

JUNE 1968

TAPE

RECORDING MAGAZINE

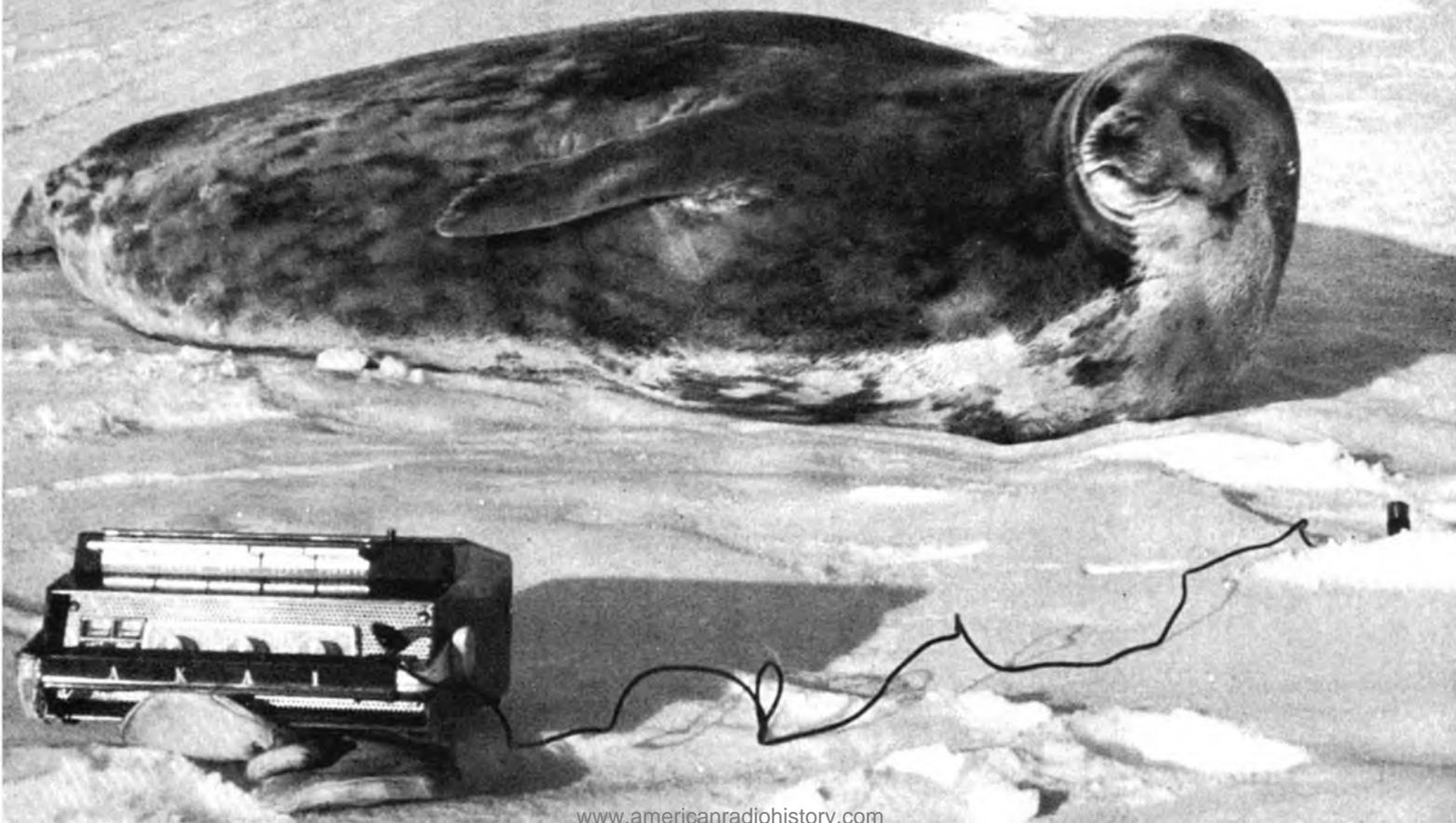
2¹/₂

ADVENTURE in ANTARCTICA

Audio Fair
Retrospect

TEST BENCH
NEW PRODUCTS
MUSIC REVIEWS
ETC., ETC.

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



TAPES



CILLA BLACK
Sher-oo
 Parlophone TA-PMC7041



PAT BOONE
Golden Hits—15 Hits of Pat Boone
 DOT TA-LPD504



CLIFF RICHARD
Cliff In Japan
 Columbia TA-SX6244



MATT MONRO
The Late Late Show
 Capitol TA-T2919

RELEASE DATE



JUNE 1ST

MUSIC CASSETTES

THE MOVE
Move

Regal Zonophone TC-SLRZ1002

MRS. MILLS
Summer Party

Parlophone TC-PCG7046

THE SUPREMES
Supremes A Go Go

Tamla Motown TC-STML11039

THE TEMPTATIONS
Temptations' Greatest Hits

Tamla Motown TC-STML11042

We'd like you to say a few words...

TK247 de luxe: solid state stereo. Four-track, two-speed. (21 transistors, 4 diodes.) Facilities for complete stereo playback *and* recording. Multi-synchronous recordings and monitoring through built-in speakers or headphones. 2 x 4W output stages, 4 speakers. Transfer mixing control. Wow and flutter $\pm 0.12\%$ at 7 1/2 i.p.s., $\pm 0.15\%$ at 3 1/2 i.p.s. Frequency response 40-16,000 Hz at 7 1/2 i.p.s. Illuminated VU input meters. Automatic tape stop. Up to 8 hours' playing time per spool. Stylish cabinet in graphite and silver steel trim. Price: 122 gns.



TK2200: perfect-recording playback anywhere. Fully transistorised. (18 transistors, 9 diodes.) Two contra-rotating flywheels to stabilise tape speed. Brushless DC motor. Wow and flutter $\pm 0.4\%$ at 1 1/2 i.p.s., $\pm 0.25\%$ at 3 1/2 i.p.s. Frequency response 40-15,000 Hz at 3 1/2 i.p.s. Takes 5" spools. Recordings can be monitored. Remote control stop/start from microphone. VU recording level meter, automatic stop, etc. Converts to mains supply using Grundig's TN12 power pack. Price: 92 gns.



C200: Grundig precision in a portable recorder. Fully transistorised. (12 transistors, 3 diodes.) Unique, reliable brushless DC motor. Reproduction of VHF quality. Cassettes give up to 90 minutes' playback. Easy-G control: stop, start, pause, fast forward/rewind, and cassette ejection. Plus recording level control, and continuously variable tone control. Frequency response 80-10,000 Hz; wow and flutter $\pm 0.4\%$; output power 800mW. Vertical or horizontal operation. Features the "Instrument Look." Sockets for external power supply, extension speaker, remote control, etc. Weighs only 4 1/2 lbs. Price: 47 gns.



"Testing, testing, one, two, three"

Go along to your local Grundig dealer, and ask him to put our latest tape-recorders through their paces. When you listen to a Grundig, you hear the tape, not the recorder. Sighs or symphonies, a Grundig plays back *exactly* what you record. So say a few words to a brand-new Grundig. We want to impress you. Grundig make a complete range of tape-recorders, up to 179 gns. One of them's right for you.

MAIL THIS COUPON FOR FURTHER DETAILS
To: GRUNDIG (Great Britain) LTD., Dept TM 6, London, S.E.26.
Please send me, completely free, "The Sound of Grundig" full-colour tape-recorder leaflet.

NAME _____

ADDRESS _____

TM6

FRANCIS OF STREATHAM

GOOD SELECTION OF USED, GUARANTEED MODELS

MAINS RECORDERS

AMPEX 753 professional Stereo Deck and Pre-amp. Transistorised. 3 speed. 91 4 Track. (Mics. extra.) A special from Francis. gns.

Ampex 800 Series Stereo
 Ampex 1100 Stereo
 Ampex 2100 Stereo
 *Akai 1710W Stereo
 *Akai 3000 Stereo
 *Akai 910 Mono
 *Akai M9 Stereo
 *Akai 355 Stereo
 *Brenell Mk.5/M Series III M.
 *Brenell Mk.5 Series III Mono
 Ferguson 3230 Mono
 Ferguson 3224 Mono
 Ferguson 3232 Stereo 4 Tr.
 *Ferrograph Mono 2 Track
 *Ferrograph 2/4 Stereo
 Fidelity Studio 2 or 4 Tr. M.
 *Grundig TK245 S/M pre-amp
 *Grundig TK340 Stereo
 Grundig TK140 4 Tr. M 3
 Grundig TK120 2 Tr. M 3
 Grundig TK145 Auto 4 Tr. M
 Philips Cassette 3312 Stereo
 Philips 3575 St. 3 sp. 4 Track
 Philips 4306 2 sp. 4 Tr. Auto M.
 Philips 4305 4 Tr. 2 sp. Mono
 *Philips 4408 Pro. 3 sp. 4 Tr. St.
 *Revox 77 Stereo Transistor
 Sanyo 800 4 Tr. St. Pre-amp Dk

Sanyo 929 4 Tr. 2 sp. St.
 Sanyo 939 4 Tr. 2 sp. St.
 *Sanyo 999 3 sp. 4 Tr. St. (Speakers extra)
 *Sanyo 800 3 sp. 4 Tr. St. PA/Deck
 Stella 463 Mono 4 Tr. 2 sp.
 Stella Mains/Batt. Cassette
 *Tandberg Ser. 6X St. PA & DK
 *Tandberg Ser. 12 St. 3 sp. 2/4T
 *Tandberg 915 Mono 3 sp. 2/4T
 Telefunken 200 Mono
 *Telefunken 204 St. 4 Tr. 2 sp.
 *Telefunken 203 Ser. 50 M2/4 Tr.
 Telefunken 201 Mono 4 Tr.
 Truvox 50 Series M 3 sp.
 Truvox R102 or R104 Mono
 *Truvox PD102 or PD104 St.
 Ultra 6212 Mono 4 Tr. 3 sp.
 *Vortexion WVA 3 sp. 2 Tr. M
 *Vortexion WVB 3 sp. 2 Tr. M
 *Vortexion CBL 3 sp. 2 Tr. St.
 *Wyndor Vanguard 3sp.4Tr.M

BATTERY MODELS

Loewe Opta 450 Cassette B/M
 Philips EL3302 Cassette
 Philips 4200
 Sharp Batt/Mains 2 Tr. 2 sp. M
 Stella 463 Cassette
 Telefunken 300 2 Tr. Mono
 Telefunken 302 4 Tr. 2 sp. M
 Uher 4000L 4 Tr. 2 sp. Mono
 *Uher 4200/4400 2 sp. St.

*Microphones extra

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 Guarantee Period.
- ★ Generous Part Exchange Terms.

SPECIAL TAPE OFFER

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

MICROPHONES, MIXERS

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

MAINS POWER PACKS

Philips, Stella
 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
 Tripleton Scott Truvox Nikko
 Goodman Ferguson Philips
 Arena Sinclair Tandberg
 "Huldra"
- **TUNERS**
 Quad Rogers Philips Leak
 Armstrong Scott Tripletone Arena
 Nikko Arena Tandberg
 "Huldra"
- **LOUDSPEAKERS**
 Quad Rogers W.B. Kef
 Wharfedale Goodman Tannoy
 Lowther Leak Elac Truvox
 Diton 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 Euphonic
 All types of Diamond and Sapphire styli, stereo and mono, Microlifts, Garrard, Goldring and Acos Pressure Gauges, Disc Preener, Acos Dust Bag.
- **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 Church

01-769 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

THE MAN WHO PROVED OYSTERS CAN SING!



Oysters can sing. Dick Kenny in the U.S.A. has not only listed oysters singing, as can be seen from this picture, but has also recorded them on tape. He now owns hundreds of microphones of this kind, including flies walking about, the sound made by prawns and falling snowflakes.

Madagasc College Malaya region kept systematic record of him some 1,200 Agla- knowledge a last 12 n Otto- und- able

record of it had probably never been made. It was held in the sparsely lit courtyard of a temple where several hundred members of this sect were gathered round the area reserved for the dancing gods. Their magnificent robes and masks, I kept carefully suppressed to some extent by the background, which was rather unsatisfactory for the recording. The had rendered

and also recorded the 'micro-sounds' of flies, prawns, moonbeams and falling snow! Extraordinary feats by an extraordinary man—nicknamed by his hundreds of friends as 'the crazy tapeworm'! Read all about him in the latest issue of Agfa Magnetron Magazine. True stories like this, technical features and a host of tips for the tape enthusiast can be found within its pages. Every issue also contains a wealth of information about the wide range of Agfa Magnetron tapes and useful accessories you can buy. It illustrates the benefits of low noise level without print-through, low distortion level, consistency, and the extreme tensile strength of all Agfa Magnetron tapes.



PROVED BY THE PROFESSIONALS

To: AGFA-GEVAERT LIMITED, Magnetic Tape Division, Great West Road, Brentford, Middlesex.
 Please send me my FREE copy of Agfa Magnetron Magazine.

NAME
 ADDRESS

AGFA MAGNETON RECORDING TAPES

Make your choice from the widest range in London's leading Audio Centres

Come and see the widest range anywhere of the newest Hi-Fi and Tape—make your choice in comfort with specialist skilled advice ready at your elbow.

Interest Free Terms? of course!

Lowest permitted deposits, interest-free terms, free insurance, carriage and packing, unrivalled stocks and unprejudiced technical advice all help to make the most of your Hi-Fi or Tape purchase and to ensure your genuine satisfaction and lasting pleasure. (Please note we are unable to offer interest-free terms on Tape Recorders offered at pre-Budget prices while stocks last.)

Mail Order? This is an R.E.W. speciality. Fast, free van service anywhere in Greater London, vast stocks to ensure that your requirements can usually be met immediately without frustrating delays and disappointments.

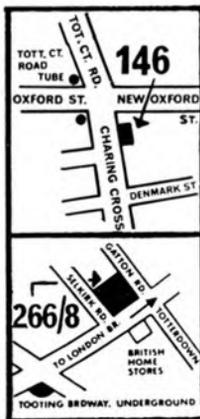
Looking for a bargain? You will always find a wide range of equipment at our Headquarters Showrooms in Upper Tooting Road, often exclusive to R.E.W., at unrepeatable and unbeatable low prices.

We specialise in Part Exchange. If you have good quality equipment for disposal you can be sure of a generous and fair offer from R.E.W., or the maximum allowance against new equipment.

New extended showrooms in London's West End. You will find us just opposite the Astoria Cinema in Charing Cross Road, at 146. You will find we have the finest and most up-to-date equipment the world has to offer, from Britain, U.S.A., Japan, Scandinavia and the Continent. Bigger and better demonstration facilities and skilled, experienced staff ready with advice if required will make your choice easier and more rewarding.

Specially trained staff, too, at our Headquarter Showrooms in Upper Tooting Road, plus the same unrivalled selection from which you can make your choice. Over 400 Tape Recorders alone in stock here!

Overseas Visitors will find our Personal Export Service really helpful. Equipment can be despatched immediately free of U.K. Purchase Tax. Careful, experienced packing, fast service and prompt delivery arranged anywhere in the world.



PHILIPS EL3302
Portable Cassette Recorder

Better performance than before! Frequency response 80-10,000 c/s. Tape speed $1\frac{1}{2}$ i.p.s. List Price £31.10.0 or on interest free terms—£7.14.6 deposit, 12 monthly payments of £1.10.0. Carr., packing & insur. 12/6. Our Price 24½ gns.

AKAI M9
STEREO TAPE RECORDER

Three speeds, $7\frac{1}{2}$, $3\frac{1}{2}$, $1\frac{1}{2}$ i.p.s., Solid state, 7 in. reels, sound on sound facilities, automatic stop, automatic shut-off. Two Vu Meters and the famous cross-field head. Frequency response 30-23,000 c.p.s. \pm 3dB at $7\frac{1}{2}$ i.p.s. Signal/noise ratio better than 50dB. Power output 8 watts per channel. List Price £195.35. Our Price £159.0.0 or £53.0.0 deposit and 12 monthly payments of £9.14.4. Total H.P. price £169.12.0



AKAI 1710W
STEREO TAPE RECORDER

Completely self-contained 4-track stereo machine, 3 tape speeds, perfect 100-micro-inch recording head, automatic shut-off, 3 digit index counter

and 7 in. reels. Two 7 in. x 5 in. built-in speakers, frequency response 40-18,000 c.p.s. 5 watts per channel output. Latest Model £89.10.0 or £30.10.0 deposit and 12 monthly payments of £5.8.2. Total H.P. price £95.8.0.

See and hear the latest developments:

AMPLIFIERS & TUNERS BY: AKAI ARENA ARMSTRONG B & O CHAPMAN DECCA FISHER GOODMAN'S GRUNDIG LEAK PHILIPS PYE QUAD RADFORD ROGERS SANSUI TELETON.

LOUDSPEAKERS BY: ARENA B & O FISHER GOODMAN'S KEF LEAK PHILIPS ROGERS TANNOY WHARFEDALE.

TAPE RECORDERS BY: AKAI AMPLEX B & O BRENNEL CINECORNER EMI FERGUSON FERROGRAPH FICORD ELIZABETHAN GRUNDIG HITACHI AIWA LUXOR OPTACORD PHILIPS REVOX SANYO SONY TANDBERG TELEFUNKEN UHER WYNDSOR.

Gt. Britain's Largest Hi-Fi and Tape Recorder Dealers!



R·E·W (EARLSFIELD) LTD. ★ LEADERS IN MAIL ORDER HI-FI ★

● HEADQUARTER SHOWROOMS AND MAIL ORDER: DEPT. T.R.M., 266-8 UPPER TOOTING ROAD, LONDON, S.W.17. Tel.: 01-672 8267 or BAL 9175
● WEST END SHOWROOMS: 146 CHARING CROSS ROAD, LONDON, W.1. Tel.: 01-836 3365 (opposite Astoria Cinema)

New
from
Tandberg

The Series 15

The new Series 15 combines Tandberg's world renowned qualities of faithful sound reproduction, reliability and compact modern design at a quite remarkably low price. It incorporates many superb features:—

- ★ Programme mixing facilities with separate controls for microphone and line inputs.
- ★ 10 watts output using an external speaker.
- ★ Volume control for monitoring whilst recording at loudspeaker level.

- ★ Loudspeaker selector switch providing choice of playback through internal speaker, or external speaker or both simultaneously.
- ★ Three speeds.
- ★ 4 digit illuminated counter with instant reset button.
- ★ Pause control gives instant stop/start.
- ★ Separate Bass and Treble lift and cut controls.
- ★ Signal to noise ratio 55db below maximum recording level.

- ★ Frequency response:—
 - 7½ ips : 30-20,000 Hz (± 2dB40-16,000 Hz)
 - 3¾ ips : 30-13,000 Hz (± 2dB50-10,000 Hz)
 - 1¾ ips : 30-7,000 Hz (± 2dB60-5,000 Hz)

Elstone Electronics Limited,
Hereford House,
Vicar Lane, Leeds 2.

Tandberg
move up to

Series 15 from 691/2 guineas.

PERFECTION-



Start with the new Lustraphone "Series Four" Microphones, add the new LO-NOISE Multi-Impedance Mixer, and feed into the 50 watt LO-NOISE Silicon Transistor Amplifier. Finally, connect to the finest loudspeaker you can find, and you will be a Stage Closer to Perfection.

The Multi-Impedance LO-NOISE Mixer provides inputs of 50 ohms, 300 ohms, and 2 megohms on each channel for the utmost versatility. Distortion is a negligible 0.1% and signal to noise ratio is superb at -86dB (for input of 1 mV at 300 Ohms).

Advanced, but brilliantly simple, circuitry of Lustraphone LO-NOISE Amplifiers brings you unrivalled performance and reliability. You get more of the sound you want and less of the noise you don't want.

Brief Specification of Lustraphone LO-NOISE Amplifiers:

Power Output: 15 watts RMS or 50 watt RMS (According to Model)

Frequency Response: 25Hz to 22 KHz within 1dB

Total Harmonic Distortion: Less than 0.5% at all levels up to full rated power

Signal to Noise Ratio: -120 dB

Send for free literature giving full details of Lustraphone "Series Four" Microphones, LO-NOISE Multi-Impedance Mixers and LO-NOISE Silicon Transistor Amplifiers.



lustraphone

THE FOREMOST NAME IN MICROPHONES

Lustraphone Limited,
Regents Park Road, London N.W.1 Tel: 01-722 8844

**Where can you get a
STEREO TAPE RECORDER
with this specification,
and at these prices, but
from HEATHKIT?**

Kit £58 incl. P.T. P.P. 10/6

Ready to Use £70.6 incl. P.T.

