

DECEMBER 1970

TAPE

RECORDING MAGAZINE

3/-
15 NP

OLYMPIA AUDIO FAIR REPORT

With the latest news of
Dolby B and four-channel

One Man's Work For
The Blind

Review: Unimixer 4S

Music Reviews
New Products
Cross Talk, Etc.

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

Our thanks to
Cybervox Language
Laboratories and
Amplivox Communicate
Limited.

Teleton ***gives you sound satisfaction***



Teleton's 999 4 Track, 3 Head Stereo Tape Recorder Deck is a de-luxe 7 reel model with solid state pre-amplifiers using 20 transistors and 6 diodes to provide the highest possible performance.

Facilities include mono or stereo recording, sound on sound, sound with sound, echo and mixing effects. Tape counter, direct monitoring and sound on sound switch are included in this versatile set which will provide hours of high quality recording within your hi-fi set up.

Teleton Electro (UK) Co. Ltd.,
Teleton House, Robjohns Road, Widford, Chelmsford, Essex.
London Showrooms: 16 Savile Row, London, W.1. Tel: 01-437 6796

FROM PRECISION TAPES: THE NEW SHAPES OF GIFTS

GLEN CAMPBELL
THE CHRISTMAS FEELING
ZCE 5047 Y8E 5047



Christmas Specials

CHRISTMAS MUSIC

THE ROYAL CHORAL SOCIETY
ZCDEL 3207 Y8DEL 3207



Our cassettes and
cartridges can now be
wrapped in colourful
gift packs!

NOVEMBER LP RELEASES

		Cassette	Cartridge
AM	Carpenters Humble Pie Quincy Jones	ZCAM 998 ZCAM 986 ZCAM 992	Y8AM 998 Y8AM 986 Y8AM 992 □
BBC tapes	B.B.C. Sound Effects No. 1 Geraint Evans Sings In Llandaff Cathedral	[MONO ONLY]	ZCBBC 47 ZCOEL 6063
	Woody Guthrie	WOODY GUTHRIE	ZCE 3129 Y8E 3129
	Luiz Bonfá and His Guitar The Band of The Life Guards	SOFTLY	ZCVOY 8874 Y8VOY 8874 ZCVOY 7048 Y8VOY 7048
8 WRC	Alan Civil – Horn The Royal Philharmonic Orchestra conducted by Rudolfe Kempe (Leon Goossens – Oboe) The Sinfonia of London conducted by Colin Davis	"MOZART" HORN CONCERTOS "MOZART" CONCERTO FOR OBOE AND ORCHESTRA IN C MAJOR, K. 314, SYMPHONY NO. 34 IN C MAJOR, K. 388	ZCWR 628 ZCWR 59
GRT	William Steinberg conducting The Pittsburgh Orchestra	A COMMEMORATION SYMPHONY – "STEPHEN FOSTER" A SYMPHONIC STORY OF JEROME KERN	ZCGRT 3063 Y8GRT 3063
PE	Sounds Orchestral Victor Silvester & His Orchestra Cyril Stapleton Choir and Orchestra The Tony Hatch Sound Labi Siffre	THE SOUL OF SOUNDS ORCHESTRAL NO. 2 WALTZES, TANGOS & MODERN BEAT COME DANCE WITH ME BEAUTIFUL IN THE RAIN LABI SIFFRE	ZCYP 153 Y8P 38018 ZCP 18351 Y8P 18351 ZCYP 192 Y8P 18207 ZCYP 164 Y8P 18176 ZCP 28135 Y8P 28135
EC	Fleetwood Mac Nancy Sinatra	KILN HOUSE NANCY'S GREATEST HITS, WITH A LITTLE HELP FROM HER FRIENDS	ZCR 9004 Y8R 9004 □ ZCR 6409 Y8R 6409 □
	Dean Martin, with Jimmy Bowen Orchestra and Chorus Neil Young	MY WOMAN, MY WOMAN, MY WIFE AFTER THE GOLD RUSH	ZCR 6403 Y8R 6403 □ ZCR 6383 Y8R 6383
WB	The Grateful Dead	THE WORKINGMAN'S DEAD	ZCW 1869 Y8W 1869

THIS MONTH'S DOUBLE PLAY CASSETTES AND CARTRIDGES

Graham Bond
SOLID BOND
ZCWD 3001 Y8WD 3001



SIMULTANEOUS RELEASE □

Everly Brothers
THE EVERLY BROTHERS SHOW
ZCWD 1858 Y8WD 1853

FROM PRECISION TAPES

FOR UP TO DATE



THE NEW SHAPES OF SOUND

CATALOGUE SEND TO:-

Precision Tapes Ltd.

ATV House, 17 Great Cumberland Place, London W1H 8AA, Telephone 01-262 5502, Cables and Telegrams, Pyrec London W1H 8AA

GUARANTEED QUALITY & SATISFACTION

4 TRACK STEREO/MONO

	Deposit £	S.	Monthly £	Cash £	Price
	s. d.	s. d.	s. d.	s. d.	s. d.
Philips N2400	23	0	0	3 15	0
Philips N4404	28	0	0	4 11	8
Ferguson 3232	33	5	0	5 1 10	93
Sanyo MR929	33	4	9	5 6 10	97
Sony TC252	33	5	0	5 10 10	99
Philips N4407	35	0	0	6 13	4
Akai 171OL	36	6	8	6 1	2
Sanyo MR939	38	13	6	6 2	3
Grundig TK247	37	10	0	6 5	0
Sony TC630	66	15	0	11 18	0
Sony TC230	40	11	9	6 15	0
Telefunken 204TS	41	19	0	6 13	4
Philips N4408	47	0	0	7 13	4
Tandberg 1241X	49	0	0	8 6	8
Sony TC540	50	15	0	8 5	0
Akai 1800	53	0	0	8 13	0
Akai 1800SD	66	6	8	11 1	2
Akai M9	65	0	0	10 16	8
Ferrograph 722/4	68	16	9	11 6	8
Philips Pro 12	83	10	0	13 16	8
Revox 1122/24	78	15	0	13 2	6
				236	5 0

STEREO TAPE UNITS

	Deposit £	S.	Monthly £	Cash £	Price
	s. d.	s. d.	s. d.	s. d.	s. d.
Sanyo MR801	24	3	0	4 0	6
Sony TC252D	24	9	0	4 0	6
Sony TC355	34	2	6	5 10	0
Tandberg 1641-X	30	0	0	4 19	2
Akai 4000D	30	18	8	4 18	4
Tandberg 3000X	33	18	0	5 10	0
				99	18 0

CASSETTES

	Deposit £	S.	Monthly £	Cash £	Price
	s. d.	s. d.	s. d.	s. d.	s. d.
Sanyo M48M	7	5	0	1 3	4
Sanyo M410G	Mns/Bat.	11	5	0	117
Philips RR290	+ Radio	11	10	0	117
Sony TC100A	Mns/Bat.	14	9	3	2 6
Philips 2400	Mns/Bat+FM/AM	16	15	0	2 15
Philips 2400	Philips 2400	22	14	0	3 15
incl. L. Spkrs.	Philips 2400	28	14	0	4 15
Sony TC130 Stereo	Sony TC130 Stereo	37	10	0	6 5
				0	112
				10	10

BATTERY OPERATED

	Deposit £	S.	Monthly £	Cash £	Price
	s. d.	s. d.	s. d.	s. d.	s. d.
Philips RR290	11	10	0	1 17	6
Grundig C200	12	7	6	2	0 10
Philips RR482	18	4	0	3	0 8
Telefunken 302TS	22	15	0	3 15	10
Uher 4000L	48	10	0	8	1 8
Uher 4200/4400	62	10	0	10	7 11
					187
					50

INTEREST FREE H.P. TERMS

(EXCEPT SPECIAL OFFERS)
OPEN SATURDAY 6 p.m. FRIDAY 6.30 p.m.
THURSDAY 1 p.m. IF UNABLE TO CALL,
WRITE FOR BROCHURES, PART EXCHANGES,
18 & 24 MONTHLY TERMS

SPECIAL OFFER



SANYO MR-990 STEREO (illustrated)
 * 4-Track * 3 Speeds * Sound-on-Sound * Sound-with-Sound * 2 Detachable Speaker Boxes * Output 2 x 10 watts Music Power * Natural Wood Cabinet * Supplied complete with 2 Dynamic Microphones; 7in Demonstration Tape, leads, etc., Maker's 12 months guarantee and instructions * Automatic Shut-Off. List Price £132 50

OUR PRICE 95gns.

Deposit £33 15 0 12 Payments of £5 18 3. Total H.P. Price £104 14 0.

AKAI 171OL STEREO

3 Speeds, 4 Track, 2 Built-in speakers. Demonstration Tape. Black Leather with Carrying Handle.

BRAND NEW. MAKER'S 12 MONTHS GUARANTEE. Deposit £27 19 0 and 12 payments £4 18 7 H.P. Price £87 16. 79gns.

4 TRACK MONAURAL

	Fidelity Braemar	Fidelity Studio	Grundig TK149	Philips 4307	Philips 4308	Ferguson 3238	Ferguson 3249	Ferguson 3216	Tandberg 1541
	11 12	8	1 17	4	34	4	8	10	28
	12	10	3 1	8	55	18	10	0	0
	15	17	10	2 10	2	46	10	1	0
	16	15	3	2 13	1	48	11	1	0
	17	3	0	2 17	2	51	9	0	0
	20	12	0	3 5	0	59	12	0	0
	20	14	2	3 5	7	60	0	10	0
	22	9	0	3 3	8	62	9	0	0
	22	16	0	3 12	2	66	2	0	0

THE RECORDER CO.

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

why pay more?

upto
40%

All tapes supplied in factory sealed library boxes and fully guaranteed.
IMPORTANT
IF YOU SEE ANY OF THESE TAPES BEING ADVERTISED AT GREATER DISCOUNTS THAN OURS, PLEASE SEND FOR OUR SPECIAL 'LOWEST PRICES OF ALL' ORDER FORM. WE WILL SUPPLY YOU AT PRICES 5% LOWER THAN THOSE OF OUR COMPETITORS.



OFF BASF tapes

	Tick Quantity required	List Price	OUR PRICE	Double Play	List Price	OUR PRICE
STANDARD						
() 5" 600'	26/3	15/9	14/4	9/-		
() 5 1/4" 900'	34/5	20/6	26/1	16/-		
() 7" 1200'	39/7	25/6	39/3	26/-		
LONG PLAY						
() 3" 210'	11/4	7/6	56/5	37/3		
() 4" 450'	22/7	15/-	21/10	14/6		
() 5" 900'	34/3	22/6	34/1	22/3		
() 5 1/4" 1200'	39/5	26/-	56/3	37/-		
CASSETTES						
() C60	15/10	10/-	69/7	46/-		
() C90	21/4	13/9	P. & P. 2/6 per order. Mail Order only. Offer does not apply outside Gt. Britain.	86/7	57/6	
() C120	31/4	19/9				

BASF LH, Scotch & Philips Tapes also available. Request price list.

Please send me the tapes I have ordered above. PO/Cheque enclosed for £ s. d.

Name

Address



DEPT. TE12, 17 LEIGH PARK RD,
LEIGH-ON-SEA, ESSEX.

London Office: 01-226 7004 (24 hrs.)

Video Spray 90 cleans tape heads- in operation



A quick squirt of Video-spray 90 and your tape heads and gaps are rapidly cleaned. And you can use Video-spray 90 whilst the machine is in operation. It dissolves even hardened dirt by simultaneous physical and mechanical action

99.8% pure, Video-spray 90 can be used safely with any video or sound recording machine. The spray doesn't attack plastics, is electrically non-conductive and is not inflammable.

Supplied in 2.5 oz. and 6 oz. cans. Available through your Retailer or direct from:

Special Products Distributors Ltd.

81 Piccadilly, London, W1V OHL. Tel: 01-629 9556

With Philips you can afford to give the best.

The Philips N4307 4-track tape recorder costs only £49.10.0.

It has everything that the most discriminating user could wish for, mono recording and playback at $3\frac{3}{4}$ i.p.s., tone control, 4 tracks with facilities for mono playback off two parallel tracks, large elliptical speaker for superb reproduction, plus tape position indicator and recording level meter.

The recorder is a precision design and has a stylishly modern wooden-sided cabinet which gives it a beautifully sleek look. It comes complete with moving coil microphone, 7" reel L.P. tape, empty spool and direct recording/playback lead.

Philips make a whole range of top quality tape recorders. One is bound to make somebody very happy.

We want you to have the best.

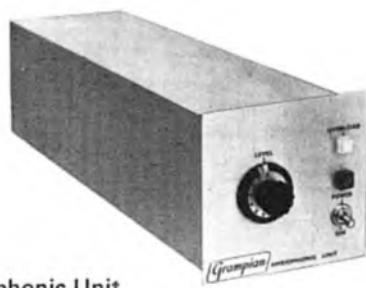


PHILIPS





Reverberation Unit Type 636



Ambiophonic Unit

Type 666

After the fun of the Audio Fair, whatever amplifier equipment you have chosen, you will no doubt be interested in the added advantages of incorporating Reverberation or Ambiophonic units. May we advise you on this?

We shall be pleased to supply further details on these two units, and indeed on any Audio equipments, including mixers, microphones and matching units etc.

AUD1/JACW/X/85.

Let GRAMPIAN know your requirements.



SOUND EQUIPMENT

GRAMPIAN REPRODUCERS LTD
HANWORTH TRADING ESTATE,
FELTHAM, MIDDLESEX.
TELEPHONE 01 894 9141.

F CAVE

TOP DISCOUNTS

5 BRIDGE STREET
RICHMOND
SURREY

Tel. 01-948 1441 up to 8pm

RECORD DEPARTMENT
CREDIT TERMS
DEMONSTRATIONS
SEND FOR LISTS TO DEPT. TRM 1

TAPE RECORDERS

	List Price	Cash Price
Revox 1122/1124	£236 5 0	£208 10 0
Revox 1202/1304	£204 15 0	£180 10 0
Revox 1322/1324	£236 5 0	£208 0 0
Revox 1222/1224	£246 15 0	£217 10 0
Ferrogaph 713	£188 10 0	£166 0 0
Ferro. 702/704	£207 7 0	£180 10 0
Ferro. 722/724	£242 10 9	£202 19 0
Akai 4000D	£89 19 1	£71 19 0
Akai 1710L	£89 0 0	£75 19 0
Akai 4000	£124 18 0	£102 19 0
Akai X5000L	£177 19 6	£156 13 0
Akai X5000W	£177 19 6	£156 13 0
Akai M10L	£245 1 0	£215 13 0
Tandberg 64X	£147 13 0	£121 4 0
Tand. 1221/1224	£154 0 0	£135 10 0
Philips 4302 Auto	£35 17 6	£30 16 0
Philips 4307	£49 10 0	£42 10 0
Philips 4404	£83 0 0	£71 5 0
Philips 2502 Auto		
Change Cassette	£49 10 0	£42 11 0
Philips 4404		
Including Speakers	£99 0 0	£87 0 0
Philips EL3302	£28 7 0	£21 10 0
Sanyo Cassette		£20 19 6
Telefunken M501	£43 11 6	£38 8 0
Telefunken M204TS	£124 19 0	£109 18 0
Grundig TK120	£39 5 0	£28 18 0
Grundig TK124	£44 18 0	£35 7 0
Grundig TK144	£49 19 0	£42 5 0
Grundig TK149	£57 12 8	£46 19 0
Grundig TK121	£54 15 7	£45 19 0
Grundig TK141	£59 4 8	£49 14 0
Grundig TK146	£68 2 10	£57 3 0
Truxox R4		£45 10 0
Teleton T710	£34 15 0	£30 10 0
Teleton 5L40	£37 10 0	£32 19 0
Teleton FXB510D	£62 0 0	£52 15 0
Crown CTR8750	£32 11 0	£24 19 0
Standard Cassette		£15 15 0

TANDBERG, UHER, VORTEXION, AIWA,
SANSUI, PIONEER.

Send for lists of special discount prices.

HEADSETS

Send for lists of special discount prices.

MICROPHONES

Send for lists of special discount prices.

