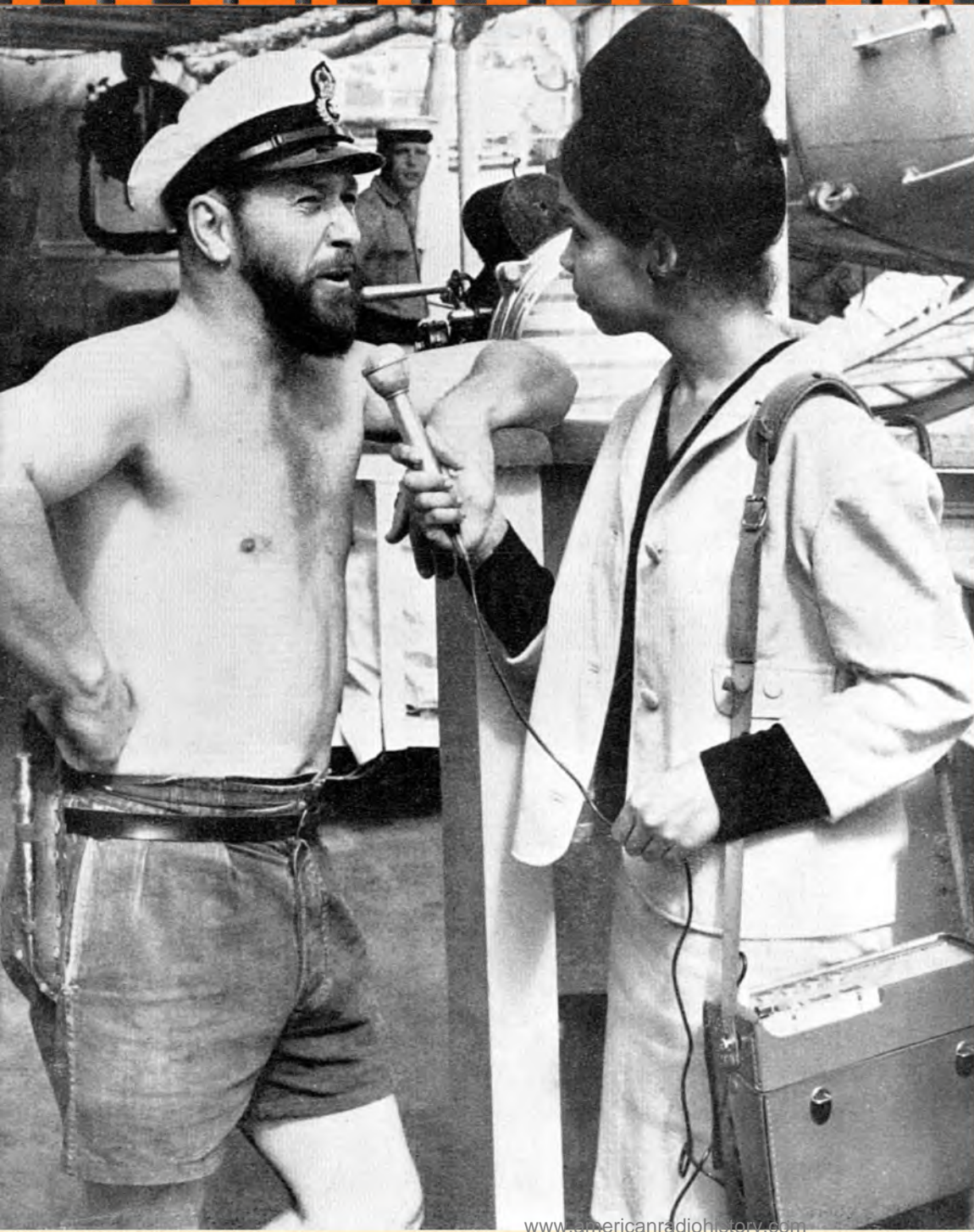


JUNE 1965

# TAPE

RECORDING MAGAZINE

24



## IN THIS ISSUE

### ● BATTERY RECORDERS

*Special survey and tabulated list of available models*

### ● Travel with a tape recorder

## ALSO

**Recording TV on tape**

**Do-it-yourself feature**

**Tape records reviewed**

**New Products**

**Clubs' News**

*Second class postage paid at New York Post Office, N.Y.*



**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 TSA100 amplifier and LS100 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.**





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.  $\pm 3$ 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:  $9" \times 6\frac{1}{2}" \times 4\frac{1}{2}"$ .
- \* 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.

# 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.....

TRM-2



What gave 'SCOTCH' Magnetic Tape its new mirror-smooth image?

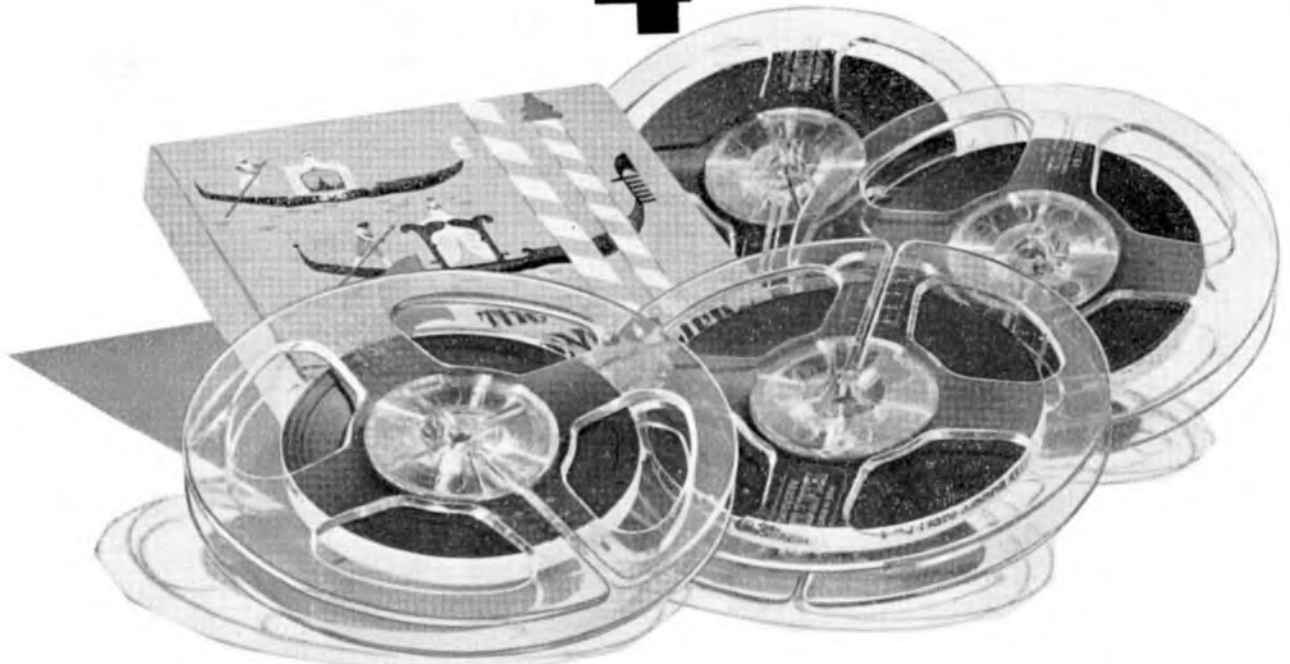


**Superlife** is the new coating on all 'SCOTCH' Polyester Tapes that binds oxide to backing more closely than ever. It virtually eliminates rub-off on recording heads and lengthens the life of both tape and recorder by drastically reducing wear. The flawless mirror-smooth surface on the recording side of the tape ensures improved head to tape contact, with increased frequency response. On or off the reel, tapes with Superlife are easily recognized for their shiny black surface. Now you can tell at a glance when you have the most advanced audio tape in the world.



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

# WORLD RECORD CLUB OFFERS YOU THE CHOICE OF ANY 4 PRE-RECORDED



## Pop... Light music... .. and more Serious



**32** Star cast and orchestra stage all the famous songs. Getting to Know You, Hello Young Lovers, I Whistle a Happy Tune, Shall We Dance, etc. Also in stereo.



**25** Ian Wallace, Joyce Blair and chorus. Some Enchanted Evening, I'm In Love With a Wonderful Guy, and all the unforgettable songs from this great musical. Also in stereo.



**28** Star cast sing Beautiful Morning, Out of My Dreams, Surrey with the Fringe, People Will Say We're in Love and all the immortal hits. Also in stereo.



**59** The silken voice of Nat King Cole in 'Walkin', 'Because You're Mine, You'll Never Grow Old, Baby Won't You Say You Love Me and 8 more.



**1** Tchaikovsky Swan Lake. John Hollingsworth conducts the Sinfonia of London in a great performance of this well-loved ballet music. Also in stereo.



**10** Tchaikovsky Violin Concerto. Toshi Spivakovsky with Walter Goehr and LSO in a superb performance of this melodious work. Also in stereo.



**11** Dvorak Symphony No. 5—From The New World. Leopold Ludwig conducts the London Symphony Orchestra in a dramatic and moving performance. Also in stereo.



**12** Beethoven Eroica Symphony. Josef Krips conducts the London Symphony Orchestra in a masterly performance of this monumental work. Also in stereo.



**63** Cuban Carnival, Yesterdays, Blues in My Heart, and eight more great numbers played by George Shearing with vocals by Dakota Staton.



**74** Superb Sarah Vaughan in ten great numbers. If I Loved You, Saturday It's Delovely, You'll find me There, etc. Every one a hit.



**108** Stormy Weather. Sweet Charms, Somebody Loves Me, Hold Me I Can't Give You Anything But Love, 7 more top numbers all with fabulous Peggy Lee.



**106** Mel Tormé's velvet voice in 12 top numbers. Body and Soul, 'Round Midnight, Blues in the Night, That Old Feeling, Where Can I Go Without You, etc.



**14** Tchaikovsky Symphony No. 5. Sir Malcolm Sargent and LSO combine to give this famous symphony a dramatic and colourful rendering. Also in stereo.



**44** Leopold Ludwig and LSO combine brilliantly in an exciting 'double', two of the world's greatest symphonies receive vivid new interpretations. Also in stereo.



**53** These two suites, containing some of Bizet's most thrilling music are given magnificent performances by the Sinfonia of London under Muir Mathieson. Also in stereo.



**54** Tchaikovsky's last and greatest symphony, is here given a splendidly moving rendering by the Sinfonia of London conducted by Muir Mathieson. Also in stereo.



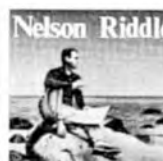
**77** In the Mood, Bugle-Call Rag, Chattanooga Choo-choo, Serenade in Blue—9 original tracks by the immortal Glenn Miller and his band.



**48** Deep in My Heart, Drinking Song, Serenade—all the old favourites fresher than ever with Maroon Grimaldi, Linden Singers and Orchestra. Also in stereo.



**30** Ian Carmichael, Joyce Blair star cast and orchestra. As Long As He Needs Me, Consider Yourself, all the hit numbers from Lionel Barr's great show. Also in stereo.



**71** The smooth sound of the Nelson Riddle Orchestra in Touch of Your Lips, Body and Soul, The Tender Touch, As you Desire Me—11 favourites in all. Also in stereo.



**117** Strauss' most popular waltzes—Blue Danube, Emperor, Vienna Woods, Voices of Spring, Roses from the South, Vienna Symphony under Rudel. Also in stereo.



**111** Ravel's Bolero, Dukas Sorcerer's Apprentice, Chabrier Espana, Falla Ritual Fire Dance and Dance of Terror. Scherchen conducts Vienna S.O. Also in stereo.



**112** Faust Ballet Music, Dance of the Hours, Aida March, Ballet Music, Cog d'Or, Hymn to the Sun, Vienna Symph. conducted by Aliberti. Also in stereo.



**163** 'Take a pair of sparkling eyes' and all the great songs from Gilbert and Sullivan's Gondoliers. Full star cast, Westminster S.O./Paris, Linden Singers. Also in stereo.

# TAPES FOR ONLY



Yes! choose 4—any 4—of these best-selling 3¼ ips mono pre-recorded tapes (or 12" LPs) for only 5/- each! This is a special privilege offer—saving you £££s—to introduce you to World Record Club and an exciting new way of collecting all the music you most want to own.

Look for yourself—hear for yourself, with no obligation at all! On this page you'll find classics, jazz, shows, light music, ballet, folk songs—and now, too, the very latest pop sound to make your parties swing with the new beat! And all this music forms just a mere fraction of the vast World Record Club treasure-house that opens for you when you join.

### HERE'S WHAT TO DO FIRST

Choose any 4 of the great 3¼ ips mono tapes shown here. (Or, if you prefer, order 12" LPs—mono and stereo—every WRC release is produced on both disc and tape). Mark the numbers on the coupon and post it to us—with no money. We'll send you all four selections on 7 days' free trial, for you to decide for yourself whether or not they're as wonderful as we claim! If you don't like them, send them back and that's all. If you do keep them, send us 20/- only for all four (plus 3/- post/packing) and you're a member of WRC, entitled to all the membership benefits of Britain's first and greatest record club. Simple enough?

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Eleven famous experts (The Countess of Harewood, Sir Arthur Bliss, Richard Attenborough, Cyril Ornadel, Steve Race, Malcolm Arnold, Antony Hopkins, Leon Goossens, Lord Montagu of Beaulieu, Ray Ellington and Miles Henslow) regularly advise WRC on its whole recording programme.

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Every WRC release is fully guaranteed and produced to the very highest

international standards by Britain's biggest record and tape manufacturers.

### LISTEN FIRST, PAY LATER

You pay for every WRC release only after you have listened at home and satisfied yourself that it is perfect in every way.

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All we ask is that you select a minimum of four—any four—tapes or 12" LPs from the year's programme of releases offered to you in advance. Prices? 29/- per 3¼ ips mono tape or 26/6 per 12" LP (mono or stereo). Here again, huge savings with free bonuses the more you buy!

Sounds fantastic? Then take advantage of this privilege offer now. Today. And get your first four recordings now for the unbelievably low price of only 20/- (you send no money now). It costs you only a 2½d stamp to obtain for yourself a free, no-obligation trial in your own home for 7 days. You'll be glad you did it!

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### THE SOUND OF THE MOMENT FOR YOUNG MODERNS

Meet beat '65—a completely new range of World Record Club recordings. Produced especially for those who enjoy the sound of today... the beat sound, the group sound, the sound for the twist, the shake... the newest yet! Hear today's great hits in the styles that made them famous!

BEAT '65 are all issued as \* 3¼ IPS MONO TAPES \* HI-FI MONO 12" LPs \* FULL SPECTRUM STEREO 12" LPs... all one price—you choose!

128. The Telstars, The Young Ones and other top Groups capture the newest of the new sounds and pay tribute to the lads who made these titles great: A Hard Day's Night, Needles and Pins, She Loves You, Have I the Right, The House of the Rising Sun, All Over Now, Bits and Pieces, Don't Throw Your Love Away, Glad All Over, The Blue and Fall of Flannel Bunt, I'll Cry Instead and I want to Hold Your Hand.

129. 12 of the top hit songs of 1964, recreated for you on this great new release honouring the singers who made them famous. Hello Dolly, You're My World, You Were

Made For Me, Secret Love, I Believe, Anyone Who Had A Heart, Do-Wah-Diddy-Diddy, My Boy Lollipop, World Without Love, As Usual, Can't Buy Me Love, My Guy. 130. The complete party background: shake and jump to side 1 and (later) smooth to side 2... Ray Ellington sings If I Had A Hammer, Let There Be Love, Fly Me To The Moon and nine more.

129. Twelve top tracks from the great musical, presented in the real Ray Conniff style. If I Ruled The World, Getting To Know You, Some Enchanted Evening, Tonight, and 8 more smash hits. 102. A swinging new release for every mood! Dance with Steve Race and his Orchestra to new arrangements of Z Cars, Coronation Street, Dr. Kildare, Perry Mason and 8 more.

131. If you like blues then this is a must. The great Ray Charles sings See See Rider, Klava Me Baby, Blues is My Name and 8 more. Available in Mono only.

127. The Seekers, fabulous group from Down Under who hit the top of the charts, in a swinging selection of 12 hits, including Blowin' in the Wind, Eriskany Love Lilt, The Ox Driving Song and Chilly Winds.

### WRC MEMBERSHIP BRINGS YOU ALL THIS

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SEND NO MONEY I would like to listen to the four releases numbered here, without obligation, for 7 days in my own home. If satisfied I will send you 20/- (plus 3/- post/packing). I understand this entitles me to membership of World Record Club and all member benefits. As a member I agree to choose a minimum of four more records from the many you will offer me at 26/6 each plus a small charge for post/packing. (NOTE: monthly pre-recorded tapes cost 29/- each). There is no membership subscription or entrance fee. If I am not satisfied with my four introductory records I will return them to you within 7 days of receipt, owe you nothing and incur no further obligation whatsoever.

Please send me

- Choice No. 1
- Choice No. 2
- Choice No. 3
- Choice No. 4

Tick for 12" LPs

- Mono
- Stereo (if available)

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This offer applies in Gt. Britain & N. Ireland only.

055

223

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

SERIES

**6**

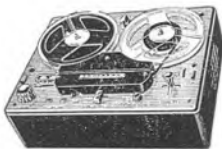


Model 64 4 track  
Model 62 2 track  
Price 110 gns. each.

Semi professional  
Stereo/mono tape  
recorders with cathode  
follower output. Three  
speeds — Three heads  
— Four amplifiers —  
"Sound on sound" etc.

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Price 93 gns. each.

Build-it-in or carry-it-  
around. Complete stereo/  
mono record and playback  
with own power  
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Three speeds — dual  
record indicators — output  
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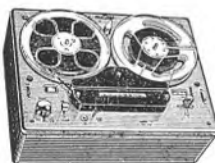


SERIES

**7**

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).

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.



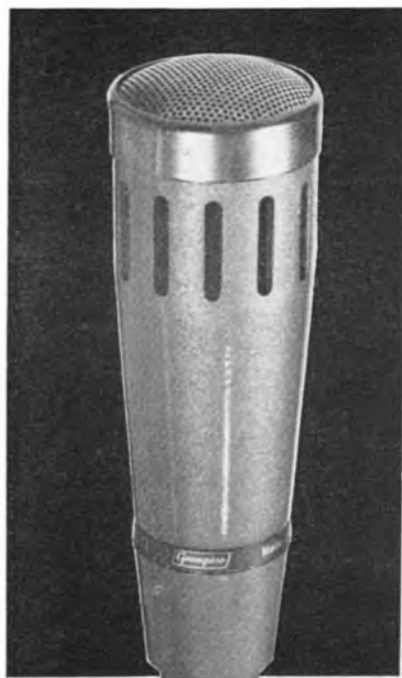
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**9**

**Tandberg**

Send for further information and specifications stating the model  
number you are interested in, to:-

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



**NEW  
FROM**

**Grampian**

**CARDIOID  
MICROPHONE!**

After years of research, Grampian proudly  
present a microphone with a really good fre-  
quency response, high sensitivity and a genu-  
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rugged enough to withstand hard usage—and  
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Especially useful under difficult conditions,  
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highest Grampian standards of workmanship,  
reliability and integrity.