FOR THIS SPECIFICATION

- 1/2 track stereo or mono record and playback at 7 1/2, 3 1/2 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.



The New Heathkit Stereo Tape Recorder has built-in audio amplifiers and speakers giving you complete recording and playback facilities in one compact cabinet that's easy to carry from room to room or house to house. The kit is complete with a good quality moving coil mono microphone, 5 1/2" spool of long play (1,200 feet) magnetic tape and one spare spool.

Versatile Recording Facilities. The Heathkit Recorder can record "live" from microphones or from auxiliary sources such as radio tuners, records, etc., and playback . . . in 1/2 track stereo or mono at either 7 1/2, 3 1/2 or 1 1/2 ips. And you can make sound-on-sound recordings by playing back through one channel and recording through the other channel . . . stereo record and playback . . . mono record and playback on either channel.

Other Features. Two audio amplifiers produce 4 watts rms per channel into two high efficiency 8"x5" speakers giving high quality sound in a portable instrument. Gives startling realism to stereo reproduction . . . jacks are provided for connecting to external speakers if required. Moving coil level indicator for visual monitoring of recorded signal level. Separate inputs and controls for microphones and auxiliaries, separate outputs for speakers/headphones and external amplifiers . . . all front-panel mounted for easy access. Ganged controls for easy operation. All transistor circuitry.

So Easy to Build . . . the Heathkit way! Simple step-by-step instructions and large pictorial diagrams in the manual show you where every part goes . . . tell you exactly what to do . . . guide you every step of the way. No special skills or technical knowledge required. Printed circuit board construction ensures speedy and easy assembly with consistent performance.

**See Britain's Finest Range
of Hi-Fi · RADIO · TAPE
in the latest FREE Catalogue**

To DAYSTROM LTD., T.6 Gloucester.

Telephone 29451

Please send my FREE BRITISH HEATHKIT Catalogue

Please send model.....
Enclosed is £ s d plus postage

Name

Address

.....

**UP TO
50%
OFF!**

FANTASTIC SAVINGS

We have a fantastic selection of tape recorders, new, shopsoiled and secondhand, showing savings on the manufacturers' list price of up to 50%. Our quoted prices are absolutely unbeatable, so why not call at any of our showrooms and see the fantastic savings that we, as Britain's largest tape recorder specialist company, are able to offer you by virtue of our ability to purchase large quantities and pass the savings thus obtained on to you! (Personal Callers only.)

- UNBEATABLE NO-INTEREST TERMS
- OVER 100 MODELS ON DISPLAY
- EXPERT STAFF EXPERT ADVICE
- GENEROUS PART EXCHANGES
- SAVINGS OF UP TO 50%

THIS MONTH'S BARGAINS

All supplied with 3 months' unconditional written guarantee
(Note: M=Mono, S=Stereo, BP=Battery Portable, 4=4 track, 2=2 track)

PHILIPS 3300 (BP/M/2). Originally £28 ...	OUR PRICE 16 gns.
ELIZABETHAN LZ32 (M/4). Originally £34 ...	OUR PRICE 19 gns.
GRUNDIG TK14 (M/2). Originally £47 ...	OUR PRICE 22 gns.
PHILIPS EL3541 (M/4). Originally £42 ...	OUR PRICE 24 gns.
COSSOR 1604 (M/4). Originally £42 ...	OUR PRICE 29 gns.
LOEWE-OPTA 408 (BP/M/2). Originally £42 ...	OUR PRICE 29 gns.
TELEFUNKEN 75 (M/2). Originally £62 ...	OUR PRICE 29 gns.
AKAI M69 (M/2). Originally £63 ...	OUR PRICE 35 gns.
REPS R10 (M/2). Originally £59 ...	OUR PRICE 39 gns.

NOTE: THESE ARE NOW EVEN BETTER VALUE AS YOU PAY NO TAX ON SECONDHAND RECORDERS - WE STILL HAVE A FEW NEW RECORDERS AVAILABLE TAX FREE AT PRE-BUDGET PRICES!

GRUNDIG TK41 (M/4). Originally £83 ...	OUR PRICE 39 gns.
WYNDSOR VANGUARD (M/4). Latest Model— List £75 ...	OUR PRICE 49 gns.
GRUNDIG TK6 (BP). Originally £85 ...	OUR PRICE 49 gns.
FERROGRAPH 4AN (M/4). Originally £80 ...	OUR PRICE 55 gns.
AKAI 1700 (S/4). Originally £90 ...	OUR PRICE 59 gns.
TELEFUNKEN 97 (S/4). Originally £95 ...	OUR PRICE 59 gns.
GRUNDIG TK245. Originally £105 ...	OUR PRICE 69 gns.
REVOX 736 (S/4). Originally £135 ...	OUR PRICE 89 gns.
UHER ROYAL (S/4). Originally £170 ...	OUR PRICE 99 gns.
AMPEX 1100 (S/4). Originally £160 ...	OUR PRICE 105 gns.

PERSONAL CALLERS ONLY

HURRY WHILE STILL AVAILABLE!

NoSound
TAPE RECORDER CENTRES

82 HIGH HOLBORN, W.C.1 (200 yards Kingsway) (Mon.-Fri. 9-6 p.m., Sat. 9-1 p.m.)	CHAncery 7401
228 BISHOPSGATE, E.C.2 (opp. Liverpool St. Stn.) (Mon.-Fri. 9-6 p.m. Closed Sat. Open Sunday 10 a.m.-2 p.m.)	BIShopsgate 2609
242/4 PENTONVILLE ROAD, N.1 (200 yards King's X) (Half-day Thursday)	TErminus 8200
36 LEWISHAM HIGH STREET, LEWISHAM, S.E.13 (Half-day Thursday)	LEE Green 2399
360 KILBURN HIGH ROAD, N.W.6 (opp. Kilburn Tube Stn.) (Half-day Thursday)	MAIda Vale 1656
2 MARYLAND STATION, STRATFORD, E.15 Adjacent Maryland Point Station (Half-day Thursday)	MARyland 5879

NORTH WEST LONDON TAPE RECORDER CENTRE



TELEFUNKEN SPECIALISTS

COMPLETE RANGE IN STOCK

Akai, Ampex, B & O, Brenell, E.M.I., Elizabethan, Ferguson, Ferrograph, Grundig, Loewe-Opta, National, Nusound, Philips, Reps, Revox, Sanyo, Sharp, Sony, Truvox, Uher, Van Der Molen, Vortexion, WyndSOR, etc., together with a wonderful range of Tape Accessories

Easily the most accessible Tape Recorder Centre in N.W. London. Situated opposite the Classic Cinema and Kilburn Tube Station (Bakerloo line). Bus routes 1, 6, 8, 8a, 16, 28, 31, 176, 187 pass near or by the door. Choosing a tape recorder? Nothing could be easier than a visit to the North West London Tape Recorder Centre.

Personal, expert advice . Generous part exchanges
Easy hire purchase terms . Free after sales servicing

**360, KILBURN HIGH ROAD,
LONDON N.W.6**

Telephone: 01-624 1656

Open 9 a.m.-6 p.m. Monday to Saturday

Half-day Thursday

IMMEDIATE DELIVERY!

K. J. ENTERPRISES

EVERYTHING AUDIO!

BRITAIN'S PREMIER MAIL-ORDER RECORDING TAPE SPECIALISTS

IMMEDIATE 24 HOUR SERVICE ON ADVERTISED LINES

FULL CASH REFUND GUARANTEED

SEND TODAY AND SAVE!

BRANDED TAPES

20% OFF

**BASF—EMI—GRUNDIG—PHILIPS
SCOTCH—AGFA—KODAK**

STANDARD PLAY	LIST PRICE	OUR PRICE
5" 600'	21/-	16/10
5½" 900' } Except	28/-	22/6
7" 1,200' } Agfa	35/-	28/-

LONG PLAY	LIST PRICE	OUR PRICE
3" 210' (Not Scotch or Kodak)	9/-	7/3
3" 300' (Scotch only)	9/6	7/6
3½" 300' (Kodak only)	12/-	9/6
4" 450' (Except Kodak)	14/6	11/8
4½" 600' (BASF, Agfa only)	21/-	16/10
*5" 900'	28/-	22/6
*5½ 1,200'	35/-	28/-
*7" 1,800'	50/-	35/-
8½" 2,400' (BASF, Scotch only)	72/6	58/-
10" 3,280' (Agfa only)	85/-	68/-
10" 3,600' (BASF only)	95/-	76/-
10½" 4,200' (Agfa, BASF only)	112/-	90/-

SCOTCH DYNARANGE (L/P)	LIST PRICE	OUR PRICE
5" 900'	32/3	25/10
5½" 1,200'	40/6	32/6
7" 1,800'	57/6	46/-
8½" 2,400'	83/6	66/10

COMPACT CASSETTES	LIST PRICE	OUR PRICE
C.60	17/6	14/-
C.90	25/-	20/-
C.120	33/6	27/-

Grundig Tape available only where marked with asterisk. Postage and Packing 2/-. ORDERS OVER £3 POST FREE

FERROGRAPH TAPE—20% OFF!

Brand New. Fully guaranteed and in normal manufacturer's pack.	LIST PRICE	ONE	THREE	SIX
BN7 1,200' on 7" reel (Dynarange)	50/-	40/-	117/6	230/-
BN8 1,800' on 8½" reel (Dynarange)	71/-	57/-	168/-	330/-
BL7 1,800' on 7" reel (Dynarange)	70/-	56/-	165/-	324/-
BL8 2,400' on 8½" reel (Dynarange)	90/-	72/-	213/-	420/-

Post and Packing 2/-. ORDERS OVER £3 POST FREE.

ILFORD TAPE NEAR HALF PRICE

A BULK PURCHASE OF PREMIUM GRADE, TOP QUALITY, POLYESTER MAGNETIC TAPE FROM ONE OF THE WORLD'S FOREMOST EXPERTS IN FILM COATING TECHNOLOGY, WITH FULL LEADER, STOP FOIL, POLYTHENE WRAPPING, AND IN ORIGINAL MANUFACTURER'S BOXES. AVAILABLE IN LONG-PLAY BASE ONLY AT THESE BARGAIN PRICES.

	One	Three	Six
900' on 5" reel	List Price 28/-	16/6	48/-
1800' on 7" reel	List Price 50/-	32/6	95/-

Please add 2/- P. & P. ORDERS OVER £3 POST FREE

SENSATIONAL NEW HALF-PRICE OFFER!

A bulk purchase of top quality Recording Tape manufactured by one of the country's leading makers. A polyester based tape with superlife black coating. Polythene wrapped boxed and fully guaranteed. Available while stocks last in one size only.

1800' on 7" reel Long Play	Normal Value	ONE	THREE	SIX
	50/-	26/-	72/-	150/-

Postage and Packing 2/-. ORDERS OVER £3 POST FREE

AMPEX TAPE 25% OFF

BRAND NEW, FULLY GUARANTEED & IN NORMAL MANUFACTURER'S PACK '500' SERIES AUDIO TAPE (MYLAR BASE)

TYPE	DESCRIPTION	LIST PRICE	ONE	THREE	SIX
541-9	900' L/P 5" reel	28/-	21/-	61/6	120/-
541-12	1,150' L/P 5½" reel	35/-	28/-	82/6	162/-
541-18	1,800' L/P 7" reel	50/-	32/6	96/-	189/-
551-12	1,200' D/P 5" reel	42/-	35/-	103/6	204/-
551-16	1,650' D/P 5½" reel	56/-	45/-	133/6	264/-
551-24	2,400' D/P 7" reel	72/6	55/-	163/6	324/-

'600' SERIES PROFESSIONAL AUDIO TAPE (MYLAR BASE)

	DESCRIPTION	LIST PRICE	ONE	THREE	SIX
641-9	900' L/P 5" reel	30/6	23/-	66/6	127/6
641-18	1,800' L/P 7" reel	52/6	39/6	116/-	226/-
651-12	1,200' D/P 5" reel	46/-	34/6	101/-	197/-
651-24	2,400' D/P 7" reel	80/-	60/-	177/-	348/-

Post & Packing 2/-. Orders over £3 Post Free

N.B.—OTHER TYPES & SIZES AVAILABLE INCLUDING THE INEXPENSIVE "WHITE BOX" SERIES

SPECIAL OFFER COMPACT CASSETTES

"MC 60"



Compact Cassettes with 60 mins. playing time. Brand new and packed in normal plastic library box—available at this exceptional price.

NORMALLY 17/6 OUR PRICE 13/-

Standard pattern to fit Philips, Stella, Elizabethan, Dansette, Sanyo, etc.

3 for 38/3 6 for 75/- 12 for 144/-

Post & Packing 2/-

Orders over £3 Post Free

BASF TAPE—30% Reduction

A SPECIAL OFFER OF THIS FAMOUS PREMIUM GRADE TAPE Brand new, boxed, with full leader, stop foil and polythene sealed. Multiples of three 4" size can be supplied in the BASF 3 compartment plastic library cassettes at no extra cost.

Type	Description	List Price	One	Three	Six
LGS 26	600' D/P 4" reel	25/-	17/-	49/-	93/-
LGS 26	1200' D/P 5" reel	42/-	29/6	86/-	166/-
LGS 26	1800' D/P 5½" reel	55/-	38/6	112/6	219/-
LGS 26	2400' D/P 7" reel	77/6	49/6	145/6	285/-

Post and Packing 2/-. ORDERS OVER £3 POST FREE.

TRIPLE PLAY TAPE—40% OFF!

A large purchase from TWO world renowned manufacturers enables us to make this unique half-price offer. Brand new, fully guaranteed, premium grade Polyester Base Tape with FULL LEADER and stop foil. In original maker's boxes and polythene wrapped at these EXCEPTIONALLY LOW PRICES.

	List Price	One	Three	Six
450' on 3" reel Gevasonor	22/-	14/-	40/6	78/-
600' on 3" reel Gevasonor	27/6	17/6	51/-	99/-
900' on 4" reel Gevasonor	39/-	24/6	72/-	140/-
2400' on 5½" reel Zonal	90/-	55/6	165/-	324/-

Post and Packing 2/-, ORDERS OVER £3 POST FREE.

20% off all Grundig and Philips equipment.

SEND FOR LISTS OF OTHER TAPE AND HI-FI BARGAINS

K. J. ENTERPRISES, (Dept. T), 17 THE BRIDGE, WEALDSTONE, MIDDLESEX (OPPOSITE HARROW & WEALDSTONE STATION) 01-427 0395 (CLOSED P.M. SAT.) REFUND GUARANTEE

FREE

Our New Illustrated catalogue sent entirely free on request. Britain's most specialized comprehensive range of recording tape and accessories. 20,000 reels always in stock with reductions ranging up to 50%.

now hike mike's got company...

... these 5 newcomers to the Audac range of integrated microphone transmitters

Transmitter Type TX/65

for use in highest quality sound systems. Versatile in operation, general purpose use in entertainment industry.



Hike Mike fitted with windshield and 'pop' filter top quality, all purpose, omni-directional.



High power separate transmitter unit

for professional use where an individual choice of microphone is required. Reliable and trouble-free operation up to 1/4 mile distance.



Transmitter Type TX/45

ideal for the solo entertainer. Uni-directional properties make it most suitable for operation in most difficult acoustic conditions.



Transmitter Type TX/C

Same characteristics as Hike Mike, shape allows either hand or lavalier operation. General purpose.



Like Hike Mike each is completely cordless, contained in one neat unit, no bigger, no heavier than a torch. No following flex, no bulging pocket transmitter

AUDAC RADIO MICROPHONE AND SOUND REINFORCEMENT SYSTEMS

AUDAC MARKETING COMPANY LTD/FOREST WORKS/CAREY RD/WAREHAM/DORSET/Tel: Wareham 2245

TAPE

RECORDING
MAGAZINE

Incorporating TAPE RECORDING & HI-FI MAGAZINE and STEREO SOUND MAGAZINE

Vol. 12

No. 6

June 1968

IN THIS ISSUE

- Tape trends and tape talk 252
Douglas Brown
- AUDIO FAIR RETROSPECT 253
TRM Report
- THE FINE ART OF MULTI-TRACK 256
F C Judd
- ANTARCTIC ADVENTURE 258
J Lucas
- Cross Talk 261
By Audios
- Techniques—MOVEMENT IN STEREO 262
Denys Killick
- Test Bench—SHARP RD-505 264
- NATURE NOTES 265
Richard Margoschis
- Accessory Review—SINCLAIR Q-14 267
- MUSIC ON TAPE—
Musicassette Reviews 268
7½ and 3¾ ips Stereo Reviews 269
New Products 270
Advertisement Enquiries Service 273

FRONT COVER PHOTOGRAPH: Naturalist Joseph Lucas believes in recording the easy way! His machine, an Akai X-IV, has been carefully placed on the snow with the microphone extended ready to catch the slightest sound from this female Crab-eater Seal. The location is Halley Bay, the largest British base on the Antarctic Continent; the temperature was about -22°C. The bridge in the middle distance was erected by Mr. Lucas' expedition—it collapsed into the sea shortly after the picture was taken. The black dot towards the left is an empty 44 gallon oil drum; these are used to mark tractor routes. The story of this Antarctic adventure appears on Page 258 this month.

"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

ADVERTISING

01-242 4851

Editor,
DENYS G. KILICK

Advertisement Manager, VIVIANNE GOODING

Tape trends and tape talk

By Douglas Brown

AN INTERESTING new group of recording amateurs has come into existence—the Wildlife Sound Recording Society, which starts life with about a score of naturalists and tape recordists as members.

Ludwig Koch, the most distinguished of the pioneering recordists of the sounds of nature, has agreed to be honorary Life President; Desmond Hawkins, Controller, BBC South and West is honorary Life Vice-President; John Burton, of the BBC Natural History Unit has been elected Chairman, Richard Margoschis—a regular contributor to this magazine—Vice-Chairman, Roger Burrows, Secretary, and Vivien Margoschis, Treasurer.

Inquiries about the Society can be addressed to *Tape Recording Magazine*. The entrance fee for new members is five shillings and the annual subscription ten shillings.

There will be a regular newsletter and circulating tape, to which members will contribute. The inaugural meeting was at Woodchester Park Field Centre, near Stroud, Gloucester, when for two days founder members enjoyed this lovely unspoiled valley on the edge of the Cotswolds and were able to match their wits against birds and mammals in the truly wild state.

It is hoped to organise further weekend meetings.

The BBC is showing great interest in the new organisation and has already featured it in two programmes. I think there may be a great future for clubs catering for specialists in this way.

* * *

THE FEDERATION of British Tape Recordists and Clubs has just celebrated its tenth anniversary—at the annual general meeting held at the Russell Hotel during the Audio Festival. There was a much-better-than-usual turnout of delegates and two important decisions were taken.

One was to elect regional representatives as additional members of the Federation Council. Initially, nominees from Yorkshire, Merseyside, Lincolnshire and the Solent Area were elected and an approach is being made to clubs in the south-west. In this way, it is hoped to dispose of any suggestion that the Federation is London-orientated.

The second development is the formation of a section for tape correspondence, with Mr. R. Johnson, of Skegness, an enthusiastic retired schoolmaster, serving as organiser. A register of members interested in this activity is to be prepared.

The officers of the Federation were re-elected, but with Mr. Terry Devereux replacing Mr. Arnold Highcazony, who resigned from the secretaryship.

* * *

THE BRITISH Amateur Tape Recording Contest prizegiving party was also staged at the Audio Festival this year, by kindness of Mr. Cyril Rex Hassan, and I thought it was the best gathering of



Smile of success. Paul Griffin, winner of the *Tape of the Year* award, at the presentation at the Russell Hotel

its sort since the Contest was launched. The winning tapes when replayed added up to an excellent programme of varied tape recording achievement.

The competitors who had made them were given an enthusiastic reception, with special applause for seven-year-old Susan Corfield, for Mr. R. Bannister, who is blind, and for Mr. P. Stevenson, a spastic. Rarely has there been so dramatic a demonstration of the attraction of tape recording to children or of its value to the handicapped.

