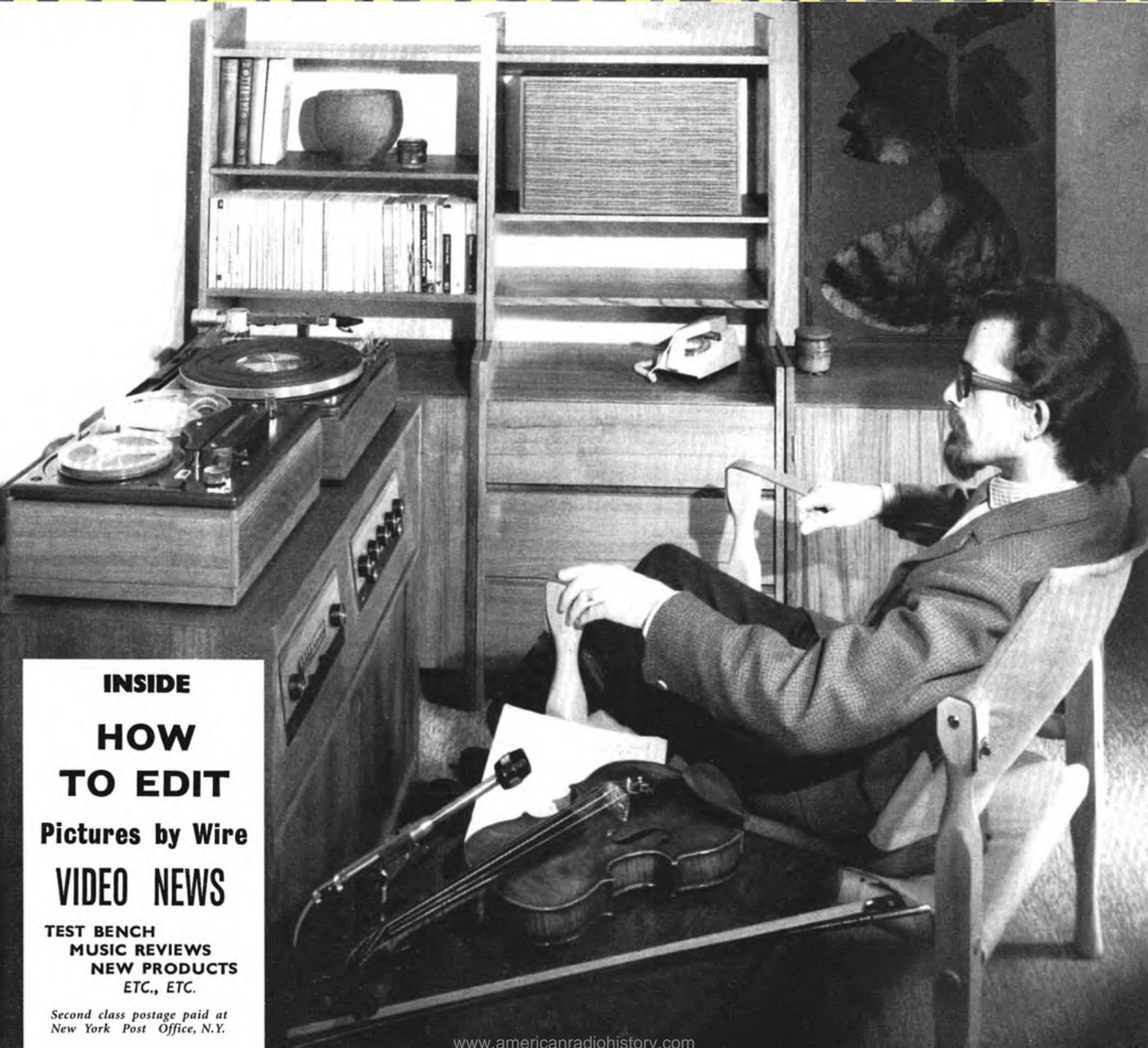


NOVEMBER 1967

# TAPE

RECORDING MAGAZINE

2<sup>1</sup>/<sub>2</sub>



**INSIDE**

**HOW  
TO EDIT**

**Pictures by Wire**

**VIDEO NEWS**

**TEST BENCH  
MUSIC REVIEWS  
NEW PRODUCTS  
ETC., ETC.**

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

# cassettes go HI-FI



-with <sup>Trade Mark</sup> Scotch  
magnetic tape

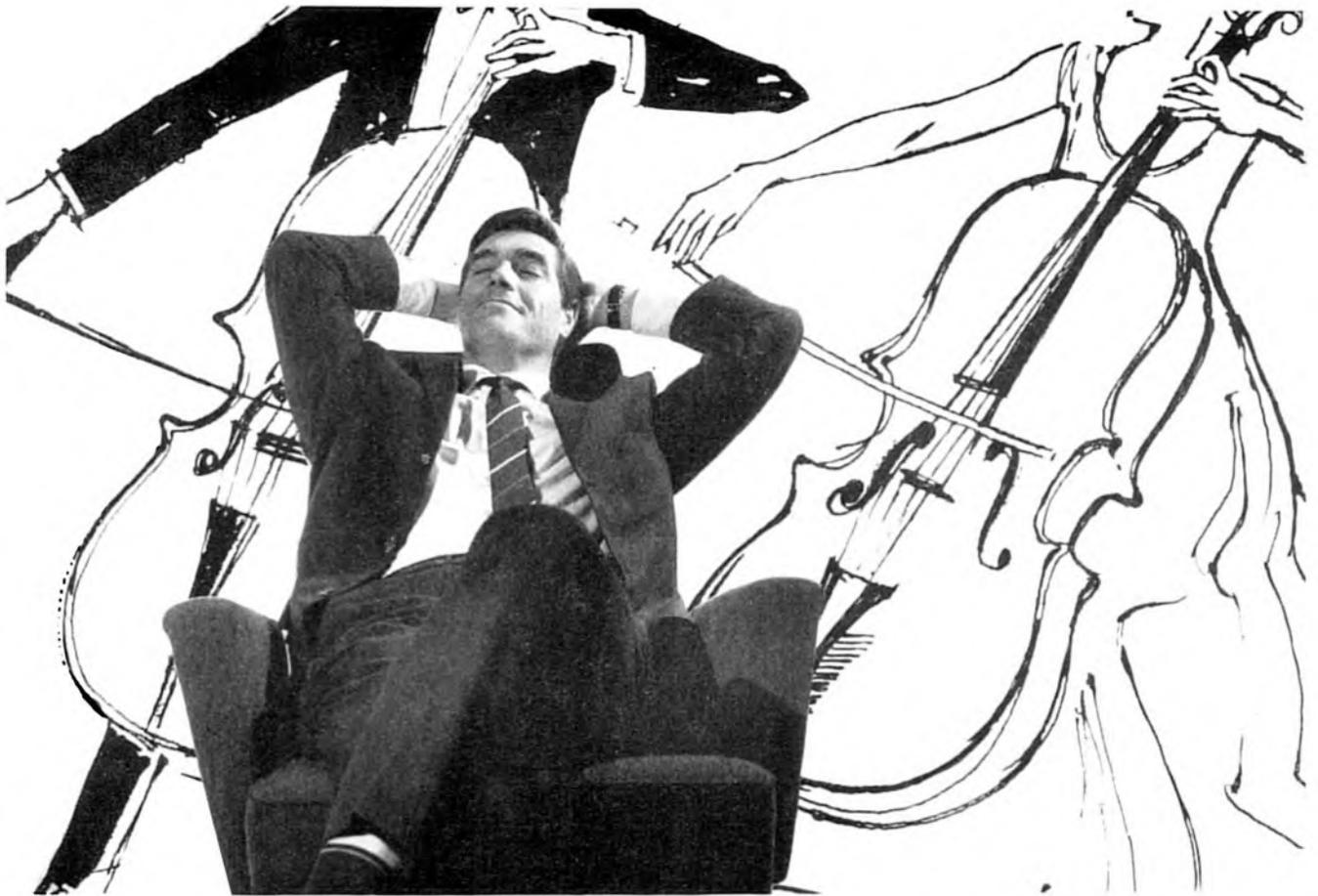
It's the very latest 'Scotch' magnetic tape development and it means that hi-fi enthusiasts will want to take another look at cassette recorders. Now, for the first time ever, you can get cassettes containing the brilliant 'Scotch' magnetic tape with 'Superlife' coating. This tape has a flawless mirror-smooth coating that gives improved frequency response and less wear on the delicate recording heads—so it keeps its high quality far longer. With 'Scotch' magnetic tape the cassette recorder becomes a serious possibility as a second, portable machine—and with these new cassettes, the recordings you make will merit playing on your full-scale home set-up.

**Scotch** **Compact  
Cassette**



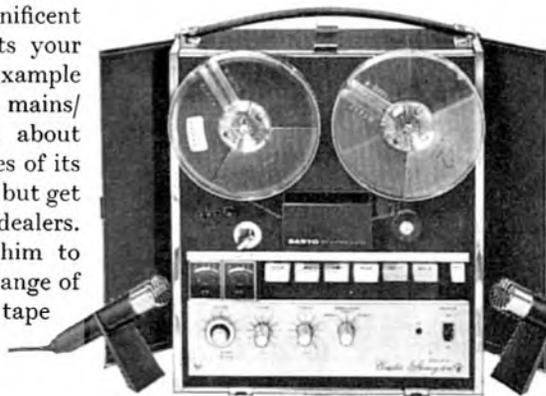
MINNESOTA MINING & MANUFACTURING CO. LTD.  
3M House, Wigmore Street, London W1. Telephone: HUNter 5522

*'3M' and 'SCOTCH' are trademarks of Minnesota Mining & Manufacturing Company*



## Sanyo puts you in the world class.

From Sanyo, a new range of magnificent hi-fidelity equipment that puts your sound in the world class. As an example the MR 151, Sanyo's splendid mains/battery stereo tape recorder, about 65 guineas. Some choice features of its specification are included here—but get the full story from your hi-fi dealers. And while you're there, ask him to demonstrate Sanyo's brilliant range of solid state tuner/amplifiers, tape decks, record players.



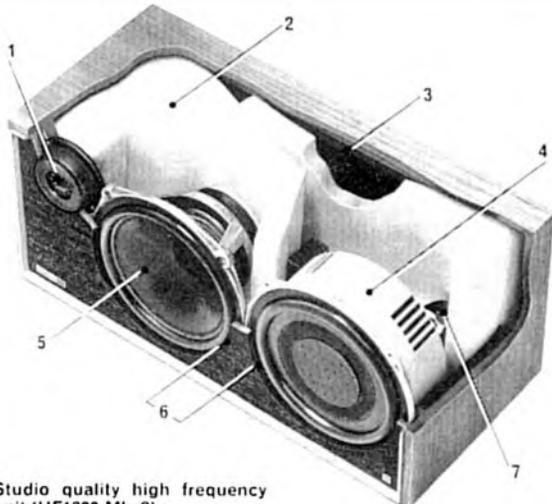
*Specification:* Mains/battery Stereo Tape Recorder. 4 tracks. Record/playback. Three speeds. Sound on sound. Sound with sound. Automatic shut-off, push button operation, including two microphones, spool of tape, empty spool. *Recording system:* AC bias 1/4 track. *Tape speed and recording time:* 100-10,000 c/s at 3 1/2 ips, 100-5,000 c/s at 1 1/2 ips, 100-2,500 c/s at 3/8 ips ± 3dB. *Output power:* Max. 800mW per channel. Undistorted 750 mW per channel. *Accessories:* Microphone x 2. 5" full tape x 1. Empty reel x 1. Patch cord x 2. Splicing tape x 1. Microphone stand x 2. Power cord x 1.

# SANYO

RELIABILITY IS BUILT IN

See Sanyo at any authorised dealer. For further information write to: J. W. Cowley, Sales Manager, Electronic Equipment Division, Marubeni-Ida Co. Ltd., 164 Clapham Park Road, London, S.W.4.

**Just what is this ABR, that makes such a vital difference to the 'DITTON 15' ?**



1. Studio quality high frequency unit (HF1300 Mk. 2).
2. Anechoic cellular foam wedge and lining eliminates standing waves.
3. High hysteresis panel loading material to eliminate structural resonances.
4. Auxiliary Bass Radiator (ABR) — plastic foam diaphragm giving high rigidity and low mass; double roll suspension allowing excursions up to 2" with minimal distortion.
5. High compliance bass unit with massive Ferroba II magnet structure for optimum magnet damping and cone treated with viscous damping layer to suppress resonances.
6. Units mounted flush to eliminate diffraction effects and tunnel resonances; covered by acoustically transparent grille cloth for maximum presence.
7. Full L-C half-section Crossover network.

**It's an interesting story – and worth enquiring about.**  
*Fill in the coupon*

**Celestion** Studio Series loudspeakers for the perfectionist

ROLA CELESTION LTD.  
 Ferry Works, Thames Ditton, Surrey Tel: 01-398 3402  
 Please send me the full story on the 'Ditton 15'

NAME \_\_\_\_\_  
 ADDRESS \_\_\_\_\_

**Stereo Headphones FREE.**



Akai will present a pair of their world-famous stereo headphones (value £5.19.6) to everyone buying any of the Akai range of Tape Recorders between October 1st and November 30th, 1967.

**LISTEN**  
 Matching impedance 8 ohms.  
 Maximum input 0.5 watts.  
 Response 25-13,000 Hz.

*To get your free headphones complete the Akai guarantee card and post it to:-*

**PULLIN PHOTOGRAPHIC,  
 11 AINTREE ROAD, PERIVALE, MIDDLESEX,**

*who will post these Stereo Headphones to you. This offer is limited to the months of October and November 1967.*



**Akai give you more for your money  
that's why it costs only 239 gns to buy  
the world's most advanced stereo recorder.**

Meet the Akai X355 - expertly made for experts.

It has relay operated controls and incorporates an automatic timer which will stop it at a pre-determined footage, rewind, change tracks and continue playing.

Naturally, it has the unique Crossfield Head which increases the response at  $3\frac{1}{2}$  ips by up to 25% when compared with other recorders. The signal head and bias head are mounted in opposition with their centres offset. This frees the recorded signal from the bias field so that the tape can be modulated over the entire frequency spectrum with maximum fidelity, whereas on other recorders the bias tends to erase the higher frequencies.

Now look at some of the other outstanding features of the X.355:—

1. 30 to 24,000 Hz  $\pm$  3 db at  $7\frac{1}{2}$  ips.
2. Output 20 watts per channel.
3. Four independent heads—erase, record, monitor, Akai Crossfield.
4. Three independent motors - hysteresis synchronous capstan drive, fast forward and rewind at 36 secs. per 1200 ft. tape.
5. Recording speeds  $3\frac{1}{2}$ ,  $7\frac{1}{2}$ , and 15 ips.
6. Completely transistorised.
7. Remote control.
8. Sound on sound, channel transfer sound.
9. Vertical or horizontal operation.

Post this coupon for descriptive leaflet.

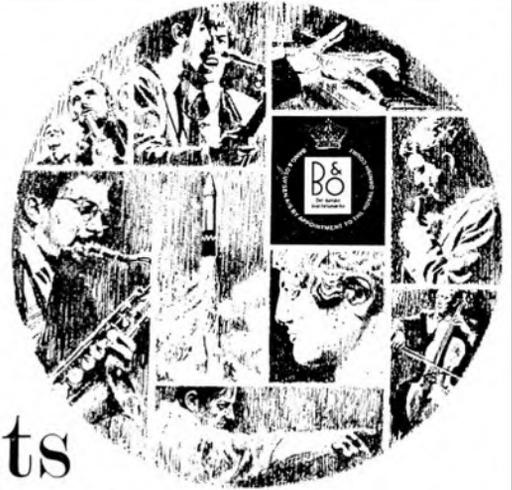


To: Pullin Photographic, Dept. No. TRM/10  
11 Aintree Road, Perivale, Middx

Please send me details of the Akai X 355.

NAME .....

ADDRESS .....

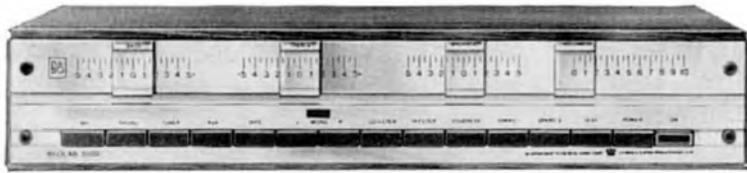


This year only  
465 music enthusiasts  
will have their greatest wish  
fulfilled—the perfect  
High Fidelity system.  
The most thrilling system ever—  
and made by Bang and Olufsen.

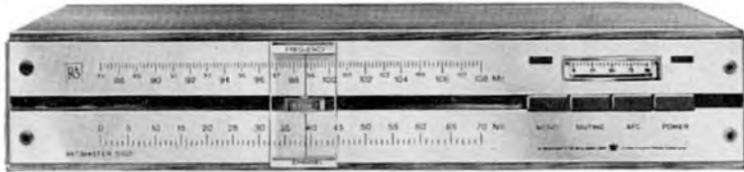
- 1** BEOLAB 5000. 2 x 60 watts R.M.S. silicon transistor amplifier. Power available to reproduce full original volume at all frequencies in association with loudspeakers of normal efficiency (1–2%). Cursor type controls in place of knobs for slide-rule accuracy in setting. Comprehensive variable inputs and duplicated phono & Din outputs. Elegant long low free-standing cabinet in solid Teak or Rosewood. 120 gns.
- 2** BEOMASTER 5000. Stereo F.M. Tuner with usable sensitivity of 1.5 $\mu$ V. Automatic Mono/stereo switching. 4 stage gang tuned R.F. section, 5 I.F. stages and A.F.C. Large radicator calibrated relative to signal strength. Cursor type tuning control with vernier adjustment. Variable muting and stereo levels. Aerial inputs for 75 ohm, 300 ohm and local. Identical in size and cabinet finish to match Beolab 5000. 85 gns
- 3** BEOVOX 3000. Pressure chamber loudspeaker with separate bass, mid and high (x 2) frequency units. Variable attenuators to the mid and high frequency units. Provision for the connection of a separate high frequency diffuser unit (Beovox 2500). Maximum power handling capacity 50 watts music power, impedance 4 ohms. Solid Teak or Rosewood finish. 45 gns.
- 4** BEOVOX 5000. Pressure chamber loudspeaker with one bass two mid frequency and four high frequency units. Variable attenuators to mid and high frequency units. Provision for the connection of high frequency diffuser unit. Distortion at maximum power 2.2%. Maximum power handling 50 watts music power, impedance 4 ohms. Solid Teak or Rosewood finish, free standing on elegant stainless steel legs. 49 gns.
- 5** BEOGRAM 3000. Transcription turntable unit fitted with the world famous B & O STL/15° tone arm, lowering device and a B & OSP7 stereo magnetic cartridge. Illuminated and magnified strobe. Mounted on solid Teak or Rosewood plinth and complete with plexiglass cover. 69 gns.
- 6** BEOVOX 2500. High frequency sound diffuser unit. Six loudspeakers mounted one to each face of a cube for the omnidirectional distribution of the high frequencies. Mounted on a stainless steel base or may be suspended. Power handling 50 watts music power over 2kHz. 42 gns. a pair.



# Bang & Olufsen



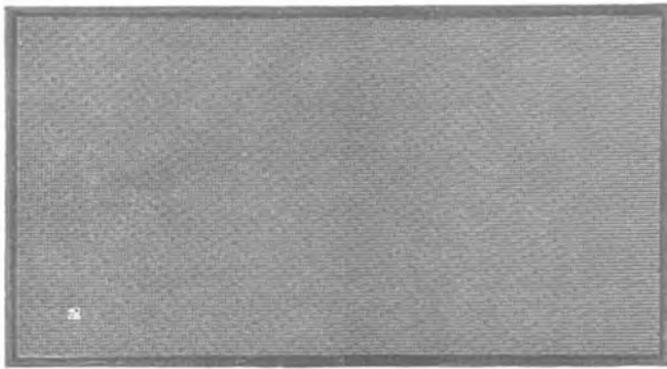
1



2



4



3



5



6

*Bang & Olufsen gave their engineers complete freedom to develop the perfect high fidelity system. The Beolab system is the result. Beolab reflects the latest radio and electronic developments and practices made possible by using space age components and stringent production control.*

**B & O for those who consider design and quality before price**

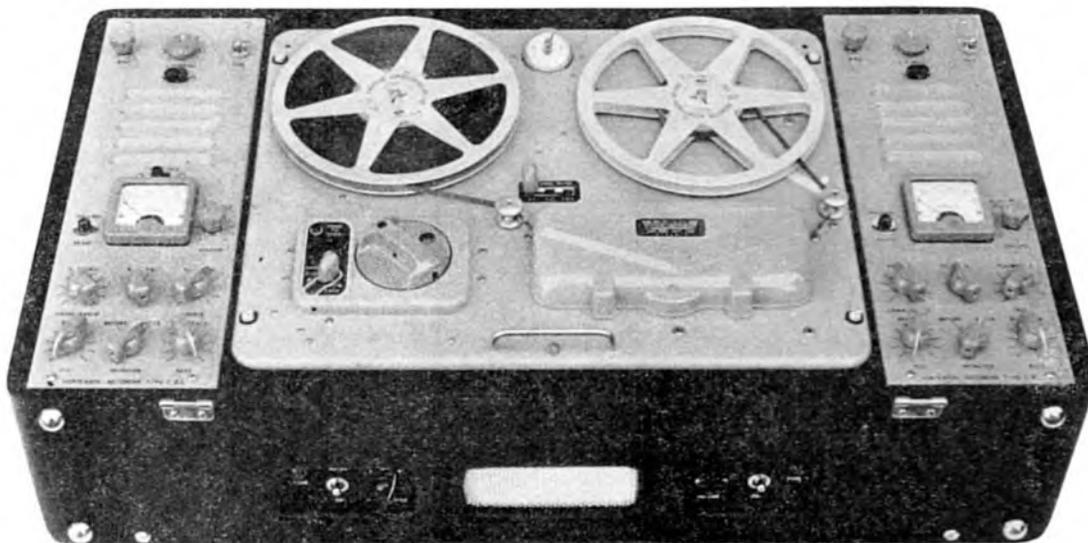
For detailed information see your B & O dealer or write to:  
**Bang & Olufsen United Kingdom Division,**  
Eastbrook Road, Gloucester. Telephone: Gloucester 21591.  
London Showrooms:  
70/71 Welbeck Street, W.1. Telephone: 01-486 2144.

# Beolab Series



# **Vortexion** *quality equipment*

## TYPE C.B.L. TAPE RECORDER



Here is a versatile stereophonic recorder which has no equal in its price group.

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

IT CAN also make a recording on one track and then transfer it to the other track while measuring and listening to it and adding one or two more signals also metered. A special PPM type meter is now used.

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

IT CAN playback stereophonically or monaurally with its own amplifiers of  $3\frac{1}{2}$  watts each.