Frequency response 40 c/s to 12 kc/s. Available  
in four Impedances. Low Impedance, £14;  
Other Impedances, £15.

**GRAMPIAN SOUND EQUIPMENT—**  
Integrity that you hear.

Obtainable now from your Grampian dealer.

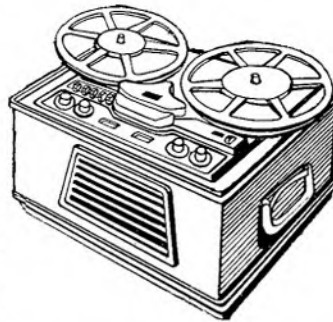
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Hanworth Trading Estate, Feltham, Middlesex. Feltham 2657



# CITY & ESSEX TAPE RECORDER CENTRES

## BRITAIN'S LARGEST TAPE RECORDER SPECIALISTS



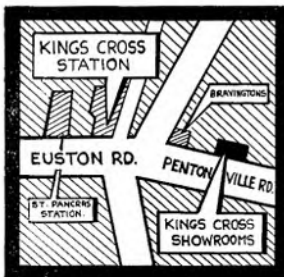
Eight tracks—6 speeds—Video-Stereo-Mono recordings—multiplay — duoplay — superimposing — 6 preamplifiers — 30 watts output per channel—all for under £40. Impossible!! Of course it can't be done. No Manufacturer or Retailer can offer something for nothing. That is why we make no exaggerated claims. Whatever claims we do make are backed by facts!!

We do claim to have an unrivalled selection of the most up-to-date recorders on display in Gt. Britain. The most experienced staff with expert knowledge. Ideal demonstration conditions with every recorder ready for immediate demonstration and comparison. The finest FREE AFTER SALES SERVICING facilities available. The largest, most centrally situated and accessible Showrooms in London devoted exclusively to tape recorders. Exaggerated claims? Don't take our word for it, put our claims to the test and visit whichever of our Showrooms is most convenient to you. You won't be disappointed and it's ten to one that if you are interested in buying a tape recorder you'll become one more of our many thousands of satisfied customers.

- ★ OVER 300 MODELS ON DISPLAY
- ★ EXPERT STAFF, EXPERT ADVICE
- ★ GENEROUS PART EXCHANGES
- ★ UP TO 2 YEARS' FREE SERVICING
- ★ ATTRACTIVE HIRE PURCHASE TERMS

### FREE 24-PAGE COLOUR BROCHURE

If you are unable to visit our Showrooms, send for our fully illustrated FREE 24-PAGE COLOUR BROCHURE detailing the wonderful selection of recorders we stock and recommend. Fill in the bottom right-hand corner coupon and post TODAY to our Head Office.



### CENTRAL LONDON SHOWROOMS

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**BISHOPSGATE.** Almost immediately opposite famous LIVERPOOL STREET Main Line Station and next door to well-known Bishopsgate Institute. Simply alight at LIVERPOOL STREET Station. See Diagram.

**NOTE.—Showrooms open Monday—Saturday 9—6 p.m., closed half day Thursday from 1 p.m.**

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### SPECIALISTS IN

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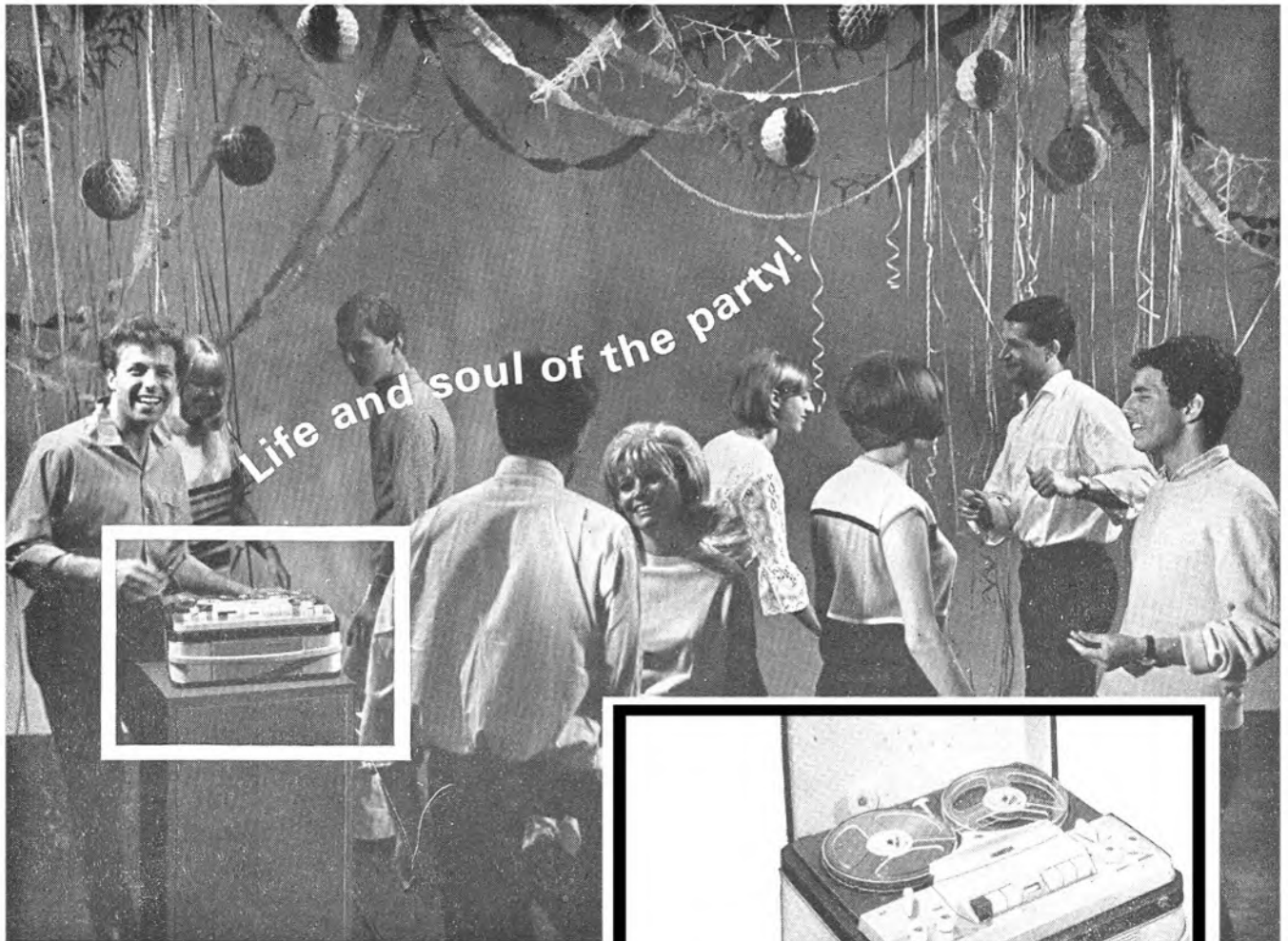
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228, Bishopsgate, London, E.C.2 .....	BIS 2609
2, Maryland Point Station, Stratford, E.15 .....	MAR 5879
205, High Street North, E.6 (Opposite E. Ham Station) .....	GRA 6543

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Name.....

Address.....

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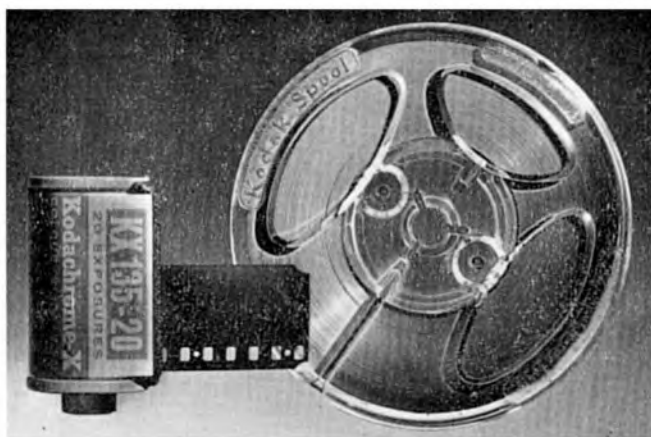
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Hi-Fi Tape Recorder  
Model EL 3549: 62 gns**

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!

**EXPERTS CHOOSE PHILIPS TAPE** Follow the example of professionals in recording and broadcasting studios all over the world—use Philips Tape, the tape that is 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.

ANOTHER ENTERTAINING PRODUCT FROM  **PHILIPS** —the friend of the family



## How Kodak's film-coating skills set today's highest standard in tape

Kodak know a lot about surface coating. More than any other manufacturer in the world, in fact. This isn't really surprising, because one of the reasons for the unrivalled high quality of Kodak colour films is the unique evenness of their emulsion coatings.


Now, Kodak have applied these advanced coating skills to the manufacture of sound recording tape. The result is a tape whose magnetic oxide layer is accurate to within *millionths* of an inch. No wonder that sound recording engineers all over the world have acclaimed it as the finest tape ever made.

Play it as soon as you can. You'll be getting a higher signal-to-noise ratio, better frequency response, a remarkable freedom from drop-out and print-through, and above all, a *total* uniformity in performance.

There's a Kodak Tape for every recorder, of course, including the world's only Quadruple Play tape, for use with battery portables (5½ hours playing time on a single 3¼" reel!). So next time you buy tape do the sensible thing and specify Kodak Tape. It will do full justice to your equipment. And it costs no more.

### Kodak sound recording tapes ... the best tapes in the world

© Patmore Sobey Promare MCMXXI



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NAME.....

ADDRESS.....

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Kodak

Ltd., Dept. 70, Kodak House, Kingsway, London, W.C.2

2

# TAPE

RECORDING  
MAGAZINE

Vol. 9                      No. 6                      June 1965

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**COVER PHOTOGRAPH:** Denise Rene of the Mauritius Broadcasting Corporation interviews the Chief Boatswain's Mate of H.M.S. Jaguar during his ship's courtesy visit to Denise's beautiful Indian Ocean island home. Recorder by Uher. Microphone by Beyer. Photograph by John Cordeaux.

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# Tape trends and tape talk

By the Editor

AMID ALL THE MOANS about government financial policies, there persists remarkable confidence about the future of audio sales—and of tape equipment sales, in particular.

I found no worried faces among the manufacturers I met at the Audio Fair: on the contrary, they all seemed very pleased with themselves (quite rightly) because of their progress to date, and very optimistic about their futures.

Our American contemporary, *Audio Times*, has recently published a forecast that tape recorder sales in the States will rise by at least a quarter in the year ahead. I think we can safely look forward to similar growth here.

Other predictions they make and which we go along with:

That there will continue to be a lot of discussion and experimentation with video, but that 1965 will end with no system indisputably accepted as the victor;

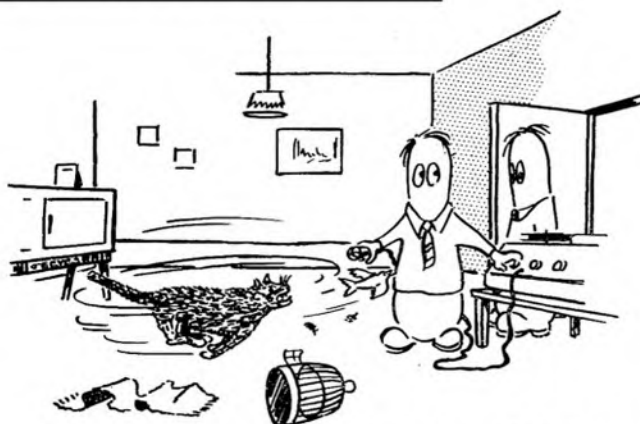
That the big advances will be in higher quality reproduction from tapes played at slow speeds.

We have not heard much of this last point lately in Britain, but I understand that notable laboratory successes are being achieved.

SLOWER PLAYING SPEEDS are going to revive interest in tape cartridges, and it is worth while taking a look at the latest American developments in this field.

One of the biggest U.S. record-player manufacturers is reported to be ready to offer a stereo tape cartridge as an optional extra on its equipment and this is expected to boost the trade all round.

## LAUGH WITH JEEVES



"I'm recording my competition entry it's called 'Wow and Flutter'."

At the Audio Fair 3M showed their tape cartridge system. In the United States this firm now has agreements with 27 recording firms for the use of its stereo music in cartridge tape records, and about 300 of these records are already available.

I have no news yet of a date for a marketing operation in this country.

SOON TO APPEAR in the dealers: the first magnetic tape manufactured in Eastern Germany to be marketed here.

There is no reason why quality should not be of the highest: East German technology in most scientific fields is good.

But the key question is: what selling price? The Communist countries behind the curtain do not always price their products by what we regard as "normal commercial standards".

THERE WAS A GREAT DEAL of publicity about the failure of the recent CCIR conference in Vienna to agree on a colour television standard for use in Europe.

Less publicised, but of much greater interest to audio enthusiasts, was the agreement by the conference on the Zenith-G.E. system for stereo broadcasting in Western Europe.

This is still not a final decision; only a recommendation to a plenary conference to be held in the summer of next year. It is astonishing to an outside observer that these matters take so long to resolve.

But the fact is that the die is cast and the BBC could quite safely proceed to adopt the Zenith-G.E. system and go ahead with regular stereo transmissions. As the radio licence fees are to go up, let us hope that some modest start will be made quickly.

Colour TV, inevitably has got to be postponed. Let the boffins who have completed their experiments and reached an agreement go ahead with the programmes that large numbers of the most discerning listeners are waiting for.

The admissibility of tape recordings in courts of law has been much discussed in the last year or so, and it seems that the legal mind has now come to terms with this new method of communication and record!

In the Court of Criminal Appeal the other day an appeal was based, for the first time, on a submission that a tape recording was inadmissible in evidence. The Court, therefore, stated its view on this matter.

The learned judges argued from the analogy of photography. For many years photographs had been admitted in evidence, and prints of photographs reproduced by mechanical means, were also admitted.

The Court decided that it saw no difference in principle between photographs and tape recordings. It did not say that recordings should be admitted in evidence whatever the circumstances; but it would be wrong to deny the advantages to be gained from new techniques, provided the voices recorded were properly identified.

The Court was satisfied that a tape recording was admissible in evidence, but that any such admission must be employed with caution in the light of all the circumstances of the case.

I think we may see the day when each police officer has a little transistor recorder tucked under his helmet!

# DESIRABLE FEATURES FOR A BATTERY

## RECORDER

H. BURRELL HADDEN discusses the main points to watch for when buying a battery-operated tape recorder and describes the outstanding features of some of the specialised models.

**W**ITH the coming of the summer many amateur recording enthusiasts will be interested in taking their recorders out of doors to record sounds of the countryside, or of their holidays: and so this is the time when we think in terms of buying a battery-operated tape recorder.

Although a comparative newcomer to the scene just a few years ago, the battery recorder has now achieved the status of a commonplace article of furniture in many homes. There are a number of different types at varying prices to choose from, the price range extending from a few pounds up to nearly £400. The range of quality obtainable within this range is obviously equally as wide.

Before describing in detail some of the recorders which are available at the present time, it might be a good idea once again to go over the desirable features of a portable tape recorder bearing in mind the requirements of the individual user.

Of perhaps the greatest importance is the question of size. Obviously a portable recorder should be as small as possible. But what is small? This surely depends on the individual's particular requirements. Should he require additional features and facilities, then of course to get a good quality machine the size cannot be too restricted. Although smaller than the average mains recorder, it would not be as small as a portable machine having only one basic speed, one microphone, no other input, and a minimum of other facilities. However, although the simplest design of battery-portable machine is likely to be the smallest it doesn't necessarily follow that it will provide the worst performance regarding quality. There are of course some extremely cheap machines currently available, but these just do not come into the range of quality machines required by the serious recordist. They are capable of recording voices, and give a good reproduction of speech, but enthusi-

asts interested in recording any of the sounds of nature or any musical sounds with any accuracy would not be happy with a recorder costing less than £10.

Further difficulties with this sort of machine arise from the drive system employed. They do not have a standard capstan drive, the tape speed depends on the amount of tape there is on the take-up spool. Tapes recorded thus, even supposing they are of good enough quality, cannot be played back on any other machine. They can only be played back on the actual machine used for recording. The serious recordist would perhaps want to edit tapes and rearrange recorded material to make, say, a feature tape, or compile a soundtrack for an amateur film. For such purposes it is essential that any tape made on a portable recorder should be playable on any other machine.

The alternatives of size or facilities, should of course be seriously considered. My own preference would be for a single speed machine. Being a professional recordist, I would require this speed to be  $7\frac{1}{2}$  ips, because I do not mind how many reels of tape I carry about. But for the average amateur, I think  $3\frac{1}{2}$  would give the necessary compromise between reasonably good quality of sound and economy in tape, as the majority of machines cannot accommodate a reel much bigger than five inches in diameter, and many of them less than this.

Next, and not far removed from the subject of size, is weight. It is equally important that the machine should be light in weight. Any recorder weighing less than 10lb. can be included in this category, although there are one or two exceptions, as always, to this rule. Once again the advantages of portability have to be weighed with the facilities offered, but for the recordist on location, 10lb. is ample weight to have suspended from the shoulder for long periods.

The third important factor is ease of operation. The recorder should be fool-proof in operation, and should be capable of being worked with its lid closed. The necessary controls should come easily to hand. Nowadays, there is little excuse for having a machine which doesn't have

power-operated rewind, and in this day and age there is certainly no excuse for a machine not having a proper HF biasing and erasing system. On some of the earlier machines one had to use clean tape, because the battery-operated amplifier could not easily be made to produce enough erasing current to wipe the tape. But today most battery models provide erase facilities, and work in every way similar to a mains machine.

These are the basic requirements. There is one other point which might well be worth considering. Many of us cannot afford more than one tape recorder. If the battery-operated model is to be the one to buy because we want to record out of doors, or away from a mains supply, it might be an advantage if the recorder can also be operated from the mains. Typical situations where this would be advantageous would be on a holiday abroad where supplies of batteries may not be plentiful. The life of the batteries would be obviously prolonged if each evening, after a day's recording, the machine could be operated from the mains supply in the hotel so that you can check your results.

Many of the machines currently available can be so operated, usually with the addition of a charger or mains unit which is available as an accessory. Using one of these machines, one gets a performance comparable to the mains-operated machine.