List Price Cash Price

	List Price	Cash Price	BASF LOW NOISE HIGH OUTPUT TAPE	Cash
Akai DM13	£7 10 0	£6 11 0	5" 900' 37/9	3 or more
Akai ADM5	£4 15 0	£4 3 0	28/- 25/-	
Akai ADM10	£5 10 0	£4 16 0	5" 1800' 62/1	
Akai AFM4	£3 17 6	£3 8 0	46/- 40/-	
Tand. TM3 for 6X	£7 10 0	£6 11 0	5" 2400' 76/7	
Tandberg TM4	£12 10 0	£10 19 0	57/- 50/-	
Tandberg TM4 Hand Microphone	£7 10 0	£6 11 0	5" 1800' 61/9	
			46/- 41/-	
			5" 2400' 76/5	
			57/- 50/-	
			5" 3600' 95/1	
			70/- 63/-	
ARMSTRONG 521	£56 0 0	£48 10 0	EMI LOW NOISE ROUND PACK TAPE AT SPECIAL DISCOUNT PRICES	
Ferrogaph F307 Stereo Amplifier	£59 0 0	£46 19 0	7" 1200' 20/- 5" 1200' 23/-	7" 1800' 30/-
Leak 30 Stereo Amplifier (Chassis)	£53 0 0	£42 10 0	BASE MAGNETIC TAPE	
Leak 70 Stereo Amplifier (Chassis)	£63 0 0	£52 0 0	7" 1200' 39/7 29/- 27/-	
Lux SO 1220 Stereo Amplifier	£124 10 0	£89 13 0	5" 900' 34/3 25/- 23/-	
Lux SO 1777 Stereo Amplifier	£67 7 6	£52 10 0	5" 1200' 39/5 29/- 26/-	
Lux SO 505 Stereo Amplifier	£97 10 0	£69 12 0	7" 1800' 56/7 41/- 37/-	
Rotel 100 Stereo Amplifier	£45 10 0	£35 19 0	5" 1800' 56/5 41/- 37/-	
Quad 303 and 33 Stereo Amplifier	£98 0 0	£87 19 0	5" 2400' 69/5 51/- 46/-	
Rotel RH 711 Amplifier	£60 1 0	£50 1 0	5" 3600' 86/7 64/- 57/-	
Teleton SAQ 150E 12 Watt Stereo Amp.	£26 5 0	£19 19 0	BASF AND PHILIPS CASSETTES 6 or more	
Teleton GA101 Stereo Amplifier	£37 10 0	£23 19 0	C60 15/2 13/- 10/-	
			C90 20/6 18/- 14/-	
			C120 30/6 24/- 20/-	
SCOTCH DYNARANGE CASSETTES			10 or more	
Musicassettes and all brands of 8 track stereo cassettes at 15% discount.			C60 15/2 14/- 10/-	
ALL TAPE AND CASSETTE ORDERS 4/6 POSTAGE AND PACKING.			C90 20/6 18/- 14/-	
PACKING AND CARRIAGE AND INSURANCE EXTRA.			C120 30/6 25/- 20/-	
SEND STAMPS FOR LISTS OF SPECIAL DISCOUNT PRICES.				

We stock a very wide range of loudspeakers, including BOWERS & WILKINS, GOODMAN'S, LEAK, QUAD, ROGERS, LOWTHER, SANSUI, AR, TANDBERG, CELESTION, KEF, WHARFEDALE, RADON, TANNORY, PIONEER, JORDAN - WATTS, E.M.I., PHILIPS, KELETRON.

The 6000X.

Are you sure you can handle it?

The 6000X is no ordinary tape deck. If you buy it you get the kind of gadgets and devices you'd expect from a professional machine.

So you'd better read what it can do very carefully. Because you might be getting hold of something you can't handle.

Limiter permits up to 25 DB overload without distortion.

Switched pick-up inputs,

either magnetic or ceramic.

Instantaneous and silent stop/start.

Mixing possibilities in stereo with separate input controls.

4 input controls for mixing in mono.

AB-test. Din and phono sockets.

'Sound-on-Sound' copying from one track to the other.

Facilities for echo and

other special effect recording.

Cueing possibility on fast forward or rewind.

Remote control of start and stop.

Vertical and horizontal operation.

Automatic motor shut-off if tape breaks or ends.

And all that is really only the half of it. If you're still not sure send us the coupon.

TANDBERG

Built by experts for experts



To Farnell-Tandberg Limited, Farnell House, 81 Kirkstall Rd,
Leeds LS3 1HR.
Please send me full details of the Tandberg 6000X
Name _____
Address _____

UNIMIXER 4S

stereo/mono mixing unit

Meets professional specifications for frequency response (± 2.5 dB 20-20,000 Hz) noise (55 dB, S/N an input signal of 180 uV at 200 Ohms or 70 uV at 30 Ohms) and distortion (less than 0.05% at rated input). The input stages are suitable for ribbon, moving coil or capacitor microphones (1 stereo pair and 2 pan controlled mics). The output stages are suitable for feeding any tape-recorder or amplifier. Individual test certificate with every unit. Price £45 (ex-factory). (PP18 Power Pack now available, £8 15s).

John Borwick wrote in the April 1970 issue of THE GRAMOPHONE: "These are excellent results and were verified on all four inputs."

AUDIO RECORD REVIEW wrote in its report: "Our product reviewer Peter Cox has had this 4S mixer in regular use for the last couple of months and has admired its professional performance . . . warmly recommended."

Further details from:

SOUNDEX LTD.

18 Blenheim Road, London, W.4. 1ES
Tel: 01-995 1661

BASF TAPE

CHRISTMAS SPECIAL OFFER

*40% OFF LOW NOISE



COMPACT CASSETTES (Min order 10 cassettes)

BUY NOW AT THESE
LOWER THAN LOW PRICES
EXTRA 2/6 for P and P

	LIST	AVON	QTY
C.60	17/6	10/6	
C.90	25/-	15/-	
C.120	38/6	20/-	

L.H. TAPE - 1/3 OFF LIST PRICE Low noise, high output tape.

Spool Size	Tape Length	List Price	AVON PRICE	Quantity Req'd.
5"	900'	37/9	24/6	
5 3/4"	1200'	43/5	27/6	
7"	1800'	62/1	40/6	
5"	1200'	43/3	27/6	
5 3/4"	1800'	61/11	40/6	
7"	2400'	76/7	50/-	
5"	1800'	61/9	40/6	
5 3/4"	2400'	76/5	50/-	
7"	3600'	95/1	63/3	

Each complete with plastic swivel box

I enclose Cheque/P.O. value £ : : (inc 2/6 p & p) for the tapes ordered above. Please send

NAME

ADDRESS

AVON ENTERPRISES, Dept D1L, Fladbury, Pershore, Worcs.
WR10 2QQ

Two Heads are better than One...



...for a smooth, flat response

Philips LBB9050 has two heads. In one microphone. And a smooth, flat output characteristic covering the entire frequency range, 25 to 19000 Hz. LBB9050 has separate high and low frequency systems —two heads in one—and a crossover filter which cleverly combines their outputs. This dynamic cardioid microphone will give you a natural objective performance in any situation. Solo, group or orchestra. Beautifully styled—a joy to use, and it costs just £36.

There's a lot more to the LBB9050. Return the coupon and we'll send you the full details.



To: P & A Department, Pye Business Communications Limited
Orchard Road, Royston, Herts.

Please send me full details of the LBB9050 twin-head microphone.

Name _____

Address _____

rely on  BUSINESS COMMUNICATIONS

M-10 CARRIES STEREO QUALITY TO A NEW HIGH

AKAI's **M-10** is the magnificent one of stereo tape recording. Who says so? The **M-10** says it for itself. It has three motors for complete power performance. Then there's automatic reverse playback bringing you ultra-sound magnificence. AKAI's **M-10** contains a 40-watt solid state amplifier with two integrated circuits. There's three speed capstan drive at $1\frac{1}{8}$, $3\frac{3}{4}$ and $7\frac{1}{2}$ ips. And don't forget that sensing tape continuous automatic reverse. See what we mean? Every AKAI feature speaks of outstandingly high quality. The **M-10** is your "Magnificent one" in a million.



Prove it by the sound!
..... prove it with

AKAI®

Model M-10

Rank Aldis-Audio Products, Rank Audio Visual Ltd.: P.O. Box 70, Grest West Road, Brentford, Middlesex Tel: 01 568-9222



Telefunken M207 separates the men from the boys.

This is the tape recorder that rises to any occasion – and any company: the M207. A precision-engineered tape deck backed by a high-performance amplifier, playing through twin full-range speakers. The M207 is designed to look elegant, efficient, elite – and that's what it does for you, too. You must have discrimination to want an M207 – but you can't have to be rich to pay for it.

The Magnetophon 207 is a 4-track 3 speed stereo tape recorder with 2 detachable speakers that clip on to the recorder for easy carrying.

Ask your local audio dealer for more information on the Telefunken M207, or write direct to Telefunken at:
AEG House
Chichester Rents
Chancery Lane
London WC2A 1NH
01-242 9944



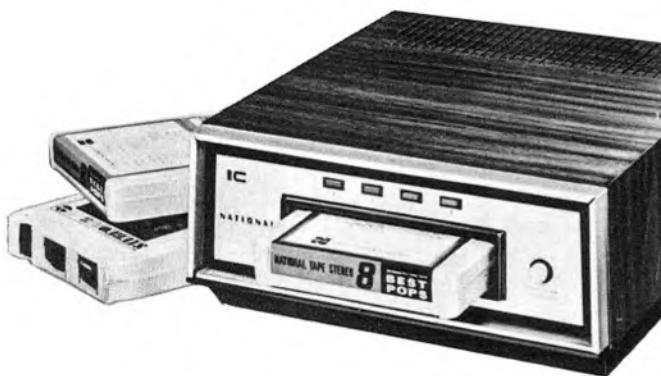
Finishing touch to your Hi-fi

Add National's new **8-track cartridge tape player** to your present stereo sound system. This advanced unit with integrated circuits is compact, neat and remarkably stable. Operation is simplicity itself – just insert the cartridge into the tape slot. Programme changing is also automatic, and there is a manual programme selection button, with an illuminated programme indicator.

Price £40

Abridged Specification – Model RS-802US

Track System	8-track, 2-channel
Tape Speed	3½ in/sec
Integrated Circuits	AN 126 (2)
Diodes	OA 81 (2), FR 2 P (1), DW-05-01 (1)
Frequency Range	50–10,000 Hz
Output	2-line, 50Ω 0.45V
Power Supply	AC 100/115/200/230/250V, 50–60 Hz
Power Consumption	20W approx.
Operation	Automatic
Cabinet Finish	Walnut
Dimensions	8½" w x 4½" h x 9¾" d (209 x 161 x 247 mm)
	Weight: 6 lb 10 oz (3 kg)



Full particulars and data will be sent gladly on request

NATIONAL PANASONIC



9 CONNAUGHT STREET
01-723 7443/4

LONDON W2

TAPE

RECORDING
MAGAZINE

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

Vol. 14 No. 12 December 1970

IN THIS ISSUE

Tape Trends and tape talk	352
Douglas Brown	
ONE MAN'S WORK FOR THE BLIND	353
Nature Notes	355
Richard Margoschis	
Cross Talk	357
WAIT FOR IT!	358
TRM Show Report	
Test Bench – UNIMIXER 4S	363
Musicassette Reviews	368
New Products	370
Advertisement Inquiry Service	373

Cover Photograph: Songwriting team Jackie Trent and Tony Hatch visited the Scotch magnetic tapes stand at the Audio Fair and tried to identify ten animal sounds in the popular competition which eventually attracted more than 1,400 entries. Many of the sounds they listened to had been taken from the Wildlife Sound Recording Contest, an event sponsored by the 3 M Company. They are seen here with another of the stand's attractions, 'Scotch' girl Lisa van der Plaats. For the record, they didn't make the top ten this time.

"TAPE Recording Magazine" is published on the third Wednesday in the month by Print and Press Services Ltd., from 16a Bevis Marks, London, E.C.3.

"TAPE Recording Magazine" is available from 7 Alverstone Avenue, East Barnet, Herts, by a postal subscription of 30/- per annum (USA and Australia \$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.

Back numbers, if still in print, are available, at 4s per copy.

Address all editorial and advertising communications to:
16a BEVIS MARKS, LONDON, E.C.3.

Address all circulation and subscription communications to:
**7 ALVERSTONE AVENUE,
EAST BARNET, HERTS.**

EDITORIAL

01-283 1724

Publisher,
R. DOUGLAS BROWN

Advertisement Manager, VIVIENNE GOODING

ADVERTISING

01-283 1622

Editor,
DENYS G. KILICK

Tape trends and tape talk

By Douglas Brown

BRITAIN made the headlines at the international tape recording meeting this year — staged in Geneva last month.

In the 19th International Tape Recording Contest (CIMES) the Grand Prix and the special prize for the tape most suitable for broadcasting were both won by Peter Bastin's five-minute production "Not a Word".

The first prize in the reportage class was won by "Sunderland hospital broadcasts", the documentary made by Ken McKenzie, which was earlier judged to be the "Tape of the Year" in the British Contest.

John Shuttleworth, of London, SE9, and Michael Bastin, of Worcester — son of the Grand Prix winner — were well placed in the Music Section and both took prizes.

As a result of this overall performance, Britain scored the highest average mark and won the cup for "the best national selection".

The full results are printed on this page.

* * *

AT THE ANNUAL Congress of the International Federation of Sound Hunters which preceded the Contest judging, the delegates did me the honour of electing me as their new President — the first time an English representative has held this office in the fourteen years' existence of the Federation.

* * *

THE DISCUSSIONS at Geneva led to a firm commitment to the idea that, from now on, we shall work to encourage not only "sound hunting", but video recording as well. Next year's CIMES will include a special section for video-tapes. The Dutch have already held a very successful national competition for video-tapes and their three top prize-winning entries were shown to the international jury, together with one from Switzerland.

CIMES has now established itself as the first international contest for sound-and-picture on magnetic tape and the twentieth year of its activity will certainly mark a dramatic extension and expansion of its activity.

The mood of Geneva was strongly that we are in a watershed in the development of amateur tape recording and FICS will provide a strong lead. I shall return to this theme on a later occasion. In this despatch which I am sending from Geneva I will restrict myself to the outstanding tapes of the 1970 Contest.

* * *

PETER BASTIN'S success was a well-deserved reward for sustained enthusiasm over the years. He has had several successes in the British Contest, but this was, I think, his first success in CIMES. Ironically, the tape that impressed the international jurors was unplaced in the British contest!

Its title — "Not a word" — is a clue to its success at Geneva. There were no language barriers. The explanatory text circulated to judges read: "This is the story of a man in a panic. Is he a fugitive? Has he committed a crime? His race through the streets and

through buildings leads him to . . . what?" Using organ and guitar notes, mixing and adding reverberation with great imagination, Peter Bastin produced a very dramatic programme.

The method of judging offered the possibility of a maximum of ten points each for idea, for production, and for technical quality. "Not a word" scored 23.25 points out of the possible 30.

Ken McKenzie's "Sunderland Hospital Broadcasts" scored the second highest mark in the contest — 22.59. John Shuttleworth's tape was placed 12th and Michael Bastin's tape 17th. There was a total of 56 entries from twelve countries.

John Bradley and Peggy Buchanan, who sat with me on the International Jury, had an impressive bundle of prizes to carry home to the British winners.

The decision on the tape suitable for broadcasting was made by those members of the CIMES jury who are employed at national radio organisations. Seven such organisations were represented this year — from Belgium, France, Italy, Norway, Holland, Germany & Switzerland.

* * *

CIMES PRIZE LIST

GRAND PRIX: Revox 1228 recorder — Peter Bastin, Great Britain, "Not a Word". This entry also won 1000 Swiss francs given by Swiss Radio for the tape most suitable for broadcasting, and the "Tape Recording Magazine" shield for the tape with the highest mark.

CATEGORY A (Reportage): B and O tuner, Jean Daudin, Switzerland, "In search of the Snife". — 2nd Two Beyer stereo microphones, P. Kaser, Switzerland, "Jester as the baker's man".

CATEGORY B (Reportage): Philips cup and N4500 recorder, Ken McKenzie, Great Britain, "Sunderland hospital broadcast", — 2nd AKG microphone, J. Haaustra, Holland, "The Laugh" — 3rd, BASF tapes, M. Lanfranchi, Switzerland, "Provencal music" — 4th, 2,500 Belgian francs, S. Joseph, France, "The blind".

CATEGORY C (Music): Crystal glass trophy, Hanna Nielsen, Denmark, "Handle with care — glass!" — 2nd, 1000 French francs, Mrs A. Sanders, United States, "Sound-on-sound recording", — 3rd, Two Studer loudspeakers, Oystein Sunde, Norway, "A tight squeeze" — 4th, 250 Swiss francs, G. Kremer, France, "Indian harp" — 5th, 250 Swiss francs, J. Shuttleworth, Great Britain, "The ash tip" — 6th, Cauny Watch, M. Bastin, Great Britain, "Silly Girl".

CATEGORY D (Sounds from nature): 250 Swiss francs and a rose bowl (given by the British Federation), B. Jensen, Denmark, "Hover-flies" — 2nd, 250 Swiss francs, O. Schoni, Switzerland, "Frogs".

SCHOOLS CATEGORY: 40 audio-visual albums, V. Lanfranchi, Switzerland, "History of a locomotive" — 2nd, SECI tapes, Liliane Bon, France, "Morocco".