Speeds  $1\frac{7}{8}/3\frac{3}{4}/7\frac{1}{2}$  i.p.s. Price **£172 0s. 0d.**

Speeds  $3\frac{3}{4}/7\frac{1}{2}/15$  i.p.s. Price **£180 0s. 0d.**

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

Speeds  $1\frac{7}{8}/3\frac{3}{4}/7\frac{1}{2}$  i.p.s. Price **£115 10s. 0d.**

Speeds  $3\frac{3}{4}/7\frac{1}{2}/15$  i.p.s. Price **£128 0s. 0d.**

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

Speeds  $1\frac{7}{8}/3\frac{3}{4}/7\frac{1}{2}$  i.p.s. Price **£96 7s. 0d.**

Speeds  $3\frac{3}{4}/7\frac{1}{2}/15$  i.p.s. Price **£107 3s. 0d.**

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

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

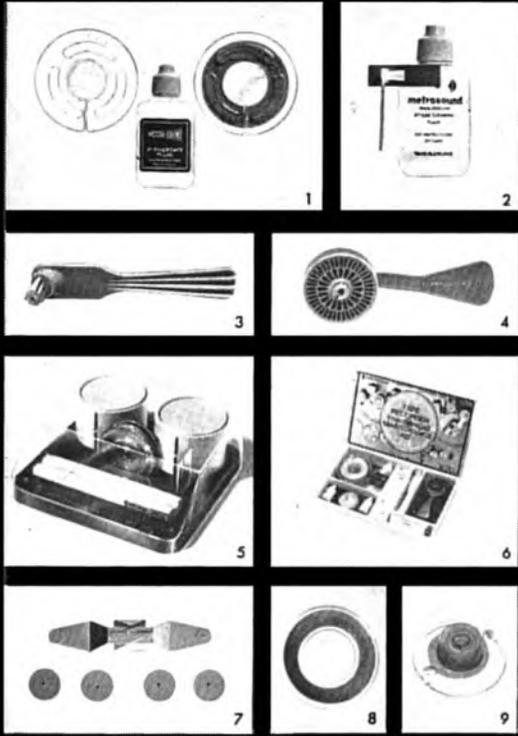
Telephone: LIBerty 2814 and 6242-3-4

Telegrams: "Vortexion London S.W.19"



# metrosound

**MANUFACTURERS OF THE LARGEST RANGE OF AUDIO ACCESSORIES IN GREAT BRITAIN**



Exclusive and unique audio and tape accessories designed to maintain and improve the quality of your listening enjoyment

- |   |      |   |     |
|---|------|---|-----|
| 1. Klensatape Kit ... ..                    | 13/6 | 8. Leader Tape, Stop Foil or Splicing Tape ... reel | 4/6 |
| 2. Hi Fi Stylus Cleaning Kit                | 7/1  | 9. Metrostrobe Spirit Level                         | 6/- |
| 3. Tape Recorder Cleaning Brush ... ..      | 2/6  | 10. 45 r.p.m. Anti Slip Key                         | 3/- |
| 4. Metrostrobe ... ..                       | 12/6 | 11. Metrostrobe Splicing Block ... ..               | 9/- |
| 5. Tape Editing Kit ... ..                  | 27/- | 12. Metrostrobe Lubrication Kit ... ..              | 6/- |
| 6. Tape Recorder Mechanical Maintenance Kit | 36/- |   |     |
| 7. Metrostyle Stylus Balance                | 7/1  |   |     |

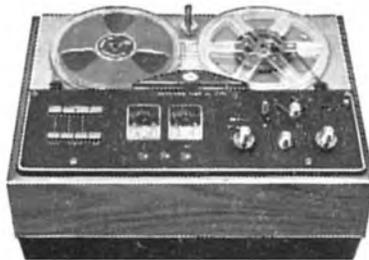
These are only a selection of metrosound accessories—the whole range is available from all leading dealers—look for the metrosound display rack and serve yourself!

metrosound manufacturing co. ltd., bridge works, wallace road, london, n.1. Tel 01-226 8641/2/3

## whatever the make....

	Deposit	12 Monthly	Cash	
	£ s. d.	Payments	Price	
		£ s. d.	£ s. d.	Gns.
<b>4-TRACK STEREO/MONO</b>				
Philips EL3312 ... ..	12 12 0	3 3 0		48
Ferguson 3232 ... ..	18 2 3	4 10 7		69
Sony TC200 ... ..	18 18 0	4 14 6		72
Philips EL3555 ... ..	19 13 9	4 18 6		75
Akai I710 ... ..	20 14 9	5 3 9		79
Tandberg 74 ... ..	24 8 3	6 2 1		93
Sony TC260 ... ..	25 9 3	6 7 4		97
Tandberg Series 12 ... ..	27 11 3	6 17 10		105
Revox 736 2 or 4-T ... ..	31 4 9	7 16 3		119
Sony TC530 ... ..	31 12 6	7 18 2		120
Akai M8 ... ..	32 16 3	8 4 1		125
Beocord 2000K DeLuxe ... ..	32 16 3	8 4 1		125
Beocord 2000T DeLuxe ... ..	33 17 3	8 9 4		129
Akai X300 ... ..	48 11 3	12 2 10		185
Akai X355 ... ..	62 14 9	15 3 9		239
<b>4-TRACK MONAURAL</b>				
Ferguson 3224 ... ..	6 11 3	1 12 10		25
Fidelity Playtime 4 ... ..	7 1 9	1 15 6		27
Fidelity Playmatic 4 ... ..	8 2 9	2 0 9		31
Elizabethan LZ34 ... ..	8 18 6	2 4 8		34
Ferguson 3218 ... ..	8 18 6	2 4 8		34
Telefunken 201 ... ..	8 18 6	2 4 8		34
Ferguson 3222 ... ..	9 3 9	2 6 0		35
Philips EL4305 ... ..	9 9 0	2 7 3		36
Grundig TK140 ... ..	10 2 2	2 10 7		38½
Philips EL4306 ... ..	11 0 6	2 15 2		42
Ferguson 3214 ... ..	11 11 0	2 17 9		44
Truvox 44 ... ..	12 6 9	3 1 9		47
Ferguson 3216 ... ..	12 17 3	3 4 4		49
Tandberg 843 ... ..	15 9 9	3 17 6		59
Philips EL3556 ... ..	16 5 6	4 1 5		62
Truvox R104 ... ..	23 7 3	5 16 10		89

### BEACORD 1500 de luxe TAPE UNIT



7½, 3½ and 1½ speeds. Three Sound Heads including Separate Record/Playback Heads. Built-in Record and Playback Pre-Amplifiers. Electrical and mechanical tape stop. Choice of Teak or Brazilian Rosewood.

**97 gns.**

Deposit £25 9 3d. and 12 monthly payments of £6 7 4d.

**INTEREST FREE H.P. TERMS. OPEN SATURDAY 6 p.m. FRIDAY 6.30 p.m. IF UNABLE TO CALL WRITE FOR BROCHURES. PART EXCHANGES. 18 AND 24 MONTHLY TERMS ALSO AVAILABLE**

	Deposit	12 Monthly	Cash	
	£ s. d.	Payments	Price	
		£ s. d.	£ s. d.	Gns.
<b>STEREO TAPE UNITS</b>				
Sony TC250A ... ..	14 19 3	3 14 10		57
Sony TC350 ... ..	19 13 9	4 18 6		75
Beocord 1500 DeLuxe ... ..	25 9 3	6 7 4		97
Truvox PD 102 ... ..	27 11 3	6 17 10		105
Truvox PD 104 ... ..	27 11 3	6 17 10		105
Tandberg 6X ... ..	28 17 6	7 4 5		110
Ferrograph 632 ... ..	32 1 6	8 5 5		126
Ferrograph 634 ... ..	34 12 6	8 13 4		132
Brenell STB2.5 '2' ... ..	37 10 0	9 7 6		150

	Deposit	12 Monthly	Cash	
	£ s. d.	Payments	Price	
		£ s. d.	£ s. d.	Gns.
<b>MAINS TWIN TRACK</b>				
Fidelity Playtime 2 ... ..	6 11 3	1 12 10		25
Fidelity Playmatic 2 ... ..	7 7 0	1 16 9		28
Grundig TK120 ... ..	7 14 11	1 18 9		29½
Philips EL3310 ... ..	9 3 9	2 6 0		35
Grundig TK18L ... ..	9 3 9	2 6 0		35
Grundig TK125 ... ..	10 7 6	2 11 10		39½
Truvox 42 ... ..	12 6 9	3 1 9		47
Tandberg 823 ... ..	14 3 6	3 10 11		54
Tandberg 92 ... ..	18 2 3	4 10 7		69
Brenell Mk. V3 ... ..	19 8 6	4 17 2		74
Brenell Mk. V3 (Meter) ... ..	20 14 9	5 3 9		79
Truvox R102 ... ..	23 7 3	5 16 10		89
Brenell V 3 'M' ... ..	24 8 3	6 2 1		93
Ferrograph 631 ... ..	24 18 9	6 4 9		95
Ferrograph 631 H ... ..	26 5 0	6 11 3		100

	Deposit	12 Monthly	Cash	
	£ s. d.	Payments	Price	
		£ s. d.	£ s. d.	Gns.
<b>BATTERY OPERATED TRANSISTORISED</b>				
Philips EL4304 ... ..	6 11 3	1 12 10		25
Philips EL3302 ... ..	7 1 9	1 15 6		27
Grundig C100 ... ..	10 7 6	2 11 10		39½
Telefunken 300 ... ..	12 17 3	3 4 4		49
Telefunken 301 4-T ... ..	14 3 6	3 10 11		54
Telefunken 302 4-T ... ..	15 9 9	3 17 6		59
Grundig TK6L ... ..	17 6 6	4 6 8		66
Uher 4000L ... ..	27 0 9	6 15 3		103
Akai X-IV 2 or 4-T ... ..	30 19 6	7 14 11		118

# THE RECORDER CO

*this is the name*

(DEPT. T) 186-188 WEST END LANE, WEST HAMPSTEAD, LONDON, NW6  
Telephone: 01-794 4977

ORIGINAL LONDON CAST  
WILLIAMSON MUSIC LIMITED  
*presents:*  
**THE SOUND OF MUSIC**  
Music by RICHARD RODGERS • Lyrics by OSCAR HAMMERSTEIN 2nd  
Book by HOWARD LINDSAY & RUSSEL CROUSE



**BEATLES**  
SGT PEPPERS  
LONELY HEARTS  
CLUB BAND



# the sound of music

**The Sound of Music**  
Original London Cast  
H.M.V. TC-CSD 1365

*with full  
colour front!*

## Other current releases

**Manuel & The Music of the Mountains**

Sunrise, Sunset  
Columbia TC-SCX 6139

**The Pink Floyd**

The Piper at the gates of Dawn  
Columbia TC-SCX 6157

**Paul Jones**

Love Me Love My Friends  
H.M.V. TC-CSD 3602

**Wout Steenhuis**

Guitars for Girl Friday  
Columbia TC-SCX 6125

**The Seekers**

Come the Day  
Columbia TC-SCX 6093

**The Shadows**

Jigsaw  
Columbia TC-SCX 6148

**Franck Pourcel**

The Sound of Magic  
Columbia TC-SCX 6171

**The Hollies**

Evolution  
Parlophone TC-PCS 7022

**The Beatles**

Sgt. Pepper's Lonely Hearts Club Band  
Parlophone TC-PCS 7027

*with full  
colour front!*

# the sound of sergeant pepper

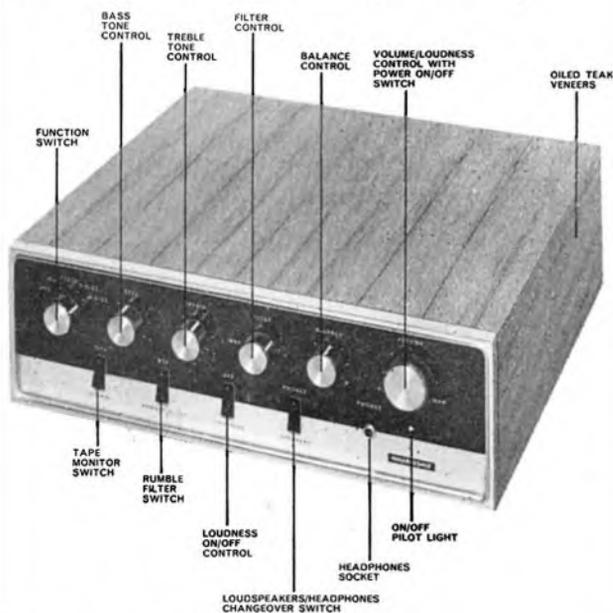
E.M.I. Records (The Gramophone Co. Ltd.) E.M.I. House, 20 Manchester Square, London W.1

# Wharfedale the quality name in loudspeakers—now make an amplifier and a tuner

## WHARFEDALE AMPLIFIER

20 watts per channel into 8 ohm load with less than 0.2% total distortion with the WHF20 Transistorised Stereo Amplifier. Power response -3db at 10 Hz and 60 kHz. Tone control range  $\pm 15$ db at 40 Hz and  $\pm 14$ db at 10 kHz.

It is no longer necessary to have the volume turned up to get the quality reproduction you are accustomed to. The new Wharfedale gives a full response even at quite low volume levels (Married men please note.)



SEND THIS COUPON FOR DETAILS

I AM INTERESTED IN :

AMPLIFIERS

STEREO RADIO TUNERS

SPEAKER UNITS/D.I.Y. CABINETS

COMPLETE SPEAKER SYSTEMS

NAME.....

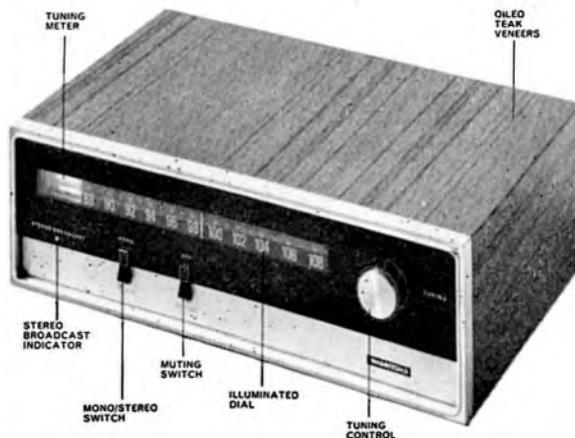
ADDRESS .....



TRM/11

## WHARFEDALE FM TUNER

WFM1 Transistorised Tuner has a range 87.5—108 MHz. Suitable for either 300 ohm balanced or 75 ohm unbalanced aerial systems. Sensitivity of 1.25 microvolts for 30db signal to noise ratio. Stereo cross-talk better than 40db. Accurate pinpointing and holding of broadcasts.



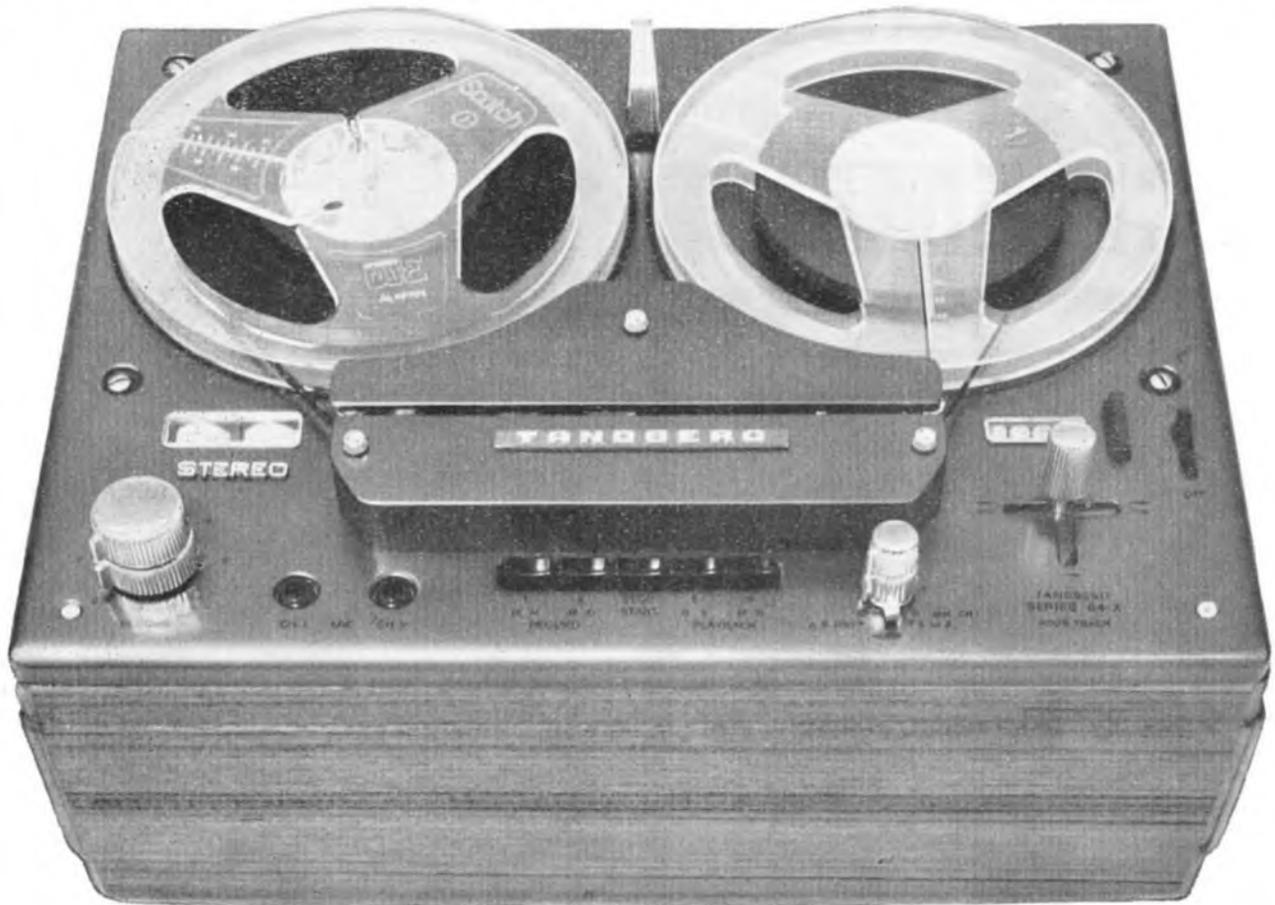
## SILENT STEREO RECEPTION

The FM stereo tuner has been designed from its inception as a multiplex stereo radio receiver—the signal to noise ratio is extremely low, the sensitivity extremely high—the result, virtually silent stereo reception.

## FULL BLOODED SOUND AT LOW AND HIGH LEVELS

RANK WHARFEDALE LTD · IDLE · BRADFORD · YORKSHIRE

# The outstanding new Tandberg 6x



## The world's best stereo tape deck plus new bias head for guaranteed frequency response and unbeatable signal to noise ratio

Tandberg have taken their finest tape deck, added a Bias head and refined the circuitry. The result is the Tandberg Model 64X.

**Frequency Response:**

7½" per sec: 20-25,000 c/s

(± 2 dB 30-20,000 c/s).

3¾" per sec: 20-18,000 c/s

(± 2 dB 30-15,000 c/s).

1⅝" per sec: 30-12,000 c/s

(± 2 dB 40-8,000 c/s).

**Signal to noise ratio:**

7½" per sec: 62 dB.     3¾" per sec: 59 dB.

1⅝" per sec: 56 dB.

\* Also incorporates Multiplex Filters (for stereo radio recording).

\* A centre channel amplifier for simultaneous playback of two tracks into mono headphones.

\* A fully transistorised oscillator circuit.

\* Cathode follower outputs.

\* 'On and off the tape' monitoring.

\* 'Sound on sound' facilities.

\* Superb teak and stove enamel finish.

The Tandberg 2 or 4 track, 3 speed Series 6X. 115 Gns.

Please send me full details on the Tandberg

**SERIES 6X**

Also full details on the Series

8    9    12

tick as appropriate

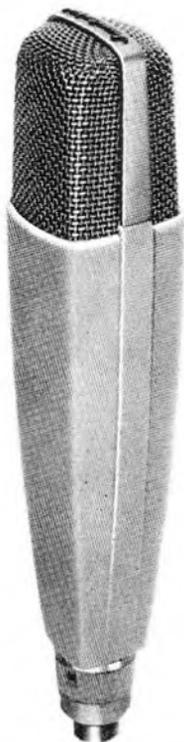
Name .....

Address .....

Post to Dept. TRM9  
Elstone Electronics Limited,  
Hereford House, North Court,  
off Vicar Lane, Leeds, 2.

SEE AND HEAR US AT THE 1967  
AUDIO FESTIVAL AND FAIR  
STAND NO. 17  
DEMONSTRATION ROOM 212

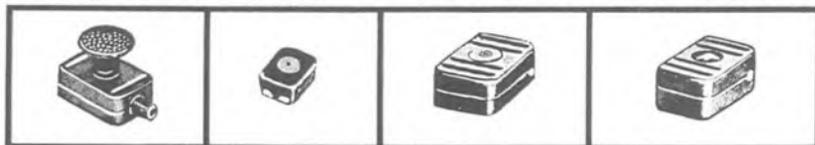
**Tandberg**



# The professional way with **Sennheiser**

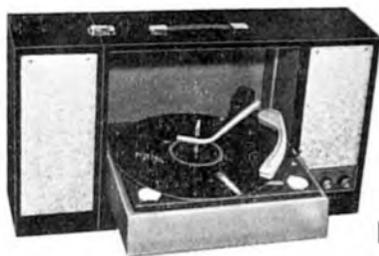
**MD 421** This studio cardioid microphone is Sennheiser's most famous, and is used by almost every broadcasting station in Europe. Over 50,000 amateurs now use this professional microphone, including some International Contest winners. The accurate cardioid characteristic and smooth frequency response (30 Hz—17,000 Hz) permit high quality sound recordings in difficult acoustic conditions. Ideal for music or speech recordings where quality is of the utmost importance, and also used for prestige public address sound reinforcement and stage use. Every MD 421 is individually tested before leaving the factory, and is supplied with its own frequency response curve. The microphone has a built-in dual impedance transformer and bass attenuator control. Only the colossal amateur demand for this professional microphone has brought the price down from £70.0.0 to £31.12.6.

**Do you know about these microphones?**



Audio Engineering Ltd. 33 Endell Street, London W.C.2  
Audio & Design Sales Ltd. 40 Queens St. Maidenhead

## HEATHKIT



**Transistor  
Portable  
Stereo  
Record  
Player**

SRP-1

TOTAL PRICE  
Kit **£27 15 0**

- Automatic Playing of 16, 33, 45 and 78 rpm records
- All transistor circuitry ensures cool instant operation
- Dual sapphire stylus for LP's and 78's
- Plays mono as well as stereo records
- Compact, with easy to carry handle for suitcase portability
- Detachable speaker enclosure for best stereo separation
- Two 8 in. by 5 in. speakers
- Operates on 220-250V ac supply.

*So Easy to Build — So Easy to Use !*

MANY OTHER HI-FI MODELS IN RANGE



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



Transistor AM FM Stereo Tuner Kit AFM-2 £32.7.0 incl. P.T.

Deferred Terms available in U.K. on £10 Mail Order prices quoted.  
Retail prices slightly higher.

## present their **NEW!** **STEREO TAPE RECORDER**

STR-1 **only £45-18-0 kit**  
FOR THIS SPECIFICATION

- 1/4 track stereo or mono record and playback at 7 1/2, 3 3/4 and 1 1/2 ips
- Sound-on-sound and sound-with-sound capabilities
- Stereo record, stereo playback, mono record and playback on either channel
- 18 transistor circuit for cool, instant and dependable operation
- Moving coil record level indicator
- Digital counter with thumb-wheel zero reset
- Stereo microphone and auxiliary inputs and controls, speaker headphone and external amplifier outputs
- . . . front panel mounted for easy access
- Push-button controls for operational modes
- Built-in stereo power amplifier giving 4 watts rms per channel
- Two high efficiency 8 in. by 5 in. speakers
- Operates on 230V ac supply.



So Easy to build . . . Simple step-by-step instructions and large pictorial diagrams guide you all the way.  
Maximum portability — Versatile Recording Facilities—Transistor circuitry offers cool reliability.

See Britain's Finest Range of Electronic Kits  
in the latest **FREE Catalogue**

To DAYSTROM LTD., Gloucester. Tel.: 20217 tick  
**FREE BRITISH HEATHKIT CATALOGUE**

Please send Free Heathkit  
Catalogue to my Friend

Full details of Model(s).....  
Name .....  
Address .....  
(Block capitals please)..... T.11

Name .....  
Address .....  
.....  
..... T.11





*for the man who really knows  
music there is only one loudspeaker*

# JORDAN WATTS

*the cleanest, clearest, most natural sound you can buy.*

“Amateur Tape Recording” says: ‘When listening to these speakers for the first time, one is immediately aware of the lack of colouration, coupled with the excellent transient reproduction and the big speaker sounds, despite the conflicting smallness of the enclosures. THE JUNO WOULD BE MY CHOICE IF I WERE LOOKING FOR A SMALL SPEAKER OF OUTSTANDING PERFORMANCE AND UNIQUE DESIGN.’

*The JUNO high fidelity loudspeaker system costs £24. 10. 0.*

Ask your dealer for a demonstration and technical details.

Manufactured by:  
JORDAN WATTS LTD.,  
Benlow Works, Silverdale Road,  
Hayes, Middx.

Distributors:  
BOOSEY & HAWKES  
(SALES) LTD.,  
Deansbrook, Road,  
Edgware, Middx.

World Exports:  
K.H. WILLIMAN & CO. LTD.,  
Blackford House, Sutton,  
Surrey, England.  
Tel: Melville 1491  
Cables: Tiger, Sutton, Surrey



*Jordan-Watts Loudspeakers - The voice of high fidelity*

## 64 W STEREO FM/AM MULTIPLEX RECEIVER KIT THAT LOOKS AND SOUNDS PROFESSIONAL



Kit-building has always saved the enthusiast money, but often the final result was more than a little disappointing. That has all changed now that Electronics have introduced the Knightkit range of Hi-Fi and other equipment to the U.K. Front panel finishes are of a very high standard and beautifully set-off by the oiled teak case. Specifications are guaranteed—both on paper and by the use of solid-state components, printed circuit boards, engineered sub-assemblies, pre-assembled and aligned i.f. front ends and “test-as-you-build” checks. And there’s always our service department to back you up, so the only difficulty you’ll have is convincing your friends you built it yourself.

The KG-964 kit costs £112-14-9 and has dozens of tremendous features like automatic multiplexing on stereo and a transformerless output, but we don’t have the space to list them all. You can get the full specification in a FREE 70-page brochure that covers the Knightkit range in detail: not only Hi-Fi gear, but test equipment, ‘scopes, power supplies, multi-meters, signal generators etc., and general interest kits that include an electronic car tuner and a photographic light meter. Credit terms are available if required. The quality on Knightkits is built-in, you build them up, saving money and adding the

knowledge of circuit construction, function and operation to the pleasure of your hobby. And if you require more detail on the principles and theory then Electronics stock a comprehensive range of technical publications—140 titles in all—many of which are detailed in your brochure.

Please send me your FREE brochure K5 giving full details of your range of kits.

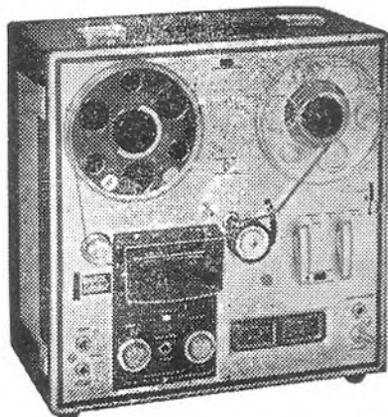
Send to **ELECTRONIQUES (prop. STC) Limited**,  
Edinburgh Way, Harlow, Essex.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_ K5

**k** **knight-kit** by **electronics**  
Quality Built-in, Built-up by you

# THE Centre for AKAI



**1710**

(left)

4-track stereo machine, completely self-contained.

**79 gns.** Deposit £20.15.0d. and 12 monthly payments of £5.3.8d.

**X 4**

(below left)

Fully transistorised stereo mono battery/mains portable recorder. 4-track; 4-speeds; Crossfield heads; superb low-speed frequency response.

**118 gns.** Deposit £31.0.0d. and 12 monthly payments of £7.14.10d.

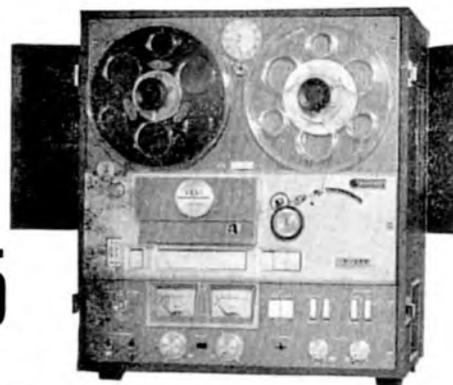


**M 8**

(above)

High quality 4-speed, 4-track stereo mono recorder featuring Crossfield head. Vertical or horizontal operation. 4 hours stereo recording on 1200ft. standard tape.