Well, what of the recorders which are available on the market today? There are only really two significant additions to the range since last year. First of these innovations is the tiny Philips EL3300. This cassette-loaded model created quite a stir when introduced last year. It uses eighth-inch wide tape in a cassette, runs at  $1\frac{1}{2}$  ips, and gives a very good performance for its size. The cartridge of tape, which can be changed very rapidly once the end of the tape is reached, overrides any possible disadvantages of limited playing time on the small amount of tape contained. However, thirty minutes per track is available, and the few seconds taken to reverse the cassette provides a further thirty minutes recording

(Continued on page 232)

# BATTERY PORTABLE ROUND-UP

Name of Recorder and Manufacturer's Address	Speeds and Number of Tracks	Frequency Response	Signal-To-Noise Ratio	Wow and Flutter	Power Output	Weight (lbs.)	Size (inches)	Max. Spool Size (inches)	Speaker Size (inches)	Microphone if included in Price	Battery Life	Power Supply	Other Features and Facilities	Price
<b>AKAI X-IV</b> (reviewed this issue) Pullin Photographic Ellis House, 11, Aintree Road, Perivale, Greenford, Middlesex	7 $\frac{1}{2}$ , 3 $\frac{1}{2}$ , 1 $\frac{1}{8}$ , 1 $\frac{1}{16}$ (4-track)	40-25,000 40-20,000 $\pm$ 3dB 40-17,000 $\pm$ 3dB 30-11,000 $\pm$ 3dB 30-5,500 $\pm$ 3dB NARTB Standards	40dB below recorded signal level	Less than 0.16% at 7 $\frac{1}{2}$ 0.17% at 3 $\frac{1}{2}$ 0.25% at 1 $\frac{1}{8}$ 0.35% at 1 $\frac{1}{16}$	Two per channel	12 $\frac{1}{2}$	12 $\times$ 11 $\frac{1}{2}$ $\times$ 5	5	5 $\times$ 3	Two Dynamic stick	Six hours cont.	Five U2 cells or recharge- able nickel cadmium battery	Mon (l and h); Rem(f); Sta; SEL; Meter/BLI; T(s); Ext(8); Rev; Trans; EAS; One motor; Rewind; Crossfield head	£137 11 0
<b>AIWA TP-703</b> B. Adler & Sons (Radio) Ltd., 32a, Coptic Street, London, W.C.1	3 $\frac{3}{4}$ , 1 $\frac{1}{2}$ (2-track)	—	-49dB	—	150mW	4 $\frac{1}{2}$	9 $\times$ 8 $\frac{1}{2}$ $\times$ 3 $\frac{1}{2}$	3	2 $\frac{1}{2}$ round	Dynamic	10 hours cont.	Four 6v Ever-Ready cells	Mon(l); Rem(h); Meter/BLI; Ext(8); SEL; Trans; Rewind	£18 18 0
<b>BUTOBA MT5</b> (Review July 1962)	3 $\frac{3}{4}$ , 1 $\frac{1}{2}$	50-1,3000	40dB	0.11% at 3 $\frac{1}{4}$	1.2	12	12 $\times$ 9 $\times$ 6	5	7 $\times$ 5	—	20-40 hours	Eight U2 cells or mains	Mon(h); Sta; P; SEL; ME; T(c); C/Rev. Trans; EAS 2 motors; rewind; mains unit available	£61 19 0
<b>BUTOBA MT22</b> Denham & Morley Ltd., 173-175, Cleveland Street, London, W.1.	7 $\frac{1}{2}$ , 3 $\frac{1}{4}$ , 1 $\frac{1}{8}$ (2-track)	40-18,000	50dB	0.15%	1 $\frac{1}{2}$	12	12 $\frac{1}{2}$ $\times$ 10 $\times$ 5	5 $\frac{1}{2}$	7 round	—	4-8 hours cont.	Eight U2 cells or mains	Mx; Mon (h and l); Rem (f and h); Sta; P; Auto; SEL; Ext (4) Meter/BLI; T(s); Rev; Trans; EAS 3 motors; rewind; Separate record/ playback controls	£93 9 0
<b>COSSOR CRI621</b> Cosor Radio & TV Ltd., 233, Tottenham Court Road, London, W.1	1 $\frac{1}{8}$ (2-track)	80-8,000 $\pm$ 3dB	40dB	Better than 1% peak-to- peak	500mW	8 incl. batts.	12 $\frac{1}{2}$ $\times$ 4 $\frac{1}{2}$ $\times$ 9	4	4 round	Moving coil	40 hours	Six 1 $\frac{1}{2}$ v U2 cells or mains	Rem(h); SEL; Meter /BLI; T(c); Trans; EAS; One motor; Rewind; (case 45s. extra)	£27 6 0
<b>EDISON ENVOY COMPACT</b> Thomas A. Edison Ltd., Victoria House, Southampton Row, London, W.C.1	3 $\frac{3}{4}$ , 1 $\frac{1}{2}$ (2-track)	100-6,000	20dB	Less than 0.5%	250mW	4	2 $\times$ 6 $\times$ 7	3 $\frac{1}{2}$	2 $\frac{1}{2}$ round	Dynamic	30 hours	Penlight batteries	Mon (l and h); Rem (f and h); Auto; SEL; ME; Meter; BLI; Ext Trans; EAS; Sep H; One motor; Rewind	£64 0 0
<b>EMI L4A and L4B</b> EMI Electronics Ltd., Hayes, Middlesex	7 $\frac{1}{2}$ , 3 $\frac{1}{4}$ (Full or half-track)	50-12,000 $\pm$ dB 50-5,000 $\pm$ 6dB	45dB un- weighted	0.2% 0.25% RMS	200mW	10 $\frac{1}{2}$	11 $\frac{1}{2}$ $\times$ 5 $\frac{1}{2}$ $\times$ 7	4 $\frac{1}{2}$	3	Gram- plan DP/4 L dynamic or Reslo 30/50 with Remote control	4 hours cont.	14v rechargeable cell	Mx; Mon (l or h); Rem (h); Meter/ BLI; Trans; Sep. (H); One motor; re- wind; (case extra) L4C with 4th head for sync. £130 0 0	£120 0 0
<b>FI-CORD 202A</b> Fi-cord International Charlwoods Road, East Grinstead, Sussex	7 $\frac{1}{2}$ , 3 $\frac{1}{4}$ (2-track)	50-12,000 $\pm$ 3dB	45dB un- weighted	Less than 0.3% at 7 $\frac{1}{2}$ 0.4% at 3 $\frac{1}{4}$ RMS	1v	6 $\frac{1}{2}$	9 $\times$ 6 $\times$ 4 $\frac{1}{2}$	4	3	—	30 hrs. motor 60 hrs. amply- fier	Rechargeable mercury battery	Mon(h); Rem(f and h); Sync; SEL; Meter/BLI; Ext; Rev; Trans; EAS; Sep (h); Rewind; (Case extra)	£69 6 0
<b>GRUNDIG TK6</b> (Review June 1964) Grundig (Great Britain) Ltd., Newlands Park, Sydenham, London, S.E.26	3 $\frac{3}{4}$ , 1 $\frac{1}{2}$ (2-track)	50-13,000 50-9,000	-48dB	Better than 0.4% at 3 $\frac{3}{4}$ 0.2% at 1 $\frac{1}{2}$	1.6 watts mains 0.5 watts batts.	13 $\frac{1}{2}$	12 $\frac{1}{2}$ $\times$ 5 $\frac{1}{2}$ $\times$ 9 $\frac{1}{2}$	4 $\frac{1}{2}$	—	Moving Coil	15 hrs. at 3 $\frac{3}{4}$ 22 hrs. at 1 $\frac{1}{2}$	—	Mon (l and h); P; SEL; Meter/BLI; T(c); Ext(5); Rev; Trans; EAS; One motor; Rewind (case extra)	£72 9 0
<b>HITACHI TRO-399</b> (Review June 1963) Lee Products (Great Britain) Ltd., 10-18, Clifton Street, London, E.C.2.	3 $\frac{3}{4}$ , 1 $\frac{1}{2}$ (2-track)	150-7,000 150-4,000	—	—	500mW	4 $\frac{1}{2}$	8 $\frac{1}{2}$ $\times$ 6 $\frac{1}{2}$ $\times$ 3 $\frac{3}{8}$	3 $\frac{1}{2}$	4 $\times$ 2 $\frac{1}{2}$	Dynamic	6 hours cont.	Four 6V U2 cells	Mon(h); Meter/ BLI; T(c); Ext.; Trans.; Rewind; ACC; case	£36 15 0
<b>HONEYTONE</b> Winter Trading Co., 95-99, Ladbroke Grove, London, W.11	Variable between 3 $\frac{3}{4}$ and 1 $\frac{1}{2}$ (2-track)	—	—	—	—	—	9 $\frac{1}{2}$ $\times$ 5 $\frac{1}{2}$ $\times$ 2 $\frac{1}{2}$	3	2 $\frac{1}{2}$	Magnetic	—	One 9V, two 1 $\frac{1}{2}$ V cells	Battery only	£8 18 6
<b>MAGNETOPHON 300</b> (Review June 1964) Welmec Corporation Ltd., 27, Chancery Lane, London W.C.2.	3 $\frac{3}{4}$ (2-track)	40-14,000	-50dB	Better than 0.2%	One watt	7	10 $\frac{1}{2}$ $\times$ 10 $\frac{1}{2}$ $\times$ 3	5	4 $\times$ 2	Moving coil	7-15 hours cont.	Five 1 $\frac{1}{2}$ v cells; rechargeable accumulator or mains power pack	M(h); P; SEL; Meter; Ext (4.5); Trans; EAS; BLI	£51 9 0

ABBREVIATIONS used in the catalogue are as follows: Mx, mixing; M(l) or (h), monitoring by loudspeaker or headphones; Rem(h) or (f), remote operation by hand or foot control; Sta, straight-through amplification; Sync, synchronisation facilities; P, pause control; Auto, automatic tape end stop; SEL, safety erase lock mechanism; ME, magic eye recording level indicator; Meter/BLI, combined meter recording level and battery life indicator; Neon, neon recording level indicator; T(c) or (s), combined tone or separate bass and treble controls; Ext(8), extension loudspeaker socket (8 ohms); Rev, digital revolution counter; C/rev, clock type rev. counter; Trans, transistorised; EAS, extension amplifier socket; Sep(h) and/or (a), separate record and playback heads and/or amplifiers; ACC, storage space for accessories; Tel, telephone adaptor supplied; Rewind, powered rewind facilities.

# BATTERY PORTABLE ROUND-UP

Name of Recorder and Manufacturer's Address	Speeds and Number of Tracks	Frequency Response	Signal-To-Noise Ratio	Wow and Flutter	Power Output	Weight (lbs.)	Size (inches)	Max. Spool Size (inches)	Speaker Size (inches)	Microphone if included in Price	Battery Life	Power Supply	Other Features and Facilities	Price
NATIONAL RQ101S	3 $\frac{1}{2}$ , 1 $\frac{1}{2}$ (2-track)	100-7,000 100-4,000	—	—	500mW (700mW Max)	—	8×8×3	3 $\frac{1}{2}$	3 $\frac{1}{2}$	Dynamic	30 hours	Six U2 cells	SEL; Neon; Ext(8); Trans; One motor; Rewind; Case extra	£19 19
NATIONAL RQ115	3 $\frac{1}{2}$ , 1 $\frac{1}{2}$ (2-track)	100-10,000 100-6,000	—	Less than 0.35% at 3 $\frac{1}{2}$ RMS	500mW (700mW Max)	4	7 $\frac{1}{2}$ ×7 $\frac{1}{2}$ ×2 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$ round	Dynamic	7 hours cont.	Twelve pen cells or mains	Mon (l and h); Rem (f and h); SEL; Meter/BLI; T(c); Ext(8); Trans; One motor; rewind; case; AC adaptor socket	£38 17 0 (Four-track RQ116: £43 1 0)
NATIONAL RQ150 <i>United Africa Mechanical and Electrical Ltd., P.O. Box 1, United Africa House, Blackfriars Road, London, S.E.1</i>	3 $\frac{1}{2}$ , 1 $\frac{1}{2}$ (2-track)	100-7,000 100-4,000	—	—	500mW (700mW max)	6	12 $\frac{1}{2}$ ×9×3 $\frac{1}{2}$	5	3 $\frac{1}{2}$ round	Dynamic	15 hours cont.	Six U2 cells or mains	Mon (l and h); Rem (f and h); Sync; Auto; SEL; Meter/ BLI; T(c); Ext(8); Trans; One motor; rewind; AC adaptor socket	£48 6 0
NAGRA IIIb <i>Livingston Laboratories Ltd., 31 Camden Road, London, N.W.1.</i>	15, 7 $\frac{1}{2}$ , 3 $\frac{1}{2}$ (full-track)	30-18,000 ±1dB at 15 ips	62.5dB	0.1% at 15 ips 0.15% at P.P. at 7 $\frac{1}{2}$ ips	Line O/P 1.55v at 100 ohms	15	12 $\frac{1}{2}$ ×8 $\frac{1}{2}$ ×4 $\frac{1}{2}$	7	3 round	—	20 hours or 70 hours— alkaline batteries	Twelve 1 $\frac{1}{2}$ v flashlight batteries	Automatic level; control, Mx; Meter Rem; Extra "Neo- pilot" head on IIP for Lip-sync.	£317 0 0
OPTACORD 408	3 $\frac{1}{2}$ (2-track)	90-10,000	—	—	800mW	6 $\frac{1}{2}$	9 $\frac{1}{2}$ ×7 $\frac{1}{2}$ ×3 $\frac{1}{2}$	4 $\frac{1}{2}$	5×3	Dynamic	—	Four U2 cells; 6v or 12v car battery or mains	Mon(l); SEL; Meter/ BLI; Ext(5); Trans; EAS; Sep(H); One motor; rewind; ACC	£40 19 0
OPTACORD 416 <i>Highgate Acoustics, 71-73, Great Portland Street, London, W.1.</i>	3 $\frac{1}{2}$ , 1 $\frac{1}{2}$ (2-track)	50-12,000 50-7,000	—	—	1 $\frac{1}{2}$ watts	9	15×9 $\frac{1}{2}$ ×4 $\frac{1}{2}$	4 $\frac{1}{2}$	5×3	Dynamic	—	Five U2 cells, 6v or 12v car battery or mains	Mon(l); Rem (h); P; SEL; Meter/BLI; T(c); Ext(5); Rev; Trans; EAS; Sep (H); One motor; rewind; ACC	£53 11 0 (416 DIA with slide synchroniser £65 2 0)
PHILIPS EL3300 <i>(Review July 1964)</i>	1 $\frac{1}{2}$ (2-track)	100-7,000 ±3dB	Better than 40dB	Better than 1% peak/peak	250mW	4	8 $\frac{1}{2}$ ×6 $\frac{1}{2}$ ×2 $\frac{1}{2}$	cassette	2 $\frac{1}{2}$ round	Moving coil	20 hours	Five 1 $\frac{1}{2}$ v U2 cells	Rem(h); SEL; Meter/ BLI; Trans; EAS; One motor; Rewind; ACC; case	£27 6 0
PHILIPS EL3586 <i>Philips Electrical Ltd., Century House, Shaftesbury Avenue, London, W.C.2.</i>	1 $\frac{1}{2}$ (2-track)	80-8,000 ±3dB	Better than 40dB	Better than 1% peak/peak	500mW	8	11 $\frac{1}{2}$ ×8 $\frac{1}{2}$ ×3 $\frac{1}{2}$	4	4 round	Moving coil	40 hours	Six 1 $\frac{1}{2}$ v U2 cells	Rem(h); SEL; Meter/ BLI; T(c); Trans; EAS; One motor; rewind; ACC; (case 45s. extra)	£27 6 0
Q-CORD R119K DE-LUXE <i>(Review August 1964) C. Braddock Ltd., 266, Waterloo Road, Blackpool, Lancashire.</i>	3 $\frac{1}{2}$ (2-track)	60-10,000 ±3dB	50dB below peak	Better than 0.5%	One watt	5	9 $\frac{1}{2}$ ×9 $\frac{1}{2}$ ×4 (Type 203 10×10 $\frac{1}{2}$ ×4)	4 $\frac{1}{2}$	6×4	Beyer Dynamic 200/50k	25 hours	Four 1 $\frac{1}{2}$ v U2 cells or 6v rechargeable battery or 110/250v mains	Mon(h); Rem (f and h); Sta; P; SEL; ME; T(c); Ext(5); Trans; EAS; One motor; rewind ACC; Bogen heads	£30 9 0
SANYO MR200	3 $\frac{1}{2}$ , 1 $\frac{1}{2}$ (2-track)	150-7,000	40dB	0.45% RMS	500mW	6 $\frac{1}{2}$	8×10×3	3 $\frac{1}{2}$	4×2 $\frac{1}{2}$	Dynamic	—	Six U2 or 9v cell or mains unit £5 15s. 6d.	Mon (l and h); Rem (l and f); Meter/ BLI; Ext(7); Trans; One motor; rewind; ACC; case; Tel.	£36 15 0
SANYO MC2A	Variable speed (2-track)	—	—	—	250mW	1 $\frac{1}{2}$	5 $\frac{1}{2}$ ×3 $\frac{1}{2}$ ×2 $\frac{1}{2}$	2 $\frac{1}{2}$	2 round	Crystal	15 hours cont.	Four U7 or 6v cells	Mon (l and h); Rem (h); SEL; Trans; One motor; rewind; ACC; case	£14 14 0
SANYO M-35 <i>Sanyo Service and Sales, 23, Savage Gdns. Trinity Square, London, E.C.4.</i>	Variable speed (2-track)	—	—	—	150mW	2	6 $\frac{1}{2}$ ×3 $\frac{1}{2}$ ×1 $\frac{1}{2}$	2 $\frac{1}{2}$	2	Crystal	15 hrs. cont.	Four U7 cells or 6v cells	Mon (l and h); Rem(h); Meter/ BLI; Trans.; One motor; rewind; ACC; case.	£20 9 6
SHIRACORDER <i>Winter Trading Co. Ltd., 97-99, Ladbroke Grove, London, W.11.</i>	3 $\frac{1}{2}$ , 1 $\frac{1}{2}$ (2-track)	150-7,000	—	Less than 0.8% RMS	250mW	8 $\frac{1}{2}$	11×10 $\frac{1}{2}$ ×3 $\frac{1}{2}$	5	4×2 $\frac{1}{2}$	Dynamic	—	Six 1 $\frac{1}{2}$ v U2 cells or mains 220/240v	Trans.; ME; Rev; T(c); SEL; Rem; rewind.	£33 12 0
STELLA ST 471 <i>Stella Radio &amp; TV Co. Ltd., Astra House, Shaftesbury Avenue, London, W.C.2.</i>	1 $\frac{1}{2}$ (2-track)	80-8,000 ±3dB	Better than 40dB	Less than 1% peak/peak	500mW	8 (inc batts.)	12 $\frac{1}{2}$ ×4 $\frac{1}{2}$ ×9	4	4 round	Moving coil	40 hrs.	Six 1 $\frac{1}{2}$ v U2 cells or mains (unit extra)	Rem(h); SEL; Meter/BLI; T(c); Trans.; EAS; One motor; rewind; ACC (case 45s. extra)	£27 6 0
STELLAVOX SM 5 <i>F.W.O. Bauch Ltd., "Chaddlewood," Cockfosters Road, Cockfosters, Barnet, Herts.</i>	7 $\frac{1}{2}$ (Full track) or 2-track for stereo use	60-10,000 +2-3dB	50dB RMS	0.15% RMS	150mW	6	10×5 $\frac{1}{2}$ ×2 $\frac{1}{2}$	3 $\frac{1}{2}$	—	—	7 hours cont.	Four Dryfit 2v cells or charger unit	Mon(h); Sync.; Meter/BLI; Ext.; Trans.; EAS; One motor; rewind; case.	£225 0 0
UHER 4000 REPORT 'S' <i>(Review June 1963) Bosch Ltd., 205, Great Portland Street, London, W.1.</i>	7 $\frac{1}{2}$ , 3 $\frac{1}{2}$ , 1 $\frac{1}{2}$ , 1 $\frac{1}{4}$ , 1 $\frac{1}{8}$ (2-track)	40-20,000 40-17,000 40-10,000 40-4,500	50dB	0.2%	One watt	6	11×8×3	5	4 $\frac{1}{2}$ ×2 $\frac{1}{2}$	Dynamic	12 hrs. cont.	Five 1 $\frac{1}{2}$ v cells 6/12v car battery or rechargeable accumulator or mains charger unit	M(l); Rem; P; SEL; Meter; T(c); Ext(5); Trans.; EAS; rewind.	£103 19 0

## Battery portable survey

(Continued from page 229)

without the sometimes tricky performance of re-threading spools on location.