SET SUBJECT: 5,000 Belgian francs — Tor Audresen, Norway, "The young today, the world of tomorrow". This tape also won the Valdemar Poulsen prize given by the Danish Sound Hunters.

MISCELLANEOUS: 5,000 Belgian francs — Simon Olaf, Germany, "The left room".

BEST NATIONAL SELECTION: Cup donated by Dutch Sound Hunters — Great Britain.

SPECIAL PRIZE: Nivada watch — G. Sciarrino, Italy, "For a Finnegan's wake".

ONE MAN'S

WORK FOR THE BLIND

IT IS A terrible thing for any human being to suffer the loss of his eyesight. Faced with the prospect of living out his life within a world devoid of light the blind person must develop great strength of will and character in order to overcome his disability to the point where he can take his rightful place as a useful member of society. One man who has spent a great deal of time, energy and money to assist those of his fellows who, like himself, have lost the gift of sight is Charles Cadwell of Farnborough, Hampshire.

Charles Cadwell has been a registered blind person for twenty-one years as the result of an injury sustained during the war. At first he bitterly resented his ill-luck; but then his strength of character asserted itself and he began to renew his interests in work and hobbies. Five years ago Charles was teaching himself German and he thought a tape recorder would be useful. He bought a Philips EL3549 about which, as he now admits with a smile, "he didn't have a clue."

It didn't take Charles Cadwell long to realise the very special potentials of the tape recorder when used by an unsighted person. Membership of Worldwide Tapetalk quickly followed and as a result he contacted Jim Barry of Altrincham who read specialist articles on tape. Charles found these readings to be of such enormous interest that he realised there should be scope for a special tape recording service for the blind dealing exclusively with material of this kind. With encouragement from Jim Barry he founded an organisation under that very title — Tape Recording Service for the Blind.

Their first step was to advertise for readers and also for blind persons who would benefit from the service they were about to offer. Neither was easy. Although many owners of recording



Charles Cadwell at home.

equipment gladly volunteered their services to read specialist articles it was quickly found that many were more enthusiastic than skilled. There is an art in reading before the microphone; a badly recorded tape is irritating to listen to and difficult to understand. Very tactfully the less competent volunteers had to be gently refused.

The blind do *not* need sympathy — what they do often require is a little understanding help. One serious problem that most blind people have to overcome relates to financial difficulty. The kind of work that can be done is all too often not very highly paid. Usually money is short. For this reason Charles decided at the outset that his service would be absolutely *free*. There are no charges of any kind whatsoever — the only obligation on the part of the member is for him to find his own tape recorder for the playback of the tapes that are circulated. Apart from this initial expenditure the Tape Recording Service for the Blind need cost him *nothing*.

What does the service do? It engages in two principal activities. The first is the circulation of readings taken from journals of interest to blind persons such as *New Beacon* published by The Royal National Institute for the Blind each month and *Viewpoint*, the quarterly publication of The National Federation for the Blind. In addition Charles edits his own magazine on tape under the title *Far and Wide* and this too is circulated amongst members. But that is only part of the service; equally important is the provision of recordings specially made to suit the personal requirements of individual members. These cover a wide range of topics from foreign language instruction to the reading of equipment manuals. Probably for the first time a blind person can ask for, and know he will get, a reading of the special material

that interests him personally.

We more fortunate persons who are sighted tend to take so much for granted. Buy a new tape recorder and the first thing one does is to read the instruction manual. But without sight what then? The need for the machine is probably even greater, but the ability to understand it and use it to its best advantage is seriously impaired. Tape Recording Service for the Blind helps to overcome this terrible handicap.

The regular compilation of his own magazine *Far and Wide* occupies a great deal of Charles Cadwell's time. With a duration of ninety minutes its "editorial" is made up of a wide selection of items of topical interest. These might include readings such as a piece on breaking in horses in New Zealand, a resume on the *Which* report on travel, cookery notes, matters of local history, reviews of tape recorders, notes on VHF aerials etc., etc. The whole is designed to form a balanced programme all of which is prepared and put together by Charles himself. Just six copies on the first issue of *Far and Wide* were circulated; in the month of October forty-two copies will have been heard in homes throughout the country.

One of the most serious problems facing the organisation lies in the fact that it has to incur expenditure without having any income out of which to pay. Consequently Tape Recording Service for the Blind has now been registered as a charity which means that it can legally appeal for and collect funds. Although there is no charge to the blind "subscribers" it is open to them to make a small voluntary donation. And with the help of their energetic young secretary, Mrs Maureen Baylis, a number of fund raising schemes are now under way. We would like especially to draw readers' attention to one of these.

At the present time all Charles Cadwell's recording work (his "studio" is a garden shed, by the way) is carried out on a new Ferrograph Series 7 machine which was presented to him by the R.N.I.B., and his original six-year-old Philips EL3549. All tape copying has to be laboriously carried out, one spool at a time, dubbing from the Ferrograph to the Philips. There is no reserve machine and although it has given trojan service in the past it obviously impossible for the Philips to continue working twenty-five hours a week indefinitely. Tape Recording Service for the Blind urgently requires another Ferrograph Series 7.

Maureen Baylis is therefore launching an appeal for approximately two hundred and fifty full books of Green Shield stamps. She has been in touch with the Green Shield Community Savings Scheme and they have not only given her idea their blessing but have themselves

Ferrograph in Polaris

The dependability of the Ferrograph Series 7 tape recorder is relied upon by the Royal Navy.

The photograph shows Ferrograph recorders at work in the Sonar Room aboard the Hunter



International Distributors

Leroya Industries Pty, 266 Hay Street,
Subiaco, Western Australia 6008, Australia;
MATELECTRIC, Boulevard Leopold II,
199, 1080 Brussels, Belgium;
H Roy Gray Ltd, 14 Laidlaw Boulevard,
Markham, Ontario, Canada;

Cineco, 72 Avenue des Champs Elysees,
Paris 8e, France;
Henry Wells & Co. KG,
1040 Wien 4, Danhausergasse 3, Austria;
Ferropilot GmbH & Co. KG,
Hamburg 39, Sierichstrasse 43,
West Germany;

Killer nuclear-powered Submarine H.M.S. 'Churchill'. The unique specification of Series 7 recorders also makes them the ideal choice for home or professional recording, where their versatility as well as their reliability give rein to imaginative applications.

Now Ferrograph has several new features to add to its already impressive list, plus the extra bonus of a three-year guarantee on all parts.

Ferrograph Series 7 tape recorders are British made, available in mono and stereo, with and without end amplifiers. All instruments are solid state, three speeds. All have two inputs per channel with independent mixing, independent tone controls on each channel, signal-level meters for each channel on playback and record, re-record on stereo models. The output is 10 watts per channel. The VU meter is now illuminated. There is a new record lock device. Ferrograph recorders are available in elegant hardwood or in vinyl-covered cases.

Follow the professionals, choose the recorder you know will serve you best at home or in your work: Ferrograph. Your local Ferrograph specialist will be pleased to demonstrate it to you. Alternatively, please write or ring for details and address of nearest stockist. The Ferrograph Co Ltd, The Hyde, Edgware Road, Colindale, London, NW9. Tel: 01-205 2241. Telex: 27774.

Ferrograph

* Now with 3-year guarantee
on all parts

Hi-Fi Installations, P.O. Box 2430,
276 Andries Street, Pretoria, South Africa;
Elpa Marketing Industries Inc, New Hyde
Park, New York 11040, New York, U.S.A.
There are Ferrograph Distributors also in
most other countries.
Please obtain details from the London office.

donated a quantity of stamps. This new Ferrograph is badly needed. When acquired it will ensure the continuity of this most important social work. Any reader who would like to contribute is earnestly requested to send either their spare Green Shield stamps or, better still, their full books of stamps to:

Mrs Maureen Baylis,
Hon. Secretary,
Tape Recording Service for the
Blind,
48 Lye Copse Avenue,
Hawley, Farnborough,
Hampshire.

They will be received with gratitude and you will have the certain knowledge that the value of your stamps is going towards something far more important than the odd household triviality that you had probably already decided to use them for.

After talking to Charles Cadwell and watching him at work in his tiny garden shed we are filled with admiration for his courage and initiative. This is the kind of endeavour that deserves support. It is appropriate that help should come from us as tape recording enthusiasts since tape is the medium that has proved itself to be of inestimable value to those who are deprived of the blessing of sight.

At the present time Charles Cadwell has a very full schedule of work together with a band of accomplished readers who are devoted to meeting his members' requirements. But there might well be an opportunity for one or two really good readers to help in the future. In particular it might be decided to distribute recordings of articles in this publication, *TAPE Recording Magazine*. Not only must a reader have a good voice and considerable practice in speaking before the microphone but he must also have time and patience and enough enthusiasm to understand that recorded material required by a certain date must be delivered on time. The organisation of this work is highly complex and there is no room for the dilettante who cannot be relied upon. So if any reader feels that he not only meets all these requirements but also will not take offence if his services should not be immediately required then he is invited to drop a line to Mrs Baylis at the address given above (please enclose a stamp for the reply!).

Of course there are other organisations catering to the special needs of the unsighted. But the success of Charles Cadwell's personal effort proves that he is catering to specific needs that previously had not been met. We who take our gift of sight for granted could spare a thought for him and his members, especially as we are approaching Christmas and the season of goodwill, by extending a little practical help in the simplest of ways. Please do what you can.

NATURE NOTES



FOR
DECEMBER
BY
RICHARD MARGOSCHIS

On numerous occasions I have said that one of the most important virtues of a successful natural history sound recordist is patience; I would even go so far as to say that it is the most important virtue. Without it the only thing to be gained in the field is what one might term the 'lucky strike' which strangely, I have noticed, is often something unusual, and therefore rewarding. Another useful inherent attribute is ingenuity; couple this with patience and you are well on the way to success with difficult subjects even before the recorder is switched on. However, when I start talking about sack bags, wooden boxes, thick blankets and even an electric blanket in connection with sound recording you will probably think that I am "off my rocker"; in fact, I am quite serious about all these things.

Ray Goodwin is one of those fellows whose livelihood depends on nature because he works on the land; he knows how nature can make or break one of his crops and the effect that this can have on his dairy herd. With his work Ray has coupled a very deep interest in nature and, having become an accomplished naturalist, has now added sound recording to his interests and the 'mixture' is paying dividends. In early September he was walking over the farm one evening when he noticed that the Dor Beetles were very active and decided to make an attempt at recording them. The insect, bright metallic blue in colour (though it can vary), has a humming flight in the dusk of evening; it burrows into the ground under cattle dung and there lays its eggs. Ray found a number of these beetles in the process of burrowing, and noted that they were making noises which he took to be conversation or contact calls. These were at a very low level of course and the inevitable traffic rumble made recording difficult. Back to the house he went to collect a box and as many sack bags and blankets as he could carry; the box was placed over the beetles, the microphone installed inside and the sacks and blankets piled on top. He tells me he secured a passable recording but I was not surprised when he said that his precautions had not

completely eliminated the traffic rumble; low frequency noise is very difficult to get rid of. This does show, however, what can be done when you are determined to make the best of things.

What about the electric blanket? Well, that is another story and one which Reg Genever thinks will take him a long time to live down! Reg is employed with the Forestry Commission and of recent years has made many natural history recordings for his employer's use. Insects which attack timber must, I am sure, play an important part in his work as a forester, and it is not unnatural that he should wish to record their sounds. On a recent tape which he sent to me I heard the sound of an Oak Leaf Miner, one-eighth of an inch long, burrowing through an oak leaf — what other leaf would an insect with such a name burrow in? The sound was at such a low level that in order to obtain the recording he had placed the leaf on the surface of the microphone.

In the case of wood boring insects Reg clamps the microphone to the log of wood and wraps it up in polythene sheet and blankets. On one occasion he had a quarter of an inch long grub of the Wood Wasp a quarter of an inch below the surface of a log, this he buried two feet deep in sandy soil and was thus successful in eliminating most of the noise from an aerodrome, but a bee working near to the 'burial site' can still be heard!

The activity of insects depends very greatly upon temperature; this is where the electric blanket comes in. Reg hit on the idea of wrapping his log in polythene and an electric blanket and piling on blankets and pillows; it worked. The insects became active and he got his recordings, but he had to switch his blanket off when actually recording in order to eliminate mains induced hum.

Another of his difficulties is in locating the precise position in the wood of his subject, and it frequently requires listening at several 'bugging' points before success is achieved. Several hours listening at each point is required because, even when warmed up, insects can be silent for long periods.

The Grundig TK147 is a hush-hush job

The TK 147, a four-track, fully automatic stereo machine, is one of Grundig's silent breed of tape recorders. The one sound we don't want you to hear out of the TK 147 is the TK 147. So we've designed it with that in mind. Because at Grundig we like to be at least several jumps ahead of the rest of the crowd. The TK 147 is built to an exclusive Grundig design with an elaborate electronic circuit that keeps noise to a minimum.

But that's just the start. This superior design also keeps the distortion level low and frequency response and dynamic range high, whatever the conditions, the composition or the volume of the recording.

And how d'you like the sound of that?

You can get superb stereo playback results by

connecting it to a Grundig Stereogram or external stereo power amplifier and loudspeaker.

Wherever you look, you'll find clear evidence of Grundig's superb craftsmanship and attention to detail which results in a sound quality that is unmistakably better.

Listen to the hush-hush TK 147 soon - it's something to make a noise about. TK 147 - £96.4.0.



GRUNDIG

Made Better to Sound Better

Grundig (Great Britain) Ltd., London, S.E.26.

I FIND BUYING clothes to be an exasperating, irritating and tiring business. Which are just some of my excuses for making such purchases at the longest possible intervals of time.

Faced with an ultimatum from the distaff side the household I was finally convinced that the acquisition of a new pair of trousers would be essential if charges of indecent exposure were to be avoided. So a pilgrimage to Places Where They Sell Trousers was duly undertaken.

And as often happens when I find myself in retail sales premises I was horrified at the arrogant manner in which so many assistants attempt to force totally unsuitable articles on the unsuspecting customer. Had I not exercised the strongest will-power and restraint I should have found myself the unfortunate owner of trousers that were too short, too long, too tight, too loose, in fact every sort of trouser other than that which matched my physique. The salesmen's reactions to my insistence on buying only what I wanted, not what they wished to sell, varied from pained incredulity to downright bad temper.

Unfortunately this arrogance (for that is what it is) on the part of sales staff is not confined to clothing shops; it has its parallel in the even more expensive and more dangerous field of audio. The consumer who fits on a pair of trousers should be able to both see and feel if the garment is to his liking. If it's not he should tell the assistant so in no uncertain terms. But when buying an audio product how is he to know if the article offered will really fulfil his needs? This is a much more tricky problem and it is likely that the customer will have to rely mainly on the integrity and sincerity of the salesman who is serving him.

Did you know that some kinds of shops operate under conditions of very strict control? Take the local chemist, for instance. When you take in a prescription you probably never doubt that the contents of the bottle subsequently handed to you are exactly and precisely what the doctor ordered. But the work of the chemist is under regular supervision from a team of inspectors who will tender prescriptions as though members of the public and then check on the mixture or tablets to make quite sure that the dispensing was absolutely accurate. As a result we very, very rarely hear of a chemist ever making a mistake.

What a pity audio retailers are not organised in such a way as to make them liable to a similar kind of investigation. I heard the other day from someone who had spent more than £300 on hi-fi equipment, only to find that the gramophone turntable was inoperative owing to the lack of a particular resistor. And the shop who had made the sale in

CROSS TALK

By Audios

the first place calmly told him that they did not stock components! In other words they were completely disinterested in their customer's satisfaction and regarded handling a sixpenny resistor as being beneath their dignity.

To combat this sort of thing I suggest adopting the "trouser" mentality. Just as you would never buy a pair of trousers without slipping them on you should insist that audio equipment must be delivered to the home, installed and not left until working properly. Only then when the "fit" has been approved should the purchase be finalised. Or if such an approach is quite impossible then transactions should be restricted to that select band of excellent retailers who are themselves dedicated enthusiasts and whose reputations are beyond reproach. These are the people it is really a joy to deal with — their interest is sincerely in your satisfaction rather than in the amount of their own sale. None of these very good people would leave you stranded for the sake of a piffling component; they are the people who would pass in the inspection routine with flying colours. Unfortunately there are not yet enough of them.

* * *

A LOVE of nature is one thing, a disturbed night's sleep is quite another. Not having the dedication to wild life of Richard Margoschis my feelings on being awoken at three o'clock in the morning by the persistent hooting of an owl would not bear publication. It just kept on and on right outside the bedroom window. Every thirty seconds or so this mournful cry jerked me back to consciousness. I would cheerfully have throttled the brute if I could have got my hands on him.