**125 gns.** Deposit £32.17.0d. and 12 monthly payments of £8.4.0d.



**X355**

## THE ULTIMATE IN STEREO TAPE REPRODUCTION

Extremely versatile professional stereo tape recorder suitable for use in home or studio. Unique AKAI CROSSFIELD HEAD is capable of recording a fantastic 30 to 24,000 cycles at 7½ i.p.s. Solid state amplifier produces 50 watts of stereo music power. 2 tape speeds, sound on sound and echo facilities, etc. Complete with many accessories.

**239 GNS.**

**Interest Free Terms.** £62.15.0d. deposit and 12 monthly payments of £15.13.8d.

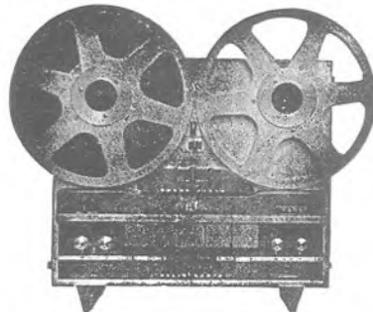
**THESE SUPERB MACHINES ARE ALL IMMEDIATELY AVAILABLE ON INTEREST-FREE TERMS**

**X 300**

(below)

A studio type 3-speed 4-track stereo mono recorder of professional quality. Crossfield heads; 10½" reels; keyboard controls, and many other features.

**185 gns.** Deposit £48.12.0d. and 12 monthly payments of £12.2.9d.



Appointed  
**AKAI  
CENTRE**

To see and hear the complete range of superb AKAI Tape Recorders you should call at the leading Centre for AKAI at 266/8 Upper Tooting Road.

Skilled, experienced staff fully trained in all the technical aspects of these magnificent machines are ready to advise and demonstrate.

We have fully equipped facilities for fast reliable servicing whenever necessary. Don't hesitate. Now is the time to enjoy the pleasure and pride of ownership which is yours with one of these superbly engineered and designed machines. Interest free easy terms arranged immediately. We specialise in Mail Order, including Export requirements. Any AKAI machine can be sent immediately to any part of the world free of U.K. Import duty or Purchase Tax.



Open 9 a.m. - 6 p.m. weekdays.  
Closed 1 p.m. Wed. Easy parking. Nearest Tube - Tooting Broadway. Buses: 88, 155, 220, 181, 711 (Green Line).

R.E.W. (Earlsfield) Ltd., Dept. T.R.M. 266-268, Upper Tooting Road, London, S.W.17.  
Telephone: 01-672 8267 or BALham 9175

# YOU WANT YOUR HEADS SEEN TO!

YOUR TAPE RECORDER CANNOT GIVE YOU FIRST CLASS RECORDINGS OR PLAYBACK UNLESS YOUR HEADS ARE IN TOP CONDITION. USE A TAPE HEAD DEFLUXER REGULARLY FOR BEST RESULTS.



THE AUDIO CENTRE DEFLUXER

specially supplied to us by the Ferrograph Company

THE AUDIO CENTRE DEFLUXER

complete with instructions

# 60/-

- POST FREE
- BY RETURN

THE *Audio Centre*

A DIVISION OF THE PHOTO CENTRE, 28-30 PELHAM STREET  
54833 · NOTTINGHAM · 51247

## FRANCIS OF STREATHAM

## FOR A FAIR DEAL AND HONEST SERVICE

- ★ Minimum Deposit and no Interest or Service Charges on H.P. up to 18 months.
- ★ Free Service during Guaranteed Period.

### MAINS TAPE RECORDERS

Ampex 800 Series  
Ampex 1000  
Ampex 2100  
\*Akai X1000  
\*Akai 1700  
\*Akai X-300  
\*Akai 910  
\*Akai M.8 Stereo  
\*Akai 355 Stereo  
\*Beocord 2000 de luxe  
\*Beocord 1500 de luxe  
\*Brenell STB2  
\*Brenell Mk. 5/M Series III  
\*Brenell Mk. 5 Series III  
Eltra 1001  
Ferguson 3218  
Ferguson 3224  
Ferguson 3216  
\*Ferrograph 631  
\*Ferrograph 632 Stereo  
\*Ferrograph 633 Stereo  
Fidelity Playtime  
\*Grundig TK245  
\*Grundig TK340  
Grundig TK140  
Grundig TK120  
Philips St. Cassette 3312  
Philips 3310 Cassette  
Philips Stereo Cassette  
Philips 3555 Stereo  
Philips 3556  
Philips 3578  
Philips 3573  
Philips 2 Tr. Auto 3572  
Sony 350 St. Pre-amp Deck  
Sony 250A Deck Pre-amp  
Sony TC 260

LATEST CASSETTE MODELS BY PHILIPS, ETC.

Sony 200  
Sony 530  
Stella 462  
Stella 463  
\*Tandberg Series 6X  
\*Tandberg Series 12  
\*Tandberg Series 8  
\*Tandberg Series 9  
Telefunken 200  
\*Telefunken 204 Stereo  
Telefunken 203  
Telefunken 201  
Truvox R.40  
Truvox R102 or R104  
\*Truvox PD102 or PD104  
\*Truvox PD 104 Stereo  
Uher Hi-Fi special  
\*Uher Royal  
Ultra 6206  
\*Vortexion WVA 3-speed  
\*Vortexion WVB 3-speed  
\*Vortexion CBL Stereo  
Wyndson Vanguard

### BATTERY PORTABLES

\*Akai X-IV 4 Tr. Stereo complete  
Loewe Opta 416  
Loewe Opta 408  
Loewe Opta Cassette  
Philips EL3302  
Philips 4200  
Sharp Batt/Mains  
Stella 473  
Telefunken 300  
Telefunken 301  
Uher 4000L  
\*Microphone extra  
Tape to disc and copy service

EVERYTHING FOR THE TAPE RECORDIST

### ● MICROPHONES, MIXERS

Hammond Condenser M100  
Grampian Reflector  
Grampian DP/4 Dynamic  
Reslo Ribbon  
AKG D.19C  
Eagle Mixer  
Hammond 5-way Mixer  
AKG K.50 Headphones  
Philips Pre-amp  
Also microphones by ACOS, TELEFUNKEN, BEYER, FILM INDUSTRIES, STANDS, BOOMS, etc.

SPECIAL TAPE OFFER	
Brand new Shamrock Tape.	
Top quality. Guaranteed	
2,400' 7" spool ... ..	25/-
1,800' 7" or 5 1/2" ... ..	21/-
1,200' 7" or 5 1/2" ... ..	15/-
900' 5" ... ..	12/6
600' 5" ... ..	10/-
P/P 1/6 per reel. Orders for £3 or more sent post free.	

### MAINS POWER PACKS

Philips, Stella or Cossor  
Telefunken 300 with cell  
Uher 4000, with cell  
PRE-RECORDED TAPES & CASSETTES by Columbia, H.M.V. and E.M.I. Bib and E.M.I. splicers. Matching transformers. Defluxers, etc., etc.

### Hi-Fi Dept.

- **AMPLIFIERS**  
Quad Rogers Leak Armstrong  
Tripletone Scott Truvox Nikko  
Goodman Ferguson Philips  
Arena
  - **TUNERS**  
Quad Rogers Philips Leak  
Armstrong Tripletone Arena  
Nikko Arena
  - **LOUDSPEAKERS**  
Quad Rogers W.B. Kef Wharfedale  
Goodman Tannoy  
Lowther Leak Elac Truvox  
Ditton Philips
  - **MOTORS, PICKUPS**  
Garrard incl. Thorens  
SP.25, 401, etc. Tannoy  
Goldring Shure  
Connoisseur Empire  
Decca Sonotone  
Decca Deram SME Mk. II  
Philips BSR  
Ortofon Pickering  
Dual Euphonics
- All types of Diamond and Sapphire styli, stereo and mono. Microlifts. Garrard, Goldring and Acos Pressure Gauges, Disc Preener. Acos Dust Bug.
- **CABINETS** by Record Housing  
Clearview and G.K.D.

169-173 STREATHAM HIGH ROAD, LONDON, S.W.16  
Between St. Leonard's Church and Streatham Station  
STReatham 0466/0192  
Please note this is our only address ● Free Car Park in Prentis Rd.—2 mins. away  
OPEN ALL DAY SATURDAY EARLY CLOSING WEDNESDAY



## SONY research makes the difference

**TC260 Features:** 4 track, 2 channel, stereophonic and monophonic tape recording and playback system  
 Reliable SONY solid state circuit  
 Smooth and wide frequency response  
 Public address facilities  
 Separate bass and treble tone controls  
 Horizontal or vertical operating position  
 Two tape speeds ( $7\frac{1}{2}$  and  $3\frac{3}{4}$  ips)  
 Full 7" reel capacity  
 Automatic shut-off switch  
 Tape index counter, two VU meters  
 Automatic tape lifter  
 Pause control  
 Voltage selector  
 Integrated input and output connectors.

### Specifications:

**Power requirement:** 55 W, 110/125 V, 220/240 V, 50/60 cps.

**Tape speed:**  $7\frac{1}{2}$ " and  $3\frac{3}{4}$ " per sec.

**Reel size:** 7" or smaller.

**Recording system:** 4-track stereophonic and monophonic.

**Frequency response:** 30–18,000 cps at  $7\frac{1}{2}$  ips. (50–15,000 cps at  $7\frac{1}{2}$  ips  $\pm$  3db). 30–13,000 cps at  $3\frac{3}{4}$  ips.

**Signal-to-noise ratio:** Better than 50 db (at peak recording level).

**Wow and flutter:** Less than 0.19% at  $7\frac{1}{2}$  ips. Less than 0.25% at  $3\frac{3}{4}$  ips.

**Erase head:** In-line (stacked) quarter track, EF18–2902H.

**Record/Playback head:** In-line (stacked) quarter track PP30–4202.

**Level indication:** Two VU meters (calibrated to 0 VU at 12 db below saturation of tape).

**Tone control:** Two separate controls for bass and treble.

**Input:** Low impedance microphone inputs—transistorised (will accommodate any microphone from 250 ohm to 1 K ohm impedance). Sensitivity—68 db (0.3 mv) (2). High impedance auxiliary inputs. Sensitivity—16 db (0.12 v) (2).

**Output:** Low impedance line outputs (2). Output level 0 db (0.775 v). External Speaker jacks (8 ohms) (2). Integrated Record/Playback. Connector (1). Binaural monitor output (1). Output level 0 db (0.775 v)

**Operating position:** Either horizontal or vertical.

**Speaker:** 4" x 8" dynamic (2).

**Power output:** 5 watts x 2.

**Transistors:** 2SB381 (x6), 2SB382 (x2), 2SB383 (x2), 2SC297 (x1), 2SC298 (x4), 2SD64 (x6).

**Weight:** Approx. 34 lbs. 3 ozs.

**Dimensions:**  $21\frac{5}{8}$ " (W) x  $15\frac{7}{8}$ " (D) x  $7\frac{7}{8}$ " (H).

**Accessories:** 5" stereo recorded tape. Empty 7" reel. Microphone Model F-96 (2). Connection cord. Capstan. Pinch roller. Reel cap. Head cleaning ribbon.

Recommended retail price **97 Gns.**

Sony offer the finest range of tape recorders from the battery portable TC 900 to the studio quality 777.

For further details see your Sony dealer or write to:

**Sony U.K. Sales Division,**  
Eastbrook Road, Gloucester.  
Tel: Gloucester 21591.

London Showrooms:  
70-71 Welbeck Street, London, W.1.

Tel: 01-486 2143

**SONY**<sup>®</sup>  
RESEARCH MAKES THE DIFFERENCE

# To anyone who wants to hear the Hi-est Fi-est Hi-Fi...



You can't hear the Grundig Hi-Fi Studio Series just anywhere. Grundig took a lot of trouble to produce it—and only a few hand-picked specialist dealers stock the range.

Still, it *is* well worth seeking out: the largest, most comprehensive . . . damn it, the *best* Hi-Fi range ever fielded by a major manufacturer.

Backed by Grundig's massive resources and technical expertise, the Studio Series of audio units is already a byword on the Continent for sensitivity, brilliant design and perfect performance.

The Grundig Studio Series can open up a whole new dimension of sound for you. See it, hear it, try it yourself. Give your nearest Grundig dealer a chance to show it off to you. Post the coupon today.

**\*To: Grundig (G.B.) Ltd., Dept. TM 1, 15 Orchard St., London, W.1.**

I accept your invitation to view the Grundig Hi-Fi Studio Series.  
Please send me the name and address of my nearest authorised dealer.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

TM 1



# Audac takes the lead... away!



Completely cordless, all contained in one neat unit, no bigger, no heavier than a torch, no following flex, no bulging pocket transmitter. This exclusive integrated Microphone Transmitter includes a microphone capsule complete with Cavity, Transmitter Unit and Rechargeable Power Supply. The Hike-Mike is available for single or multi-channel operation with existing systems and embodies SHURE microphone inserts to provide studio quality performance. Patent applied for.

Audac Product Range includes—

Microphone Stands; Boom arms; Radio microphone transmitters and receivers; Pre-amplifier units; power amplifiers; loudspeaker enclosures; F.M. Tuners.

Trade terms on application. All 'Audac' Radiomicrophone systems conform to Post Office requirements. 2-year guarantee. Immediate Service replacement.

**AUDAC** Consultants and Design Engineers. Specialists in V.H.F. and U.H.F. communications and equipment. Special purpose recording mechanisms. Audio equipment.

**AUDAC MARKETING COMPANY LIMITED, FOREST WORKS, CAREY ROAD, WAREHAM. Tel: Wareham 2245 (4 lines)**

To Audac Marketing Company Limited.  
 Please mail me literature and prices for Hike-Mike  Full range of equipment  Trade terms

Name .....

Address .....

TRM2

# TAPE

RECORDING  
MAGAZINE

Vol. 11 No. 11 November 1967

## IN THIS ISSUE

<b>Tape trends and tape talk</b>	<b>426</b>
Douglas Brown	
<b>"Techniques"—SPlicing AND EDITING</b>	<b>427</b>
Denys Killick	
<b>PICTURES BY WIRE</b>	<b>428</b>
Derek Lyons	
<b>Video News</b>	<b>430</b>
Denis Gilbert	
<b>Cross Talk</b>	<b>432</b>
By Audios	
<b>Test Bench—Tandberg 64-X</b>	<b>436</b>
<b>Accessory Review</b>	<b>438</b>
<b>MUSIC ON TAPE—</b>	
<b>Musicassette Reviews</b>	<b>440</b>
<b>Tape Record Reviews</b>	<b>442</b>
<b>New Products</b>	<b>444</b>
<b>Readers Letters</b>	<b>447</b>
<b>Advertisement Inquiries Service</b>	<b>453</b>

**COVER PHOTOGRAPH:** Properly organised recording and hi-fi installations are not untidy—in fact they can enhance the appearance of any room. Our violinist, Paul, is listening attentively to the playback of his tape on the Tandberg Series 12 machine. The microphone he used is the T.T.C. omni-directional dynamic, B1053. The Design Furniture EQC 20 Cabinet houses a Leak Stereo 30 Amplifier and Troughline Tuner, as well as neatly storing tapes and records behind tambour doors. A Garrard Lab 80 turntable stands on top next to the Tandberg and the whole becomes as pleasing to the eye as it is to the ear.—Photograph by Roger Picton.

"TAPE Recording Magazine" is published on the third Wednesday in the month, by Print and Press Services Ltd., from Prestige House, 14/18 Holborn, London, E.C.1.

"TAPE Recording Magazine" is available by a postal subscription of 25s per annum (U.S.A. \$3.75) including postage, or it can be obtained at newsagents, bookstalls and radio and music dealers. In the event of difficulty, write to the Publishers at Prestige House, 14/18 Holborn, London, E.C.1.

Back numbers, if still in print, are available, at 2s. 6d. per copy.

Address all communications

**PRESTIGE HOUSE,  
14/18 HOLBORN, LONDON, E.C.1**

### EDITORIAL

01-242 4742

**Publisher,  
R. DOUGLAS BROWN**

**Advertisement Manager, VIVIANNE GOODING**

### ADVERTISING

01-242 4851

**Editor,  
DENYS G. KILLICK**

# Tape trends and tape talk

By Douglas Brown

---

I SHOULD GUESS it is about six years since I scripted and took part in a BBC television programme called "A World without Writing." The idea had occurred to me that the electronics revolution, and tape recording in particular, opened up astonishing possibilities of conveying information and ideas and of storing facts and statistics without resort to the written form.

The programme did not explore the possibilities in the way I had intended, for the producer had his own ideas about the way to make it entertaining! But it did put on record the significance of the new form of communication using tape.

Now a fascinating discussion is under way, sparked off by one Marshall McLuhan, a Canadian professor, about the long-term social effects of the new form of communication. The catch-phrase you hear at intellectual parties is "The medium is the message."

McLuhan's thesis is that television and other inventions are bringing the era of print to an end; that reading print encourages individualism; that listening or watching are communal exercises which, in an integrated world, will lead to some sort of tribal communism. The technology of communication he argues, shapes peoples views of their world, their behaviour and their thinking.

McLuhan aspires to some sort of philosophic theory, which many of his critics challenge. There is no doubt that he is carelessly sweeping in his assertions; what technology hasn't achieved, he assumes it soon will. Thus he speaks of simultaneous translation from one language or code into another—and we are certainly a long way from achieving that electronically.

The McLuhan controversy, however, provides an opportunity to consider just how much can now be achieved without the use of writing. We have tape-letters. We have talking books. We have television news bulletins and news features. We have not only instruction manuals on tape, but tapes which give the instructions direct to the machine, without human intervention. We have storage of vast quantities of information—written text, statistics or images—in the form of impulses on magnetic tape.

The easiest way to assess the situation, in fact, is to try to think of the things *that can only be done in writing*. Just at the moment, I cannot think of any. Can you?

THE ARGUMENT for and against omnidirectional loudspeakers for the reproduction of stereophonic sound is far from being resolved. Opinion has been divided between the advantages of "spreading" the sound in all directions from a pair of omnis—which will give a less well defined spatial image—against the "beaming" of sound from two directional transducers which under ideal conditions will give dramatically good stereo, although this will be observed in a fairly limited listening area.

Now the Zenith Radio Corporation, a large and reputable concern, claim to have evolved a stereophonic system which will convey the effect to listeners anywhere in the room. This implies the use of deflecting enclosures, and as these are the result of three years' research by Zenith they will undoubtedly be of unusual design. It would seem that the argument is about to be revived with increased vigour.

\* \* \*

FIVE BRITISH ENTRIES have been submitted to the International Recording Contest 1967 (CIMES) by the Federation of British Tape Recordists and Clubs . . . one each in the Documentary/Reportage, Actuality and Technical Performance classes and two in the Music section. Because of a change in the time-table of the British Recording Contest it has not been possible, this year, to submit to CIMES the best tapes in the national event, and the Federation has had to make emergency arrangements to maintain the British entry. The situation will right itself in 1968.

The programme for the 1967 Contest and the Congress of the International Federation of Sound Hunters, meeting in West Berlin soon after I write these words, reflects the health of the German amateur tape movement. The main events will take place in the Sender Freies Berlin radio station and the Telefunken and Philips organisations are playing an important role in the programme.

Delegates and judges are expected from ten countries: Belgium, Czechoslovakia, Denmark, Germany, Great Britain, France, Holland, Italy, Sweden and Switzerland.

I am delighted to report that Cyril Rex Hassan, one of the big names of audio in this country, Chairman of the committee organising the 1968 British Contest and now a vice-president of the Federation of British Tape Recordists and Clubs, has agreed to come to Berlin as a member of the British delegation. It will be his first contact with the international amateur movement.

## SPLICING AND EDITING

**E**DITING recorded programme material is one of the most satisfying of all the creative exercises in the medium of recorded sound. Only demanding a little patience, the operator is able to transform a series of disjointed items into a single cohesive and satisfying whole. Unlike many other recording techniques the art of editing can be practised without the expenditure of large sums of money. And it is the editing process which puts the final professional polish to almost any recorded programme.

This article follows the discussion on interviewing published last month, and is intended to be a sequel to it. But editing is not confined to recorded interviews. I was recently working on the preparation of master tapes of the recording of a Sonata for Two Violins. This work was recorded under unusually difficult conditions in a private London house one warm summer evening. The hot weather must have brought out the traffic—at several points the recording was spoilt because the microphones picked up sounds of motorcars and motorcycles. All these spoilt passages had to be edited out and replaced by identical sections from other “takes.” Work of this kind is exceedingly difficult; by working on recordings of the spoken word one is introduced to editing in the simplest possible manner. Playback will immediately reveal whether the edit has been a success or a failure. With practice success will be achieved every time.

The basic function of editing is to cut out or remove unwanted sections of a recording. It may be that the sounds removed are not required, or they may be retained for insertion elsewhere. The editor requires to know three things:

1. What sections to remove and why they should be removed.
2. How to precisely locate those sections on a recorded tape.
3. How to cut and then rejoin the tape after removal of the unwanted material.

Dealing with point No. 1 first, let us admit at once that this process of selection is the most difficult of the three tasks. As soon as we start chopping up an existing recording, discarding some pieces and re-arranging others, we have stepped into the world of creative endeavour where technical rules no longer apply and people start talking in terms of “aesthetics.” And if we allow ourselves to be side-tracked into discussions on artistic merit we can go on and on for ever without getting anywhere at all.

Why cut out anything at all from a recorded interview? There are many answers. The successful recorded interview will be pithy, direct and to the point. In the original recording the interviewee may well have talked around the subject. All that irrelevant material must be removed. So first we carefully study the tape to see how much of the recorded comment is what we really wanted and how much is unnecessary chat. Next we listen to our own questions. How many were badly phrased or even unnecessary? All these must be removed or amended. A bad fault with many interviewees (myself included!) is to interpolate meaningless sounds into the interviewee's reply to a question to indicate that we have understood the meaning. These sounds can take the form of grunts, aahs, ums or yeses. They are all unnecessary and should be removed.

Most recorded interviews have to be fitted into a programme slot of fixed duration. This might be, say, three minutes. The original recording might be of any length, perhaps even thirty minutes out of which we have to edit a three minute interview. The process of selection is certainly difficult.

If the enthusiast should be appalled at the thought then he might be encouraged by the one guiding principle that every editor should keep firmly in mind. The more we discard the better will be the end product. Naturally this axiom must be interpreted intelligently, but believe me it is very true. In every recorded interview there will be sections that we particularly like—cleverly phrased questions we are proud of having asked. If they do not add to the objective of the interview then they must be relentlessly removed.

Please turn to page 429

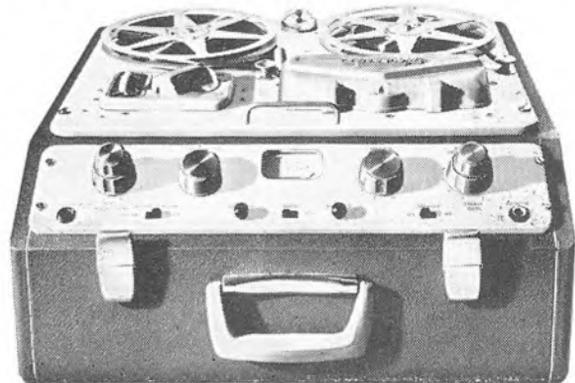
# 631

the incomparable  
*Ferrograph*

The Ferrograph is truly British, built affectionately with finely engineered components mostly of our own manufacture and containing only 2% imported materials. Every component is part of the Ferrograph master plan to make high fidelity in recording an enduring quality. **You'll enjoy moving up into the Ferrograph class.**

**MODEL 631.** Mono recorder/reproducer with additional plug-in head position for stereo playback of pre-recorded tapes, monitoring and other purposes. 95 gns.

Other models: 632 126 gns., 633 120 gns., 634 132 gns. All models available with alternative teak sides for in-building.



All models are available from your  
Ferrograph Centre

**R. E. W. (EARLSFIELD) LTD.,**  
266 Upper Tooting Road, London S.W.17.  
Telephone: BALHAM 9175

*Specialists in quality products by Mail Order*

The coupon will bring you details of all models

R.E.W. (EARLSFIELD) LTD.,  
266 Upper Tooting Road, London S.W.17.

Please let me have full details  
of Ferrograph Tape Recorders.

Name \_\_\_\_\_

Address \_\_\_\_\_  
\_\_\_\_\_

TM 15



Tape has a vital part to play  
in sending

# PICTURES BY WIRE

By DEREK LYONS



The nerve centre at Associated Press, a scene of continuous, bustling activity

Photo by courtesy of Associated Press Ltd.

**N**EXT time you see a press photograph of some dramatic action taking place on the other side of the world spare a thought for the tape recorder that helped to process it. For in the complex, but incredibly fast, link that allows a photograph taken at, say, a Detroit baseball game to arrive within the hour on the desk of a London newspaper editor as a finished print, the tape recorder has a vital part to play.

At the offices of Associated Press, an American-owned news agency, I saw the nerve centre where pictures (press photographs are always called "pictures") are received and wired to papers in England and around the globe. Two large tape recorder consoles dominate this basement room festooned with wires and switchboards, abuzz with beeps and reed-thin voices coming over the ether. One might be forgiven for wondering what place tape recorders have in this photographic complex. Their size commands a certain respect, even before one is told they each cost more than £2,000. The firm who manufacture them are specialists in this sphere of photos by wire. To understand the process it is necessary briefly to describe what is involved in the transmission of photographic material by line or radio, a process that has revolutionised the speedy publication of topical pictures that would lose much of their impact if they appeared in tomorrow's newspapers instead of today's.

At Associated Press the tape recorder is an essential part of this high-speed traffic because it enables pictures (or the signals that will eventually produce the pictures) to be "stored." Apart from the chap who originally clicked the shutter, the two other vital components in the chain are sending and receiving photographic instruments linked by telephonic line. Over this line come the beeps that I referred to earlier. Their variation in pitch is the factor that dictates the light or dark shades appearing on a special paper revolving on a drum, scanned by a photoelectric cell. Tones at 15,000 Hz

generate too little current to mark the paper and it is therefore left white; but as the tones rise up the scale to the highest at 23,000 Hz so the shades grow darker. Thus, a black-and-white photograph with the necessary gradation of black, and not-so-black, tones is built up.