It provides a response from 120-6,000 cps, and wow and flutter at the low single speed is extremely good. This machine is very easily transportable, weighing only 4lb., and it operates from easily replaceable small dry cells. Supplied with a moving coil omni-directional microphone, this is a very versatile machine for anyone wanting portability, not expecting the ultimate in quality. The sort of recorder used to capture "snap-shots" of sound. The price is £27 6s.

Newer even than this and at the other end of the price scale, is the recently introduced Akai X-IV. At present this is the only stereo battery-operated tape recorder available. It is available in this country for the first time, having made its public debut at the recent Audio Fair. It costs 131 guineas.

This is another highly interesting recorder, recording both mono and stereo using the four-track system. It is supplied complete with a mains unit, an essential part of the recorder, combining as it does the job of converting the mains supply and acting as the second channel amplifier for stereo playback. This particular machine is discussed more fully in the "Test Bench" feature of this issue.

Whilst mentioning this recorder it may be opportune to recall the only previous stereo battery recorder, the stereo version of the Uher 4000 Report. The earlier model has now been withdrawn, but latest reports suggest a modified version available in the not too distant future.

What of the others? Not counting the considerable number of under £10 machines, which I have already dismissed from this survey, there are some forty other machines on the market in the price range between £25 and nearly £400, for the professional Nagra IIIb.

This unique recorder deserves a brief mention because without doubt it is the finest portable battery-operated recording machine in the world. It employs three speeds, 15, for professional use, and 7½ and 3½ ips. It has a performance equal to any mains-operated professional machine selling at £1,000 or more.

Completely transistorised, it has a microphone input, line input, and with a line output, can and has been used as a complete outside broadcasting unit. All the necessary means of monitoring the programme are provided, and available as accessories are a power amplifier and monitoring loudspeaker, also transistorised.

Enough of this because very few of us can afford to buy this sort of machine for domestic use, and more is the pity.

Next downwards in price range are three machines at £120-£130. First is the recently introduced latest version of the E.M.I. professional portable model, the L4. This is a development of their early "Midget" recorder, probably the first battery-operated recorder ever made to give any reasonable performance. The L4 weighs only 10½lb., including its batteries. Quite a lightweight machine, with extra facilities compared to the earlier versions. It now has two speeds, a remote control switching system and facilities for mixing two microphone inputs.

Within this price range also is the Akai X-IV already mentioned, leaving only the Uher 4000 Report S which sells at just under £100 basic price. With the necessary leather carrying case and other accessories, the price comes up to £120. The stereo version of this machine is expected to be shown at the Hanover Fair this year. Our information is that it will compare in price with the Akai at around £130.

Coming down in price there are several recorders in the £40-£60 range. The recent Optacord model 416 at 51 guineas, and its 11-guinea dearer brother with a synchroniser for slide projector control, are joined this year by a single speed, 3½ ips, model Optacord 408 at 39 guineas. All three machines can be operated from dry cells, car battery, or mains supply. The 416 employs 3½ and 1½ ips speeds, and accommodates 4¼-inch spools.

Then there is the Fi-Cord 202A, an improved version of the 202 which has given valuable service in many organisations all over the world. This is just slightly more expensive, selling at about £70.

Here, I must mention once again the widespread regret that the old Fi-Cord 1A was ever withdrawn from service. This tiny machine with its extremely light weight was able to give excellent performance and one could carry it around all day without any undue fatigue. Its admitted lack of many facilities which are now commonplace, do not detract from the uniqueness of this double speed (7½, 1½ ips) recorder. Some of these models continue to give yeoman service.

Also in this range is the Magnetophon 300, made by the Telefunken company. This is a very elegant machine running at 3½ ips, and giving extremely good performance at this speed. It is easily controllable with one hand. The start and stop mechanism for the tape being situated in the carrying handle. The volume control on either record or playback is operated by the thumb of the carrying hand, leaving the right hand free to concentrate on the microphone. I was most impressed when reviewing this machine for *TAPE Recording Magazine* last year (*June issue*), although at the time I was not able to obtain the unique microphone available with the M300. This cardioid instrument incorporates a recording level control with meter indicator enabling the user to control the recording level during an interview without having to peer down at his machine.

Well those are some of the battery portable machines which are currently available. Obviously in an article of this type we cannot mention every model, selecting only those models with some unique flavour. There are many good models on the market which have not received an honourable mention, although the catalogue in this issue will provide the newcomer with a good idea of just what is available and at what price.

With equipment of this type it is very true to say that you get what you pay for. Nothing could be truer than with battery portables. Decide how much money you can afford and look for the machine within that price range. If you have doubts regarding the depth of your pocket; decide on how you will use your recorder first, then check off those machines which incorporate those facilities.

Whatever your requirements there will be a recorder on the preceding pages to suit them. Whatever your choice, here's wishing you many enjoyable recording moments in this highly fascinating hobby.

**M**AKING stereophonic recordings at home or in the studio is certainly fascinating. But stereo recordings in the field—away from base, out on your own—is positively exciting. One reason for this is because it is highly improbable that anyone else has ever recorded before in stereophony whatever or whoever is in front of your own microphones: this, anyway, has been the case with all my recordings made overseas. After all, until recently, there just hasn't been portable equipment capable of being slung on a shoulder, while the recordist and his stereo microphones wander exactly where they listeth.

Again, there is that thrilling sense of reality and presence when stereo brings faraway places into your home—so that, perversely almost, your own hearth becomes the magic carpet that transport you to the ends of the earth, or even, let's face it, to Southend, perhaps, on a Saturday evening in August, or to a little country parish church for morning service, or to a farmyard far more real than that of the Archers' of "Brookfields."

The Magic Carpet-Baggers themselves, who regularly have a welcome in my home, were originally stereo-taped in five continents, and one particularly delightful and romantic visitor is a watery one. In the far-distance a calypsonian is humming and strumming a love song, while in the foreground a gentle, moon-flecked Caribbean Sea washes the soft sand. Recently, a guest to whom we played this particular tape, unconsciously lifted her feet a few inches off the carpet as the breakers broke across the room between the two loudspeakers.

It is fairly true to say that, compared with monophonic recording, making satisfactory tapes in stereophony requires twice as much trouble and care over balancing and control. It is indisputably quite true that stereo recording requires twice as much tape, and that an efficient stereo recorder is a good deal more expensive than its monophonic brother—even if it is not usually quite twice as expensive. However, as fellow stereophiles already know, the results of one's labours are also just about twice as satisfying, evocative and realistic.

My own present main equipment for stereo consists of a Revox 736, a Beomaster 2000, a Uher Stereo Mixer, and—for all work away from base—the marvellous Uher 4004 (Stereo) Report. For "playback," I have several pairs of AKG headphones and, at home, a Leak preamplifier, amplifier, and a pair of Leak Sandwich speakers. I also have a Thorens turntable which needs a dose of bicarbonate of soda since it has recently begun rumbling. The Beomaster, incidentally, is the suitcase model, so I can, when needs be, make use of its twin, detachable, speakers. For microphones, I use either the Uher coincidentally paired cardioids (available with the recorder), or a pair of Beyer cardioids. At one time I owned a Lustraphone stereo ribbon microphone. Although this produced a nice enough noise, it was, of course, of little use out of doors. The slightest breath of wind was disastrous. On the question of windshields (which obviously you cannot use with a ribbon), Beyer's provide excellent shields for their microphones and, for the Uher microphone, I have made my own



with a tape recorder: continuing our new series on location recording JOHN CORDEAUX recounts some of his adventures—technical and otherwise—getting the tropics taped.

from sponge rubber. On mono recordings, wind noises are bad enough, but in stereo the wind literally buffets you from two sides.

As I wrote last month, omni-directional microphones are useless for stereo work. When one thinks about it, it is obvious why, but I once experimented with two omni's and the result was confusion worse confounded on the stereo "stage." You have to be rather careful with the figure-of-eight ribbons too, making sure that unwanted sources of sound don't creep up on you from behind. On playback, a sound picked up—say—behind you on the right will come out at you from the front and from the left-hand speaker. Another trouble with figure-of-eight or bi-directional microphones in stereo, is the greater danger of getting things "out of phase." No, I don't think you can really beat a couple of good cardioids. Even though a good cardioid is not a cheap instrument, economy, so far as microphones are concerned, can be false.

Nearly all the recordings I make these days in the field—foreign or home—are stereophonic. After all, you can never change a mono into a stereo recording, while the converse is not only technically very simple, but by careful mixing at the subsequent copying stage, a much better monophonic reproduction can even result. It may sound a little like cheating, perhaps, but after having stereo-recorded, for instance, a solo singer and piano accompaniment, with one microphone covering the piano on the nearly extreme left and the other microphone aimed at the singer just left of centre, a mono dubbing (with the levels of the piano and singer artistically balanced) is likely to sound more satisfactory than would have an original "one microphone" mono set-up for the recital. Perhaps it shouldn't, but nevertheless it probably will. Of course, the recital could have been recorded in the first place monophonically by using two microphones and a mixer. Like this a perfect mono recording can be achieved—but it may involve extra gear, perhaps an extra person, and, generally, a heap more brouhaha. If all "mixing" is virtually left until afterwards at the copying stage, an initial "stereo" recording (even if stereophonically speaking there's too much left or too much right or an ugly gap in the middle) will provide the correct bricks for a properly "balanced" final mono reproduction.

Although I am not primarily discussing mono recording, I have touched on the subject because not only in the domestic field is one sometimes called upon to, as it were, "make mine mono" for friends who are not stereo-types, but, in my case anyway, many of the songs and sounds I recently stereo-recorded in the warmer regions of the Commonwealth were transferred to mono for transmission over the local radio stations I was officially visiting on behalf of Thomson Television (International). And last month I also presented on the BBC Home Service, monophonically, three "stereo" programmes compiled from some three dozen recordings made on my Uher 4004 (Stereo) Report in about ten different overseas countries. The short series, "The More We are Together" was produced in

stereo by Richard Keen and the BBC's Stereo Unit for possible future stereophonic transmission. After the three programmes had finally been put to bed, Richard Keen (who had been monitoring mostly in mono) remarked how clearly the words had come over in the songs—even when the soloists or group of singers had had heavy backing. Credit for this acceptable "balancing" was partly due to the fact that in the original recordings, the stereo microphones had between them covered the whole canvas, and when I copied in stereo from the portable Uher to the Revox, I ensured that the modulations on the tracks carrying any soloist slightly preponderated on the stereo stage. So, a subsequent mono copy of "the sum of the two tracks" naturally sounded nicely balanced.

I would like to suggest a neater and more accurate way of referring to the precise position of sounds (in width and depth) across the stereo stage. Just now, in trying to "place" the singer and the piano, I wrote, "on the nearly extreme left," and again, "just left of centre." This is clumsy and I find that, without being geometrical, like, say— $67\frac{1}{2}$  degrees Left—the magnetic compass can be borrowed or boxed or whatever it's called, in the interests of stereo.

Picture the top half of a compass divided into its eight segments. Now, for West read *Left*, for East read *Right*, and for North read *Centre*. The stereo stage will therefore be divided up as follows (Left to Right): L (Left), LCL (Left-Centre-Left), CL (Centre Left), CCL (Centre-Centre-Left), C (Centre), CCR (Centre-Centre-Right), CR (Centre Right), RCR (Right-Centre-Right), and R (Right).

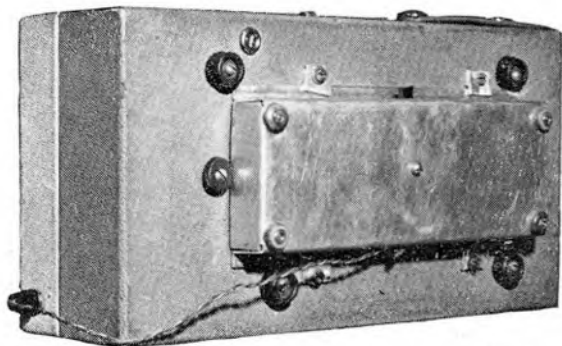
Incidentally,  $67\frac{1}{2}$  degrees left would, of course, be: LCL. The stereo stage can be divided up still further if you wish—as is the compass. "On the nearly extreme left" would, I suggest, be (think of the compass: West-North-West-by-West), LCL-by-L.

A few thoughts now addressed especially to fellow stereophiles—whether at large or not. We stereo-recordists are in a minority (and I personally think it's a privileged one) at the present time. This means that we have got to do some of our learning by our own rather than by other people's mistakes: there aren't really enough of the latter yet. Do not therefore be browbeaten by members of the big brothers brigade (this could include me!) who say, for example, "Oh, you surely don't use  $3\frac{1}{2}$  ips with stereo?" Or, "You don't dare use any tape other than X or Y with stereo." (Both X and Y are very expensive, incidentally). And so on, Just as though stereo-recording is a mystique only capable of being practised by divinely elected members of the magic stereo circle. Nonsense. And, more or less answering my own questions above, one of the overseas recordings which always pleases me most—and one that equally appeared to please the BBC Stereo

Unit—is of old Bishop Moses dominating a cheery big congregation in the "Church of Prophecy" at Nassau in the Bahamas. On my Lafayette or Electronic World double-play tape (I forget which, both are good), at  $3\frac{1}{2}$  ips and using the comparatively inexpensive Uher coincidental microphones, I recorded a humdinger hour of hearty praise and pop-hymn-singing. Back home in London, I copied from the  $3\frac{1}{2}$  ips Uher tape to  $3\frac{1}{2}$  ips on the Revox. I edited the item on the Revox, as I always avoid using spliced tape on the battery operated Uher. Then, on the Revox, before taking yellow chinagraph pencil to tape (preferably not double play this time, when it comes to splicing) an Ever Ready blade to EMI block, I monitored the tape—as is my wont in editing sessions—by means of stereo headphones. Particularly at the slower speed of  $3\frac{1}{2}$  ips, careful stereo monitoring is essential: your left ear should know precisely what your right ear is doing at the point you make the splice. At this stage, the  $3\frac{1}{2}$  ips (half-track) copy of my original  $3\frac{1}{2}$  (quarter-track) recording was again copied—but this time at 15 ips by the BBC for inclusion in one of my three travel programmes! Yet this was not really an attempt to make a silk purse out of a sow's ear: but it was one of many "professional" recognitions of the broadcastability of material originally recorded by me on a quarter-track machine and at a speed which is still too often considered to be "impossible" in professional circles.

Finally, then, a brief beef. As a recordist, I get a bit weary of what I consider to be the frequent mis-use of the actual word "professional". *Professional* machines; *professional* tape speeds; *professional* tapes; *professional* microphones . . . the list can be as long as the manufacturers want to make it. There's even a well-known (and pretty good) tape recorder that is sold under the sales banner of "Semi-Professional." Now, what on earth does that mean, I wonder? But it's the other side of the coin that's the really silly side. The "Oh, I'm afraid it's not professional" excuse, apology or shrug. As though to say that the job can't be done, the recording shouldn't have been made, certainly couldn't be broadcast—all because "qualified" recording engineers hadn't made the recording on equipment costing half the earth. And if this "hi-pro-fi" nonsense is true in mono—well, it's doubly true over matters stereophonic. Yet—given ordinary, commercial, workmanlike equipment, it is the expertise of its operator that is all important. And this admittedly essential expertise all we stereophiles can certainly acquire in time—be we Amateurs (or indeed Professionals!).

Next month, our "Stereophile at Large," John Cordeaux concludes his series of articles with an account of some of his experiences of "taping the tropics" with his Uher 4004 (Stereo) Report.



## An auxiliary battery container for the Fi-Cord 1A

**A** FI-CORD 1A was used by the producers of three of the winning tapes in the 1964 British Amateur Tape Recording Contest. Each of these tapes also won awards in the International Contest.

Further proof of the versatility and quality of this tiny battery-operated recorder and helping to support my view that the Fi-Cord 1A is the best battery-operated machine ever produced.

Though I hold nothing against the Fi-Cord 202, which has superseded it, I still think the 1A is the better instrument for the work I do, especially considering its weight, size, price, and the quality of the recordings that it can produce.

Because of the size of the built-in speaker, which is intended for monitoring only, a mains machine is an advantage for replay. But most enthusiasts use a battery machine as a secondary unit and, in any case, facilities are available for feeding from the 1A to external amplifiers.

After using my own 1A for some time I realised that there were one or two points which, for my purposes, I thought could be improved. They arose particularly as a result of recording bird song but the modifications carried out have also been of advantage in many other situations, for example, when using the machine for dubbing purposes.

In this article I shall describe two of these modifications, but first let me detail the difficulties which they overcome.

Firstly, when using the monitoring earphone it was necessary for the lid of the recorder to be kept open. This is most inconvenient with the 1A hanging at your side and there is the risk of the lead to the earphone easily fouling the revolving spools.

Secondly, the amplifier could not be kept alive without the motor running. This, in turn, meant a drain on the batteries and also that the lid must remain open so that the tape could be started, when required, by applying the pressure roller.

Third, and for my purposes most important, a little noise from the motor is fed back through the batteries on to the tape. I must emphasise that although this is only a small amount, it is of prime importance when a low signal, such as bird song, is being recorded.