* * *

EXCITING DEVELOPMENTS are taking place in Czechoslovakia these days, as headlines in the daily press during recent weeks have indicated. Change on the political level is having an effect in many fields.

I have just received preliminary information about Hi-Fi Expo Prague 68, which looks like being the biggest exhibition of audio and tape recording equipment ever staged in central or eastern Europe. It takes place towards the end of this month and the organisers hope to be able to show a full range of equipment from western European manufacturers—if they are ready to co-operate.

Certainly, *Tape Recording Magazine* will be introduced to Czech enthusiasts on this occasion—we already have readers and good friends there.

Later this year, of course, the International Recording Contest is also to be staged in Prague.

AUDIO FAIR RETROSPECT

LOOKING back on the 1968 International Audio Festival and Fair one is left with a succession of kaleidoscopic impressions of sights, sounds and people. For four hectic days the Russell Hotel was the hub of the audio world. Now the tumult and the shouting has died. A peaceful normality has returned to Russell Square and all that remains are the aching muscles and the pleasant memories.

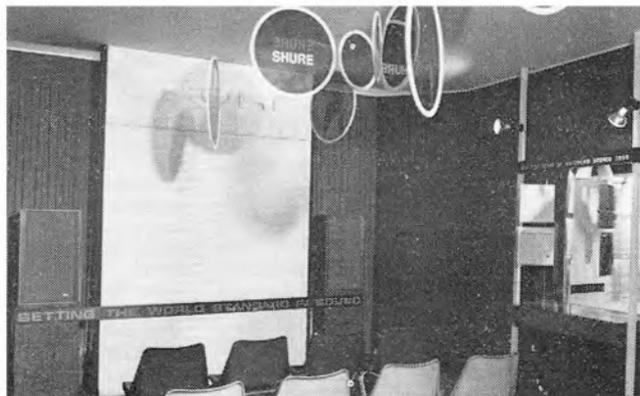
The task of visiting and reporting on every single demonstration is colossal—and if we were to refer in this editorial to every single exhibitor's products it would make dreary reading indeed. Our aim in this "Retrospect" is not to labour through a list of equipments (which we are sure every manufacturer would dearly like us to mention) but to attempt to convey an overall impression of what took place. So right at the start we should like to plead for greater imagination and skill on the part of exhibitors in the handling of their demonstrations. Some of these fell far short of the hi-fi label attached to their products.

This was not always the exhibitor's fault. After listening to the playback of a demonstration tape made by one very well known firm we asked the Sales Manager with heavy sarcasm which bathroom he had used to record his commentary in? With an air of hopeless resignation he opened the door behind him to reveal a small private bathroom which, he explained, was the only quiet spot he could find to use as a studio. Such are the difficulties with which the exhibitor has to contend.

But these things could be avoided with more care and forethought. In the hope that the general standard of demonstrations might be improved in the future we should like to mention a few that were, in our opinion, of outstanding merit.

THE MOST TASTEFUL

Firstly we would award the accolade for the most tasteful presentation in the whole Fair to Shure Electronics Limited for the manner in which they demonstrated their VI5-II cartridge. The demonstration room was dimly lit; the walls were draped with black. On a large white screen in front of the rows of chairs abstract patterns of coloured



The Shure demonstration room that earned from us the title of "The Most Tasteful." With lights dimmed a single spot produced abstract coloured patterns on the white screen from the suspended transparent discs which moved freely in the air. A peaceful atmosphere in which one could really listen to the music

light were allowed to form random designs. From a pair of KEF Concerto loudspeakers placed unobtrusively in the shadows on either side came a stream of pure music at comfortable listening level.

The psychology behind this arrangement is as interesting as it is absolutely correct. When listening to a demonstration the audience should be permitted to concentrate all their attention on the sound. In the Shure demonstration room the eye was held by the gently changing patterns of colour on the screen and in the half-light there was nothing to distract the mind or the attention. The whole thing was most tastefully arranged, and in our opinion highly successful. The manufacturer resisted the temptation to spotlight any advertising material at all, and so the visitor could really concentrate on what he had come to hear—the music. Many thanks, Shure, for providing this delightful haven of refuge.

THE MOST COURAGEOUS

The award for the most courageous demonstration must surely go to Truvox Limited. Taking their life in their hands they offered their visitors genuine record/playback sessions using two members of the Temperance Seven Group as instrumentalists. At each demonstration the audience heard a live recording being taken and then listened to the playback. Under the normal difficulties of recording in an hotel bedroom this would be a hazardous enterprise; with some thirty members of the public packed in as well it was a sincere and courageous effort. So many things could have gone wrong. Naturally the stereo was highly directional, since the two instrumentalists, one on guitar and one on clarinet, were pushed into opposite corners of the room—there was no space for them anywhere else. The microphones were Shure Unispheres, the recorder was the

new Truvox Series 200 stereo machine and playback was via a pair of Truvox LS 200 speakers. A thoroughly excellent effort that proves the manufacturer's confidence in a good product.

THE MOST ORIGINAL

For originality the C. E. Hammond colour film could not be bettered. Made by members of the Hammond staff with a little professional assistance it announced the arrival of the new Series 77 Revox tape recorders in just about the most original manner one could think of. The cameras took us to one of the largest stone quarries in Europe—actually it was in Derbyshire. There in the quarry was placed the old Model 736. With dramatic shots of klaxons sounding the camera panned back to the tape recorder standing isolated in the centre of the quarry. Suddenly an almighty explosion. Clouds of smoke and chunks of rock and debris flying all over the place. The 736 had been disposed of in a truly grand manner.



An enlargement from the 16 m.m. colour film showing the explosion that disposed of the Model 736 Revox. How could they be so cruel to such a fine piece of equipment!

We were told afterwards that 12 tons of explosive were used and 112,000 tons of rock were shifted by the blast. C. E. Hammond Limited thank I.C.I. for their courtesy and assistance and we must all

Continued overleaf

thank Hammonds for an amusing and entertaining film. We have no reserve at all in naming their demonstration as the most original.

THE MOST CONTROVERSIAL

Last in this list of special awards comes one for the most controversial demonstration. We have no hesitation in naming 3 Ms as the outright winner in this class. Their demonstration of Scotch recording tape raised more controversy than any other exhibit this year.

The recording they produced was in four channel stereo. The loudspeakers were arranged with two in front of the audience and one on either side. Bob Auger, recording manager for Pye Recording Limited, explained that this was a frankly experimental exercise. His attempt was to produce "stereophony in the round"—in other words to give solid spacial perspective so that the listener could feel that he was *within* the sound stage rather than viewing it from a distance.



Bob Auger, recording manager for Pye, who was responsible for producing the controversial Scotch demonstration tape

A little thought soon makes it quite clear that the sense of immediate participation requires the sound to be reproduced at the level of the original performance; anything less would destroy the illusion of participation. With a cheerful smile and a great deal of nerve the 3 Ms boys regularly involved their audiences in intimate and undeniable participation. The recording was of an oratorio, "The Trumpets," with augmented brass and percussion accompaniment. As the sound crashed out from all around us we were overwhelmed by sheer instrumental noise. There was no doubt at all that we, the audience, were right in the thick of it.

This demonstration relates specifically to our current articles on "creative stereophony," since Bob Auger was quick to explain that all his work on this tape had been purely experimental and solutions to problems of microphone placing are still open to solution.

The 3 M demonstration poses many controversial questions. Was it wrong to reproduce the programme at such a level? Is there any domestic future for

The two instrumentalists who performed for the Truvox live record/playback demonstration. In spite of very cramped conditions in the Russell Hotel the audience were able to compare the actual sound to the recorded version. A courageous enterprise on the part of all concerned, and a most welcome change for jaded visitors. Congratulations, Truvox



four-channel stereo? Does four-channel stereo prove conclusively the superiority of tape over disc as a music reproducing medium? These and many other questions enable us to unhesitatingly award the 3 Ms demonstration the title of the most controversial.

SOCIAL FESTIVAL AND TRADE FAIR

Having named those four outstanding events we now have the rest of the show to deal with. Some of the demonstrations were competent but unspectacular, others were spectacular for their lack of competence. But the Audio Fair is as much a social festival as a display of ironmongery and so we should like to mention a charming social event to which we were invited at 10 o'clock in the morning of the first day. Richard Allan Radio Limited were celebrating their 21st birthday and to mark the occasion they held a small private party complete with 21st birthday cake. After a short speech by Mr. E. R. Worley, director, Mrs. Worley ceremonially cut the cake and all of us fortunate enough to be present felt that this delightful informal gathering with its friendly family atmosphere provided the best possible start to the proceedings.

Amongst their new products Richard Allan were showing a new triple speaker system, the Pavane, and a new transistorised amplifier designed by James Sugden. Offered in two models the A 21 is a fully integrated 10 watts per channel version complete in teak case and Model A 41 giving 20 watts per channel is designed for use with the separate control unit C 41 which features facilities designed for both the discriminating enthusiast and the professional user.

On demonstration both the new loudspeaker enclosure and the amplifiers produced exceedingly pleasant sound from the carefully selected discs that were used. These records had not been chosen to demonstrate the utmost limits of the equipment but to offer pleasant music to the audience. As such it was gratefully appreciated by your reporters.

Loudspeakers by Jordan-Watts proved so popular it was difficult to fight one's way into the demonstration room. Highlights were two new bookshelf units, the Janet and the Juliet. Although we have a rooted objection to small speaker enclosures we had to grudgingly admit that the Jordan-Watts design does provide better quality sound than one would normally associate with such tiny enclosures.

There is no doubt that small enclosures are highly popular today—they are both less expensive and take up less room than their bigger brothers. We are worried however that purchasers might one day realise just what advantages a few more feet of floor space and a few more pounds could have given them. Anyone in the market for small enclosures is strongly advised to listen to comparative tests with the large ones, but if you must buy a little 'un then the Jordan-Watts models are well worth investigating.

Celestion Ditton is a loudspeaker manufacturer working in the opposite direction—that is from small enclosures to towards large ones. Latest in the range is the Ditton 25. This follows logically from the Ditton 10 and the Ditton 15 which was reviewed by us last month.

This latest addition to the Celestion range reinforces our opinion that the large box is the only practical method of reproducing good quality sound and the new Ditton 25 at 53 guineas certainly does this. Design includes a 12 in. auxiliary base radiator as well as a 12 in. long throw bass speaker, two mid-frequency units and one ultra-high frequency speaker.

One of the most interesting tape recorders at the Russell Hotel was the new Philips PRO '12. Described as attaining studio quality performance and facilities with a lifetime of at least 10,000 hours use, it has been specially designed for broadcasting stations, recording and film studios, outside broadcast vans and of course for discriminating amateurs. Running at two speeds, 3½ and 7½ ips, the smoothness of the transport system and the ingenuity of the tape cueing arrangements make this an outstanding model at a cost of £190 plus purchase tax. A machine well worth investigating.

Immediately opposite the Philips room we located Vortexion playing back recordings on their new CBL/7T transistorised machine incorporating the Wright and Weaire Series 7 deck. The first part of a two-part review of this tape recorder was published by us last month and the second part will follow as soon as possible. As your Editor was responsible for the demonstration recordings it would be immodest of us to say too much about it, but that does not prevent us from repeating what others said—that the piano, organ and violin recordings all sounded extremely good indeed.

The new Series 7 Ferrograph was an obvious centre of attraction and their demonstration room was continually filled with interested enquirers. Wisely they had

decided not to give formal set playback sessions but to devote all their time to answering questions. This new Ferrograph is really going to make an impact in the future and like a lot of other people we can't wait to get our hands on a model so that we can put it through its paces.

During the last few months the name of Sanyo has seriously entered the hi-fi lists. We now have a comprehensive range of equipment under this label, all manufactured in Japan and all displaying the attributes of the better-class products that originate from that country. Of particular interest is Model MR 990 solid state mains stereo/mono tape deck with three speeds, a wide range of facilities, 20 watts of output power and separate speakers at £130 and MR 1020, another three-speed stereo machine at £185 including purchase tax.

Tandberg equipment was demonstrated very ably by our old friend Arthur Dakin of Elstone Electronics Limited who gave us the opportunity of looking at some of their most recent models. The 64X employing an extra bias head is so well known as not to warrant mention here, but we were particularly attracted to the new Series II battery portables. These machines are in short supply as yet but we have been promised a review sample as soon as possible.

Armstrong Audio Limited proudly displayed their controversial new styling for the second year. They frankly admit that this is equipment that one either loves or hates. There has been so much talk of British lack of originality in design and styling that we are grateful to see so much imagination displayed by this London manufacturer. Anyone who objects to the appearance should have sat in on their demonstration when they would have found little to complain about in the quality of the sound.

In a quiet demonstration room on the fifth floor we located the full range of Akai machines being put through their paces with a choice of programme that showed more discrimination than this manufacturer has sometimes used in the past. It takes many, many years of bitter experience to learn how to prepare and present a thoroughly polished and acceptable audio demonstration. After the rather noisy show Akai put on last year we must compliment them on getting the message and doing something about it.

The Wharfedale demonstration we attended was given by Bob Cox, who is himself a relative newcomer to hi-fi. With four pairs of loudspeakers to control via some rather complicated switching Mr. Cox steered us through his range of products from the Denton to the Super Linton to the Dovedale to the Teesdale with assured confidence. We did tell him privately we would have liked to hear comparative switching between the smallest (the Denton) and the largest (the Teesdale) since this would have provided the audience with the biggest "sound differential". Experienced ears can easily detect quality differences but some of these were rather subtle particularly between the Super Linton and the Dovedale. A pleasant programme very well presented.

Swissstone Limited brought along the Pioneer range of Japanese equipment and they also brought a magnificent old wind-up gramophone with a colossal polished horn. This period piece probably dated from about 1913 and offered a dangerous counter-attraction to the products that were really on show.

Passing along to Brenell we were able to see the first prototype of the new tape

recorder designated type SSM. This machine is a little further away from production than some of the other British new models but the manufacturer's quoted specification is certainly impressive. With signal-to-noise ratio of -66 dB on the half-track version at 2% distortion we would have in the Brenell SSM an instrument of valuable potential. Built for quality, the price is likely to be around £140 for the mono version and we look forward to handling production models just as soon as possible.



Two veterans in the BSR room. Miss Cicely Courtneidge came to see the historic wind-up gramophone that Scott is said to have taken with him on his Polar expeditions. Talking to Miss Courtneidge is Arthur Nicholls of BSR. Amongst other products this firm was showing the UA 75, the latest of their turn-table units

Across in the Tavistock Hotel we located the new Technomark group showing B & O, Radford and Sony equipment. Of these perhaps greatest interest will centre on the Radford range of amplifiers and loudspeakers. To those with experience in hi-fi the name Radford is regarded as synonymous with quality. In the past we have seen too little of this firm's products. Perhaps in the future, under the guidance of Technomark, we may both see and hear rather more of them.

A new model tape recorder from Sony is the TC 230 W. Priced at 109 guineas including purchase tax it is complete with output stages but less loudspeakers. Unlike some of the earlier Sony models the 230 W has a mode selector to facilitate monophonic reproduction. Bang & Olufsen were showing the complete range of Danish styled equipment including the now famous Beolab models with their sliding vernier controls. These have been well accepted in this country and are obviously here to stay.

Back in the Russell Hotel we had a quick look at the Ampex professional tape recorder Model AG 440. Based on modular plug-in transistorised construction it can use either half-inch or quarter-inch tape and by means of additional heads and electronic units can operate full, half, four or eight-track. In its cheapest versions it costs £1,173 mono and £1,500 stereo. But what a machine to own!

Ampex were also showing their professional battery portable AG 20 together with a full range of domestic equipment and Ampex pre-recorded tapes.

Again outside the main Fair we located Transatlantic Music Tapes Limited in the Morton Hotel. Besides showing Viking tape recorders, which for the four-track stereo three headed version cost £220 plus purchase tax and less loudspeakers they are also demonstrating their Model 440 energised speaker enclosures at £59 15s. per

pair. In the course of their demonstration the point was made that all music being reproduced comprised third or fourth generation copies and there was certainly no evidence of loss of top. To the contrary, one could complain of a little too much at the upper end.

The part of this display that interested us most was the comprehensive range of stereo headsets from £5 19s. 6d. to £27 10s. per pair. These really are very good value indeed and we particularly liked the Adjust-atone at £8 15s. and the Serenata studio model with liquid filled ear-cups at £27 10s.

Back in the Russell Hotel we had to make an early morning appointment to see Tape Recorder Developments Limited. Their demonstration room was always too full during opening hours. Manufacturers of high quality tape recorders designed to fill the gap between domestic and professional equipment we were most impressed with the sounds produced via a pair of KEF Concerto loudspeakers. With the price label around the £200 mark T.R.D. Limited are giving us some very nice quality indeed. We understand that during the past twelve months they have been working to production capacity but hope that during the coming year they will be able to increase their output to meet popular demand.

Cosmocord were showing their range of Acos stereo and stereo/mono cartridges playing on a Lab 80 turntable via Rogers Cadet amplifier to Wharfedale Airedale enclosures. After listening to a great deal of very expensive equipment our first impression was one of amazement that so much good quality can be achieved at so little cost. Acos cartridges cost approximately as many shillings as certain other magnetic cartridges cost pounds. They don't pretend to be as good as their more costly brothers—but it's such a close approach that it would satisfy all but the hypercritical. If you are dissatisfied with the sound quality from your existing turntable why not change the cartridge? Remember that ceramic cartridges give bags of output and require no equalisation correction.

Another old friend we are always delighted to meet is Mr. D. G. Warby of Elcom (Northampton) Limited. Well known for their comprehensive professional mixing desks, Elcom have now developed a modular mixer which can be built up in unit form and at a cost of approximately £100 for a full range of facilities could provide a useful tool for many amateurs. Expensive? Yes, but this is the real thing and will bring genuine professional equipment within the reach of the more enthusiastic amateur. We feel sure we shall hear quite a lot more about Elcom modular mixers in the near future.

Where have all the reflectors gone? Grampian are one of the few firms making them. Since they have been in production for a number of years and are still being made we would hazard a shrewd guess that they must have sold say 1,500. Who uses them? How often do you see a reflector in use? Well there's an awful lot of reflectors somewhere! Grampian were also showing their ranges of microphones, amplifiers and sound reinforcement systems.

We were very curious to hear the demonstration tape of Sennheiser microphones by Audio Engineering Limited. As far as it went it was excellent—we must comment however that we feel it did not go quite far enough. The sound extracts chosen were suitably brief and had obviously been selected with care. However we would have liked to have heard more spoken commentary which could have been combined with simple

Please turn to page 268

THE FINE ART OF MULTI-TRACK

FIRST of all may I take this opportunity of thanking my friends in the field of tape recording, amateur, professional and the trade, including of course your Editor Denys Killick, all of whom so very kindly sent cards and letters wishing me well during my recent spell in hospital.

Looking back now to the end of part 4, it seems I am due to cover what is perhaps the ultimate in multi-tracking technique—the use of two stereo recorders and certain other requisite equipment such as signal mixers etc. For all my own multi-tracking I employ two half-track stereo machines, both of which have high impedance high level (line) inputs that can be fed from signal mixers with outputs of comparable impedance and signal level. See front cover *Tape* April, 1968. Both stereo recorders also have separate input and output volume controls for each channel.

In addition there are two mixers with amplifiers having almost unity gain between the high level inputs and the 600 ohm cathode follower outputs. I say almost unity gain, but in actual fact there is a gain of about 2 to 3 dB. This is of no great importance but is useful if a signal happens to be a little on the low side. The remaining main item of equipment is a 20 watt high quality amplifier which feeds a loudspeaker of appropriate power handling capacity. This can be coupled to the outputs of either or both mixers or the tape recorders and is for replay of those parts of recordings which have been completed as well as those being recorded. The amplifier also has mixing input sockets of its own. This provides for accurate audible balance of the work in progress. The block diagram gives some idea of how the system is coupled up.