The Mufax tape recorder console, reproduced by courtesy of Muirhead & Co. Ltd., Beckenham, Kent

At an agency like Associated Press, where the traffic is very heavy, some method of storing signals is essential. But reliability is paramount. The slightest variation in speed, tape stretch, or "cleanliness" of the original signal will impair the eventual quality of the photograph. Associated Press claim that the Muirhead tape recorders they employ are so superbly engineered that there is absolutely no difference between a

photograph that has been "stored" and later transmitted to one transmitted direct without this intermediate stage. A normal tape is used, wound on 8½-inch spools, but its oxide coating is protected by an additional, sealed-in, layer that prevents oxide being deposited on the heads of the recorder. So effective is this "sandwich" tape that A.P. say they seldom needed to clean the recorder's tape channel more than once a month, and this only as a routine precautionary measure.

The beeps necessary for the transmission of three separate pictures can be stored on one of these 8½-inch spools, two tracks being recorded simultaneously across the entire tape width. On one track are the beeps of varying pitch; on the other the synchronisation and phasing signals which ensure that the Muirhead photo receiver (enslaved by the tape recorder signals) will revolve at the precise speed that the original transmitting unit employed.

These recorders, costing £2,300 each, are tailor-made and rarely more than six are produced annually. United Press, Cable and Wireless, and the Meteorological Office are among the select band who use them. Weather charts, which once had to be laboriously sent by teleprinter in plain language, can now be transmitted in their original form complete with isobars and other symbols in the same way as photographs, and similarly the information can be stored on tape until it is required.

Because of the immediacy of news A.P. seldom keep pictures on tape longer than twenty-four hours. The tape transport, with infinitely variable rewind facilities, operate at the unconventional speed of 11.8 inches per second to handle the frequency generated when an F.M. signal is used. It takes only 75 seconds to rewind 1,800 ft. With modern technology advancing apace the day may come when it will take no longer to receive and print a picture taken in Barbados!

A good exercise is to see if one can remove as much of the interviewer's voice as possible. Even, perhaps, all of it. Remember that the purpose of the interview was to collect a commentary from other people, not to give the interviewer an excuse to hear the sound of his own voice. All questions that are left in the finished tape should be concisely and clearly expressed. And it goes without saying that the answers should follow logically on.

Having mentioned a code of ethics for interviewers we must mention the moral trust that the editor exercises. It is a very simple matter to edit a tape in such a way that the interviewee appears to express opinions that differ from those obviously intended in the original recording. Although this might be regarded as harmless fun or even a party trick when practised amongst friends, the editor must always do everything in his power to retain the original sense and meaning of a real interview. Deliberate distortion of recorded statements is an immoral and vicious act which would, I am sure, never be considered for one single moment by readers of *TAPE Recording Magazine*.

The location of the precise position of any given recorded passage on the tape is a fascinating occupation which calls for a certain amount of experience. As the best way to learn is by actually doing the job, and as that is the only way of acquiring experience, I am going to suggest that we try a little experimental editing. If we were to take an old piece of scrap tape and record on it a numeric sequence by counting into the microphone from 1 to 10 we could then play around by cutting numbers out to break the series, and we could then try reinserting them out of their correct order. Playback of edits of this kind will immediately reveal their success or failure.

This is an exercise I have carried out many times before classes of students. It usually raises a good laugh towards the end when they realise how cunningly I had stacked the cards in my own favour so that the edits are virtually bound to be right. But this is all part of the lesson, so I am going to suggest that you follow my example. When preparing an exercise tape such as I have suggested, *always use the fastest available speed on the machine and always leave a brief pause between each spoken word*. And do remember that whenever tape is to be cut one track only should be recorded; the three other tracks in a quarter-track system or the single other track in a half-track system should be blank.

The method used for locating particular sounds will depend upon the kind of tape recorder in use. There are two methods, first which we might call "professional" is the most accurate, but it can only be employed on a tape recorder where the playback function can be engaged without the capstan or spools revolving. So check your own equipment to see if this condition is possible; if it is you have an ideal machine for all forms of editing—if not you will have to use the alternative method which will be described in a moment.

Now we know that recordings are registered on the tape in the form of magnetic pulses which reproduce the original sound when passed at the correct speed across a playback head. If we take our experimental tape and pull it slowly by hand across a live playback head we shall still hear the recording but it will not sound anything like its original form. Because the speed is very much slower there will be an extreme drop in pitch and the sounds of speech will be expanded into the most peculiar, long-drawn-out, guttural noises. If the tape is "inched" slowly enough these very weird noises will be quite unintelligible to the listener. If the motion of the tape is speeded up the intelligibility becomes apparent; if a tape is passed very rapidly across the head we can even achieve a reverse effect with an increase in pitch.

Take just one sound on our tape, say the recording of the number "two" and pass it by hand across the playback head several times at different speeds. Particularly note the slowest speed at which the word is still intelligible. The pronunciation of the word "two" begins with the explosive consonant represented by the letter "t." You will find that this point can be picked out very easily indeed. The silent period between numbers "one" and "two" will be represented by almost silent tape. If a whistle should be present don't worry about it. This will be the supersonic bias signal which becomes audible only when tape speed is greatly reduced. As we come to the beginning of the word "two" we will hear a definite point at which a crashing low frequency sound is audible. These are the very first modulations of the recording of that word, and their position on the tape must be that particular spot which is then immediately opposite the centre of the playback head.

Having established that point we next have to clearly mark the back of the tape so that we know where to cut. The shiny side of tape will not hold a mark from an ordinary pencil or pen. Professionals all mark tape very simply by using what are known as Chinagraph pencils. Available in a number of different colours, these excellent pencils are exceedingly useful and can be purchased for a few pence each from any good class stationers. Every recording enthusiast should own a good selection of them; they

Please turn to page 431

# 632

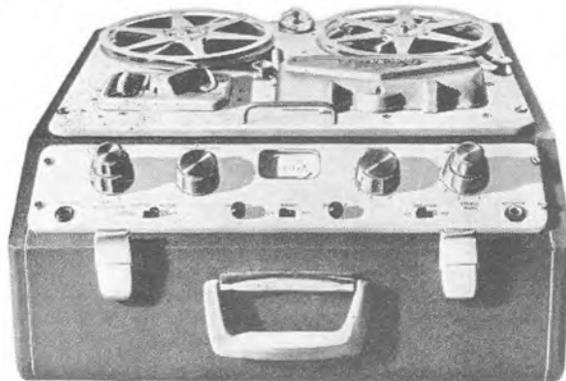
the incomparable

## Ferrograph

The Ferrograph is an instrument of impressive excellence—impressive in the high quality of its recording, and in its reliability through years of exacting use. That's the way we build it. The way we always have built it! **You'll enjoy moving up into the Ferrograph class.**

**MODEL 632.** Stereophonic, with separate record, replay heads and amplifier systems (2 record amplifiers and 2 playback pre-amplifiers) and an output monitor stage with built-in speaker. 126 gns.

Other models: 631 95 gns., 633 120 gns., 634 132 gns. All models available with alternative teak sides for in-building.



All models are available from your  
Ferrograph Centre

### NUSOUND TAPE RECORDER CENTRE

82 High Holborn, London W.C.1.

Telephone: CHANCERY 7401.

For all Hi-Fi products—particularly Ferrograph  
This coupon will bring you details of all models.

NUSOUND TAPE RECORDER CENTRE

82 High Holborn, London W.C.1

Please let me have full details  
of Ferrograph Tape Recorders.

Name \_\_\_\_\_

Address \_\_\_\_\_



TM 15

# VIDEO NEWS

Denis Gilbert Reports

**J**UST twelve months ago, in October 1966, *TAPE Recording Magazine* featured the very first amateur experiments in Video recording. These were fully reported in our issue of that date. Since then we have seen the arrival in this country of the Sony video equipment which sells at a total cost of approximately £500, including camera, video tape recorder and monitor screen. Anxious to be first to handle what we regard to be both a new medium and a new means of expression, we now feel that although we performed a useful service in publicising the possibilities of video recording we were perhaps premature in anticipating a rapid growth of amateur interest. Naturally the cost of the equipment has been a restraining influence.

All our first experiments involved the use of video tape recorders operating on the helical scan principle. As we then explained, this requires a fast rotating head assembly to achieve the necessary tape speed across the head that must be reached if video frequencies are to be recorded. So it is with great surprise and interest that we now learn of a new video tape recorder about to be introduced into the U.S.A. which employs a fixed head as used in audio applications.

The new machine is the AKAI VX1200, and we learn from the States that first deliveries should have been received by the end of this year. It is rather strange that we have not heard of this development before, because audio enthusiasts will realise the significance when we point out that it has only been found possible to record the very high video frequencies satisfactorily in this way through the use of the much publicised AKAI Crossfield Head system. Early fixed head video machines had tape speeds of 200 ips, or more; the AKAI VX1200 uses speeds of 30 or 45 ips. This may seem to be inordinately fast to those used to working at  $1\frac{1}{8}$  ips—in fact it is a very remarkable achievement. We would have thought that the existence of this equipment would do much to substantiate the manufacturer's claims of extended frequency response through the Crossfield Head bias system. There are doubtless many advantages in using the fixed head as opposed to the rotating assembly, although these must obviously be paid for in the cost of the extra tape that will be used for any given programme time. In our opinion tape cost, quite apart from equipment cost, is likely to prevent this particular machine from successfully appealing to amateur users in this country, but it does perhaps point the way towards the future.

In one of his "Tape Trends" editorials Douglas Brown suggested that the breakthrough in home video might take place when the system is capable of reproducing



The uses for video equipment are legion. Here we see one of the latest equipments, the Shibaden, marketed by Thermionic Products Ltd., of Hythe, Southampton, being used in a sports school. By recording the golf swing the pupil can immediately see faults when the tape is played back. Similar techniques can be used in almost any training programme, whether for sport, industry or professional education.

One of the advantages of Shibaden equipment is the ability to stop the tape on replay and so "freeze" the action at any required point. The tape itself, 2,400 feet, half-inch wide on a 7-inch reel, can give uninterrupted programme times of up to 70 minutes which is longer than most educational films. Another typical use is in security applications in banks, stores, or even traffic black spots

full colour. Obviously such a development is in the fairly distant future. When it comes it will present serious rivalry to conventional cinematography.

But now we have news of a completely new development based upon a very different approach to the problems of video reproduction. It is claimed that by the use of this new system it is possible to show on conventional domestic television sets pre-recorded material from either cine film or video tape at low cost for the first time. Called EVR, Electronic Video Recording and Reproduction, the system is to be marketed in the United Kingdom by a partnership of leading companies; Imperial Chemical Industries Ltd., Columbia Broadcasting Systems Incorp. of America, and C.I.B.A. Limited of Switzerland. The fact that concerns of such standing and repute are joining together in this enterprise will underline its significance.

There are three main stages in the system:

(1) Pre-recording: a sophisticated electronic process transfers any film or video tape programme to a special 8.75 mm. unperforated thin film.

(2) Cartridge: the film is then stored in a cartridge 7 in. in diameter and approximately  $\frac{1}{2}$  in. thick.

(3) Reproduction: the cartridge is inserted into a player attached to the aerial terminals of the television receiver and is then automatically "played" on the television screen.

The player is not a video tape recorder. The film cartridges it plays will be made only in processing facilities specially designed for that purpose. Eventually, equipment will be available combining the player and television set into a single integrated unit.

EVR is a system which claims to combine optics and electron physics technology to produce inexpensively and in large quantities cartridges containing video and audio information. Not only has it been demonstrated that a great deal more pictorial and sound information can be stored on the EVR cartridge than is possible on a reel of magnetic tape of the same diameter—and at much lower cost than with conventional cine or magnetic tape techniques—but by this system colour is recorded as black and white and yet reproduces in full colour when played back via a colour television set.

Operation is said to be extraordinarily easy. The cartridge is inserted into the player where it is automatically threaded, "played," rewound and ejected. The player, which is roughly the size of a domestic tape recorder, is attached externally to the TV set. One player can be made to operate a number of sets simultaneously if required.

A great advantage of the system in educational application is the ability of projecting a single frame for prolonged periods of time at will. The player itself is fully portable and can be used without special dark-room facilities or screens. The first full-scale application of EVR will be in England using existing black and white receivers. As soon as there is sufficient demand for colour television, colour EVR programmes will be marketed. EVR programming, colour and black and white equipment will be demonstrated next spring; cartridges and players will be available in the spring of 1969.

Ilford Limited, a jointly owned subsidiary of I.C.I. and C.I.B.A., have been collaborating with C.B.S. laboratories on the development of the specialised film required for this system. The pre-recorded cartridges will be made on a high speed plant to be erected in one of Ilford's works in the U.K. Prototype production players will be manufactured by Thorn Electrical Industries.

Is this, then, the final breakthrough which will link cine and video, but which will dispense entirely with the video tape recorder? In the future the owner of EVR equipment will be able to show his colour films on his domestic colour television set instead of using a projector and screen. But the problem of sound-track will still remain. If a silent film is sent for processing into an EVR cartridge, then that cartridge will be reproduced silently. It will still be necessary to employ all the basic audio techniques—including synchronisation—to avoid what would otherwise be "silent television." Although one might endure watching the projection of amateur cine film without a sound-track, no one is likely to put up with a silent television programme.

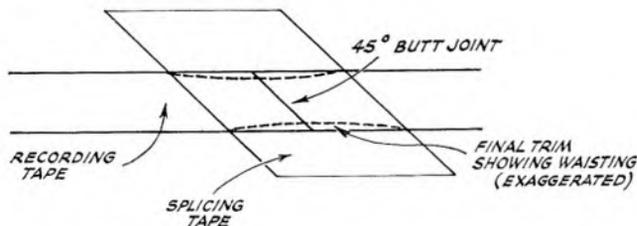
With conventional VTR equipment it is necessary to transport the recorder with the camera; using the new system an ordinary cine camera can be used quite independently of any other equipment. That advantage alone will weigh very heavily in its favour. This new system could well herald the shape of things to come in future audio visual applications. We shall keep readers in touch with events as they occur in this rapidly moving field.

are invaluable for all sorts of other purposes including marking spools. One advantage of the Chinagraph pencil is that it not only leaves a clear mark on any shiny surface, but the mark can be very easily removed at will. The last time I bought them they cost me about 9d. or 10d. each, and they are well worth every penny of it.

So taking our Chinagraph pencil we can easily mark the back of the tape at the point where the first modulations of the word "two" begin. In the same way we can find the end of the word by continuing to inch the tape past the head. The other recorded sounds can be similarly marked. These are the reference points for actual cutting. In practice it will be found more simple to locate, mark, cut and join, instead of marking up all the reference points for future cutting.

Once one knows where to cut there is nothing easier than the actual cutting and splicing process. A number of appliances are available to assist in cutting and joining neatly. The best (and incidentally the cheapest) of these is in the form of a metal block carrying a simple groove in its upper side into which a tape is pressed. Slots in the metal block guide an ordinary razor blade so that it will either cut directly across the tape at an angle of 90 degrees, or alternatively will make an angled cut of 45 degrees. These are the two most frequently used splicing cuts. The best of these is the 45 degree angle because when tape is cut and spliced in this way it will pass more easily over the heads. The 90 degree cut should be reserved for use only on tapes that have been recorded in stereo. It will be appreciated that where both stereophonic channels have to be cut in an identical spot then the 90 degree cut must be employed.

The procedure for removing an unwanted section of recording is to mark the cutting points as described above, to use one of the several splicing tools available, to cut the tape and then to butt the two edges to be joined together and to complete the splice by applying a short length of specially made splicing tape. The use of proper splicing tape is strongly recommended; many amateurs try to make do with ordinary transparent adhesive tapes such as Sellotape, but this should only be used as a temporary emergency measure. Although Sellotape will make a good firm joint it will tend to get sticky on its outer surface and in a short time will begin to pull away the oxide from the turn of tape immediately overlying it. Proper splicing tape may appear to be expensive—6s. or 7s. for a small spool—but remembering that we only use about an inch for every splice its relative cost is really so small as to be insignificant.



The technique of splicing is very simple once it has been mastered. Our diagram shows two 45° cut edges butted up together with a piece of splicing tape laid on top. The dotted lines indicate the line of the trim. This work must be done on the back of the recording tape

Whatever splicing tool is used the two newly cut edges that are to be joined must be butted up together as perfectly as possible. They should not overlap, neither should they have an open space between them. A short length of splicing tape is then laid diagonally across the open joint and pressed firmly into position with the thumbnail. Using an ordinary razor blade the two edges are trimmed to remove surplus splicing tape, and when this is done the splice should be "waisted." Instead of just cutting away the bare excess of splicing tape we cut gently but firmly into the recording tape itself to remove just a thin shave in an elliptical form so that the finished splice will show a slight narrowing of width at its centre.

This is the professional method of doing the job and it will help the splice to pass smoothly across the heads. One of the disadvantages of four-track work is that such a splice may either cut into the recorded track or may prevent the tape riding accurately through the guides. If four-track recordings are to be spliced then the very greatest care is necessary.

Please turn to page 433

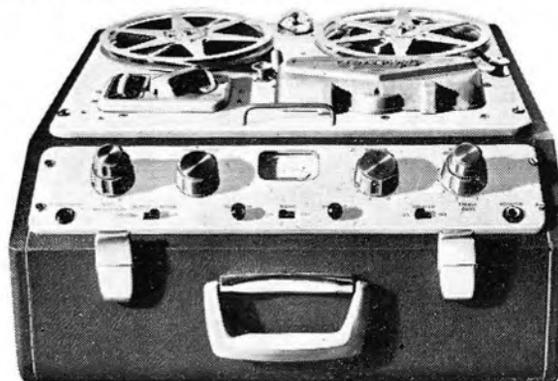


the incomparable  
**Ferrograph**

We have never claimed perfection for the Ferrograph, but we believe it comes nearest of all to the unattainable. Superbly engineered, with a specification that will withstand any test or evaluation, the Ferrograph adds enduring reliability to faithful recording. You'll enjoy moving up into the Ferrograph class.

**MODEL 633.** A monophonic recorder made, in limited numbers, for the connoisseur and professional. Guaranteed for 3 years and carrying a test certificate covering all important specification measurements. 120 gns.

Other models: 631 95 gns., 632 126 gns., 634 132 gns. All models available with alternative teak sides for in-building.



All models are available from your Ferrograph Centre in

**Newcastle upon Tyne**

**TURNERS (NEWCASTLE UPON TYNE) LTD.**

Camera House, Pink Lane, Newcastle upon Tyne 1.

Telephone: 25391

For everything Sound

The coupon will bring you details of all models.

TURNERS (NEWCASTLE UPON TYNE) LTD.,

Camera House, Pink Lane, Newcastle upon Tyne 1.

Telephone: 25391

Please let me have full details of Ferrograph Tape Recorders.

Name \_\_\_\_\_

Address \_\_\_\_\_



# CROSS TALK

## By Audios

**B**Y the time these words are in print we shall have begun to experience the new BBC sound radio structure. It will take a little while to get used to referring to programmes as Radio 1, Radio 2, Radio 3 and Radio 4. The new programme, Radio 1, is likely to provoke most discussion; this is the service that will provide almost non-stop light or pop music and is intended to fill the breach that has been left by the scuttling of the pirates.

Having listened to "commercials" broadcast on the good old Light Programme advertising Radio 1, I am filled with misgivings. These announcements are not spoken—they are shouted at the poor unfortunate listener in pseudo-American style accent. We are not asked to listen we are told to listen. To my mind this is very, very bad radio. Very bad radio indeed.

In his day Lawrence Gilliam was one of the greatest exponents of the art of sound radio. He never tired of pointing out that radio transmission should be regarded as a private message addressed to the cavity of the inner ear of the listener within the sanctity of his own home. Shouting and bawling, coupled with the use of foreign styles and accents, can only be offensive at the point of impact. The BBC has a well-earned reputation for providing one of the finest—if not the finest—broadcasting services in the world. It is to be hoped that they are not going to debase their standards and offer on Radio 1 a feeble copy of a poor transatlantic pattern. As every amateur knows only too well the microphone will always reveal the slightest hint of insincerity. The transparently hypocritical poses of certain disc jockeys is mercilessly revealed to the discerning listener, so please let us produce Radio 1 as a British programme for British listeners.

At the other end of the scale we have news that the University of the Air, or Open University as it is now to be called, will come into being late in 1970. This will be a joint co-operative effort with sound and television both taking part together with correspondence colleges. Once it gets going the medium of recorded sound is going to play an immensely important part, both from the point of view of the instructor and the student. The new university will confer degrees in academic subjects that will be as valuable

as those earned at the more conventional existing institutions. I can foresee enormous possibilities for this brilliant concept. Not only will it attract very large numbers of students, but those students will undoubtedly derive great benefit from recording their broadcast instructional material. Cassette equipment will be ideal for this purpose. What a pity we have to wait nearly three years before it begins.

*RECENT remarks of mine about audio analgesia have provoked a lively correspondence. One of the most interesting came from reader C. S. Kennedy, of Aberdeen. He asks if the principle could not be reversed? He quotes an example of a well-known pop group who performed at a local dance.*

*Apparently five minutes before they appeared a high-pitched whine was heard from their electronic equipment. No attempt was made to correct it and the sound continued throughout the performance, becoming almost painful. During their act several young girls broke into tears and some became hysterical. Mr. Kennedy suggests that if sound can be used to relax and anaesthetise people why should it not be used to induce mass hysteria? As he says himself, the mind does indeed boggle at the possibility.*

**R**EMEMBER the old Walter 101 tape recorder? Many of these machines are still in use and many more have probably been put on one side because of the lack of spare parts. I now hear from C. Braddock Limited of 266, Waterloo Road, Blackpool, Lancashire, that for a limited period they will be able to supply pressure rollers for this machine. Any Walter owners stuck for this spare part should contact this firm immediately.

Braddocks also mention that they are the sole UK agent for the long obsolete Saja range of tape recorders. Although spares are becoming more and more rare they still have many items in stock and can undertake service. It's very nice to know that at least one firm really does bother about owners of obsolescent equipment.

**M**Y notes on the lack of evidence of sales of British tape recording equipment on the Continent are reinforced by the 1966 trade figures just published for Kenya. I mentioned last month that the manufacture of cameras in this country is now virtually non-existent. Total imports of cameras into Kenya for the year 1966 are quoted as £131,919 of which the UK share was just £376. Looking down the list we find that the Kenyans spent rather less on tape recorders, the total being £123,114. Of this the UK share of the market is quoted at £4,758. According to my arithmetic this is something under four per cent. Is the British tape recorder industry really going to go the same way as the British camera industry?

I put these points to Mr. Williams of Wil-mex Limited, exporters of Ferrograph

equipment. He assured me that Ferrograph tape recorders are established in educational applications in Kenya and they are hoping to exhibit at a British Sports and Leisure Goods Show in Nairobi to be held in May next year. That's good news, but can't we improve on the miserable four per cent of sales achieved last year?

**T**HE life of a service manager is not easy. If he should happen to be conscientious then his life is likely to be as short as it is difficult.

I heard of one case recently of a service manager who could not trace the fault causing an alarming increase in background noise occurring in one of his customer's machines. The customer's tapes—all of birdsong recording—clearly demonstrated the fault; recordings taken in the workshop were absolutely free from this obtrusive background interference. The problem seemed insoluble until in desperation the service manager spent the night at the enthusiast's home. After rising at 4 o'clock in the morning he watched him operating. Sure enough the birds were singing and a good recording was produced—complete with the offensive background noise. But the service manager was happy. His efforts had enabled him to successfully trace the fault. What was it? Trains on a railway line half a mile away. . . !

**W**HAT is a guarantee worth? When we have spent hard-earned money purchasing equipment from which we expect to derive continued pleasure and enjoyment we look to the manufacturer's guarantee for protection. If the equipment we have bought should cease to function and cannot be repaired then our money is lost. We might just as well have thrown it down the nearest drain.

One reader recently wrote complaining bitterly that he had been refused service on his brand new machine by the local agent. He had been told that because he bought the equipment below list price the guarantee was not valid.

This is absolute nonsense and I do hope that none of my readers will be misled in this way. Manufacturers can no longer compel retailers to sell their products at fixed prices; instead they can only recommend retail prices. The shopkeeper is free to charge the public whatever he wishes. Under this new arrangement any clauses in guarantees excluding equipment purchased other than at "full list price" are automatically invalidated. The price you pay for your equipment should not affect the manufacturer's guarantee.

One word of caution however. Some retailers may be offering goods at extremely low selling prices on the explicit understanding that they will not themselves afford free servicing facilities. It is my belief that this in no way affects the manufacturer's original guarantee. This is a most interesting point and I would welcome comment from both manufacturers and retailers.

The place, Clydebank. The date, Wednesday, September the 20th. Present: H.M. The Queen, H.R.H. Prince Philip, H.R.H. Princess Margaret, one hundred thousand other people and the Q4 poised on the stocks. All was ready for the most momentous occasion in our maritime history.

At that moment (according to a "Daily Telegraph" report) an official tested the microphone on the launching platform and found it was not working. Was this very nearly another "Day When Everything Went Wrong?"

## TECHNIQUES—Contd. from page 431

For permanent splicing the final touch should be the very lightest application of French chalk (talcum powder) to the back of the splice. This will ensure that there is no danger of sticking. The actual implement used for both cutting and trimming will depend upon the splicing tool used. Some splicing kits include a pair of non-magnetic scissors. If we use any metal instrument to either cut or trim the tape there is a danger of actually recording a click at the point of the splice. Personally I always use one of the ordinary, single-edged, type razor blades, but this is always defluxed before use to ensure that it is magnetically inert.



Most tape manufacturers market "Splicing Kits." The one shown is sold by BASF and is a comprehensive kit which included automatic splicer, spare knife, 4 tape clips, stop foils, splicing tape, 3 leader tapes, spool labels and marking pencil. Price complete is 52s. 6d.

If the splicing process sounds complicated then that is only because even simple things appear difficult when set down in print. It is not unusual to carry out these operations literally hundreds of times in a single recording. Although first attempts might take several minutes, it will be found that with practice splices are very quickly and easily made.