At this point perhaps I should make it clear to the reader that I am an amateur. My knowledge of tape recording has been gained mainly from *TAPE Recording Magazine*, and by gaining experience on a hit-and-miss basis of "having a go."

The first modification is a very simple one. On the standard machine the socket for the earphone is on the top of the deck and the insertion of the plug prevents the lid from closing. I found that by removing the miniature plug from the lead I was able to cut about a quarter of an inch off the top of its

plastic cover, making it possible to leave the plug permanently inserted in the socket.

The grey covering material on the inside of the lid can be pulled back to allow a short length of the lead, now re-soldered to the plug, to run along the lid to a miniature socket fitted in the end of the lid just above the volume control. This should be an open circuit jack socket.

I found it necessary to chisel out a little



Above, shows earphone plug, reduced in size, with white lead going under covering material in lid. The miniature socket with jack plug inserted brings supply from auxiliary batteries. The lead from socket is inserted through filed-off corner of the deck

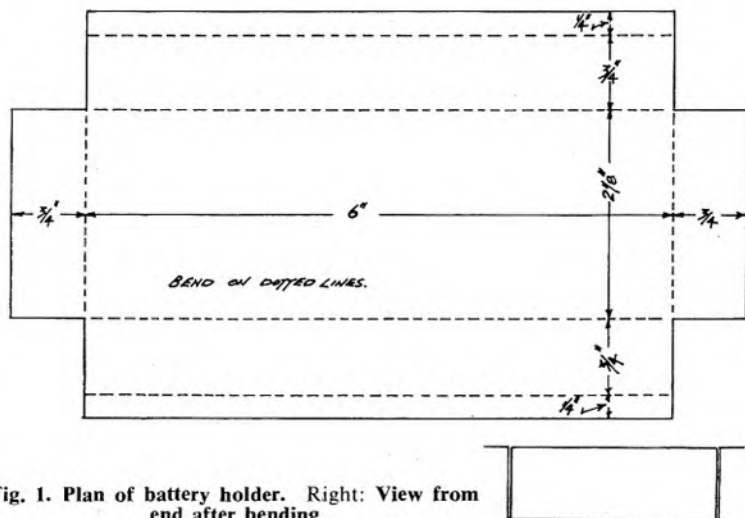


Fig. 1. Plan of battery holder. Right: View from end after bending

of the wood at the back of the lid to allow the threaded portion of the socket to protrude sufficiently to accept the fixing nut. Leaving just sufficient spare at the plug end to allow the lid to open, the lead is soldered to the new socket and the cover material stuck back to keep the lead neatly in place. A plug suitable for the new socket is soldered on to the remainder of the earphone lead and the first mentioned difficulty is overcome.

The second modification is rather more complicated but removes both the remaining difficulties. It requires the installation of a second set of batteries in order to provide separate power supplies to the motor and the amplifier and has the effect of completely removing the unwanted noise. By using the added batteries to drive the motor and incorporating a switch in the supply line,

control of the motor is independent from the amplifier but the main switch still has overall control.

The auxiliary batteries are carried in a separate container which clips on to the bottom of the recorder, the supply being plugged in via a socket wired into the printed circuit. It is therefore only a moment's work to remove the modification and use the machine as a standard model.

The first step is to construct the battery holder and reference to Fig. 1 will indicate the necessary dimensions. The holder is made out of 20-gauge sheet aluminium. A hole in the side allows for the fitting of a small switch. I had some difficulty in finding a suitable one but eventually found, at a radio shop, a sub-miniature sliding double-pole double-throw switch normally used for wave-band change.

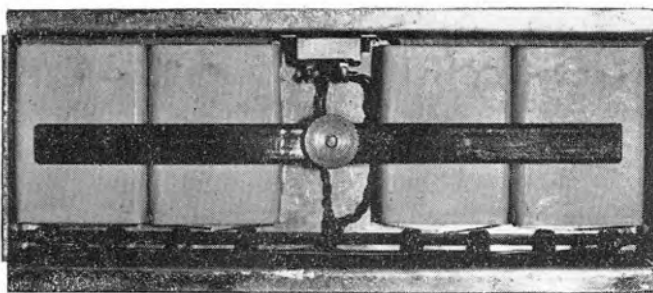
The battery connecting bar is made up of two strips of insulating material (Formica in my case), with one strip drilled to pass eight B.A. screws as shown in Fig. 2. The eight screws which form the battery contacts are round headed, whilst the two longer screws which hold the assembled bar in place in the container are countersunk to prevent any possibility of the batteries shorting on to the case. To ensure correct register it is advisable that the holes for these two screws should be drilled through the two insulating strips and the side of the container in one go before the connecting bar is assembled. Countersink the holes which will face the batteries.

Each of the round-headed screws is passed through the drilled front strip and a nut fixed to hold a soldering tag in place on each, the screws then being filed down flush with the nut face. Tags 2 and 3; 4 and 5; 6 and 7 are connected by short lengths of wire. A red wire is taken from Tag 1 (positive end) and black wire from Tag 8 (negative end) each to the switch. The connecting bar can now be assembled by passing the two 8BA countersunk screws through holes "X" and "Y" and bolting to the side of the container. The rear strip serves to insulate the eight contacts from the container. The batteries will now be connected in series through the switch with all the positive poles to the left side of the container and similar to the arrangement on the recorder.

A nine-inch length of each wire is then taken from the switch, through the side of the container, to a miniature jack plug and the red wire connected to the stem of the plug and the black wire to the tip of the plug. This is very important and great care must be taken in making these connections in order to preserve the correct polarity when the auxiliary batteries are connected into the printed circuit of the recorder. Fine stranded wire should be used for these two leads and if they are twisted together they will form a firm but pliable lead from the container to the recorder.

A short metal bar (I used a piece of brass curtain valence rail) serves to hold the bat-

Right: The auxiliary battery container ready to be attached to bottom of recorder. Note switch between batteries.



teries firmly in place. A hole is drilled in its centre to allow it to drop over a 6BA screw standing up from the base of the container between the two middle batteries. The bar is bent down a little between these two batteries to allow a knurled 6BA nut to hold it in place without the nut standing proud of the sides of the container.

A set of batteries can now be inserted, care being taken that the positive side of

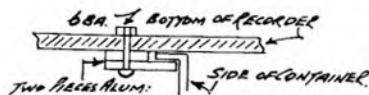


Fig. 3. Detail of one of the four clips used to secure the battery holder

each battery is to the red lead (on the left) and that all batteries are in firm contact with their respective contact screws.

The next step is to remove the recorder from its wooden case. Holding the machine with its controls uppermost remove the small screw to the left of the on/off switch, it is situated close to the "ear" sign, and the similar screw to the right of the gain control, situated just above the figure "1" of that control. Now remove the only screw in the bottom of the case, it is fitted with a washer and situated near to one of the rubber feet. After removing the four batteries the recorder can now be lifted out of its case. This, incidentally, will reveal to you the true beauty and craftsmanship in the instrument.

Remove the four rubber buffers on which the case stands and replace with larger ones; this is necessary to allow for the depth of the clips which are to be fitted to the case bottom. The buffers which have been removed can, with advantage, be fitted to the new battery container.

Each of the four clips, which are to hold the container in place, is made from two small pieces of aluminium, one smaller than the other. The smaller one acts as a spacing piece to hold its mate sufficiently clear of the case to allow the lip on the container to slip underneath it. (See Fig. 3). Two of the clips are fitted to each side of the bottom of the case by 6BA nuts and bolts and so placed that the new container will comfortably slip into place between them, a small

flat-headed screw can be fitted in the centre at the end farthest from the controls to act as a stop.

Now fit a miniature closed circuit jack plug socket in the lid (see photograph). The best position for this is as close as possible to the corner which closes down just to the left of the batteries. It is fitted as previously described for the earphone extension socket.

The next step is to make the necessary alteration to the motor circuit. Having taken the recorder from its case turn it over so that the printed circuit is towards you, with the motor on the left and the flywheel at the top. Just to the right of the motor you will see a number of different coloured wires soldered to the printed circuit at different points, from the top down they are brown, blue, yellow, blue and pink. With a soldering iron remove the lower of the two blue wires, the one between the yellow and pink; if you follow the printed circuit from this point you will see that it goes to the negative side of the batteries.

You now require three short lengths of fine stranded wire, preferably of different colours. Connect one, say red, to the point on the printed circuit just below the pink

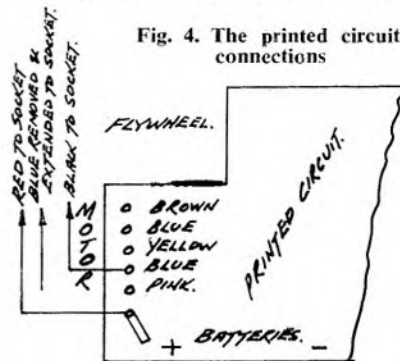


Fig. 4. The printed circuit connections

wire, this will make a connection through the printed circuit to the positive side of the batteries. Connect another wire, say black, to the point from which you have removed the blue wire and connect your third wire, say blue, to the blue wire you have removed, in order to lengthen it. Twist the three wires together and slip a short length of plastic sleeve down over them to adequately protect the joints you have made in the blue wire. Fig. 4 and the photograph (page 243) will help to explain the connections.

With a file round off the corner of the deck close to the earphone socket which is fitted into the deck. (In doing so take great care to prevent any filings getting into the instrument.) You can now lay your lead over the motor and behind the earphone socket on the underside of the deck, making sure it does not foul anything. Now replace the deck in its case and bring the lead out at the filed off corner, cut the lead to leave just sufficient length to connect each wire to the socket in the lid when the lid is open.

(Continued on page 243)



DRILL AT EACH POINT TO PASS 8BA. COUNTERSINK X & Y ON FACE TO BATTERIES.

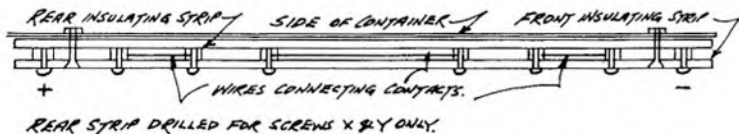


Fig. 2. Dimensions of the battery connecting bar. (See also photograph at top of page)

**L**AST MONTH it was explained that recording television signals was beset by certain problems. These were, in the main, somehow bringing the wide, seventeen-octave, television spectrum down to less than the nine octaves, which is the probable ultimate limit of tape—recordable spectrum, due to the self-demagnetising effect of short magnets. (See Fig. 1.)

The television signal is impressed, to this end, on a frequency-modulated (FM) carrier, which extends, nominally, from 4.2 Mc/s corresponding to the tips of the synchronising pulses, to 6.8 Mc/s which corresponds to the signal, when a peak white is sent. Of the additional sidebands that are produced, more will be said later.

To accommodate the (relatively) high frequencies that result, a head/tape speed of about 1,570 ips is achieved, by scanning recorded tracks *across* the width of the two-inch wide tape, with a rotating (at 15,000 rpm) headwheel, carrying four record/playback heads on its periphery; the tape, meanwhile, moving longwise at 15.6 ips. Audio is recorded, as normal, along the top edge of the tape, using a practically conventional head.

In this issue, further general principles of magnetic recording, relevant to TV particularly, will be examined, along with the properties of the standard TV signal which we wish to record.

#### WHAT IS MAGNETIC TAPE ?

Magnetism is believed to be an effect produced by the rotation of electrons round their parent atoms. In any given plane of possible orbit, there are two possible directions of travel, producing one or the other

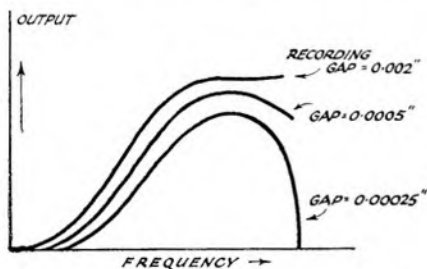


Fig. 1. Family of curves illustrating self-demagnetising effect

magnetic polarity. The magnetic properties, if any, of a substance, are governed by the proportions existing in the numbers of, as it were, "left or right-hand drive" electrons, in its make up.

There is one exception to this rule, arising in the case of hydrogen, which has only one electron per atom.

Magnetic properties are most marked in elemental iron, its alloys, e.g. steels, two of its oxides, (faintly) in nickel and cobalt, and oxygen in the liquid or solid state. (Not a very satisfactory transformer core material, one would think ?)

The material important to us, is the Oxide of Iron  $Fe_2O_3$ —"Rust" in private life. This usually forms cube-shaped crystals containing eight molecules, one at each corner of the cube. The magnetic efforts of

# TAPE RECORDING TELEVISION

Recording television images on tape poses certain problems. The main difficulty is condensing the necessarily wide television spectrum range down to the narrow tape spectrum. In the second of his new series of articles, JOHN VALENTINE discusses general principles of magnetic recording and their relation to television.

all, are paired in opposition, to produce a resultant zero; this configuration is termed the Alpha ( $\alpha$ ) form. However, if the oxide is allowed to cool down from a high temperature in a magnetic field, the crystals draw out into cigar-shaped units, with a magnetic force along the long axis—this form is termed  $Fe_2O_3$  Gamma ( $\gamma$ ).

These so-called "acicular" crystals group together, about 300-400 at a time to form "domains." All domains act as tiny very strong bar magnets (about 20 millionth/inch) and will align themselves with any magnetic field in their vicinity, like a compass needle, and, obligingly, stay put.

So, accordingly, we spread them evenly on a flexible tape. At the outset, they will point every which-way, and, as a mass, have no magnetic influence at all. But under external influence, more and more of them can be aligned, producing progressively greater and greater remanent field, until they are all lined up—"saturated." From this point onwards, they behave as though the material was free space, with no permanent or "remanent" properties. (Fig. 2.)

It should be understood that though the force/field graph in Fig. 2 is shown as a smooth curve, it is, in fact, a series of small steps, produced by individual domains turning round to face away from the external field. This, incidentally, is a minor cause of noise, of the "slush" variety in all tape recorders. So much for the coating. It remains to say that the binder which secures the coating to the backing tape, has to have many important qualities. It must be durable, non-abrasive, and resist moderate ambient temperatures. For audio tape, particularly, it must resist "frilling" away from the edges of the backing, and, most important for video-tapes, must stick every single particle on fast. A spot where oxide has fallen off—a "dropout," is relatively serious, since it causes a most objectionable white flash on the screen.

#### BACKING MATERIAL

For sound tape, a variety of materials are used for backing—some better than others. Paper, acetate (rayon) p.v.c. and "Mylar" are common, the best being "Mylar," which is the plastic better known as "Terylene," not knitted but formed as a solid thin sheet.

"Mylar" is used, almost exclusively, for video recording, because of its enormous strength, flexibility, and ability to resist what the manufacturers mildly term "abusive" use, in video recording. The author has tried to snap a "Mylar" tape (two inches x 1/1,000-inch) and failed miserably—with a cut hand!

For both audio and video recording, the

materials used are fundamentally the same, apart from the physical sizes, and the much greater manufacturing quality control necessary for video-tape. To quote the "Scotch" company, who make much of it, "We have to eliminate defects equivalent to a grain of sand on a tennis court."

#### THE TELEVISION SIGNAL

The other scientific-type matter to be considered in this essay, is the television signal which we wish to record, and later reproduce. Fig. 3 shows the last of the (assumed) 405 lines of a picture which consists of a peak white vertical bar on a black background.

There are five main aspects of it worth considering at this stage. In the area between 0-30 per cent are the synchronising pulses, ("Syncs" from now on), applied to keep the receiver scanning from left to right, up and down, in step with the original televised scene in the studio. Two sorts of syncs have to be given, the "start a line" syncs, and the "Start a new picture" syncs. (From now on, "line syncs," and "frame syncs").

On the 405-line system, 50 frames syncs per second are necessary, that is, at the rate of picture repetition, and  $50 \times 202\frac{1}{2} = 10,125$  line syncs. The figure  $202\frac{1}{2}$  arises out of the fact that TV pictures are sent half at a time at twice the speed—"interlacing" them, to reduce the apparent flicker.

The remaining portion, that is, between 30-100 per cent, contains the picture information. This tells the receiver, from instant to instant, to vary the brightness of

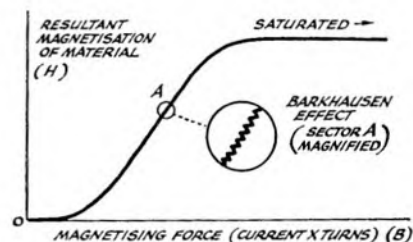


Fig. 2

the flying spot on the screen, and to, thus construct fifty still scans per second. This deludes our simple minds into an illusion of continuous movement.

Every picture can be said to contain 60,000 elements—that is a supposed 60,000 tiny areas which are individually either black, white, or in between, which when viewed as a whole, represent a picture.

# TAPE RECORDING TELEVISION

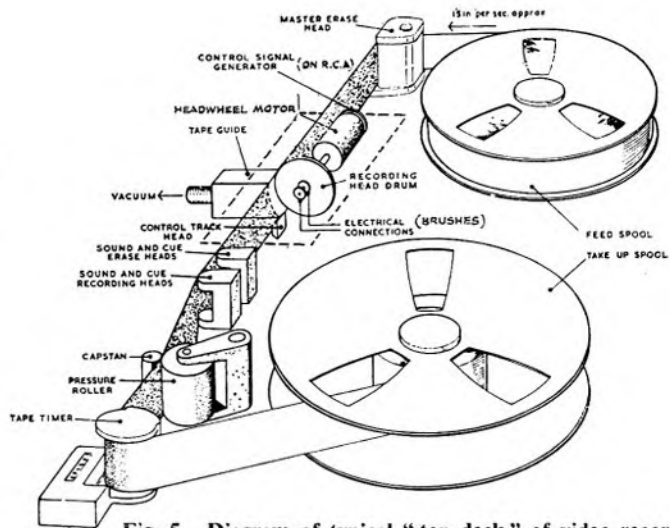


Fig. 5. Diagram of typical "top deck" of video recorder

The figure 60,000 is arrived at by saying that there are fifty pictures per second, each resolved into 202½ lines. Each line is resolved into (theoretically) 202½ x 4/3 sections. (British TV pictures are of a 4:3 size, or, "aspect ratio"). Multiplying the last figures by 50, 3,000,000 results—or nearly. This means that up to three million bits of information, every second, have to be catered for. So, 0 cps (mean picture brightness) to 3 Mc/s (max. detail) are involved, compared with the 25 cps to 20 Kc/s in sound recording.

This sounds like a tall order, but, in practice it's surprising what one can get away

with, which has had to be employed, that is, a control track, recorded simultaneously with the vision and audio tracks, all on the same tape.

### THE CONTROL TRACK

On the bottom edge, a 250 cps signal is recorded during the record process.

It is placed in a narrow gap, shortly after the tape has been past the vision heads. It is not strictly necessary to pre-erase a space for it, since the signal is put onto the tape at such high level that it crushes any previous modulation out of existence. No record bias is used at all on control track

it spins, at 250 revs per second a 250 cps signal is induced in the pickup.