Now I do realise that such a system is a very costly one to install and is similar to that used by versatile professional instrumentalists such as Wout Steenhuis. All the same I feel it worth describing, if only to show the possibilities it presents to those who feel they might put their

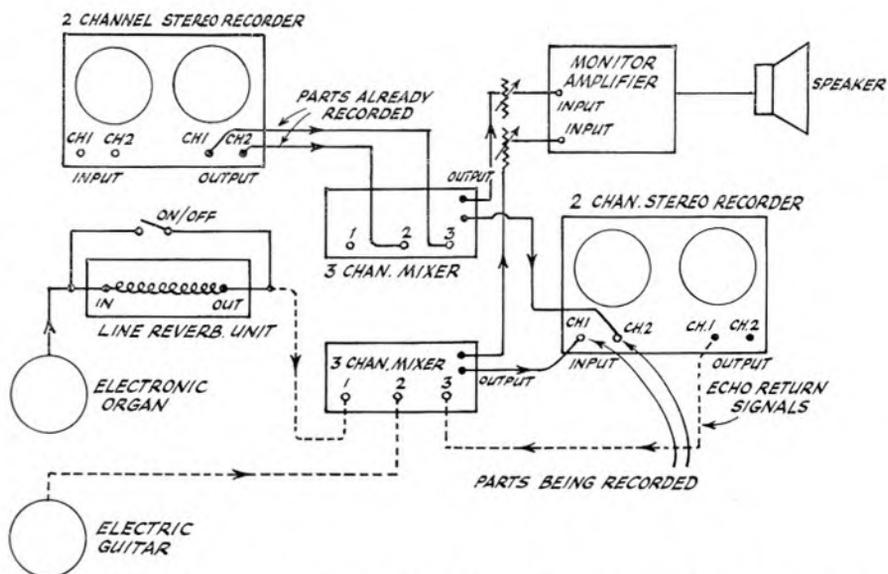


Fig. 1. A block diagram of the two-track multi-recording system used by the author

musical talents to more than an otherwise absorbing and interesting pastime.

It was my original intention to deal now with the two-track to two-track method of multi-recording, but I realise that so far I have provided little for those with the technical knowledge and facilities to build useful items of auxiliary equipment. For example, the signal mixers mentioned earlier can be used for recording work in several other ways, in straightforward mixing of signals from any high level sources. Passive mixers, which are merely two or more ordinary volume controls with appropriate circuitry, are of little use for mixing purposes unless the signal inputs are very high. The gain loss is usually around 6 dB and has to be made up by increasing the gain during recording and/or playback as I explained earlier in this series. A signal mixer which has no gain loss, or even a slight gain, must have inbuilt amplifiers. When microphone mixing is required then the inbuilt amplifiers (for the microphone inputs) will have considerable gain.

The mixer circuit shown in Fig. 2 is for *high level inputs only*, the output being suitable for any medium to high impedance, high level signal input as available on most tape recorders. (Signal sensitivity say 200mV to 1 volt or so). The mixer circuit could well provide unity gain which means that the signal at the output will be equal to the signal going in. On the other hand it can be adjusted to have a gain of 2 to 3 dB which may be useful. My preference is for the 2 to 3 dB gain. The output stage is a cathode follower which provides an approximate terminal impedance of 600 ohms, this being quite suitable for direct connection to practically all tape recorder high level signal inputs.

I am afraid I am unable to provide wiring plan diagrams for building the mixer or additional circuits for microphone pre-amplifiers etc. Those with practical experience of building from a theoretical circuit should have no difficulty in deciding on a component layout and provision for a suitable power supply

THE SAME AUTHOR'S NEW SERIES STARTING NEXT MONTH WILL DEAL WITH ELECTRONIC MUSIC TECHNIQUES, MUSIQUE CONCRÈTE AND SPECIAL ELECTRONIC SOUND EFFECTS—DON'T MISS IT!

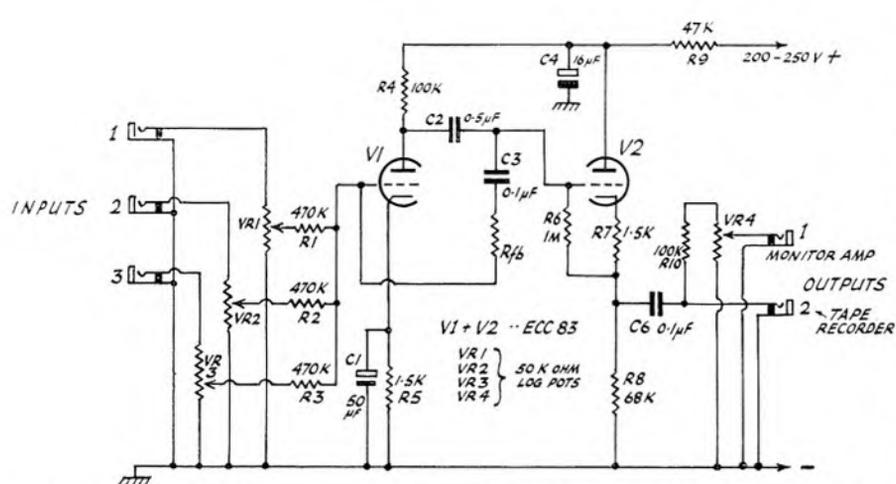


Fig. 2. The circuit for a three-channel mixer for high level signals. This instrument could be easily constructed by any reader used home building and it can be adjusted for unity gain or a gain of from 2 to 3 dB

(approximately 250V ht and 6.3V for the valve heaters). The mixer must be housed in a metal case, and there is no reason why the ht—lt transformers, rectifier and smoothing components should not be included in the same box, so long as the usual precautions are taken with regard to hum pick-up.

The circuit is quite a common one and has an extremely low noise level and a wide frequency response. It provides for three separate inputs which are fed into an ordinary resistive control network. The gain can be pre-adjusted by experimenting with the value of the negative feedback resistor Rfb. A value of around 2 M.ohms will provide approximately unity gain. Reducing Rfb to 1 to 1.5 M.ohms should allow for a 2 to 3 dB gain between any input and the output. The output stage has provision for connection to (a) a tape recorder and (b) a controlled output for connection to an external amplifier for monitoring.

The use of two half or quarter-track stereo recorders allows for a highly flex-

ible system of multi-tracking. Two stereo recorders, plus appropriate mixing equipment as previously described, can be used in the following way.

Suppose we have a pre-recorded rhythm track or drums to start off with. This is now placed on one recorder and the appropriate channel is connected, via a mixer with a loudspeaker monitor, to say channel 2 on recorder number 2. The first instrumental recording, perhaps guitar chording, is recorded on channel 1 of recorder number 2. We now have the rhythm and chords on two separate tracks but of course they are synchronised. Both these tracks are now replayed from number 2 recorder via a mixer (with monitoring) to channel 2 of recorder number 1.

By this method accurate balance between the drums and guitar can be achieved whilst recording the bass part on channel 1. When these parts have been recorded the process is repeated; the two channels of recorder number 1 are mixed and fed to channel 2 of recorder number

2. The next musical part is recorded on the remaining channel and so on until all parts are completed.

Now a word about the kind of tape most suitable for multi-track work. I would avoid using double play tape, for although this may provide a generally lower noise level it cannot take high level signals. Long play tape of good quality is suitable, but better still would be one of the low noise, high output tapes now available in the U.K. I recently had the opportunity of testing the new BASF PE38 low noise, high signal output tape which is now on the market. It is indeed excellent tape, but don't take the recording level too high. The noise level of this tape is extremely low and my check on a studio Telefunken M24 full-track recorder showed that virgin PE38 tape increased the overall noise level of the recorder by only 0.25 dB. The noise level of the recorder is around -55 dB reference to full signal output. The added noise level from the BASF PE38 tape after erase, again using the Telefunken M24, was virtually nil. Another tape, but a rather expensive professional one, is BASF LR56. This will take exceptionally high signals without saturating and therefore produces less distortion at high signal level. This again is a means of defeating tape and amplifier noise.

By way of concluding these articles on multi-tracking, may I say it has been a pleasure to write them and I trust that they will have been of some help to those already working in this fascinating field of magnetic recording, and perhaps they may also have encouraged the newcomer to try multi-music for the first time.

My next series (starting in next months edition of *TAPE—Ed.*) will deal with electronic music techniques taking in musique concrète and the production of special electronic sound effects.

FOOTNOTE: F. C. Judd is no newcomer to the field of electronic sounds and music, having produced much of this kind of material for television, radio, films, plays and three gramophone records. He is the author of "Electronic Music and Musique Concrète" which is published in both English and German.

A CHANCE to visit every British base in Antarctica, some bases of other nations and, into the bargain, be the only journalist ever to have done so. This was the offer made to me by Sir Vivian Fuchs, the Director of the British Antarctic Survey, early last year. The only difficulty was that I should have to make my own way to and from Montevideo, in Uruguay. Unfortunately I did not, as was suggested in the article by Denis Gilbert (*TAPE Recording Magazine* March 1958), have any financial backing, but a visit to a friendly bank manager produced a hefty loan to help with the fare.

I went primarily as a freelance journalist to write up the work of the Survey. But as a zoologist I was also interested in recording and photographing the wild life. For this purpose the Rank Organisation and Messrs. Pullin Photographic were kind enough to loan me an Akai X-IV tape recorder. The equipment was entirely standard except that it had been lubricated with a low viscosity oil. As we were not sure how the batteries would stand the very low temperatures I took two spares. This was just as well, but for a completely different reason—because of the difficulties of finding a source of AC supply. All the Survey ships operate on DC and I had to find a converter before recharging the cells.

I flew from Gatwick on December 17th; almost inevitably it was snowing when we took off in the BUA VC10. However, Las Palmas was very pleasant in the small hours although Rio de Janeiro at breakfast time was unpleasantly hot and humid. Buenos Aires and Montevideo were hot, too, but the humidity was considerably lower. It seemed very strange to be able to eat fresh fruit, such as plums and strawberries, at Christmastime, but even more memorable was the size of the steaks which cost only the equivalent of about four shillings.

At each stop I had recorded airport sounds and discovered again just how alike all international airports are. Now, in Montevideo, I tried to build up a picture of the city with street and market recordings and the effects of the docks. After four days the m.v. *Perla Dan* arrived to carry us down to the ice barrier. She is a Danish ship of about 2,500 tons and is ice strengthened, though not an ice-breaker. Our first call on the way south was at Stanley, the capital of Britain's southernmost colony, the Falkland Islands. The weather on this five day run was magnificent; little wind, warm sun and blue skies. The wildlife was interesting, with our first sight of albatrosses, penguins and seals, but of course they were not recordable.

From Stanley, after taking on fuel and stores, we headed eastwards to South Georgia. As we got nearer the weather

deteriorated. When we arrived at Grytvi-ken, the only settlement and a disused whaling station, a gale was blowing with flurries of snow sweeping across the sea and the clouds were very low. The island is very mountainous with many glaciers and a true ice cap. Although the weather was so poor it was here that I was able to make the first recordings of true Antarctic birds and mammals. The temperature was just about freezing point but the protective clothing issued by the Survey kept me very warm, not so the tape recorder which was exposed to the weather. However, it was not affected and I set to work.

The most obvious animals were the elephant seals, great, grey-brown, rather slug-like animals, sprawled over the beaches and up into the coarse tussock grass. The bulls weigh up to 8,000 lb. and may be 18-20 feet in length, while the cows are smaller and only weigh about 2,000 lb. When undisturbed they are quite quiet and lie blowing with a snuffly sound through their nostrils. When annoyed by other seals or by man, they rear up and, opening their enormous caverns of mouths, roar.

The term, roaring, is perhaps something of a euphemism, because the noise produced sounds much more like an extremely loud and prolonged burp! As with any large wild animal, one had to be careful while close but I found that they had the annoying habit of becoming quite dumb when approached with the recorder. It was possible to improve this state of affairs by rapping them smartly over the nose with the microphone. But although this invariably produced the desired effect it also produced a disconcerting by-product. Large tears promptly streamed down their faces. As all seals were capable of this I spent a good deal of time feeling a complete bully.

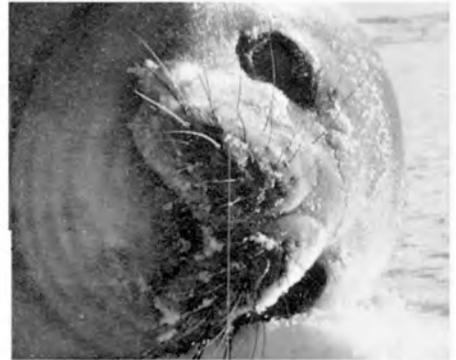
Walking away from the whaling station I came across a flood plain below a glacier snout, where I was lucky enough to find Antarctic tern nesting. These set up a considerable clamour at my approach and came in to the attack with harsh cries and chattering beaks. Very easy to record, they sounded just like strafing fighters. Occasionally they misjudged the distance and scored a hit, but it was usually more surprising than painful. However, when one flew off with my woolly hat impaled on its crimson beak, I felt it was time to withdraw.

In this same area I was able to record the threat of a very belligerent fur seal pup. He was only the size of a small terrier but repeatedly came barking into my neighbourhood with snapping teeth.

Leaving South Georgia we travelled on eastwards almost to the Greenwich meridian before turning south to enter the Weddell Sea.

ANTARCTIC ADVENTURE

SPECIAL FEATURE BY
NATURALIST
JOSEPH LUCAS



Reclining beauty, Antarctic style! This delightful close-up of a crab-eater seal was taken by Joseph Lucas at Halley Bay.

At Halley Bay, which is Britain's largest Antarctic base, there was little wild life. The base is situated on the Brunt Ice Shelf, a mass of ice some 600 ft. thick which floats on the sea. We have now had four bases there, each of which gets buried by drifting snow and becomes unusable after a period of a few years. The oldest base is the one which was built for the International Geophysical Year in 1959. This is now some 50 ft. below the surface and is slowly being crushed by the weight of ice on top. It is still accessible by means of Dexion ladders which also lead to huts which were built on top in 1961 and 1962. Above these again are more huts which were put in position in 1964 and these are now about 12 ft. below the surface. When I visited the base some of these were still in use, but an entirely new base about 1½ miles further south was just having the finishing touches put to it.

Because the ice shelf is slowly moving northwards this new base is in the same geographical position as the IGY base was when it was built in 1956. The ice shelf is separated from the sea by about 2 miles of sea ice. This is about 8 ft. thick and, since it is moved up and down by the tides, a crack forms between it and the ice shelf. Seals come up through this tide crack to lie out on the ice and these I recorded without any difficulty.

We left Halley Bay with mixed feel-

ANTARCTIC ADVENTURE

SPECIAL FEATURE BY
NATURALIST
JOSEPH LUCAS



These British Antarctic survey cargo sledges are loaded with drums of fuel being taken from the "Peria Dan" and "John Biscoe" for driving the generators at the Halley Bay base. As will be seen from the many tractor marks in the snow the sledges are following a fixed route but all signs of this will probably have vanished by next year owing to the constantly changing Antarctic terrain

ings. The scenery was monotonous in the extreme—just ice, as level as a billiard table as far as the eye could see. On the other hand, we also had a week's unbroken sunshine and no apparent difference in the amount of light between noon and midnight. Now, however, it was back into the pack for the journey to Signy Island in the South Orkneys. Once we cleared the ice we ran into a storm in which the winds were blowing at 60-70 m.p.h. I had transferred to the R.R.S. *John Biscoe*, a little ship of about 1,500 tons, and in the mountainous seas she was like a live thing.

Signy Island is quite small but has a permanent ice cap and to the north has a large penguin colony. Here I was able to record chinstrap, adelic and gentoo penguins, but not without hazard. Chinstraps are endearing, but have the habit of gripping one's trouser leg in their beaks and battering hell out of one's leg with their flippers. It sounds comical, but their flippers are very hard and bony. Once again, I felt that what was really needed was a recorder for smells—penguin colonies are usually large and contain a great deal of guano!

Also while we were at Signy Island I managed to record the calls of giant skuas and giant petrels, both of whom had chicks in their nests. Skuas will attack anyone close to their nests by diving in and striking out with their feet. Since they are about 8 ft. in wing span

this can hurt, especially if the blow is received on top of the head. The alternative names for the giant petrels are "nellies" or "stinkers". The latter name is appropriate because their defence consists of ejecting partly digested oily food at the intruder. The smell lingers for several days.

From Signy Island it was again a stormy passage back to the Falkland Islands, where I arranged to go out on the Royal Navy hovercraft to a Nature Reserve recognised by the International Union for the Conservation of Nature. There were many birds and mammals to record here, especially the Magellanic or jackass penguin which sounds for all the world like a donkey braying. However, I nearly wrote the recorder off here before I really got started, for when the hovercraft left me it headed off shore directly away and blew what seemed like the entire ocean and most of the beach over me. I was afraid that the recorder would never be the same again, but apparently it suffered not at all.

The second half of the trip consisted of a tour of all the bases down West Graham Land. But first a call was paid to the recently, and hurriedly, evacuated base at Deception Island. It was here that an entirely new island emerged from the sea following a volcanic eruption early in December. Deception Island is a mountainous horseshoe, but the snow was black with volcanic ash. The new island was still steaming gently and its three craters were filled with pea green sulphurous water.

From here we sailed southwards to visit a brand new Russian base where a most convivial afternoon was spent. It was just as well the tape recorder was running all the time or memories would be even more hazy than they are. And then another international visit—this

time to an American base where perhaps the most palatial building in the whole of the Antarctic is being constructed—three stories of it, with a power and central heating plant fit for an ocean liner.

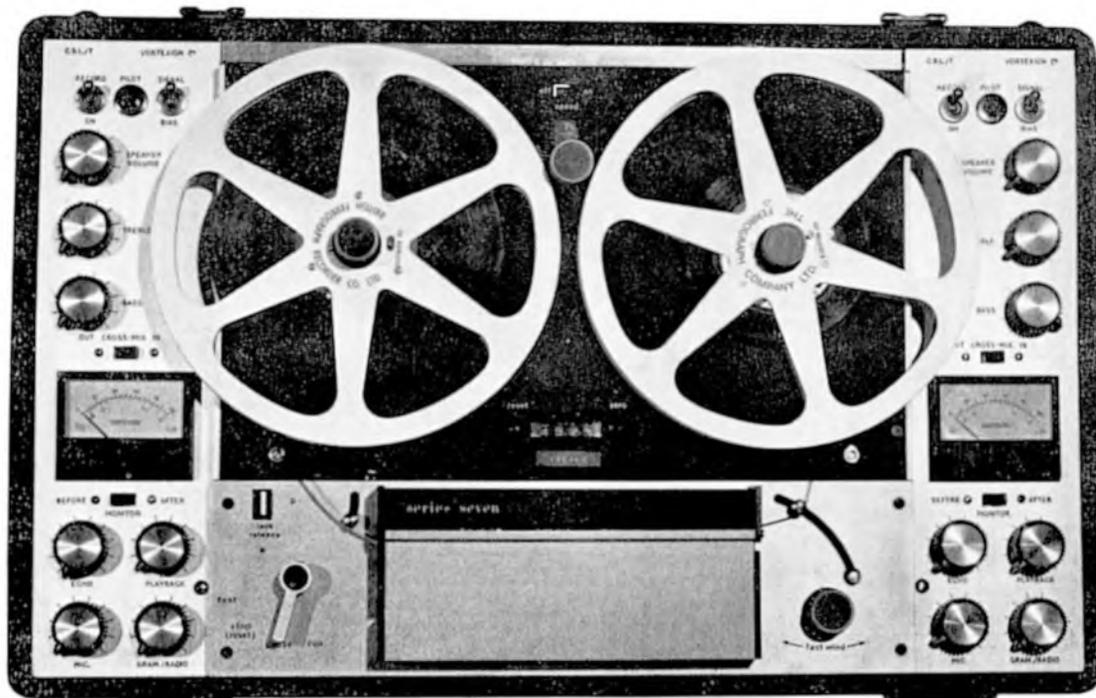
This part of British Antarctic Territory is very impressive, with towering mountains, snowfields and glaciers, and once again it is cold. Here indeed it was that I found an annoying feature of the tape recorder. When the temperature dropped, the microphone lead stiffened up. So when the microphone was moved the lead moved with it. Consequently, as the jack has no locking mechanism, it tended to pull out very easily. As little as an eighth of an inch movement outwards was enough to break contact. When I was concentrating on a bird or a seal this was unnoticed and resulted in the loss of a recording.

At Port Lockroy two skin divers who we had on board went for a swim with the water temperature at about -1.8°C . They had thick dry suits on, but even so got very cold, and 20 minutes was about the limit. A rich haul of bottom living plants and animals was their reward. The fact that it was snowing at the time seemed to make no difference. At Adelaide Island I tried to repeat their hardiness unintentionally, by falling into the tide crack at the margin of the sea ice. I have no wish to repeat that experience.