How can we locate reference positions on recorded tape if it is not possible to inch the tape past the playback head in the manner described? It *can* be done, but it will be with less precise accuracy than is possible by the method already prescribed. Having recorded the tape at the fastest possible speed as suggested, try playing it back at the slowest speed on the machine. The sounds emitted by the loudspeaker will be only just intelligible and they will take the form of extended low frequency noises. Try using the brief pause control if one is available (alternatively the stop key) and practice stopping the tape exactly at the beginning and end of each sound. It will soon be found that it is possible to anticipate and to stop at just the right place.

Assuming access to the heads for tape marking is not conveniently available, it's a good plan to inscribe a standard reference measurement on the deck of the machine itself. To do this it will be necessary to uncover the heads on just one occasion. With the heads exposed place a length of tape in position in the sound channel and carefully mark the back of the tape at the centre of the playback head and at any other exposed point on the deck that you care to use as a reference point. This could be at a tape guide or other permanent fitting. Having measured this length cut a piece of ordinary zinc oxide sticking plaster to this precise measurement and stick it in a convenient position along the front of the main deck panel. Whenever editing is to be performed the tape is stopped at the appropriate point by means of the brief pause control as described, and then the back of the tape is marked at the reference point on the deck. If the tape is now removed from the sound channel and laid on top of the zinc oxide standard marker with the reference mark at one end, the point on the tape at the other end of the standard will be the exact position to cut. The cutting mark is then applied and editing proceeds in the normal fashion. In many ways this is often a simpler method of marking tape than actually applying the Chinagraph to the tape in the sound channel.

Now we can come on to some finer points of editing. We described marking the recorded sound of the word "two". It may be that this was preceded in the recording by the intake of breath. If this should be so the sound of breath being drawn in will be heard on the tape and should be retained with the number two when it is cut out.

If you were to be asked what was recorded on your original tape I am quite sure you would say the sounds of the words, "one, two, three, four . . . ten". This would really be only half true. What you actually have recorded on that tape is: "one, pause, two, pause, three, pause, four, pause . . . ten". If we were just to cut out the word "two" and reinsert it immediately after "three," our tape would then play back: "one, long pause, three-two, pause, four, pause . . . ten". In editing we have to deal realistically with silences as well as sounds. If we wished to remove the sound of the number "two" and still maintain the rhythm of the series we should have to cut half-way between the end of "one" and

Please turn to page 435

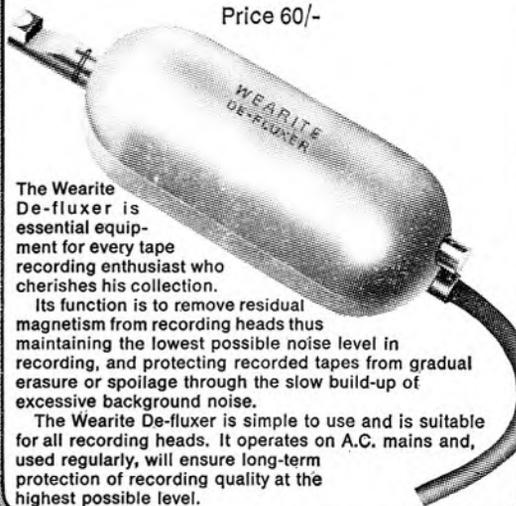
# A Gift to delight every tape recording enthusiast

(leave this page open where your wife,  
favourite aunt or girl friend can see it).



## The Wearite de-fluxer

Price 60/-



The Wearite De-fluxer is essential equipment for every tape recording enthusiast who cherishes his collection.

Its function is to remove residual magnetism from recording heads thus maintaining the lowest possible noise level in recording, and protecting recorded tapes from gradual erasure or spoilage through the slow build-up of excessive background noise.

The Wearite De-fluxer is simple to use and is suitable for all recording heads. It operates on A.C. mains and, used regularly, will ensure long-term protection of recording quality at the highest possible level.

From all good tape recorder specialists or  
The Ferrograph Co. Ltd. 84 Blackfriars Road,  
London, S E 1 Waterloo 1981.

TM 15

# MUSIC CASSETTES

"In our opinion the sound quality obtained from Musicassettes will be better than that obtained from their disc equivalent if the discs are produced other than under the very best conditions."

*Tape Recording Magazine—July, 1967*

## NEW RELEASES INCLUDE:

The first piano concertos on musicassette; outstanding performances!

**FRANZ LISZT CPC0008**

Piano Concerto No. 1, in E flat  
Piano Concerto No. 2, in A  
Sviatoslav Richter, piano  
London Symphony Orchestra  
Conductor: Cyril Kondrashin



Haitink, now resident conductor of the London Philharmonic Orchestra, gives a supreme rendering of this popular work.

**MENDELSSOHN CPC000**

A Midsummer Night's Dream, Op. 21

Overture (1826);

A Midsummer Night's Dream, Op. 61

Incidental Music (1842); Scherzo; Fairies' March; Song with Chorus; Ye spotted snakes; Intermezzo; Notturmo; Wedding March; Funeral March; Dance of the Clowns; Finale: Through this house give glimm'ring light

Rae Woodland; Helen Watts; Women's voices of the Netherlands Radio Chorus

Concertgebouw Orchestra, Amsterdam

Conductor: Bernard Haitink



This recording was much praised when issued on disc.

**MOZART CPC0012**

Concerto for Flute, Harp, and Orchestra in C, K.299 (Cadenzas: Marius Flothuis) Hubert Barwahser, flute; Osian Ellis, harp

London Symphony Orchestra  
Conductor: Colin Davis

Clarinet Concerto in A, K.622  
Jack Brymer, clarinet  
London Symphony Orchestra  
Conductor: Colin Davis

One of the finest soundtrack albums ever!

**PORGY AND BESS 40-70007**  
An original soundtrack recording

Overture; Summertime; A woman is a sometime thing; The wake; Gone, gone, gone; Porgy's prayer; My man's gone now; I got plenty o' nuttin'; Bess, you is my woman now; Morning; Catfish row; I can't sit down; It ain't necessarily so; I ain't got no shame; What you want with Bess; Street cries; Strawberry woman; Crab man; I loves you, Porgy; A red-headed woman; Clara, Clara; There's a boat that's leavin' soon for New York; Oh, where's my Bess?; I'm on my way



The first musicassette of Christmas music. A best seller on record!

**HARRY SECOMBE**  
with orchestra and choir  
directed by  
**WALLY STOTT**

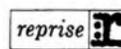
**CHRISTMAS CHEER CPP1050**

Here we come a-wassailing; While shepherds watched their flocks; The first Noel; Good King Wenceslas; Once in Royal David's City; O Come All Ye Faithful; That's what I'd like for Christmas; The holly and the ivy; Mary's boy child; Silent night, Holy night; God rest ye merry gentlemen; White Christmas

Possibly the finest Sinatra album, with a Latin flavour, following on the success of CRP350, 357 and 358.

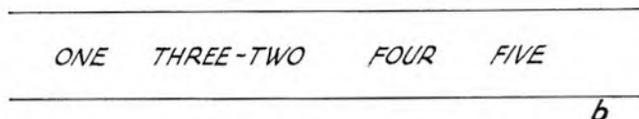
**FRANCIS ALBERT SINATRA/ ANTONIO CARLOS JOBIM CRP361**

The girl from Ipanema; I concentrate on you; Change partners; Quiet nights of quiet stars; Meditation; If you never come to me; How insensitive; Dindi; Baubles, bangles & Beads; Once I loved



For full details of other musicassette releases, please write to:—Musicassettes Department, Philips Records Limited, Stanhope House, Stanhope Place, London, W.2

the beginning of "two," and then half-way between the end of "two" and the beginning of "three". On splicing we should then join two half-pauses together make one full pause and playback would give us: "one, pause, three, pause, four, pause . . . ten". Similarly if we wished to reinsert number "two" out of sequence, say between "three" and "four," we should have to cut half-way between the end of "three" and the beginning of "four". This would then give us: "one, pause, three, pause, two, pause, four, pause . . . ten".



The diagram at (a) shows, schematically, our experimental tape with its recorded numeric sequence. Dotted lines at TWO indicate cutting points for removing that one word. We see at (b) what happens if we re-insert TWO immediately after THREE. From this we learn the importance of "silence" (really recorded background noise) in creative editing

From this we have learned that silences are as important as sounds. Also important are the inflections used when the words were first spoken. If as commonly happens our series of numbers had been recorded with the voice ascending and then descending in pitch, it would be immediately obvious that the tape had been doctored when we hear the sound of the number "two" between numbers "three" and "four" because the pitch of the voice would not agree with the context. Similarly with accentuation; we might successfully cut a word out of a sentence and reinsert it elsewhere, but if it does not have the correct inflection to suit its new position then it will sound quite wrong.

Splicing and editing is one of the few activities that can be indulged in without spending very much money. All we need is a few lengths of scrap tape, a razor blade, a few Chinagraph pencils and a splicing block. We are ready to go at a cost of less than 20s. And with these simple tools we can begin to make really professional recordings.

If it should still not be clear why you were asked to record at the fastest speed available on the machine then try recording at a really slow speed and then see if you can accurately locate the positions on that recorded tape. Because each sound takes proportionately less space on the tape and, perhaps more important, because every pause is also reduced in length in proportion, it will be found exceedingly difficult to separate words and to mark accurately. Even when recording at fast speeds one is sometimes in difficulty. In ordinary conversation we do not articulate each word completely, deliberately and separately, but tend to run one word into another. A string of words so joined together can be very difficult indeed to sort out. This again is why we start practising with words spaced by regular pauses.

The expert can do the most fantastic things with razor blade, splicing tape and splicing block. For instance, these are the tools in most frequent use in an establishment like the B.B.C. Radiophonic Workshop where sophisticated and costly equipment is employed. You would find in the Radiophonic Workshop that every tape recorder has its splicing block bolted in position on the deck plate ready for instant use. Although they must number their splices in hundreds of thousands the methods used are precisely those described. It is as easy—or as difficult—for their technicians as it is for the ordinary amateur working at home.

In this country we don't have to wait very long for a wet Sunday when people say, "What a miserable day. What on earth shall we do now?"

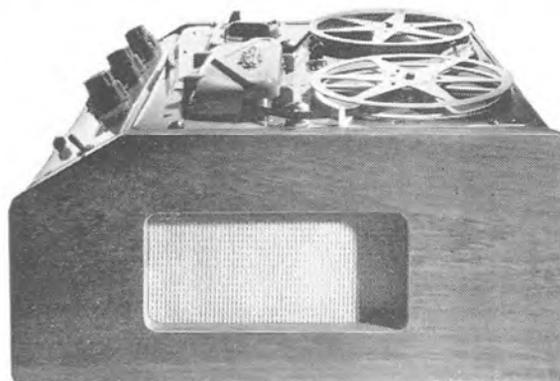
Here's the answer. Start practising splicing and editing techniques. Not only are they great fun but I am sure you will find, as I have, that there is a great deal of personal satisfaction to be achieved in producing smoothly edited recordings. Once one really has the feel for editing it is something that is never really forgotten. The skill will always be retained and through it you will find the door has been opened that will allow you to produce either contest entries or even professional recordings to the highest standard.

# The incomparable Ferrograph now with teak trim

All Ferrograph tape recorders are available with a graceful and strong teak-sided housing. This pleasing variation from the standard finish—at no extra cost—is particularly suitable as a component in a hi-fi installation as a free-standing module.

You'll enjoy moving up into the Ferrograph class!

MODELS: 631 95 gns., 632 126 gns., 633 120 gns., 634 132 gns.



All models are available from your Ferrograph Centre in

**Bury**  
**J. SMITH & SON**  
184 The Rock, Bury, Lancashire.  
Telephone: 1242.

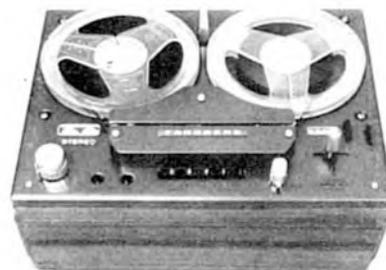
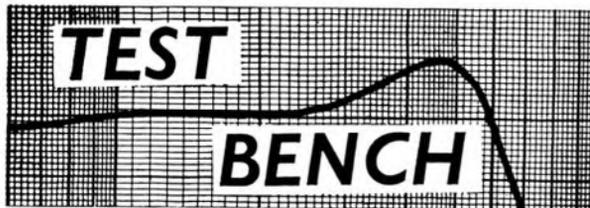
For personal Ferrograph Service

The coupon will bring you details of all models

J. SMITH & SON  
184 The Rock, Bury, Lancashire.  
Please let me have full details of Ferrograph Tape Recorders.

Name \_\_\_\_\_  
Address \_\_\_\_\_

TM 15



# TANDBERG 64-X

INVESTIGATED BY R. HIRST AND D. KILLICK

## MANUFACTURER'S SPECIFICATION Tandberg 64-X

Power Supply: 110, 125, 200, 220 and 245 Volts, 50 Hz AC. U.S. model 60 Hz.

Power Consumption: 65 watts.

Recording Tape: Max. reel diameter 7 in. Best quality recording tape should be used.

Tape Speeds:  $7\frac{1}{2}$ ,  $3\frac{3}{4}$  and  $1\frac{7}{8}$  ips.

Speed Tolerance: Relative tolerance (record and playback on same machine)  $\pm .2$  per cent or  $\pm 2.6$  seconds in 30 minutes. Absolute tolerance less than .5 per cent.

Fast Forward and Rewind: Approx. 2 minutes in either direction for 1,200 feet of tape without head wear.

Amplifiers: Two preamplifiers for recording, two preamplifiers for playback and one transistorised centre channel amplifier.

Heads: One each, quadruple erase, quadruple record, quadruple playback and bias.

Record Level Indicators: One electronic beam indicator for each channel with sluggish backward movement. The indicators should just close at three per cent distortion from the tape.

Inputs: Identical inputs are provided for each of the two channels.

Microphone—5 Mohms, 50 mV max. input signal.

Hi-Level—1 Mohms 3 Volts max. input signal.

Lo-Level—100 kohms 200 mV max. input signal.

Outputs: A maximum recorded signal (three per cent distortion from the tape) will give during playback:—

On Centre Channel Outputs 1 Volt with 200 ohm load impedance

On Cathode Follower Outputs 1.5 Volts min. impedance two kohm

On Line Output 150 mV impedance 10 kohms.

Distortion: Record amplifier at max. recording level less than 5 per cent.

Playback amplifier at max. playback level less than .2 per cent.

### Frequency Response:

$7\frac{1}{2}$  ips 20 to 25,000 Hz ( $\pm 2$  dB 40 to 20,000 Hz)

$3\frac{3}{4}$  ips 20 to 18,000 Hz ( $\pm 2$  dB 40 to 15,000 Hz)

$1\frac{7}{8}$  ips 30 to 12,000 Hz ( $\pm 2$  dB 40 to 9,000 Hz)

Signal to Noise Ratio: Weighted measurements on low noise tape:—

$7\frac{1}{2}$  ips 62 dB,  $3\frac{3}{4}$  ips 59 dB,  $1\frac{7}{8}$  ips 56 dB.

Wow:  $7\frac{1}{2}$  ips less than 0.1 per cent,  $3\frac{3}{4}$  ips less than 0.15 per cent,  $1\frac{7}{8}$  ips less than 0.25 per cent.

Crosstalk Rejection: Better than 60 dB.

Dimensions: Length  $15\frac{5}{8}$  inches; Width 11  $13/16$  inches; Height 6  $11/16$  inches.

Weight: 23 lb.

Price: 115 guineas.

Distributors: Elstone Electronics Ltd., Hereford House, North Court, off Vicar Lane, Leeds 2.

TANDBERG 64-X TEST CHART

Frequency Hz	Overall Response dB			Playback Only dB 7 $\frac{1}{2}$ i.p.s.	Crosstalk dB	Distortion		
	7 $\frac{1}{2}$ i.p.s.	3 $\frac{3}{4}$ i.p.s.	1 $\frac{7}{8}$ i.p.s.					
40	-1.2	-2	-2	-1.5	65	2.7%		
50	+0.8	-1.6	-1.8	+0.5				
60	+0.5	-1	-0.5	0				
100	-1.5	0	-1	-1.6				
250	-0.3	-0.3	-1	-0.8				
500	-0.5	-0.3	-0.5	-0.5				
1000	0	0	0	0				
2000	+0.2	+1	+1.6	0				
4000	+1	+1	+1.8	+0.5				
6000	+1.3	+1.6	-0.8	+1.7				
8000	+1.6	+1.7	-2	+1.5				
10000	+1.8	0		+1.5				
12000	+1.8	+0.5		+1.6				
14000	+1.0	+1		+1.8				
16000	-0.5			+0.8				
18000	-0.6							
20000	-2							
Wow and Flutter	0.06%	0.18%	0.28%					
Signal/Noise 40 Hz to 20 k Hz	55dB							
Signal/Noise 1.5 k Hz to 3.5 k Hz	58dB							

NOTES.—The Overall Response figures relate to record and playback. Playback Only relates to the reproduction of a 50 microsecond test tape at  $7\frac{1}{2}$  i.p.s. (N.A.B.), but see text.

For Signal-to-Noise Ratio the tape was recorded at peak level and then the input signal was removed from the record amplifier. By reference to the signal level recorded and the resultant tape noise, the noise voltage was read off, with the tape still in motion. Distortion is quoted against a 1,000 Hz signal recorded at the correct maximum level as indicated by the manufacturers, and the figure is an R.M.S. value.

Wow and Flutter is also R.M.S., the test frequency being 3,000 Hz. Test equipment used includes: Bruel and Kjaer Signal Generator, B & K Frequency Analyser Type 2107, B & K. Level Recorder Type 2305, Marconi Distortion Factor Analyser and Gaumont-Kaylee Wow and Flutter Meter.

ONCE again we find ourselves taking a close look at an extremely interesting piece of equipment. Externally the 64-X is very similar in appearance to the Tandberg Series 12 which we reviewed last April. But there the similarity ends.

The Series 12 is a conventional two-head machine offering stereo record and playback via its own built-in audio amplifiers. The 64-X has no final audio output stage and is therefore intended for use with an existing amplifier and loudspeaker installation. The machine is equipped with separate record and playback heads

and offers "before and after record" monitoring and easy comparison between the signal being fed into the equipment and that coming off the tape. A fundamentally different departure for Tandberg is the provision of a fourth head which applies the bias signal to the rear of the tape. This method of biasing has been widely publicised as giving both an increased frequency response and also improved signal to noise ratio. In this respect it should be noted that the machine under investigation is a 4-track model, the

Please turn to page 438

# THE BIG SOUND

## by Philips, the first name in Cassette Recorders

First came Philips Cassette snap-in simplicity and go-anywhere Portable Cassette Recorders. Then Musicassettes, issued in their hundreds by all the great record companies. Then mains mono and stereo Philips Cassette Recorders. And now Cassette simplicity gets THE BIG SOUND—fabulous playback reproduction through Hi-Fi loudspeakers. Plus Extended-Play Musicassettes with two pops each side. And language-course cassettes. And a 'letterbox' cassette playback unit for your car. All these and lots more exciting Philips Cassette developments are at your Dealer's now—see him and . . . join the Philips Cassette pleasure movement!

### Go-anywhere portables!



There are two battery-operated portable Philips Cassette Recorders, one with a carrying case EL3302 (23 gns); one with a carrying handle EL3303 (27 gns). Complete with many extras.



Both Portable Cassette Recorders are powerful enough to drive an extension Hi-Fi loudspeaker, without a separate amplifier! GL559, 10 gns (plus PT surcharge).

### BIG SOUND IN YOUR CAR



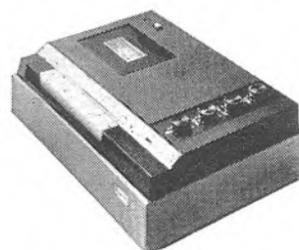
Philips Model 2600 at 19 gns gives the greatest music you've ever heard in your car, completely static-free. Plugs into your car radio, uses car battery power. Just 'post' a cassette or Musicassette into its 'letterbox' opening. *Playback only.*

### Compact Cassette



Just snap-in a Philips Compact Cassette and you're ready for instant push-button recording or playback. Two sizes of Compact Cassette—C60 (60 minutes) at 17/6, and C90 (90 minutes) at 25/-.

### BIG SOUND AT HOME



Philips Mains Mono Cassette Recorder (30 gns) looks great, sounds fantastic. Can also be used to drive a GL559 or other Hi-Fi loudspeaker. For stunning stereo, get Philips stereo Cassette Recorder, now only 55 gns complete with two Philips GL559 Hi-Fi loudspeakers and many other extras.

Learn it all—post this coupon now for the whole fascinating story of Philips Cassette revolution. If you don't know about cassettes, you don't know about recording!

NAME.....

ADDRESS.....

Post to

Philips Electrical Ltd., Dept. TM11  
Century House, Shaftesbury Av.  
London W.C.2.



# PHILIPS

## TEST BENCH—from page 436

$\frac{1}{2}$ -track version, reference 62-X, might be expected to give about 3 dB better figures than we achieved.

We proceeded with laboratory tests in the usual manner and show our results in the accompanying tables. Frequency response readings display a most interesting situation. It will be noted that the overall response, i.e. record/playback, is comfortably within the manufacturer's specification. The reviewer tends to regard the extreme claims of some manufacturers with cynical scepticism; in the case of the 64-X it was found that the manufacturer's claims are justified instead of exaggerated.

It will be noted that the  $7\frac{1}{2}$  ips playback-only figures have been quoted against a standard NARTB calibration tape; this of course is recorded to a 50 microsecond time constant. In fact equalisation in the 64-X is to a 60 microsecond time constant which is half-way between NARTB and CCIR/DIN. This is rather curious and was presumably evolved as a fairly obvious compromise between American and European standards. In practice it means that to achieve a dead flat response very small tonal correction should be applied at the amplifier when reproducing recorded tapes—fractional treble boost for CCIR/DIN or a corresponding top cut for NARTB. The amount of correction needed is so small that it would probably pass unnoticed in most cases, and we mention it only for the sake of strictly impartial accuracy.

For signal to noise ratio measurements we decided to investigate a little more deeply than usual to see if we could establish the true effect of the additional bias head. Throughout the entire audio frequency spectrum from 40 Hz to 20 kHz the least satisfactory reading that could be obtained was 55 dB. This is exceptionally good. Pursuing the matter a little further we investigated the noise level within the frequency range of 1.5 kHz to 3.5 kHz. It is known that this is the most sensitive area for human hearing, and unwanted noise within this frequency range is aurally far more objectionable than the same amount of noise at other frequencies. We found that within this "ear sensitive" block of frequencies the signal to noise ratio was at its least favourable, 58 dB. The implication of this fact is highly significant—it means that the Tandberg 64-X is in this respect performing up to an enviable professional standard and has not been bettered, to our knowledge, on the domestic market.

These figures may appear to contradict the manufacturer's claim for 62 dB, but this is a "weighted" level which bears no relation to our own readings. For the sake of clarity we have ourselves inserted the word "weighted" in our version of the manufacturer's specification on page 432 although this is not quoted in the published literature we have seen.

In the same way we feel that tiny differences in Wow and Flutter figures at  $3\frac{1}{2}$  and  $1\frac{1}{2}$  ips are of no consequence at all.

When considering the distortion level of 2.7 per cent (which was consistent on both channels) wow and flutter at 0.06 per cent RMS at  $7\frac{1}{2}$  ips and crosstalk rejection of 65 dB we can only conclude that we are dealing here with an instrument of outstanding quality at the head of its class.

Passing to the user comments we first noted the very convenient provision of DIN connectors in addition to phono sockets. This appears to be standard practice with Tandberg and could well be followed by other manufacturers. The tape transport system is operated by the familiar single

joystick control which offers a "free" position in addition to fast-wind, fast-rewind and run.

A row of small black push-buttons at the front of the deck panel provide the two record controls, two playback controls, and in the centre a brief-pause control. On the left of the deck are found a pair of sensibly large level controls for recording use only, and on the right a similar pair of smaller knobs for controlling playback volume together with a lever switch to give sound-on-sound, normal and AB test. The record level indicators are a pair of fluorescent green tubes (accurate to within 2 dB on each channel) and the speed change switch is a substantial lever mounted at the centre rear. The mains on/off switch and illuminated four digital revolution counter complete the deck controls; separate microphone inputs for channel one and channel two are also provided on the top plate. All other inputs and outputs are mounted on panels tucked immediately beneath the deck-plate at the rear and the whole is enclosed in a plain but neat teak enclosure conforming to the modern furniture style trend. A transparent plastic deck cover and a carrying case are both available as extras.

It is not our intention to say very much about the actual use of the equipment. It functioned exactly as one would expect from the technical findings given above. The AB monitor facility worked perfectly—even at  $3\frac{1}{2}$  ips one had to listen carefully for the time lag to detect any difference between the signal going into the machine and that coming off the tape. In fact we used the brief-pause control on a number of occasions to really convince ourselves that we were listening to an after-record signal.

All that we have had said so far is in sincere praise of this equipment, so we looked very hard to see what faults we could find. Nothing is perfect, and sure enough we did find a few things we could criticise. As with the Series 12 models the user must take great care to return the joystick control to the neutral position after the microswitch has been actuated on either record or playback as this does not effectively separate the capstan from the pinchwheel. It would be a sin to spoil those wow and flutter figures through careless thoughtlessness.

We would have preferred the deck-plate to maintain a lower temperature than we found after a period of use. The deck is quite warm to the touch after about ten minutes and so we checked to see if any significant rise in temperature took place after two or three hours running. It was found that this did remain constant but we do feel that heat such as is produced here is likely to encourage print-through. Nevertheless we must point out that the deck was cooler running than certain other machines.

Lastly one rather unusual criticism which we did not discover until we had attempted to house the machine permanently in a Design Furniture cabinet. An aperture of the correct size was cut in the cabinet motorboard, the 64-X was removed from its own teak case and dropped in the hole. It fitted perfectly but because the input and output sockets are right at the top of the back the highest ones were masked by the thickness of the motorboard itself. Where this machine is to be housed in a cabinet it should be free-standing in its own case in a partitioned well.

