7\frac{1}{2}$. All are housed in new modern style cabinets.

Also among the new recorders is the **Akai X4**, shown above. This is a unique battery/mains portable stereo/monaural recorder, with rechargeable batteries. Features include interlocked piano key controls, quarter track record/play, erase and cross-field bias system of heads, as well as a new design of constant speed DC micromotor to ensure superb quality at the four tape speeds. Performance figures are: 40-20,000 c.p.s. ± 3 dB and wow and flutter less than 0.16% r.m.s. at $7\frac{1}{2}$ i.p.s. with equally impressive figures at $3\frac{1}{2}$ and $1\frac{1}{8}$ i.p.s. and an outstanding 30-5,500 c.p.s. ± 3 dB with

wow and flutter less than 0.35% r.m.s. at 15/16 i.p.s. Maximum reel size is 5". The transistor amplified gives 2-watts maximum on each channel and can be monitored on the internal 5" elliptical speaker or fed to hi-fi speaker enclosures. Two high sensitivity dynamic microphones are supplied for stereo-recording and twin VU meters (as well as providing a battery check) ensure perfect recording level. Up to $6\frac{1}{2}$ hours running time are achieved with a single charge. Price 135 gns. Further details from Akai - U.K. distributors, Pullin Photographic, 11 Aintree Road, Perivale, Middlesex. We considered the Akai X IV such an excellent machine that we have chosen it as the prize in our simple, free-to-enter competition open to all ATR readers. Full details of this competition on page 15, or from Stands 25 and 50 at the Audio Fair.

For budget-priced hi-fi speakers or enclosures visit the **Goodmans Stand** (No. 68). Ask for their booklet on speakers and enclosures, which includes designs and full details for constructing these and the crossover networks to go with them. One of the newer additions to the Goodmans family of speakers is the Triaxiom 1220 C 12" triple element unit which comes complete with cross-over network and attenuation control.

From the same distributing company come two famous foreign products - the

Norwegian **Tandberg** recorders, and the **Scott American** amplifiers. Tandberg will be demonstrating the monaural Series 8 and Series 9 recorders, as well as the stereo Series 6 and Series 7 versions. The new Series 8 is available in two-track and four-track models in the well-known Tandberg teak case, and also as a completely portable machine with special fabric cabinet incorporating lid and carrying handle. H. H. Scott Inc. will be demonstrating their 229 stereo amplifier, and introducing their new solid state amplifier, the Model 260, which has two 30 watt channels, and is transistorised. Also shown will be the model 200 amplifier with two 15 watt channels, separate tone controls for each channel, tape monitoring facilities, derived centre channel output, and low volume compensation circuits.

New from **S. G. Brown** is a dual function microphone which by the simple operation of a shutter mechanism is transformed from a conventional pressure operated configuration to differential operation, which renders the microphone sensitive only to sound originating in close proximity to it. Thus the instrument is well suited to deal with the majority of programme situations. Most of the Brown range of audio products will be on display including the new Canada headset which uses circumaural earpieces with liquid filled earpads.

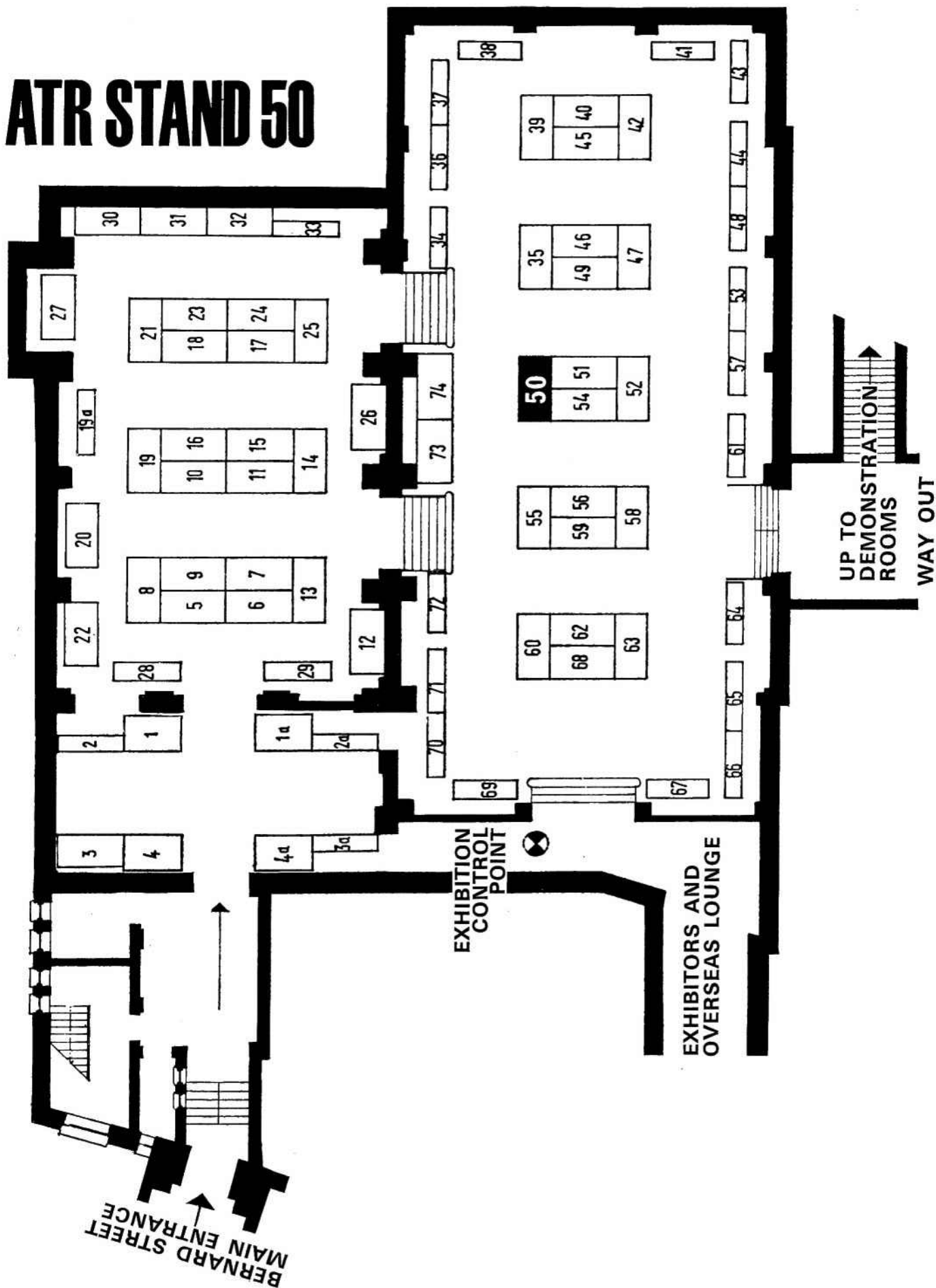
Continued on page 36.

INTERNATIONAL AUDIO FESTIVAL & FAIR

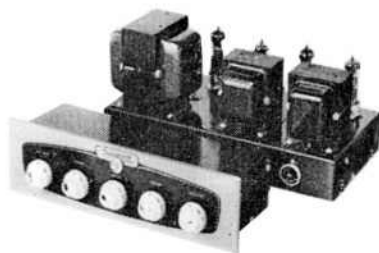
HOTEL RUSSELL APRIL 22-25

Name	Trade Name	Booth	Name	Trade Name	Booth
Acoustical Manufacturing Co. Ltd.	Quad	65	Lustraphone Ltd.	Lustraphone	16
Agfa Ltd.	Agfa	33	M.S.S. Recording Co. Ltd.	M.S.S.	9
Akustiche U Kino-Gerate GmbH	AKG	51	Metro-Sound Mfg. Co. Ltd.	Sonotone	2A
Ampex (Great Britain) Ltd.	Ampex	15	Minnesota Mining & Mfg. Co. Ltd.	Scotch	58
Armstrong Audio Ltd.	Armstrong	52	Mullard Ltd.	Mullard	19
Audio Dynamics Corporation (KEF)	ADC	37	Ortofon (Metro-Sound)	Ortofon	3A
B.A.S.F. Chemicals Ltd.	B.A.S.F.	28	Peto-Scott Ltd. (Philips)	Peto-Scott	-
B.M.B. Sales Ltd.	B.M.B.	48	Philips Electrical Ltd.	Philips	8
Beyer (Fi-Cord)	Beyer	10	Planet Projects Ltd.	Planet	30
Boosey and Hawkes Ltd.	Jordan Watts	55	Print and Press Services Ltd.	Tape Recording Magazine	-
Braun Radio	Braun	22	Pullin Photographic Ltd.	Akai	25
Brenell Engineering Co. Ltd.	Brenell	12	Pye Ltd.	Pye	56
S. G. Brown Ltd.	Brown	73	Radford Electronics Ltd.	Radford	5
Butoba Ltd.	Butoba	42	Record Housing	Record Housing	21
Celestion Ltd.	Celestion	46	Records and Recording	Records and Recording	74
Clarke and Smith Manufacturing Co.	Clarke & Smith	35	Reslo-Sound Ltd.	Reslo	70
Decca Radio and Television	Decca Radio	31	Revox-Studer (Hammond)	Revox-Studer	72
Decca Record Co. Ltd.	Decca Records	23	Rogers Developments Ltd.	Rogers	44
Derritron Radio Ltd.	Chapman	71	S.M.E. Ltd.	S.M.E.	57
Design Furniture Ltd.	Design Furniture	45	Saba Electronics Ltd.	Saba	47
Dual Electronics Ltd.	Dual	66	Scandinavian Radio & TV Co.	S.R.T.	13
E.M.I. Tape Ltd.	E.M.I.	24	H. H. Scott Inc. (A. C. Farnell)	Scott	17
Elcom (Northampton) Ltd.	Elcom	6	Shure Electronics Ltd.	Shure	64
Electroimpex Hungarian Co.	Qualiton	43	Sony Corporation of Japan	Sony	49
Fane Acoustics Ltd.	Fane Acoustics	38	Standard Telephones and Cables	S.T.C.	3
Ferrograph Co. Ltd.	Ferrograph	61	A. R. Sugden & Co. Ltd.	Connoisseur	34
Fi-Cord International	Fi-Cord	11	Svenska Høgtalabriken	Svenska Hog.	1A
G.K.D. Ltd.	G.K.D.	26	Tandbergs Radiofabrikk A-s	Tandberg	18
Garrard Engineering Ltd.	Garrard	67	Tannoy Products Ltd.	Tannoy	63
Goldring Mfg. Co. (Great Britain)	Goldring	41	Thorens S-A	Thorens	4A
Goodmans Industries Ltd.	Goodmans	68	Truvox Ltd.	Truvox	2
The Gramophone	The Gramophone	-	Vortexion Ltd.	Vortexion	27
C. E. Hammond & Co. Ltd.	Hammond	14	Welme Corporation Ltd.	Telefunken	7
Haymarket Press	Amateur Tape Recording	50	Wharfedale Wireless Works Ltd.	Wharfedale	53
Ilford Ltd.	Ilford	62	Whiteley Electrical Radio Co. Ltd.	Whiteley	60
K.E.F. Electronics Ltd.	K.E.F.	36	K. H. Williman & Co. Ltd.	Williman	—
Kelly Speakers (Decca Radio & TV)	Kelly	32	Wilmex Ltd.	Wilmex	—
Kodak Ltd.	Kodak	59	Wilson Stereo Library Ltd.	Wilson Stereo Library	—
H. J. Leak & Co. Ltd.	Leak	69	Wireless World/Wireless & Electrical Trader	Wireless World/ Wireless Elec. Trader	1
Link House Publications Ltd.	Hi-Fi News	39			
Loewe-Opta AG (Highgate Acoustics)	Loewe-Opta	40			
The Lowther Manufacturing Co.	Lowther	29			

ATR STAND 50



AUDIOVIEW



NEWS OF TAPE RECORDERS AND HI-FI

But perhaps the most interesting item of news this month is the fact that **Grundig** will definitely not be exhibiting at the Audio Fair, as they maintain that this is no longer beneficial to them. They have however just introduced a new range of four recorders, one of these is the TK 18L, which is a two-track recorder designed to make perfect recordings under difficult conditions. It incorporates the Grundig "Magic Ear" system of automatic recording level as does the TK 23L. The latter is a four track machine on which the automatic facilities may be switched out to allow the recorder to be manually controlled. Full details of these, and the TK 14L and TK 17L may be obtained from Grundig at 40 Newlands Park, Sydenham, London, SE26.

Record Housing will be showing as many of their products as can be accommodated at the Audio Fair. Look for the Longfellow a six-foot long low model which will hold turntable, complete tape recorder, amplifier, tuner, tapes and records. Last year's Lowflex and Lowline 2 have undergone slight improvements in style but prices remain unchanged. The centre piece of the exhibit will be the new Hi-flex Audio System comprising equipment housing unit, record housing unit and twelve inch speaker enclosure. The Hi-flex unit can be used as free-standing cabinets, in continuous runs

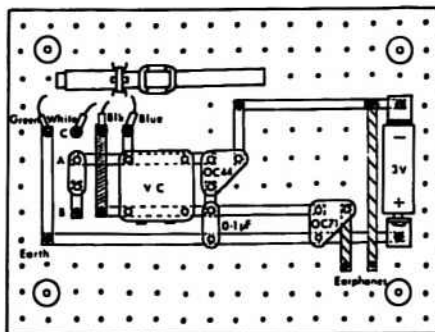
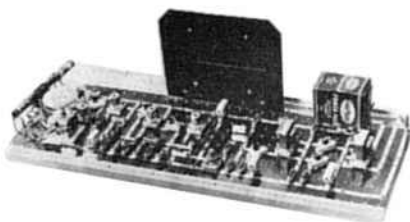
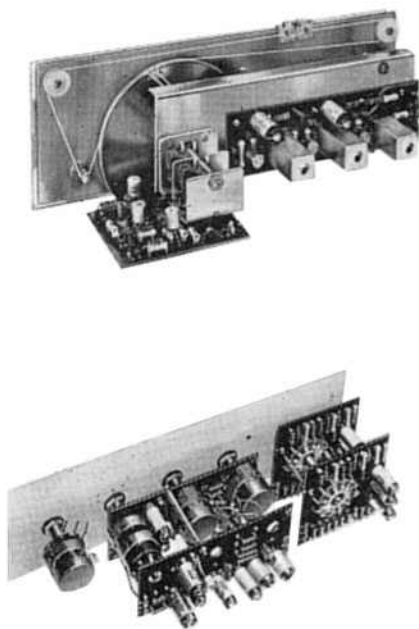
along the wall, or even (with the use of Hi-rak) up the wall. (Stand 21).

Lustraphone too have their range of microphones on show. These include the model TH 59/SB tubular hand dynamic model with press-to-talk switch, the model D 59/RT which is a combined/transmitter, and the now famous Lustraphone radiomic system (Stand 16).

The centre of interest on the **Leak** stand should be the demonstration of the Stereo 30 and Sandwich loudspeaker system. Other Leak products will of course be on display at Stand 69. On show for the first time will be the new portable model from **Lowe-Opta** – the Optacord 416. Basically the same as the 414, it incorporates two speeds, i.e., $1\frac{1}{2}$ and $3\frac{1}{2}$ i.p.s. (Stand 40).

One example of budget hi-fi is the **Tripletone** range of amplifiers which have received very favourable reviews and which we can also recommend. The **Tripletone** catalogue is worth writing for and from this we have chosen the Stereo 8-8 model which consists of the dual pre-amplifier and power amplifier shown above. This retails at £25 18s. 9d. and provides 8 watts of audio power per channel (16 watts total on mono). **Tripletone** also do mono only amplifiers and

Amateur Tape Recording Video & Hi-Fi



F.M. tuners. For the catalogue, write to the Tripletone Manufacturing Co., Ltd., 241a, The Broadway, London S.W.9.

Building from kits is both interesting and instructive and these days is simplicity itself. Most kit manufacturers provide printed circuit boards and all that is required is the ability to solder in components and wire up sockets etc. The **Martin Audio** kits excel themselves when it comes to simplicity and economy for you can build up an entire hi-fi outfit stage by stage. The kit contains a number of separate units for a complete F.M. tuner. These are unit 15, the F.M. head with tuning capacitor; unit 16, the IF amplifier; unit 17, the tuning drive and control panel. It assembles into a complete tuner as shown above. Total cost £12 17s. 6d., but you can purchase the units separately. They also do a complete amplifier system on the same unit construction principle, the complete pre-amplifier of this being shown above. Their leaflets are well worth writing for. Martin Electronics Limited, 154-155, High Street, Brentford, Middlesex.

Finally we must mention a new range of kits by **Radionic**. These are primarily for educational purposes but with them one can build a vast range of working circuits. For instance with Kit No. 2 one

can build 20 different kinds of simple radio receivers which incidentally work quite efficiently and can be used with a tape recorder. The construction of any of the circuits is so simple that children can do it for everything just plugs in. Take for instance circuit No. 14 from kit No. 2. It is all put together from an assembly plan as above. Just conducting strips and plug-in components all mounted on a perspex board. If you are looking for something even more ambitious then circuit 26 from Kit No. 4 offers a complete six transistor superhet receiver as shown above. For amplifiers, kit No. 3 offers 22 circuits including a push-pull amplifier complete with loudspeaker. **Radionic** kits are an ideal way to learn radio and electronics by easy construction and operation. For details of all kits write to Radionic Products Limited, Stephenson Way, Three Bridges, Crawley, Sussex.

Another well-known kit manufacturer is **Daystrom Limited** of Gloucester who market the **Heathkits**. These cover just about everything including tape recorders, hi-fi amplifiers, F.M. tuners, radio receivers, test equipment, and even electronic organs. Their fully illustrated catalogue can be obtained just by writing to Daystrom, Gloucester.