It took half an hour of this torture to make me realise that I ought to be doing something about it instead of just allowing myself to become increasingly irritated. So (with a few muttered curses) out came the portable tape recorder and microphone. Sure enough it worked.

From long experience I know that nothing will produce impenetrable silence on the part of a wild creature like the appearance of a microphone. It isn't even necessary for the microphone to be seen — the subject seems to have some uncanny means of knowing that he is being recorded whereupon he instantly shuts up.

And that is just what my owl did. But first I did get four beautifully clear calls without a

trace of unwanted traffic or aeroplane noise in the background, and that's quite an achievement in the middle of London. Then the benison of an owl-less silence and the prospect of a warm bed to return to. Needless to say it took at least two hours to get off to sleep again

* * *

WITH THIS ISSUE cover-dated December we have again come to the end of yet another year. Christmas will be with us before we can turn around and we shall soon have to remember to date letters and cheques 1971.

Tape recording will doubtless play its part in the many parties that will take place during the coming weeks. It might be that the tape recorder will provide continuous background music, or it could be used more creatively as a focal point for party games. Children particularly appreciate amusing games that involve the recording of the sounds of their own voices. Variations on the theme of "charades" are always popular.

A good one for older children is based on familiar historical events. Before the party a number of cards are prepared, each bearing brief details of an occurrence that the youngsters are likely to be familiar with. Examples are: Alfred and the cakes, Canute and the waves, Execution of Mary, Queen of Scots, etc, etc. The children are divided into two groups, girls on one side and boys on the other. The boys only are each given a card which they must read and keep without disclosing its contents to the others. One at a time each boy selects a girl partner, goes out of the room and records an imaginary conversation that they might have had if they had taken part in the event. When all the recordings have been made they are played back to all the children together when the game is to guess the identity of the events — with suitable prizes of course. Usually this produces a great deal of spontaneous fun and some surprisingly witty ideas about our great and glorious past. It's easy to work out other similar ideas, all of which will help your party to go with a swing.

* * *

TALKING OF CHRISTMAS don't forget recording equipment or accessories when making up your presents list. Spools of tape or cassettes are an obvious choice, but equally acceptable is the range of editing kits now readily available. Slightly higher priced, but why not think about a pair of stereo headphones? If you can't run to that then a head-cleaning outfit is quite a good idea. Microphones are tricky things to buy, but if the exact requirements are known a suitable microphone makes a most acceptable gift. One of the portable battery cassette machines is an obvious, if rather expensive, choice for a teenager, or at the other end of the scale an assortment of coloured chinagraph pencils will cost only a shilling or two. Pre-recorded music is always popular and remember that when buying cassettes or cartridges they will not, like a disc record, suffer damage from mishandling.

Present buying should be no problem where money is plentiful. The audio shops and hi-fi dealers have a wider range of equipment and accessories than ever before. And even when money is in short supply worthwhile gifts will still be found there. A soldering iron for the mechanically minded or a couple of made-up leads for the unhandy; a tape indexing system for the collector or a head defluxer for the purist. The choice at all price levels is quite bewildering.

WE FOUND THAT MOST OF THE MORE INTERESTING PRODUCTS AT OLYMPIA COULD NOT BE BOUGHT

WAIT FOR IT...!

SAID MANY AUDIO FAIR EXHIBITORS

OUR IMPRESSIONS of the 1970 International Audio and Music Fair could not be better expressed than in the phrase used by Bell & Howell on the front of their brochure describing the B & H Des 1700 Dolby B cassette machine. Wait for it, they say. So, too, said most of the exhibitors with interesting equipment on display. Never before have we come across so many firms with so much to say about so much equipment that could not really be claimed to exist at all. Wait for it! It's wonderful — but you can't buy it. Wait for it!

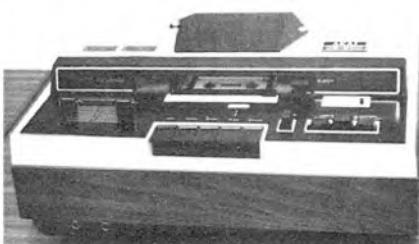
This general feeling of frustration is in no small part due to the emphasis on two recent developments: Dolby B and four-channel stereo. Many manufacturers were showing one or other, or even both. To our knowledge only one has any stock of machines for immediate sale, and with the inevitable demand they are likely to be sold very quickly.

Dolby B noise reduction is big news — exciting news. It really does work and it will revolutionise cassette recording and playback; it will also influence open spool work as well. But the bottleneck lies in the manufacture of the decks and electronics. Dolby Laboratories Inc. of London demand that any equipment incorporating their circuitry must come up to a very high overall specification. So high is this requirement that they have so far only granted a licence to one firm in Japan. Faced with world-wide interest their orders are hopelessly out-stripping their production capacity. Most British distributors have nothing more than samples for demonstration. All they can say to the consumer is — wait for it!

Bell & Howell have named the date when their Des 1700 will be available. They say February 1971 and they predict a cost in the region of £100. The machine is a "deck only" version requiring the use of existing amplifier and loudspeaker equipment, and it is a complete stereo record/playback mechanism. The specifications refer to wow and flutter of 0.15% weighted peak-to-peak and the



The image of audio 1970 as shown by BRC with their Ultra Model 6405 "Group Stereo". Will the record player soon be replaced by a Dolby B cassette machine?



The Akai cassette machine first seen at Sonex. It has an automatic turn-over feature together with outstanding specification at £111, or £156 complete with Dolby B.



With a claimed output of 240 Watts Music Power the Akai AA-850 FM/AM stereo tuner/amplifier costs £229 and incorporates many sophisticated features.

frequency response on standard tape is given as 20 to 15,000 Hz.

15,000 Hz at $1\frac{1}{2}$ ips on standard tape! It's almost unbelievable. We have seen a curve produced by a cassette machine with an almost flat response all the way up to 15,000 Hz, but that was only possible through the use of the new chromium dioxide tape (wait for it — not yet available!). In anticipation of the day when the new tape formula is used on cassette machines as a matter of course the Des 1700 incorporates a bias/equalisation switch so that the user has only to make a single adjustment when recording on the new medium.

Another firm vitally concerned with Dolby equipment and on whose activities we have reported at some length recently is Kellar Electronics. Originally their cassette machine was to be in production last month. Instead they now have delays due to the shortage of decks, but they do promise that the first models will be off the lines before the end of this year.

However Kellar are not sitting back and waiting. Instead they are devoting their energies to the production of "black boxes" or "noise reduction units" as they are now called. These are self-contained Dolby B noise reduction systems intended for use in conjunction with existing open spool recorders, and through their use the tape recorder owner will at once acquire all the benefits of lower noise levels at the most economic price. Prototypes of two models were on show, the KDB1, switchable from record to playback and designed to be used in conjunction with a tape recorder having a single combined record/playback head. Cost of this model will be approximately £45. The KDB2 has two completely separate record and playback channels so that when coupled to a three-head machine it will be possible to monitor the recording as it is being made. Retail price of this version will be about £75.

Both appliances give full two-channel operation for stereo and are complete with their own stabilised power supply,

WAIT FOR IT...!

OLYMPIA AUDIO FAIR CONTINUED

VU-type meters and the necessary controls for setting up. The nominal input is 100 mV into 100 kOhms and 0.2 mV into 600 Ohms. Output is 1 V into 10 kOhms.

As we forecast a couple of months ago Kellar are also going to produce a "deck only" version of their DTA 50 Dolby cassette machine. This latter, complete with a pair of high-grade audio amplifiers, is to cost about £150, but the price of the deck (identical in all respects apart from the omission of the output stages) comes down to £94 10s. This is obviously a better proposition for the enthusiast who already owns a quality hi-fi installation. The final message from Kellar is - wait for it!

Rank Wharfedale is not a name that one associates with tape recording equipment. But what do we find on their stand? A Dolby cassette machine, of course. Can you buy one? Most certainly not. Wait for it! The Wharfedale DC9 should be in the shops early next year and it will cost around £115 to £120. It compromises a complete stereo record/playback mechanism, but is a "deck only" requiring the use of external amplifier and loudspeaker equipment. Wow and flutter is quoted as 0.18% RMS and the frequency response, using ordinary tape, 40 to 12,000 Hz plus or minus 2 dB. In view of the Bell and Howell claim for their Des 1700 of up to 15,000 Hz without referring to any tolerances we queried this with Rank Wharfedale. They agree that their machine too will extend right up to 15,000 Hz, but at that point it will be outside the 2 dB variation limit of their published specification. So it looks as if performance at this level is going to be fairly standard in the future.

To get right away from both Dolby and waiting, EMI had a very special offer. You know their famous L4 battery portable recorder? It's been used by the BBC and other broadcasting authorities for many years. Production has now been discontinued and the remaining few are



Outstanding design from Armstrong with 525FM and 526 AM/FM tuner/amplifier. Claimed power output is 25 Watts per channel and prices are £41 17s 8d for FM only or £53 15s 3d for AM/FM.



Complete with a three-head system the Sony TC 366 at £110 claims to be a revolutionary tape deck. Its shape is certainly unusual! A four-channel version of this machine was used for Sony's quadraphonic demonstration.



Also from Sony, the TC 127 cassette record/playback deck costing £69 15s is said to be the ideal companion to a hi-fi stereo system. Frequency response is given as 30 to 12,000 Hz and wow and flutter 0.2%.

being sold off at the ridiculously low price of £59. This is a chance to acquire a thoroughly professional piece of equipment at less than half price - but, whatever you do, *don't wait!* There are very few left. If you're interested contact EMI Electronics Ltd, Hayes, Middlesex at once.

And talking of high-grade portables Uher have announced a new cassette machine that is claimed to parallel their 4000L open spool recorder, another machine that has been used by broadcasting authorities all over the world for many years. The new model does *not* replace the existing series of open spool machines, but will complement them.

Details are given in our New Products section this month, but when we asked to see one we were told - wait for it! Yes, the Uher cassette recorder only exists in prototype form at this stage. We have no doubt that it will arrive - one day. When it does it will be costly. Probably best part of £200. But it will be a really professional piece of equipment, the first in the Compact Cassette format.

Also new from Uher is the model 724 open spool stereo machine reported on in New Products.

An interesting product from Sanyo is the MR 805 stereo tape deck. This four-track mains machine operates at three speeds, gives full monitoring facilities whilst recording, provides for echo effects, sound on sound and sound with sound. It has a built-in tape cleaner, stereo headphone connection, automatic shut-off and a 4-digit tape counter. Price of the MR 805 will be £95.

Both Sony and Sansui were demonstrating four-channel stereo systems. Sony were using a special four-channel version of their new TC 366 recorder, called the TC 366/4, together with a four-channel pre-amplifier and a pair of main stereo amplifiers. Listening to the CBS four-channel pre-recorded tape being reproduced we had mixed

Please turn to Page 361

Akai 1710L Under £90

Here is the news! Akai now offer you a four-speed, four-track stereo recorder with noise 50 db below the signal and 4 watts per channel output for only £89*.

You expect to pay £110 for a machine of this specification and quality.

It's selling fast. See it at your dealer soon.



PERFORMANCE SPECIFICATIONS

TAPE SPEED:	1 $\frac{1}{2}$, 3 $\frac{1}{2}$ and 7 $\frac{1}{2}$ ips (15 ips optional)
WOW AND FLUTTER:	Less than 0.12% RMS
FREQUENCY RESPONSE:	40 to 18,000 cps at 7 $\frac{1}{2}$ 40 to 14,000 cps at 3 $\frac{1}{2}$
SIGNAL TO NOISE RATIO:	Better than 50 db

POWER OUTPUT:
EQUALISATION:

LEVEL INDICATOR:
RECORDING SYSTEM:

4 Watts per channel
Correct equalisation for playback of tapes recorded to the NARTB curve
VU meter 2
4 track stereo/monaural system

For further details write to



AUDIO PRODUCTS
Rank Audio Visual Ltd, P.O. Box 70
Gt. West Road, Brentford, Middlesex.
Telephone: 01-568 9222

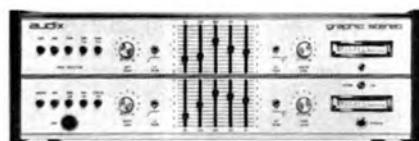
AKAI

Audio Fair from Page 359

feelings about it. Some of the musical excerpts were quite brilliant; others were, in our opinion, so gimmicky as to be stupid. The success of four-channel operation would seem to depend entirely on the quality of the pre-recorded material available. So far as Great Britain is concerned that is not a worry. There is none. If four-channel stereo ever establishes itself on these shores it will not be for a very long time to come, and the probable cost will be very high. Given the right repertoire, properly recorded, the system can offer an unique listening experience. The fact that it often doesn't is the fault of the recording companies.

perhaps we are wrong. Made by Francis Turner this working model is built to a scale of 1 inch to 1 foot and it took some 8000 hours to make. We can believe that. It is beautiful. Visitors could listen, in stereo, to a suitable musical accompaniment and free sample tapes were distributed.

The 3M Company were demonstrating their Compact Cassettes and open spool Dynarange tape. Another of their popular "guess the sounds" competitions had been organised, this time using animal noises. As 3M sponsor the Wildlife Sound Recording Contest it was a very appropriate arrangement; in fact a number of the sounds used were taken



"Graphic Stereo" from the pre-amp unit by Audix of Stansted, Essex, said to be made to professional specifications.

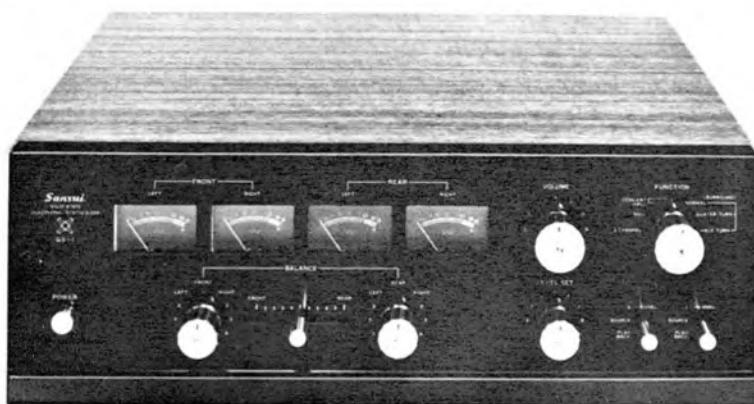
equipment.

Loudspeakers are still a problem, and to get good quality here one must be selective. We were very impressed, as usual, with the Bowers & Wilkins enclosures and we liked the sound made by some of the Wharfedale models. New on the scene are the Sonab omni-direction loudspeakers of rather unusual design, and a complete range of the J. B. Lansing enclosures from America were being shown by Feldon Recording Ltd of 126 Great Portland Street. Some of their designs are described as "provocative" and they represent yet another move into the more sophisticated design area.

This year the Fair included displays by musical instrument manufacturers, so there was a proliferation of organs, guitars and drum kits on show. Emphasis here was on those instruments most closely allied to audio, so many of them had their own amplifiers and speaker systems. We would have liked to have had time to discuss the question of "quality" versus "quantity" on some of these stands. The noise levels produced by some groups closely approach the threshold of pain. At that dynamic the quality is entirely swamped by the quantity. As is the audience. But so long as there is a demand for these excruciatingly powerful musical instrument amplifiers they will presumably continue to be made.

Back to audio we noted three new Rotel models, one amplifier and two tuner/amplifiers, together with an Akai cassette machine which is not yet generally available. More about this one when we have had the chance to look at it closely. Also new is the Rotel 1100 transcription gramophone unit which was being demonstrated with Empire cartridges using a number of Rotel amplifiers. All products worth keeping an eye on.

We were pleased to find Decca Records, Precision Tapes and Philips Records all represented at the Fair. Decca have firmly opted for Dolby B in their new range of Musicassettes, and we have reason to suppose that Precision will very shortly follow suit. A member of the staff of Dolby Laboratories was giving lectures in their auditorium, so one can draw one's own conclusions about that.



Flown specially from Japan, the Sansui Quadphonic Synthesizer.

Sansui used their QS-1 system, the "Quadphonic Synthesizer", and again the listener was completely at the mercy of the repertoire. When good it produced a positively uncanny sense of involvement with the music; when bad it was laughable. It is doubtful if any enthusiasts, or any equipment distributors either for that matter, will really take four-channel seriously. It is being demonstrated to prove that the individual firms concerned are well aware of the very latest developments and are hard at work on them. As consumers we can do little more than note the fact and then turn our attention to more productive fields.

Sansui's new SD-7000, a three-motor, four-head, two-channel stereo tape deck looks like being a very interesting product. It is hoped that we will have the opportunity of reviewing this machine in the very near future. It is claimed that it incorporates "many rare features" and includes "more tape protection devices than any comparably priced machine". We will take our usual coolly dispassionate look at the equipment when it arrives for review.