We can best summarise our findings by saying that this machine operated to such a high standard that we have decided to acquire it for use as a standard for comparative evaluation purposes and for the assessment of recorded quality of stereo tape records.

## ACCESSORY REVIEW

### Bib Tape Head Maintenance Kit 12s 6d

Multicore Solders Ltd.,

Maylands Avenue, Hemel Hempstead,

Herts.



**P**ROBABLY the most prevalent single cause of poor quality recording from domestic equipment is the presence of dirt on erase, record or playback heads. Although modern recording tape is a highly sophisticated product it always has a tendency to shear off particles of oxide as it passes through the sound channel. The amount of solid matter deposited on tape heads and guides in this way will vary with different makes of tape—and a fact not often appreciated is that usually brand new tape of any make will lose more oxide proportionately than a spool of well-used tape of the same brand.

The plastic base from which recording tape is made is usually transparent; the familiar brown colour is the magnetic oxide coating applied to the "business side." Oxide losses are therefore easily detectable. An examination of the sound channel of any tape recorder will reveal the presence of a light brown dust. Its removal is essential if the equipment is to operate to specification. Remembering that head gap lengths are measured in microns it will be readily appreciated that even the thinnest coating of oxide dust on the working faces of heads will impair efficiency. The insensitive owner might not realise what is happening until it becomes so bad that the erase head leaves a substantial ghost of a previous recording instead of wiping the tape clean. When that happens you can be quite sure that recent recordings on such a machine have been seriously degraded in quality due to severe losses of the high frequency content.

To prove the need for cleaning take a freshly laundered white handkerchief, moisten very, very lightly with methylated spirit and carefully apply to the faces of the heads, using any convenient wooden (not metal) implement. This treatment will reveal a brown stain on the white fabric indicating that the head is in need of cleaning. Try it on your own equipment and see what happens.

The conventional cleaning method is to apply a minimum of pure alcohol. As this is not generally available methylated spirit is the commonly accepted substitute. However the design of magnetic heads and sound channels generally is such that access to the soiled parts is often extremely difficult. In fact it can be so awkward as to deter even the enlightened enthusiast from cleaning activities unless they are absolutely essen-

Please turn to page 440



Body and soul, beautiful! That's Philips EL3575 Stereo Tape Recorder.  
 Beautifully styled and finished in teak to look at home in your home.  
 Designed and built with painstaking care to record and play back the truth in sound . . .  
 mono through two speakers, or stereo through two separate channels. Four tracks,  
 three-speeds, comprehensive controls and connection facilities, plus an array of top-recorder  
 features such as Multiplay and Duoplay. One of today's most advanced tape recorders.  
 Price, with stereo moving coil microphone, 7" reel of LP tape, 7" empty spool and direct  
 recording playback leads, is 75 gns. For the best results, use Philips new High-Fidelity Low-Noise tape—  
 it costs no more than ordinary tape. See your Philips Audio Dealer today.



**PHILIPS**

PHILIPS ELECTRICAL LTD.

CENTURY HOUSE, SHAFTESBURY AVE., LONDON W.C.2.

## Bib Tape Head Maintenance Kit

tial. To overcome this problem Multicore Solders Limited have introduced their completely new Bib Tape Head Maintenance Kit. Selling at the modest price of 12s. 6d., the outfit comprises a blue plastic wallet containing a variety of applicator and polisher tools and sticks, a double-ended brush, a bottle of Bib Instrument Cleaner, a packet of cleaning tissues and a comprehensive five-page instruction folder. Replacements of all the items are available at extremely low cost.

I would not, under any circumstances, be prepared to apply any patent cleaning fluid to the delicate magnetic heads of my own recording equipment unless I were to be quite sure that it could not cause damage. Some cleaners, such as carbontetrachloride can be most harmful; their solvent properties are so strong as to physically damage the heads. In the present case I was pleased to note that Bib Instrument Cleaner is backed by an endorsement from The Ferragraph Company Limited who, after carrying out extensive tests, confirm that the cleaner is not only quite harmless to Ferragraph heads but is also recommended by them for this use. This completely satisfied me, and I proceeded to use the kit following the manufacturer's instruction.

The selection of tools within the wallet is comprehensive and practical. These are used both to apply the cleaner and then

subsequently to polish the heads. Experimenting with a Tandberg Series 64-X I found that the applicator and polisher sticks were essential to get to the working faces of the heads. These sticks are manufactured from a slightly flexible material which enables them to be used in the most convenient shape. A minimum of cleaner was applied; the deep brown stain on the padded tip of the applicator proved without doubt how much oxide was being removed. Priding myself on keeping my equipment in reasonable condition I was rather hurt to find out just how dirty it really was.

The double-ended brush is again a most useful little tool for removing the scattering of oxide that will always appear around the head mounts. Manufactured of twisted wire with nylon bristles its pristine whiteness was soon as badly discoloured as the applicator. In less than a couple of minutes an awkward little job had been satisfactorily completed with a minimum of trouble.

Two minor criticisms of this outfit. The bottle of instrument cleaner is fitted with a small aperture dropper insert in its neck. The instruction folder suggests that this may be removed by a penknife if it is desired to dip the cleaning tools into the bottle. However harmless this fluid might be it is good practice to get into the habit of using a minimum of cleaning fluid on heads. I would never dream of dipping either a felt-tipped applicator or a wadding-tipped stick into the bottle. Proper cleaning can be effected by using only the tiniest quantity of cleaner—I would like to see an even

more constricted opening to the dropper gap.

The other point relates to the advice in the instruction folder on the vexed question of how frequently one should clean heads. After stating that this depends upon both the use to which the equipment is put and also the kind of tape that is fed through, the manufacturers suggest that 30 hours operating time should be a starting point as a guide to the need for frequency of cleaning. The danger here is that no amateur logs the operating hours of his equipment and he will never actually know when he has reached the 30 hour point. My own advice with regard to cleaning is that it should always be done without fail whenever an important recording is to be undertaken, even if this necessitates cleaning the heads every day of the week. In addition a regular clean, say, once a week or once a fortnight, will ensure that the equipment is kept up to the mark even when little recording is done.

Summarising my comments on the Bib Tape Head Maintenance Kit I would again stress the absolute necessity for regular cleaning of some kind. It can be done with methylated spirits on a handkerchief wrapped around a matchstick—but as it has to be done so often the tools now provided by Multicore Solders will enable the job to be done more quickly and efficiently with less trouble than before. And one final point; the owner is far more likely to indulge in regular maintenance if he has the proper tools to do it with. Strongly recommended.—D.G.K.

## MUSICASSETTE

## REVIEWS

**HANDEL, MESSIAH (Excerpts).** London Symphony Choir with London Symphony Orchestra conducted by Colin Davis. Philips CPC0005, 45s.

Philips are releasing an interesting selection of classical Musicassettes during the autumn and this recording of excerpts from the Messiah is one of the first of them.

The sleeve notes quote the interesting biographical story of Handel's composition. The Messiah has always been something of a mystery—even today we are not sure of the authorship of the libretto.

The selection of excerpts comprises: *Comfort ye my people, Every valley, And the glory of the Lord, Behold a virgin shall conceive, O thou that tellest good tidings to Zion, For unto us a Child is born, Then shall the eyes of the blind be opened, He shall feed his flock, Come unto Him, Why do the nations, Thou shalt break them, Hallelujah, I know that my Redeemer liveth, The trumpet shall sound, Worthy is the Lamb and Amen.*

Performance is excellent and I was delighted to note that in this first of the new classical releases Philips have been able to achieve a significant reduction in background noise. As a result this Musicassette can be strongly recommended and will undoubtedly be enjoyed by the countless thousands for whom the Messiah offers both a spiritual and a musical experience.

**SCHUBERT. Quintet in A Major for Piano and Strings, op. 114, D.667 "The Trout," and Impromptu in E Flat Major op. 90, No. 2, D. 899.** Ingrid Haebler, piano, Arthur Grumiaux, violin, Georges Janzer, viola, Eva Czako, 'cello, and Jacques Cazauran, double-bass. Philips CPC0011, 45s.

This issue of "The Trout" and the E-flat Impromptu is another new autumn release from Philips. Again it reveals an improvement in signal-to-noise ratio. My only complaint with regard to the recording relates to the piano sound, which tends to be boxy. This is a great pity because the piano part is, of course, the most important. In the strings we have some of the richest quality I have heard from a Musicassette, so weighing the one against the other I would say that this is a good buy—if the piano had been better it would have been really superlative.

**SCOTT. Scott Walker. Philips CPP1052, 40s.**

In the sleeve notes Keith Altham refers to this album as "an obsession" of Scott's and when speaking of Scott Walker he invokes the names of Sinatra and Piaf.

Although I do not doubt Scott's sincerity, his talent does not measure up to either Sinatra or Piaf. Never mind—comparisons of this kind were ever odious and anyway are meaningless. In performing a brilliant selection of moving numbers Scott Walker has brought us through this Musicassette a glimpse of one man's private world of innermost thoughts. I enjoyed it immensely; recommended strongly for all but the narrow-minded.

The items performed are: *Mathilde, Montague Terrace (in blue), Angelica, The lady from Baltimore, When Joanna loved me, My death, The big hurt, Such a small love, You're gonna hear from me, Through a long and sleepless night, Always coming back to you and Amsterdam.*

**COLOUR IT FOLKSY. The Mike Sammes Singers. HMV TC-CSD1607, 40s.**

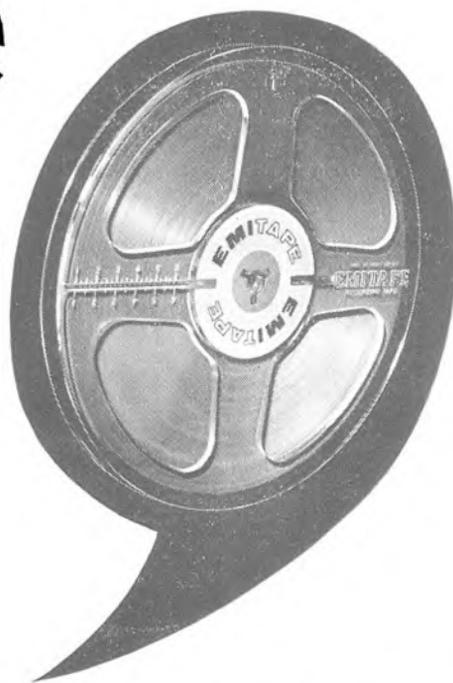
Formed just ten years ago in 1957, the Mike Sammes Singers have won well-deserved popularity. Their thoroughly professional approach produces a colourful blend of sound and an uninhibited verve which makes them one of the most distinctive vocal ensembles of recent years. In the present collection we have a charming blend of melody and humour, all presented in their characteristic style.

The programme includes on track one *A Hole in my Shoe, The Waiting Time, Down in the Jungle, Soldier Soldier, Green Grows the Laurel, Sippin' Cider*, and on track two: *That Day it Rained, And Still the River Flows, Step Right Up, I have a Bonnet Trimmed with Blue, The Great Meat Pie, and A Merry Lark.* The sleeve notes comment on the fact that some of the traditional songs have been re-arranged and in certain cases have had their lyrics changed to bring them into the current idiom. Much of what we now regard as "traditional" is in fact only a derivation from the original words and melody, which have had to suffer change to meet modern commercial requirements. When the result is as pleasing as it is in this album then one can really not complain.

Recorded quality is good, the collection is well balanced and the whole forms an interesting and pleasing album that will give pleasure to many. I should mention that my review copy had its labels reversed so that the side labelled track two in fact contains the items listed on the other side. This is one of the small human errors that can occur in the manufacturing process, as unlike gramophone records the individual labels are applied to Musicassettes by hand after the tape has been loaded. A small black mark for that little lapse, which must be immediately eradicated by the overall sound quality which is so good that it really does earn full remission.



**safe  
and  
sound**



## **the case for keeping** **EMITAPE**

There's a dust-proof library case with every reel of Emitape you buy. These are self-standing for compact storage and transparent for easy reference to index of recordings. This is just one advantage of the new, improved range of Emitape, designed to match all tape recorders. Enjoy its cleaner sound and consistent quality. *Insist* on Emitape every time and get the best results.

**Don't buy any tape - buy** **EMITAPE** 

## MUSIC ON TAPE

### 3½ i.p.s. Mono Tape Records

#### **YOUNG AND WARM AND WONDERFUL.** Gene Pitney. Stateside TA-SL 10194. 3½ ips, mono, 35s.

This is popular music at its very best, and ideally suited to tape. I would never before have described Gene Pitney's voice as "romantic," but here he sings his way through a dozen slow ballads to create a genuine, late-hour atmosphere—"heads close together, and the lights way down low." Probably an ideal vehicle for the repair of lovers' tiffs, the tape is enhanced by very fine quality recording indeed. The backing is clear, but never obtrudes. Every syllable of Pitney's words comes over with the utmost clarity.

The tracks are *Young and Warm and Wonderful*, *Golden Earrings*, *Serenade of The Bells*, *Where is your heart*, *Silver Bracelets*, *On A Slow Boat To China*, *Far Away Places*, *Hey There*, *South of The Border*, *Till The End of Time*, *I'll be Seeing You*, and *Two Sleepy People*.

The arrangements are by Garry Sherman—who ought to go down in history as the only man (to my knowledge) who can make something attractively listenable out of *Slow Boat To China*.

#### **HALL OF FAME.** Georgie Fame. Columbia TA-SX6120. 3½ ips, mono, 35s.

Georgie Fame is probably one of the finest singers in the jazz-cum-popular idiom that we have in Britain today. He sings with a sincerity and "feel" for bluesy numbers that's often sadly lacking with other artists. What a disappointment, then, is this Columbia tape.

It starts badly. As I remember, the record release of *Yeh Yeh* wasn't a bad number. Here, something seems to have happened that makes the backing (by Georgie's own Blue Flames) drown his voice in a surfeit of confusing sounds. There may be a slight improvement on other tracks, for the whole selection is taken from a miscellany of sessions stretching over two years. But the initial impression sets the teeth on edge, and something sour lingers over the whole of the tape.

On side one, *Yeh Yeh* is followed by *Sunny*, *Point Of No Return*, *Like We Used To Be*, *Get on The Right Track*, *Baby*, *Outrage*, *Let The Sunshine In*. Side two opens with *Getaway*, followed by *Sitting In The Park*, *In The Meantime*, *Something*, *Do Re Mi*, *Sweet Thing* and *Li'l Darlin'*.

The very last track is possibly the best—but it's the best of a very scrappy bunch. Someone, unhappily, seems to have let our Georgie down.

#### **BRASS ON THE MARCH.** Harry Mortimer and His All Star Brass. Columbia TA-SX6121. 3½ ips, mono, 35s.

Harry Mortimer is undoubtedly the best known master of this kind of music in the country; he may even one day be honoured for his services to music and/or the Copper and Tin Alloy industry. His work in preparing this selection, with the best of the musicians from BMC, Fairey and Foden's was undoubtedly of the very best. But what went into the machines at the recording studio certainly doesn't come out. It's all woolly. There's no definition. Whoever played lead tuba would find it impossible to play this tape to his friends and say: "listen—that's me."

The selection played consists of very well-known and agreeable marches. *Under The Double Eagle*, *Le Reve Passe*, *With Sword And Lance*, *The Thin Red Line*, *Fame And Glory*, *El Abanico*, *Old Comrades*, *National Emblem*, *The Phantom Brigade*, *Nibelungen*, *Voice of The Guns*, and *On The Quarter Deck*.

Perhaps the quarter deck would be the best place to listen to this tape. Or maybe the barrack square. I think it would bring back a touch of nostalgia to a retired sergeant major, but I don't think it would excite anyone interested in something different on tape. Rather, if you like a brass band, go and see it live.

#### **GATEWAY TO THE FORTH.** Jimmy Shand and His Band. Parlophone TA-PMC7018. 3½ ips, mono, 35s.

This is really excellent material. Not perhaps for recorded quality, although the balance is perfectly passable. Not perhaps for general appeal, for there must be many of us who don't care much for Scottish accordion bands.

But nobody can deny that, all over the British Isles, both North and South of The Border, there is a great boom in Scottish Country Dance Societies. I once belonged to one myself, and I can remember the irritation when a dance had to be halted in mid-stride for someone to go and turn over the 78 rpm record on the gramophone. So this sort of tape, playing a dance to its logical conclusion without any consideration for restricted time, is just the thing for a pretty large selection of people.

This particular tape has the added virtue of minimal distortion at high volume. Wullie Mackenzie will find it of unlimited appeal for his end-of-term ceilidh to be held in the gymnasium of what'sisname's evening institute next December.

For those who like to heel-and-toe, the selections—or rather, the dances played—are *Berwick Johnnie*, *Kiss Me Quick My Mother's Coming*, *Duchess Of Atholl's Slipper*, *The New Rigged Ship*, *Reel Of Mey*, *Highland Laddie*, *Haddington Assembly*, *Dashing White Sergeant*, and *Lassies O' Dunse*.

Buy this, ye Highland Laddies, Dashing Sergeants of whatever colour, and Lassies O' Dunse. Quickly now, before Berwick Johnnie beats you to the local shoppie.

#### **MATT MONRO.** Here's To My Lady. Capitol TA-T2068. 3½ ips, mono, 35s.

Here's to My Lady. And here's to this tape. Ah, Mr. Monro—how acceptably like Frank Sinatra you sound! This selection of evenly-balanced numbers is a real gem for anyone looking for something soothing for relaxation. Sid Feller's musical direction is masterly. Restrained and complementary. It never competes with Matt's sensitive voice.

It's difficult to pick out a best track. They're all good. But listen to the sensitive delivery on *When Sunny Gets Blue*. Lovely. And every word means something.

On side one, we have *When Joanna Loved Me*, *Real Live Girl*, *When Sunny Gets Blue*, *Laura*, *People*, and *Here's To My Lady*. Track two contains *The Good Life*, *You've Got Possibilities*, *Rain Sometimes*, *Sweet Talkin' Hannah*, and *Nina Never Knew*.

That last track's a real cracker, too—but perhaps the greatest compliment I can give to this tape is to admit, with absolute candour, that if there's one singer I normally find indigestible—it's Matt Monro!

### 7½ i.p.s. Stereo

#### **HEAVENLY SOUND IN HI-FI.** Ferrante and Teicher. ABC-Paramount ATC 803 4-track 7½ ips, 75s.

The title, "Heavenly Sounds in Hi-fi," is enough to put anyone off buying this tape. On the other hand it does have a definite bearing on the recorded content. To be absolutely honest this album is nothing more or less than an example of musical and technical gimmickry. Judged by conventional standards the whole could be condemned on a number of counts from the purist point of view. But this is not a conventional recording; and who cares about convention anyway?

Let us give credit where credit is due. The two performers, Ferrante and Teicher, are not merely pianists; their aim is to extract every last ounce of sound—and sound effect too, for that matter—from their Steinway concert grands. They do not perform on these instruments as one would expect a pianist to perform. They do not accept the limitations of the keyboard. With alarming (and probably dangerous!) dexterity, the range of the instrument is extended to an octave above and an octave below that which the manufacturer intended. Not content with such unmentionable treatment, they then proceed to regard their interpretations as experiments into the realm of pure sound rather than as mere performances of listed works. The result is as fascinating an experience as one could wish for.

A few months ago I had the pleasure of reviewing another Ferrante and Teicher album. Entitled, "Ferrante and Teicher with Percussion," I commented at the time that this album was likely to make many listeners reassess the quality of their existing recordings. Although the album now under review does not quite reach this exceptionally high standard, it is nevertheless in the very best Ferrante and Teicher tradition.

The items performed are: *The Moon was Yellow*, *Stella by Starlight*, *Stardust*, *Stars in my Eyes*, *The Moon is Low*, *Over the Rainbow*, *Out of this World*, *Out of Nowhere*, *Beyond the Moon*, *I've Told every Little Star*, *East of the Sun and Serenade to a Star*. As I have said before about these two unusual gentlemen, their list of titles is nothing more than the vehicle utilised to display their brilliant virtuosity and the techniques employed by their recording engineers. Their peculiar style is so individualistic that they insist on complete control of studio and microphones themselves. Knowing precisely what effects they wish to be achieved, and knowing how to get them, they accept personal responsibility for the final recorded interpretation of their works.

The pedant might complain that the stereo image is false and that the sound is too directional. He might also complain that no piano ever built was intended to sound as these two Steinways do. I can only feel sorry for him.

If we accept this tape for what it really is, a *tour de force* within the hi-fi realm, then it can be enjoyed and appreciated by all who have a love of quality sound reproduction. This album is thoroughly recommended to all who are open-minded enough to accept sincere and worth-while entertainment at its face value without worrying about cold, scientific analysis. And to any readers who feel they might therefore be excluded I extend my deepest sympathy. Buy it—enjoy it—and to blazes with convention!

## THE SIT-UP-AND-LISTEN SOUND TAPED BY EMI



Starting with these  
great new releases, all  
EMI 3 $\frac{3}{4}$  IPS Tapes  
will be boxed in strong  
clear perspex, with gay interior  
picture covers safe  
from accidental damage.

**MELLOW FRUITFULNESS**

A Whiter Shade Of Pale  
Columbia TA-SX6164

**THE MIKE SAMMES SINGERS**

Somewhere My Love & Other Hits  
H.M.V. TA-CLP3621

**FRANK SINATRA**

The Movie Songs  
Capitol TA-T2700

**THE ALOHA HAWAIIANS**

Hawaiian Sunset  
Columbia TA-SX6160

**RON GOODWIN**

Gypsy Fire  
Columbia TA-SX6187

**CLIFF RICHARD**

Good News  
Columbia TA-SX6167

**HERMAN'S HERMITS**

There's A Kind Of Hush  
Columbia TA-SX6174

**PEPE JARAMILLO**

Moonlight In Mexico  
Columbia TA-SX6188

**THE BEACH BOYS**

The Best Of The Beach Boys VOL 2  
Capitol TA-T20956

**GENE PITNEY**

Just One Smile  
Stateside TA-SL10212

**EMI**

E.M.I. RECORDS (THE GRAMOPHONE CO. LTD.)  
E.M.I. HOUSE, 20 MANCHESTER SQUARE, LONDON W.1.

## NEW PRODUCTS

### GRUNDIG HALF-TRACK STEREO MACHINE

THE latest addition to the Grundig range is the half-track TK320. This is a 3-speed, fully stereophonic, tape recorder, incorporating separate record and playback heads and amplifiers, facilities for multiple synchronisation, monitoring after record and the introduction of echoes and remote control.



Maximum spool size is 7 in. and the machine is equipped with two built-in loudspeakers, but outlets are provided for a pair of 8 watt, 5 ohm, extension speakers.

Signal-to-noise ratio is quoted as better than 47 dB at  $1\frac{7}{8}$  ips and better than 52 dB at both  $3\frac{1}{2}$  and  $7\frac{1}{2}$  ips. Wow and flutter is said to be less than 0.2% at  $1\frac{7}{8}$ , 0.12% at  $3\frac{1}{2}$  and 0.1% at  $7\frac{1}{2}$  ips. Frequency response is given as 40 to 10,000 Hz at  $1\frac{7}{8}$ , 40 to 15,000 Hz at  $3\frac{1}{2}$  and 40 to 18,000 Hz at  $7\frac{1}{2}$  ips.

Dimensions are 21 in. x  $8\frac{1}{2}$  in. x 16 in. and the weight is 37 lb. Recommended retail price is 119 guineas.

Grundig (Great Britain) Limited, Newlands Park, Sydenham, S.E.26.

### 4-TRACK MONO RECORDS

IT is usual for mono music-on-tape to be offered as half-track recordings. Now Recotape Recordings Limited are making available a large proportion of their catalogue of mono items in 4-track versions. According to the distributor this will confer an enormous advantage on the purchaser since twice as much material can be recorded 4-track as half-track on the same length of tape and this will be done at no increase in cost.

The new 4-track tapes will provide a wide range of music and give a frequency response of from 50 to 12,000 Hz. Interchannel cross talk is said to be less than 45 dB below peak signal and it is claimed that on tested samples it was virtually inaudible at any time. One peculiarity of these tapes is that in some tracks the runout period is longer than normal owing to the varying lengths of the musical works involved and a desire on the part of the producer to keep a complete programme on one track.

All recordings are  $3\frac{1}{2}$  ips on 1 mil. tape and are spooled on five-inch reels. Readers are reminded that such tapes will only play satisfactorily on quarter-track machines and are not suitable for use on half-track machines.

The same firm announce the release of a new series of sound effects tapes of interest to creative tape recordists, movie makers and producers for operatics and dramatic societies.

The new range consists of ten tapes, each containing ten or more individual sound segments. There is a three-second gap between each and the sound is recorded on one track only in order to make cutting in or dubbing a simple operation. Each segment is timed and the individual timings are printed on the box label. Recording speed is  $3\frac{1}{2}$  ips and the tapes retail at 15s. each.  $7\frac{1}{2}$  ips is available to special order and costs 21s. per tape.

There are no restrictions upon the use of these sound effects apart from a prohibition on copying for resale. The musical segments are non-copyright and are therefore not subject to restriction or fee. All Recotape products are obtainable from tape recorder dealers and camera equipment suppliers.

Recotape Recordings Limited, Bristol, and West House, Salisbury, Wiltshire.

### BAKER MAJOR MODULE

ONE of the latest products in the loudspeaker world is the Baker "Major Module." This unit has been produced to meet the demands of an increasingly critical public and it is hoped that the modest price will bring excellent hi-fi within everyone's means.



The assembly comprises a twelve-inch Baker Major loudspeaker and a high efficiency tweeter, both mounted on a wooden baffle, size 19 x  $12\frac{1}{2}$  inches, ready for housing in a suitable enclosure or using for the conversion of existing cabinets.

The Major has a built-in concentric centre cone to maintain the necessary balance between bass, middle and treble; its bass resonance is 40/50 Hz and the claimed overall response is 30 to 17,000 Hz.

The owner carries out the simple assembly instructions which include mounting on the baseboard and wiring in the crossover unit. The cost of the complete kit is £10 19s.6d., or alternatively the unit can be supplied fully assembled and tested at £12 10s., both prices post free.