In the $3\frac{1}{2}$ months I spent in the Antarctic, I saw how animals and birds, particularly birds, live under such adverse conditions. I saw a great deal of the research which is being carried out by the British at a cost of less than £1 million per year. But I came back with a unique and unrepeatable tape record of the journey, and with a tape recorder which was working as well as it had before I left.

Vortexion
quality equipment

TYPE C.B.L./7T
TAPE RECORDER



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

The CBL/7T solid state version uses 8 low noise Field Effects Transistors on its twin channel Mic. P.U. and Playback inputs to give low intermodulation distortion, and the 10 watt sine wave 15 watt speech and music amplifiers each have less than 0.05% harmonic distortion and less than 0.1% intermodulation distortion at 10 watts output.

“ Before and After ” monitoring on phones and by internal or external speakers is catered for, and separate power amplifier volume controls allow the speakers to be independently controlled from the headphones. 30/50Ω balanced line Microphone and P.U. inputs can be mixed with the other channel via a crossmix and an echo control.

All the facilities of the valve model C.B.L. are provided, plus a few extras . . . The series 7 deck has variable speed wind in either direction, solenoid operation, provision for an external switch for remote run or voice operated accessory, and still lower wow and flutter figures.

Mono and full track versions of this will also be available.

AUDIO FAIR
Demonstration Room 334
Booth 2

VORTEXION LIMITED, 257-263 The Broadway, Wimbledon, S.W.19
Telephone: 01-542 2814 & 6242/3/4
Telegrams: “Vortexion London S.W.19”

EASTER, for your intrepid columnist, was spent bravely enduring the rigours of our British weather under canvas in a remote part of the Derbyshire Peak District. With Joseph Lucas' story of his Antarctic travels well in mind I repeatedly told myself that the mere freezing-point night temperatures should only concern the least hardy of outdoor enthusiasts.

As the biting east wind howled around our tent, the poles bent crazily under the strain; the flysheet beat a deafening tattoo as it shook and writhed beneath the power of the gusts. Even our metal cutlery was so cold as to be painful to handle. And yet it was a holiday I would not have missed for anything.

During the day the sun shone fitfully across this grandiose landscape of hills and valleys. Tramping beside crystal-clear mountain streams as they twisted their way through the dales or facing the wind across endless open country chequered with drystone walls once could feel truly at peace with the world.

My one regret was my inability to take any recording equipment with me. The decision to go away was not made until late in the evening on the Thursday before Easter, and we left London at 7 o'clock the next morning, Good Friday. If all my equipment had been in a state of constant readiness—as of course it should be—there would have been no problem. In the event there was insufficient time to make the necessary preparations and so I have returned without any sound records of some very remarkable experiences.

In such a situation one can do no more than "mentally record." In other words, take special mental note of all the interesting sounds that would have been recorded if the equipment had been available. I have already mentioned the terrific noise of the flapping flysheet. That would certainly have evoked some chilly memories. But in wild open country of this kind there is almost endless sound for those with the patience to stop and listen.

Bubbling water makes sounds of almost infinite variety. We found the source of one small stream in a spring which literally gushed out of the side of a mountain. Ice cold and crystal clear, it was the sweetest water I have drunk for years. One of the most nostalgic sounds is the mournful cry of the curlew. Not very easy to record it seems to express perfectly both the loneliness and the magnitude of wide open spaces. How I wished that my very good friend Richard Margoschis had been with us.

For the first time in my life I saw wild hares chasing each other around the hillsides. As big as a small dog they were a delight to watch—unfortunately I was never able to approach closely enough to find out if any sound was audible.

CROSS

TALK

By Audios

Skylarks sang in endless profusion. Lying warm and snug in a down sleeping-bag in our tent the song of the skylark was the first sound to herald the coming day. "Up with the lark" is very true—the songsters were on the wing more than thirty minutes before first light.

And then there were the people; the locals in the village pub looking uncomfortable and conspicuous in their heavily pressed Sunday best. The shopping crowds in the delightful little town of Bakewell on Saturday morning. The determined walkers in their heavy boots and colourful anoraks.

Perhaps it is as well that I left my recording equipment at home. Had it been with me I am quite sure there would have been little time to sit back, relax and enjoy a memorable experience. So if you imagine there is little to record in our countryside try experimenting with a little mental recording and you will be amazed at the wealth of material that surrounds you. As for me, I shall return to Derbyshire just as soon as I can, but next time I shall be quite sure to take my portable equipment with me.

* * *

A REPORT in "The Guardian" newspaper on the International Audio Festival and Fair is headlined "Antiquated Modernity of Hi-fi." The accompanying editorial suggests that the private listener would appear to need four degrees in audio physics to enjoy Beethoven's Fifth. This is sheer rubbish of course. Certainly the public are right to revolt against a profusion of wires and unnecessary controls. But the myth that high fidelity sound reproducing equipment is either difficult or complicated to use is something that originated in the 1930s and has obstinately persisted ever since.

Close examination of any of the so-called "easy-to-use" systems that are advertised as suitable for all the family will quickly reveal that they are fundamentally no different and require only the same minimum amount of commonsense on the part of the operator as does the most complicated, sophisticated and aristocratic of hi-fi set-ups. No manufacturer introduces complication for complication's sake. The best is certainly no more difficult to use than the worst—in fact in some cases is even easier. It's a great pity that the national press should foster this absurd story that hi-fi is complicated and beyond the average person's comprehension. Any child of ten could have operated any of the equipment on show at the Russell Hotel. Surely it's time "The Guardian" got its facts right?

AT Belle Vue Zoo, Manchester, the Superintendent, Mr. Ray Legge and the official in charge of the aquarium, Mr. Winston Taylor, are celebrating. After three years of patient waiting they have at last succeeded in recording the "Love Song" of a ten foot male alligator as he courted his six foot mate.

We continually stress the need for patience in natural history recording but a three year wait must be something of a record. One would hardly expect a creature like an alligator to produce a musical song, and in fact the sounds are described as a succession of grunts and groans.

The alligator's courtship was also filmed and Mr. Legge is anxiously waiting to both film and record the hatching of the young. If he succeeds it will be the first time the whole cycle has ever been seen and heard and will be of tremendous zoological interest throughout the world. No alligator has yet been born in captivity. Mr. Taylor is sure that an egg hatched last year but that the baby was eaten by the father—who, by the way, also ate most of the other eggs.

Most important in setting the stage for courtship and mating are the perfect conditions in the Belle Vue alligator house with plenty of water to swim in, high humidity, tropical plants and mud near the water—and most essential a waterfall. Mr. Taylor has found that when the waterfall stops the male stops making his courting noises.

Those who believe that only very expensive equipment is suitable for serious recording work should specially note that this epic recording was taken on a £36 Japanese-made Sharp RD-504 tape recorder. The Sharp RD-505 machine is reviewed elsewhere in this issue.

* * *

WHEN someone objects to an unusual amount of noise that invades the privacy of his home it is sometimes found that the only way to remove the nuisance is to go to court to apply for an injunction to restrain the person causing the nuisance. Faced with such a problem it is natural that the sufferer should think it a good idea to record the offending noises so that the judge can play them back in the court room. This is what has happened on many occasions but hopeful litigants should understand that such a recording is valueless unless it has been both made and can be reproduced under controlled conditions.

Any recording of any noise can be made to appear as innocuous or as objectionable as the recordist wants. It all depends upon the way the sound has been recorded and also on the way in which it is played back. The only way to provide valid legal evidence of this kind is to use a sound level meter as well as a tape recorder. As well as taking the recording the plaintiff must also note carefully the level of noise as registered on the sound level meter within his own home so that the recording may be reproduced in the court room at precisely the same amplitude. Even then this procedure is fraught with legal peril and a good defence Counsel with a sound knowledge of audio engineering could probably argue very strongly against the validity of the evidence.

So if you want to go to law with a tape recorder be very careful indeed and be sure to obtain expert professional advice first.

* * *

AT IRED and confused visitor to the "TAPE Recording Magazine" Press Lounge at the Russell Hotel bitterly complained that the only replicas of our first edition being offered for sale were identical to those we sold last year. Surely we could have had a different replica this year. . . !

MOVEMENT IN STEREO

BY DENYS KILLICK

IN last month's article we dealt with the principles of stereophonic recording in relation to musical performance. We discussed the placing of microphones relative to the sound source to give depth and perspective in playback, recreating within the home something approaching the reality and feeling that was present in the original performance.

This was the goal that the pioneers who developed stereo originally had in mind. But experiment soon showed that stereophony could do something more. It could realistically convey impressions of movement to the listener.

In the early days of stereo we were inundated by demonstration recordings, all of which emphasised movement—in fact many people were misled into believing that the portrayal of movement was the only reason for bothering with stereo at all. These gimmicky recordings were popular because in this way it is far easier and more dramatic to show what stereo actually does. The sound of a motor-car, aeroplane or a train can pass directly across the front of the sound stage giving the listener a positive sense of movement and direction that is not possible in monophonic reproduction. The benefits that stereo bring to music are far more subtle and less obvious.

People genuinely interested in audio and high quality sound reproduction soon became thoroughly fed up with facile stereo recordings of pointless movement. Feeling ran so strongly that a school of thought developed adopting as its principle the philosophy that the only respectable use for stereo was the recording of music. Only now with the transmission of dramatic features in stereo by the BBC and the publication of excellent spoken word recordings in stereo by the gramophone companies are our eyes being opened to the true scope of stereo.

When this ability to accurately represent movement is properly used it can open up a whole new dimension to sound recording. During the last decade sound radio—which as I have explained before is identical in principle and purpose to sound recording—has been fighting a losing battle against the visual attractions of television. Many of us have mourned the fact that sound radio will never again be what it once was. This is a tragedy because as soon as the audience is presented with a visual image the imagination is no longer called upon to work. And in spite of all the wonderful things that television may bring to us it is still a far narrower, more confined, more limiting medium than pure sound. But now we have stereophony with an added dimension which reinforces the listener's imagination to bring a new impact and reality to the old-fashioned medium of pure sound. Many things that are possible in sound are quite impossible in sound-and-vision. The most recent

advance in television, that of full colour, is likely to be even more restricting in many respects, whereas the latest development in sound—stereophony—could, if properly used, broaden its appeal and even offer the possibilities of renewed popularity in spite of television competition.

But how do these rather academic and abstract arguments affect the amateur recording enthusiast? They do affect him very significantly and in a number of ways. The amateur who owns or has access to stereo recording equipment has at his disposal the basic tool with which to do the job. The best professional brains in the country are today exploring the dramatic possibilities of stereo seriously for the first time. Because the idea is so new there are no accepted rules of precedence to follow. Creative work in this field must be largely experimental. There is not the slightest reason why ambitious amateurs should not themselves take part in this exciting new phase in sound recording. There are relatively so few people engaged in this work that the amateur is just as likely to discover new techniques and methods as the professional. Although some very complicated and sophisticated equipment is used in professional and broadcasting studios the underlying principle is basically extremely simple. It is no more than that of using the directional qualities of stereophony to increase the reality of a dramatic production. In this application stereo is justified when it aids the dramatic illusion—it is wrong and out of place when stereophonic effects are introduced merely to indicate to the listener how technically clever the producer has been.

Before closing I will refer to the latest and most ambitious of the BBC's excursions into this field. But in the meantime let's consider just what the amateur can do.

Because movement can be portrayed so easily in stereo, first experiments should be with the kind of gimmicky recordings that were referred to earlier. When these are made for their own sake they are valueless—when used as the basis of experimental work they take on a new significance. First attempts can be made at home, requiring only a stereo record/playback machine, two microphones and some tape.

I can vividly remember my own first endeavours. I didn't have a stereo machine and so used two mono recorders. Connecting a microphone to each I managed to get both spools turning at (approximately!) the same time. Having set the levels for (roughly!) equal gain I then proceeded to walk up and down between the two microphones muttering loudly to myself rather like one demented. The tapes were then both wound back and after several false starts both machines were playing back precisely in synchronisation. Listening to the output over a pair of speakers I had the thrill of listening to my own first genuine live stereo recording. There was the sound of my voice moving about in space exactly as I had walked a few minutes earlier. Unhappily it didn't last long. All too quickly the machines lost synchronisation and the sound was absolutely horrible.

With the increasing popularity of stereo equipment very few people will have to resort to such extreme improvisation. It is impossible to get two mono machines to run exactly in step with each other for more than a very short space of time. But the stereo machine removes that difficulty entirely. Since both the stereophonic channels are recorded on the same tape driven by a single transport mechanism synchronisation is one of the problems we never have to worry about.

First experiments should be devoted to simple moving sources of sound. For maximum directional effect arrange the two microphones about six feet apart, both instruments looking straight ahead. As the most readily procurable sound source is one's own voice, start walking up and down a straight line about ten feet long and a couple of feet in front of the two mikes. Playback should immediately convey a strong impression of movement. This experiment can now be developed by using sounds other than your own voice. Use anything that makes noise—a tin whistle, a ringing alarm clock, the sound of a saucepan being struck by a kitchen spoon—absolutely anything will do. The great thing is to assess the effectiveness of the recorded sounds in relation to stereophonic movement.

All this can be fun but it doesn't achieve a great deal on its own. It's only a beginning. Taking a short step forward we can

try a series of slightly more sophisticated experiments. If we were to record a conversation between two people, speaker number 1 opposite the left-hand channel microphone and speaker number 2 opposite the right, we should get a highly directional recording. Suppose we were now to add a third speaker in the centre. Immediately the problem becomes far more complex. If we adhere to our original microphone arrangement we will have two strong voices on either side and a weak voice in the centre; if the microphones are too far apart this will amount to the "hole-in-the-middle" effect we referred to last month when discussing musical recording. Obviously, microphone positions must be re-arranged to give equal coverage to the three voices, whilst at the same time maintaining their relative spatial positions. One solution is to bring the two microphones together at the centre inclining each inwards so that the left-hand microphone is facing directly towards the right-hand speaker and the right-hand microphone towards the left-hand speaker. Having got a good firm central image from our central speaker we must now bring the other two voices up close enough to achieve an overall sound balance.

Now a fourth speaker or sound can be introduced so that it move across the sound stage from one to another of the three original voices. If another voice should not be available use any sound producing instrument and pass it slowly across from hand to hand. From this point on we have all the beginnings of the stereophonic dramatic production, complete with spatial perspective and movement.

You remember how I suggested in earlier articles that even in mono movement is largely a matter of the imagination and it should not require thundering footsteps to reinforce it. Relative positions in space can be easily indicated in mono by merely directing a speaker to move slowly and quietly the few inches necessary to bring his face round to the "dead" side of a directional microphone. On playback he will sound to be miles away although the actual movement in the studio was negligible. In stereo we can move our sound components about at will without any physical movement taking place in the studio at all.

So far we have considered the simple arrangement involving the use of just two microphones, one for each stereo channel. Suppose we now introduce a third microphone covering the left-hand side of the sound stage and then connect it to a mixer with individual variable controls into which is also plugged the microphone covering the right-hand side of the sound stage and then connect the mixer to the right-hand channel of the recorder. (See Fig. 1.) It will be found that by adjusting the gain on this extra third

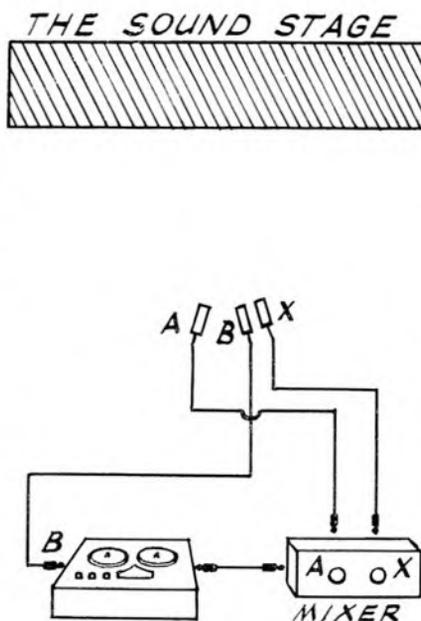


Fig. 1. Two microphones, A and B, with crossed axes, are the main stereo pair covering the whole of the sound stage. Instead of being fed directly into the microphone socket of the recorder, microphone A is connected to a mixer. Now a third microphone, marked X, is introduced. It covers the left side of the sound stage but its output is mixed with that of microphone A which covers the right. Equal mixing of these two signals, A plus X, would destroy the stereo image completely and give us a mono recording. Careful relative adjustment, however, will cause sound elements from the left to apparently move towards the right without requiring any actual movement within the sound stage. Such an arrangement gives the producer immediate control over the new dimension of position. In practice the same network would be used for both recording channels, requiring the addition of a fourth microphone and a second mixer

microphone we can cause the sound image on the left to travel, apparently miraculously, across towards the centre, and even over to the right if the original left-hand microphone is faded down. This is the whole basis of directional control in a stereophonic speech studio. The versatility of more sophisticated developments of this system will be readily appreciated. Characters can change their relative positions exactly and precisely under the control of the producer, and through his skill is added this new dimension to recorded sound.

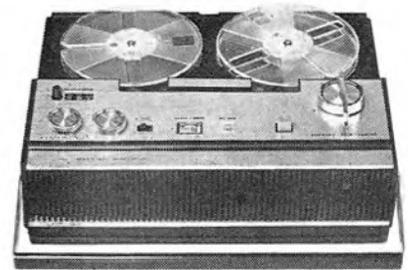
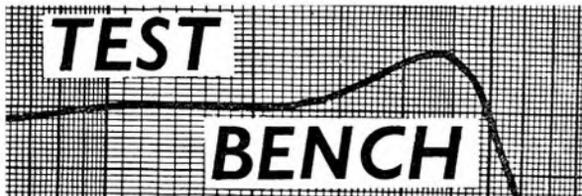
The arrival of the stereophonic dramatic documentary has been regarded as so important by the BBC that they recently mounted an epic production in this medium under the title "Rus." With a programme duration of no less than two hours and forty minutes Rus is described as "Variations on themes from the history of Russian culture." Extending in history from the river journey of the Vikings

through the Russian forest to Byzantium to the contemporary excursions of modern Russia into outer space, the sheer magnitude of the enterprise leaves one quite breathless. It was transmitted on the 29th March and will be repeated on the 9th May in the BBC Third Programme. Unfortunately both those dates are well past the on-sale date of this issue of *TAPE Recording Magazine* but I have no doubt that the BBC will give listeners more opportunities in the future to hear this great work.

The wording of the official handout is significant. *Rus* is called "a stereophonic sound painting for total radio." The words "total radio" are in italic. I think we can take it to mean that this is the ultimate technique in sound recording. The medium has been pushed to its furthest limits from which future trends can only be those of consolidation and improvement. The vast resources of the BBC radiophonic workshop were fully deployed by producer Michael Mason. I wish I could say that the whole thing had been a great success and that I thoroughly enjoyed listening to it. Heavy with scholarly academic recital, often delivered in liturgical tones, much of the programme was turgid and indigestible. I suspect that the powers-that-be were dazzled with the new-found attraction of the stereophonic documentary. Determined at all costs to produce an epic, both in duration and content, they resolutely achieved their objective. Born of technical inspiration and sincere intellectual endeavour such a programme is hardly likely to meet with universal popular approval. And yet its brilliance shone through in inspired flashes of production genius. Edited down to half its length it would offer fast-moving and fascinating entertainment.

With *Rus* I think the BBC tried much too hard. Unlike the Corporation the amateur is not burdened with the intolerable obligation of producing epics for the international market. Neither, thank goodness, is he burdened with the complexity and multiplicity of all the facilities that are available to the BBC producer. I feel quite sure myself that the final solution to the really epic stereophonic documentary will lie in pure, unconfused, simplicity. The BBC fell into a trap by making *Rus* far too confused and bitty.

Both radiophonics and *musique concrète* have a rightful place in productions of this kind. A new series by Fred Judd devoted to the techniques employed in sound manipulation of this kind will be starting in *TAPE Recording Magazine* next month. The creative enthusiast does not have to use either stereo or radiophonics, but a combination of these techniques, allied to good dramatic presentation, open the door to a vast new field of research and experiment—a door that is as available to the amateur as it is to the professional.