The range of **Harvey** bulk tape erasers,

one of which is shown above, will no doubt be of interest for a unique feature of these erasers is that they cater for spools up to 12" in diameter and also one inch wide N.A.M. tape. Complete erasure of even the largest spools can be accomplished in seconds, the tape being left in a completely neutral condition. The usefulness of this instrument is not limited to erasing tapes, as it can be used to demagnetise small items such as hand tools, ball races, gears, etc., and even watches. Prices range from £6 5s. 0d. to £15 10s. 0d. retail and a detailed leaflet is available from the manufacturers — Harvey Electronics Limited, 308 Farnborough Road, Farnborough Hants.

Truvox are releasing Britain's first ever all-transistor range of quality tape recorders and tape units. The complete sound system will be demonstrated with full monitoring facilities at the Audio Fair. Full details from Truvox at Stand 2.

E.M.I. will of course be displaying their four grades of tape, together with the six instructional taped Emiguide and the Emitape guide to better recording, a 64-page booklet, written by John Borwick. Recorders on display will include the new L4 portable professional recorder, as well as the TR52 and the VTR 4.

IN last month's article we gave a brief outline of the history of the stereophonic art up to the middle 1930's, and ended by mentioning the work being carried out at that time in the U.S.A. and in the United Kingdom. This month we will describe the differences in approach to the problem in the two countries, and in the next article see how the present-day techniques are directly descended from principles established at that time.

As we said last time, the American team under Dr. Harvey Fletcher, working at the Bell Telephone Laboratories, had to develop a technique of stereophonic reproduction, as well as the necessary equipment to enable their famous public demonstration to take place. It is the technique, rather than the apparatus, which concerns us here. Two engineers of the team, J. C. Steinberg and W. B. Snow, were given the job of evaluating this. They started their work on the assumption that if it were possible to erect a "curtain" consisting of an infinite number of microphones in front of the sound source, then every minute part of the "wavefront" coming from that source would be picked up by its own individual microphone. If then

each of these microphones was connected via its own amplifying system to a loudspeaker placed in the identical position in a similar curtain of loudspeakers, then this curtain would reproduce the same wavefront as received by the microphone. This, of course, would be the ideal case, impossible to achieve in reality.

In order to bring the experiments to more manageable proportions, three microphones were set up in a small studio, and each was connected to a loudspeaker in a rather larger auditorium. A "caller" moved about in front of the microphone, and observers in the auditorium were asked to mark on a plan of the stage area the apparent position as he moved. The system also allowed different connections between microphones and loudspeakers. The best reproduction of the movements of the caller was obtained when three channels were used, and this gave a good representation of both the width, and the depth, of the stage area. When the number of channels was reduced to two, the width of the reproduction was slightly increased, but the depth was reduced. Furthermore, positions in the centre of the stage seemed to be

INTRODUCTION TO STEREO

H. Burrell Hadden

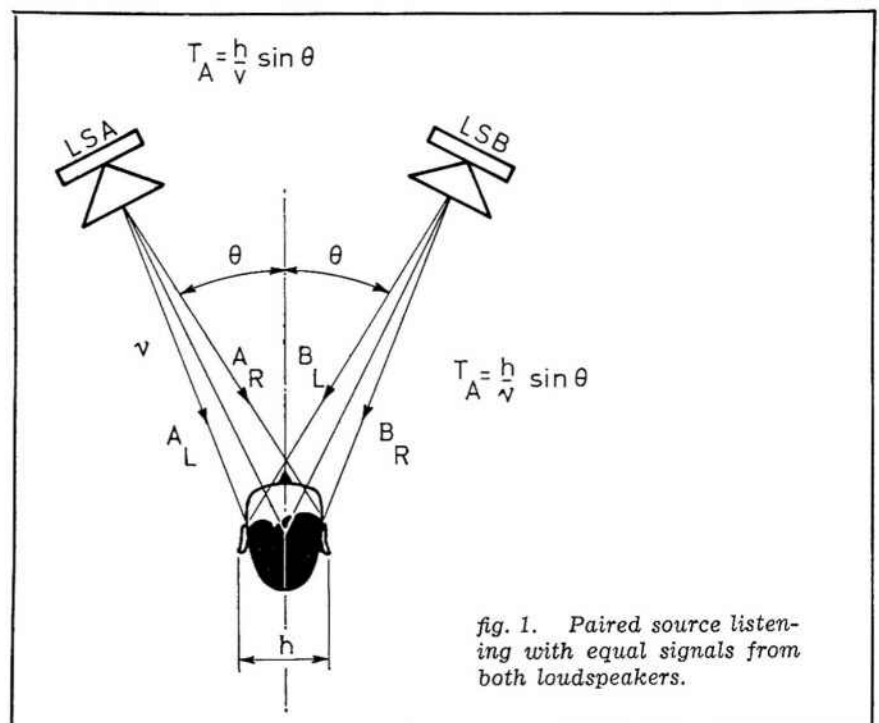


fig. 1. Paired source listening with equal signals from both loudspeakers.

more distant from the observer than they in fact were. This effect could be corrected to some extent by reconnection of the centre microphone, so that it fed equally into the left and right hand channels. This helped to fill up the "hole in the middle" but reduced the stage width somewhat, and did little to restore the lost depth. Other combinations were tried, and each test ended with the caller making his moves actually in the auditorium, unseen by the observers of course.

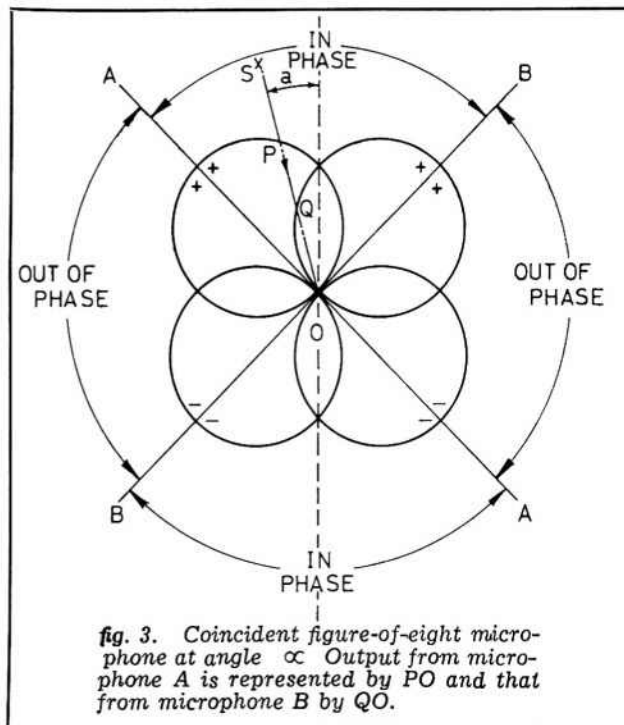
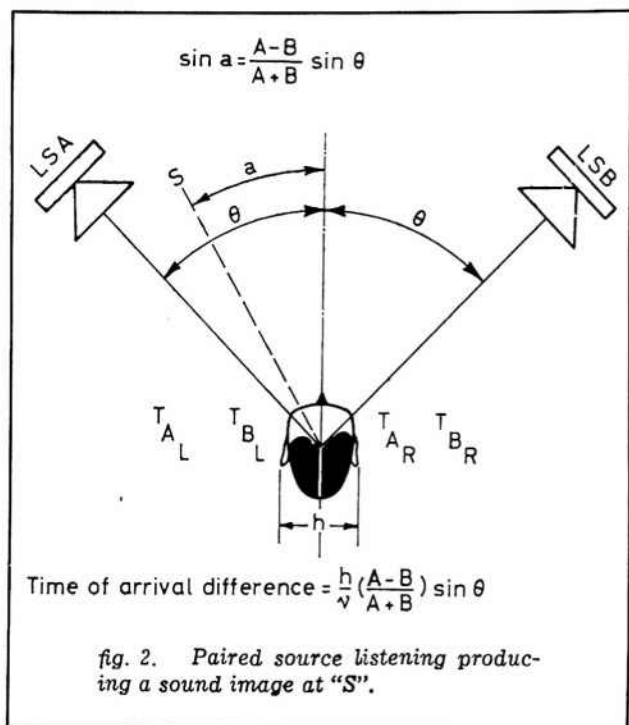
Let us for a moment examine what happens acoustically in a set-up as described. Suppose the sound source is directly in front of the left hand microphone. The sound will be received by that microphone, and also by the centre and right hand microphones. These microphones will receive the sound with progressively less amplitude, since they are further away from the source, and these differing amplitudes will produce differing electrical currents, which in their turn will produce differing amplitudes of sound from the three loudspeakers. In addition to this, the sound from the source will arrive at the second and third microphones progressively later in time

than it arrives at the nearest microphone. This means that the three loudspeakers will show differences in time and amplitude depending on the position of the sound source with respect to the three microphones. The same will obviously apply in the simpler case of the more common two-channel system. We shall see later how these *inter-channel* differences affect our ability to fuse the sounds from the separate loudspeakers into a complex sound source extending across the space between them.

At more or less the same time as the work with spaced microphones was being carried out at the Bell Laboratories, A. D. Blumlein and a team of workers at the laboratories of the Columbia Company at Hayes (since incorporated in the E.M.I. organisation), were attempting to achieve stereophonic reproduction from a somewhat different fundamental assumption. Instead of considering the "wavefront" coming from the sound source, as the Americans had done, Blumlein tried to reproduce the effects on the ears and brain which would occur if the listener was in front of the original sound source. Various theories had been put forward, and many experiments carried out, to

at the two ears. Obviously if a sound is, say, at the left hand side of the head, it will reach the left ear before it reaches the right. As the sound moves round the head, this small time difference will decrease until the sound is directly in front of the head. When it is the same distance from both ears there will be no time difference. As the sound moves further round towards the right ear, the difference in time of arrival, known as the "interaural" time difference, increases again, but in the opposite direction. In Blumlein's day, it was believed that we used other information to perceive the position of sounds at high frequencies, but recent investigation by Professor Cherry and his workers at London University has proved that this theory holds good, with slight modification, in this part of the frequency spectrum as well. It can easily be shown that the interaural time difference is proportional to the sine of the angle at which the sound meets the "normal" to the head, i.e., the line drawn straight in front through the nose.

Let us now consider the case when we are listening to two loudspeakers, both producing the same sound (fig. 1). Both ears are hear-



INTRODUCTION TO STEREO

Continued

ing sounds from both sources, and the time of arrival difference can be shown to be proportional to the sine of the angle each speaker makes with the normal. If we then vary the relative amplitudes of the sounds from the two loudspeakers, such that the volume from speaker "A" is represented by A, and that from "B" by B, then the sound at each ear will be A_L , B_L , and A_R , B_R . In this case it can be shown that the angle of incidence from the virtual sound source created by system is:

$$\sin \Theta = \frac{A - B}{A + B} \sin \Theta$$

and the time of arrival difference will be as shown in fig. 2. The only variables in this expression are the amplitude of the sounds from the two loudspeakers, and so in this case the inter-channel *amplitude* difference produces an interaural *time* difference. This argument is

only strictly true at low frequencies, but an extension can be shown to fit the high frequency case.

To return now to Blumlein's work. He described several methods of producing the required inter-channel amplitude difference using alternative types of microphone arrangement, but the simplest is the one which has been carried forward to the present time. In this (fig. 3) he used two figure-of-eight microphones, mounted as close together as possible with their main axes at right angles. In this case, the inter-channel time differences can be neglected, since the microphones are so close together, and only inter-channel amplitude differences will be present in the two outputs. These will be proportional to the angle of incidence of the sound source to the line bisecting the right angle between the two microphones. This of course occurs because of the variation of output of each microphone as sound is moved around in front of it, due to the polar response.

This "coincident" method of microphone technique can produce extremely accurate directional information. Recent work by Cherry has shown this to be due in part to the relative absence of inter-channel time differences. There will always be slight time differences, because it is physically impossible to mount the two microphones exactly at the same spot. With modern microphones, however, with two capsules in the same case, they need not be more than an inch or so apart.

The two main systems described above, one developed in America and the other in England, are still the basis of all stereophonic recording and broadcasting taking place at the present time. Whilst the Americans still stick basically to their system and most of Europe to the British system, there has been some interchange of ideas, and so many workers use effectively a combination of the best parts of both systems. Next month we shall consider some of the modern techniques.

important books for the amateur by H. Burrell Hadden

High-Quality Sound Production and Reproduction

Sound studio and outside broadcasting practice

Produced in the Central Programme Operations Department of the BBC for their own personnel to enable them to obtain the best results from studio equipment, this book is of absorbing interest to everyone, professional or amateur, interested in the production of high-quality sound.

42s net by post 43s 5d 274 pp. plus 46 pp. plates

Practical Stereophony

Whilst mainly directed to those who make their art their profession, there is much the amateur can learn, not only to improve his own recordings in the home, but also the reproduction from both tape and disc. The book is non-mathematical and deals with practical aspects of the work and can be easily read by professional and amateur enthusiasts alike.

37s 6d net by post 38s 5d 159 pp. plus 16 pp. plates

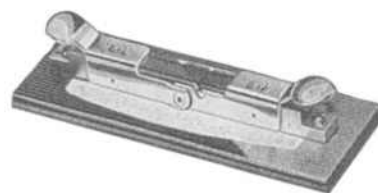
obtainable from leading booksellers

ILIFFE Books Ltd.

DORSET HOUSE STAMFORD STREET LONDON S.E.1

BUY A Bib

THE PROFESSIONAL TAPE SPLICER



—The most reliable and easy to use.

All metal—beautifully plated—compact in size—mounted on flock covered base. Easily and permanently attached to your tape recorder. Ferrograph, Vortexion, Reflectograph and Wearite decks already have fixing holes for the Bib splicer.

Clamps hold the magnetic or leader tapes in the precision cut channel—no danger of damaging the edges—most important with 4 track recordings. Right angle and oblique cutting slots are provided to facilitate editing to a syllable.

The Bib tape splicer saves tape and makes editing a fascinating hobby.

More Bib splicers have been sold in recent years than any other make. It is incorporated in the "Scotch" Tape Accessory Kit and is used by recording studios and broadcasting organisations.

MULTICORE SOLDERS LTD.

MULTICORE WORKS, HEMEL HEMPSTEAD, HERTFORDSHIRE

**Complete with
razor cutter
only 18/6**

(In case of difficulty
send remittance to
address below)

SWITCH OUT BACKGROUND NOISE...

MICROPHONE 1C 600

DUAL FUNCTION



A high degree of versatility is provided by this new, attractively styled microphone from S. G. Brown. The unit embodies a Ceramic Piezo-electric Transducer having excellent frequency response characteristics and incorporates a novel shutter mechanism, whereby its polar response can be modified instantly from a conventional pressure operated configuration to differential operation, which renders the microphone sensitive only to noise originating close to it. This facility makes the instrument ideally suited to most programme situations. The unit is supplied with a desk stand specially designed for quick release and is beautifully styled and finished in Smoke Grey with metal parts chromium plated.

A new audio advance by S.G. Brown

BRIEF SPECIFICATION—Frequency Range 50-12,000 c/s; Impedance predominantly capacitive having a value of .001 mfd., which can be regarded as 150 K ohms at 1 Kc/s; Sensitivity 0.6 mV. per microbar into 500 K ohms load; Voltage output 3.5 mV. for speech at 2 in. distance; Noise discrimination (differential operation) attenuation of unwanted signals at a distance of 12 in. for speech at 2 in. distance ranges from 30 dB at low frequencies to 18 dB at high frequencies and is 14 dB at 1Kc s. Only 8 in. long x 1.4 in. max. dia. Weight 3; oz. Price 8 gns. complete with desk stand and 6ft. cable.

Post the coupon today for full information and name of your nearest dealer.

S. G. BROWN LTD., KING GEORGES AVENUE, WATFORD HERTS.

Telephone: Watford 23301

Telegrams: Radiolink, Watford.



Full details of the **BROWN 1C 600** Microphone please.

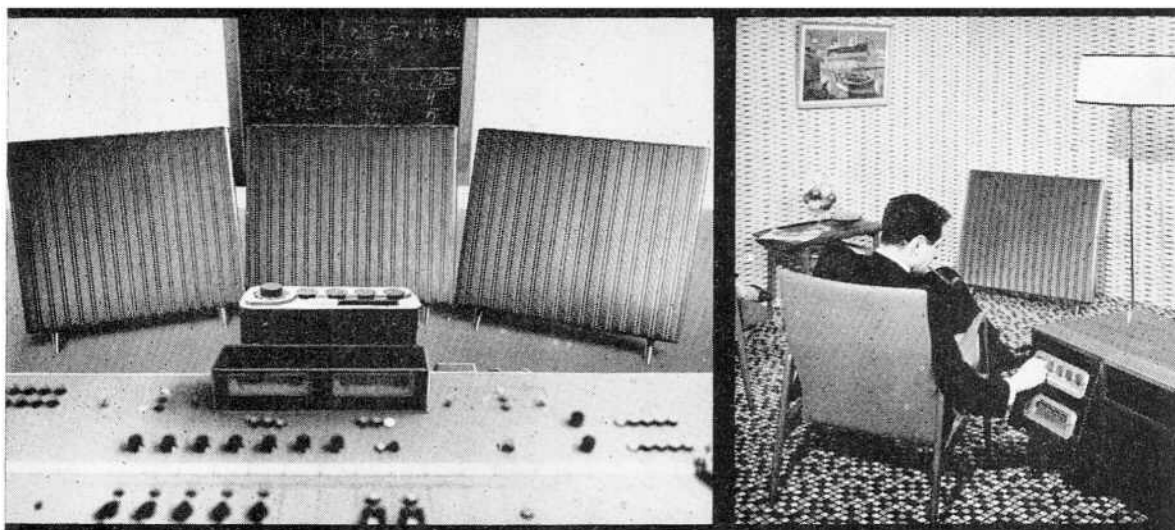
Name

Address.....