Baker Reproducers Limited, Bensham Manor Road Passage, Thornton Heath, Surrey.

### REAL AUTOMATION BY PHILIPS

A GREAT deal of original thought has gone into the design of the new Philips 4-track stereo recorder Model N4408. Described as "bridging the gap between the domestic tape recorder and the professional machine," it can be operated in either the vertical or horizontal position and has been provided with an ingenious automatic tape positioning device. This will enable the user to stop during rewind at any predetermined position.

Three speeds are available,  $1\frac{7}{8}$ ,  $3\frac{1}{2}$  and  $7\frac{1}{2}$  ips, and quoted frequency responses are 60 to 10,000 Hz, 40 to 15,000 Hz and 40 to 16,000 Hz respectively. The signal-to-noise ratio according to DIN standards is given as better than 45 dB and the output power 2 x 6 watts. A pair of illuminated VU type meters are included and the input and output sockets are five pin to the DIN standard.

The cabinet work is in solid wood covered with black leather cloth with two detachable loudspeaker enclosures in light grey polystyrene with black grilles. Brushed aluminium escutcheon plates are fitted around the push buttons and rotary controls and a similar finished plate enhances the appearance of each loudspeaker cabinet. Recommended retail price is 95 gns.



By contrast another new Philips product is a portable radio combined with cassette recorder, Model No. 22 RL 673.

The equipment comprises an all transistor AM/FM portable with an integrated cassette recorder in a luxuriously padded cabinet. Powered by dry cells the recorder can record from the self-contained radio or from microphone or pick-up and it can also play back pre-recorded Musicassettes. An automatic level system is employed so that the user can adjust volume and tone controls on the radio without affecting the quality of the cassette recording.



Priced at 55 guineas this versatile equipment embodies special circuitry to overcome the possibility of recording whistles from long and medium wave reception. Separate stabilisation is provided to prevent distortion when the battery voltage drops.

Philips Electrical Limited, Century House, Shaftesbury Avenue, London, W.C.2.

John Keene: recording engineer

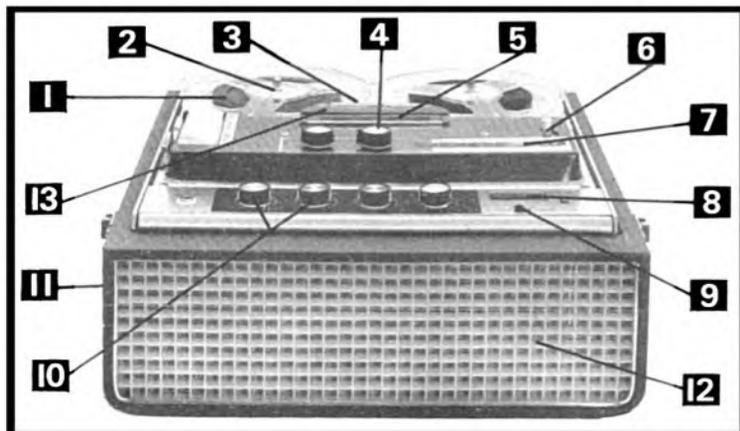
# What buttons does he push at weekends?



To Jerry, his violin is his living. And he's a superb violinist. But not the best. *Yet*. So when he's not playing before thousands, he's practising before his Truvox 100 Tape Recorder. He plays, then turns a knob, *and learns*. The Truvox 100 is the only tape recorder for Jerry. If you can catch him in a spare moment, he'll be glad to give you the reasons, button by button **1** 7" spools **2** Spool clamping **3** Duo play and Multiplay (R 104) **4** 3 speeds **5** Built-in splicing flap **6** Cue and inching control **7** Push button reset 4 Digit counter **8** Accurate V.U. Recording Meter **9** Tape/Source A-B monitor switch **10** Mic/Radio/PU mixing **11** Solid wood cabinet covered with tough washable P.V.C. **12** 8" x 5" loudspeaker **13** 3 heads

And there are a few features without buttons that make the R 104 Jerry's choice. Like **Solid state all-silicon transistor circuitry/Pre amplifier output fully variable 0-1 volt/3-motor Truvox Tape Deck/Separate record and playback heads/Micro-switch deck operation/Also available - Belgravia model finished in selected teak veneers.**

Jerry Keebels is a professional musician. So he simply can't afford anything less than the reproduction of the Truvox 100. **Prices R 102 (two track) R 104 (four track) 89 gns. Belgravia model 93 gns.**



## THE TRUVOX SERIES 100



For full details of the Truvox Series 100 recorders, tuner, amplifier and stereo tape units, and all Truvox sound equipment, write for your free copy of 'Sound with depth and colour'.

Truvox Ltd., Hythe, Southampton, Hants. SO46ZH

**YOUR LOCAL DEALER**

**LONDON**

*Lee Electronics*

THE TAPE RECORDER & HI-FI AUDIO SPECIALISTS  
400, EDGWARE RD., LONDON, W.2 (PAD 5521)

London's leading Stockists of High-Fidelity and Audio Equipment. Many bargains in new and reconditioned equipment.

SEND FOR FREE LISTS OF RECORDING TAPES, RECORDERS, AMPLIFIERS, ETC.



APPOINTED B. & O. AGENTS

**YOUR LOCAL DEALER**

**LONDON**

**RAPID RECORDING SERVICE**

78s and LPs FROM YOUR OWN TAPES  
48 HOUR SERVICE

MASTER DISCS AND PRESSINGS  
RECORDING STUDIO  
DEMONSTRATION DISCS  
MOBILE RECORDINGS—ANY DISTANCE

Brochure on request from  
**Rapid Recording Service**  
21, BISHOPS CLOSE, LONDON, E.17

**YOUR LOCAL DEALER**

**THE NORTH**

CHESHIRE

**CHARLESWORTH'S**  
OF. CREWE LTD.

Tape Recorder  
and Hi-Fi Specialists

Head Office: 14 Hightown, Crewe. Tel. 3327  
**Hi-Fi CENTRE: 28 HIGHTOWN, CREWE.**  
Technical Division: 19 Ludford St., Crewe.

- ★ TAPE RECORDER HIRE
- ★ TAPE TO DISC 78 & LP
- ★ RECORDING STUDIO
- ★ TAPE RECORDER REPAIRS
- ★ SALES—EXCHANGES

**MAGNEGRAPH**

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

**THE SOUTH**

**SOUTHAMPTON**

Tape Recorder Specialists

APPROVED AGENTS FOR—  
PHILIPS - GRUNDIG - FERROGRAPH  
VORTEXION, ETC.

- ALL MAKES OF TAPE RECORDERS SUPPLIED
- ACCESSORIES AND HI-FI EQUIPMENT
- PART EXCHANGES AND SECOND-HAND MACHINES
- PROMPT AND SKILLED SERVICING

**RECORDING MACHINES LTD.**

79 Queensway, Southampton

Telephone: 27092

**TAPE RECORDER CENTRE (Halifax)**

stock all the best tape recorders and hi-fi equipment. Agents for Revox, Tandberg, Ferrograph, etc. Demonstrations by expert staff. Two years' free service on recorders over £35.

30 King Cross St., Halifax. Phone 66832

**Masseys Centre of Sound**

West London's Hi-Fi Tape Recorder Specialist  
—Demonstration Room with Comparator  
APPOINTED FERROGRAPH DEALER

AT  
**CHISWICK, W.4**

Accessories, All Kinds—Servicing—Pre-Recorded  
Tapes Mono/Stereo  
121-123 High Road—10 a.m.—7 p.m.

◀ TEL: CHI 2082 ▶

(not closed for lunch)

**THE SOUTH WEST**

**TOM MOLLAND LTD.**

Invite you to visit their well-equipped  
Demonstration Theatre and compare all the leading makes of Hi-Fi and Tape Equipment at

102 CORNWALL ST., PLYMOUTH

Telephone 69282/3

Immediate delivery to ALL Areas

**CUSSINS & LIGHT LTD.**

YORK'S LEADING RADIO TV & ELECTRICAL STORE

Visit our First Floor  
TAPE RECORDER CENTRE

LARGEST RANGE OF RECORDERS & ACCESSORIES IN THE NORTH

KING'S SQ.  
YORK



**TAPE RECORDER HI-FI CENTRE (SHEEN) LTD.**

— The Centre for —  
FRIENDLY HELP—SALES—SERVICE  
DEMONSTRATIONS ANY TIME—ALL PRE-RECORDED TAPES—STEREO—MONO  
LANGUAGES—DANCE—JAZZ—SHOWS  
CLASSICS, etc.—2 and 4 TRACK—STOCKISTS OF ALL MAKES AND MODELS OF RECORDERS AND HI-FI—Add sound to your movies with Synchrodek—WE ARE STOCKISTS OF SYNCHRODEK  
TERMS—EXCHANGES, ETC.

3/4 STATION PARADE, SHEEN LANE,  
SHEEN, LONDON, S.W.14  
(Opposite Mortlake Station, S.R.)  
Showroom: PROspect 0985  
9 a.m.—6 p.m.; Fridays 9 a.m.—8 p.m.

**WORTHING Tape Recorder Centre**

- Tape and Hi-Fi Experts
- Agents for all types of machines and equipment
- SERVICING & REPAIRS

THE MUSIC SHOP

22 NEW BROADWAY,  
Tarring Road, Worthing, Sussex.  
Telephone: Worthing 3630

**—THEATRE ORGAN DISCS and TAPES—**

ORGAN OF THE MONTH CLUB brings out regular releases of famous Theatre Pipe Organs and organists, our aim is to present a record of every known make of Theatre Organ.

Full details from:

**CONCERT RECORDING**  
P.O. BOX 2  
ROTHWELL, KETTERING, NORTHANTS

## READERS WRITE . . .

SIR.—In these days of poor workmanship and indifference by manufacturers it is most refreshing to report that at least one manufacturer has the interest of the customer at heart. I refer to Brenell Engineering Limited of Liverpool Road, London.

I purchased their latest Mark 5 recorder about three months ago but had to criticise the pause control. I wrote to Brenell and in a very courteous reply from their Mr. J. W. Raine was told that they would make arrangements to fit a new "mask" if I left the recorder at my local dealer by a pre-arranged date.

Accordingly I took my machine to the dealer as requested and whilst discussing the fault in walked Mr. Raine of Brenell. He listened to my complaints (which were only small) and then took me and my machine to my home six miles away and spent about two hours with his assistant giving my recorder a first class overhaul and fitting a new mask. In fact I could not have had more courtesy, efficiency and advice had I been royalty.

Hats off to Brenell who are obviously proud of their products and their customers however small. To Mr. Raine and his Company—  
"Thank you!"

Yours, etc.,  
**G. Dainty,**  
Great Barr, Birmingham.

*Bouquets for good service are greatly appreciated and I am always delighted to hear such pleasant stories as this one from Mr. Dainty. Like so many people in the audio industry Mr. Raine is an enthusiast and I have no doubt that it was as great a pleasure to him to be able to render this service as it was to Mr. Dainty to receive it. And if any manufacturer should regard such episodes as "a waste of time" then let me hasten to add there is no finer way for any firm to establish an untarnished reputation than through its own service department. Congratulations Brenell.—Editor.*

\* \* \*

SIR.—We refer to the article "Tape and Transparency" which appeared in the August edition of *TAPE Recording Magazine*. In this article it was stated:

"Firstly, we have to understand that we may not, under any circumstances, use copyright music. We may not, for instance, dub our music from commercial gramophone records . . ."

This society represents more than 10,000 composers and publishers of music throughout the world and is therefore qualified to speak on behalf of the majority of copyright owners on questions involving the mechanical reproduction of their works. A writer of music relies for his income on use of his material and is not likely to agree with the statement that others may not, in any circumstances, use copyright music. It would be more correct to add, "without the consent of the copyright owner or his authorised agent."

MCPS has done much in the recent years to allow the amateur recordist freedom of choice of copyright music with its repertoire by offering a "blanket" licence, concerning all works the rights in which are owned by its members. The door is thus open to possibly a million musical works, and whilst it is necessary to restrict the licence to use of the recordings within the home and amateur tape and cine competitions, the cost (10s. per annum for tape or 50s. for tape and cine) will not reduce any of our enthusiasts to penury.

The manufacturers of gramophone records also have the right to restrict the copying of their records and their problems are different to those of the music publisher. This Society does not represent them when dubbings are made on to tape and cannot therefore put their point of view, but I do not think it right to advise your members that records may not be dubbed. They may not lawfully dub from a record without the manufacturer's consent, which is quite a different matter.

Yours, etc.,  
**R. A. Sweetman,**  
Licensing Manager,  
Mechanical Copyright Protection Society Limited,  
Streatham, London, S.W.16.

*I am only too pleased to publish this letter from MCPS in full. On rechecking the text of "Tape and Transparency" there is no doubt that the information given was misleading and for this I must apologise. Mr. Sweetman's letter accurately describes the true legal situation and it is hoped that readers will particularly note the Society's willingness to issue licences for amateur use at the very low cost of 10s. per annum.*

*In a telephone conversation with Mr. Sweetman he assured me that far from wishing to prevent amateurs from recording copyright works the intention is to encourage such activity—provided it is covered by the appropriate licence.—Editor.*

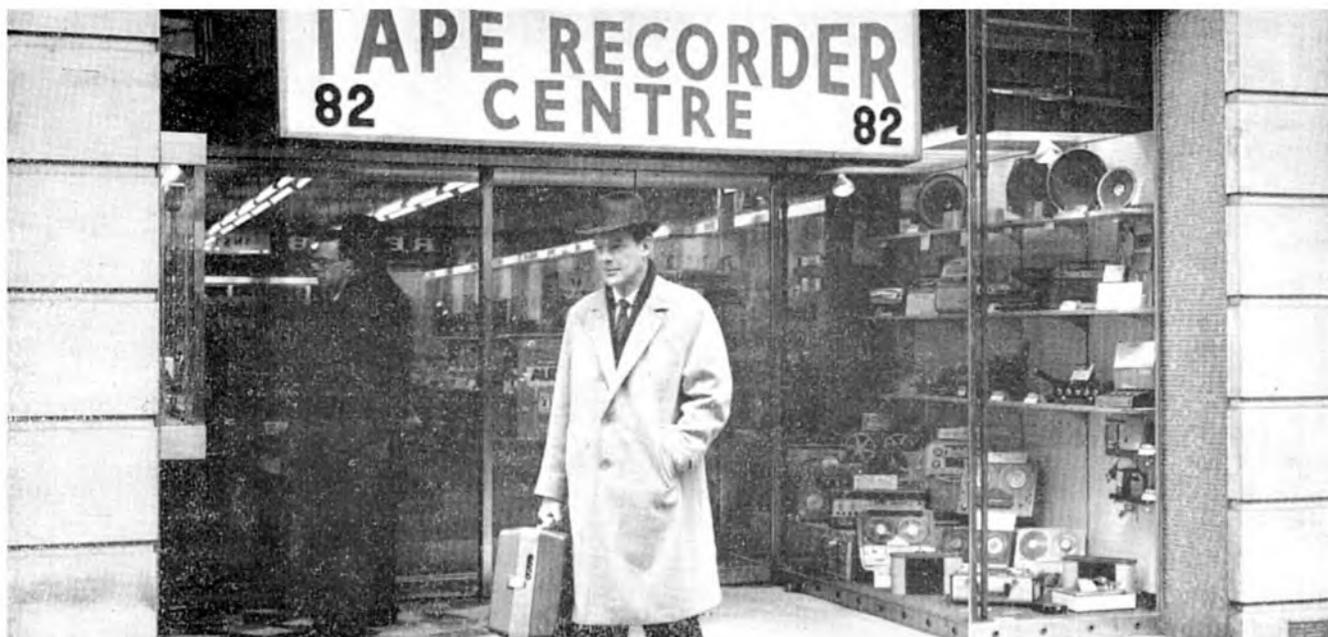


# TELEFUNKEN

Listen to as many portable recorders as you can. Compare. This is the one that stands out.

From now on, this is the one that all other machines are going to have to try and live up to. Go into any good dealers and ask them what they think about it. Magnetophon 300 is the one you can shake, move or twirl—subject it to any kind of movement—yet it still gives a faultless recording . . . compares with very good Hi-Fi machines. 5" spool 2-track. 40-14,000 c/s. 3 $\frac{3}{4}$  i.p.s. Sockets for radio, microphone, pick-up, headphones, tape recorder, additional loudspeaker, AC power supply/battery charger. Operates on 5 flashlight cells, car battery or rechargeable storage battery. Recommended retail price 49 gns. Also 4-track M 301 : 54 gns. At only 59 gns : M 302 4-track with speeds of 3 $\frac{3}{4}$  i.p.s. and 1 $\frac{7}{8}$  i.p.s. Write today for fascinating FREE colour booklet to AEG (Great Britain) Limited 27 Chancery Lane London WC2.





# Over 100 different Tape Recorders and Hi-Fi equipments: ONLY ONE IS RIGHT FOR YOU

**THEY'RE ALL HERE . . . .** every kind of Tape Recorder on the market. Nowhere else can you see such an all-embracing display as that which awaits you at NuSound.

As Britain's largest Tape Recorder sales organisation with over 10 years' experience in this specialised field, NuSound have built up a reputation that is "second to none."

Only from NuSound can you obtain the benefits of all these invaluable features—The most comprehensive range of equipment on display in the country, expert staff, free technical advice, immediate demonstration of any model, the finest after-sales servicing available.

Whatever your means of transport or point of arrival, be it Holborn, King's Cross or Liverpool Street Stations there is a NuSound showroom within easy reach. The position of each showroom has been carefully selected to be just a few minutes away from well known Central London landmarks and Main Line Stations.

- UNBEATABLE NO-INTEREST TERMS
- OVER 100 MODELS ON DISPLAY
- EXPERT STAFF EXPERT ADVICE
- GENEROUS PART EXCHANGES
- UP TO TWO YEARS' FREE SERVICING

## SHOWROOMS

82 HIGH HOLBORN, W.C.1 (1 minute Holborn Underground)	CHAncery 7401
242/4 PENTONVILLE ROAD, N.1 (3 minutes from King's Cross Station)	TERminus 8200
228 BISHOPSGATE, E.C.2 (1/2 minute Liverpool Street Station)	BIShopgate 2609
36 LEWISHAM HIGH STREET, S.E.13 (1 minute Lewisham Station)	LEE Green 2399
2 MARYLAND STATION, STRATFORD, E.15 (adj't Maryland Station)	MARYland 5879
205 HIGH STREET NORTH, E.6 (opposite EastHam Station)	GRAngeWood 6543

AND INTRODUCING A NEW  
TAPE RECORDER CENTRE EXCLUSIVE—

## FREE TRAVEL

Yes, **FREE TRAVEL** to and from **THE TAPE RECORDER CENTRE!** Come up to London, see the sights, purchase your tape recorder from the finest selection in Gt. Britain and have your fares to and from **THE TAPE RECORDER CENTRE** paid in full. Unbelievable? Then write today for your unique **Free Travel Voucher** to be sent to you by return post. Not a sales gimmick but a genuine offer, for we are certain that once you see the fantastic selection of recorders at **THE TAPE RECORDER CENTRE** you cannot fail to become another of our satisfied customers.

**DO NOT DELAY, SEND TODAY  
FOR YOUR FREE TRAVEL VOUCHER**

### NOTE: HOURS OF BUSINESS

**HIGH HOLBORN:**  
Monday to Friday 9 a.m. to 6 p.m. Saturday 9 a.m. to 1 p.m.

**BISHOPSGATE:**  
Monday to Friday 9 a.m. to 6 p.m. Closed all day Saturday.  
Open Sunday 9-30 a.m. to 2 p.m.

**KING'S CROSS, STRATFORD, LEWISHAM, EAST HAM:**  
Monday to Saturday 9 a.m. to 6 p.m. Halfday Thursday.

# NUSOUND TAPE RECORDER CENTRES

HEAD OFFICE: MAGNATAPE HOUSE, 191 PLASHET RD., UPTON PARK, LONDON, E.13 GRANGEWOOD 2185

JAN FEB MAR APR  
 MAY JUN JULY  
 AUG SEPT OCT  
 NOV DEC

**DID YOU KNOW—**

- That **TAPE RECORDING MAGAZINE** was the First Publication of its kind in Europe.
- That it is still the Best Tape Recording Magazine.
- That it is the only Tape Recording Magazine staffed by Enthusiasts for Enthusiasts.
- That you can ensure receiving your regular monthly copy by handing your newsagent the coupon below.
- That you can be entered on our postal subscription register.

**TO MY NEWSAGENT**

I would like to be sure of receiving **TAPE Recording Magazine** regularly.  
 Please order it for me.

NAME .....

ADDRESS .....

**OR** send coupon with remittance of 25/- direct to **TAPE Recording Magazine, Prestige House, 14/18 Holborn, E.C.1** for a direct 12 month's postal subscription. (U.S. \$3.75)

*TAPE Recording Magazine is distributed by Trans-World Circulation Co.*



**TELEFUNKEN**

Your eyes tell you  
 it's good  
 Your ears prove it

It's called the Magnetophon 201 TS. The one that gives a clearer, more natural sound. Painstakingly engineered. Compact. Distinctively styled, too. 4-track monaural. 7" spools give you up to 12 hours playing time per tape. Speed : 3 3/4 i.p.s. Frequency response : 60-13,000 c/s. Illuminated level meter. Digital counter with push button zero reset. Disconnectable loudspeaker. Sockets for radio/microphone, pick-up, headphones, additional loudspeaker. Recommended retail price 34 gns. Also 2-track M 200 TS : 32 gns. At only 69 gns : M 203 4-track with speeds of 3 3/4 and 1 7/8 i.p.s. monaural and stereo recording ; monaural playback : stereo playback through additional monaural or stereo radio/amplifier. Write today for fascinating FREE colour booklet to AEG (Great Britain) Limited 27 Chancery Lane London WC2.



# QUALITY

## the simple, single aim

behind the manufacture of these and every UHER Tape Recorder. The production of tape recorders for every amateur and professional need is the sole pre-occupation of the UHER Company, whose specialisation has led to many outstanding developments, including the first application of printed-circuit techniques in tape recorder manufacture.



### 4000 Report-L

**UHER**



An extremely versatile battery portable that gives virtually every facility of a mains-operated recorder—with many exceptional new features. Four tape speeds provide an infinite variety of recordings. Collectorless motor. Weighs only 6 lbs. Price, including microphone and tape, 103 gns.

### 1000 Report Pilot

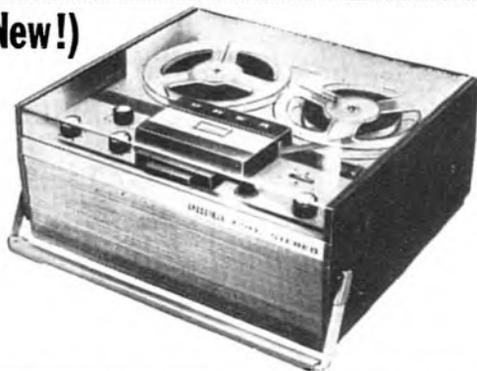
**UHER**



A tape recorder of the highest standard, specially manufactured for professional use. Ideal size, weight, performance and exceptional quality reception. Can be used to synchronise sound with film as well as reporting under professional conditions, on a wide range of voltages. Remote control stop/start. Full track. Collectorless motor. Automatic volume control. Price on application

### 724L Stereo (New!)

**UHER**



The latest, full stereo four track, all mains recorder, specially designed to meet the strong demand for an instrument particularly easy to understand and operate. Monophonic and stereophonic recording and playback. Suitable for use with 'hi-fi' equipment. Fully transistorised. High impedance output. Takes 7" spools. Now built in to a smart teak cabinet with a smoke-tinted perspex lid. Priced at only 75 gns.

**SEE US AT THE AUDIO FAIR—BOOTH  
No. 47 IN DEMONSTRATION ROOM 122.**

**BOSCH**

BOSCH LIMITED. 205 Great Portland Street,  
London, W1. Telephone: LANGHAM 2672-5

**UHER**

# Leda Tape or TAPE 70?

Two fine recording tapes representing exceptional value for money!

**LEDA TAPE** has gained a splendid reputation during the past three years for quality and economy. It is widely used by educational bodies, particularly in language laboratories, and is noted for its consistently high quality.

**TAPE 70** has been designed to meet the needs of the professional user at a realistic price. It provides a remarkable freedom from drop-out and print-through, a high signal-to-noise ratio and an exceptional consistency in performance. However demanding your requirements, TAPE 70 is guaranteed to fulfil them.

Standard Play (P.V.C.)	Leda Tape	TAPE 70	Long Play (P.V.C.)	Leda Tape	TAPE 70
3" 150'	2/3	3/3	3" 225'	3/-	4/3
4" 300'	3/9	6/6	4" 450'	5/-	7/6
5" 600'	8/3	11/6	5" 900'	9/9	14/6
5 1/2" 900'	10/-	14/6	5 1/2" 1200'	12/3	17/6
7" 1200'	12/3	17/6	7" 1800'	17/3	25/-

Double Play (Polyester)	Leda Tape	TAPE 70	Triple Play (Polyester)	Leda Tape	TAPE 70
3" 300'	4/3	6/6	3" 600'	8/9	13/-
4" 600'	8/3	12/-	4" 900'	12/6	17/6
5" 1200'	15/3	22/6	5" 1800'	22/6	35/-
5 1/2" 1800'	19/3	29/6	5 1/2" 2400'	28/6	48/6
7" 2400'	21/9	37/6	7" 3600'	38/6	62/6

Both brands are strongly and attractively boxed and both have leaders, trailers and stop-foils on all sizes 5" and above. Try a reel of each. BOTH ARE COVERED BY OUR IMMEDIATE REFUND GUARANTEE. P. & P. 2/6 per order. S.A.E. full lists.

**LEDA TAPES (T), 30 BAKER ST., LONDON, W.1**

# ENGINEERS!

Have you sent for your free copy of "ENGINEERING OPPORTUNITIES"?

