

SEPTEMBER 1969

TAPE

RECORDING MAGAZINE

2'6



FIRST DETAILS
of the
NEW PACKETTE
SYSTEM

Arena at home

MORE LIVE STEREO

TEST BENCH
MUSIC REVIEWS
NEW PRODUCTS
Etc., Etc.

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

the
1969
INTERNATIONAL
audio
festival
&
Photo-Cine
FAIRS



OCTOBER
16-22

Hear and compare the world's finest sound producing equipment for the home. The top loudspeakers, amplifiers, tape-recorders, pick-ups, tapes and accessories have been brought together under one roof to give you a superb Festival of Sound and Sight.

Both newcomer and expert . . . everyone who takes pleasure in using and listening to Hi-Fi equipment of the Highest Standard must visit this International Audio Fair.

Lovers of music of all types, if they are true to their enthusiasm, can hear for themselves, how exactly and faithfully their favourite passage can be played back to them.

Admission 4/-

OLYMPIA

10 a.m.—9 p.m.

Not Sunday

London W.14.

BRITAIN'S LARGEST SPECIALISTS

At every NUSOUND showroom you'll find a wonderfully comprehensive range of equipment and expert staff with many year's experience in this ever growing and highly specialised field—in which the NUSOUND reputation is "Second to None".

Every make and model of Tape Recorder and Hi-Fi Unit is available for immediate demonstration by our specialist staff who will be delighted to assist you in selecting equipment to suit your individual requirements. Only from NUSOUND can you benefit from all these invaluable features—the most comprehensive range of equipment on display in the country, competitive prices and special offers, expert staff, free technical advice, immediate demonstration of any model and the finest after-sales servicing available.

Visit any NUSOUND centre and you'll be certain of 100% Service and Satisfaction.

SPECIAL SANYO OFFER!

MODEL MR 929
ALL TRANSISTOR
STEREO TAPE
RECORDER

List Price £97.4.9

OUR PRICE

79 GNS. Carr. & Ins. 25/-

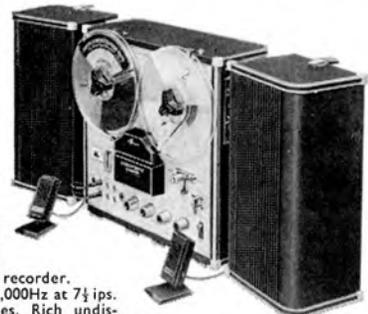
A complete stereo tape recorder that offers unlimited versatility—High Fidelity 4-track stereo and mono recorder.

Frequency response 20-19,000Hz at 7½ ips.

Sound on Sound facilities. Rich undistorted sound from twin detachable speakers.

Takes 7in. reels. 7½ ips and 3½ ips 2 VU meters.

Separate tone and volume controls for each channel. Complete with two high-quality dynamic microphones, reel of tape, empty spool, two recording leads, splicing tape and two reel caps. Fully guaranteed 12 months.



SENSATIONAL STEREO OFFERS!

As Britain's Largest Specialists our tremendous purchasing power enables us to offer you the famous makes—Garrard, Goldring, Rogers, Decca, Arena, Philips, Wharfedale, etc. etc.—at unbelievably low prices. We offer over 30 Hi-Fi Stereo systems utilising these famous makes all showing substantial savings off our normal list prices.

A Nusound Stereo System represents the finest value for money available today. Every system is complete with all leads, plugs, etc., carrying full manufacturers' guarantees and backed by 100% Nusound after sales service.

Call into any of our showrooms or write to Dept. TRM/ST., 24, Oxford Street, London, W.1 for full details.



NuSound

BRITAIN'S LARGEST SPECIALISTS

- 24, OXFORD STREET, LONDON, W.1. Telephone: 01-580 4638
(25 yards Tottenham Court Tube Station)
- 82, HIGH HOLBORN, LONDON, W.C.1. Telephone: 01-242 7401
- 228 BISHOPSGATE, LONDON, E.C.2. Telephone: 01-247 2609
(Opposite Liverpool Street Station)
- 1242-4, PENTONVILLE ROAD, LONDON, N.1. Telephone: 01-837 8200
- 360, KILBURN HIGH ROAD, LONDON, N.W.6. Telephone: 01-624 1656
- 87/100, ILFORD LANE, ILFORD, ESSEX. Telephone: 01-478 2291
- 36, LEWISHAM HIGH STREET, LONDON, S.E.13. Telephone: 01-852 2399

Hours of business: Oxford St. 6 days a week; Bishopsgate closed Sat.—Open Sun. 10-2; High Holborn half day Sat.; Lewisham, Ilford, Kilburn, Pentonville Rd., half day Thurs.