BASF had an eye-catching stand incorporating a hand-made model of a Victorian carousel. We always thought they were called "round-abouts", but

from the last contest. With a Bush TP70 cassette recorder being offered as a prize the interest was considerable. A selection of open spool machines were reproducing copies of a recording of a jazz recital given in a London public house.

EMI were giving the public the opportunity to judge the quality of the Emitape range of recording tapes by giving a series of demonstrations. Last year we credited EMI with the best cassette sound in the show, and although they had the various Dolby equipments to compete with this year they again succeeded in making an excellent impression on us.

With many, many demonstrations being given all over Olympia we again found it to be quite impossible to cover all the items. Like any other visitor we were bewildered with so much to listen to and so much to talk about. Generally the quality of sound being produced was up to the standard we have come to expect from this event. There is a definite trend towards lower cost equipment with a performance standard that would have warranted a much higher price ticket a few years ago. Both amplifiers and tuners of good quality are now available in the £30 to £50 price range, although in most cases they do not include some of the more sophisticated features of the dearer

Please turn to Page 369



Recording studios use it every day.

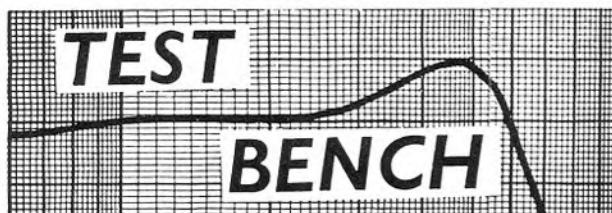
'Scotch' low noise 'Dynarange' Magnetic Tape is the choice of top recording studios such as CBS, Decca, De Lane Lea, Lansdowne and Pye. Both the tapes and cassettes are now available in smart

new plastic packaging.
Your dealer stocks the complete range.

Scotch Magnetic Tape

3M 'Scotch' and 'Dynarange' are trademarks

3M



UNIMIXER 4S

Illustrated on Page 371

INVESTIGATED BY D. KILICK
WITH HUGH FORD (of H. F. Engineering)

IN LAST MONTH'S "Tape Workshop" feature we discussed the basic principles of balancing and mixing so it is appropriate that our technical investigations should now deal with a British-made mixer, the Unimixer 4S by Soundex of London. Mixing equipment probably covers the widest price range of any audio accessories. One can pay a few shillings for a "passive" or "resistive" appliance that is very rudimentary, and at the other end of the scale we have the sophisticated mixing desks used in pop studios where the cost can run into many hundreds, or

even thousands, of pounds. The instrument we are now looking at represents a sensible compromise between these extremes, offering the ambitious amateur or even the smaller studio full stereo facilities at modest price from a compact and portable piece of equipment.

The Unimixer 4S is intended for use with up to four microphones. These may be either 25/60 Ohms or 150/600 Ohms, the correct impedance being selected by means of four slide switches, one for each input socket on the rear. For "low impedance" one uses the "30" setting of the switch, whilst for microphones of 150 to 600 Ohms impedance one only has to adjust to the "200" setting. This impedance choice is extremely useful indeed since it makes the appliance so much more versatile. Many modern microphones are now being sold in the 200 Ohms versions only, and these often have to be used in conjunction with existing 30 Ohms instruments. By the use of the impedance switches on the rear of the Unimixer this problem is immediately overcome in the simplest manner possible.

The microphone sockets themselves are of the tip, ring and sleeve GPO jack type, a very sensible connector that we strongly favour. This arrangement permits "balanced line" connections with the two internal conductors within the lead being taken to the tip and ring respectively and the screening to the shank of the plug. Working in this way very long cables can be used without the danger of picking up unwanted noise, but care must be taken to ensure correct "phasing". This only means that all the microphone connections **must** be made in precisely the same way, the usual formula being to connect the red conductor to the tip and the black to the ring. Providing this arrangement is strictly adhered to the question of phasing can be forgotten.

Each microphone input channel has its

own separate fader knob on the front panel. These controls are of reasonable size and they rotate around a numeric scale from 0 to 10. Inputs 1 and 2 are the main stereo pair, 1 being the left-hand channel and 2 the right-hand. On the face plate there is a bracketing line drawn between these two controls and in the centre beneath them is an additional knob marked "1 + 2". This fulfils the function of "stereo fade" and through its use both stereo channels may be faded up or down at will. It is, in fact, a ganged control.

Inputs 3 and 4 are not permanently connected to either stereo channel; instead each is provided with an additional separate control marked "Pan 3" and "Pan 4" with arrows indicating left and right as is appropriate for the direction of rotation, with zero in the centre. These are "pan" controls and they enable the user to position his additional microphones (injection microphones as they are called) anywhere within the stereo sound stage.

For instance, in the simplest arrangement using a main stereo pair with an extra microphone on each channel we could have Pan 3 turned fully left and Pan 4 fully right. This would give a result equivalent to that achieved by two completely separate mixers, one for each channel. Alteration to the pan controls will feed variable amounts of the signal from the injection microphones into the other stereo channel, thus altering the subjective impression of relative positions in space. This is standard professional practice, but it is not often found in amateur equipment. Through its provision the designers have enormously increased the versatility of the Unimixer and we will discuss its practical application later in this review.

Also on the front panel we have a very large Master Gain control that literally turns everything up or down, a pair of switches to give power On/Off and choice between stereo or mono modes and a small meter to indicate battery condition. The required batteries, by the way, are a pair of PP9s housed internally to give the required 18 Volts, but a connection facility is provided for the use of an external mains power pack if desired.

In addition to the four microphone sockets at the rear, together with their associated impedance switches, we have a pair of two-pin jack sockets giving output connections for left and right-hand channels, and these are duplicated with a five-pin DIN socket which can be used as an alternative. The whole is presented in a hammered metal case measuring approximately 12-inches long by 6-inches high by 6½-inches deep with a carrying handle on the top and a hinged support

MANUFACTURER'S SPECIFICATION

Unimixer 4S

Input Sensitivity: 30 microvolts 25/60 Ohms. 75 microvolts 150/600 Ohms.

Signal/Noise Ratio: for 55 dB measured on a 20,000 Hz band-width, 70 microvolts at 30 Ohms or 180 microvolts at 200 Ohms.

Distortion: At 40 dB above rated input less than 0.25% measured at 1,000 Hz.

Overload: Greater than 45 dB above rated input.

Frequency Response: ± 2.5 dB from 20 to 20,000 Hz (200 Ohms).

Output: For rated input; 250 mV Stereo, 125 mV Mono, 100 mV pan controls.

Output Impedance: 1,000 Ohms to feed a load of 10,000 Ohms or greater.

Output Overload: 4.7 V RMS (5% distortion).

Power Supply: 18 V D.C. at 25 mA.

Retail Price: £45 plus cartridge.

Manufacturers: Soundex Ltd, 18 Blenheim Road, London, W.4.

Distribution: Direct from manufacturers only.

in the base so that the control panel can be set at a convenient working angle. The overall impression of the appliance is of severe but thoroughly practical usefulness.

The laboratory check of a mixer follows very much the same lines as that given to the other audio appliances. We have to investigate frequency response, noise levels, distortion etc., bearing in mind that the function of the appliance should be to impose as little change as possible to the signals fed in, other than the fading and mixing for which it is intended. A poor mixer will add unwanted noise, restrict the frequency response, increase distortion.

There is a simple rule to follow. The quality of the mixer must match the quality of the recorder and microphones being used with it. For this reason our examination of the Unimixer was particularly stringent and uncompromising.

For frequency response we used a 50 Ohm generator, with a 150 Ohm resistance in series, connected in turn to each of the four microphone inputs switched to the 200 Ohm setting. Sweeping from 40 to 20,000 Hz. it was found that all inputs were within plus or minus 1 dB of flat and identical results were obtained when we repeated the operation at 30 Ohms. This is significantly better than specification, but we must mention that the individual test figures supplied with the review sample (every model sold has its own test chart supplied) differed slightly from our readings. Since these differences were of the order of fractions of a decibel we regard them as being of little consequence. Our first concern, that the mixer should not degrade the frequency response of either the microphones or the recorder, has been more than adequately met.

Next we come to distortion. The specification claims less than 0.25% at 40 dB above the rated input. We found that we could agree 0.25% at 30 dB above; when the signal was increased to 40 dB above the total harmonic distortion rose to 0.40% with low third but higher second harmonics. Looking at these figures realistically we can say that they are more academic than practical. When working at the rated input the distortion fell way below the measured wideband noise so there is not the slightest danger of this appliance adding significantly to the distortion content of any recording made with its use.

The weakest feature of low-cost mixers is usually found in the noise they add to a recording, so we examined the noise factor very carefully indeed. The specification quotes 55 dB referred to a 180 microvolt signal at 200 Ohms. We measured rather differently. With the equipment

switched to the stereo mode we fed signals into the 200 Ohm input sockets with a 200 Ohm screened dummy load in circuit and then related the noise levels to the rated output of 250 millivolts. In other words we were using maximum gain and so were operating under the worst possible noise conditions. To relate our figures back to the specification a factor of 10 dB can be added to our findings. The results, quoted both RMS and to the "A" weighting, were as follows:

Input 1 34 dB RMS 48 dB A scale.
Input 2 33 dB RMS 48 dB A scale.
Input 3 42 dB RMS 55.5 dB A scale.
Input 4 41 dB RMS 53.5 dB A scale

The two inputs 3 and 4 gave virtually identical results when the pan controls were turned to either left or right-hand channels.

There are two important points to bear in mind about these figures. First, as previously mentioned, they must be increased by 10 dB to relate to the specification. Second, they refer to the worst possible conditions of use. After many years of experience using mixing equipment in the field your reviewer can never recall having any of the individual gain controls set to maximum. Settings between 3 and 6 on the numeric scale are far more likely—sometimes one is working even lower. When used in this way (and we have never had to use a mixer in any other way) the noise figures quoted present no problem at all.

Unfortunately that is not quite the end of the matter. Such noise as is present is in the form of high frequency hiss. So high, in fact, that we decided to have another check on the frequency response taking the sweep on up into the inaudible regions that are rarely referred to in purely audio topics. There was method in our madness, but first consider what happens in the area where only passing bats could appreciate the sounds produced. Sweeping from 50,000 to 100,000 Hz. we had the following results:

50,000 Hz. + 1.5 dB.
60,000 Hz. + 3.0 dB.
70,000 Hz. + 5.0 dB.
80,000 Hz. + 7.5 dB.
90,000 Hz. + 11.0 dB.
100,000 Hz. + 15.5 dB.

Above 120,000 Hz. the response began to fall! Now this presents a rather tricky situation. No-one is going to suggest that any of these frequencies can be heard—they are quite useless and perform no function whatsoever. But they do present a danger—two dangers in fact. It is well known that a bias current is present at the record head, and this too is above the limits of human hearing. If we then feed to the head already carrying that bias frequency another very high but different

frequency the two are liable to "beat" together to produce a tone that is audible indeed. In addition there could be all manner of strange intermodulation effects.

We must therefore regard the presence of these very high frequencies as a fault and so we discussed the matter with the manufacturer. He understood the problem at once and explained that most of their production had incorporated additional components to restrict the bandwidth to more reasonable figures; we were unlucky and had received a sample that had not been so modified. However we have his assurance that all mixers offered for sale will be modified in such a way as to completely cure the trouble. We were very pleased with their immediate response to our comments and their attitude indicated that they are taking the quality of their product very seriously indeed.

To continue with the results of our investigation. We found that the input sensitivities agreed with the specification, requiring 30 microvolts at the 30/60 Ohm inputs to give the quoted output. The overload characteristic was also satisfactory, up to 8 millivolts being accepted at low impedance and up to 20 at 200 Ohms. Crosstalk between channels was also quite respectable with the following readings being taken:

At 25 Hz. channel separation was 44.5 dB.
At 1,000 Hz. channel separation was 50.0 dB.
At 10,000 Hz. channel separation was 33.0 dB.

The balance between channels was accurate, but only when the Master Gain was at its maximum setting. The errors at other positions were: at position 6 a difference of 0.25 dB, at position 3 the channels were balanced again, at position 2 there was 2.5 dB difference and at position 1 there was 10 dB difference. A similar state of affairs was found to exist at the 1 + 2 control. The non-linearity displayed at these points is caused through the functioning of the potentiometers which are exhibiting very common faults. The only way to eradicate them is to pay up to twenty times as much for the components and that is obviously not possible when the equipment is designed to be offered at a reasonable price—as is the case here. However when we discuss the use of the appliance we will suggest the adoption of a working routine that will completely overcome the imbalance found in the review sample. To be fair it must be added that other samples could display similar differences at other settings, although there is a possibility that such errors will be minimised if our suggestions are followed.

This concluded the technical section of

our investigation, and from our findings we formed the opinion that the Unimixer 4S is likely to be a highly practical and useful tool that will add to the interest and flexibility of any live recording work without having any harmful effect on the final audio quality. From here on we began to consider problems associated with practical use.

Whenever using any accessory appliance with a tape recorder one is faced with the question of matching sensitivities. In the instruction booklet with the mixer details are given of a simple attenuator circuit that would be useful if the line input of the machine should be unusually sensitive. If the recorder gain control is turned to an exceptionally low level and yet the signal from the mixer is still registering as unmanagably high, then the attenuator is recommended.

Which brings us to the next question : how does one line up the recorder with the mixer ? The gain control on the recorder is variable; there are variable controls on all the microphone channels; there are two overall gain controls on the mixer itself; the whole situation could be very confusing indeed. All these difficulties are overcome when a calibration tone facility is built into the mixing appliance. Then one merely presses a button, a tone at fixed level is generated at the output socket and the recorder gain is adjusted to give full modulation against it. Simple. We should have liked to see such a facility incorporated in the Unimixer, but the manufacturers pointed out that the increased cost would be likely to be relatively high. So it is probably better that each owner should establish the correct setting of the recorder gain himself by trial and error. Once found it could be permanently marked on the machine as it should not vary; all future recording would be taken by reference to it.

One is helped in mixing, balancing and lining up if the mixer also incorporates its own audio metering facility. Unfortunately the meter in the Unimixer does nothing more than indicate battery condition. This, too, is a question of cost. A good meter could cost around £8 and on top of that is the cost of the amplifier circuit required to drive it. Had the manufacturer adopted all our suggestions his selling price would probably be more than doubled. From the amateur point of view it is better to restrict the facilities and keep the cost down. The great thing is to make sure that the primary functions of the appliance are carried out at high efficiency and then, if no frills are included, we get very fine value for money. In our opinion the Unimixer 4S fulfils that requirement.

For monophonic operation the toggle switch on the front panel is thrown to its

Mono setting, the 1 + 2 control is turned to maximum (making inputs 1 and 2 fully operational through the whole of their capacity), the pan controls are adjusted centrally (giving a straight-through feed from inputs 3 and 4) and the entire set-up is then being controlled through the individual faders on each of the four microphone inputs with overall control via the Master Gain.

Here we would differ from the recommendation of the instruction booklet. The manufacturer's suggestion is that the recorder level should be set so as to give full modulation with the Master Gain at approximately its mid-point setting, around 4 to 6 on the scale. From long experience in the field we have found it to be much more practical to work with a maximum setting on a Master Gain control—provided, of course, the recorder is not overloaded. The reason is simple. When working to maximum one is working to a fixed position with the control against its end stop. One doesn't have to remember an intermediate setting, which, in any case, is not likely to be one hundred per cent accurate every time it is selected.

We, then, would line up the equipment in the following way. Turn all mike input channels to zero. Turn Master Gain to maximum. Connect to recorder with recorder gain at zero. Bring up one input channel with a good sound intensity at the microphone to about setting No. 3. Bring up the recorder gain and note at what position the level indicator is showing full modulation. Adjust the two controls together until satisfactory levels are obtained by increasing the microphone gain or vice versa. Bring in the other microphone inputs and watch for peaks, adjusting the recorder gain to cope with them. In this way one is lining up the mixer with its Master Gain at a fixed, easily found setting—maximum. When ready to fade in all four inputs at once the operator can concentrate visually on the level indicator in his machine instead of groping for an unmarked, intermediate setting on the mixer. It makes life very much easier, and, in the case of the review sample, it would also overcome the errors noted in the operation of this particular control, although this would only apply, of course, when working in the stereo mode.

For stereo operation the same principle is followed, but this time the ideal is to use both the 1 + 2 control and the Master Gain at maximum. This method does not agree with the printed recommendations but it eliminates two variables, and the fewer variables we have to worry about when working under tense conditions of mental strain the better.