ATM

THROUGHOUT THE WORLD.....

QUAD is used professionally
to ensure the highest quality
of reproduction in music.



Monitoring with QUAD equipment
at the Lucerne Music Festival.

... and in your own home, too. QUAD gives
the closest approach to the original sound.

QUAD *for the closest approach to the original sound*

Send a postcard, quoting ref. **ATR** for full details of the QUAD range.

THE ACOUSTICAL MANUFACTURING CO. LTD. HUNTINGDON, HUNTS. TELEPHONE : HUNTINGDON 361.

TAPE RECORDERS IN THE MAKING

TOUCHDOWN 0930 hours in a fierce but short lived snowstorm about sums up our rather cold welcome at Aldergrove Airport just outside Belfast. Cold that is from the weather point of view but sincerely warm on the part of our hosts of the day—Grundig (Great Britain) Limited, whose giant factory at Dunmurry turns out nearly 500 tape recorders a day.

To describe the complex production system of Grundig would take an entire magazine and the individual stages through which a tape recorder goes before it emerges as a complete and tested unit are themselves too numerous to recount. As with everything else, the production of a tape recorder has to have a beginning, and at Dunmurry the beginning is the actual design. This is achieved in close co-operation with laboratory and production. From here a tape recorder emerges as a prototype ready for breakdown into the vast number of separate production stages. Machines must be set up to turn out small parts, giant presses must be tooled to stamp out the one piece chassis around which the tape recorder will be assembled, enormous automated plastics machines geared up to turn out the cases, thousands of electronic components must be distributed to the production lines and a new tape recorder is on its way.

New Models

During our tour we saw four new models being produced and by the time you read this, these new additions to the long line of Grundigs

will be on the market. The four newcomers are the TK 14L a two track machine, the TK 17L, a four track recorder with track synchronizing, the TK 18L another automatic model and the TK 23L, also automatic but with a lot of extra interesting facilities.

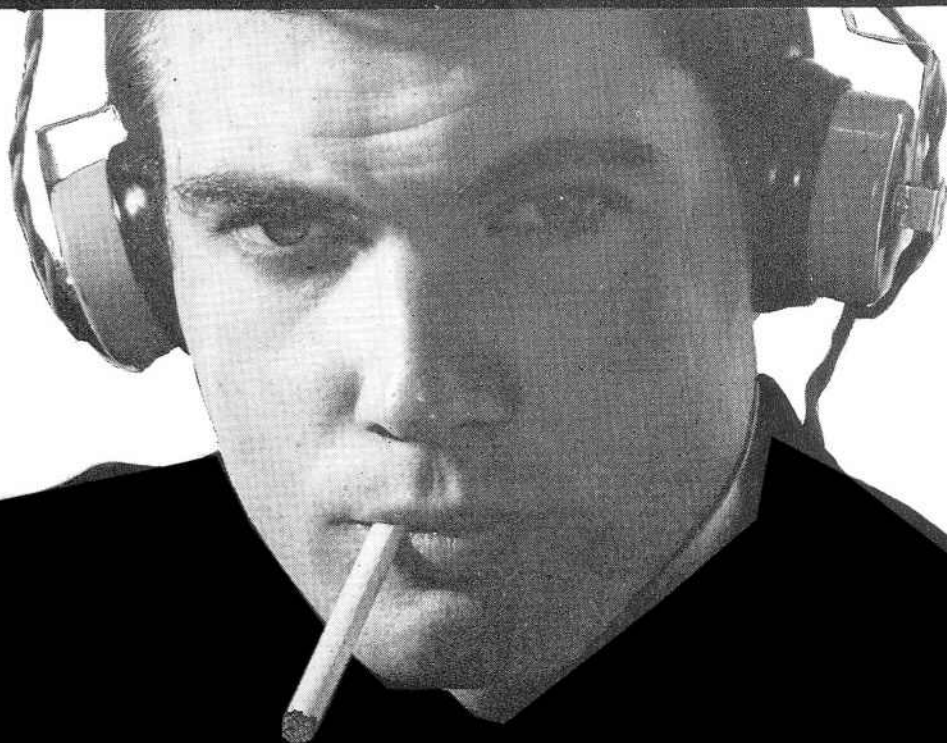
Production

Let us then take a turn around a production line to see how they are made. We start with the all important chassis which is polystyrene covered steel and makes for absolute rigidity — an important factor in a box full of intricate and carefully balanced mechanism (top). Then there are the specialised parts, those made by Grundig themselves, such as mains transformers, chokes, coils and so on. Whilst these are being made (below) the chassis moves slowly through the tape drive mechanism assembly lines finally emerging complete with its quota of wheels and levers ready for electronic production.

Still mounted in its protective production frame it moves stage by stage collecting resistors here, capacitors there, recording heads, valves and soon we see the familiar lines of a tape recorder taking shape. It is now ready for the critical adjustments that will make it comply to a rigid specification. On page 45 for instance we see circuit tests being carried out, and last but by no means least on page 45, the head azimuth and frequency response being set accurately with test tapes and electronic measuring apparatus. The innate box of mechanics and

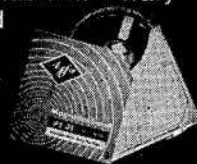
*Top: I make a thorough inspection of a Grundig tape recorder chassis.
Below: The winding of mains transformers.*





if it's true that one tape is as good as another, why do recording studios throughout the world insist on Agfa?

Stands to reason doesn't it? With money no object and the chance to choose what he wants, no discerning Engineer is going to pick Agfa tape unless it's the best. And when you consider that his Agfa tape is the same that you can buy in any shop and that it costs much the same as other tapes it must be best for you too. So look for the bright Agfa pack and remember — the one with the Agfa diamond is *your* best friend. Agfa Polyester recording tapes are available as long play, double play or triple play. The range is extensive from long play 210' with a playing time of 11 minutes for 9/- to 3,600' in triple play with a playing time of 3 hrs. 12 mins. for £5. 15. 0. A range of popular sizes is available in library cassettes. A splicing tape dispenser at 6/6, and accessory kit at 34/6 are useful extras. **FREE! MAGNETON ILLUSTRATED** — an informative and lavishly produced colour magazine. Please write for your copy.



the world's most versatile tape

AGFA LTD, 27 Regent St, London S.W.1. Tel: Regent 8581
A product of Agfa-Gevaert A. G.

Full details from your dealer or direct from Agfa Limited.
Why not enter the British Tape Recording Contest?

TAPE RECORDERS IN THE MAKING CONTINUED

below left: Circuit and frequency response tests.

top right: Azimuth alignment of the record play head is carried out with a special test tape.

below right: This machine operates push button controls thousands of times to ensure that they will stand up to hard wear.

electronics is now a fully fledged tape recorder, ready for the deck cover and a final critical inspection which includes a record and play-back listening test by Grundig's 'synthetic customer'.

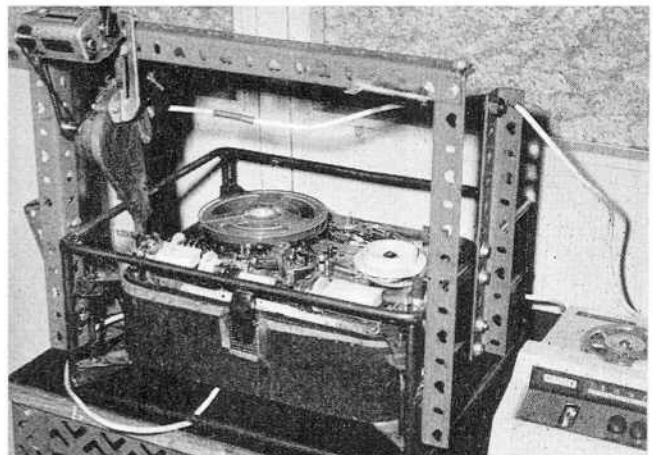
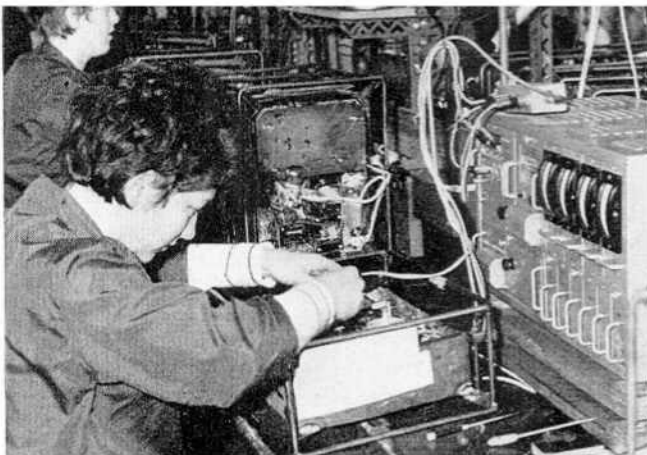
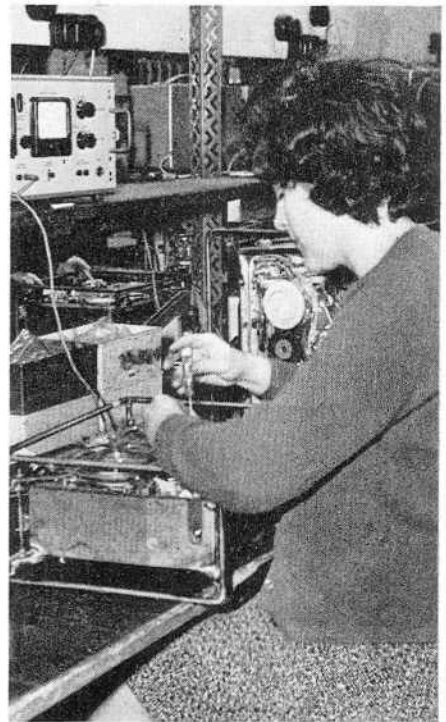
In a sound proof cabin an experienced inspector actually makes a recording, checking at the same time all the controls and facilities that may be required during recording. When this has been done a re-play test is carried out, again taking all controls into account. When, and only when, the inspector is satisfied, can the finished tape recorder, its reel of tape and other accessories be packed ready for distribution.

Our tour of Grundig covered several production lines including a unique automated plating system which ensures full protection to chassis and small metal parts against rust and corrosion. It ended in a rather special laboratory. Here highly trained engineers carry out all kinds

of tests to ensure that a production tape recorder will stand up to the claims made by its makers. Take a look below right which shows how a non-stop test is applied to push buttons. The testing mechanism had already clocked up several hundred continuously repeated operations of just one push button which also included the wind re-wind mechanism inside the recorder.

This is but a brief report on Grundig thoroughness when it comes to making a tape recorder. I am sure that my fellow visitors to the Dunmurry factory were as impressed as I was by the high standard of manufacture that backs the name of Grundig.

When we left Dunmurry, the skies had cleared but the snow still chilled the night air. Two hours later the twinkling lights of London 15,000 feet beneath our B.E.A. Vanguard heralded the approach to London Airport.—F.C.J.





Monday



Tuesday



Wednesday



Thursday

CAPTURE SOUND 7 DAYS A WEEK



Friday



Saturday



Sunday

**AND
BRING
IT BACK
ALIVE**

NEW FI-CORD



202A

FI-CORD INTERNATIONAL
Charlwoods Road, East Grinstead, Sussex. Telephone: East Grinstead 21351

Built to the same specification which made the Fi-Cord 202 the first choice of broadcasting and film companies, the new Fi-Cord 202A offers still more refinements. Among these are a button-operated battery tester with separate indicator scale, and a redesigned control panel, giving greater ease of operation, finished in silver-anodised aluminium.

Match the standards of the most exacting professionals with the new Fi-Cord 202A—the hand-made portable battery/mains recorder that captures every sound as faithfully as studio equipment.

Brief specification

- * Frequency response: 50-12000 c.p.s. ± 3 db at $7\frac{1}{2}$ i.p.s.
- * Signal to noise ratio: 45 db unweighted at $7\frac{1}{2}$ i.p.s.
- * 2 speeds: $7\frac{1}{2}$ and $3\frac{3}{4}$ i.p.s.; standard 4" spools and $\frac{1}{4}$ " tape.
- * Vu-meter for recording level.
- * Input socket for any microphone with an impedance from 20-1000 ohms.
- * Constant motor speed with wow and flutter figure of less than 0.3 r.m.s. at $7\frac{1}{2}$ i.p.s.
- * Separate batteries operating motor and electronics to reduce motor noise to a minimum.
- * Button operated battery tester with indicator scale.
- * Fast forward and fast rewind.
- * Remote control socket for greater versatility.
- * Built-in speaker for monitoring.
- * Separate speaker and amplifier sockets.
- * Size: 9" x $6\frac{1}{2}$ " x $4\frac{1}{2}$ ".
- * Extras available include calfskin case, microphones, headphones, amplifier-speaker unit, transistorised mixer.

Choice of four power systems:

- 1 Rechargeable batteries.
- 2 Long life mercury batteries.
- 3 Power Pack for use with 12v car battery.
- 4 Power Pack for use with AC mains 110-240v.

ELECTRONIC WORLD

AUDIO FAIR—22nd to 25th April

We are exhibiting under ideal acoustic conditions at the **TAVISTOCK HOTEL**. Regular recorded concerts to demonstrate not only our tape — free samples available—but other first class equipment, including Woollett speakers and Jobo turntables.

De Villiers (Electronic World) Ltd., 16c Strutton Ground, Lond. SW1

STANDARD PLAY (PVC Base)		DOUBLE PLAY (Prestressed Polyester Base)	
3" / 150 ft.	4 for 18/-	3" / 375 ft.	2 for 20/-
do.	48/- doz.	do.	108/- doz.
4" / 300 ft.	4 for 26/-	4" / 600 ft.	2 for 30/-
5" / 600 ft.	2 for 26/-	5" / 1,200 ft.	27/-
5 1/2" / 900 ft.	16/-	5 1/2" / 1,800 ft.	35/-
7" / 1,200 ft.	19/-	7" / 2,400 ft.	45/-
LONG PLAY (Prestressed Polyester Base)		TRIPLE PLAY (Prestressed Polyester Base)	
3" / 225 ft.	4 for 22/-	3" / 475 ft.	2 for 26/6
do.	60/- doz.	do.	150/- doz.
4" / 450 ft.	2 for 21/-	3 1/2" / 650 ft.	17/-
5" / 900 ft.	2 for 35/-	4" / 900 ft.	23/6
5 1/2" / 1,200 ft.	24/-	5" / 1,700 ft.	40/-
7" / 1,800 ft.	31/-	5 1/2" / 2,300 ft.	52/6
		7" / 3,300 ft.	80/-

Enclosed £ s. d.

NAME

ADDRESS

BLOCK CAPITALS PLEASE

CASH WITH ORDER

POST FREE • SEND COUPON NOW—



GRAMPIAN REPRODUCERS
Ltd.,

Hanworth Trading Estate,
Feltham, Middx. Feltham 2657.

the
Grampian
Ribbon Microphone
With a frequency response, virtually level from 40 c/s to 15 kc/s, it is the ideal microphone for the studio and where a high standard of fidelity is essential.

Model GR. 1. Semi-cardioid response, giving partial suppression at the rear face. Ideal for overcoming problems of feedback between microphone and speakers.

Model GR. 2. Has a 'figure of eight' sensitivity pattern. Discriminates against unwanted side-noises, both in the vertical and horizontal planes.

Complete with 18ft. screened lead, swivel holder and connector: £10.5.0.

A range of accessories is available — please send for illustrated leaflet to:

Grampian

RECORDING DIARY

THIS MONTH we present another new feature to guide the amateur recordist—a diary of tapeworthy events and unusual sounds to collect. Towns are shown in bold type for easy reference, and dates (in brackets) are all in May, unless shown otherwise. But before you rush 'out with your portable, one word of warning. Check for copyright restrictions. And if in doubt, turn to page 15 of this issue, where you'll find a handy reference to the complexities and problems of copyright.

WHAT WHEN AND WHERE TO RECORD DURING MAY

MAY-TIME CEREMONIES

Keen sound hunters are in for a feast this month, particularly with an abundance of traditional May-time ceremonies. With celebrations at **Abingdon** (3rd), **Berwick** (28th-2nd June), **Boston** (3rd-10th), **Elstow** (13th), **Gravesend** (15th), **Great Torrington** (6th and 8th), **Hereford** (4th-6th), **Knutsford** (1st), **Ludlow** (30th April-4th), and **Spalding** (8th).

ARTY OR ANCIENT

Those of you lucky enough to be in **Pitlochry** during Festival season (10th April-9th October) should find a wealth of beautiful sounds, or by way of contrast, there's the 4th Annual **London-Brighton** Run of Historic Commercial Vehicles (2nd) and the National Traction Engine Club Rally (29th-30th) near **Boston**.

TRADITIONS

It's worth enquiring if there's a "Beating the Bounds" ceremony in your parish — quite a few take place in May, notably **Berwick** (1st), **Oxford** (27th), and the **London Manor of the Savoy** (also 27th). Morris dancing at **Thaxted** (21st-23rd), **Highgate** (28th) and in **Kent** (8th onwards), as well as the Festival of English Folk Dance, Song and Music at **Birmingham** (19th and 20th) could provide a mediaeval note.

MOTOR RACING

Finally, if you like the high whine of really powerful engines, try **Oulton Park** (1st) or **Silverstone** (15th).

THE LOUDSPEAKER PART 5 TOP UNITS

by D. J. Barnett

THERE ARE FIVE MAIN GROUPS IN THE HIGH FREQUENCY SPEAKER RANGE:—

CONE, DOME, HORN, RIBBON AND ELECTRO-STATIC.