Introducing the Akai 4000D with new one-micron head. Result: Another 2000Hz at 3 $\frac{3}{4}$ I.P.S.

This impressive increase in frequency response from 14000Hz at 3 $\frac{3}{4}$ i.p.s. on the previous 3000D model to 16000.Hz on the new 4000D is a direct result of the new one micron gap head.

Of the 3000D, the reviewers in the March 68 edition of Tape Recording Magazine said: 'It can claim to achieve a standard of technical performance

far in excess of that indicated by its price.'

All of which makes the new Akai 4000D even better value at £89.18.8 (recommended), and almost certainly the best tape deck in Britain for under £100. And don't forget the 4000D is just one of Akai's range—the most comprehensive range of tape recorders in Britain.

PERFORMANCE SPECIFICATIONS

TAPE SPEED 2 speeds... 3.3 4 and 7.1 2 ips
WOW AND FLUTTER Less than 0.15% RMS at 7.1 2 ips
 Less than .20% RMS at 3.3 4 ips
FREQUENCY RESPONSE 30 to 22,000 Hz \pm 3db at 7.1 2 ips
 30 to 16,000 Hz \pm 3db at 3 3 4 ips
SIGNAL TO NOISE RATIO Better than 50db

LEVEL INDICATOR 2 VU meters
RECORDING SYSTEM 4 track stereo/monaural system
FORWARD/REWIND TIME 150 seconds using 1,200 foot tape at 50 cycles

SPECIAL FEATURE 3 heads for off-the-tape monitoring. Plus sound-on-sound recording.

For further details, write to:

 **AUDIO PRODUCTS**
 PULLIN PHOTOGRAPHIC-RANK ALDIS

AKAI®

ONE WAY TO SATISFACTION

4 TRACK STEREO/MONO

	Deposit			12 Monthly Payments			Cash Price		
	£	s.	d.	£	s.	d.	£	s.	d.
Philips EL3312 ...	23	4	1	3	14	5	67	17	1
Philips 4404... ..	26	17	0	4	5	0	77	17	0
Ferguson 3232 ...	33	5	0	5	1	10	93	5	0
Sanyo MR-929 ...	33	4	9	5	6	10	97	4	9
Sony TC260... ..	33	0	0	5	10	0	99	0	0
Philips 4407... ..	35	15	10	5	13	4	103	15	4
Akai I710W	37	15	7	6	2	1	111	0	5
Sanyo MR939	38	13	6	6	2	3	112	0	2
Telefunken 204TS... ..	41	13	0	6	18	10	124	19	0
Grundig TK247 ...	45	10	9	7	2	4	130	18	9
Philips 4408... ..	46	19	5	7	8	9	136	3	10
Sony TC530	49	12	3	8	1	8	146	12	3
Beocord 2000K ...	53	5	0	8	17	6	159	15	0
Beocord 2000T ...	55	5	0	9	4	2	165	15	0
National Console-Aire	61	16	8	10	5	4	185	0	0
Ferrograph 722/4... ..	65	3	1	10	15	0	194	3	1
Akai M9	68	12	4	10	16	8	198	12	4

4 TRACK MONAURAL

Fidelity Braemar... ..	11	12	8	1	17	4	34	4	8
Ferguson 3226	15	9	0	2	11	7	46	6	0
Grundig TK140	16	10	1	2	11	11	47	13	1
Philips 4307	16	15	3	2	13	1	48	11	11
Ferguson 3238	20	12	0	3	5	0	59	12	0
Ferguson 3216	22	16	0	3	12	2	66	2	0
Wyndson Vanguard	25	4	0	4	4	0	75	12	0
Tandberg 1541	26	15	3	4	10	0	80	15	3
Reps HW10 4-T	28	16	9	4	11	2	83	10	1

STEREO TAPE UNITS

	Deposit			12 Monthly Payments			Cash Price		
	£	s.	d.	£	s.	d.	£	s.	d.
Sanyo MR-801	27	9	5	4	6	8	79	9	5
Sony TC355... ..	33	7	6	5	11	3	100	2	6
Akai 3000D... ..	35	0	3	5	10	7	101	6	11
Beocord 1500	42	15	0	6	18	4	125	15	0
Ferrograph 702/704	58	8	5	9	11	8	173	8	5