SHARP RD-505

INVESTIGATED BY R. HIRST AND D. KILLICK

MANUFACTURER'S SPECIFICATION Sharp RD-505

Type: Solid state amplifier, plastic cabinet, 5-inch reels, AC/DC portable.
 Power Source: DC 9V (6 x U2 LP batteries), AC 240, 220, 200, 110V 50/60 Hz.
 Tape Speeds: 3 $\frac{3}{4}$ and 1 $\frac{7}{8}$ ips.
 Driving System: Capstan drive with interchangeable sleeve for speed change.
 Recording Tracks: Two.
 Heads: Record and playback x 1, erase x 1.
 Record and Erase Systems: AC bias, 40 kHz, erase DC magnetic.
 Output Power: Maximum 1.0 watt, distortion-free 0.8 watts.
 Frequency Response: 120 to 6,000 Hz at 3 $\frac{3}{4}$ ips, 120 to 3,000 Hz at 1 $\frac{7}{8}$ ips.
 Signal to Noise: Better than 40 dB at 1,000 Hz.
 Output Circuit: External Speaker, 8 ohms.
 Input Circuit: Microphone, 200 ohms; Radio 500 Kohms.
 Tone Control: Rotating knob, high boost/cut.
 Monitoring: Sound monitoring with built-in speaker.
 Speaker: Elliptical dynamic, 8 ohms.
 Microphone: Dynamic, 200 ohms, with remote control switch.
 Record Level Indicator: Level meter (battery monitor).
 Dimensions: 12 x 10 x 4 inches (approx.).
 Weight: 8 lbs. (approx.).
 Accessories: 1 dynamic microphone, 1 AC power cord, 1 5-inch empty spool, 1 5-inch spool tape, 1 earphone (magnetic) and 1 connecting cord.
 Price: £39 18s. complete (including £7 4s. 6d. Purchase Tax).
 Distributors: Sharp Sales & Service, 16/18 Worsley Road, Swinton, Manchester.

SHARP RD-505 TEST CHART

	Overall Response dB		Playback Only dB	Signal/Noise Ratio dB	Distortion
Frequency Hz	3 $\frac{3}{4}$ i.p.s.	1 $\frac{7}{8}$ i.p.s.	3 $\frac{3}{4}$ i.p.s.		
50.....	-18.0		-16.5		
60.....	-13.0		-14.0		
100.....	-6.0	-18.0	-7.0		
250.....	+5.3	-10.0	+7.0		
500.....	+1.0	-4.0	+1.5		
1000.....	0	0	0	42dB	2.8%
2000.....	0	-4.0	+1.2	(at best— text)	
4000.....	+1.0	-12.0	+2.0		
6000.....	+0.5	-14.5	+1.0		
8000.....	-1.5	-18.0	-1.5		
10000.....	-7.5		-8.6		
12000.....	-15.0		-16.0		
Wow and Flutter	0.28%	0.47%			

NOTES.—The Overall Response figures relate to record and playback. Playback only relates to the reproduction of a 90 microsecond test tape at 3 $\frac{3}{4}$ i.p.s. (N.A.B.).

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 (see text for further information). Distortion is quoted against a 1,000 Hz signal recorded 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.

WITH the warm sun of late spring tempting us to travel out into the country or to the sea-side thoughts turn towards battery portable tape recorders. As we mentioned editorially recently there does exist a breed of machines offering a compromise between pure battery and mains equipment. One of these is the Sharp RD-505, a $\frac{1}{2}$ -track, 2-speed, mono tape recorder, which is driven by its six size U-2 LP internally housed batteries but has only to be connected by the lead provided to a suitable power point for AC mains operation without the addition of any accessories.

Recent reviews have dealt with some items of truly high fidelity standard at

the upper end of the domestic price range. The Sharp RD-505 is, by contrast, a low-cost instrument with a very modest specification. In arriving at our assessment we shall endeavour to relate performance to price and so indicate some of the general differences one might expect to find between equipments at the two ends of the broad price range.

Our laboratory investigation was conducted in the usual manner and results are tabulated above. The Wow and Flutter figure of 0.28 per cent RMS at 3 $\frac{3}{4}$ ips is surprisingly good for a machine of this class. Unfortunately at 1 $\frac{7}{8}$ ips it deteriorates to 0.47 per cent RMS making

the recording of music at that speed a very dubious proposition.

The signal-to-noise ratio quoted in our table is given as 42 dB. It is usual for such a measurement to be quoted at the *worst* reading obtained. In the present case we have taken the measurement at 1KHz since the manufacturer's specification is limited in that way. The result of this test was to produce a measurement within specification. However when applying the more usual tests over the full bandwidth of from 50 Hz to 14,000 Hz (with the machine operated by its internal dry cells) the true reading obtained was 36 dB. Investigating further

Please turn to page 266



NATURE NOTES

FOR JUNE

BY RICHARD MARGOSCHIS

THE popular holiday months are with us and there is no doubt that everybody is looking forward to long sunny days. If you are a keen naturalist it is more than likely that your holiday will have been planned with some particular project in view, perhaps to travel to some part of this country—or abroad—where a specific species might be found.

On the other hand, if you are a recordist who has become interested in natural history recording your holiday might have been arranged without any special thought to what can be found in the area. If such is the case a study of a map before going, or a ride around the area on arrival, can give you an idea of what to look for. Estuaries and coastal mudflats usually have their population of waders; inland, the moors will offer the possibility of grouse, curlew and probably falcons; at the heads of the valleys where the waters collect from the moors to run crystal clear over boulder-strewn beds the sandpiper and the dipper, or water ousel, will be rearing their young, whilst lower down, as streams converge and the valleys become more wooded you will find the haunts of a huge variety of species.

Have a wander around to get the feel of the area and then select a few spots with a varied character at which to linger and watch, as time permits. If there are any especially good places in the area, they will more than likely be revealed by a word with a local inhabitant such as the policeman, postman or publican; they will know if naturalists frequent any spots in their district. There are several books which can also be of assistance in this way. The Shell Nature Lovers' Atlas by James Fisher (7s. 6d.) gives a very comprehensive list of nearly seven hundred reserves in Britain and is not confined to birds; it has the advantage of clearly indicating their location on maps. "Where to Watch Birds" by John Gooders (30s.) lists some five hundred good places for bird-watching and gives direction for finding them. It also lists the species likely to be found on the sites during the different seasons.

If you notice a small bird flying away from you and displaying a red tail you can be fairly sure that it is a Common Redstart, in fact he is also known as a Firetail. In summer the cock bird is particularly colourful. There is a striking contrast between the white forehead and the black throat and grey mantle; the underparts are similar in colour to the tail; the legs and bill are black. The hen is not nearly so colourful but does have the red tail. The bird is a summer visitor and with the exception of the extreme south-west is found in all parts of Britain. A hole in the ground, a tree or wall is selected for the nest and is usually near wooded areas and sometimes beside streams.

The song is clear, often contains some rich notes. In some respects it is similar to that of a robin but is not so varied; it is also known to mimic other birds. By the end of July the song of the Redstart will be over.

If holiday travels are to take you into the Welsh border country, such as the Long Mynd area of Shropshire, or the Snowdonia National Park of North Wales, a bird well worth looking for is the Pied Flycatcher. He can also be found in the Forest of Dean area of Gloucestershire and around the moors of North Yorkshire. Well-wooded valleys in these areas are a particularly good place to look.

He is a very smart little bird, black and white as his name suggests; black back, white underparts and well-defined white forehead; black bill and legs. The female is brown rather than black and quite unobtrusive. If you find a small black and white bird catching flies and returning to the tree from whence it came you can be sure you are watching a pied flycatcher. He will be in Britain until October, but by then his well-defined black and white will have vanished and his song will have ceased before the end of July.

He has several sharp call notes; the song, which is sweet and can be very varied, is generally delivered from a tree, often for long periods from one spot, although he also will move within a limited area as he sings.



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: 3½ i.p.s.
Frequency response: 60-13,000c/s.

Illuminated level meter. Digital counter with
push button zero reset. Disconnectable
loudspeaker. Sockets for radio/microphone,
pick-up, headphones, additional loudspeaker.

Also 2-track M200 TS: M203 4-track with
speeds of 3½ and 1½ i.p.s. monaural: stereo
recording; monaural playback: stereo
playback through additional monaural
amplifier. Write today for fascinating FREE
colour booklet to

AEG (Great Britain) Limited
27 Chancery Lane London WC2.

M201 TS	£47 13 9
M200 TS	£45 2 3
M203	..From	£88 18 8



the tests were repeated with the machine in its mains condition when it was found that the signal-to-noise ratio deteriorated to the very poor level of 26 dB. It should be mentioned that the majority of the additional noise was introduced by the replay system but there was some worsening in the actual recording in the order of about 3 dB. These figures will be referred to again in the user tests which conclude this review.

The established distortion level of 2.8 per cent is surprisingly good. We would have thought that 5 per cent would have been reasonable and cannot help feeling that this excellent distortion figure has been achieved at the expense of noise. If our suggested 5 per cent had been adopted then the signal-to-noise ratio measurement would have shown a significant improvement.

In his specification the manufacturer does not define any tolerance limits to the extremely modest frequency response claimed, neither does he state to what characteristic the playback amplifiers are equalised. For our tests we used a standard NAB calibration tape at 3 3/4 ips.

Our quoted figures cover a far wider range than the specification and it will be noted that the low frequency response trails off sharply between 100 and 50 Hz and at the upper end falls equally steeply somewhere between 8,000 and 10,000 Hz to 12,000 Hz. To be scrupulously fair these figures demonstrate that this equipment does in fact perform rather better than the manufacturer states it will. Because of the trouble we experienced with additional noise when working from mains all frequency response readings were taken with the machine being driven by dry cells.

Styled in the form of a slim box fitted with a sensible and substantial carrying handle, the RD-505 is neatly finished in black and silver. Controls are large and logically positioned. On the right of the control panel is found a massive rotary function control giving Forward, Stop and Rewind settings. For Fast Forward a spring loaded lever immediately above is engaged when the function control is turned to the Forward position.

Immediately to the left is the red record button which is depressed as the function control is turned to Forward to set the mechanism in the record mode. Towards the centre of the control panel is an amber pilot light which indicates only when mains AC power is applied and switched on. Next to this is an edge-type meter which combines record level indicator with battery power check. Continuing to the left we have a slide switch marked ALC which switches an automatic level control circuit on or off. The pair of rotary controls on the far left provide mains On/Off, Record Gain and

Playback Volume controls on one and Tone Control with a switched position for Internal Speaker Monitor On/Off on the other. The three-digit Position Counter is provided with the usual reset button. Maximum spool size is 5 in., the spindles are fitted with retaining springs and the tape follows a conventional path through the sound channel. The plastic head cover is simply pulled off for head cleaning. In a concealed compartment at the rear storage is provided for the microphone which incorporates a remote Stop/Start button. The speaker grille is positioned longitudinally in one side beneath the carrying handle. A recessed panel in the left-hand side carries a row of miniature jack sockets marked External Speaker, Radio Input, Remote Control and Microphone. On the opposite side is found the AC Input Socket.

For our first tests we reproduced some EMI pre-recorded tapes. It was at once noted that the machine does not provide an outlet to external amplifier and so assessments had to be made on its own internal loudspeaker. As might be expected quality fell far short of high fidelity standards although it must be admitted that the RD-505 is quite capable of producing a reasonably cheerful sound. Too much gain on the playback amplifier will of course introduce distortion but then this will happen with virtually any tape recorder at any price when monitoring via internal speakers.

For recording tests we reproduced a 7 1/2 ips 1/2-track tape of known quality standard on a professional machine and fed the input to the Radio jack on the RD-505. We recorded in three ways. Firstly by manual control carefully observing the indicated peaks as shown by the meter, secondly by switching the Automatic Level Control into circuit and so dispensing with manual control altogether, and lastly by recording manually but deliberately adopting a higher peak level than that marked on the meter.

These recordings proved to be most

interesting. The first, manual and strictly according to the meter, sounded under-recorded with obtrusive background noise. The second, controlled by ALC, gave us a heavier loading of the tape and so achieved a reduction in background noise but definitely compressed the dynamic range. The third recording gave us the best result of all and this relates back to the signal-to-noise figures mentioned earlier. By deliberately over-recording we were pushing up the distortion factor (which doesn't hurt at all because it is so low to start with) and at the same time reducing the inherent noise. We strongly feel that the machine should be operated in this way for best results.

Live recording tests with voice and piano demonstrated the usefulness of the Automatic Level Control. Although frowned upon by purists this facility is most useful for conducting interviews singlehanded—its one limitation is that it should not be used where the ambient noise level is unduly high. Unlike some ALC systems the one on the RD-505 really does work and can be switched out when not needed. We should mention that the Brief Pause button on the microphone does not separate capstan and pinch-wheel and so is a potential source of short term speed instability. Whenever possible the mechanism should be stopped and started by the main function control to prevent mechanical damage.

In summarising our conclusions we must again refer to the price of this equipment and also its mains/battery facility. As we have suggested before this latter is a compromise and in the present case it is the mains operation which suffers. The manufacturer has tried very hard to give a very great deal for our money. Whether or not he has succeeded is purely a matter of opinion—if the quality standards we have enumerated meet your personal requirements then the Sharp RD-505 could be a very good investment indeed. The word "investment" is used in its literal sense since this is one of a very few tape recorders which carries with it a five year guarantee. For the first year of ownership defective parts will be replaced free of all charge, for the subsequent four years labour charges only will be made. Very reasonably, rotating parts are excluded from the final period of the guarantee.

Mechanically the machine operated faultlessly. Backed by the unusually generous terms of the manufacturer's warranty we see no reason why this tape recorder should not give great pleasure to those who require a mobile low-cost medium-performance instrument.

Leda Tape

FULLY GUARANTEED ☆ STRONGLY BOXED

Size Base	Standard		Long		Double		Triple	
	P.V.C.				POLYESTER			
3"	150'	2/3	225'	3/-	300'	4/3	600'	8/9
4"	300'	3/9	450'	5/-	600'	8/3	900'	12/6
5"	600'	8/3	900'	9/9	1200'	15/3	1800'	22/6
5 1/2"	900'	10/-	1200'	12/3	1800'	19/3	2400'	28/6
7"	1200'	12/3	1800'	17/3	2400'	21/9	3600'	38/6

Factory Fresh. Superb Quality. Leaders, Trailers and Stop Foils on all sizes 5" and above. We supply many local authorities and professional recording studios. May we supply you? P. & P. 2/6 per order. S.A.E. Full Lists.

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

THE prospective purchaser of loudspeakers will not go far wrong if he follows the universally accepted rule-of-thumb that small enclosures cost less, but do not sound so good, are larger ones. Although some small enclosures are admittedly better than others, none are so good that they really become exceptions. But in these days of increased taxes we are all of us looking around for possible economies. So what happens if we go right down the scale to the smallest and least costly of them all? To find the answer I have been examining a pair of Sinclair Q-14s for the past eight weeks.

To avoid any misunderstanding I must refer to what are probably the very cheapest loudspeaker enclosures that one can buy. These are to be found in any radio or electrical store in the High Street, and they invariably comprise a small drive unit mounted in a (more or less) ornamental enclosure. Usually sold as "extension loudspeaker enclosures" they probably cost from 30s. to £3 or so and are not regarded as being of the slightest value to the hi-fi or recording enthusiast. Compared to any properly designed and built enclosure the sound they produce is truly pathetic. But if we can pay up to about £3, or perhaps even a little more, for what is really only a decorative chocolate box, what can we expect to get for a little more than twice that price?

Well, the Sinclair Q-14s cost just £7 19s. 6d. each, and for that money we get a drive unit properly mounted in an acoustically designed enclosure together with a base plate to stand it on, a couple of screws to hang it up by and a template to facilitate insertion into an existing hi-fi enclosure.

The sceptics will have already raised their eyebrows. They will be thinking—as I did—that all this sounds much too good to be true. I will excuse anyone who glances at the price, shrugs his shoulders and dismisses the Q-14 as being unworthy of serious consideration. But this would be a most serious error of judgment. After a great deal of listening I have formed the positive and unshakable opinion that in the Q-14 we have the very finest value for money that it is possible for anyone to buy today.

The design is based on a square frame measuring $9\frac{3}{4}$ in. along each side and constructed of a heavy grade of block or chipboard. A solid aluminium bar inset forms a trim around the face of this front panel and encloses the speaker grille. A single drive unit is mounted on the rear of the panel and is totally enclosed in a seamless pressure chamber of unusual design. Instead of the familiar rectangular box each side is cut at an angle from the corner to give a constantly decreasing dimension to the cross-section.

ACCESSORY REVIEW

SINCLAIR Q 14 SPEAKERS

By Denys Killick

Much of the secret of the quality produced by the Sinclair Q-14 lies in the shape of this sealed sound chamber which had to be determined mathematically to produce forward radiation without directional effect or resonance. Constructed from what is described as a special high density, ultra-low resonance, material which has only been made possible by modern bonding and processing techniques, the pressure chamber is sealed permanently to the rear of the main baffle board. It gives an overall depth of only $4\frac{1}{4}$ in. and provides connections at the rear marked for correct phasing.

Styled completely in black apart from the aluminium trim and name plate the whole offers a most pleasing appearance. The loose base board is merely a piece of grooved timber coloured black to match, on which the speaker enclosure can be allowed to rest quite securely without any form of fixing at all.



The manufacturer claims "a remarkably smooth response between 60 and 15,000 Hz." He publishes a B and K pen chart showing 5 dB down at 60 Hz with a sharp rise up to flat at 100 Hz followed by deviations of no more than about 1 dB all the way to 8,000 Hz, a further drop of 2 dB at 10,000 Hz and about -6 or 7 dB at 15,000 Hz. In this graph lies the answer to the astonishing quality that these little fellows produce.

The little Q-14s will knock spots off any transducer that has not been scientifically mounted, and that includes the entire range of conventional radio sets, radiograms, and of course tape recorders. The one weakness is in the very place we would expect to find it; lack of efficiency. As a rule the smaller the speaker

the more "reluctant" it becomes and the tiny Q-14 will not only take quite a big punch but it needs adequate power to drive it properly. The specification refers to an input impedance of 15 ohms and states the unit will comfortably accept loading in excess of 28 watts music power. I have been driving mine very comfortably with a Wharfedale System 20 amplifier which gives 20 watts RMS per channel. 10 watts RMS could probably be regarded as a comfortable minimum driving power—if one attempted to use these speakers directly from, say, the 5 watt output from the extension speaker socket on a tape recorder then the tape recorder amplifier would have to be up to maximum and distortion would inevitably result. However many of the new tape recorders are now provided with at least 10 watts of output power from their transistorised amplifiers and these should be quite suitable for driving the 8 ohm version of the Q-14.

One of the first sound sources I happened to use in testing these speakers was a live recording of my own of a performance of the Palaestrina Mass. Without boasting I must admit that this is an excellent quality tape with a good stereo image. The sound from the Sinclairs was so startling that I just let the tape run on to its end. It must be remembered that this unaccompanied vocal recording was making the very best use of the flattest area of the speaker's response curve. Full range instrumental recordings revealed the inevitable lightness in solid bass and a tailing off of high frequency at the other end. But there was more than enough left to permit me to enthuse sincerely about this little pair of gems.

Performance at the top end was so good that I queried the published curve with the manufacturer. He confirmed that current production models are now nearer 4 dB down at 15,000 Hz owing to improvements in airtight sealing of the pressure chamber.

These are the loudspeakers for the man who is teetering on the brink of real high fidelity sound reproduction but feels that £100 or more for a pair of really good speaker enclosures is the absolute last straw that makes the whole thing impractical. My recommendation to such a person is to invest in Sinclair Q-14s and then sit back and enjoy them for the next few years at least. Perhaps one day he will be able to acquire those magnificent and truly high fidelity but costly enclosures. And when he does he will still have left an excellent pair of speakers for use in another room.

Manufacturer:

Sinclair Radionics Ltd., 22, Newmarket Road, Cambridge. Price: £7 19s. 6d. complete.

demonstrations of directional patterns to help to make the whole thing more clear. The problem is to keep the demonstration tape interesting, to pack into it as much information as possible and yet not let it drag on too long. Fewer musical excerpts and more spoken explanation is our advice for next year. Nevertheless a good effort.