CONE TREBLE UNITS

These are a miniature version of the standard moving coil loudspeaker. Due to the fact that the speaker is going to handle only high frequencies, the diameter of the diaphragm is small, usually about 2 to 3 inches. The cone weight is kept as low as possible without introducing distortion due to the cone "breaking up" in order to increase the efficiency of the speaker and also to increase the high frequency extension. Similarly the voice coil is light and often wound in aluminium wire. The principle of lightweight diaphragms and coils does not apply only to the conventional cone treble unit but to all moving coil speakers that are intended to handle only top frequencies.

The movement of the coil and diaphragm at high frequencies is very small and consequently the length of the voice coil is usually the same length as the magnetic gap. This differs from full range moving coil speakers where the voice coil is either considerably longer or smaller than the magnetic gap to ensure that the coil works in a constant magnetic field. As the efficiency is high owing to the light weight of the moving parts of the speaker, the magnet system is considerably smaller than that of the full range speaker.

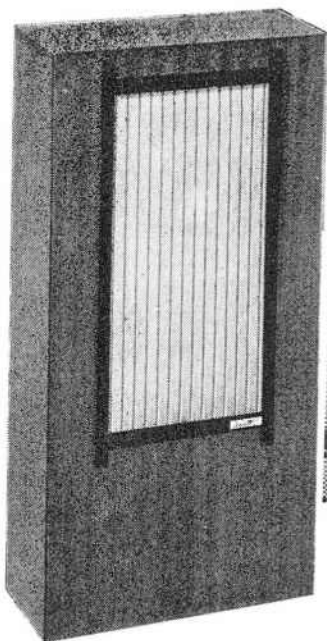
The shape of the cone and the cone surround are of the utmost importance in the design of these units. The cone itself usually has a curved profile, and the shape of this will not only affect the frequency response on axis but will also determine whether the speaker will be very directional or not. As it is at high frequencies that the polar response tends to become directional, it is important to design top units that have a reasonable response up to 30° off axis. Response curves both on and off axis for a conventional cone treble unit are shown in fig.1.

As with full range speakers the rim of the cone must provide satisfactory termination for the speaker and it is common to use a rim of different material from the cone body. The body is normally of paper and the rim of PVC, plastic foam or of paper treated with some damping material.

However it is a mistake to think that any small speaker will act as a tweeter. A normal commercial speaker used in radio or television is not designed to have an extended frequency range and so it is essential that the speaker is correctly designed and manufactured, if it is intended to reproduce high frequencies.

DOMES TWEETERS

Instead of using a small diameter coil driving a diaphragm at the centre, an alternative is to use a domed diaphragm driven on the outside by a larger coil. The dome is usually about 1" to 1½" dia. and is made from a fairly rigid plastic, metal or treated cloth. The edge of the diaphragm is again suitably terminated with some resistant material.



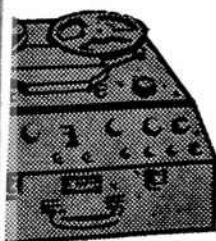
Perfect Partners...

Your Tape Recorder and the

JORDAN WATTS A.12

High Fidelity Loudspeaker

The quality of reproduction of which your tape recorder is capable, is seldom heard by way of its internal speaker. For fullest enjoyment of your recordings replay should be through an external speaker of the quality of the Jordan Watts A.12. This 12-watt system comprises a single loudspeaker module capable of reproducing the entire audio frequency spectrum, housed in a handsome reflex enclosure. It is the perfect partner to your recorder in the search for realistic sound reproduction.



Available at
High Fidelity
dealers
throughout
the country.

* Jordan-Watts Loudspeaker Systems range from the Mini 12 (12-watt) to the C.100 (100-watt). Write for descriptive leaflet—

DIMENSIONS:— 24½" high x 12½" wide x 5½" deep. £22.0.0

BOOSEY & HAWKES (Sales) LTD., EDGWARE, MIDDX.

OR

BESSION & CO. LTD., EDGWARE, MIDDLESEX,

Telephone EDGware 5581

Telephone
EDGware 6611

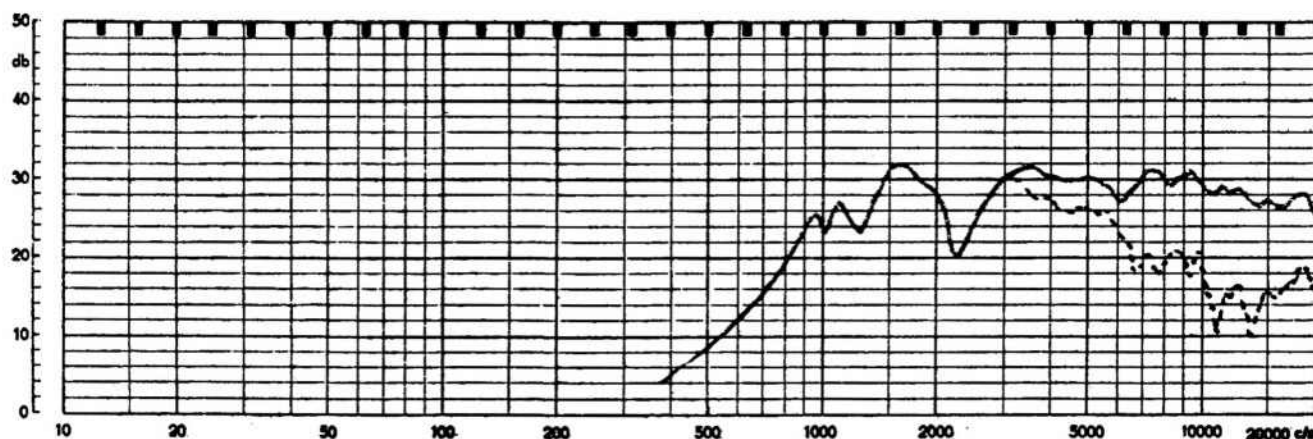


fig.1. Response curve of a cone treble unit—on axis -- - 30° off axis.

HORN LOADED PRESSURE UNITS

It was mentioned in a previous article that to horn load a speaker for use at low frequencies was impractical because of the size of the horn. Once the unit is required to reproduce high frequencies only, the horn becomes very much smaller and quite feasible. A correctly designed horn is extremely efficient and this has been a reason for its popularity. The diaphragm must be closely coupled to the horn in order to take advantage of the loading, and correct design will be responsible for the high frequency extension. Again the diaphragm is made either of metal, plastic, paper or treated cloth.

May, 1965

One disadvantage of the horn loaded tweeter is that it tends to be more directional than most other units. fig.2 shows a typical horn loaded top unit.

RIBBON TOP UNIT

An aluminium ribbon is stretched in a magnetic field in such a way that the ribbon itself is the conductor and the radiator. The ribbon is usually corrugated to help strengthen the aluminium which is only about a thousandth of an inch thick. When the signal is applied to the ribbon, it will vibrate and radiate sound. However the system is very insensitive and so a large magnet is

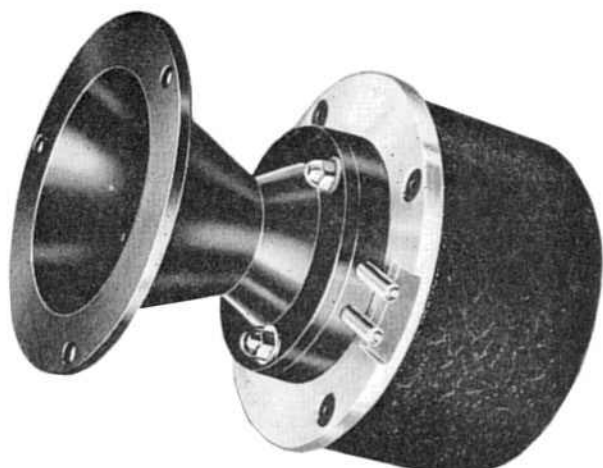


fig. 2. A typical horn loaded high frequency speaker unit. The Goodmans "Trebax 100".

THE LOUDSPEAKER *continued*

usually necessary, together with horn loading. In order to protect the ribbon at low frequencies a crossover is built into the unit.

A popular model of this construction has been held by many experts as being the best available top unit over the last few years and there is no doubt that the response and distortion of such speakers makes extremely pleasant listening.

ELECTROSTATIC TOP UNITS

All the units described above are variations of a moving coil electromagnetic system but the electrostatic speaker works on an entirely different principle.

The simple electrostatic tweeter consists of a rigid perforated electrode and a thin moveable electrode which acts as the diaphragm of the speaker. The diaphragm is mounted in such a way that it can vibrate without touching the rigid electrode. Most diaphragms are made of plastic coated with a conductive surface.

If an alternating signal is applied between the two electrodes then alternating force will result and the moveable plate will vibrate. However the force will be dependent upon the applied voltage and will not be affected by the direction of the voltage. Thus if a sinewave is applied the plate will vibrate at twice the frequency of the signal.

To stop this happening, a bias voltage is applied to the diaphragm of such a value that the signal always remains in one direction. Then the diaphragm will vibrate directly with the signal. This is the principle of the simple electrostatic tweeter, which will generally give a smooth response with fairly low distortion. A development of this can be applied to full range speakers but there are considerable problems regarding suitable diaphragms and suspensions, electrical breakdown and efficiency.

IS HALF YOUR TAPE RECORDER



WASTED?

The performance of a portable tape recorder is severely limited by the space available for its internal loudspeaker.

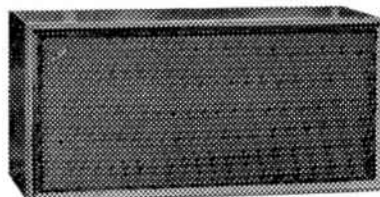
The connection of a high quality external speaker will reveal hidden detail in your recordings, and the Wharfedale PST/8 is an ideal choice.

This unique, patented enclosure design gives optimum results with Wharfedale 8" unit. Impedances are easily matched by fitting the WMT.1 transformer, costing only 13/6.

*Descriptive literature FREE on request
including Cabinet Construction Sheet*

WHARFEDALE PST/8

PRICES: £10. 10s. 0d. in a choice of polished walnut or mahogany veneers or oiled teak. Oak finish (light, medium or dark) available to special order.
In whitewood £7 10s. 0d.



Recommended units
8" Bronze/RS/DD
75/10 inc 10/10
P.T.
Super 8/RS/DD
134/2 inc. 19/2
P.T.

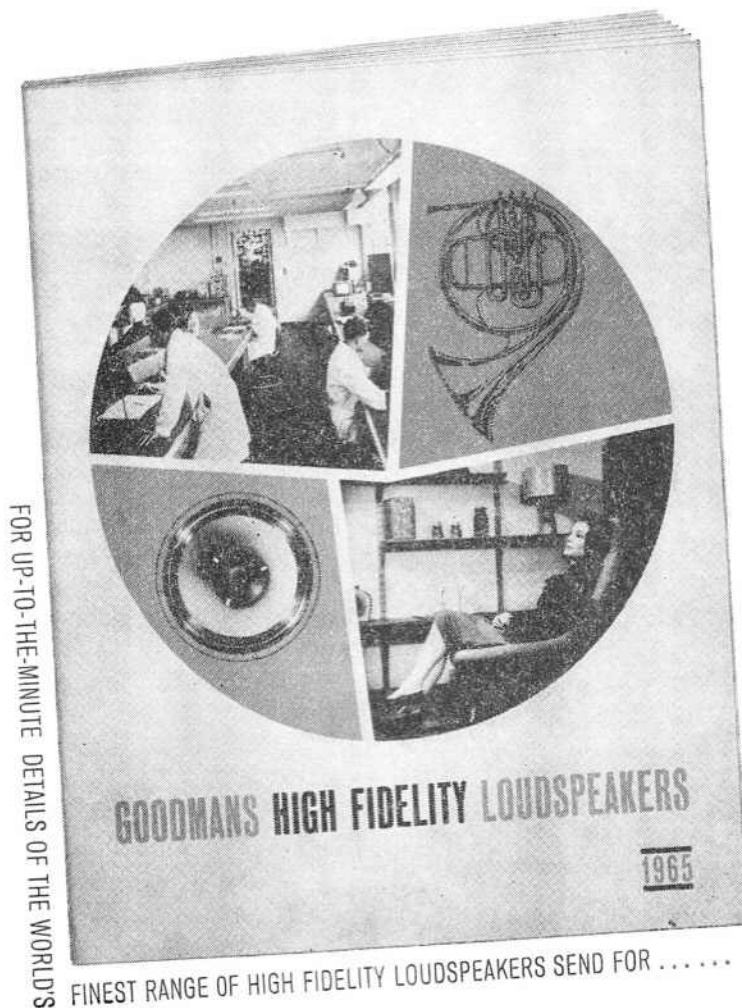
WHARFEDALE WIRELESS WORKS LTD.



Idle, Bradford
Yorkshire

Telephone:
Idle 1235/6

Telegrams
'Wharfedel'
Bradford



GOODMANS HIGH FIDELITY LOUDSPEAKERS MANUAL 1965 EDITION NOW OUT !

A new, bigger, more colourful edition of this "Guide to full listening enjoyment"—revised and completely up-to-date. Packed with information for everyone interested in High Fidelity.

Articles on High Fidelity for beginners, and on stereo, "budget" systems and electric guitar amplification.

Details of the full Goodman's loudspeaker range, including complete Systems, and laboratory-tested designs for enclosures.

You'll find the Manual both interesting and informative — send the coupon for your free copy of the new edition.

GOODMANS

GOODMANS INDUSTRIES LIMITED
AXIOM WORKS · WEMBLEY · MIDDLESEX

Tel : WEMbley 1200.

A Member of the Rentaset Group

FREE

Please send me a free copy of the 1965 Goodman's High Fidelity Manual.

Name

Address

TR 5.

May, 1965

51

SOMETHING IS ROTTEN ROTTEN

Continued

T.E.: It depends on the kind of entry. Two of last year's prize-winning tapes have been broadcast by the BBC.

J.B.: But if there were to be considerably more good entries it might be possible to extend this?

T.E.: Well, the chance of finding acceptable material would be that much better! If the entry figure was doubled . . .

J.B.: . . . and we're back again with the problem of getting the individual to be creative and then enter his creation. Doubling the entry figure would make it three hundred. Now how many clubs would you say there were in this country?

K.C.: At a rough guess I'd say that Britain has about 300 tape clubs.

J.B.: Well then, if each tape club were to do what my local club is doing, you'd have three times that amount for a start.

T.E.: Well what exactly are you doing then?

J.B.: As most clubs do, we run a monthly tape contest. This produces some excellent little tapes, but the members seldom enter them for the national contest. What we have resolved is that every winner, and possibly runner-up, of our monthly contest this year will automatically have his tape sent in by the club on his behalf. Unless of course he has really strong personal objections, but I don't think that's very likely.

K.C.: And if every club could do this, with the tapes sent in by private individuals, we could top the thousand mark. That would be tremendous if we could manage it. But perhaps we're being rather over-optimistic.

J.B.: Unfortunately we may be. But on the other hand, it is possible if only everyone would do their part, shake off the cobwebs and really get down to it.

K.C.: I think the problem with most people, particularly those who don't belong to one of the many clubs, is that they tend to run out of ideas too quickly.

J.B.: Myself, I'm all in favour of the actuality recording — that is, anything that is real, genuine, not "fudged" in any way. And as Tim said, this too is the kind of subject that the BBC uses in programmes like "Today". Local colour, unusual interviews . . .

T.E.: . . . You can't beat that sort of thing. Get hold of the bewhiskered old man in the pub, or the little old lady who has her little memories of some famous personality of the past. The older generation have so much to offer the young recordist in his search for the unusual. There's not much point in recording anything that looks like lasting another ten years or more. The real value of many recordings is that fact that they just couldn't be made at a later date . . .

J.B.: . . . the obvious example here being the steam trains. Soon that'll be a sound impossible to capture. And it's no use leaving it till the last minute — all the professionals will be there recording the last steam train as it leaves Victoria or where-have-you. What I shall do, for instance, is start collecting later this year. Talk to the people who work with steam trains, the people whose jobs will die with the steam train. This sort of thing really does have a point.

K.C.: And what's more, you don't have to sit down and consciously dream up a gimmick. If you're there and it's happening and you've got your recorder you can't really lose.

J.B.: Of course it isn't always possible to have an idea come to you just like that, but I have found that if you carry a portable the way some people carry a camera, the wealth of subjects you can capture on tape is amazing.

K.C.: And of course, it's a big mistake to scorn anything as being un-tape-worthy. Take the old rag-and-bone

man for example. The local Steptoe may not look as though he's got much to say, but what he does have to say will be said colourfully, you can be sure of that. And I know John will agree with me here — he won the ATR contest last year with his interview with a rag-and-bone man, Thomas Edward Ward, Esq.

J.B.: And this brings up another point. This particular kind of tape needs what you might call considerate editing. For example, my Mr Ward's opening gambit was a really fruity bronchial cough. Many people would have cut this out. But I felt that this was part of him, so the cough stayed in.

K.C.: And the amazing thing was that it didn't sound revolting. In any other context it might have done, but as John says, because it was so much part of the man, a part of his character, it went a long way into making the tape the success it was.

T.E.: I think after a while any thinking recordist will realise that to edit out all the ums and ahs isn't always a good thing. It does make for a natural feeling, if you leave some in, and conveys character far more than a stilted, over-edited recording. Mind you, you don't want to go to the other extreme — just get a reasonable balance between the stilted and the rambling.

J.B.: And, bearing these things in mind, it shouldn't be too difficult for anyone with even an inexpensive portable recorder to produce something worth while for the contest.

K.C.: Even if they only start thinking about it now, for the first time, there's still time, until the end of May in fact, to get something on tape.