MAINS TWIN TRACK

Fidelity Braemar... ..	10	9	8	1	15	0	31	9	0
Ferguson 3224	11	12	8	1	16	10	33	14	0
Grundig TK120	14	0	3	2	3	9	40	5	3
Beocord 1100	28	5	0	4	14	2	84	15	0
Brenell Mk. V/3 Std.	36	8	2	5	16	7	106	16	8
Brenell Mk. V/3 Mtr.	39	8	3	6	4	6	114	1	9
Ferrograph 713	51	6	3	8	10	0	153	6	3
Ferrograph 713H... ..	53	14	6	8	17	6	160	4	6

BATTERY OPERATED

National RQ-113S	7	13	5	1	5	7	23	0	3
Philips 3302 Cassette	11	1	7	1	15	0	32	1	7
Sharp RD505 Bat./Mns.	13	12	8	2	5	0	40	12	8
Telefunken 300	15	15	0	2	12	6	47	5	0
Sony TC210... ..	16	0	0	2	13	4	48	0	0
Telefunken 301	17	17	0	2	19	6	53	11	0
Telefunken 302	19	12	0	3	5	4	58	16	0
Sanyo MR151 Stereo	30	4	1	5	0	0	90	4	1
Uher 4000L	44	13	1	7	8	4	133	13	1

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

SPECIAL OFFER



TELEFUNKEN 300

★Telefunken 300TS Battery/Portable. ★5" Tape capacity. ★Volume and Stop/Start controls in handle. ★Complete with microphone. Reduced from 61 gns. **Our Price 45gns.**

TELEFUNKEN 301

Similar Specifications as for Model 300 but 4-track. Reduced from £70 17s. 6d. **Our Price 51gns.**

TELEFUNKEN 302

★4-Track. ★2 Speeds, 3½ and 1½ i.p.s. Reduced from £77 8s. 9d. **Our Price 56gns.**

TELEFUNKEN 203TS

★Mono/Stereo. ★4-track. ★Sound-on-Sound. ★2 speeds, 3½ and 1½ i.p.s. ★Complete with TD21 microphone. Reduced from 86 gns. **Our Price 64gns.**

THE RECORDER CO

this is the name

(DEPT. T) 186-188 WEST END LANE, WEST HAMPSTEAD, LONDON, NW6

Telephone: 01-794 4977

Now on sale . . . Documentary programmes on tape

A new Tape Recording Handbook

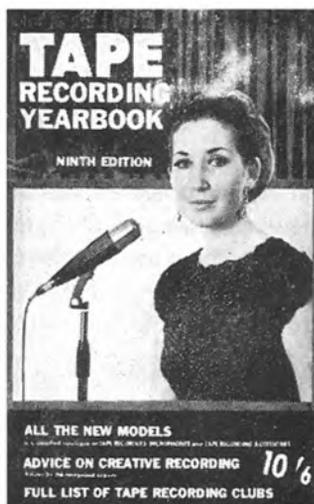
by Peter Bastin, who has produced several prize-winning documentary tapes in the British Amateur Tape Recording Contests.

Contents include: **Setting yourself up** (machines, microphones, speeds, hazards, preparing a studio); **The idea and the script** (preparing a script, interviews, narrations, inserts, music); **The job of recording** (setting up, speaking the narrative, techniques, adding other tracks, reverberation, effects, outdoor recording); **And the next time** (examining the results, contests, BBC); with an appendix suggesting equipment for different types of studio

Price 5s Available now from **Print and Press Services Ltd**,
Prestige House, 14-18 Holborn, London, EC1

Cheque or postal order must accompany all orders and be made payable to Print and Press Services Ltd

Other titles in preparation: ABC of Audio; Advice on script-writing; Natural history sound recording



NOW
AVAILABLE
 *
TAPE RECORDING
YEARBOOK

COMPLETELY NEW NINTH EDITION

PRICE 10/6 POST FREE

A Must for all Recording Enthusiasts

Not only a Comprehensive Catalogue Section but also important Articles by *TAPE Recording Magazine's* Team of Experts, including:—

- JOHN BORWICK**
- DOUGLAS BROWN**
- ROBERT HIRST**
- FRED JUDD**
- DENYS KILLICK**

*

MAKE SURE OF YOUR COPY NOW by posting this coupon and remittance to:—

TAPE RECORDING YEARBOOK,
 PRESTIGE HOUSE,
 14-18 HOLBORN, LONDON, E.C.1

TAPE RECORDING YEARBOOK

NINTH EDITION, PRICE 10/6d. POST FREE (U.S.A. \$1.75)

Please supply me with.....copy/ies.