Tannoy Products Limited offered a quiet and well arranged demonstration of their several enclosures based upon the Monitor Gold Dual Concentric unit. The largest of these is the Autograph and the smallest the 111 LZ Mark II. The word "small" in this context is relative, since although the 111 LZ is said to be sufficiently small to be placed on a shelf or a small table we must comment that a pretty large shelf or hefty table is required! This is all to the good because it means that the manufacturer has resisted the temptation to explore the possibility of the extreme limits of miniature enclosures marketed by other firms, and has drawn the line at around the middle of the size scale so as not to permit quality to be degraded too much.

As usual the Tannoy enclosures all produced very pleasant and acceptable sound. The new Monitor Gold unit performs extremely well as we might expect from the famous name it bears.

Slot Stereo is a new name to many people. Basically an eight-track stereo cartridge system it is a method of sound reproduction eminently suitable for mobile use in motor-cars and will also be developed for home installation as well. The eight-track cartridges run at a tape speed of $3\frac{3}{4}$ ips and can only be purchased in pre-recorded form. None of the equipments have as yet a recording facility. These eight-track cartridges have proved immensely popular in America and we await with interest the public's reaction to their introduction to this country. We shall have more to say about Slot Stereo in future issues of *TAPE Recording Magazine*.

Chapman amplifiers and tuners are now handled by Reslosound and their Models FM1000 for use on VHF only and Model 2005 for long, medium and short-wave bands were on show together with the full standard range of Reslo microphones and accessories. Reslo microphone stands, boom arms and stereo twin mounts are very practical accessories for the enthusiast.

The familiar Telefunken tape recorders were demonstrated in their second floor room together with the not quite so familiar associated hi-fi equipment. This latter comprises the T201 stereo tuner and the Concertino 101 hi-fi stereo tuner.

In the Grundig room we were delighted to renew our acquaintance with Herr Kämmer from Grundig, Germany. In our Retrospect last year we commented at some length on the refreshing enthusiasm that this gentleman always displays. He is proud of his Company's products and his enthusiasm is infectious. And in the new range of tape recorders and the latest Grundig integrated tuner/amplifier—which Herr Kämmer explained has more components than a colour television set—he certainly has something to be proud of.

If this editorial reads rather like an endless catalogue then we do apologise. Regrettably we were unable to visit every single demonstration room in spite of the fact that we were on duty during the whole period of the Fair — including a good few hours both before and after the public were admitted. Even all those we saw we have not been able to refer to in detail. But then an Audio Fair is an event that needs to be attended—not just read about.

At one stage we even seriously considered mentioning no equipment at all in this report; only people. The basis of our reasoning being that honest and sincere people only sell honest and sincere products. We have already quoted a number of cases where this could be proven to be so. Continuing in this context we must refer to some of our very best friends in the audio industry, including Mr. Patrick Campbell of Politechna whose AKG microphones have a world-wide reputation; Mr. John Notley of Agfa-Gevaert Limited whose assistants were handing out samples of recording tapes (complete with visitors' recordings on them) faster than we would have credited possible, and of course Mr. Bruce Nicholls of BASF whose film demonstration was of the very highest professional quality.

We apologise sincerely to those exhibitors to whom reference has not been made in this Audio Fair Retrospect. In some cases this is because plans are already in hand to deal comprehensively with their equipment in future editorials. Finally we should like to pay a sincere tribute to all those members of staffs who manhandled equipment into the hotel the day before the show, spent half the night setting it up and then endured four days of duty in demonstration room and booth only to be faced with the task of breaking everything down on the Sunday night and removing it from the hotel. We did not find a single case of bad temper or irritation. Believe me, we were proud to be associated with such a fine industry whose members can put on a show of this magnitude and take it all in their stride.

There will always be some complaints from the public but this year we heard fewer than usual. Turning occasionally from the equipment to the visitors we noticed the usual number of disconsolate and abandoned ladies with hopeless expressions of blank incredulity on their faces. Deserted by their escorts they looked and felt defeated. What a shame that all the ladies could not be brought into the hi-fi fold. If only their menfolk would spend a little more time explaining we are sure that they would be no less enthusiastic than their husbands or boy-friends.

The most amusing activity of the show was to stand outside the 3 Ms demonstration room and watch the expressions on the visitors' faces as they surfaced after being blasted by what we have described as the most controversial demonstration of them all. The most touching moments were to observe visitors in certain rooms behaving with the concentration and rapt absorption they would exhibit if they were attending a live concert performance.

To live through the period of an Audio Fair is to undergo a profound human and technical experience. With worries about purchase tax and business prospects on one hand and the enthusiasm of the public on the other we found the International Audio Fair Festival and Fair 1968 to exceed our expectations. In spite of our criticisms, which we know will be kindly taken, without a doubt "the best yet". Regrettably it is now over. Already we are looking forward to next year!

MUSICASSETTE REVIEWS

CAMELOT. Original Motion Picture Sound Track. Warner Brothers CWP 552, 54s. 6d. incl. P.T.

This album falls short of the superb version of the stage production of *Fiddler on the Roof* (CBS 40-70030 reviewed December 1967) but only just. It's good, extremely good, with an abundance of life and vitality in the voices without the artificial cinema colouration we used to associate with film sound tracks on record.

The excerpts that go to make up the album are: *Prelude and Overture, I Wonder What the King is doing Tonight, The Simple Joys of Maidenhood, Camelot and the Wedding Ceremony, C'est Moi, The Lusty Month of May, Follow Me, How to handle a Woman, Take me to the Fair, If Ever I would Leave You, What do the Simple Folk do?, I Loved you once in Silence, Guenevere and Finale Ultimo.*

Frederick Loewe's music is sweetly haunting, particularly when rendered by the children's chorus in *Follow Me* nicely set off by Lerner's satirical lyrics as King Arthur ruefully asks *How to handle a Woman?* Neither the overall recorded quality nor the sense of movement across the sound stage is as good as the *Fiddler on the Roof* record mentioned earlier. However, it is still an excellent light-hearted entertainment with wholly acceptable and occasionally brilliant sound and so can be strongly recommended.

THE HOME STUDIO

This popular feature by John Borwick will appear again next month in our July issue.

SHOWTIME SPECIAL (medley). The George Mitchell Minstrels from the Black and White Minstrel Show. EMI TC-CSD 3642. 54s. 6d. incl. P.T.

This popular medley, comprising as it does more than forty titles, is typical of the artistry and accomplishment of the Black and White Minstrels. Recording is extremely good indeed; it is an album that will be appreciated by the Minstrels' fans who can invest in it with complete confidence.

Space does not permit the listing of the titles. They are all typical Minstrel material and as such offer thoroughly pleasant and innocuous listening. Whether one likes the Minstrels or not (and to be honest I don't) the precision of their performances is always something to marvel at. Like a battalion of foot guards at ceremonial drill, sergeant-major George Mitchell produces a discipline that could well be emulated by other choral ensembles.

A good buy for countless thousands of Minstrel fans.

IT MUST BE HIM. Vikki Carr. Liberty LBC 83037. 54s. 6d. incl. P.T.

No one would deny that Vikki Carr has a voice—indeed a powerful voice. Opening this collection with *It must be Him* she continues with: *None but the Lonely Heart, Her Little Heart went to Loveland, Laia Ladaia, Toys, Forget You, Cuando Caliente el Sol, How does the Wine Taste, Should I Follow, May I come in, Look Again and San Francisco.*

Recording, although not over-brilliant, is acceptably good. The vocalist is well in the foreground but it must be admitted that with the power of her lungs it would be difficult to swamp her.

The choice of items is popular and the album presents a good average quality in all respects. Although not outstanding in any way it does offer both a pleasant sound and enjoyable entertainment, and can therefore be recommended to those who are expecting nothing more.

MUSIC ON TAPE

7½ & 3¾ ips STEREO

Equipment used for review tapes: Amplifiers—Quad valved and Wharfedale transistorised. Loudspeakers—Celestion and Jordan-Watts. Tape Recorders—Akai 3000 D and Tandberg 64X.

MOZART. *Così fan Tutte* (complete two reels) Irmgard Seefried, Nan Merriman, Herman Prey, Ernst Haefliger, Erika Köth and Dietrich Fischer-Dieskau with the Berlin Philharmonic Orchestra conducted by Friedrich Schulz directed by Eugen Jochum. Ampex DGR 8863. 4-track stereo 7½ ips. 326s. 10d. incl. P.T.

The sheer joy and satisfaction to be derived from collecting recordings of complete operas has to be experienced to be believed. The one disadvantage is the cost, which in the present case is not inconsiderable.

However, once purchased such a recording represents an investment for a lifetime—particularly if it is wisely acquired on tape instead of on disc. I believe it takes far more courage to hand over such large sums of money for gramophone records than it does to invest the same, or even more, in the tape equivalent. If the disc should be treated with anything other than the utmost respect and if it should be reproduced on faulty or sub-standard equipment, the quality might be lost for ever. By contrast there is every hope that the tape version will endure to be handed on to coming generations.

With which sobering thought let us turn to the opera in question, a work whose libretto is flimsy to the point of inconsequence. Frivolous in the extreme, it is described by Lionel Salter in his admirable notes accompanying a full text and English translation as "little more than a carnival jest". And yet around this frivolous structure the composer built some of the sweetest and the most beautiful music of all time.

"Women are all the same" says the title, and then the plot proceeds to prove the fact by heavily theatrical changed and mistaken identities. With an imbecility that would be recognised for what it is anywhere other than on the stage, the lady heroines fail to recognise their lovers merely because they are wearing different clothes. After a succession of misunderstandings and forced situations true love wins through at the end—but only just! The cynics amongst us could agree with Don Alfonso that women are indeed all the same.

How very remarkable it is then that one of the finest and best loved of all operas should owe its existence to such a feeble vehicle. It is said that the subject was suggested by the Emperor himself and it would have been more than understandable if the music it inspired had been on an equally trivial level. Surely one of the hallmarks of genius is the ability to transmute the mundane into the artistic. This is what Mozart did; it would have been quite impossible for him to have done otherwise.

Recording is excellent. Running at 7½ ips. we get a good full frequency range with minimum of background noise. Stereo is not so directional as in some dramatic recordings, the movement of characters within the sound stage being minimal. The impressive list of singers quoted at the head of this review

holds a promise of the highest performance standards and in this the listener will not be disappointed.

Some will say there is no substitute for the live performance, and with them I would agree. It must be pointed out however that recorded versions have advantages that live performances will never have, providing as they do a permanent source of both reference and enjoyment. To own this complete recorded version of *Così fan Tutte* is to own the most delightful works of the greatest master of all time. Very strongly recommended.

HERBERT von KARAJAN: Moussorgsky-Ravel, *Pictures at an Exhibition*; Respighi, *The Pines of Rome*; Berlioz, *Roman Carnival Overture*; Liszt, *Les Preludes*. The Philharmonia Orchestra. Angel Y2S 36300. 4-track stereo 3¾ ips. 163s. 10½d. incl. P.T.

With an approximate playing time of 1 hour 25 minutes (equivalent to two full stereo discs) this programme by the Philharmonia Orchestra is conducted for us by Herbert von Karajan. Unfortunately it is offered at the slower speed of 3¾ ips.

Surely the advantages of magnetic tape as a medium for commercial recordings are going to be totally lost if publishers continue to put out orchestral works at the slower tape speed? We already have the cassette system looking after the very slow end of the market and they are doing that job extremely well. The open spool man can achieve really excellent—indeed perhaps ultimate—quality when working at 7½ ips. As soon as the speed drops to 3¾ we have a deterioration in signal-to-noise ratio and a narrowing of the frequency band. The effective dynamic range is also probably curtailed.

Musicassette quality is in some cases already better than we are being offered on certain pre-recorded tapes running at 3¾ ips. The moral is so clear that it should not be necessary to spell it out in words of one syllable. The market for open spool pre-recorded tapes is the very top quality end and that means running at 7½ ips. In the future those who are less exacting in their demands will be more than satisfied with music in cassette form. So where do the 3¾ ips. tapes fit in? Answer, they just don't.

The album now being considered suffers technically as all the 3¾ ips. recordings must. Had it been offered at 7½ ips. we should have had some really brilliant sound that would enable us to enjoy excellent performances under the masterly baton of Karajan. As it is the cream has been skimmed off the top and we have to put up with a product that is unquestionably inferior.

I suspect that this policy of slow speed recordings has been influenced by the requirements of the American market. It is a well known fact that in the U.S.A. the private listener will accept lower standards in terms of sound quality than his European counterpart. When selling in the United Kingdom the distributors should surely study the requirements of the market and not fob the public off with sub-standard products.

By tape recording standards the programme time is by no means extended. *Pictures at an Exhibition*, which occupies the whole of Side 2, is timed at only 37 minutes 28 seconds. Hardly an excuse for using 3¾ ips? The other individual items are each of shorter duration, the longest being Respighi's *The Pines of Rome* at 22 minutes 47 seconds.

This could have been a really outstanding album. As it is I am left with the feeling of having been robbed of the best part of my enjoyment.

MUSICASSETTES

Send 6d. in stamps for comprehensive catalogue, part-exchange details and library service. All makes of cassette machines are supplied at cut-cash prices. Blank cassettes, Carrying cases, Language Courses, etc.

ALL MUSICASSETTES REVIEWED IN THIS MAGAZINE ARE AVAILABLE FROM US BY RETURN POST

THE MUSICCASSETTE SUPPLY COMPANY
13 Angel Street, Worcester

For Jiffy-fast Postal Service

THEATRE ORGAN DISCS and TAPES

ORGAN OF THE MONTH CLUB brings out a new Theatre Pipe Organ record each month. Our discs are playable on Mono or Stereo equipment. Approx. 38 minutes playing time 31/6d.

7½ i.p.s. 4 track stereo tapes 41/7d.

Full details from:

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

Gramplan
for good
SOUND EQUIPMENT
GRAMPIAN REPRODUCERS LTD
Hanworth Trading Estate, Feltham, Middlesex

SUBSCRIBE TO TRM

and receive your monthly copy by post for 1 whole year (12 issues). Send 25s. (U.S.A. \$3.75) by postal order or cheque today.

25/-
U.S.A.
\$3.75

To: TAPE RECORDING MAGAZINE,
Prestige House, 14-18 Holborn, London, E.C.1

Name.....

Address.....

.....

.....

YOUR LOCAL DEALER

LONDON

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)

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 0685
9 a.m.—6 p.m. Closed Wednesdays.

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

THE SOUTH

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
110 CORNWALL ST., PLYMOUTH
Telephone 69285
Immediate delivery to ALL Areas

NEW PRODUCTS

PHILIPS PRO' 12

BRIDGING the gap between domestic and professional equipment Philips now for half-track mono or stereo operation offer their PRO' 12 tape recorder. Suitable special version using the quarter-track system will also be available.

Built-in mixing facilities are provided for two inputs besides multiplay and sound-on-sound and before and after record monitoring via the separate playback head and amplifier. Special attention has been given to the cueing and dubbing facilities which incorporate a device for lifting the tape clear of the heads. A pilot tone head for cine synchronisation can be provided as an optional extra.

Tape speeds are $3\frac{1}{2}$ and $7\frac{1}{2}$ ips and wow and flutter (peak values) is quoted as 0.13 per cent for the former and 0.1 per cent for the latter.



Playback frequency response conforms to DIN 45511 giving 40-18,000 Hertz minus 2.5 dB at $7\frac{1}{2}$ ips and 40-15,000 Hertz with the same tolerance at $3\frac{1}{2}$ ips. Signal-to-noise ratio measured according to DIN 45405 at $7\frac{1}{2}$ ips is -56 dB weighted at $3\frac{1}{2}$ ips -22 dB weighted.

Weight is approximately 50.6 lbs. and dimensions are $2\frac{1}{2}$ in. x $13\frac{1}{2}$ in. x $9\frac{1}{8}$ in. The chassis is suitable for 19 in. rack mounting. Price is £190 plus purchase tax.

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

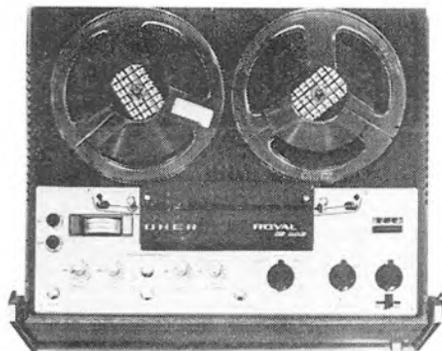
LATEST UHER

FOR the first time Uher are producing a new model suitable for horizontal or vertical operation. This is the Royal de Luxe which incorporates a number of sophisticated features including inter-changeable head assemblies for half-track or quarter-track operation.

Tape speeds are $7\frac{1}{2}$ ips, $3\frac{1}{2}$ ips, $1\frac{1}{8}$ ips, and 15/16 ips and wow and flutter is quoted as 0.05 per cent at the faster speed, 0.1 per cent at $3\frac{1}{2}$ and 0.25 per cent at $1\frac{1}{8}$ ips.

Frequency response is given as 20-20,000 Hertz at $7\frac{1}{2}$ ips, 20-15,000 Hertz at $3\frac{1}{2}$ ips, 20-9,000 Hertz at $1\frac{1}{8}$ and 20-5,000 Hertz at 15/16. Output power is claimed to be 2 x 10 watts into 4 ohms sinewave tone.

As with the earlier Uher Royal models a built-in dia-pilot is provided to automatically send switching impulses to a slide projector with the necessary automatic mechanism. It is suggested that the Uher Royal de Luxe can not only be operated horizontally or vertically but it may even be hung on a wall like a picture frame. This latter claim is presumably only possible in view of the exceptionally light weight of 29.4 lbs.



Incorporating a full range of facilities including switchable AB monitoring, mixing, multiplay, echo, synchro-play and what is described as physiological volume control the suggested retail price is 189 guineas.

Bosch Limited, 205 Great Portland Street, London, W.1.

SLOT STEREO 8-TRACK SYSTEM

SLOT Stereo is the designation given to a new British system designed to reproduce $3\frac{1}{2}$ ips 8-track stereo cartridges.

There are said to be well over 1 million American motorists enjoying mobile stereo from eight-track cartridge systems, but now University Recording Limited have devoted their energies to producing improved playback units. Measuring only 8 in. long x 3 in. high x $6\frac{1}{2}$ in. deep the new Slot Stereo for mobile use is priced at 47 guineas inclusive of purchase tax and is offered complete with two specially developed 3 ohm speakers and speaker grilles. Installation in the owner's motorcar costs about £5 extra.

As a new concept in hi-fi stereo for the home (claimed to be the ultimate in "goof-proof" convenience) Slot Stereo are now marketing two new home units for the reproduction of their eight-track stereo cartridges.

A self-contained system at £85 inclusive of purchase tax (as illustrated above) incorporates its own amplifier and a full set of controls including an on/off indicator light, volume, tone and speaker balance knobs and track selector button. A "satellite" unit provisionally priced at £44 for plugging into an existing hi-fi set-up is the alternative model. The satellite comprises a tape deck, pre-amplifier and track selector switch.



Claimed technical specification for the complete unit includes wow and flutter of not exceeding 0.3 per cent, cross talk 40 dB or better at 1 KC, separation of 40 dB or better at 1 KC, frequency response 30-16,000 Hertz and speaker impedance 8 ohms.

Production of eight-track cartridges is now in progress in London and the catalogue includes a wide range of popular instrumental and classical items. Standard albums cost £2 each, double-play albums £3 15s. each, plus purchase tax.

Slot Stereo Limited, 36 Hertford Street, London, W.1.

TRUVOX SERIES 200

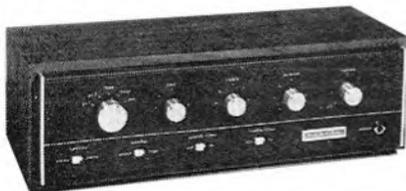
SERIES 200 range of equipment from Truvox includes the R202, a half-track portable mono tape recorder in grey leatherette case (R204 is the four-track version), RB202, a half-track mono tape recorder in teak cabinet (RB204 is the four-track version), PD202, a half-track stereo tape unit (PD204 is the four-track version), TSA200, a transistorised stereo amplifier, FM200, a new radio tuner unit, MPX100, a stereo multiplex decoder and LS200 the matching loudspeaker.