T.E.: You persuade your readers — every single one of them — to do something, and we might be able to do justice to the International. After all, we are hosts to all the other member countries this year, and it's going to look pretty poor if we can't even command reasonable entries for our own contest, let alone the International.

J.B.: This is something that worries me too. After all, we're only hosts to the International once every five years. For us this year, it's come at the right time. Tape recording needs a big boost, and the International could be just the thing to bring it — if we can get the response.

T.E.: And of course, tape recording may have immediate news value while the International judging and prize-giving is actually going on.

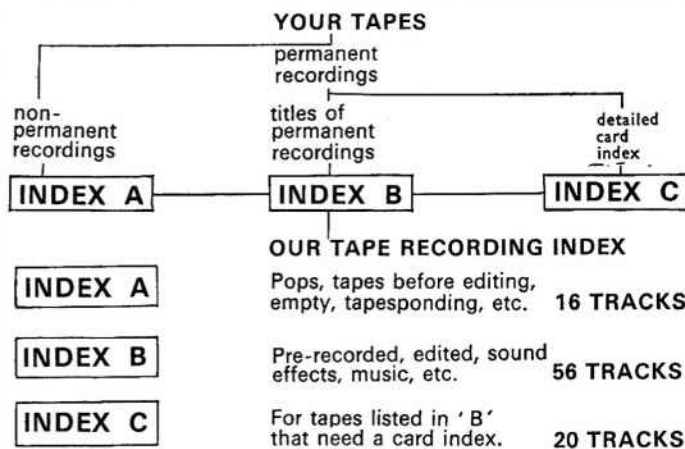
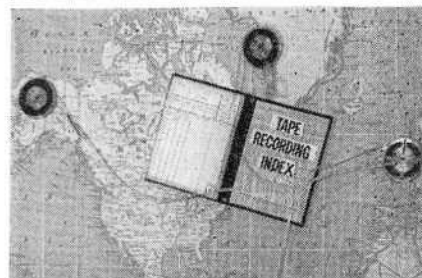
K.C.: So all that remains for us to do is to press home this little advantage while we have it. After all, it won't come our way again until 1970, and by then — depressing thought — it might be too late, particularly if people won't rouse themselves. In fact all along the line it's up to the individual and clubs. If they'll do their part, all the necessary powers-that-be are quite willing to help.

T.E.: That seems to sum it up admirably.

J.B.: It certainly does. Three or four entries from every active club, plus plenty of individual entries, and we're home and dry.

K.C.: And of course, anything that we at ATR can do, we'll do. But first, I think, recordists need to show us that they're worth it!

EVERY TAPE RECORDER NEEDS AN INDEX



Immediately changeable. Seen at a glance. All contained in a beautiful 6" x 8" folder. Easy to slip on your tape rack or under the lid of your machine. From your local dealer or send 25/- plus 1/6 p. & p. to:

THISTLEBOON ENTERPRISES LTD., 13 THISTLEBOON ROAD, MUMBLES, SWANSEA

LUSTRAPHONE

the foremost name in microphones



REBONETTE MICROPHONE

A pencil ribbon microphone giving the highest standard of monaural or stereophonic reproduction, the Ribbonette by Lustraphone is a really high quality product.



LAVALIER MICROPHONE

With an adjustable neck halter to leave the hands free, the 'Lavalier' microphone by Lustraphone is a most efficient dynamic microphone, equally effective indoors or outdoors.

Send for fully illustrated literature

LUSTRAPHONE LIMITED

(Dept. A.T.5), St. George's Works, Regents Park Road, London, N.W.1.

PRImrose 8844/5/6



AUDIO FAIR — Stand No. 16 : Demonstration Room No. 342

TAPE CLUB NEWS

What's happened to the enthusiasm and hard work for which tape clubs have hitherto been so well known? Where has all that drive and keenness disappeared to? Or is it just lurking temporarily we hope — beneath the surface? Either way, it's time you all shook yourselves out of the little rut you appear to be in. Club reports for the first four months of this year are not only down considerably on last year's, they're also sadly lacking in evidence of that vital element of get-up-and-go.

Is there a lack of incentive to hard work? Maybe there has been, but there isn't any more. Elsewhere in this issue (pages 10 and 11) you'll find the report of a challenging discussion I had recently with two other well-known tape enthusiasts. Read, mark, learn and inwardly digest it — and don't let that reference to clubs go over your heads. It's addressed to each and every one of you. You can make or break the future success of the British Tape Recording Contest, and its participation in the International.

At the next club meeting, make a point of bringing this well and truly home to your committee members. Don't rely on someone else to do it. Do it yourself. Make a formal request that the best tapes from each monthly competition this year be entered in the B.T.R.C. And if you haven't been having monthly contests, now's the time to start, and enter the first and second tapes from this month's contest. You'll find all the rules and regulations of the B.T.R.C., together with an entry form and plenty of tips, on page 16 of the March issue of ATR. If you want more forms, and I hope you do, write and ask me for them.

You've got six weeks left — enough time for every single member of your club to make a really worthwhile tape and enter it for the contest — if only you can muster some of that latent enthusiasm and really get down to it.

CLUB OF THE MONTH

Undoubtedly top marks for **Thornton Heath** for being the only club in the country to recognise the present situation, and what's more, for doing something about it. The suggestion of a tape a month from every club came from them, and they're taking the lead by entering at least six tapes made by club members. And having studied the rules very carefully, they found that even if a tape was made some time ago, it would still be eligible for the contest.

Their February competition, entitled "Help — Let Me Out" certainly produced some tapes for the B.T.R.C. The winning tape, made by John Bradley, was the life story of "Willie," the champagne bubble, and other entries which did well came from Christine Thompson (who thought up the competition subject) and John Thompson, father of the said Christine.

But perhaps the noisiest night was the live recording night, when music from an electronic accordion, a gong, two flutes, and an assortment of Christmas cracker whistles, squeakers and blowers, were all recorded on ten machines and all played back at once! Great fun, as well as being something of a technical experiment(?).

JOIN IN AND SING

When the **Birmingham** Tape Recording and Audio Club records programmes for the Birmingham and Midland Ear, Nose and Throat Hospital, Alan Crook always plays an active part — possibly because his wife is the matron! Lately, several live recordings have been made at the hospital, so that patients and staff can join in and sing. Another club night was devoted to dubbing a collection of hymns, mixed over many spools of tape, on to tapes tabulated into seasons of Easter, Epiphany, etc., so that they can be found easily for Sunday services. A fascinating session along the lines of a "brains trust," a visit from the Kidderminster club, and an excursion to record the last sounds of the organ of the old Piccadilly Cinema completed an interesting programme for the past few weeks.

RECEPTION AND REGALIA

Les Bridges, of the **Walthamstow** and District Club, recently had a 3½-hour recording session with a new Bang and Olufsen stereo recorder at a silver wedding celebration. The tape is being edited down to 45 minutes to be sent to relatives of the couple in Australia. The B. & O. was also demonstrated at a club meeting, when members of the London club were visiting.

Two blind members of the club, Mr. and Mrs. Don Cooper, have interviewed the Mayor of Leyton about his regalia. Details of the past and present history of these items were taped, as a fitting record, for the regalia will no longer be used, following the rearrangement of the London boroughs.

HARLOW IN THE BOX

When members of the **Harlow** Tape Club visited their local Odeon cinema for a tour of the projection room, they were somewhat surprised to hear it referred to as "the box." Nevertheless, it proved a box full of weird and wonderful things, and provided a very interesting evening for all. The first tape for the local Blind Folk's Club consisted of readings from the local papers interspersed with a liberal amount of old-time music to provide a lighter, reminiscent touch.

A particularly informative talk/demonstration was provided by Messrs. Nash and Horner, of Cosmocord Ltd., on the production of their Acos mics.

NO PRESIDENT

The **Montrose** and District Tape Recording Club, which was formed in September, 1963, lost its first honorary President in January of this year when the Welsh tenor Trefor Jones collapsed and died suddenly. The club virtually owes its existence to the generosity of the late president, who not only made members most welcome at the many meetings held in his home, but was always willing to provide live material of the highest standard.

In spite of the fact that club funds are now at a low ebb, they are managing to

keep going, and have staged a small display at a local hobbies exhibition. In spite of a shortage of time, money and publicity, the display was successful enough to warrant more intense preparations for something similar next year. Club members also made recordings when the Gordonstoun School choir gave a concert at the local Town Hall.

NEW HOME?

The committee of the **London** Tape Recording Club are seriously considering proposals to move the club's HQ from Chandos Place to somewhere off Oxford Street, and also for meetings to be held fortnightly instead of monthly. At the same time members will consider what can be done to broaden the outlook of the club.

Certainly recent activities have been wide enough in scope, including 'Audio-scope,' a tape/slide show, visiting Tele-Radio of Edgware Road for a demonstration of almost every kind of recording equipment imaginable, entertaining members of the Southall tape club and arranging a practical exercise on the art of interviewing.

MEMBERS' CHOICE

At a recent meeting of the **North London** Tape & Hi-fi Club, members conducted a consumer test on various tape recorders and tapes. The results showed that the three most popular recorders were: 1, Philips EL 3515; 2, Philips EL 3538; 3 (tied) Truvox PD 92 and Ferguson 3205 (export model). Among the tapes the results were: 1, Philips double play; 2, Philips triple play; 3 (tied) Philips long play and EMI 88 long play. I understand that the club does not hold any shares in Philips! Keith Parker won the January competition with a very amusing tape of the January sales at a radio dealer's — one for the BTRC I hope.

CO-OPERATION

Members of **I.V.A.S.** have, in the past, experienced some difficulty in getting members of the public to co-operate

when they are out recording on location. If this has been because they have been using the wrong approach, it could be that they have now mastered this. On a recent excursion into the City of London, members were waiting to cross at a set of traffic lights when a Mini-Cooper with a very throaty exhaust note drew up. Wishing to tape it, they approached the driver, and were treated to some discreet revving, a beautiful take-off and acceleration in the best Grand Prix style. Unfortunately it seems as though the Vision side of I.V.A.S. has been falling off somewhat, and all the ideas for films and soundtracks seem to be coming from the Sound Section — as well as much of the hard work. Two new members have been recruited, but there's still room for more.

WELCOMING OUR MAN ABROAD

'Our Man Abroad,' or, to give him his proper title, Mr. Bob Danvers Walker, was a very welcome speaker at a recent meeting of the **Reading Cine and Tape Recording Society**. His talk was liberally illustrated with recordings made on Fi-Cord equipment, in all corners of the globe, from Morocco to Lapland. With him came Mr. Monk of **Fi-Cord International** who gave a very comprehensive demonstration of Fi-Cord and Beyer equipment for professional and amateur recordists. All agreed it was a most stimulating occasion. The Abbey Cup for the best tape and slide programme of the year was won by Mr. Lee, the Chairman. Runner-up was Mr. Chaney.

JOGGING ALONG

The new secretary of the **Bournemouth Tape Recording Club** are 'jogging along, although membership shows no sign of increasing yet.' The club held its first tape contests recently, and the entries are to be judged by someone from the **Federation of British Recording Clubs**. Another contest took the form of a sound hunt, with sounds, real or faked, that were 'found' included a bus crash, cows chewing the cud, and early morning tea. It is hoped that the club can make contact with other clubs in Sussex with a view to promoting tape exchanges, inter-club visits and other joint activities.

BOWLS BY TAPE

I've heard of people who play chess by tape, but never bowls. However Peter Warden, treasurer of the **Coventry Tape Recording Club**, and his wife Kathleen have discovered that their taperspondents Don and Doris Gowdy of Coventry, Connecticut, are bowling fanatics themselves. A challenge was issued, and now Peter and Kathleen tape their Sunday game, and airmail the results to America. Don and Doris play their game on Friday and airmail the results back! The club's annual competition showed Roy Reynolds the champion, with Stan Day second, closely followed by Ken Preston, Peter Warden, Bob Tucker and Walter Stacey.

NO CLOSED SHOP

A Dudley Chadwick, U.K. Representative for **Catholic Tape Recorders International** tells me that the club is not the 'closed shop' it might at first seem. Members of other faiths are always welcome, and the club is at present very pleased to be able to say 'snap' to us at ATR. They have just announced their first club pilgrimage to Rome, where it is hoped that many members will be able to meet in person for the first time. It should certainly help to promote the family feeling which all tapersponding clubs strive for.

WAYZGOOSE

For those of you who don't have the faintest idea what a wayzgoose is, the dictionary defines it as 'an annual outing or feast for printers.' Members of the **Ipswich and District Tape Recording Club** had a chance to see and hear for themselves what a really first class wayzgoose consists of when Mr. Ivor Pinch presented a very interesting tape/colour slide show of the **East Anglian Daily Times** wayzgoose to North America last September. The places visited included New York and the World Fair, Niagara Falls, Boston and Ipswich (USA). The latter part of the programme provided a very interesting comparison with the two towns. (That's the second tape twin town in the USA this month. Any more?)

The club's blind services, hi-fi, cine and outdoor recording groups are still very active. Secretary Malcolm Wilding has now moved to 4 Meadowvale Close, Ipswich.

OUR MAN ABROAD AGAIN!

Bob Danvers Walker was again a most welcome guest, this time at a recent meeting of the **South Devon Tape Recording Club**. Again accompanied by a Fi-Cord representative he enthralled the club with details of his foreign tours in search of sounds. Two recent visits to Plymouth included a visit to the BBC studios there, and an interclub battle against members of the Plymouth club.

ANNUAL AWARD

Another club annual award to be presented recently was the Terry Davis Trophy, given to the best tape made by a member of **Rugby Amateur Tape Recording Club**. Keith Fisher was the proud winner of the Trophy and a cheque for two guineas. Second place was gained by president Len Stephens, and Bill Long came third.

GENERATING POWER

Members of the **Dartford Tape Recording Society** were astounded at the amount of noise that exists inside a power station. They discovered this when they were taken on a conducted tour of the three stations which comprise the Littlebrooke Generating Station.

Material for a very interesting documentary included facts and figures about the processes which were quite startling—900 tons of coal and 1,200 tons of oil used daily, 20 million gallons of water per day from the Thames used to cool the condensers, and 100 tons of grit and dust cleaned daily from the flues!

PUPPETS

A novel puppet show, which included one scene showing the characters landing on the moon, was staged by Mr. and Mrs. Jeffries for the benefit of the **Derby Tape Recording Club**. All voices and sound effects had been previously recorded on tape, and much impressed the club. The club in its turn impressed Mr. and Mrs. Jeffries in such a way that they have both become members.

REDUCED FEE

The **World Round Robin Club** are proudly announcing a reduction of membership fee, by almost half the original amount. The club already has many more members than anticipated, and at present has many tapes circulating round the world. Anyone interested in joining this club should contact the Secretary, John Page, at 45 Elgin Avenue, Belmont, Harrow, Middlesex.

NEW SECRETARY

The new secretary of the **Bournemouth Tape Recording Club** is Miss Doreen Slack, of Studio One, 18 Kingswell Road, Ensbury Park, Winton, Bournemouth. Meetings continue to be held fortnightly on Tuesday evenings at 8 p.m. in the Pembroke Hotel, Poole Hill.

NEW CLUB

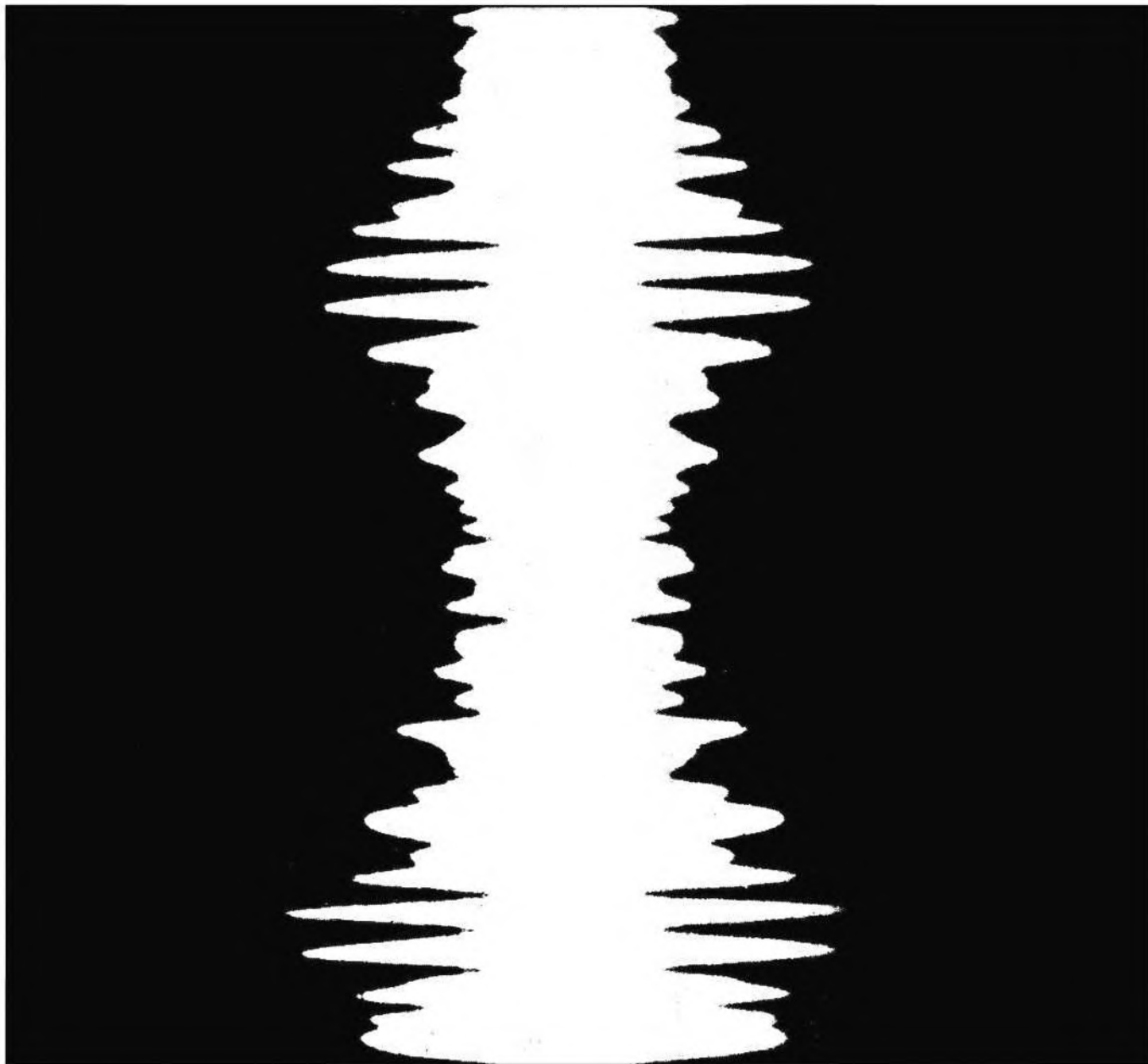
The Gateway Social Centre, at the Coppice Hospital, Ransom Road, Nottingham, has started a tape section, to be known as the **Gateway Tape Recording Club**.