R.C.A. recorders use an iron wheel on the headwheel shaft with a square notch cut in it, which influences a nearby magnetic pickup, but the net result is the same. So then, in the record mode, a filtered version of this signal is recorded on the tape. It is picked up in the control head during playback, and is used, after amplification to drive the headwheel motor of the reproducing machine, and, after frequency division by 4, (to 62.5 cps) the capstan motor, which drags the tape past the heads. Both motors operate synchronously in the way of electric clock motors.

As an afterthought, editing information, of which, more appears later, is applied onto the control track.

One of the operational controls of a video recorder is the knob which controls the relative phasing of the control track and the capstan motor, ensuring that at all times, approximate "tracking" of the vision heads and the tracks they must play back is maintained. It doesn't, in practice, have to be precise. The head is picking up an FM radio signal, remember—some fading, due to mis-alignment is compensated for to a degree, naturally. In the FM stages there are limiters which pass only a small fraction of the available signal (less than 40 dB) anyway.

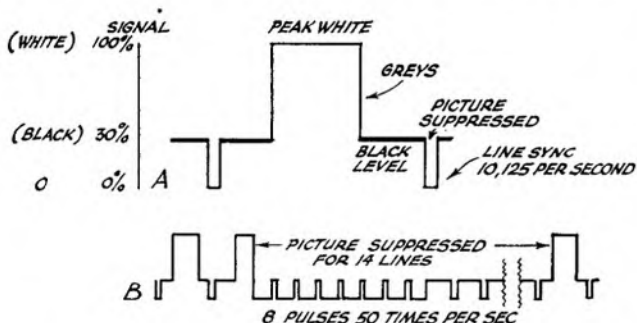


Fig. 3. The television signal. (A) One line of TV signal (white vertical bar on screen) (B) Frame sync "Packet" plus neighbouring lines

with, while still maintaining good picture quality. Most vision monitors, for example, will still give sensible pictures with syncs that are appallingly distorted. In fact, most TV apparatus lends itself readily to a bit of scientific "fiddling."

In professional outfits, every effort is made, of course, to make a video-tape offering to the public every bit as good as live or filmed shows. Quite often, (NO, I'm not exaggerating) better, for powerful reasons explained later in the series.

### THE LAST SNAG

The main difficulties of TV recording have, I hope, been lightly explained away. However, one other remains.

The well-informed reader may well have seen that it's all very well to record TV in an unusual way on slightly unusual tape, but, what happens when you try to play it back?

It is clear that unless the record/playback heads, when in the playback mode follow exactly the previously recorded tracks, the result will be meaningless. For example, the playback heads could easily scan the gaps between the tracks or, more likely, two adjacent tracks in part.

The answer lies in another refinement

either, thus when the track is played back, it is very distorted (Fig. 4). But this is unimportant—the 250 cps signal is restored back to the true sine-wave form easily with a simple filter.

During the record process, this 250 cps signal derived directly from the position, during its rotation, of the headwheel. Ampex recorders use as control signal, the output of a photo-electric cell, (actually a photo-transistor), which "looks at" a sector of the headwheel motor shaft. This sector is half silver half black, and there is a small bulb near it which shines on the shaft. As

### ACTUAL LAYOUT

So much for the theory. We are now in a position to consider a practical setup. Fig. 5 shows the top panel of a video recorder, with all the essential mechanical parts. Note the control track head on the headwheel panel, and the curved vacuum tape guide against the vision heads.

In the next issue simple Frequency-Modulation theory as relevant, will be considered, together with a fuller description of the headwheel method of recording, and a brief description of the FM modulator and demodulator.

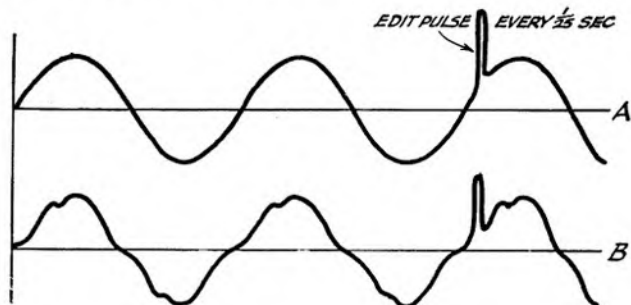
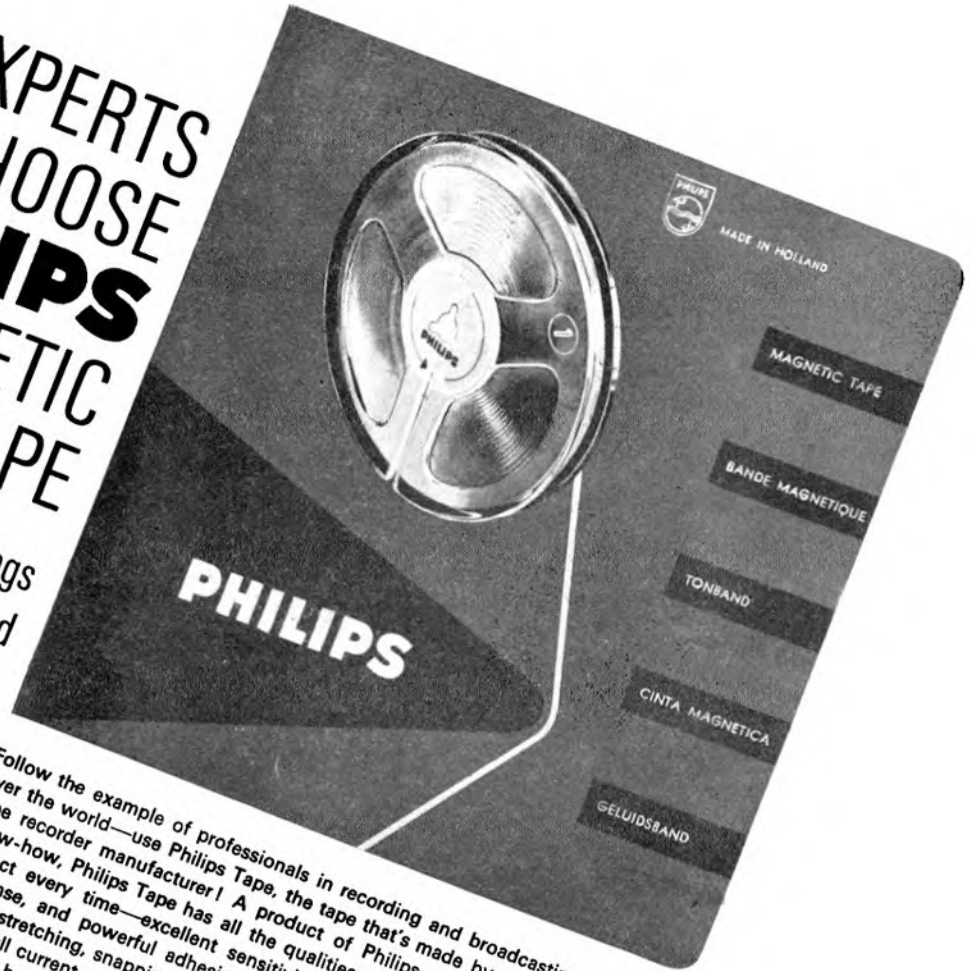


Fig. 4. The Control track. 250 cps control signal. (A) as recorded (no bias) (B) as played back

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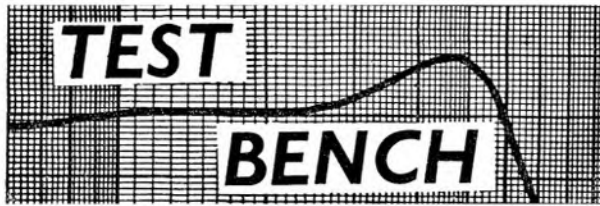
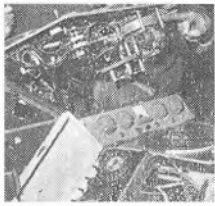
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## AKAI X-IV

by H. B. Hadden

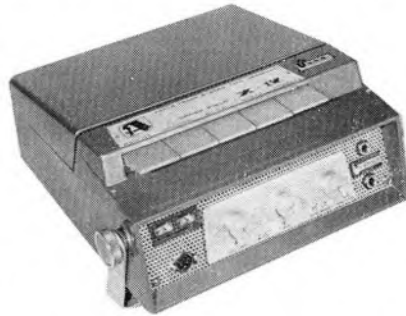
**T**HE Akai model X-IV is an interesting addition to the ranks of better class portable tape recorders. For some time now there have been numerous battery portables on the market, at varying prices from five pounds upwards, and generally speaking the results obtainable with these are more or less commensurate with the price; as with most electronic equipment, you get what you pay for. So far, however, there have not been very many machines in the semi-professional class, which this machine certainly is, and at the moment it has the additional merit of being the only stereophonic portable currently in production. (Uher produced a stereophonic version of the 4000 Report a year or two ago, but it is no longer available, and I understand that a new version will appear shortly.)

The machine is of small size, the dimensions being 5 x 11 x 12 inches, and the weight including the battery is 12½ lb. It is fully transistorised, and operates at four standard tape speeds; 7½, 3½, 1½ and 15/16 ips. It will accommodate tape reels up to five inches in diameter, giving a maximum of sixteen hours playing time mono, or eight hours stereo, using 1,200 ft. of tape at the slowest speed. Fast forward and rewind facilities are provided, the time taken to rewind 600 ft. of tape being 90 sec.

The power supply for the X-IV is by means of a rechargeable dry accumulator; battery and charger being supplied with the machine. The charger unit will also act as a mains unit to power the machine directly from the mains. A most interesting feature is the inclusion of a second power output stage within the charger unit, so that the addition of two loudspeakers is all that is necessary for full stereophonic reproduction. Monophonic listening is, of course, available on the built-in 5 x 3-inch elliptical loudspeaker. The power output stages each deliver two watts, so this little machine can give a very good account of itself. Of course the battery life would be reduced if it were used continuously for stereo playback and so this only possible when the machine is being mains operated, but even at full power output, it will last for over three hours when playing back monophonically. When recording, the machine can be operated in the stereophonic condition for about six hours before the battery needs recharging. The charging process is carried out without removing the battery from the machine; the charger is merely plugged in to a socket at the back. This single connection also connects the machine for mains operation as well as making the necessary connections for the second power amplifier mentioned above. The machine can be run

from the mains with or without the battery being charged.

Control of the tape motion is by means of five large piano-type keys, clearly labelled so that their functions can be seen with the machine either horizontal, or vertical in the carrying position. From left to right the functions are: rewind, record, stop, start, and fast forward. In order to switch

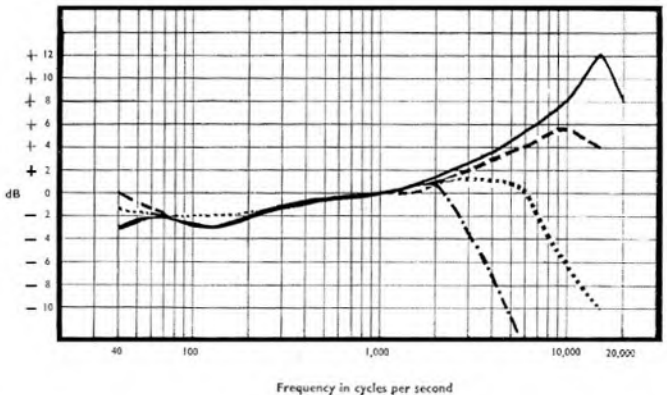


the machine to the record mode both start and record keys must be pressed simultaneously. All other controls are to be found on the front panel of the machine. The two gain controls, concentrically mounted, act for record level and playback volume, and the on/off switch is incorporated with one of these. Two further concentric controls provide tone control of the top cut variety on playback, and ganged to one of these is the switch for cutting out the internal loudspeaker. The only other knob selects the required tape speed.

Two standard "tip and sleeve" jack sockets are mounted on the front panel, a small slide switch being used to select the appropriate circuitry for microphone or line operation. Also on the front panel is a DIN type socket providing the usual "two-way" operation for record and playback with suitably equipped external apparatus. The only other socket is the jack type for the left-hand channel when it is desired to use an external loudspeaker. The jack for the right-hand external loudspeaker is to be found on the charger unit.

Record level indication is by means of two VU type meters on the front panel.

**Record/playback characteristics of the Akai X-IV tape recorder.** 7½ ips ———  
3½ ips - - - - -  
1½ ips - - - - -  
15/16 ips — · — · —



and a digital tape position indicator is provided.

The Akai X-IV is the only portable machine to employ the recent American discovery of the "cross-field" bias system, whereby the bias current is not applied, as normally, to the recording head, but is fed in separately to a special bias head, which contacts the rear side of the tape. By this means it has been found that for a given tape speed, it is possible to record to much higher frequencies than were previously possible.

The success of this new development is well demonstrated by the sample tape supplied with the machine. This tape has eight minutes of music recorded at the slow speed of 1½ ips, and the quality of reproduction has to be heard to be believed. It is perfectly adequate for the reproduction of popular music for background or party use, and for some more serious uses, although the slight wow and flutter audible at this, and the slowest speed of 15/16 ips, rule these "economy" speeds out for serious music recordings. At the two higher speeds, and particularly at 7½ ips, wow and flutter were quite insignificant, and it was possible to satisfy that most difficult test, the recording of a piano.

Technical tests on the machine also came out well, and the frequency response at the four different speeds is shown in the diagram. It will be seen that at the two higher speeds there is a pronounced high frequency peak in the machine measured, compared with the maker's specification, and at the two lower speeds there is a slight loss of top frequencies, again compared with the spec. The measurements were made at the DIN socket output, where no tone control is available, and the use of this made the effects much less when the machine was used on its own internal loudspeaker, or on the pair of larger speakers supplied by the manufacturers as extra accessories. In any case the effect could well have been due to slight misadjustment of the equalising components on this particular machine. The signal-to-noise ratio was well within spec. at the high speeds, but fell off somewhat at the lower speeds, as might be expected.

The machine is supplied complete with two moving coil microphones, and all necessary leads. It has a well-written instruction book. A special mention must be made of the excellent way in which the equipment is packed. The machine itself is held securely by strong springs in a wooden case, and all the accessories are well supported in expanded plastic.

As the only presently available stereophonic portable recorder on the market, I can recommend this machine as a good buy at the price of 131 gns.

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## Letters to the Editor

### BRITISH TAPE RECORDING CONTEST

— a retrograde step!

I AM encouraged by Mr. Margoschis's letter (*April issue*) to back him up in his outspoken criticisms of the new British Tape Recording Contest formula.

I think it disastrous that professionals are now eligible to compete with amateurs and novices. Who ever heard of such a thing? What would tennis players and other sporting enthusiasts think? It occurs to me that there has been some sort of internal pressure somewhere—some sort of mistaken idea that a few entries from the professional field will encourage *hol polloi*.

How on earth are the judges, in all good faith, going to decide between a BBC man's recording and a bit of fluff from an eager novice? I have heard enough good and bad amateur and professional recording to sympathise with anyone unfortunate enough to be on the judging panel.

Another point which arises and which concerns the serious amateur is the loss of opportunity afforded by the new rules. In the old days, an enthusiast could enter a tape in every category and stand a chance of winning with each. Now, he must enter his tape(s) in *one* category and each of his tapes must compete with each other as well as with the other entries. This is a serious retrograde step placing an unwarranted restriction on the activities of the more serious-minded amateurs.

If the Contest must be altered in format, broaden it by offering greater opportunities to the keen recordist: don't stifle him by making him compete for the "Tape of the Year" with professionals and novices. After all, it must be remembered that most of the valuable recording work is done by amateurs who get virtually no recognition from the BBC or other sources.

PETER L. BASTIN.  
*Barbourne, Worcester.*

### LACK OF INTEREST AMONG TAPE RECORDISTS

I, TOO, was excited to hear of the BBC's "Wildlife" recording competition and subsequently disappointed to find that all but expensive professional machines were excluded by the conditions. But I was also surprised by the apparent lack of interest among fellow recordists.

The BBC were polite but adamant when I wrote to them. They said that they considered even the Fi-Cord only just good enough. The Council of Nature were more sympathetic and, after further consideration,

said they could not alter the conditions of the present competition, but would consider a separate class for 3½ ips in future ones. From neither body did I get the impression that anyone else had complained.

I then endeavoured to enlist the support of another tape journal, and sent them copies of correspondence. Their reply was several degrees less than enthusiastic. They published about two lines of my letter, and, so far as I know, did nothing else.

I hope that if the opportunity recurs, those interested will make their views known loudly and promptly.

D. C. BURTON.

*London, W.5.*

P.S.—Why not add a wild-life section to the British Tape Recording Contest?

### VOLUNTEERS FOR TALKING BOOK SERVICE

I READ the article on page 65 of your February issue relating to "Contest tape to be broadcast by BBC."

We do not in fact require volunteer "readers" but radio enthusiasts or those having a knowledge of electronics who would volunteer to instal and service Talking Book Machines in the homes of our members.

Volunteers should contact us at Mount Pleasant, Alperton, Wembley, Middlesex.

E. READ-JONES.

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for the Blind.*

### MY AID TO BETTER RECORDING

I PURCHASED my first issue of *TAPE Recording Magazine* in May 1964, and was delighted by its hints and suggestions on recording music. I was specially impressed by A. S. Carpenter's "Musically Yours" article, and by J. Pitcher's do-it-yourself impedance matching unit.

Articles that are simple to understand like these are a Godsend to an amateur and dabbler like myself as an aid to better recording.

PATRICK GAY.

*Camberwell, London, S.E.5.*

### READERS ABROAD REQUEST TAPE CONTACTS

WE should like to contact tape enthusiasts in England, and wonder if any of your readers would like to exchange tapes with us.

Our prime interest is with outdoor sounds, particularly bird calls. We can promise some interesting tapes from South Africa, and will answer all tapes promptly. Airmail postage per tape is about five shillings; sea-mail about 2s. 6d. Our address is Wicken, Kendal Road, Constantia, Cape Town, South Africa.

Mr. & Mrs. EDDY MORRIS.

I WAS pleased to read in an Austrian magazine of various tape recording clubs in England.

As I am trying to learn English and own a tape recorder, I would be grateful if any of these club members would be willing to establish contact with me using taped messages.

I hope that on the basis of experiences gleaned from such club members, a similar club could be founded in this country.

OTTO MUSIL.

*Brigadniku 3, Praha 10,  
Czechoslovakia.*

### HANDY GADGET FOR LUBRICATION

YOUR readers may be interested in a gadget which caught my eye recently in Boots (Chemists) Ltd. This is the "Moulin Rouge" perfume spray filler, a small flexible polythene container with a spout in the form of a hypodermic needle. The cost is one shilling.