Tense conditions ? Anyone who does

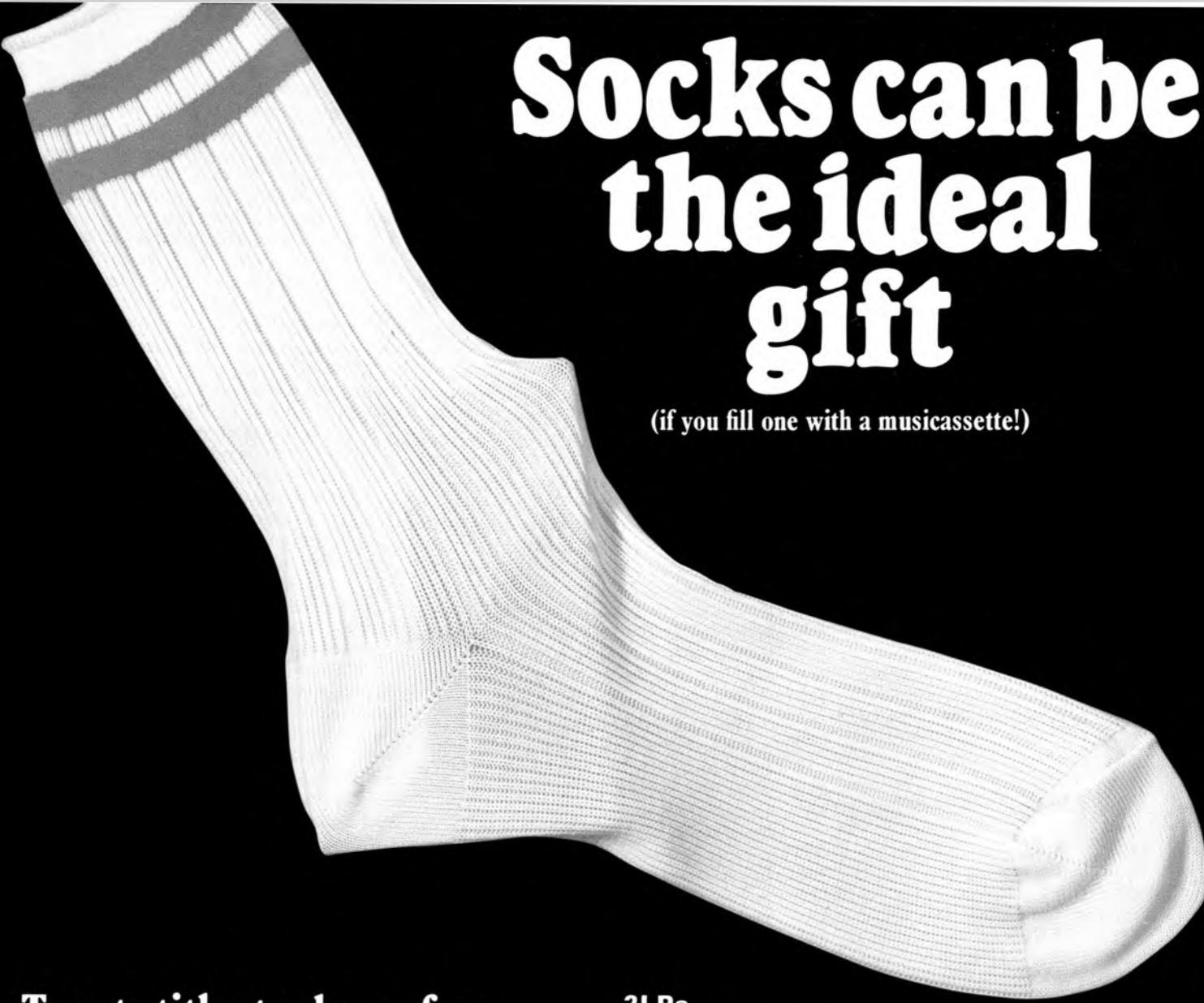
not believe they exist in the recording world has never undertaken a recording of a live public performance. This is the condition under which most amateurs have to work. The choir (or whatever the sound source might happen to be) does not perform specially for the recordist. There is an audience present, before which they will perform just once. There are no second chances. One either succeeds or fails. Often there is little opportunity even to set levels properly. Success comes when variables are eliminated!

When working stereo we have the chance to make use of the very interesting pan controls. As mentioned these cross-mix inputs 3 and 4 into either the right-hand or left-hand stereo channels with a central position that "splits" the signal equally between the two. It now becomes possible to finely adjust the position of, say, a solo instrumentalist to get him into the correct perspective across the sound stage. Another even more fascinating use of this facility is in the recording of dramatic works. By merely turning a knob one can actually create the realistic impression of movement without any actual movement taking place at all. Properly used such a facility is a great aid to dramatic effects — overdone or utilised clumsily the result would be so silly as to be laughable. Like any creative work it must be carried out with discrimination and feeling.

We are sorry to have to stop talking about the Unimixer 4S—it has so very many possibilities. Its use can be strongly recommended in conjunction with all good class tape recording equipment (Ferrograph, Vortexion, Revox, Tandberg, B & O, Akai, Sony, etc., etc.) when it will bring to the amateur many of the facilities previously enjoyed only by the professional. And even the pro. could find it to be a most useful additional appliance.

The manufacturers have asked us to mention that they are only too pleased to modify to suit customers' individual requirements, so if you have a problem that is not met by their standard specification it is only necessary to enquire if they can help. Every unit has a twelve-month guarantee against defective components or workmanship together with the offer of further advice in the use of the appliance if required. As we happen to know that the makers are highly practical recording people themselves the enquirer is likely to get some very sensible answers to his questions.

We make no excuse for summarising the Unimixer 4S by using the time-honoured phrase "it fulfils a long-felt need". It does just that at a cost that can only be regarded as surprisingly low in view of the instrument's high performance standard.



Socks can be the ideal gift

(if you fill one with a musicassette!)

Twenty titles to choose from

LPs

Family Entertainment Family CRP377

The Great Chaquito Revolution

Chaquito 7109005

The Wonderful Musical World of

Ron Goodwin Band of H. M. Life Guards 7108011

Lie Back and Enjoy it - Juicy Lucy 7138014

Richard Barnes 7108012

Moog Plays the Beatles Marty Gold 7138151

Summer Samba Walter Wanderley 7141003

Louis Armstrong & Friends 7144022

Our World - Blue Mink 7108014

2LPs

Relax With Various Artists 7553009

Country & Western Winners Vol. II

Various Artists 7553010

Famous Viennese Waltzes with

Robert Stoltz 7554004

Strict Tempo Dancing

Ray McVay/Arthur Frewin Orchestras 7564004

The Story of Rock Various Artists 7553011

King of Swing - Benny Goodman 7554015

Tropical Dance Party Various Artists 7552015

Operette Highlights Various Artists 7554006

Beethoven Symphonies Nos. 6 & 8

CGO/Eugen Jochum 7505013

Jazz With Various Artists. 7560002

Make this a sound of the seventies Christmas-
with musicassettes from Philips



Recommended Retail Prices:
LP Musicassettes 47/6 & 49/11

2LP Musicassettes 71/6 & 74/6



PHILIPS

P.S. Tick your choice. Then leave this advertisement lying around where Santa Clause is most likely to see it.

The Sansui Anticipators

In the Sansui lexicon, to merely be contemporary is to be obsolete. It's a condition we simply can't live with if we're to maintain our world-famed reputation as the anticipators of new ideas in stereo.

Ideas like the 200 watt EIGHT AM/FM Stereo Tuner Amplifier and the 3-motor 4-head SD-7000 stereo tape deck. Components for those who can't wait for tomorrow. From the company which specializes in tomorrow.

Take the EIGHT, a receiver so advanced it's quite on a par with the most sophisticated control amplifier. Which in fact is equipped with a Triple Tone Control circuit, a virtue usually associated only with such amplifiers. Which has a wide 10 to 40,000Hz power bandwidth, a 10 to 40,000Hz frequency response range in its separately usable preamplifier section, which handles up to three sets of speaker systems and two taping units and which makes distortion a word without meaning.

Or take the SD-7000, more than a match for any comparably priced tape deck you can name. Equipped with an advanced relay/solenoid controlled tape transport section, it anticipates every

feature you've ever hoped for in a 4-track 2-channel deck.

Such as Automatic Rewind and Repeat in addition to Automatic Reverse. Such as an impressive array of tape protection devices. And tonal quality you have to hear to appreciate.

If contemporary stereo interests you, almost any stereo maker can help. But only your authorized Sansui dealer can show you the components you see here.



Sansui



England: VERNITRON (UK) LTD. Bursledon Road, Southampton SO9 5QF **Tel:** Southampton 45166 / **Ireland:** RADIO CENTRE 122A, St. Stephen's Green, Dublin 2 / **West Germany:** COMPO HI-FI G.M.B.H. 6 Frankfurt am Main, Reuterweg 65 / **Switzerland & Liechtenstein:** EGLI, FISCHER & CO. LTD. ZURICH 8022 Zurich, Gotthardstr. 6, Claridenhof / **France:** HENRI COTTE & CIE 77, Rue J.-R. Thorelle, 77, 92-Bourg-la-Reine / **Luxembourg:** LUX Hi-Fi 3, rue Glesener, Luxembourg / **Austria:** THE VIENNA HIGH FIDELITY & STEREO CO. A 1070 Wien 7, Burggasse 114 / **Belgium:** MATELECTRIC S.P.R.L. Boulevard Léopold II, 199, 1080 Brussels / **Netherlands:** TEMPOFOON N.V. Tilburg, Kapitein Hatterasstraat 8, Postbus 540 / **Greece:** ELINA LTD. 59 & 59A Tritis Septemvriou Street, Athens 103 / **Italy:** GILBERTO GAUDI s.a.s. Piazza Mirabello 1, 20121 Milano / **South Africa:** GLENS (PTY) LTD. P.O. Box 6406 Johannesburg / **Cyprus:** ELECTROACOUSTIC SUPPLY CO., LTD., P.O. Box 625, Limassol / **Portugal:** CENTELEC Avenida Fontes Pereira de Melo, 47, 4d., Lisboa-1 / **SANSUI ELECTRIC CO., LTD.** FRANKFURT OFFICE 6 Frankfurt am Main, Reuterweg 93, West Germany / **SANSUI ELECTRIC CO., LTD.** 14-1, 2-chome, Izumi, Suginami-ku, Tokyo, Japan

Music

Music cassette Reviews

Consultant Critic Katinka Seiner

MOZART. Violin Concertos K207, K211, K216 and K218 Arthur Grumiaux with the London Symphony Orchestra conducted by Colin Davis. Philips Double L.P. 7505 003 74s 6d including purchase tax.

Whether or not any individual will like this cassette is going to depend on their attitude to classical music. If, like me, you are one of those persons who must really *listen* then four concerti (or concertos) on a single album is likely to be more than can be stomached. On the other hand if you can accept repertoire of this kind as a pleasant background sound then you will probably feel that this collection has much to commend it. The background noise is low; very low. In fact I cannot help wondering if there is not a lack of top tending to destroy the reality of subtle string tones. If there is then it can be at least partially corrected by the application of a little top boost. Had the background noise been high then such tonal correction would have made the whole unacceptable; as it is the cassette will definitely stand such drastic treatment.

Translating the index numbers quoted above (and also given on the spine and the front cover of the sleeve) our repertoire comprises: *Violin Concerto in B flat major, K207*, *Violin Concerto D major K218*, *Violin Concerto in D major K211* and *Violin Concerto in G major K216*. A plethora of violin concerti. No concert programme would ever be arranged in such a way, but if the listener cannot take the whole in a single dose then there is no reason why each could not be heard separately, or at least one side at a time.

Arthur Grumiaux gives us a performance that is note-perfect. Unfortunately it tends to lack the personal touch. Personal involvement is not to be found in his interpretation which, in spite of its perfection, seems to me to lack the fire of inspiration. The overall sound is pleasant enough with the soloist well in the foreground and yet instead of warmth one gets the impression of a colder precision. There is just the same feeling about Colin Davis' handling of the London Symphony Orchestra. This is not great conducting, rather competent.

All five of Mozart's violin concertos are very popular; the only one missing here is the *A major, K219*. Most readers will recognise the melodies of those that are included in the album.

Thinking once again of the perfection of phrasing in works such as this I am reminded of my recent visit to the Queen Elizabeth Hall to hear the Istomin-Stern-Rose Trio performing Beethoven trios. The difference between what I heard there and what we have on this cassette is unbelievable. Music is in part a combination of "technique" and phrasing. Listening to the live musicians was an emotional experience within which I had the sensation of understanding the composer's original intention and design. By contrast the Mozart, although technically brilliant, gave me no insight as to the real meaning of the music. Here intellect overawes artistry.

However, no-one would deny that this is a first-class recording of some of the most popular violin concertos and as such could be a valuable addition to any library of recorded music.

THE BRASS ARE COMIN'. Herb Alpert and The Tijuana Brass. A & M 7420 001 Double L.P. 71s 6d including purchase tax.

Here we go with another of those marathon "double l.p.'s" that give us the equivalent of two complete long play albums within a single cassette at a price that represents a considerable saving on the cost of separate collections. As with other albums of this kind "The Brass Are Comin'" has an outstandingly good quality that must owe something to the fact that the thinner tape used conforms more accurately to the configuration of the playback head. Better wrap-round means better sound, and that is what we have got here.

Twelve titles a side this album gives us, and for those who can stand the pace here they all are: *The brass are comin', Good morning Mr. Sunshine, Country lake, Moon river, I'll be back, The Maltese melody, Sunny, I'm an old cowhand (From the Rio Grande), Anna, Robbers and cops, Moments, You are my life, South of the border (Down Mexico Way), The girl from Ipanema, Hello Dolly, I've grown accustomed to her face, Up Cherry Street, Mexican shuffle, El presidente, All my loving, Angelito, Salud amor y dinero, Numero cinco and Adios mi corazon.*

The sleeve note writer says the Tijuana Brass will continue - he hopes - ad infinitum. In this double l.p. his hopes are very nearly fulfilled. It seems to go on - and on - and on. But it's all very much worth listening to. Well recorded and well performed the whole thing has a swing and a jollity that makes it very suitable for motor-car use. It would certainly help the miles to roll away. A thoroughly good buy.

ANYTHING GOES. Harpers Bizarre. Warner Bros. CWP 554. 47s 6d including purchase tax.

Anything goes? You're telling me! At least it does here. There never was a truer word spoken.

The most pretentious and interesting part of this album is to be found in the sleeve notes. Full of "sales jingles" they only impressed me negatively. Which is better than nothing.

It is, of course, a relief to know that producer Lenny Waronker has a 14-inch hand-carved nude on his desk top. But it hardly makes me want to rush out and buy his latest offering. As for the philosophy of the album - which is admitted to be nothing more than a dilemma - it is about as valid as the nude. High-sounding words are all very well - but what about the poor listener?

He gets just what the notes tell him to

expect: "all nice words but making no nice sentence". Does that make sense to you? If it does then so might the album. As for me, I would beg to contract out of this confusion of thought.

The items that Harpers Bizarre claim to "reveal" include: *This is only the beginning, Anything goes, Two babes in the wood* (best of the bunch but the acknowledgement should go to the arrangers) *The biggest night in her life, Pocket full of miracles, Snow, Chattanooga choo choo* (where has all the philosophy gone?) *Hey you in the crowd, Louisiana man, Milord* (a travesty - have they never heard Piaf's superb rendering of the same item?) *Virginia City, Jessie, You need a change and High coin.*

For me a disappointing collection. These boys have tried to be different. They have tried to take a new look at old problems. Their answers turn out to be as dated as the questions themselves. Their parodies do not come off. Recorded quality is slightly on the muddy side, too. So unless you feel your life to be incomplete without the bizarre I cannot recommend this collection.

BALLAD OF THE EASY RIDER. The Byrds. CBS 40-63795 47s 6d including purchase tax.

The Byrds are a pleasant-sounding group and in this collection they give us an assortment of pleasant-sounding numbers. Yes, you guessed it. What is really lacking is character. The whole tends to be rather colourless for my taste.

Arrangements and performance are both careful to avoid offence and in so doing they stand in danger of avoiding giving really deep pleasure either. Like so much music of this kind it is heard and then promptly forgotten; as item follows item each rubs its predecessor from the mind leaving at the end a feeling of having missed something instead of having enjoyed an experience.

The course followed by the Easy Rider is: *Ballad of the easy rider, Gunga Din, Deportees, Armstrong, Aldrin and Collins, Jack Tarr the sailor, Jesus is just all right, It's all over Baby blue, There must be someone, Oil in my lamp and Tulsa Country blue.*

Perhaps part of my own dissatisfaction with the album lies in the deliberately affected lethargy of the group - a mournful laziness that does not inspire. So I feel lazy too. So do we all. But most of us have to keep it to ourselves. There's a little more lively fun in the simulated blast-off of *Armstrong, Aldrin and Collins*, but as soon as the vocal starts they are subjected to the same melancholic treatment. Were The Byrds in charge of the space-ship it would certainly never get itself lifted off the ground.