REMINDER

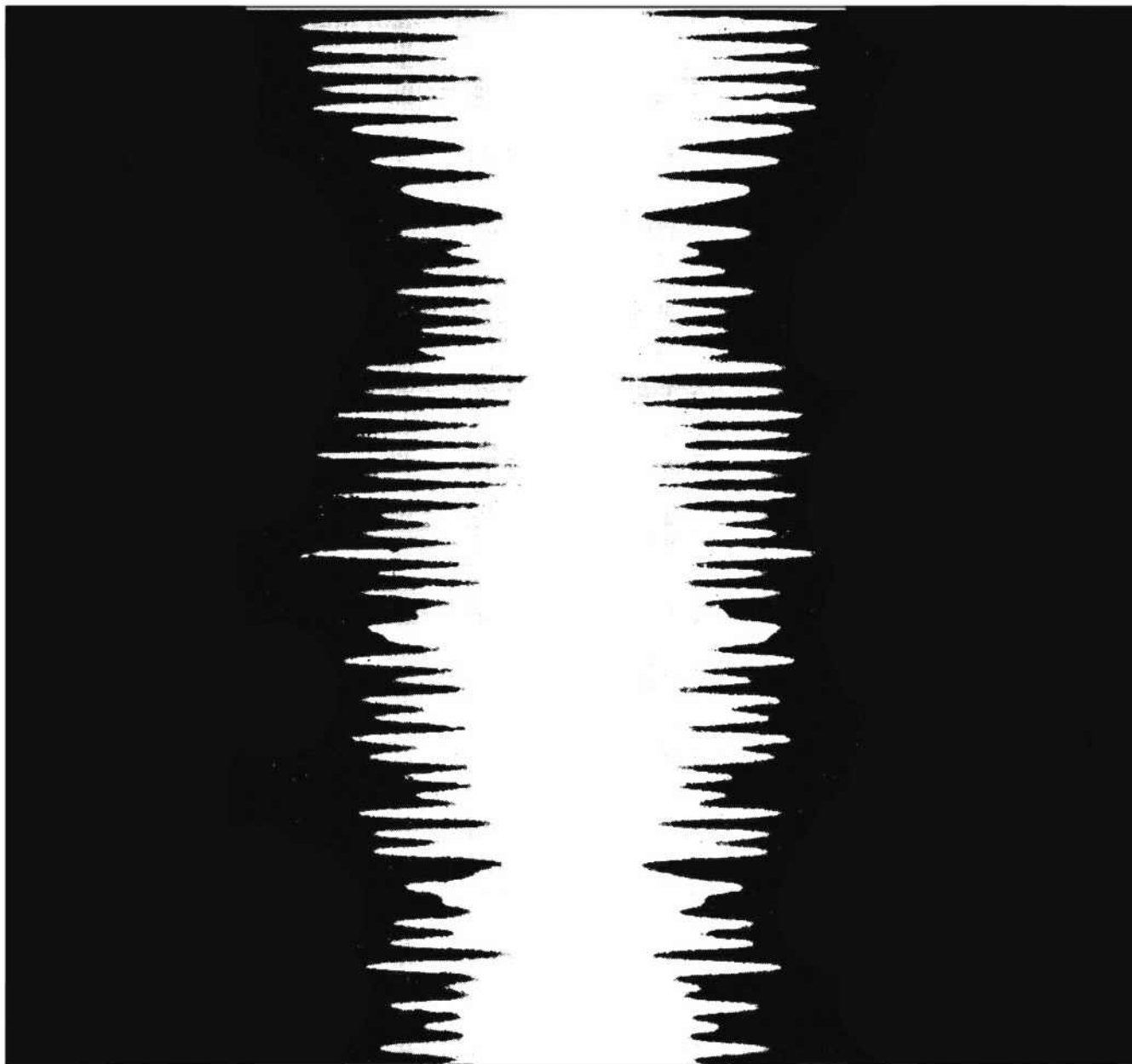
Reading through the reports received this month, I've spotted mentions of at least a score of tapes which could well be entered for the **British Tape Recording Contest**. After all, if they're good enough to gain a high place in the club's contest, and good enough to be published in these pages, they should certainly be good enough to be sent in to the contest. So make sure they're entered.

SEE YOU AT THE RUSSELL

Finally, I expect many of you will be reading this at the Audio Fair. I thoroughly enjoyed meeting many of you last year, and hope to see even more club enthusiasts at the Russell this year. On those occasions when I'm not actually at the ATR Stand (No. 50), I'll be around, like you, listening for all the sounds to be heard. Hope to meet you there. **K.C.**



Lawrence of Arabia



The Yellow Rolls Royce

Who put the sound and fury into 'Lawrence'?

Zonal.

Who taped the purr of 'The Yellow Rolls Royce'?

Zonal.

They both sounded pretty good.

You can get recording tape of the same professional quality in most hi-fi shops and a good many radio stores.

You ask for Zonatape, and you get results to match.

It's made by Ilford, the photographic people.

ILFORD LIMITED Ilford, Essex

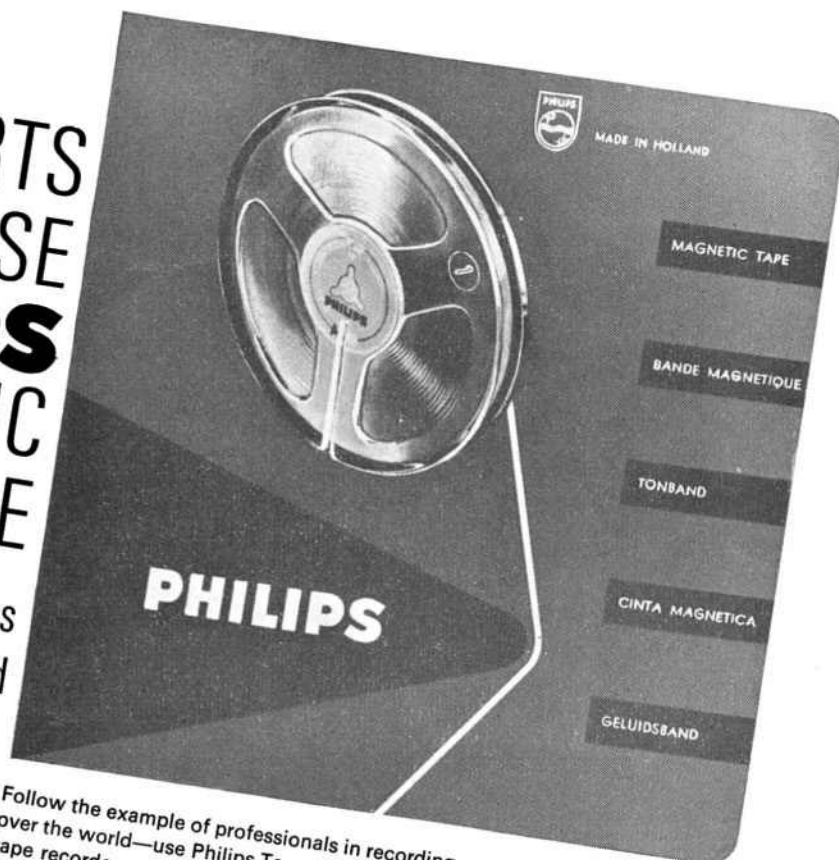


The new symbol
of the Ilford Group

MGM's production of Anatole de Grunwald's 'The Yellow Rolls Royce'. The Sam Spiegel David Lean Production of 'Lawrence of Arabia' A Columbia Picture release.

EXPERTS
CHOOSE
PHILIPS
MAGNETIC
TAPE

—for perfect recordings
of every sound



Follow the example of professionals in recording and broadcasting studios all over the world—use Philips Tape, the tape that's made by the world's leading tape recorder manufacturer! A product of Philips unrivalled experience and know-how, Philips Tape has all the qualities needed to make your recordings perfect every time—excellent sensitivity, low noise level, uniform frequency response, and powerful adhesion of the magnetic coating. It's tough, too—resists stretching, snapping and tearing. Philips Tape is available in four types and in all current reel sizes; apart from the special Audio Letter message tapes all types have metallized switching foil and leader tape with writing surfaces. What's more, each type comes in a colour-coded box for easy identification. Ask for Philips Tape next time *you* buy a new reel.

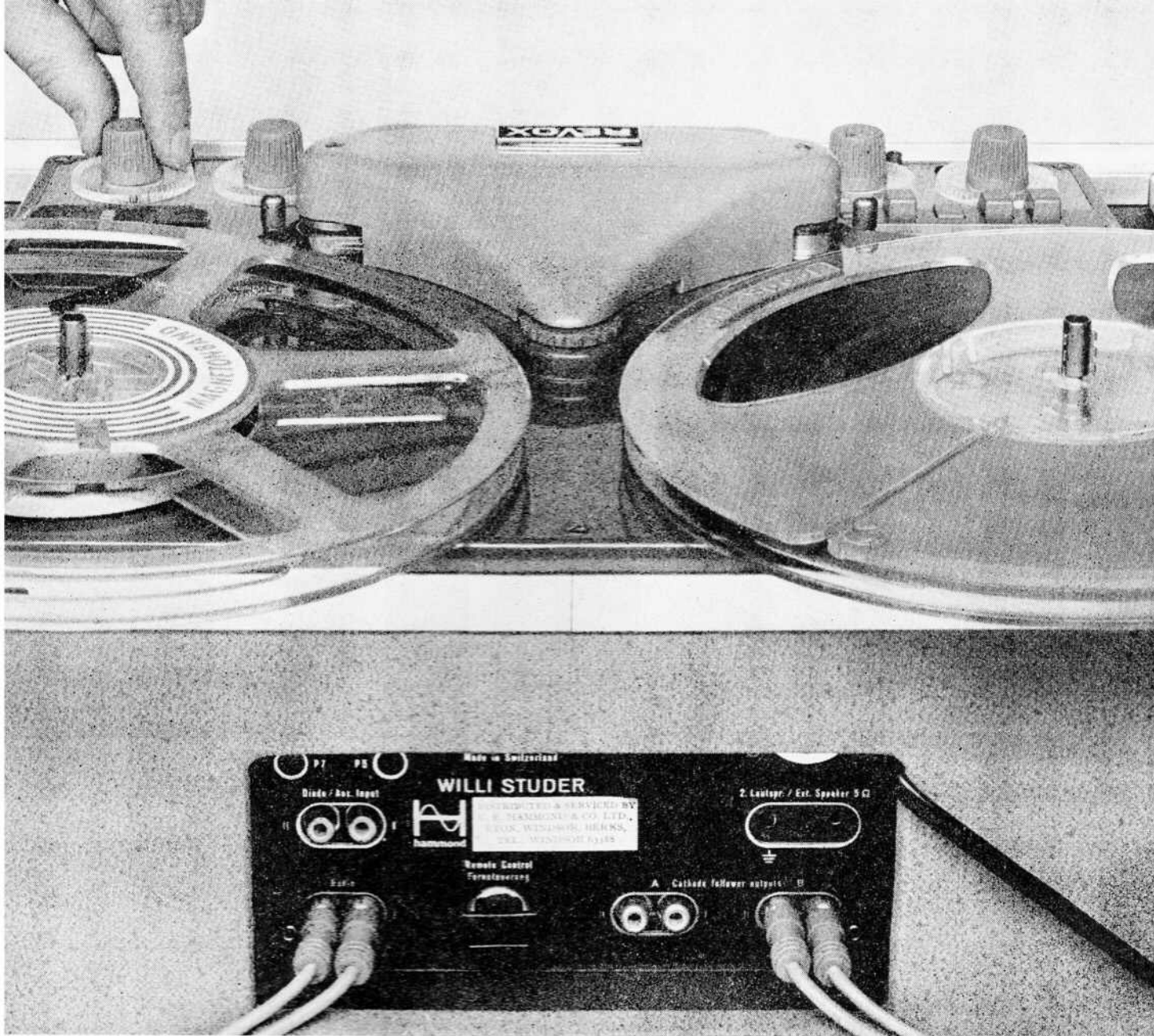
GREEN for standard
RED for longplay
BLUE for doubleplay
GREY for tripleplay

More fine products from **PHILIPS** —the friend of the family
Philips Electrical Ltd • Electro-Acoustics Div • Century House • Shaftesbury Ave • London WC2



(PTA0065A)

Amateur Tape Recording Video & Hi-Fi



WITH REVOX WHAT GOES IN DOES COME OUT*

* + nothing that matters

The electronics are made that way—the mechanism keeps it that way. Remember when you choose your "recorder of a lifetime" there is no substitute for fine engineering, generous bearings, three motors and fail-safe brakes, or quality — all found in REVOX. Don't try expensive experiments. Choose once, wisely — after all, the perfection of REVOX only costs 124 gns.

Please send details of REVOX 736 and local stockist to:

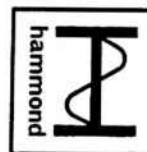
Name

Address

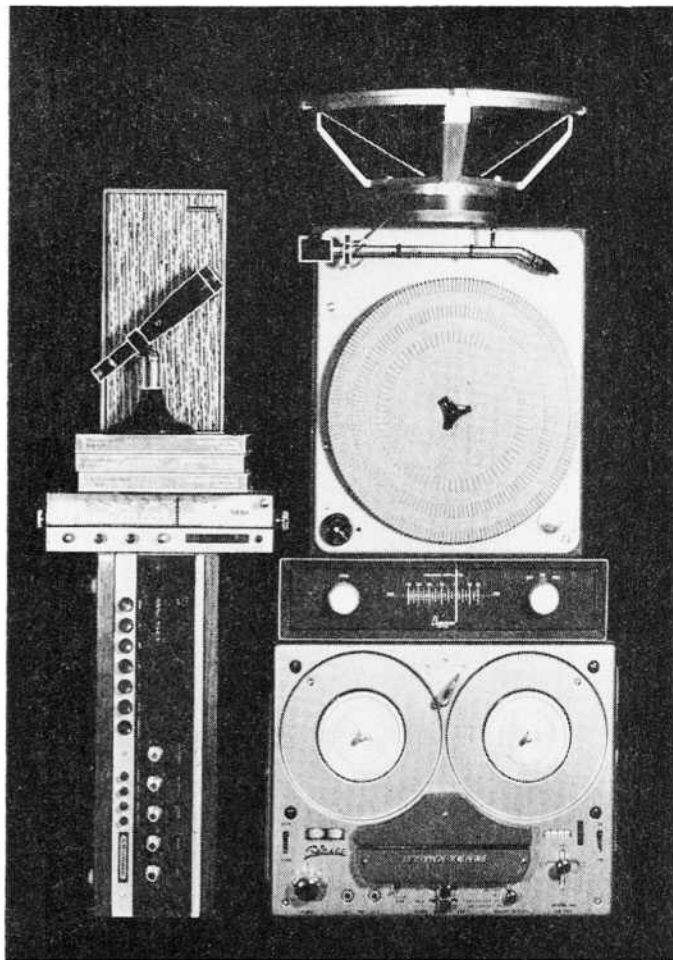
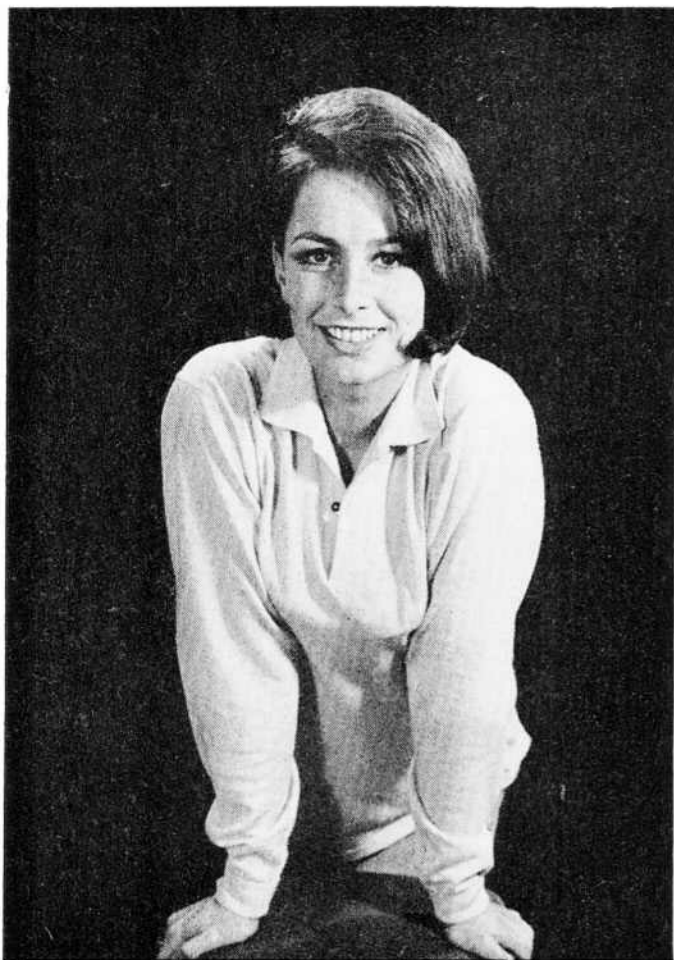
Post to—
C. E. Hammond & Co. Ltd., 90 High St., Eton, Windsor, Berks.
(SATR65)

Distributed by

C. E. HAMMOND & CO. LTD.
90 High Street, Eton, Windsor, Berks.
Telephone: Windsor 63388



REVOX



SIGHT & SOUND

Do you appreciate things that look right – and sound right? If you do, maybe we can help you. As the biggest specialists in Gt. Britain, we sell only the best makes of Tape Recorders and Hi-Fi. We don't like rubbish and we won't sell it. **THAT'S WHERE OUR EXPERIENCE AND REPUTATION PAY OFF.**

What's so special about us? Our business has been built up over the last 10 years on a basis of thousands of satisfied customers ★ We deliver free anywhere in the U.K. ★ We give free home demonstrations anywhere in the Greater London area ★ We give free service for 12 months ★ We insure H.P. customers against all risks – but if you want to know the full story of what we have to offer you, then write or phone for free brochures:

Please indicate interests:

TAPE RECORDERS

Mono under £50	<input type="checkbox"/>
Mono over £50	<input type="checkbox"/>
Stereo	<input type="checkbox"/>
Battery	<input type="checkbox"/>

HI-FI

Amplifiers and Tuners	...	<input type="checkbox"/>
Speakers and Enclosures	...	<input type="checkbox"/>
Turntables and Arms	...	<input type="checkbox"/>
Portable Radios	...	<input type="checkbox"/>
Record Players	...	<input type="checkbox"/>

HOWARD

TAPE RECORDERS · HI-FI

218 HIGH ST. BROMLEY. KENT. RAV.4000



Why Kodak P.300 tape gives you better high frequency response at low speeds

When you record at speeds below $7\frac{1}{2}$ ips, noticeable high frequency losses will occur, whatever your equipment.