I have found this extremely useful for placing single, or a precisely controlled number of drops of light oil in bearing of tape recorders and similar small mechanisms. Apart from the accurate control of the amount of oil, the size of the spout makes it possible to get into awkward corners with ease.

C. H. SIMMONS.

*Wallingford, Berkshire.*

### WE APOLOGISE FOR A MISPRINT

"TAPE Recording Magazine" for March 1965, Page 109 — book reviews by Mr. P. Milton. Right-hand column — aerials. Penultimate paragraph: "The Yogi array".

The word, Sir, is YAGI.

Col. W. H. LLOYD

*Harrow Weald, Middlesex.*

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## MAGNEGRAPH

1, Hanway Place, London, W.1.  
 Tel.: LAngham 2156

## Tape records reviewed

### CLASSICS



By Edward Greenfield

## A tape of a train ride in reverse!

**HONEGGER.** Pacific 231, Rugby, Movement Symphonique no. 3, "Tempest" Prelude, Pastorale d'été, Chant de Joie. Philharmonic Symphony Orchestra of London conducted by Herrmann Scherchen. WRC (TCM 61) 3½ ips, mono, 29s.

As a railway enthusiast myself I have never quite been convinced by Honegger's famous portrayal of railways noises in "Pacific 231." As sound it is most attractive and nowadays there is nothing daring about it at all in musical idiom, but any railway recording will provide far more consistent rhythmic excitement. Honegger seems to have fitted unrelated railway noises together—as though indeed he had spliced tapes taken at different times. As it happens years after writing the piece Honegger disclaimed all idea of providing an exact imitation. It was, he insisted, "an utterly abstract idea," and originally the piece was called *Mouvement Symphonique*. This he found rather dull and then when the work was finished suddenly thought of the title *Pacific 231*. So are musical illusions shattered.

"Rugby" is also described as a "*Mouvement Symphonique*," the composer drawn, as he said, to the savage, brusque, disordered rhythm of the game. The third piece of the series was given no such advantage as a colourful title, and has been performed correspondingly rarely. But Neville Cardus writing after the first performance in the *Manchester Guardian* had the right idea when he said that it was like *Pacific 231* coming back.

The other pieces are equally bold in style and equally attractive. Admittedly the *Pastorale d'été* is gentler than the rest, but even there the ruggedness of Honegger's musical personality is clear. The performances under Hermann Scherchen are very vigorous. One assumes from the use of the orchestral pseudonym that this Westminster recording was made some years ago.

**BARBER.** Violin Concerto, Opus 14 (1939); **DELIUS.** Violin Concerto (1916). Robert Gerle (violin) and Vienna State Opera Orchestra conducted by Robert Zeller. WRC (TCM 59) 3½ ips, mono, 29s.

British and American music from a most unexpected source: it is encouraging to have such recordings from Vienna. The coupling is equally unexpected, but as it turns out the autumnal romanticism of Delius matches the New England pastoral

mood of Samuel Barber very well indeed. Barber is best known of course for his *Adagio for Strings*, and while none of the three movements here quite matches that supremely beautiful and memorable piece the quiet sincerity of the first two movements puts this among the most attractive of modern violin concertos.

Neither in the Barber nor for that matter in the Delius is there anything that could shock a listener brought up on Tchaikovsky. The Delius is one of his masterpieces. The reason it is not so well known as some of his tone-poems is, I suspect, two-fold. In the first place it puts a solo violinist in the central limelight, when as we all know, Sir Thomas Beecham, the creator of Delius's popularity, liked to take the centre of the stage. In the second it appeared at a difficult time during the first world war, and so had a difficult start in life.

The work is in one long movement, very cunningly put together, and the opening with an ecstatic fluttering motif for the violinist is enough to win one over straight away, even if one is not a committed Delian. Much of the later music is equally memorable.

Robert Gerle plays both works most sympathetically with a rich romantic style, and it is a pity that the orchestra does not sound quite so rich behind him. An excellent note by Peter Gammond is provided, but the order of presentation is the reverse of the order of tracks on the tape which will certainly mean some listeners getting mixed up on which is which.

**THE BEST OF BALLET.** Extracts from *Coppelia*, *Sylvia* and *Naila (Delibes)*, from *Les Sylphides (Chopin)* and *Giselle (Adam)*. Vienna State Opera Orchestra conducted by Maurice Abravanel. WRC (TT 440) 3½ ips, mono, 29s.

There is an obvious need for tape records of ballet-music miscellanies, and this is as good a one as one could find. Abravanel is best known as the regular conductor of the Utah Symphony Orchestra, and he drives rather too hard in places with less flexibility of rhythm than such music really demands. Neither the box nor the programme-note included gives precise details of the items selected from each ballet.

## An album with very high standards



By Mike J. Gale

**BASIE - ECKSTINE INCORPORATED.** Count Basie and his Orchestra and Billy Eckstine. WRC (TT 398), 3½ ips, mono, 29s.

As I said in the December issue the great names come together more frequently than ever for a temporary association to record an LP and none more frequently than the ubiquitous Count Basie whose associations include Frank Sinatra, Oscar Peterson and Ella Fitzgerald to mention many. On this album he has teamed up with a man sadly

neglected by the British if not the American public, Billy Eckstine.

Both men have been extremely successful. Basie, for instance, had to find work as a theatre organist when a touring show he was working with went bankrupt in 1926. Yet nine years later he had formed a magnificent band using several of the musicians from Benny Moten's group which had split up with the latter's death in 1935. Basie was also lucky with featured vocalists unlike many of his contemporaries. First Jimmy Rushing and then Joe Williams in the reformed band of the early 'fifties.

Eckstine's success has been concentrated in America except for the hard core enthusiasts spread thinly throughout the world. But if his greatness has been largely unacknowledged in this country then this album should go a considerable way to changing that especially since Basie's magic spreads far beyond the jazz world.

There is not one track which falls below the very highest standards expected from the greatest big band, I consider, of all time. Both brass and reed play with a magnificent but disciplined abandon never over-shadowing but always emphasising the vocal. And Basie's economical style of playing is complementary not crowding.

For Eckstine, a man of professionalism and rich experience, his performance can only be described as brilliant despite some pretty terrible lyrics. This highly recommended set contains *Stormy Monday Blues*, *Lonesome Lover Blues*, *Blues*, *Mother of Sin*, *Jelly Jelly Blues*, *Don't Cry Baby*, *Trav'lin' All Alone*, *Little Mama*, *I want a Little Girl*, *Drifting*, *Song of the Wanderer*, and *Piano Man*.

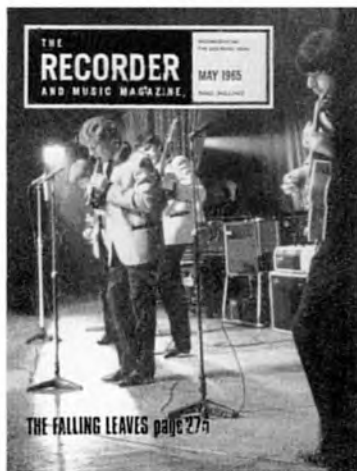
The tapes reviewed this month are issued by:

"WRC": The World Record Club Ltd., Box 11, Parkbridge House, The Little Green, Richmond, Surrey.

## THE OTHER RECORDER

(not to be confused with tape!)

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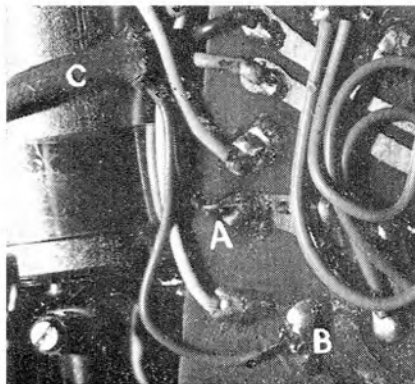
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## DO-IT-YOURSELF

(Continued from page 235)

Care must be taken to ensure that the wires are each soldered to the correct tag of the jack socket and reference to Fig. 5 should make the procedure clear. Your red wire must go to the collar of the socket to ensure that it connects with the stem of the jack plug when inserted. The black wire must go to the springy arm of the socket to connect with the point of the jack plug, whilst the blue wire goes to the fixed arm of the socket. When the jack plug is not inserted the original circuit is completed by the extended blue wire being automatically connected at the socket to the black wire. When the jack plug is inserted the original circuit is broken and the black and red wires bring the auxiliary batteries into use. There-



Motor circuit alterations (see also Fig. 4). Remove blue wire from A, extend to plug, and replace by black wire from plug. Solder red wire from plug to B. Plastic sleeve (C) covers joint in blue wire and carries lead around motor

fore, insertion of the plug automatically causes the motor to be fed from the auxiliary supply whilst the amplifier is still fed from the original, but the main switch still has overall control of both supplies. Removal of the jack plug and the auxiliary battery container brings the recorder back to normal with both motor and amplifier being fed from the original set of batteries.

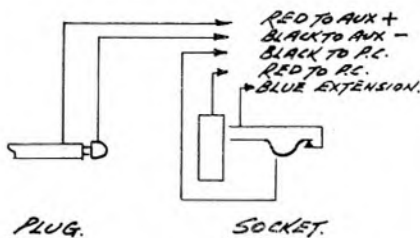


Fig. 5. Jack plug connections for the earphone socket

Having finally replaced the deck in its case do make sure that when the lid is closed neither of the leads to the two sockets you have fitted foul any of the working parts.

Collectively I have found these modifications of most use when using a parabolic reflector but separately they have uses in many other ways, and I have little doubt that when you think about it you will consider the relatively small amount of work involved to be well worth while.

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**NEW PRODUCTS**

**NEW STEREO  
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**L**ATEST model to join the Brenell range of recorders is the STB2, a four-speed two- and four-track mono and stereo machine selling at £150.

The new model, incorporating a wide range of features, is the latest version of the earlier STB1 tape unit, designed for use with hi-fi amplifiers. The STB2 is available complete with its own monitoring amplifiers and loudspeakers (£25 extra), or as a tape unit as before.

Featuring the basic four-speed Series 3 tape deck, the STB2 (illustrated below) is available in two versions. The standard model includes separate heads for two-track erase, record, and playback, and an additional head for four-track playback. The alternative version to special order is for four-track erase, record and playback, with an additional two-track playback head. The standard model will therefore record two-track and playback two- or four-track, mono or stereo in both cases.

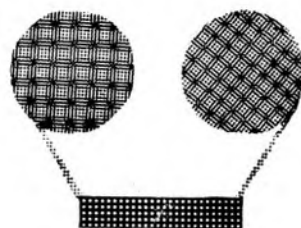
It has a quoted frequency response of 40-15,000 ± 2 dB at 15 ips, and 40-14,000 cps, 40-11,000 cps, and 40-6,000 cps all ± 3 dB at 7½, 3½ and 1½ ips. Wow and flutter at these speeds is given as less 0.05, 0.1, 0.15 and 0.25 per cent. The basic machine will



accommodate 8½-inch spools, providing a playing time of 46 minutes per track using standard-play tape (1,800 ft.) at 7½ ips. Rewind is achieved within 60 seconds for 1,200 ft. of tape. The STB2/510/2 version will accommodate 10½-inch spools.

Among the many facilities are four-channel mixing (two channel for stereo), monitoring, comparison listening between original and recorded signals, sound-on-sound recording, superimposition, and it also incorporates pause control, four-digit rev. counter, safety erase lock, meter recording level indicators for each channel, and separate record and playback amplifiers.

Four input channels (two per track for stereo) are incorporated, these are adjustable from ½ mV to one volt into 1 M ohm. Record and replay characteristics are selected to suit tape speed by means of a single control. A track selector is for



stereo, both tracks in circuit, all signals to upper track, or all signals to lower track. Outputs include one per channel (few millivolts to 1.5 volts across 600 ohms) and cathode follower. Noise level is rated at 50 dB below peak recording level.

The STB2 measures 19½ x 17½ x 9½ inches, and weighs 48 lb.

Brenell Engineering Co. Limited, 231-235, Liverpool Road, London, N.1.

**AKAI INTRODUCE  
THEIR  
LATEST MODEL**

**L**ATEST of the recent influx of Akai tape recorders is the ST-1, seen for the first time at the recent Audio Fair in London. This is a four-track, two-speed, transistorised stereo recorder suitable for vertical or horizontal use.

Described as "Stereo in a suitcase," the ST-1 features two 7 x 5 inch elliptical loudspeakers built into either end of the cabinet. The quoted frequency response is 30-18,000 cps (40-15,000 ± 3 dB) at 7½ ips, and 40-9,000 cps ± 3 dB at 3½ ips. Wow and flutter is given as less than 0.17 and 0.28 per cent at the respective speeds.

With accommodation for up to seven inches, the ST-1 provides a playing time of 64 minutes per track using standard-play tape (1,200 ft.) at the slower speed. Rewind is achieved within 150 seconds.

Among the features are facilities for monitoring sound-on-sound recording, automatic tape end stop, separate VU meter recording level indicators for each channel, digital rev. counter and pause control.

The rated power output is three watts per channel, and distortion is within two per cent at 1,000 cps OVU, total harmonic distortion. The tube line-up includes four 2SD75 transistors, plus a rectifier-silicon diode, two 6BM8 and one 6AR5 valve. Power supply is 100-245 volts AC, 50/60 cycles AC, consumption rated at 80 watts.

The ST-1 measures 13½ x 21 x 9 inches, and weighs 41½ lb.

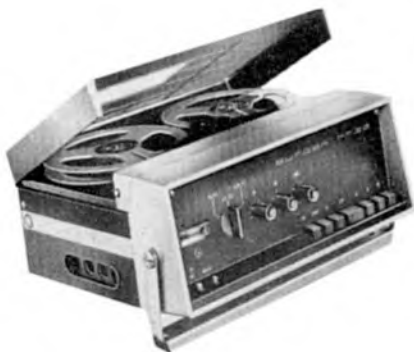
Included in the price of £129, are two high sensitivity dynamic microphones (50 K ohms), plus the usual Akai accessories.

Pullin Photographic, 11 Aintree Road, Perivale, Middlesex.

**NEW BATTERY  
RECORDER  
FROM BUTOBA**

**A** NEW battery portable recorder and a range of microphones and accessories have been introduced by Denham & Morley Ltd.

The new recorder is the Butoba MT22 (illustrated top right); full specifications are given in the battery portable round-up on page 230 of this issue.



The new range includes four dynamic stick units, and one ribbon stick microphone. The most expensive of the new range is the MB301, a studio quality ribbon cardioid stick microphone selling at 21 guineas. With an impedance of 200 ohms, the frequency response is quoted as 40-18,000 cps  $\pm$  2.5 dB. It measures 7 $\frac{1}{16}$  inches, and weighs 10 $\frac{1}{2}$  ounces.

Next is the 200 ohms, 16-guinea dynamic moving-coil cardioid microphone, the MB211, with a quoted frequency response of 50-18,000 cps  $\pm$  2.5 dB. Weighing five ounces, it is six inches long, and  $\frac{3}{4}$  inches in diameter. With a similar performance is the MB201, moving-coil cardioid unit, selling at 15 guineas. It is 5 $\frac{1}{2}$  inches long, and has a  $\frac{3}{8}$ -inch diameter. It weighs 4 $\frac{1}{2}$  ounces.

The MB101, at 14 guineas, looks identical to the MB201. Variations include 40 cps bass response and an omni-directional polar diagram.

Final new microphone is the MB250 TR dual impedance (200 ohms and 50 K ohms) unit selling at only 4 $\frac{1}{2}$  guineas. This cardioid dynamic stick microphone has a response quoted as 100-16,000 cps  $\pm$  2.5 dB. It measures 5 $\frac{1}{2}$  inches in length, and approx. 1 $\frac{1}{2}$  inches square. The weight is 3 $\frac{1}{2}$  ounces.

Also recently introduced are three sets of headphones at 6, 10 and 12 $\frac{1}{2}$  guineas; six-foot microphone leads (3 guineas) or with built-in transformer (5 guineas); a folding table stand (2 guineas), and a tripod mounting clamp (12s. 6d.) for their microphones.

Denham & Morley Limited, Denmore House, 173-175, Cleveland Street, London, W.1.

## A. C. FARNELL ENTER TAPE RECORD MARKET

A RANGE of musical tape records is announced by A. C. Farnell Ltd. Their new repertoire of classical, pop and jazz music will retail at 21s. Recorded on 600 ft. of polyester long-play tape, this is equivalent to purchasing blank tape, making these the least expensive tape records available.

Temptapes are recorded at 3 $\frac{3}{4}$  ips. Only the top track is recorded, leaving the second track free for the user's own programmes. Among the titles released now are *Oklahoma*, *South Pacific*, *Sound of Music*, *Featuring Billy Daniels*, *Tribute to Woody Herman*, *Famous Overtures*, *Tchaikovsky's 1812*, and the Hollywood Studio Orchestra playing *Camelot*.

Twenty-six titles are included in the initial issue.

A. C. Farnell Limited, Hereford House, North Court, Vicar Lane, Leeds 2, Yorkshire.

## GRAMPIAN ANNOUNCE LOW-PRICED MIC. WINDSHIELD

INTRODUCED by Grampian at the recent Audio Fair for use with their DP4, DP6 and DP8 microphones is a windshield selling at only 17s. 6d.

The new unit (illustrated below) comprises a moulded housing designed to slip over the head of the microphones. It has been developed from the usual airfoil principle with the added advantage of a further acoustic resistance network fitted internally.



This reduces the air turbulence to a low value without affecting the response of the microphone. Maximum performance from the DP4 and DP8 microphones is obtained by closing the bass equaliser eyelet with a rubber band.

The windshield is 2 $\frac{1}{4}$  inches in diameter, and weighs three-quarters of an ounce.

Grampian Reproducers Limited, Hanworth Trading Estate, Feltham, Middlesex.

## NEW SOUND EFFECTS TAPE BY GLOBAL

A NEW series of tape records is announced by Global Products. Available by mail order, or from Teletape Ltd.—the London specialist tape record dealers—the new releases are recorded at 3 $\frac{3}{4}$  ips, half-track monaurally. The price is 12 shillings each, plus 8d. postage.

Among the titles is "Sound Effects," a re-issue of their earlier tape which sold at 32s. 6d. Sounds include air raid warning and all clear siren, lawn mower, road drill, eleven train sounds, door bell, and a low flying aircraft. Also issued are Theatre Organ tapes, including a demonstration of a three manual 27-pipe rank Studio Organ; *Intermission*, a theatre organ recital of *Orpheus in the Underworld*, *Blaze Away March*, and *Jealousy*, etc.