I enclose my cheque/postal order for

TO:

.....

.....

REMITTANCE MUST ACCOMPANY ORDER

Cheques and Postal Orders to be made payable to **Print and Press Services Ltd.**

Vortexion

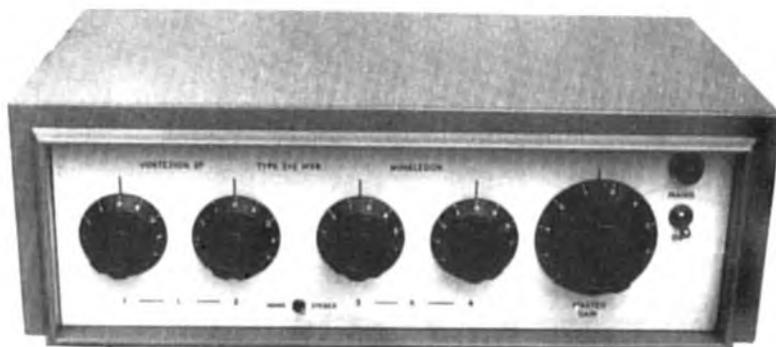
STEREO MIXERS

These electronic Stereo Mixers range from 2+2 to 5+5 input channels, with left and right outputs at 500 millivolts into 20K ohms up to infinity.

Separate control knobs are provided for L & R signals on each stereo channel so that a Mono/Stereo changeover switch provided can give from four to ten channels for monaural operation, in which state the L & R outputs provide identical signals.

A single knob ganged Master Volume control is fitted, plus a pilot indicator.

The units are mains powered and have the same overall dimensions as monaural mixers.



Also available Monaural Electronic Mixers:—

- | | |
|------------------------|-----------------------------------|
| 4 Way Monaural Mixers | 3 Way Monaural Mixers with P.P.M. |
| 6 Way Monaural Mixers | 4 Way Monaural Mixers with P.P.M. |
| 8 Way Monaural Mixers | 6 Way Monaural Mixers with P.P.M. |
| 10 Way Monaural Mixers | 8 Way Monaural Mixers with P.P.M. |

200 WATT AMPLIFIER. Can deliver its full audio power at any frequency in the range of 30 c/s—20 Kc/s ± 1 db. Less than 0.2% distortion at 1 Kc/s. Can be used to drive mechanical devices for which power is over 120 watt on continuous sine wave. Input 1 m W 600 ohms. Output 100-120 v or 200-240 v. Additional matching transformers for other impedances are available.

30/50 WATT AMPLIFIER. With 4 mixed inputs, and bass and treble tone controls. Can deliver 50 watts of speech and music or over 30 watts on continuous sine wave. Main amplifier has a response of 30 c/s—20 Kc/s ± 1 db. 0.15% distortion. Outputs 4, 7.5, 15 ohms and 100 volt line. Models are available with two, three or four mixed inputs for low impedance balanced line microphones, pick-up or guitar.

CP50 AMPLIFIER. An all silicon transistor 50 watt amplifier for mains and 12 volt battery operation, charging its own battery and automatically going to battery if mains fail. Protected inputs, and overload and short circuit protected outputs for 8 ohms—15 ohms and 100 volt line. Bass and treble controls fitted. Models available with 1 gram and 2 low mic. inputs. 1 gram and 3 low mic. inputs or 4 low mic. inputs.

100 WATT ALL SILICON AMPLIFIER. A high quality amplifier with 8 ohms—15 ohms and 100 volt line output for A.C. Mains. Protection is given for short and open circuit output over driving and over temperature. Input 0.4 v on 100K ohms.

20/30 WATT MIXER AMPLIFIER. High fidelity all silicon model with F.E.T. input stages to reduce intermodulation distortion to a fraction of normal transistor input circuits. The response is level 20 to 20,000 cps within 2 db and over 30 times damping factor. At 20 watts output there is less than 0.2% intermodulation even over the microphone stage at full gain with the treble and bass controls set level. Standard model 1-low mic. balanced input and Hi Z gram.

Visit our Demonstration Room No. 150 at the SONEX 70 Hi-Fi Exhibition
at the Skyway Hotel, 23-26 April

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

Telephone: 01-542 2814 & 01-542 6242/3/4

Telegrams: "Vortexion London S.W.19"



Microphones and Pick-ups by Bang & Olufsen

MICROPHONES



Beomic 1000 Omni-directional moving coil microphone. Response 50 – 17,000 Hz \pm 2.5 dB. Sensitivity 0.1 mV/ μ bar. Hum sensitivity – 139 dB. Output: 200 ohms at 1 KHz. via 9ft lead, 5 pin DIN plug. Supplied with frequency response chart, lavalier cord, anti microphonic base, and packed in a futuristic container. Price *£9.9.0d.