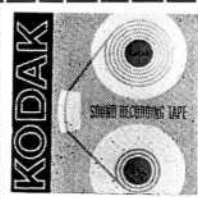
But now, with Kodak P.300 Triple Play Tape, you can bring these losses to a lower level than ever before. That's because Kodak P.300 Tape has been specifically designed for low-speed operation and incorporates 'gain' at high frequencies.

This enhanced high frequency response at low speeds has not been achieved at the expense of the tape's other features. Its combination of exceptional wavelength response, signal-to-noise ratio and low distortion cannot be equalled by any other triple play tape in the world. What's more, print-through is up by only 1dB on standard play tape.

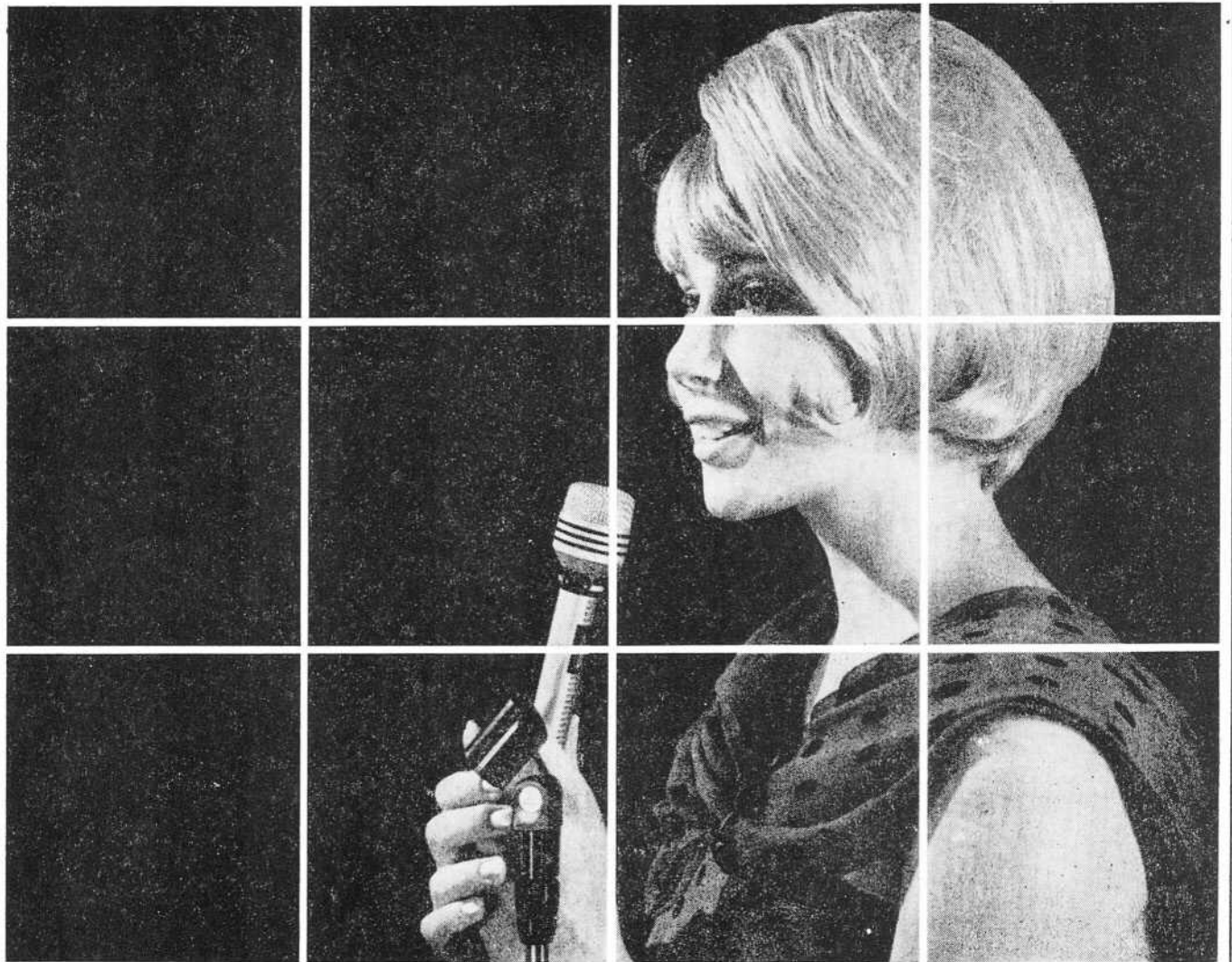
Yet these are not your only benefits. The oxide coating on Kodak P.300 tape is accurate to within *millionths* of an inch, providing incomparable uniformity of output. And this uniformity, together with the flexibility of the specially treated base material, gives you complete freedom from drop-out—an important advantage in both

low-speed and quarter-track recording.

But you be the judge. Try Kodak P.300 Triple Play Tape for your next recording and hear for yourself.

	<p>Post this coupon today Please send me full technical data on Kodak P.300 Triple Play Tape.</p>
	<p>NAME.....</p> <p>ADDRESS.....</p>
<p>Kodak Ltd., Dept., 70, Kodak House, Kingsway, London W.C.2.</p>	

Kodak sound recording tapes—the best tapes in the world



YOU ARE JUST MY TYPE

... maybe the singer, but surely the microphone ...
the new, elegant and well designed AKG D 119 microphone.

... bass attenuation switch ... on switch
... cardioid characteristic,
... high frequency range (40-16 000 cps)
... excellent sensitivity (0,18 mV/ubar)
... low weight ... The best microphone for you
The D 119 from AKG
... from Vienna, where they know
the true sound of music.

D 119

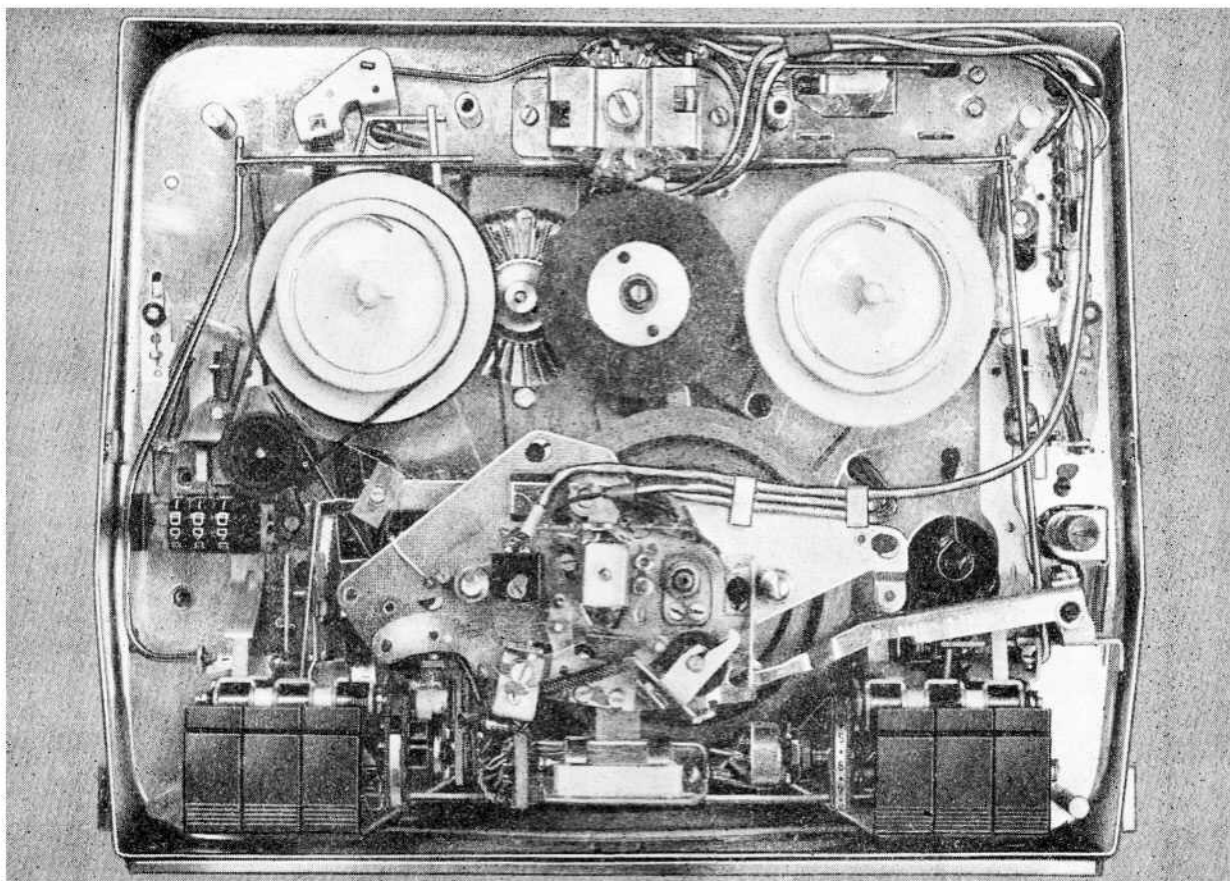
**POLITECHNA (LONDON)
LTD.**
EARDLEY HOUSE
182/4 CAMPDEN HILL RD.
KENSINGTON
LONDON W.8

Telephone
PARK 0711/3 & 5008

Amalgamated Wireless (Australasia)
Ltd., Sydney, Wellington — Caldwell
A-V Equipment Co. Ltd., Toronto 5,
Canada — Chartered Electrical Engi-
neer, Salisbury/Southern Rhodesia —
Connoisseur Records Ltd., Dublin —
HAQ Trader, Karachi 2, Pakistan —
International Aeradio (East Africa) Ltd.,
Nairobi, Laos, Cambodia, South Korea,
South Vietnam — D. Pollock (Pty) Ltd.,
Johannesburg — A. Rajab & A. Silsilah,
P.O. Box 203, Jeddah — Soundrite Ltd.,
Singapore, Penang, Kuala Lumpur —
The China Engineers Ltd., Hong Kong —
The Hi-Fi Centre, Colombo 7 — Vichai
Trading Company, Bangkok, Thailand.



Grundig lift the lid on four new Tape Recorders



And set new styling standards inside and out!

350 Design and Development engineers went to work to produce Grundig's new *de luxe* range of tape recorders. They made the internal layout so brilliant that the outside just had to be a world-beater too!

Here's what you get: a complete choice of two track, two track automatic, four track and four track automatic machines, at sensible prices, from 37 gns.

It's worth remembering that whatever you pay, Grundig make no charge at all for a 7 gn. *dynamic* microphone, and a good-looking protective case. You'll get an ingenious rigid plastic tape library cassette for tape storage, a full 5 $\frac{1}{4}$ " spool of Grundig L.P. or Double Play tape, a screened multi-purpose lead, plus Grundig's unique 12 month Warranty.

Ask us to send you the latest leaflet that dots the i's and crosses the t's of tape recording. You'll be delighted, and convinced that Grundig represents the finest value in quality tape recorders today.



GRUNDIG

Showroom: 15 Orchard Street, London, W.1. Tel: WELbeck 4898

GRUNDIG (GREAT BRITAIN) LTD
LONDON, S.E.26 SYDenham 2211

Please send me details of the wonderful new range of Grundig Tape Recorders.

NAME _____

ADDRESS _____

ATR/5



TAPE RECORDER COVERS

Smart, waterproof cover to give complete protection to your tape recorder. Made from rubberised canvas in navy, wine, tan and bottle green with white contrasting pipings, reinforced base, handy zip microphone pocket and name panel.

GRUNDIG TK 1	with pocket	49/6
GRUNDIG TK 5	with pocket	55/-
GRUNDIG TK 6	—	67/6
GRUNDIG TK 8	with pocket	63/-
GRUNDIG TK 14, 23 & 18		59/6
GRUNDIG TK 20	with pocket	52/6
GRUNDIG TK 24	with pocket	55/-
GRUNDIG TK 25	with pocket	55/-
GRUNDIG TK 30	with pocket	60/-
GRUNDIG TK 35	with pocket	63/-
GRUNDIG TK 40 & 41		66/-
GRUNDIG TK 46	with pocket	82/-
GRUNDIG TK 60	no pocket	75/-
TELEFUNKEN 85	with pocket	65/-
TELEFUNKEN 75/15 & 76K		
with pocket		55/-
TELEFUNKEN 95 & 96	with pocket	69/6
PHILIPS 8108	with pocket	57/6
PHILIPS EL3534	with pocket	87/-
PHILIPS EL3549	with pocket	79/6
PHILIPS EL3538	with pocket	63/-
PHILIPS EL3542	with pocket	63/-
PHILIPS EL3536	with pocket	70/-
PHILIPS EL3515	with pocket	57/6
PHILIPS EL3541/15	with pocket	57/6
PHILIPS 3541H		72/-
PHILIPS STARMAKER		66/-
COSSOR 1605	with pocket	84/-
COSSOR 1602	with pocket	57/6
COSSOR 1601	with pocket	63/-
COSSOR 1604		79/-

STELLA ST455	with pocket	63/-
STELLA ST454	with pocket	57/6
STELLA 459	with pocket	84/-
STELLA 458		79/-
STUZZI TRICORDER	with pocket	58/-
SABA	with pocket	63/-
WYNDSOR VICTOR	no pocket	60/-
ELIZABETHAN FTI	with pocket	66/-
ELIZABETHAN LZ 29		75/-
FI-CORD IA		52/6
FIDELITY ARGYLL	no pocket	55/-
CLARION (comp. with strap)		52/6
BRENELL MK. 5	with pocket	77/-
BRENELL 3 STAR	with pocket	69/-
ROBUK RK3		67/6
SONY 521		90/-
FERROGRAPH		80/-
REVOX		84/-
OPTACORD 412 & 414		63/-
TRUVOX R92 & R94		99/-

CALL, SEND MONEY OR REQUEST C.O.D. WITH YOUR ORDER TO:

A.BROWN & SONS LTD.

24-28 George Street, Hull
Tel. 25412/3

YOUR LOCAL

WORTHING, SUSSEX

Stocking Ferrograph, Revox, Sony, Tandberg, Truvox, Philips, EMI, Luxor, Bang & Olufsen, etc., on fully comparative Demonstrations

BOWERS & WILKINS LTD.

1 Becket Buildings, Littlehampton Road, Worthing 5142

TAPE RECORDER CENTRE (HALIFAX)

Stock all the best Tape Recorders; Hi-Fi Equipment; Tape; L-P Records, etc.

DEMONSTRATIONS BY EXPERT STAFF
2 years FREE SERVICE ON NEW RECORDERS over £35

30 KING CROSS STREET, HALIFAX 'Phone 66832

WIMBLEDON'S

TAPE RECORDER CENTRE

Agents for: TRUVOX, FERROGRAPH, VORTEXION, REVOX, BRENELL, GRUNDIG, PHILIPS, COSSOR, REFLECTOGRAPH, ETC.

Get it Taped the Expert Way—By letting us install your apparatus

TEL-LEE-RADIO

Liberty 4946

220 The Broadway, WIMBLEDON, S.W.19

FRANCIS OF STREATHAM

include among their customers many who call personally from all over the country, because of the stocks and service in TAPE AND HI-FI EQUIPMENT to be found there. With so many shops to choose from, there must be excellent reasons why people prefer to buy from Francis. Perhaps you would care to find out by calling or writing to us about your requirements.