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## CHANGE OF ADDRESS

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39. **Tape Recorder Manual** by Wallace Sharps. (New cheap edition). **10s. 6d.**  
*Sections on its uses in business, education and pleasure, how it works, etc.*

2. **Alternating Current and Acoustics.** Edited by Edgar J. Black (1964). 116 pages, 86 illustrations. **10s. 6d.**  
*Deals in simple terms with the origin and generation of alternating current, construction of coils and capacitors. The second part deals with the nature of acoustics and construction and operation of devices used for sound recording and reproduction.*

21. **Practical Hi-Fi Handbook** by Gordon J. King. 224 pages. **25s.**  
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*The author, an instructor at the BBC, has been actively engaged for many years in research in this field, as a result the book is mainly directed towards those who make this art their profession, but there is much for the amateur enthusiast.*

35. **Tape Recording Yearbook 1965.** **7s. 6d.**  
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# News from the Clubs

## BIRMINGHAM

For the second year in succession, members of the Birmingham tape club were invited to attend the annual mobile rally of the Midland Amateur Radio Society.

The main purpose of the visit was to record the radio messages transmitted to and from cars travelling to the rally, which always attracts thousands of amateur hams. The recordings were later played back to the hams for quality and strength comparisons of their transmissions.

Throughout the day, great interest was shown at the Birmingham stand. A wide range of recorders were exhibited, and members were kept busy answering a continuous barrage of questions. Highlight of the stand was a back projection screen which featured films complete with stereo sound. Several of the members toured the grounds with portable recorders.

During April, members visited the Birmingham Science Museum, where they were afforded the rare privilege of a private preview with facilities for recording several of the mechanical instruments. Included in the items recorded were several old musical boxes, barrel organs, a cylinder phonograph, a pylon, a pianola, and a large Orchestrian organ (circa 1879) which was originally played at the Blackpool Tower.

Later in the month members boarded a coach for their annual visit to the Audio Festival. During their visit, the Birmingham members were interviewed and photographed by members of the Glasgow club.

Secretary: Mrs. Dawn Knee, 23 Holly Lane, Birmingham 4, Warwickshire.

## IPSWICH

An exhibition of members' tape recording equipment was held on March 4 by the Ipswich tape club. This was followed a fortnight later by contributions of programmes by the four groups established within the club. The hi-fi group presented mono and stereo recordings, and they were followed by a selection of tapes produced by the blind services group. The cine and outdoor groups were also represented during the evening. First the location group presented recordings of interviews, folk songs, the Town Band, and excerpts from an amateur production of "The Pirates of Penzance." The cine section then showed their films complete with taped commentaries. Among the films seen was "Washday Dilemma," by R. Frost and J. Steggall, which was awarded first prize in the local cine society's annual competition.

In April, the club was entertained to a colour slide show with taped commentary. This was presented by Mr. W. A. Sunderland of the local photographic society, who had compiled a programme entitled "Classical Italy" including shots taken in Sorrento, Pompeii, and Rome.

Among recent visits made by the club were the ITA transmitter at Mendlesham and the Cliff Quay generating station. Future visits were to include the Audio Fair, and the local brewery—for which 100 per cent attendance is expected.

Secretary: Malcolm Wilding, 4 Meadowvale Close, Ipswich, Suffolk.

## MIDDLETON

Latest report of locally organised associations is received with the an-

nouncement of the intended formation of the North-West Association of Tape Clubs. In his latest news report G. E. West of the Middleton tape club, writes that he has already circulated a tape containing his proposals for the formation. Any club not receiving this tape is invited to write to Mr. West.

The N-W Association will not be restricted to tape clubs, membership will also be open to individual recordists. It is the Middleton club's intention to unite the northern clubs to break what is called, the southern monopoly on tape recording, and encourage manufacturers to travel north with their demonstrations.

Secretary: G. E. West, 187 Oldham Road, Middleton, Lancashire.

## NATIONAL FEDERATION

Response from clubs with regard to the AGM of the National Federation of British Tape Recording Clubs seems quite promising as we go to press, and it is hoped to have a record attendance.

Among topics to be discussed will be the arrangements for the International Amateur Recording Contest to be organised by the Federation as British affiliates to the International Committee.

Much behind the scenes activity has taken place within the past months, and already the Federation committee have encouraged support from the BBC who will be providing playback facilities in Broadcasting House for the judging session of the International Contest. The BBC will also be host at an official reception for the representatives of the countries taking part.

Current lobbying is taking place with Miss Jennie Lee, the Minister with special responsibility for leisure and the arts within the Ministry of Education. The Federation are seeking re-assurance on the full extent of the Government's support for the International Contest.

Other arrangements include arrangements at Church Hall, Westminster, which has been booked for the International Committee's Congress meetings.

Secretary: E. Roger Aslin, 53 Whitehouse Avenue, Boreham Wood, Hertfordshire.

## NORTH LONDON

A documentary feature tape on the "Titanic" disaster is the subject for the latest internal competition organised by the North London club. With a time limit of five minutes, members are limited in the use of copyright material, for this, the first solemn subject ever tackled by the club.

Latest activity of the club included a visit by Grundig, who demonstrated their TK41 battery portable, and the TK41 stereo recorder. The demonstration team of four was led by Mr. Gordon Skippon, manager of Grundig's West End showroom. He was at one time a member of the South Birmingham club, and has now been invited to join the London club.

A Uher battery-operated tape recorder will be invaluable to journalist member Ken Smith who will be driving to West Berlin this month during part of a 1,000 mile return journey to road test a Saab station wagon and report on road conditions behind the Iron Curtain. Accompanied by a London bus driver who is also a cine enthusiast, Ken will rather recorded material on the Queen's forthcoming visit to the West German capital. He has already been promised personal assistance by the field bureau of Radio Free Europe.

Future activities of the club were to include a visit by Truvox Ltd. during May.

Secretary: John Wilson, 50 New Kent Road, London, S.E.1.

## NORTH MANCHESTER

The North Manchester Soundtrackers are currently involved producing a documentary tape. The subject for the tape, entitled "Where the Irk Flows" concerns the course of a local river. It

is intended to combine its early history and modern connections, and have a secondary feature for cine purposes.

The club's members recently provided a judging panel for the Northern Tape Club's recent internal competition. These two groups have established close ties, and NMS members have been invited to the NTC's annual dinner.

Secretary: A. Lomas, 2 Hamer Hill, Chapel Lane, Blackley, Manchester 9, Lancashire.

## RUGBY

Another milestone in the life of one of the oldest established clubs has been reached by Rugby members, who have recently published the 100th edition of their regular newsletter "Tape Life."

In his editorial marking the occasion, club instigator and secretary Mike Brown recalls the first edition issued as a single quarto newsletter in August 1958. The third edition showed an increase to two pages, progressing to three pages by May 1959. In February 1960 "Tape Life" became a four-pager, and the following November it boasted six pages. Since then the club has maintained a four-page issue with the occasional bumper number of six pages.

Mike spoke about the need for a regular newsletter which informs those members unable to attend regularly, and also serves as a permanent record of the club's activities. Prospective members are also interested in reading recent back issues of such newsletters, providing a clearer picture of the club than can be obtained by other means.

His editorial then goes on to describe the reorganisation taking place in the club, including an increase in elections with officers holding their posts for only one year in future.

Among other items contained in "Tape Life-100," is the occasion last April 1, when the secretary was 'phoned at 12.30 a.m. by an unknown caller who required the club's assistance and equipment to transmit tape recorded sound waves under water. Calling for further examples of April Fool's Day jokes, Mike stipulates remittance of a 5s. Postal Order with all anecdotes. A prize of 2s. 6d. will be awarded to the best story. We understand his generous offer is made with his holiday costs in mind.

The Presidential address, by Len Stephens, outlines seven points towards a stronger and more active club. Adoption by all club members everywhere would see a much healthier tape club movement in this country, and for this reason we publish Mr. Stephens' points.

In order, his points are: full attendance at club meetings; more support for visits to other clubs; greater participation by every member in the internal competitions; contributions from everyone for the club's tape exchange programme; more volunteers for group activities; taped messages from members unable to attend regularly; and more use of the club's suggestion box.

Among recent meetings of the club was that held on April 8. Two tapes from New Zealand were played. The first from the Palmerston North tape club, included extracts from a programme entitled "Sounds of New Zealand," and featured various members talking about their work and interests. Then came a tape from Joyce Lawson, former secretary of the Bournemouth tape club, who now lives down-under. Her tape included messages to some of her old tape contacts, a description of a typical New Zealand Christmas, and comments on the driving test and Highway Code out there.

A fortnight later members were entertained by local hi-fi dealer Mr. J. W. Barwick. Among equipment demonstrated was the Saba TK 230-S stereo recorder, and various hi-fi pieces by Decca, Garrard, Pye, Rogers and Goldring.

For their meeting on May 6, members are to hear R. A. Margoschis describe the production of his three successful

tapes in the British Amateur Tape Recording Contest.

Secretary: Michael Brown, 219 Clifton Road, Rugby, Warwickshire.

## THORNTON HEATH

In accordance with their planned campaign to increase entries for the British Tape Recording Contest this year, members of the Thornton Heath club have set aside May 6 as a special meeting to hear all the winning tapes in their monthly contests. These will be re-appraised, and some will be selected as entries for the BTRC.

John Bradley writes a letter of encouragement to other clubs to repeat their example ("and there is still time") and provide "entries of such magnitude not only to embarrass the judges, but perhaps make the BBC realise there is a good source of programme material." On the first day of the recent Audio Fair, Mr. Bradley toured with a battery portable. He collected background and speech to edit with commentary and played back his composite tape at that evening's club meeting—an "audio" preview indeed!

Earlier in the month members were entertained by an Ethiopian student, Mr. Belaye Abbebe, who gave a live and recorded demonstration of his own and Western music played on native wind instruments. He also described how the instrument makers size up the potential user before making an instrument which is designed according to the user's physical resources!

Earlier still members were visited by Armstrong Audio who presented a demonstration of their equipment, highlighting the evening with a closed circuit stereo transmission being recorded and played back on their new range of equipment.

Secretary: John Bradley, 8 Canning Road, Addiscombe, Surrey.

## TAPE EXCHANGES

**T**APE recorder owners who wish to contact others with similar interests, to exchange news and views by tape are invited to fill in and return the form on page 248, giving their name, age, address, special hobby or interest for this section.

Details given here also include speeds and spool size to be used, name of recorder, and special area to be contacted.

**Collins, John** (28). 33, Dagmar Avenue, Wembley, Middlesex. Photography, music. 7 $\frac{1}{2}$ , 3 $\frac{1}{2}$ , 1 $\frac{1}{2}$  ips. Seven-inch spool. Truvox PD99, Grundig TK5. Male contacts preferred in UK and USA.

**Darnell, Cyril** (33). 49, Rudyard Street, North Shields, Northumberland. Photography, records. 3 $\frac{1}{2}$  ips. Seven-inch spool. Grundig TK30.

**Dimond, Richard A.** (44). 40, Barnfield Wood Road, Beckenham, Kent. Languages, hi-fi classical music. 7 $\frac{1}{2}$ , 3 $\frac{1}{2}$ , 1 $\frac{1}{2}$  ips. Seven-inch spool. Martin Recordakit, four-track.

**Duggan, Michael John** (22). 12, Bellevue Road, Bexleyheath, Kent. Politics, films, medicine, cars, music. 7 $\frac{1}{2}$ , 3 $\frac{1}{2}$ , 1 $\frac{1}{2}$  ips. Seven-inch spool. Philips ED3536, four-track stereo.

**USA, New Zealand, South Africa.**  
**Glenn, John** (23). 264, Cavendish Road, Carlton, Nottingham. Military topics, French language. 7 $\frac{1}{2}$ , 3 $\frac{1}{2}$ , 1 $\frac{1}{2}$  ips. Seven-inch spool. BSR Carousel.

**Gomer, John R.** (?). 150, Layer Road, Colchester, Essex. Amateur dramatics, folk music, fairground organs. 15, 7 $\frac{1}{2}$ , 3 $\frac{1}{2}$ , 1 $\frac{1}{2}$ , 15/16 ips. 8 $\frac{1}{2}$  inch spool. Uher 4000, Ferrograph.

**Hills, John** (32). 41, Brays Mead, Harlow, Essex. Photography, electronics, radio. 7 $\frac{1}{2}$ , 3 $\frac{1}{2}$ , 1 $\frac{1}{2}$  ips. Seven-inch spool. Fidelity Playmaster Major, four-track.

(Continued on page 248)

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## TAPE EXCHANGES

(Continued from page 247)

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**Lockie, Fiona** (32). 4, Maryfield Place, Bonnerigg, Midlothian, Scotland. 35mm colour photography, philately, travel, historical places, music. ¾ ips. Five-inch spool. Philips Starmaker. **Israel, Hawaii, Bermuda, Orkney.**

**Martin, Raymond Arthur** (56). 25, St. George's Avenue, Timperley, Altrincham, Cheshire. Cine photography, do-it-yourself household jobs, light music. ¾ ips. Five-inch spool. Philips recorder. Letters not needed.

### TEENAGE READERS

**Bandy, David M.** (19). 59, Dylwyls, Denmark Hill, London, S.E.5. Driving, bowling, pop records, dancing. ¾ ips. 5½-inch spool. Grundig TK20.

**Bockell, Michael** (16). 23, Stopples Lane, Hordle, Lynton, Hampshire. Bell-ringing, church work, pop music. ¾ ips. Five-inch spool. Stella ST460. **USA, Canada, Australia.**

**Clifford, Miss Jacky** (16). 101, Upminster Road, Hornchurch, Essex. Cliff Richard, pop music. ¾ ips. 5½-inch spool. Grundig TK14. Male contacts only in **England.**

**Jester, Miss Noeline** (13). Red Gables, Nampton, Rugby, Warwickshire. Sport, reading, pop music. 1½ ips. Three-inch spool. Philips EL3585/15 battery portable. **UK, America, Australia.**

**Madell, Miss Lynn** (16). les Effards, Castel, Guernsey, Channel Islands. Travel, French language, pop music. ¾ ips. 5½-inch spool. **Overseas only.**

**Millward, Clifford** (13). 181, Ebenezer Street, Hilltop, West Bromwich, Staffordshire. Electricity. ¾ ips. 5½-inch spool. Fidelity Playmaster.

**O'Cainte, Noel** (18). 17, Trimleston Gardens, Booterstown, Co. Dublin, Eire. Travel, hitch-hiking, youth hostelling. ¾ ips. 5½-inch spool. Grundig TK23. **France, USA, Britain, Spain, South America.**

**Squires, Jack** (19). Chapel Cottage, Plumstone Road, Acol, near Birchington, Kent. Travel, motor-cycling, camping, music. 7½, ¾, 1½ ips. Seven-inch spool. Challenge 44 recorder. **Overseas only.**

**Tyers, Eris** (16). 23, Healy Road, Watford, Hertfordshire. Travel, swimming, fishing. ¾ ips. 5½-inch spool. Grundig TK24.

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Tape recorder owners wishing to make contact with others of similar interests are invited to complete and return this form. (BLOCK LETTERS PLEASE)

Name ..... Age .....

Address .....

Special interests .....

Speeds to be used ..... Maximum spool size .....

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(Unless otherwise stated, I am prepared to accept tapes from any part of the world)



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

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Mixer for 200-250V A.C. Mains	...	...	...	...	...	...	...	£40 8 6
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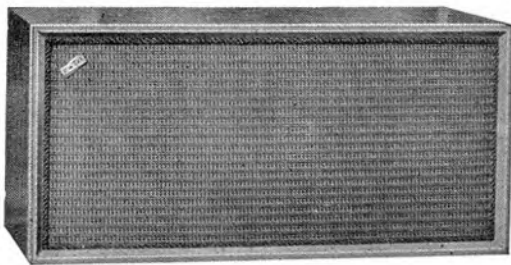
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FLAP B

FIRST FOLD ALONG THIS LINE

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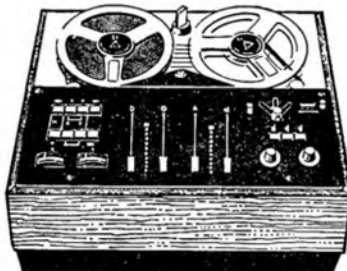
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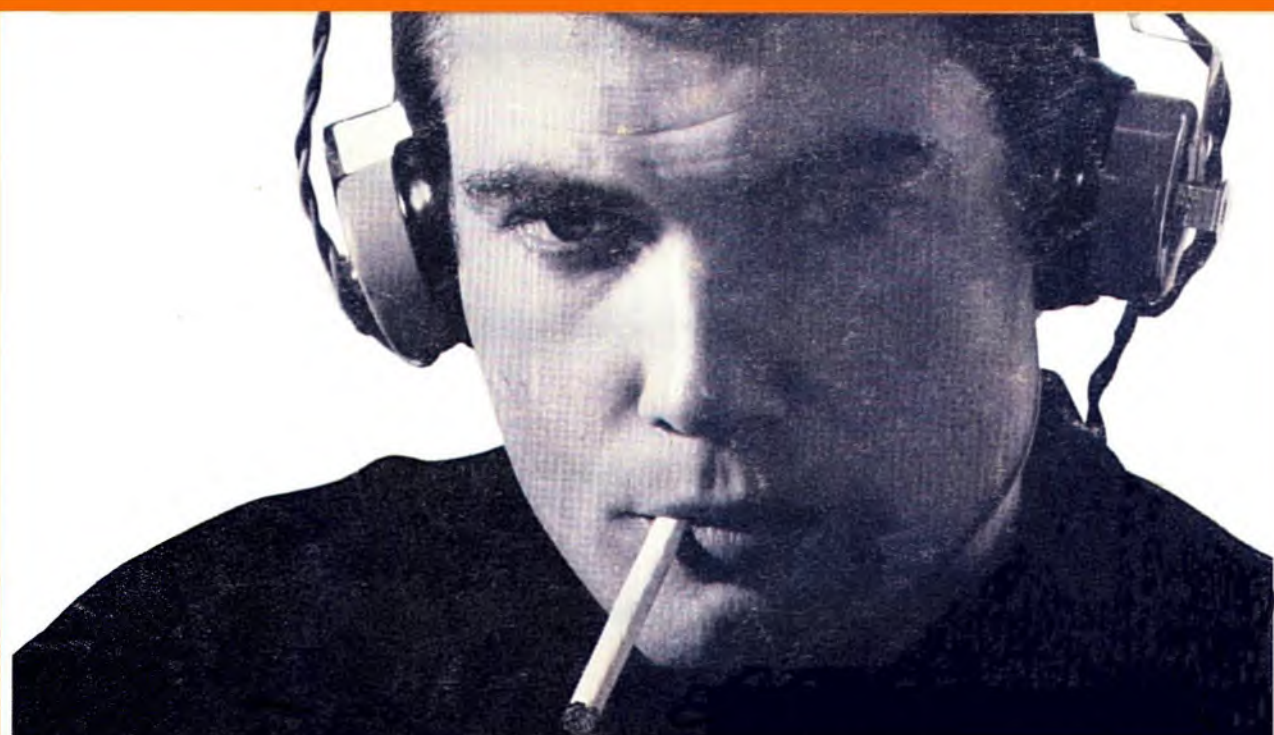


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