Too much of this and we shall all be in tears. Or is that the object of the exercise?

Four-channel stereo from a disc gramophone record was featured in the Denham & Morley (Overseas) Ltd room. This involved a patented method of recording the *four* tracks of information within the *single* groove of a disc and has been evolved by the engineers of the Victor Company of Japan (first reported in our New Products last month). The same firm was also reproducing four-channel via a JVC four-channel tape deck using GBIE spherical loudspeaker enclosures. When we called here we found the repertoire to be in the best taste and the sound quality from the distinctively shaped enclosures (omni-directional) perfectly suited the environment. Consequently we felt that this was the best four-channel we had heard at Olympia.

A new name to the audio industry, although very well-known to photographers, Arrowtabs Ltd, were showing – and playing – a "budget" range of Musicassettes and Stereo-8 cartridges. Costing some 30% less than the usual prices, 29s 10d for a cassette and 35s for a cartridge, the repertoire is based on popular melodic works that will appeal to a great many music lovers. It is hoped that we shall be able to include Arrowtab products in our music review section very soon when we shall be pleased to comment frankly on their musical and audio merit. From what we were able to hear at the show they appeared to compare very favourably with their full-priced competitors.

We must give B & O full marks for the way in which they organised and controlled their demonstrations. With admission strictly by ticket, all numbered to correspond with the seating arrangements, their studio always had audiences of just the right size and attention was not distracted by people coming and going. B & O also projected slides of the equipment being used so that everyone could clearly see all the details, an excellent idea. Only criticism here – we should have liked to find rather more delicacy and musicality within their choice of repertoire. A very sincere effort, nevertheless.

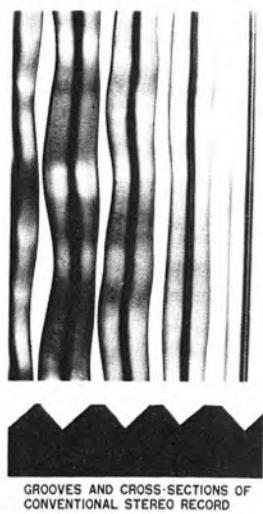
Koss headsets attracted an enormous amount of attention with special interest being shown in the new PRO-4AA. This model has an advanced dynamic insert to give a performance that falls short only of the superb quality obtainable on their costly electrostatic 'phones.

Celestion have a remarkable loudspeaker enclosure in their Model 120. This tiny bookshelf system is a scaled down version of the Ditton 15 and it proved itself capable of reproducing sounds to a standard that is quite out of proportion to either its price (£48 the

A close-up the grooves of a gramophone record showing the difference between ordinary stereo and the new system evolved by the Victor Company of Japan and shown at Olympia by Denham & Morely (Overseas) Ltd. Said to be "fully compatible" with conventional players, these records enable the single stylus to transmit four separate channels of information to give four-channel stereo.

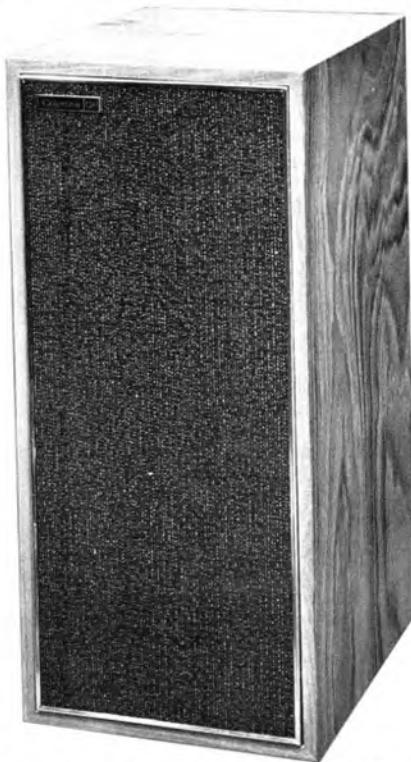


GROOVES AND CROSS-SECTIONS OF CD-4 SYSTEM RECORD



GROOVES AND CROSS-SECTIONS OF CONVENTIONAL STEREO RECORD

matched pair) or its size, we listened to a carefully selected and well-balanced repertoire. Definitely a loudspeaker system to consider very seriously.



New from Celestion, the Model 120 bookshelf loudspeaker enclosure

A welcome return to audio can be reported from the giant Sharp Corporation of Japan. With a completely new range of equipment that will soon be in the shops for the first time this company now boasts products that will compete in price and quality, not to mention appearance.

Fidelity without high prices is claimed for the BSR range of turntables. The new models based on the MP60 single play turntable (complete with anti-skate device, counter balance weight, viscous

cueing etc) were playing continuously via Koss PRO-44A headsets giving the public a startling demonstration of the high standard of audio that can be enjoyed without necessarily breaking the bank.

More four-channel from Tandberg, together with displays and demonstrations of complete systems from this famous Norwegian manufacturer. The Farnell-Tandberg cine system reported by us last month drew a great deal of comment and interest as it well deserves to do.

Top-of-the-list hi-fi equipment was featured by Grundig – all their products within this range are for the discerning listener who is prepared to pay that little more for the benefits of smoother, cleaner sound with an array of facilities that must put the equipment into the luxury class. But, unlike some firms, Grundig have achieved luxury in performance too. Their "professional" open spool 3-head battery portable is a machine we are looking forward to handling in the near future. We shall be pleased to comment on it in detail as soon as possible.

BRC were showing off their latest open spool and cassette recorders. When asked about the prospects of a Dolby B machine an official spokesman said, "Wait for it!"

At the 1970 Audio and Music Fair there was a feeling that everything is poised and ready to go. But it's not quite moving yet. So much is happening in the audio world, but for most of it we have to wait. The real excitement will be in next year's shows when the waiting will be over and we shall see just what has evolved. Our forecast is that most of the promises will have been fulfilled within six months and that by March 1971 the whole tape recording industry will be working furiously to catch up with demand. All that we have yet seen is nothing more than an appetizer for what is to come.

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

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,
 16a Bevis Marks, London, E.C.3.

Name.....

Address.....

THE NORTH

BIRMINGHAM TAPE RECORDER CENTRE

Demonstrations Daily
 All leading makes

Vehicle & General House
 Hurst Street
 BIRMINGHAM 5
 Tel: 021-622 2323/4

CHESHIRE

Charlesworths HI-FI & CINE CENTRES

112 FOREGATE STREET, CHESTER. Tel. 25075
 and 28 HIGHTOWN, CREWE. Tel. 3327

For all leading makes of Audio and
 Photographic equipment

*Spacious demonstration studio *Easy Parking
 *Half Day Wednesday

NEW PRODUCTS

DOLBY B MACHINE AVAILABLE FROM STOCK

A DOLBY B CASSETTE MACHINE available ex stock is announced by Highgate Acoustics who have now acquired the Harmon Kardon agency for Great Britain. Incorporating full Dolby B noise reduction circuitry for stereo record and playback machine, known as CADS, will cost £185.

It is said that the CADS enables the recording enthusiast to make cassette recordings with a tremendous gain in signal-to-noise ratio - as much as 10 dB. It also gives him the ability to copy tapes over and over again with no increase in noise. The manufacturers suggest that only a few minutes of listening to a Dolby-processed tape on the CADS clearly demonstrates the incredible clarity and naturalness of sound. It is not simply the absence of tape hiss during the quieter passages, but the absence of all types of effects, inaudible or unidentifiable in themselves, that contribute to this cleaner sound quality.



The technical specification refers to third harmonic distortion of less than 1.5%, speed variation less than 1%, wow and flutter 0.15% RMS, frequency response plus or minus 2 dB from below 30 to beyond 12,500 Hz., signal to noise better than 50 dB at 0 VU, crosstalk 40 dB, Output 1 Volt, erasure better than 55 dB, high level input sensitivity 200mV plus or minus 2 dB for 0 VU, high level impedance 200,000 Ohms.

Dealing with the most common questions relating to the Dolby B noise reduction system in general and the CADS in particular, the manufacturers say that the Dolby process does not add distortion or limit transient performance of the CADS. Any distortion added by the Dolby circuitry is negligible - far below the threshold of perception. It is also said that a Dolby processed pre-recorded tape, or a tape recorded on the CADS with the Dolby switched in, can be played back on a standard cassette machine. They add, however, that the sound produced from a Dolby-ised recording when reproduced on a machine without the necessary equalising circuitry will be somewhat "brighter" than normal. This can be corrected by the use of treble attenuation on playback.

It is also explained that no special knowledge is required to operate the CADS Dolby recorder. All that has to be done is to select the programme to be recorded, switch in the Dolby system, set the

controls to the proper recording level and start the tape running. Lastly they add that if the user wishes he can record on the CADS without the Dolby process being operative. Simply turn the Dolby switch to its Off position and the CADS will function as an ordinary cassette recorder.

Apart from Dolby the CADS includes a number of other sophisticated features, such as a bias/equalisation switch at the rear which sets the proper recording and playback curve when using the new chromium dioxide tape (when it is commercially available in the U.K.). The tape transport mechanism incorporates electronic speed control and the newly designed deep-gap head has four laminations per stack for extended frequency response as low as 30 Hz with unusual linearity.

Metering is by a pair of illuminated VU-type indicators and an additional overmodulation light on the front panel working in conjunction with the meters to prevent driving the recorder into the distortion range. Two console-type sliding record level controls are included. Finally the manufacturer states that the CADS is certain to satisfy the requirements of even the most demanding high fidelity enthusiast because it offers specifications, features and quality together with a performance that is on a par with the most versatile and technologically advanced professional reel-to-reel recorders.

Other items from Harman Kardon include the Citation range of pre-amplifiers and main power amplifiers and loudspeaker enclosures, together with two "compacts".

Highgate Acoustics would also like to make it quite clear that they are an independent company and will market Alpha-Arena equipment exclusively in Great Britain under an agreement reached with Rank Bush Murphy. Amongst the many new Alpha-Arena products is the D400S cassette stereo recorder.

This machine is said to have all the facilities of a stereo tape recorder including press button controls for tape transport, automatic end stop, two VU-type meters for level indication, a 3-digit counter, two microphone inputs on the front panel, press button for cassette change, stereo socket at the rear for stereo amplifier, record/playback, as well as radio, record player and second tape recorder input and output and a very quiet running hysteresis synchronised motor.

Technical data quotes frequency response from 35 to 12,000 Hz., signal-to-noise ratio better than 40 dB, wow and flutter less than 0.25% and output 1 Volt. Recommended retail price of the Alpha-Arena D400S, including purchase tax, is £55.

Highgate Acoustics, 184 Great Portland Street, London, W.I.

HIGH-PERFORMANCE LOW-COST TUNER

WHAT IS CLAIMED to be the world's first "phase lock loop" high fidelity tuner is announced by Sinclair Radionics Ltd of Cambridge. They state that the phase lock loop principle was first applied to receivers for reception from satellites because of the important improvements in signal-to-noise ratio that could be obtained through the use of this technique. In addition there were benefits of greatly improved selectivity

and sensitivity. The new Project 60 tuner from Sinclair is therefore said to have a specification that is unsurpassed by any tuner now available, and yet it costs no more than a fraction of the price. From the high fidelity point of view the new circuit is claimed to have another very important advantage, that of extremely low distortion. The manufacturers state that the distortion figure of their instrument is very much lower than that of any other tuner known to them.

In use the tuner is said to be especially attractive because the "squelch" circuit gives complete silence between stations and because fine tuning is accomplished automatically by the tuner itself. An integrated circuit is used in the stereo decoder to give improved performance and excellent stereo separation. Switching from mono to stereo is automatic and is indicated by a bulb.



The Project 60 tuner is supplied completely built and tested ready for mounting into any cabinet, and can be used in conjunction with any high fidelity amplifier system. Sensitivity and selectivity is said to be such that it will be possible to receive stereo transmissions from many more areas and foreign broadcasts will also be received more readily. It is claimed that in most areas the Project 60 tuner will operate satisfactorily on an aerial consisting of nothing more than a few inches of wire if this should be necessary.

The tuning range is 87.5 to 108.5 MHz, and the capture ratio is 1.5 dB. Sensitivity is given as 2 microvolts for 30 dB quieting and 7 microvolts for full limiting. Squelch level is 20 microvolts and the AFC range \pm 200 kHz. Signal-to-noise is quoted as better than 65 dB and total harmonic distortion 0.15% for 30% modulation. Operating level of the stereo decoder is 2 microvolts, pilot tone suppression 30 dB and crosstalk 40 dB. Output voltage is 2 x 150 mV RMS, aerial impedance 75 Ohms and the indicators provided are: Mains On, Stereo On and Tuning.

Recommended retail price of the Project 60 tuner, first supplies of which will not be available until later this month, is £25.

The Sinclair System 3000 amplifier is claimed to be of an entirely new design offering a performance matched by only two or three other companies in the world and by none at less than twice the price. Total harmonic distortion is given as less than 0.04% at full output at 1,000 Hz, and is less than 0.1% at all power levels and frequencies in the audio spectrum. Output power is claimed to be 17 watts per channel RMS with both channels operating. The circuit features a stabilised power supply with automatic overload protection making the amplifier "virtually indestructible".

The amplifier incorporates every feature likely to be required by the user, including the usual tone, volume and balance controls, two pick-up inputs, radio and tape inputs, tape output, scratch filter, speaker muting switch, headphones socket and switched mains outlet. The circuit uses silicon transistors exclusively and the output transistors are claimed to be especially robust. Casework is black anodised aluminium and the recommended retail price is £45.

Sinclair Radionics Ltd., 22 Newmarket Road, Cambridge.

CASSETTE CASE

ALTHOUGH COMPACT CASSETTES are small in size they are not the easiest of things to carry about in large numbers. Now the Bib Division of Multicore Solder Ltd offer a new cassette tape case designed to hold 12 cassettes.



Fabricated in an attractive black "deer-skin" PVC the Bib Tape Cassette Case size 30 costs 24s 10d from all audio retailers.

Multicore Solders Ltd, Hemel Hempstead, Hertfordshire.

UHER PORTABLE

HIGHLIGHT FROM UHER is a portable stereo cassette machine that is said to be built to the same rugged standards as the famous 4000L series. Its outstanding feature is a reversible drive to obviate the necessity of turning the cassette over to play the second track. This reverse mechanism can be manually or automatically operated.

Frequency response of the new machine is given as from 50 to 12,000 Hz and the microphone for mono speech applications is built into the case, but sockets are provided for the connection of external stereo microphones. A single monitoring loudspeaker is included and there is provision for the connection of external loudspeakers if desired. A mains unit and other accessories will be made available and the price of the machine has yet to be announced.

Also new from Uher is model 724, a four-track mains open spool record/playback machine with a claimed output of 2 Watts per channel.

Operating at two speeds, 7½ and 3¾ ips, the frequency response at the faster speed is given as 50 to 20,000 Hz and at the lower 50 to 15,000 Hz. Wow and flutter figures are, respectively, better than 0.2% and 0.25%.

The machine, which is built to DIN standards, can be used vertically or horizontally, is fitted with a carrying handle and costs £103 10s plus purchase tax of £25 11s 5d.

Two new microphones are also featured, the M136, a low-cost omni-directional instrument of medium impedance, and M634, a moving coil stereo pair.

M136 costs only £3 8s, has a claimed response range of from 50 to 15,000 Hz and is intended for general purpose use. The M634 pair has a music/speech switch fitted to each, cardioid directional characteristics and a claimed frequency response of from 50 to 16,000 Hz. Supplied with stereo mounting bar and table tripod the cost of M634 is £21 9s.

Bosch Ltd., Rhodes Way, Radlett Road, Watford WD2 4LB, Herts.

CUSSINS & LIGHT LTD. KING'S SQUARE - YORK

Tel: 55666



The Group of Companies

Leading Dealers in Hi-Fi
Tape Recorders and Accessories
Expert Advice

GOOD'S of SCARBOROUGH
23 Newborough Ltd
Tel: 63543

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)

LONDON

TAPE RECORDER HI-FI CENTRE (SHEEN) LTD.

HI-FI EQUIPMENT

TAPE RECORDERS

ACCESSORIES

SERVICE

3 & 4 STATION PARADE, CLOSED WEDNESDAYS
SHEEN LANE, SHEEN, 01-876 0985
LONDON, S.W.14 Opposite Mortlake Station S.R.



Photograph of the Soundex Unimixer 4S reviewed in our Test Bench feature this month on page 363.

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," 16a Bevis Marks, London, E.C.3.

FOR SALE

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

UHER 4000L REPORT as new incl. dryfit Storage Battery, Mains Operated Power Unit and Battery Charger plus Dynamic Remote Control Microphone for £125. Miller, Tel. 636 3838 or evenings 348 1905.