132 PAGES Free!

NOW ready, a new and enlarged edition of this famous book. There will be an enormous demand for it, but we want every ambitious Engineer, to have a free copy. "ENGINEERING OPPORTUNITIES" outlines a magnificent range of modern Home Study Courses and is packed from cover to cover with interesting and useful information about the opportunities you are now missing. You really cannot afford to miss reading the enlightening Handbook. Make sure of your copy by posting the coupon now. No cost or obligation of any kind.

POST COUPON NOW (put a tick by subject of interest)

- Electronics..... Telecomms..... Electrical.....
- Radio..... Television..... Mechanical.....
- Civil..... Production..... Plastics.....
- Build'g..... Man'g'm't..... Draughtsm'n'p.....
- A.M.I.E.R.E..... A.M.I.Mech.E..... A.M.S.E.....
- A.M.I.C.E..... A.M.I.M.I..... A.R.I.B.A.....
- A.I.C.B..... CITY & GUILDS..... C.ENG.....
- GENERAL CERTIFICATE OF EDUCATION.....

if not above..... (State subject or Exam.)

Please send me FREE and without ANY OBLIGATION, a copy of your 132-page handbook "ENGINEERING OPPORTUNITIES"

NAME..... ADDRESS.....

BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY  
264 D ALDERMASTON COURT,  
ALDERMASTON, BERKSHIRE.

WHAT THIS BOOK WILL TELL YOU  
HOW to get rapid promotion to a better paid job.  
HOW to put some valuable letters after your name quickly.  
HOW to use our free Appointments & Advisory Depts.  
HOW to leave the ranks of the poorly paid for ever.  
HOW, whatever your education or experience, you can succeed in any branch of Engineering that appeals to you.

132 PAGES OF EXPERT ADVICE

THE B.I.E.T. IS THE LEADING INSTITUTE OF ITS KIND IN THE WORLD

# THE EXPERTS ARE ENTHUSIASTIC ABOUT THE Bib tape head maintenance kit

## EXTRACTS FROM TEST REPORTS

**Donald Aldous, Technical Editor "Audio Record Review".....**  
"It is not always easy to get at the head surfaces of domestic machines and it is for this reason that the Bib Kit contains various cleaning tools suitably shaped to enable the user to tackle with confidence any recorder in his possession". "This kit is certainly one of the neatest and most effective that we know of for ensuring that your tape recorder can be kept in the pink of condition. The bottle of fluid supplied should last a very long time and replacements of the tape applicators, polishers and sticks, are readily available from the best tape stockists. At 12/6d. this Bib Kit is a "must" for all serious tape enthusiasts".

**John Borwick, Technical Editor "The Gramophone".....**  
"Cleaning the erase and record/replay heads of a tape recorder should be as much a regular routine as the inspection and cleaning of a gramophone stylus". "The enemy is oxide dust... When this forms a film or ridge on the tape heads—which start life with a mirror-like polish—erase may be incomplete (so that faint 'ghosts' of previous recordings are still audible) and the overall sound quality becomes muffled and noisy. Oxide particles may also adhere to tape guide pillars, the drive capstan, pressure roller and pressure pads. This can lead to erratic trans-pulse pressure and the odd effect known as 'tape squeal'—a high pitched screeching sound due to friction between the tape and the pillars etc.". "Cleaning is particularly important on quarter-track recorders, of course, because the area of head gap, tape contact is that much smaller. For cassette recorders too, the small dimensions associated with 1/8 inch tape make the dirt problem quite critical. However, I found that the felt pads on the Bib Applicator and Polisher tools easily reached the small heads etc. on cassette machines". "I am perfectly satisfied that this Kit of handy tools is the definitive answer to tape head maintenance. Its use for about 10 minutes after, say, each 50 hours of recording/playback will eliminate the oxide boggy completely. At 12s 6d. it is a real bargain."

**D. G. Killick, Editor "Tape Recording Magazine".....**  
"The thinnest coating of oxide... will impair efficiency". "The selection of tools within the wallet is comprehensive and practical". "In less than a couple of minutes an awkward little job had been satisfactorily completed with a minimum of trouble". "I would again stress the absolute necessity for regular cleaning of some kind". "The tools now provided will enable the job to be done more quickly and efficiently with less trouble than before". "Strongly recommended".

**David Kirk, Deputy Editor "Tape Recorder".....**  
"From the outset, the tools proved vastly more effective and certainly more convenient than the makeshift combination of clean rag, cotton wool and match-sticks that I have been accustomed to using... I have used one other commercial tape-head cleaning device, which admittedly removed oxide and dust from the head channel but replaced these particles with much greater quantities of clinging soapy fluff. The Bib Tape Head Maintenance Kit performs faultlessly the task for which it is intended".

**Percy Wilson—the well-known Audio Consultant.....**  
"I have been having trouble lately with one of my older tape recorders. The speed had gone irregular—both different every time I switched on and full of "wow" and "judder". I tried all the advice given in the textbooks about cleaning heads and driving wheels etc. with either alcohol or petrol. No go! Then I tried the Bib Instrument Cleaner and thoroughly cleaned the effect has been miraculous! The first thing noticeable was an appreciable increase in speed, both of the capstan and of the take-up spools. Playing a tape then showed that "wow" and "judder" had disappeared".

## BIB TAPE HEAD MAINTENANCE KIT. (SIZE E.)



The Kit is intended for the cleaning of tape heads and all parts of the recorder liable to soiling through the shearing off of oxide. Within a blue plastic wallet are packed two tape head applicator tools, two tape head polisher tools, ten applicator and polisher sticks, one double-ended brush, one bottle of Bib Instrument Cleaner, one packet of cleaning tissues and a comprehensive five-page instruction folder. Price 12/6d.

Replacements include: Size F. 2 Tape Head Applicator Tools 2/6d; Size G. 2 Tape Head Polisher Tools 2/6d; Size H. 20 Tape Head Applicator & Polisher Sticks 1/-; Size A. Bottle Bib Instrument Cleaner 4/6d.  
Obtainable from most good Audio shops. In case of difficulty send 15/- for Size E Kit and postage & packing to: BIB DIVISION, MULTICORE SOLDERS LTD., HEMEL HEMPSTEAD, HERTS.

# CLASSIFIED ADVERTISEMENTS

Rate.—One shilling per word: box numbers, 2s. 6d. extra. Payment with copy, which should be sent to Advertising Department, "TAPE Recording Magazine," Prestige House, 14-18, Holborn, London, E.C.1.

## NEW EQUIPMENT

TAPE RECORDERS SAVE FROM 30 per cent to 60 per cent on the original price. Large stocks of second-hand, new, shop-soiled machines. All guaranteed. Obtainable on our **NO INTEREST TERMS**. Best part exchange allowances on your existing equipment. CALL, WRITE, PHONE today for free list. Quotation and details. Our Mail Order covers the whole country.—R. E. W. Earlsfield Ltd., 266, Upper Tooting Road, London, S.W.17. BALham 9174-5.

## FOR SALE

BLACKBURN has Lancashire's leading Hi-Fidelity/Tape Recorder stockists and Electronic Engineers at HOLDINGS AUDIO CENTRE, MINGING LANE/DARWIN STREET, BLACKBURN (Tel. 59595).

GEVAERT new boxed Recording Tapes: 600 ft. (5½ in. spool) at 9s. each or six for 50s. GRUNDIG two-transistor Pre-amplifiers suitable for boosting microphones and tape head monitoring—listed at 4½ gns.—OFFERED NEW and boxed at 57s. 6d. each. LEE ELECTRONICS, 400, Edgware Road, W.2. PADddington 5521.

VORTEXION WVW 4, ¼ track, 7½ and 15 ips. A SUPERB INSTRUMENT capable of highest quality recording work. Seen S.W. London. £60 cash. No offers. Box No. 478.

30 per cent OFF BASF TAPE. LP 7-inch reel 1,800 ft. 33s. 3d.; DP 7-inch reel 2,400 ft. 52s. 6d. P. & P. 5s. per order. W.S.L., 104, Norwood High Street, S.E.27.

GEE'S RECORDING TAPE and AUDIO ACCESSORIES cost LESS! Send 1s. for illustrated catalogue, Gee Bros. Radio, 15, Little Newport Street, London, W.C.2. Gerrard 6794.

PHILIPS CASSETTE TAPE RECORDER EL3301, cost £28, will accept £16 on. Also ELIZABETHAN AUTOMATIC 4-track, cost £28, will accept £17 on. BOTH AS NEW. Apply: F. H. FINDLER, 82 Fountain Street, Leek, Staffs.

20% CASH DISCOUNT on Hi-Fi equipment, Radiograms, Radios, Tape Recorders, Cameras, Type-writers, etc. Join England's largest Mail Order Club now and enjoy the advantages of bulk buying, send 5s. for membership card, catalogues, price lists or s.a.e. for free quotation and leaflets. C.B.A. (Dept. A5), 370, St. Albans Road, Watford, Herts.

## REPAIRS

OUR MODERN SERVICE DEPARTMENT equipped with the latest test equipment including a wow and flutter meter and multiplex Stereo Signal Generator is able to repair Hi Fi and Tape Recording Equipment to manufacturer's standard. TELESONIC LTD., 92 Tottenham Court Road, London, W.1. 01-636 8177.

## TAPE DUBBING

E.R.S. RECORDS: TAPE/DISC Vari-groove High Level Recordings with WIDE FREQUENCY RANGE. Top quality pressings. 162, SHIRLAND ROAD, LONDON, W.9.

J. & B. RECORDINGS. Tape/disc. Mobile unit. Quality recording. 14, Willows Avenue, Morden, Surrey, Mitcham 9952.

JOHN HASSELL RECORDINGS. Tape-to-Disc Service using latest high level disc-cutting system. Quality pressings made. Studio with Béchstein Grand, MobHe unit. 21, Nassau Road, London, S.W.13. RIVerside 7150.

TAPE-TO-DISC RECORDING. Finest professional quality. 10-Inch LP—42s. (32 mins.), 12-inch LP—48s. (45 mins.), 7-inch EP—21s.

40ft. RECORDING STUDIO. S.A.E. for leaflet to DEROY Sound Service, High Bank, Hawk Street, CARNFORTH, Lancs.

## TAPE EXCHANGES

FRIENDLY FOLK ASSOCIATION, Torquay (Est. 1943). Social introductions, Pen-friends, Book-lovers, Stamps, Photography. Tapesponding. Members 108 countries.

G.T.R.E. American Tape Club. Postcard Shows. Sound Mags. Write: Trix Cosier, 12 Yeovil Close, Orpington, Kent.

MAKE INTERESTING NEW FRIENDS. Trial introductions free. VCC. 34, Honeywell, London, S.W.11.

Join TAPEMATES INTERNATIONAL and exchange tapes with friends throughout the World. Club and recording booths 6 p.m.-10.30 p.m. Tuesdays, Thursdays and Saturdays. 6, Holland Park Avenue, London, W.11.

FAR AND WIDE RECORDING CLUB, Eccles, Maidstone. Details free.—S.A.E.

"Joining WORLDWIDE TAPETALK was the best move I made... I am pleased beyond words," says Member 671 of South Africa. Britain's Largest Tape Exchange welcomes YOU. Details: WWTT, 35, The Gardens, Harrow.

## MISCELLANEOUS

HIGHEST CASH PRICES offered for good quality Tape Recorders and Hi-fi. See our advert, page 421 this issue. R.E.W., 266-8, Upper Tooting Road, London, S.W.17.

## TAPE RECORDS

ABSOLUTELY EVERY AMERICAN 4 TRACK STEREO TAPE released in America can be obtained through our special postal service. For complete and up-to-date catalogue of all releases send only 3s. to: MUSIC U.S.A., 201, Pearse St., Dublin 2, Ireland.

Every pre-recorded tape available in Britain is listed in the complete TELETAPE catalogue at 1s. 6d. post free.

Vast selection of Mono and Stereo tapes. Send now for your copy by return to: Mail Order Dept., TELETAPE Ltd., 11, Redvers Road, London, N.22, or call at our Marble Arch or Shaftesbury Avenue Showrooms.

Four-track Stereo Tapes are expensive! Join the W.S.L. Stereo Tape Library and enjoy every tape for only a few pence per day. **Worldwide Service.** Send 9d. postage for full details to: 104, Norwood High Street, London, S.E.27.

## PUBLICATIONS

NOW IN ITS SECOND REPRINT, Alan Beeby's informative handbook **SOUND EFFECTS ON TAPE**. Invaluable to all dramatists and recording enthusiasts. Tells in practical terms not only what to do but also how and why. 3s. 6d. post free. Remittance with order to Print & Press Services, Prestige House, 14-18, Holborn London, E.C.1.

THE LAW and Your Tape Recorder by Andrew Phelan, Barrister-at-Law. Excellent NEW booklet which interprets many aspects of UK Law for tape recorder owners. 3s. 6d. post free. Remittance with order to: PRINT & PRESS SERVICES LTD., Prestige House, 14-18, Holborn, London, E.C.1.

## EDUCATIONAL

LEARN WHILE YOU SLEEP: GCE and Professional subjects. Languages, etc. Free booklet from THE SLEEP LEARNING ASSOCIATION, 14 Belsize Crescent, London, N.W.3. Tel.: SWI 6160.

## VACANCY

TAPE RECORDER SERVICING ENGINEER required for central service department (East London) of Britain's largest tape recorder specialists. Telephone: Mr. Willis, GRAngewood 2110.

## OFFICIAL APPTS.

LONDON BOROUGH OF EALING EDUCATION DEPARTMENT, LABORATORY TECHNICIAN—VISUAL AIDS, required at Ealing Technical College, St. Mary's Road, Ealing, W.5. Duties include preparation of equipment for Audio Visual Classes, cine-projection and care of films, tapes, etc. Salary scale T2—£810-£935 per annum inclusive. Apply to the Registrar at the College as soon as possible. E. J. COPE-BROWN, Town Clerk.

## 20% OFF TAPE

**SCOTCH, EMI, PHILIPS, BASF, etc.**  
*Brand New, Guaranteed, Boxed.*

*Send for lists:*

### IMPULSE SOUND (HI-FI DEPT.)

71, High Street, WALLSEND, Northumberland.

## WIMBLEDON'S TAPE RECORDER CENTRE

SKILLED TAPE RECORDER REPAIRS carried out by expert personnel of many years' experience backed by extensive test equipment:— Wow & Flutter Meter, Audio Valve Voltmeter, Audio Generator, Oscilloscope, etc. with final test performance figures quoted if required:— Ferroglyph specialists.

**Tape Recorder Centre TEL-LEE-RADIO 220 The Broadway, Wimbledon, S.W.19. 01-542 4946**

## The Berean

(NON-DENOMINATIONAL)

## Forward Movement

Loan of over 1,000 reliable expositions of the Bible available on tape (3½ ips) for cost of postage only. For Bible Study groups or private meditation. Supporting literature also available. Details from: Miss R. Hammond, (TRM), Burwood, Blofield, NORWICH, Norfolk. NOR 84Z.

## ● TRM BINDER

Tape Recording Magazine Binder in two-tone green, gold stamped on sturdy spine. Insert your copies of TRM as they are received to form a smart, complete and tidy volume.

**PRINT & PRESS SERVICES LTD.**  
Prestige House,  
14-18 Holborn : London, E.C.1

**14/6**  
POST FREE  
**16/3**  
OUTSIDE U.K.

## GLOBAL PRODUCTS

TALKING BOOKS. 3½ i.p.s. Twin Track. GHOST STORIES. MOUNTAIN ON FIRE, etc. Ask for our leaflet on these Heron Hunter Talking Books  
**POPULAR ORGAN TAPES and DISCS.** Catalogue on request  
**GLOBAL Mk. 2 Speed Erase.** Clears all traces of previous recordings from your tapes in seconds. £5 16s. 0d. inc. postage  
**ENA BAGA** at the Hammond Organ. 3½ i.p.s. Twin Track Mono. £1 plus Is. P. & P. S.A.E. for Leaflets and Catalogue  
**P.O. BOX No. 1, ROTHWELL, KETTERING, NORTHANTS**

## THE INSTITUTE OF SLEEP-LEARNING

is pleased to announce

### A MAJOR BREAKTHROUGH IN SLEEP-LEARNING ECONOMICS

At last we are able to offer a recorder which is not only ideal for Sleep-Learning and Therapy and gives excellent results on music but is at the same time at a sensationally low price—only 25 gns.

Send now for our latest free catalogue of Complete Sleep-Learning Kits and accessories including our special Induction Tapes, Pillow Speakers, Time Switches, etc., etc., together with latest Press Reports on this Vital New Subject.

THE INSTITUTE OF SLEEP-LEARNING  
 Dept. TRM, 153, FELLOWS ROAD, SWISS COTTAGE, LONDON, N.W.3

01-722 3314

## TAPE HANDBOOKS

FOR THE NEWCOMER as well as the ENTHUSIAST OF LONG-STANDING

Advice on Buying a Tape Recorder by J. F. Ling.  
 2s. 6d. (USA \$0.65) post free.

Chapters on preliminary considerations, tape deck, amplifier, etc.

Introduction to the Tape Recorder by C. Langton.  
 3s. 6d. (USA \$0.75) post free.

To help the newcomer to a working knowledge and maximum enjoyment.

Sound Effects on Tape by Alan Edward Beeby.  
 3s. 6d. (USA \$0.75) post free.

How to achieve realistic effects simply and economically

How to Record Weddings by Paul Addinsell.  
 3s. (USA \$0.70) post free.

Illustrated. Covers preparation, mike positioning, equipment, etc.

Hi-Fi for the Music Lover by Edward Greenfield.  
 3s. (USA \$0.70) post free.

Aims at giving the music lover basic technical know-how.

The Law and Your Tape Recorder by Andrew Phelan (Barrister).  
 3s. 6d. (USA \$0.75) post free.

Interprets the law in UK for the tape recorder owner; what is free, forbidden, restricted.

Tape and Cine by John Aldred.  
 3s. (USA \$0.70) post free.

With practical advice on synchronising methods, etc.

### MAIL ORDER ONLY

REMITTANCE MUST ACCOMPANY ORDERS

Send Orders to—

PRINT & PRESS SERVICES LTD.

Tape Bookshop, Prestige House,  
 14-18, Holborn, E.C.1.

# ADVERTISEMENT INQUIRIES SERVICE

I should like further information about Messrs ..... 's advertisement

on page..... of TAPE Recording Magazine about..... (product)

NAME.....

ADDRESS.....

.....

.....

.....

.....

November 1967

This is a special service for readers of "TAPE Recording Magazine." It enables you without cost to get fuller information about those products in which you are particularly interested. Fill in one coupon below for each inquiry, with your name and address in block capitals in each case. Then cut out the whole of this section, following the dotted line, fold as indicated overleaf and post to us.

I should like further information about Messrs ..... 's advertisement

on page..... of TAPE Recording Magazine about..... (product)

NAME.....

ADDRESS.....

.....

.....

.....

.....

November 1967

I should like further information about Messrs ..... 's advertisement

on page..... of TAPE Recording Magazine about..... (product)

NAME.....

ADDRESS.....

.....

.....

.....

November 1967

I should like further information about Messrs ..... 's advertisement

on page..... of TAPE Recording Magazine about..... (product)

NAME.....

ADDRESS.....

.....

.....

.....

November 1967

I should like further information about Messrs ..... 's advertisement

on page..... of TAPE Recording Magazine about..... (product)

NAME.....

ADDRESS.....

.....

.....

.....

November 1967

# ONLY ENGLISH ANNUAL TO DEAL EXCLUSIVELY WITH TAPE RECORDING SEND NOW FOR USEFUL 1966 EDITION

Fill-in & Post this Coupon with Remittance Today! 

To: **TAPE Recording Magazine, 7 TUDOR STREET, LONDON, E.C.4**  
 Please send me.....copy(ies) of TAPE Recording YEAR BOOK 1966, at 7s. 6d.  
 (U.S.A. \$1.25) per copy POST FREE. I enclose remittance.

NAME .....

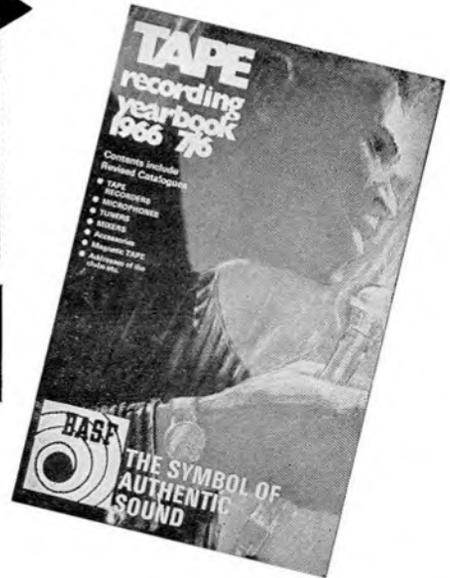
ADDRESS.....

## TAPE YEAR BOOK the Recordist's Reference

PRICE  
**7/6**

- ★ The only available up-to-date comprehensive catalogue of TAPE RECORDERS on the market with full specifications, price, etc., plus photographs.
- ★ Review of tape developments during the past year.
- ★ Manufacturers, dealers and Club Secretaries' addresses.
- ★ GLOSSARY of technical terms, "at-a-glance" tabulated catalogues of microphones, tuners, mixers, and associated accessories; Magnetic Tape Charts, etc.

*On sale at bookstalls or direct from publishers using coupon above*



..... CUT ALONG DOTTED LINE .....

THIRD FOLD HERE

POSTAGE  
WILL BE  
PAID BY  
PRINT AND  
PRESS  
SERVICES  
LIMITED

TAP  
E

TAPE RECORDING MAGAZINE,  
7, TUDOR STREET,  
LONDON, E.C.4

BUSINESS REPLY FOLDER  
Licence No. ND 922

SECOND FOLD HERE

THIRD FOLD HERE

NO POSTAGE  
STAMP  
NECESSARY  
IF POSTED  
IN GREAT  
BRITAIN OR  
NORTHERN  
IRELAND

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

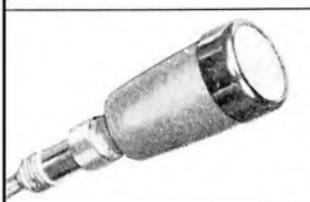
SECOND FOLD HERE

THIRD FOLD HERE

FIRST FOLD ALONG THIS LINE

# Microphones

for every purpose

	<p><b>The DP4</b></p> <p>Designed for general use — P.A., tape recording etc.</p>
	<p><b>The DP6</b></p> <p>Small in size, large in performance. As a lavalier type and for panel mounting on control units etc.</p>
	<p><b>The GC/1 Cardioid</b></p> <p>For stage and church work, P.A. use, lecture halls etc., where acoustic feedback is a serious problem.</p>
	<p><b>The GR/1 and GR/2 Ribbon</b></p> <p>Ideal for studio and similar uses, when a high standard of fidelity is essential. Easily replaceable ribbon assembly.</p>

**Other models and a full range of stands, reflectors, windshields and accessories available**

All microphones are manufactured in a special section of our works, under strictly controlled conditions with stringent test and inspection at every stage. Each and every microphone is individually tested both aurally and on Bruel & Kjoer visual and graphic recording test equipment for conformity to a prescribed performance.

**Grampian** SOUND EQUIPMENT  
Integrity that you hear

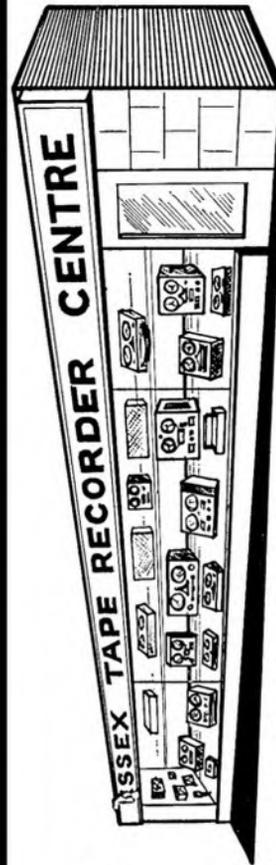
Send for leaflet giving full details

**GRAMPIAN REPRODUCERS LTD.,**  
Hanworth Trading Estate, Feltham, Middlesex. 01-894-9141

## STOCKISTS OF EVERY LEADING MAKE

Alkai, Sony, B & O, Vortexion, Tandberg, Wyndor, Ferrograph, Ampex, Revox, Brenell, Philips, Uher, Telefunken, Truvox, Eltra, Repts, Grundig, Van Der Molen, Ferguson, Sanyo, National, Dansette, E.M.I., etc.

- **GENEROUS PART EXCHANGES**
- **NO FUSS HIRE PURCHASE TERMS**
- **100% AFTER SALES SERVICE**



IF YOU LIVE IN OR NEAR:

**SOUTHEND, BRENTWOOD, COLCHESTER, ROMFORD, CHELMSFORD, GLACTON, BISHOPS STORTFORD, HARLOW, EPPING, LOUGHTON, ETC. ETC.**

THEN THE ESSEX TAPE RECORDER CENTRE MUST BE YOUR AUTOMATIC CHOICE

2, MARYLAND STATION, STRATFORD, E.15 (ADJACENT MARYLAND POINT STATION) TEL: 01-534 5879

Parking facilities: Ample, unrestricted, free parking at rear of premises

# ESSEX TAPE RECORDER CENTRE



# LOW NOISE LEVEL WITHOUT PRINT-THROUGH

## on Agfa Magneton tape

Print-through is what you *don't* get with Agfa Magneton tape. What you do get is perfectly balanced sound reproduction over the complete tonal range... and superb quality, tape after

tape. That's why Agfa Magneton tape is used for so much top-flight professional recording. Give professional polish to *your* recordings with Agfa Magneton tape—proved by the professionals.

... as CineTeleSound Studios will tell you

*'Agfa Magneton tape is especially impressive for its low noise level without print-through' say CineTeleSound Studios. 'We are now using Agfa Magneton tape for recording tracks of feature films, Television shows and commercials and records of all kinds.'*



**PROVED BY THE  
PROFESSIONALS**

**FREE MAGAZINE — SEND NOW**

To: Agfa-Gevaert Limited, Magnetic Tape Division, Great West Road, Brentford, Middlesex.

Please send me my free copy of Agfa Magneton Illustrated Magazine.

NAME .....

ADDRESS .....