- ★ VERY LARGE STOCKS OF TAPE AND HI-FI EQUIPMENT
- ★ NO EXTRA FOR CREDIT UP TO 18 MONTHS
- ★ OWN SERVICE DEPARTMENT
- ★ FREE SERVICE DURING GUARANTEE PERIOD

FRANCIS OF STREATHAM

169-173 STREATHAM HIGH ROAD, LONDON, S.W.16

Between St. Leonards
Church and Streatham Sen.

Open all day
Saturday

Phone STR
0192/0466

SHEEN TAPE RECORDER HI-FI CENTRE

ANNOUNCE THEIR NEW PREMISES ARE
NOW OPEN

3 & 4 STATION PARADE, SHEEN LANE,
SHEEN, LONDON, S.W.14

Specialists in Tape Recorders - Accessories - Hi-Fi
Stereo - Pre-recorded Tapes - Mics - Tuners
Amplifiers - Speakers - Etc.

Showrooms open until 7 p.m. PRO 0985 Opp. Mortlake Station, S.R.

ADVERTISERS IN THIS ISSUE

Page	Page	Page
Agfa 44	Gramplan 47	Philips 12, 58
Akai ... 24, 25, 62	Grundig 63	Pullin 24, 25
AKG 62	Howard 60	Quad 42
Armstrong 27	Ilford 56, 57	Reslosound 66
B.A.S.F. 63	Iliffe 40	Revox 59
Brenell 4	Jordan Watts ... 49	SFX Records ... 28
A. Brown 64	Kodak 61	Sheen 64
S. G. Brown ... 41	Lustraphone ... 53	Sony 67
De Villiers 47	Mallory 2	Tandberg 6
Esoteric 5	Massey's 31	Thistleboon ... 53
Ferrograph 9	Mastertape 8	Truvox 23
Fi-Cord 46	MMM 7	Vortexion 26
Francis 64	Multicore 40	Wharfedale ... 50
Goodmans 51	Newnes 27	Zonatape ... 56, 57

DEALERS

G. L. MORTON & CO. LTD.

12 OXFORD STREET
NEWCASTLE UPON TYNE

L.E.C. (Leyton) ELECTRICAL CO.
120 HIGH ROAD, LEYTON, E.15

LEYtonstone 6814

Stockists of: Ferrograph, Vortexion, Brenell, Revox, Rogers, Armstrong, Leak, Goodmans, KEF, Record Housing Furniture, etc. TAPES by BASF, AGFA, ZONAL 3" to 10". Demonstrations in the Home. Tape to Disc Service.

Tape recorder service in the

BIRMINGHAM AREA
L. BISHOP LTD.

1708 BRISTOL ROAD SOUTH,
REDNAL, BIRMINGHAM
Telephone: RUBery 2709

GRUNDIG SPECIALISTS

- ★ Suppliers of Fine Tape Recording and Hi-Fi equipment, Microphones and Accessories.
- ★ Specialist Technical Service Department
- ★ Part Exchange and H.P. welcome.
- ★ Suppliers to Schools, Universities, Atomic Energy Authority, Leading Architects and Broadcasting Organisations.

VISIT US AT No. 70

**LAMBDA RECORD
CO. LTD.**

70 LIVERPOOL ROAD, LIVERPOOL 23
Tel. GREat Crosby 4012

**SOUTHERN RECORDER
SERVICE**

2 ST. GEORGE'S STREET
WINCHESTER, HANTS

Visit the North's
Finest Tape Re-
corder Show-
room. All lead-
ing makes in
stock, ready for
demonstration.

Tape, Mics., Mix-
ers, all acces-
sories, Tape Re-
corders. Separate
Hi-Fi and con-
structors show-
rooms, Full Tech-
nical Service.

CUSSINS & LIGHT



KINGS SQUARE, YORK. Tel. 55666

**WORTHING TAPE RECORDER
CENTRE**

Tape and Hi-Fi Experts. Agents for all types
of machine and equipment. Servicing and
Repairs

22 NEW BROADWAY
Tarring Road, WORTHING, Sussex
Telephone: WORTHING 3630

CLASSIFIED ADVERTISEMENTS

Classified advertisements in "Amateur Tape Recording" cost 9d per word, minimum 7/6. Box Nos. 1/6 extra. Advertisements and remittances should be sent to Advertisement Manager, "Amateur Tape Recording", Haymarket Press Ltd., 86-88 Edgware Road, London, W.2.

PERSONAL

Speedy and Expert Tape Recorder and Hi-Fi Repairs by England's leading Hi-Fi Specialists. **Telesonic Ltd.**, 92, Tottenham Ct. Rd., London W.1. MUS 8177.

Electronic Theremin, brand new, complete, ready for use. As described in ATR November issue, £20, buyer collects. Also Ferrograph 806, £45. Telephone: BUC 9315.

Learn while you Sleep. Learn languages, memorise speeches and sales presentations, absorb business statistics or the highway code while asleep with Learn-asleep Equipment. Details from Sleep Learning Supplies, (Dept. ATR), 245 Capworth Street, Leyton, E.10.

Highest cash prices offered for good quality Tape Recorders, Hi-Fi Equipment and L.P. Records. **R.E.W. Earlsfield Ltd.**, 266/8 Upper Tooting Road, London, S.W.17. Tel. BAL 9174.

You ought to send for a copy of "Psychology and Whisper Teaching" to 1 York House, Huddersfield — 5s. 9d. post free.

"Eroica" Recording Services Ltd. (Established 1949). Complete Studio and Mobile Recording Service. Recording equipment supplied (Ferrograph, etc.) and services. Special offers: Truvox PD 85. Tape Unit, 3-speed, quarter track, with level meter, records and plays back excellently into any good amplifier, as new, bargain £35. Stuzzi Magnette 2-speed battery recorder with mic and sling (4" spool capacity), good condition, £35 (List £63). Audio Consultants. "Eroica" House, 34 Ashley Road, Altrincham, Cheshire. ALTrincham 6688. (Car Park).

The Arden Marriage Bureau, 82 Links Drive, Solihull, Warks. For a personal and confidential service.

Globe-Trotters, Business Men, Students and Holidaymakers, learn Languages on Tape with Languatutor. Why? Because our experienced Tutors and Nationals teach you to speak the Language naturally, without effort, and with the correct pronunciation, in the shortest possible time. Send Now for the Free Brochure on French-German-Italian-Russian and Spanish to: Languatutor Recordings Ltd., (Dept. AT2), Milton Street, Brixham, S. Devon. Trade Enquiries Also Invited.

Pre-Sleep Study. Learn difficult lessons or parts or improve your mental powers while you sleep! Send now for Price List of materials; including the perfect Tape Machine, Time Switch, Pillow Speaker, Endless Tape Cassettes, Pre-recorded Tapes for Learning or Therapy, Language Courses, etc. — **Psychology Tapes Ltd.**, (ATR), 16 Kings College Road, London, N.W.3. PRI 3314.

The perfect companion to A.T.R. is 8 mm Magazine — an unbeatable combination for the sound and cine enthusiast. 8 mm tells you all you need to know on how to take cine films and where to look for subjects. Packed with news of the latest cine developments, unbiased test reports and hints on sound and cine. All for only 2/6 a month, or special introductory subscription offer of 25s a year from Subscription Dept., 8mm, Haymarket Press Ltd., 86-88 Edgware Road, London W.2.

Attention girls everywhere! All the tape pals you need upon joining friendly

Worldwide Tapetalk, 35 The Gardens, Harrow. Particulars without obligation.

TAPE TO DISC

J & B Recordings. Tape/disc. Mobile unit. Wedding experts. 14 Willows Avenue, Morden, Surrey, Mitcham 9952.

Tape to Disc Recording. Finest professional quality, 10 in. LP, 42/-; 12 in. LP, 48/-; 7 in. EP, 21/-; 40 ft. recording studio; 48 hour postal return service. Any speed tapes. S.A.E. for leaflet — **Deroxy Sound Service**, 52 Hest Bank Lane, Hest Bank, Lancaster.

Rapid Recording Service. 78s and L.P.s from your own tapes (48 hour service). Master Discs and Pressings. Recording Studio, Mobile Recordings. Dept. A.T.R., 21 Bishops Close, London, E.17.

Tape/Disc/Tape transfer, editing, duplicating. If quality and durability matter (especially with LPs from your precious tapes), consult Britain's oldest transfer service. Records published for choirs, schools. **Sound News**, 10 Clifford Street, London, W.1.

John Hassell Recordings. Tape to Disc. Studio and mobile services. 21, Nassau Road, London, S.W.13. Riverside 7150.

EQUIPMENT

Don't Buy A Tape Recorder until you have visited the **Barden/Grundig Centre** opposite Dalston Junction Station. All Grundig models are available on easy terms with generous part-exchange allowances. — **The Grundig Centre**, 21 Dalston Lane, E.8. CLIssold 8811.

"Somerset" 10 and 30 watt output transformer. **Transformer Equipment Limited**, Railway Place, London, S.W.19.

Join Audio Supply for better terms on Hi-Fi equipment, 60 page photographically illustrated (non-advertising) Hi-Fi Catalogue 4/6d. — 10 Clifford Street, London, W.1.

MAGNETIC TAPE

A Unique Buy! Recording tape top brand, 7" 2400 ft. D.P. 25/-; 5 1/2" 1200 ft. 19/6; P. & P. 1/6 per spool. Bargains in all sizes. S.a.e. for list. We repair, buy and sell recorders. **E. C. Kingsley & Co. Ltd.**, 132 Tottenham Court Road, London, W.1. EUSton 6500.

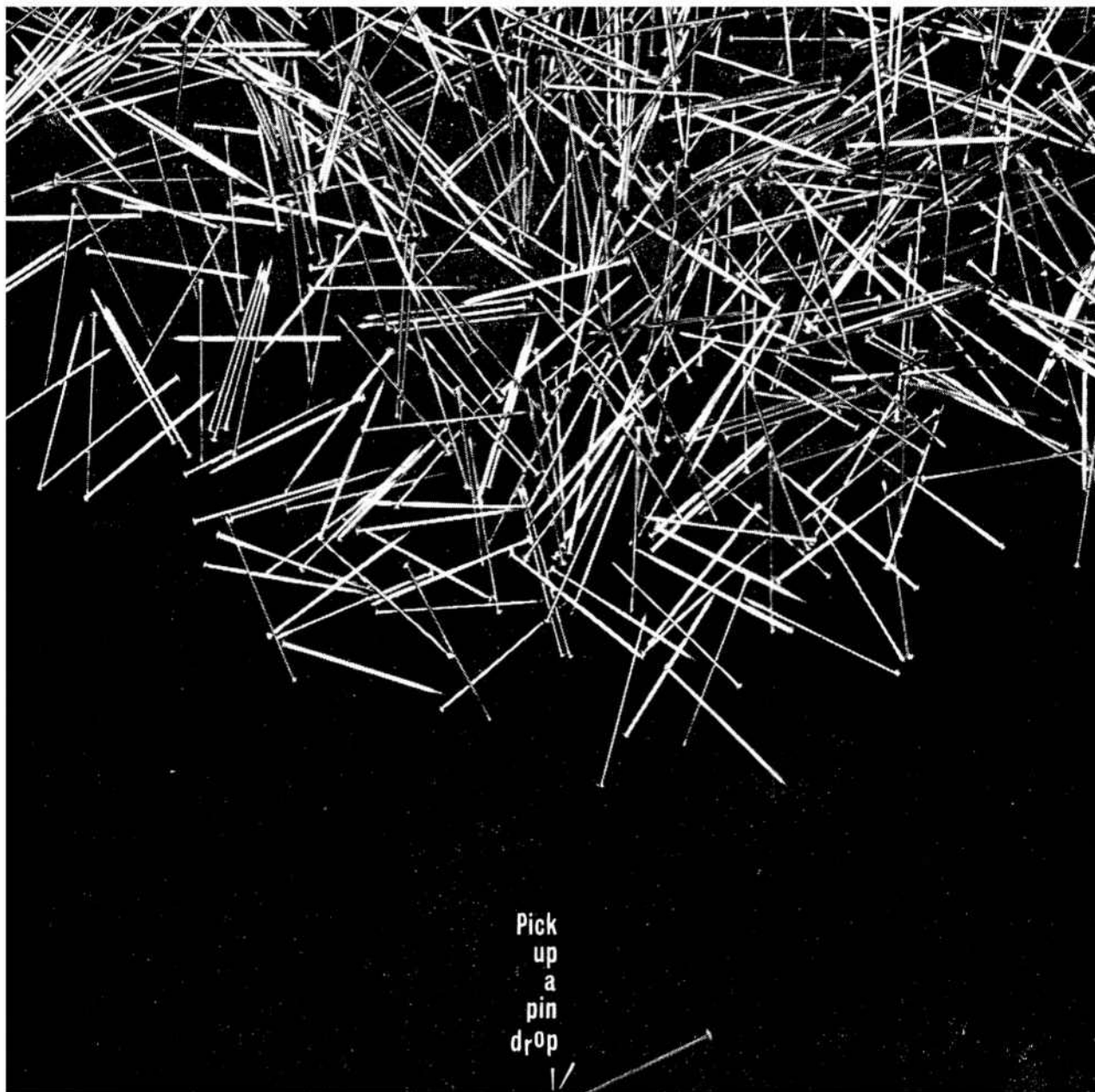
Lafayette "International" Tape. Polyester: — 7" 2400 ft. 22/6; 5 1/2" 1800 ft. 20/-; 5" 1200 ft. 14/-; 7" 1800 ft. 19/-; 7" 1200 ft. 12/-; Acetates: 7" 1800 ft. 14/9; 5" 900 ft. 10/6; 5" 600 ft. 8/-. Refund guarantee. "Bib" Tape Slicer, 14/11d. We also have a full range of Message Tapes and Triple Play Tapes all at lowest ever prices. P. & P. 2/s per order. S.A.E. list. **Leda Tapes**, 27 Baker Street, W.1.

Bad recording tape gives bad results so if you want only the best, Zonatape and Mastertape, why not drop a line to Seward, 16 Longley Street, Newcastle upon Tyne 4. Club enquiries welcome.

PRE-RECORDED TAPES

Pre-Recorded Tapes. Unique complete catalogue listing all makes, Mono, Stereo, 7 1/2 and 3 1/2 i.p.s., including World Record Club tapes. Call for FREE copy or send 1/- mailing fee. Dept. TR.2, Teletape Ltd., 33 Edgware Road, W.2. PAD. 1942.

Good news for A.T.R. readers! The subscription rate for postal subscribers is now reduced to 30/-. The postage will be paid by the publishers. Why not take out a postal subscription by sending your name and address and 30/- to the Subscription Department, Amateur Tape Recording, Haymarket Press, 86-88 Edgware Road, London W.2.



All critics agree that perfect sound reproduction depends on the lack of distortion in the microphone signal

$$PSR = LOD = \text{Reslo} *$$

With a Reslo microphone you can prove this equation.

* PSR = Perfect Sound Reproduction LOD = Lack of Distortion



RESLOSOUND LTD

24 Upper Brook Street, W.1

Telephone HYDe Park 2291

ATR/5/65

Amateur Tape Recording Video & Hi-Fi



be there with

SONY®



Sound so faithful you almost feel you're at that race meeting . . . sitting in that concert hall . . . dancing to that pop group. That's the quality of the sound "Sony Research" brings to you in the Sony range of precision-built high-fidelity stereo tape recorders.

THE SONY TC200—A COMPACT STEREO TAPE RECORDER

"Professional sound" with these features: Complete 4 track stereo and mono recording. 2 V.U. meters. 2 full range balanced satellite speakers. Instant Stop. Sound on Sound and Trick Recording. Variable Tone Control. Transistorised Pre-amplifier. Recording monitor through speakers. Public Address facilities. Individual Level Controls on each channel. Complete with two F-96 dynamic microphones. TC 200—72 gns.

THE SONY TC500—A COMPLETE HIGH FIDELITY 4 TRACK STEREPHONIC TAPE RECORDER

2 full range, balanced satellite speaker systems. Sound on sound recording. The most dependable belt-less mechanism capable of operation in either vertical or horizontal position. Separate Mic Aux. level controls for mix recordings. 2 professionally calibrated V.U. meters. Complete with 2 SONY F-87 cardioid dynamic microphones. TC 500—105 gns.

SONY RESEARCH MAKES THE DIFFERENCE

For the name and address of the SONY dealer in your area, write to —

SONY* U.K. SALES DIVISION,

A Division of Overseas Electrical & Radio Distribution Co. Ltd.

EASTBROOK ROAD, EASTERN AVENUE, GLOUCESTER. Telephone: Gloucester 26841-4

Northern Ireland Distributor: Messrs. Solomon & Peres Limited, Belfast 1

Distributor for Scotland: Bryterlite Electrical Co. (Glasgow) Ltd., Glasgow C2

Available only through appointed dealers of quality. Sony products are on permanent exhibition at our new London Showroom 70, 71, Welbeck Street, London, W.1



See BASF at the AUDIO FAIR—
Hotel Russell, Stand No. 28,
Room No. 312,
22nd–25th April.

BASF

—were the first to produce magnetic recording tapes. Today, they use the same imagination, initiative and craftsmanship to maintain a standard of technical perfection unequalled throughout the world. BASF *insist* on high-quality production; all tapes possess dimensional and magnetic stability, full frequency response, negligible print through and mirror finish surface. So capture the beauty of perfect sound forever with BASF—the wide range ensures that there is a BASF tape for every type of machine and every possible requirement.

BASF 1865
1965



THE SYMBOL OF AUTHENTIC SOUND

BASF Chemicals Limited • 5a Gillespie Road • London N.5. • Telephone: CANonbury 2011