WANTED

HIGHEST CASH PRICES for good quality Tape Recorders. 9.30 — 5.00. Immediate quotations. 01-472 2185.

TAPE RECORDS

PRE-RECORDED AMERICAN STEREO TAPES, 7½ ips. Cheap as records. Bernsteins, Mahler, Maazels, Silbelius, Karajan, Beethoven Symphonies. £15 per set of 5 tapes incl. PT and duty (any duty or purchase tax charged by the postman will be refunded — see instruction slip in tape box). £3 cheaper than records. PO 5s for complete catalogue. Postereo Tapes, 9 Darley St., Harold's Cross, Dublin 6, Eire.

TAPE EXCHANGES

WORLDWIDE TAPE-SPONDENTS, FREE SOUND MAGAZINES, FAR & WIDE RECORDING CLUB, 117 Plains Avenue, Maidstone, SAE.

MAKE INTERESTING NEW FRIENDS ALL AGES OVER 17. Send SAE, for free details. VICTORY BUREAU, 34 Honeywell Road, London, S.W.11.

NEW ZEALAND TAPE-RECORDING CLUB INC. P.O. Box 5368, Auckland, New Zealand. Membership Prospectus on Application, to Overseas Director. Join our International Club.

REPAIRS

TAPE RECORDER REPAIRS by Specialists, The Tape Recorder Centre, 82 High Holborn, London, W.C.1.

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...

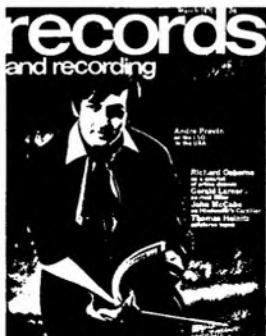
DICTATING and AUDIO RE-PAIRS LTD. for Tape Recorder service. Authorised service agents. Grundig, Philips and other leading makes of tape recording equipment repaired to Manufacturers' Standards by skilled staff, using modern test equipment — audio generators, oscilloscopes, audio voltmeters, etc. 5 Coptic Street, London W.C.1. (Near the British Museum). Telephone: 636-6314/5.

IF QUALITY MATTERS consult first our 75-page illustrated catalogue with technical specifications (6s 6d). 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. (Excellent fund-raiser). Please specify requirements. AUDIO SUPPLY ASSOCIATION, 18 Blenheim Road, London, W.4. 995 1661.

PUBLICATIONS

A sell-out! Second printing now ready: "Tips for Tapespondents — International Message Making"; 2s 10d. WORLDWIDE TAPE-TALK, 35 The Gardens, Harrow.

*please
write
for a
free*



*introductory
copy*

WRITE YOUR NAME & ADDRESS HERE, CUT & POST THIS COUPON OR WRITE A SEPARATE LETTER	
NAME	records
ADDRESS	
TOWN	COUNTY
ARTILLERY MANSIONS, 75 VICTORIA STREET, LONDON, SW.1.	

TAPE DUBBING

J. & B. RECORDINGS. Tape to Disc — latest high level disc-cutting system. Quality pressings made. Studio with Bechstein Grand. Mobile unit, 21 Nassau Road, London, S.W.13. RI Verside 7150.

GRAHAM CLARK RECORDS. Tape to Disc Pressings, P.F.A. House, 182a Station Road, Addlestone, Weybridge, Surrey. Tel: Weybridge 43367.

YOUR TAPES to DISC, 7 in. 45-22s, 10 in. LP-55s, 12 in. LP-65s. 4-day postal service. Top professional quality. SAE photo leaflet: DEROY STUDIOS, High Bank, Hawk St, Carnforth, Lancs. W.11.

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. RI Verside 7150.

EDUCATIONAL

Tapespond with the COUNTRY OF YOUR CHOICE by means of ESPERANTO. Details of Correspondence Course from British Esperanto Association (TR), 140 Holland Park Avenue, London, W.11.

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.

APPEAL

Green Shield Stamps for the Blind

Tape Recording Service for the Blind desperately needs a new Ferrograph Series 7.

Please send them your Green Shield Stamps — they need 250 full books. And they need YOUR help to get them.

See our editorial on page 353 of this issue and post your stamp books or even loose stamps to:

Mrs Maureen Baylis,
Hon Secretary,
Tape Recording Service for the Blind,
48 Lye Copse Avenue,
Farnborough, Hants.

Space donated by TAPE Recording Magazine

DID YOU KNOW—

- That **TAPE RECORDING MAGAZINE** was the First Publication of its kind in Europe.
- That it is still the Best Tape Recording Magazine.
- That it is the only Tape Recording Magazine staffed by Enthusiasts for Enthusiasts.
- That you can ensure receiving your regular monthly copy by completing one of the two coupons opposite.
- **THAT TAPE RECORDING MAGAZINE POSTAL SUBSCRIPTION IS ONLY 30/- PER ANNUM.**

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 Seymour Press Ltd.
334 Brixton Road, London, S.W.9.*

TO THE PUBLISHERS

Please post me a copy of **TAPE Recording Magazine** regularly. I enclose 30/- as a subscription for one year (USA \$3.75, AUSTRALIA \$3.75).

NAME

ADDRESS

.....
Post to: **TAPE Recording Magazine, 7 Alverstone Avenue, East Barnet, Herts.**

CUT ALONG DOTTED LINE

POSTAGE
WILL BE
PAID BY
PRINT AND
PRESS
SERVICES
LIMITED

SECOND FOLD HERE

Do not affix Postage Stamps if posted
in Gt. Britain, Channel Islands or
N. Ireland.

FLAP B

FLAP A

TAPE RECORDING MAGAZINE,
16a BEVIS MARKS,
LONDON, E.C.3.



FIRST FOLD ALONG THIS LINE

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.

Documentary Programmes on Tape
By Peter Bastin

5s. (USA \$1.25) post free

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.

How to Make Money With Your Recorder by Henry Woodman.

3s. 6d. (USA \$0.75) post free.

MAIL ORDER ONLY

REMITTANCE MUST ACCOMPANY ORDERS

Send Orders to—

PRINT & PRESS SERVICES LTD.
Tape Bookshop, 16a Bevis Marks,
London, E.C.3.



FRANCIS OF STREATHAM

MEMBERS OF THE HI-FI DEALERS ASSOCIATION

LONDON'S FOREMOST TANDBERG STOCKISTS

DECKS WITH PRE-AMPS (microphones extra)

Akai CR800 8tr. Cartridge
Philips N4500 3 sp. 4 tr. Stereo
Philips Pro 12, 2 tr. 2 sp. Stereo
Sanyo 801, 3 sp. 4 tr. Stereo
Sony 355 3 sp. 4 tr. Stereo
Sony 255 Stereo
Sony 3600 3 sp. 4 tr. St.
Sony 6300 3 sp. 4 tr. St.
Sony 252D 2 sp. 4 tr. St.
Tandberg 6000X 3 sp. 2/4 tr. St.
Tandberg 3000X 3 sp. 2/4 tr. St.
Telefunken 3 sp. 4 tr. Stereo
Revox 1102/4
Ferrograph 702/4

COMPLETE TAPE RECORDERS

*Akai 1710W Stereo
*Akai M.9. Stereo
*Brenell Mk. 6 Mono
*Ferrograph 712
*Grundig TK320 2/4 tr. 3 sp. St.
Grundig 124 2 tr. Mono
Grundig TK141 4 tr. Mono
Grundig 4304 4 tr. Mono Auto
Philips 4307 4 tr. Mono
Philips 4308 4 tr. 2 sp. Mono
Philips Stereo 4402 2 sp. 4 tr.
Philips Auto Cassette 2401
Philips 4407 Stereo 3 sp. 4 tr.
*Revox 77 Stereo 2 or 4 tr.
Sony TC230W
Sony 252 3 sp. 4 tr. Stereo
Sony 630 4 tr. 3 sp. St.
Tandberg 6X 3 sp. 2/4 tr. Stereo
*Tandberg 15 2 or 4 tr. 3 sp./M.

*Tandberg 12X 3 sp. 2/4 tr. St.
*Telefunken M207 2 sp. 4 tr. St.
Telefunken 204 T.S. 4 tr. Stereo
Telefunken 501 4 tr./Mono
Telefunken 203 4 tr. 2 sp. St.
Telefunken 201 Mono 4 tr.
*Uher 4 tr. Mono
*Uher Royal de luxe 4 sp. 4 tr. St.
*Uher Varicord 263 St.

BATTERY PORTABLE & CASSETTE MODELS

Philips RR392 Cassette + AM/FM
Philips RR290 Cassette/AM radio
*Philips 2205 Batt./Mains Cassette
Akai 10 U 4 tr. Stereo/BM
Tandberg Cassette Series 11 2
Sony TC800B
Grundig Cassette C200
Aiwa Cassette Batt./Mains
Pye Cassette
Telefunken 302 2 sp. 4 tr. Mono
*Uher 4200/4400 2/4 tr. 4 sp. St.

● MAINS POWER PACKS

SPECIAL OFFER — Philips Cassette Recorder EL3302 with dyn. mic., cassette, and carrying case. 22gns.

● MICROPHONES, MIXERS, etc. by AKG, Grapian, Resio, Acos, Telefunken, Beyer, Grundig, Philips, Sennheiser, etc.

FOR A FAIR AND DEPENDABLE DEAL IN TAPE and HI-FI

★ Minimum Deposit and no Interest or Service Charges on H.P. up to 18 months ★ Free Service during Guarantee Period
★ Fair Part Exchange Allowance on your old Recorder
★ Reconditioned Recorders available to personal shoppers only

HI-FI DEPT.

● AMPLIFIERS

Quad - Rogers - Arena - Philips - Goodman - Nikko - Leak - Armstrong - Tripletone - Tandberg - Decca - Rotal - English - Linear - Telefunken.

● TUNERS

Quad - Rogers - Leak - Armstrong - Tripletone - Arena - Philips - Nikko - Goodman - Huldra

● LOUDSPEAKERS

Quad - Rogers - Kef - Wharfedale - Goodman - Tannoy - Lowther - Leak - Celestion - Tandberg - Arena - Keleton.

● MOTORS, PICKUPS

Goldring SME
Connoisseur Pickering
Thorens Audiotech
Shure Neat
BSR-Macdonald Acos

Diamond stylis, Microlifts, Pressure Gauges, Cleaning Accessories, Cabinets by Clearview.

Bib and EMI splicers, Matching transformers, Defluxers, Bulk Erasers, etc.

● TELEFUNKEN pre-recorded tapes and music cassettes. Tapes and Cassettes, etc. Also 8 tr. pre-recorded stereo cassettes.

AMPEX TAPE BARGAINS

P = Polystyrene: M = Mylar: A = Acetate. Compact cassettes	C.90 15/6: C.120 21/-.
7" reels	
D/P 2400' (P)	30/-
L/P 1800' (P)	21/-
Stndrd. 1200' (M)	12/6
5½" reels	
L/P 1150' (M)	17/6
L/P 1150' (A)	15/-
Stndrd 850' (A)	12/6
5" reels	
D/P 1200' (P)	17/6
L/P 900' (P)	12/6
Stndrd 600' (P)	10/-
3" D/P 600' (P)	5/-
Postage 2/- on orders up to £3. Over, post free in U.K.	

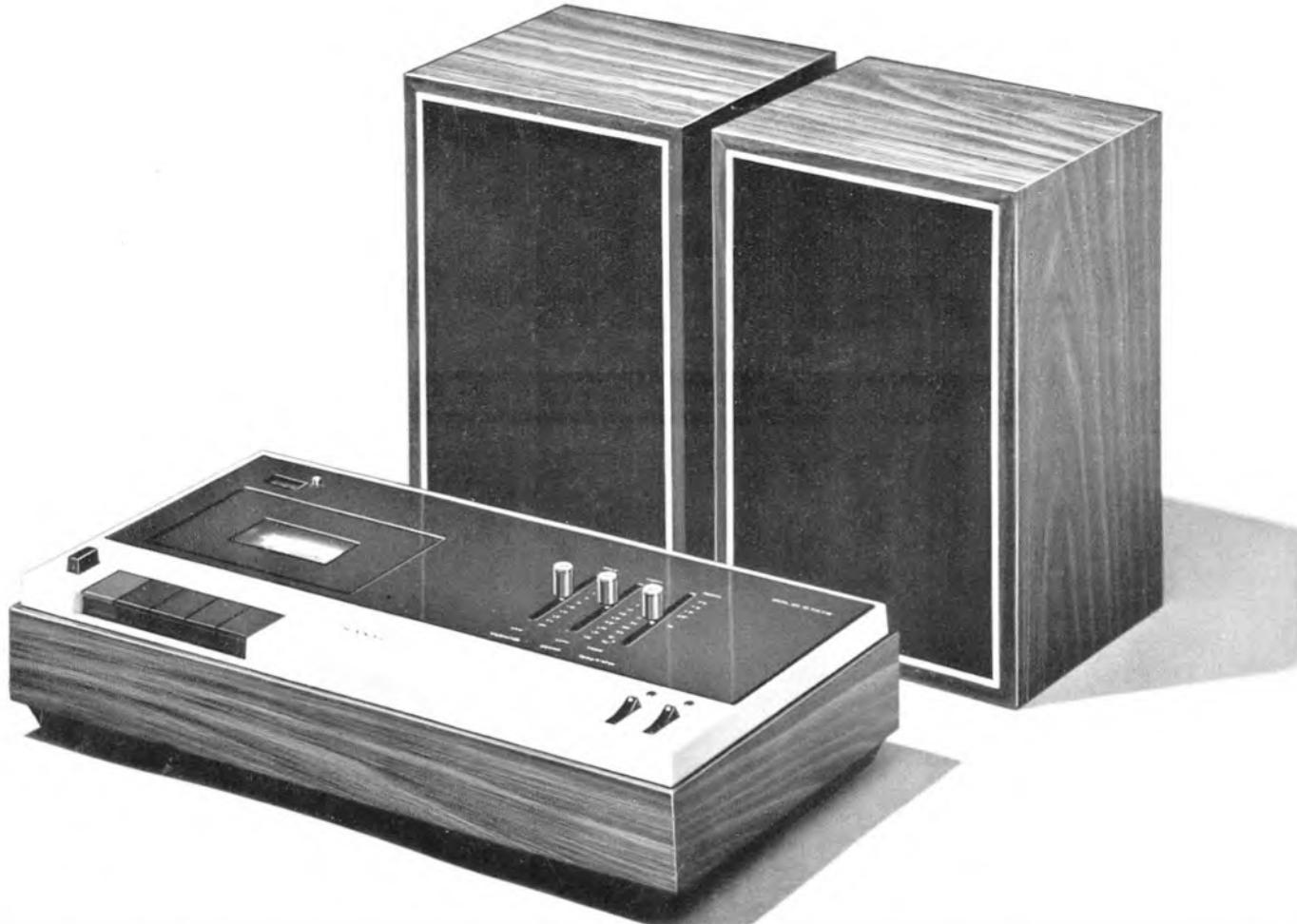
HEADPHONES by AKG, Ampex, Akai, Nikko, Philips, Eagle, Koss, TTC, Beyer.

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

Between St. Leonard's Church and Streatham Station

Please note this is our only address ● Free parking Prentis Road, 2 mins. away

OPEN ALL DAY SATURDAY—EARLY CLOSING WEDNESDAY



Where does the record go?

The answer is — it doesn't

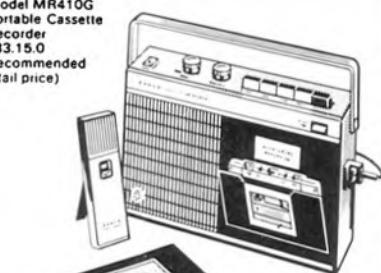
This is a stereo system which plays convenient standard cassettes. In their pre-recorded form, called Musicassettes, these protected tape packs reproduce a high quality performance. Cost LP prices. And give you no worries about scratching or other damage.

Musicassettes are simple to play—In your car, out in the country or at home—if you have the equipment. Which is where Sanyo come in because they are the world's leading manufacturers of cassette players. From simple portables to sophisticated stereo they have the complete range.

Above you can see the MR440G which is a perfect model to introduce you to cassette stereo. It is neat, elegant and simple to use with its slide and pushbutton controls. You can buy it for just £84.15.0 including speakers (recommended retail price).

Sanyo have excellent service facilities throughout the U.K.

Model MR410G
Portable Cassette
Recorder
£33.15.0
(recommended
retail price)



Model MR115
Portable Tape
Recorder
£39.15.0
(recommended
retail price)

*Visit your local Sanyo dealer
today!*
or write to Sanyo at Watford
for further information.



Sanyo Marubeni (U.K.) Ltd.,
Bushey Mill Lane, Watford, Herts.
Telephone: Watford 25355