The stereo tape unit illustrated above is provided with three speeds, $7\frac{1}{2}$, $3\frac{3}{4}$ and $1\frac{7}{8}$ ips and quoted wow and flutter figures are 0.1 per cent and 0.15 per cent and 0.25 per cent respectively. Maximum reel diameter is 7 inch and frequency response is claimed to be 30-18,000 Hertz plus or minus 3 dB at $7\frac{1}{2}$ ips, 30-12,000 Hertz plus or minus 2 dB at $3\frac{3}{4}$ ips and 40-7,000 Hertz at $1\frac{7}{8}$ ips. Unweighted signal-to-noise ratio is given as 50 dB for the half-track version, 48 dB quarter-track. Equalisation is to the new CCIR timeconstant. Dimensions are 16 in. x $16\frac{1}{2}$ in. x 8 in. and the weight is 28 lbs.

Features include full stereo record/playback, separate record and playback amplifiers, compatibility with all multiplex systems, three-motor Truvox deck with outer rotor capstan motor, full AB monitoring, mixing, duo-play, track transfer, etc. Recommended retail price including purchase tax is £147 17s. 4d.

The mono version has a similar specification and the price inclusive of purchase tax is £124 14s. 2d.

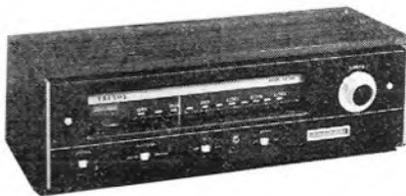


The Series 200 amplifier illustrated above embodies a programme selector, phones output, loudness control, function switch, tape/source switch, stereo inputs, non-short loudspeaker outputs, tape outputs, etc.

Five inputs are provided: Pick-up 1 50 mV into 100 kilohm and Pick-up 2 3.5 mV into 50 kilohm, both equalised to RIAA, Tape 100 mV into 100 kilohm, Tuner and Auxiliary at similar sensitivities and impedance, the three latter providing a flat response. Tape output is 200 mV into not less than 22 kilohm. Separate bass and treble controls are provided together with a balance control.

Distortion is claimed to be less than 0.25 per cent at 20 watts and cross talk better than -50 dB at 1 kHz.

Scratch and rumble filters are incorporated, the operating voltages are 100-120 volts, 200-250 volts AC 50/60 Hz. Dimensions are 16 in. x $6\frac{7}{8}$ in. x $5\frac{1}{8}$ in. and the weight is 13 lbs. Recommended retail price inclusive of purchase tax is £54 12s.



The tuning unit, FM200, is supplied in a teak cabinet or may be panel mounted. It is fully wired for stereo for which the additional stereo decoder unit MPX100 (a slide-in module) must be purchased as an accessory. Tuning range is 87.5 to 108.5 MHz and the aerial inputs are balanced 300 ohm or unbalanced 75 ohm. Tuning indicator is by centre zero meter and the stereo indicator is an automatic stereo beacon. Recommended retail price inclusive of purchase tax £36 19s. 4d.

The Series 200 loudspeaker is an infinite baffle enclosure measuring 17 in. x 8 in. x $5\frac{1}{4}$ in. and weighing 12 lbs. Overall frequency response is claimed to be 35-15,000 Hertz and fundamental resonance 70 Hertz. Power handling capacity is given as 12 watts RMS and impedance 15 ohms.

Drive units comprise a 5 in. bass transducer and a moving coil pressure HF unit $1\frac{1}{2}$ in. in diameter. Crossover frequency is 3,500 Hertz. Recommended retail price inclusive of purchase tax is £21 19s. 2d.

Truvox Limited, Hythe, Southampton.

A NEW BEYER DYNAMIC

A NEW cardioid moving coil microphone the Beyer Sound Star is now available from Fi-Cord International of East Grinstead. The unit is of slimline design and is intended for use by both professionals and amateurs. It has a pop filter and hum compensation.

Frequency response is quoted as 30-18,000 Hertz and output level is given as 0.2 mV, μ bar (-52 dbm) and the hum induction factor is quoted as 5 mV/50 mG (50 Hz). The instrument is available in two versions, the Sound Star N costing £19 18s. has a 200 ohm output impedance, Model HLM costing £23 1s. 11d. has an impedance selector switch giving 200, 500 or 25 kohm outputs. All versions are also available with Cannon plug XLR-3-5 OT or Tuchel T 3007.



Fi-Cord International, Charlwoods Road, East Grinstead, Sussex.

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 CENTRE (HALIFAX)

stock all the best
Tape Recorders, Hi-Fi Equipment,
Tape, Pre-Recorded Tape, etc.

REVOX
SPECIALIST

30 King Cross Street, Halifax
Phone 66832

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



Any MUSICASSETTE BY RETURN POST

Our catalogue lists every available
Musicassette in detail. Send for your
FREE copy now (enclose 6d. stamp
for postage)

**LIBRARY AND PART EXCHANGE
SERVICE AVAILABLE**

For double quick mail order service
send to:

GRAMO-TAPES LTD.
Newport Crescent, Middlesbrough.

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, MINCING LANE/DARWIN STREET, BLACKBURN** (Tel 59595).

£200 Shaub-Lorenz Hi-Fi 126 tracks, 46 hours tape recorder, and V.H.F. 4-wave radio for £65. New unused. 01-445 9581 or 01-445 2825.

MINIFLUX 4-Track stereophonic/monophonic record/playback heads. List Price 6 gns.—Special Offer **55/- each**. MINIFLUX 4-Track stereophonic/monophonic Ferrite Erase Heads. List Price **£3 10s.** — Special Offer **32/6 each**, or supplied together (one of each) at **£3 17s. 6d.** SKN4 ¼-Track stereophonic record/play heads for Transistor Circuits **55/- each**. Also ½-Track and full-track monophonic Ferrite Erase Heads complete with technical specifications. S.A.E. for details. **LEE ELECTRONICS, 400 Edgware Rd., Paddington 5521.**

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.

20% CASH DISCOUNT on Hi-Fi equipment. Radiograms, Radios, Tape Recorders, Cameras, Typewriters, 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), 40, Cassio Road, Watford, Herts.

PRE-RECORDED TAPES for sale. R. Barnes, 9 Rangoon Road, Sunderland, Co. Durham.

AKAI ST-1 STEREO TAPE RECORDER. Excellent condition. £40 o.n.o. Holtom, 6 Wilson Close, Middle Wallop, Hants.

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.

SERVICE and professional independent evaluation of "quality" equipment, also manufacture of specials. On-site service by appointment. **H.F. ENGINEERING, 3 Willowbank, Sunbury-on-Thames, Middlesex.** Telephone 83232 (24 hr. service).

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. Cheap pressings. 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 Bechstein Grand Mobile unit. 21, Nassau Road, London, S.W.13. RIVERSIDE 7150.

YOUR TAPES to DISC, 7 in. 45—18s., 10 in. LP—48s., 12 in. LP—55s. 4-day postal service. Top professional quality. S.a.e. photo leaflet: **DEROY STUDIOS, High Bank, Hawk St., Carnforth, Lancs.**

TRUSOUND announce the opening of a new recording studio available to groups, artists and small orchestras in the Luton and Bedford areas for the production of demonstration tapes and discs. Specialists in location recording and public address, Weddings, etc. Tape to Disc Service, s.a.e. for leaflet. **TRUSOUND Recording Services, 4, Hitchin Road, Shefford, Beds.** Telephone: Shefford 355.

TAPE EXCHANGES

FRIENDLY FOLK ASSOCIATION, Torquay (Est. 1943). Social introductions, Pen-friends, Book-lovers, Stamps, Photography, Tapesponding. Members 100 countries.

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

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

MISCELLANEOUS

ALWAYS BE CAREFUL (and money wise) before buying quality equipment. Send your requirement list to **AUDIO SUPPLY ASSOCIATION** for evaluation and quotation. See below

HIGHEST CASH PRICES offered for good quality Tape Recorders and Hi-Fi. See our advert page 246 this issue. **R.E.W., 266-8, Upper Tooting Road, London, S.W.17.**

IF **QUALITY MATTERS** consult first our 70-page illustrated catalogue with technical specifications (5s. 6d.) and equipment housing guide (1s. 9d.). Members enjoy unbiased advisory service, preferential cash terms. Membership 7s. 6d. Our Associates also manufacture records from your own tapes, or record the Master at our studios (Steinway Grand). Bulk terms for choirs fund-raising. Please specify requirements. **AUDIO SUPPLY ASSOCIATION, 18, Blenheim Road, London, W.4.** 995 1661.

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 4s. to: **MUSIC U.S.A., 146 Lower Baggot Street, 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.**

WANTED

GOOD QUALITY TAPE RECORDERS PURCHASED FOR CASH. TELEPHONE 01-472 2185.

WANTED. SERVICE SHEETS FOR ALL TAPE RECORDERS. Any quantity. State price. **CARANNA, 200 High Road, East Finchley, N.2.**

TELEFUNKEN M.105 or 55 or 75 wanted. Good condition. **N.R.S. Ltd., 153 Fellows Road, London, N.W.3.** Telephone 01-722 3314.

EXPERIENCED MONITOR requires additional work. Professional equipment used. Reply to **T.R.M. Box No. 481.**

SITUATIONS WANTED

YOUNG MAN (23) with **G.R.S.M.** and **A.R.C.M.** **SEEKS POST** for August/September in a **CENTRAL or SOUTH LONDON RECORDING STUDIO.** Experienced in Music editing, Tape Equipment operation and maintenance. Two years in school-teaching. **BOX 482.**

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.

PLEASE MAKE USE OF THE ADVERTISEMENT INQUIRIES COUPON OPPOSITE

Complete details of products in which you are interested, fill in your name and address, fold and post. No stamp required when posted in U.K.

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

MAILWAY LOW COST TAPES

Supplied in strong Boxes with length of leader. Fully guaranteed. Free index with each order.

7" Mylar 2400 ft.	21/-	5" Mylar 1200 ft.	16/6
7" Mylar 1800 ft.	16/3	5" Mylar 900 ft.	11/3
7" Mylar 1200 ft.	11/6	5" Mylar 600 ft.	9/6
7" Acetate 1800 ft.	12/6	5" Acetate 900 ft.	8/6
7" Acetate 1200 ft.	10/-	5" Acetate 600 ft.	8/-

Post and Packing 2/- per order. Send S.A.E. for Tape and Accessories Catalogue to "MAILWAY" (TRM), 1, Icknield St., Dunstable, Beds.

Turn your tape recorder into a powerful learning machine

Send now for Catalogue of Accessories such as Time Switches, Pillow Speakers, Special Induction Tapes for Learning and Therapy, Endless Tape Cassette Repeaters, Language Courses, G.C.E. Courses etc. If you do not already have a tape recorder we can supply an all-British 3-speed model for only 28 gns. Credit terms available. Get with it! Take advantage of these new, simpler, faster educational techniques.

Send postcard to:
Institute of Tape Learning (TRM), 153, Fellows Road, London, N.W.3.
01-722-3314



To ALL OWNERS of
Tape Recorders!
YOU SAVE MONEY AND
PREVENT IMPORTS



High-grade Magnetic Recording Tape. Polyester and PVC. Specially coated. Sensitive. Clear and durable. Appreciated by discerning people.

STORED AT CORRECT TEMPERATURES.

Dear Sir,
Thank you for your service to us members of the Tape World.
S.T. Beds.

New	3"	5"	5½"	7"
Standard Play each 3 for	150' 2/- 5/9	600' 5/6 16/-	850' 7/- 20/-	1200' 8/6 25/-
Long Play each 3 for	240' 3/- 8/6	900' 7/6 22/-	1200' 9/6 27/9	1800' 12/6 36/9
Double Play each 3 for	300' 4/3 12/3	1200' 11/- 32/3	1800' 15/- 44/-	2400' 19/9 58/3

Also full Range of Triple Play. List Free. 'Scotch' Splicing Tape 4/6. 4" LP. 450' 5/-

Mora Trading Co. (T3) Postage 1/6 per order.
Mora Works, Mora Road, N.W.2. Posted the same day.
Money-back gtd.

The Berean Forward Movement

(NON-DENOMINATIONAL)

Loan of over 1,000 reliable expositions of the Bible available on tape (3¼ 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.

LONDON microphones

Quality sound—at low cost

The London Microphone range offers you quality microphones, good characteristics—and good looks, too, at remarkably little cost. Made in Britain.

LM 100 Dynamic Omnidirectional microphone, available in a range of impedances to suit many different input requirements including transistorised tape recorders. U.K. retail price range £3.3.0 - £3.18.6.



LM 200

Dynamic cardioid microphone. Balanced output. Eliminates unwanted background noise. Gives good recordings even under difficult conditions.



U.K. prices
£4.19.6
£5.15.0

Home and overseas inquiries welcome. Write or ring for details.

LONDON MICROPHONE CO LTD

182/4 Campden Hill Road, London W.8. Telephone Park 0711. Telex 23894

ADVERTISEMENT INQUIRIES SERVICE

I should like further information about
Messrs 's advertisement
on page..... of *TAPE Recording Magazine*
about..... (product)
NAME.....
ADDRESS

June 1968

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

June 1968

I should like further information about
Messrs 's advertisement
on page..... of *TAPE Recording Magazine*
about..... (product)
NAME.....
ADDRESS

June 1968

I should like further information about
Messrs 's advertisement
on page..... of *TAPE Recording Magazine*
about..... (product)
NAME.....
ADDRESS

June 1968

I should like further information about
Messrs 's advertisement
on page..... of *TAPE Recording Magazine*
about..... (product)
NAME.....
ADDRESS

June 1968

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

- 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 TAPE RECORDING MAGAZINE IS STILL ONLY 2/- MONTHLY.**

DID YOU KNOW—

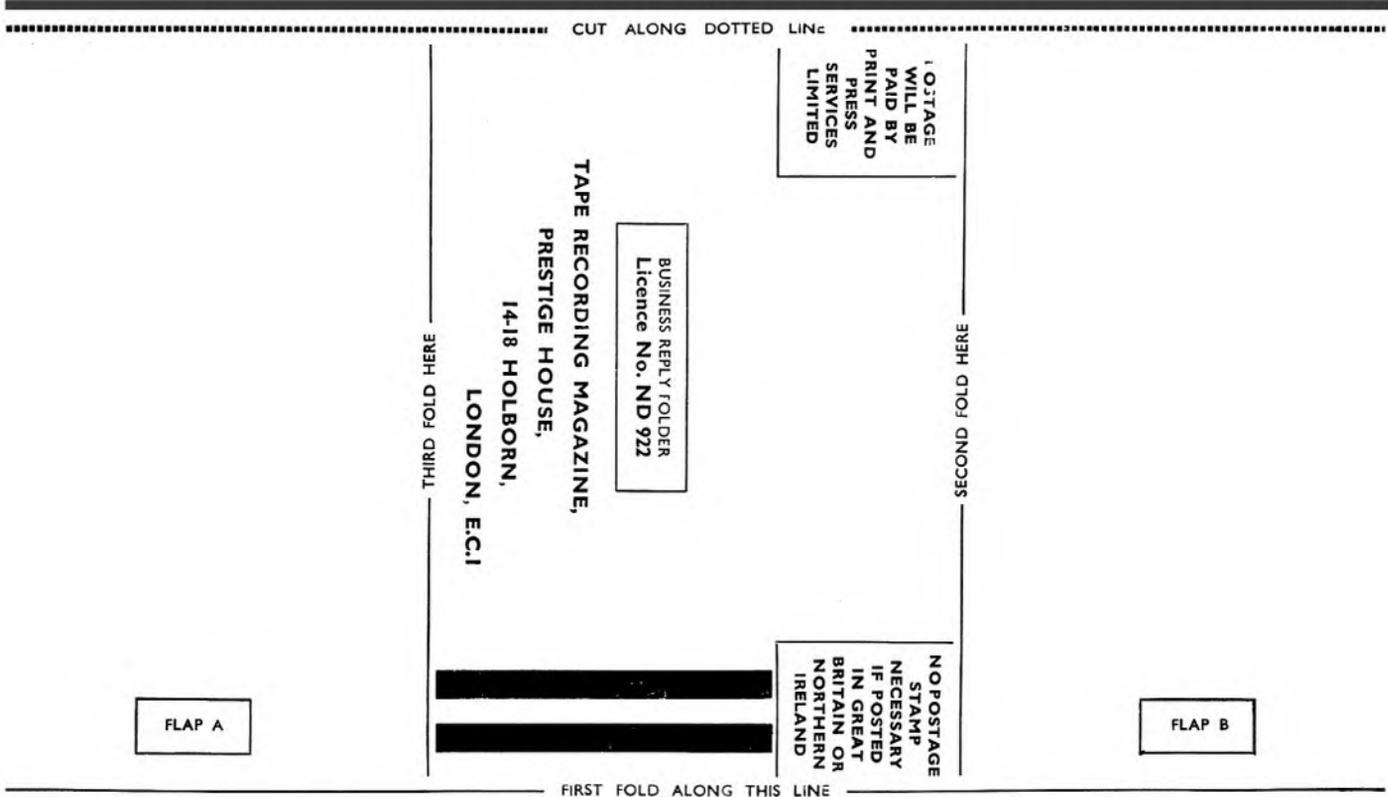
- That **TAPE RECORDING MAGAZINE** was the First Publication of its kind in Europe.
- That it is still the **Best Tape Recording Magazine.**

TO MY NEWSAGENT

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

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

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



Fold along lines as indicated and then tuck Flap A into Flap B

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.

MAIL ORDER ONLY

Tape and Cine by John Aldred.

3s. (USA \$0.70) post free.

With practical advice on synchronising methods, etc.

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.

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.

REMITTANCE MUST ACCOMPANY ORDERS

Send Orders to—

PRINT & PRESS SERVICES LTD.
Tape Bookshop, Prestige House,
14-18, Holborn, E.C.1.

TAPE BOOKSHOP

Bishopsgate
Institute

CITY

TAPE RECORDER CENTRE

BISHOPSGATE

Liverpool Street Station

**228 BISHOPSGATE
LONDON, E.C.2.**

Tel. BISHopsgate 2609

Opposite Liverpool Street Station

Hours of Business:

MONDAY TO FRIDAY

9 a.m. to 6 p.m.

Closed all day Saturday

**OPEN
SUNDAY**

10 a.m. to 2 p.m.

At the City Tape Recorder Centre you can see one of the finest selections of tape recorders on display in London. Every leading make and model from Akai to Vortexion.

Many Special Offers of brand new 1968 models showing dramatic savings on the manufacturer's list prices! A wonderful selection of secondhand and shopsoiled models with savings of up to 50%.

We are easy to get to being almost opposite Liverpool St. Station (see diagram above) and remember we are the only tape recorder specialists in Gt. Britain open on Sunday!

Do your weekly rush shopping on Saturday with your wife and visit us on Sunday at your leisure!

- GENEROUS PART EXCHANGES
- FREE AFTER SALES SERVICING
- UNBEATABLE SPECIAL OFFERS
- EXPERT STAFF EXPERT ADVICE



Our manager Bob Hookings is a keen tape recording enthusiast. Bang & Olufsen's are his speciality, having used B. & O. equipment for several years his knowledge of this wonderful range is second to none. He is able to give personal callers his expert advice (please avoid telephoning) not only on B. & O. but on any other recorder suitable to your individual requirements and pocket.

WHEN IN THE CITY — CALL IN AT THE CITY!

THE BANG & OLUFSEN SPECIALISTS



Sanyo puts you in the world class



This is the new MR 910 stereo tape recorder with built in speakers

- Full fidelity
- Extraordinarily compact
- 4 track
- Sound with sound

Tape speeds

7½ in/sec (19 cm/sec)
3¾ in/sec (9.5 cm/sec)

Playing time

30 min x 2 at 7½ ips
(stereo 7" 1,200 ft. tape)
1 hour x 2 at 3¾ ips
(stereo 7" 1,200 ft. tape)

Frequency response
50-15,000 c/s at 7½ ips
50-10,000 c/s at 3¾ ips

Power Output

Maximum 1.8W
(each channel)
Undistorted 1.5W
(each channel)

Speakers

Two 4" permanent
built-in speakers.
Voice coil
impedance 8 ohms.

Weight

18 lb. (8.5 kg)

Accessories

Dynamic
microphone x 2,
7" (18 cm) full
tape and empty reels,
Patch cord x 2,
Splicing tape,
Reel stopper x 2

SANYO

RELIABILITY IS BUILT IN