B.M.5. Studio quality Stereo ribbon microphone. Figure of 8 response: Sections may be swivelled up to 90° relative to each other for the desired stereo effect. Fitted with music/ speech switch. Response 30 – 13,000 Hz \pm 2.5 dB. Sensitivity 85 dB below 1 volt/ μ bar. Hum sensitivity – 146 dB. Output 200 ohms at 1 KHz. via 9 ft lead, 5 pin DIN plug. Supplied in rosewood

presentation box with table stand. Price *£30.9.0d.

B.M.6. Mono ribbon microphone (lower half of the B.M.5). Specification as B.M.5. Supplied in presentation case with table stand, price *£21.2.0d. It may be converted to a B.M.5 by an addition of the B.M.7. (available separately price *£9.19.6d.)

Microphone Accessories Stereo/Mono extension leads: prices *15 ft £1.17.6d. 30 ft £2.9.6d. 45 ft £2.19.6d. 60 ft £3 15s. 75 ft £4 5s/Floor Stand £7.15s. Boom Arm £4.19.6d. Line matching transformer to 50 K ohm impedance; £2.9.6d.

PICK-UP CARTRIDGES

A range of quality magnetic cartridges using the B & O patented micro-cross system giving low harmonic distortion and a smooth frequency response. They follow the International tracking angle of 15° and, with standard $\frac{1}{2}$ " mounting centres, will fit virtually all quality pick-up arms.



S.P.6. Response 20 – 20,000 Hz \pm 2.5 dB. Compliance 15 x 10⁻⁶ cm/dyne. Pressure 1.5 – 2.0 g. Stylus: 15 μ diamond. Output: 7 mV. 47K ohms. Price *£7.19.6d.

Replacement styli available: 15 μ , 75 μ , and 5 x 17 μ elliptical.

S.P.8. As S.P.6, but supplied with 5 x 17 μ elliptical stylus in Rosewood box, price *£12.19.6d.

S.P.10. Response 15 – 25,000 Hz \pm 3dB. Compliance 25 x 10⁻⁶ cm/dyne. Pressure 1.0 – 1.5g. Stylus: 15 μ naked diamond. Output: 5mV. 47K ohms. Price *£9.19.6d. Replacement styli available: 15 μ and 5 x 17 μ elliptical.

S.P.12. As S.P.10, but supplied with 5 x 17 μ elliptical stylus. Price *£14.19.6d.

* Prices indicated are recommended retail prices.

B & O quality accessories are obtainable from B & O dealers:

Send for further details to the Accessory Department.

Bang & Olufsen U.K. Limited,

Eastbrook Road, Gloucester.

Telephone: 0452 21591.

TAPE

RECORDING
MAGAZINE

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

Vol. 13 No. 9 September 1969

IN THIS ISSUE

Tape trends and tape talk	288
Douglas Brown	
THE PASSIONATE LISTENER	289
Denys Killick	
Action—MORE AND MORE STEREO	290
Basil Dawson and John Claxton	
EDUCATION—A NEW DEVELOPMENT	294
TRM Report	
Cross Talk	297
By Audios	
AT HOME WITH ARENA	298
The Editor	
NATURE NOTES	301
Test Bench—FERROGRAPH	302
Music on Tape—Musicassettes	307
7$\frac{1}{2}$ and 3$\frac{3}{4}$ Stereo, 3$\frac{3}{4}$ Mono	309
New Products	310
Advertisement Inquiry Service	313

COVER PHOTOGRAPH: On page 298 of this issue we describe a visit to the Arena factory in Denmark where a comprehensive range of top-flight audio equipment is made. Here we have a typical scene in the works where the separate modules containing the important circuitry are being subjected to the most rigorous testing. These tests are continued through every stage of manufacture, even including vibration tests of the completed product to ensure that it will travel without suffering damage.

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

"TAPE Recording Magazine" is available by a postal subscription of 25s. per annum (U.S.A. 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 at Prestige House, 14 18, Holborn, London, E.C.1.

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

Address all communications

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

EDITORIAL

01-242 4742

ADVERTISING

01-242 4851

Publisher,

R. DOUGLAS BROWN

Editor,

DENYS G. KILLICK

Advertisement Manager, VIVIENNE GOODING

Tape trends and tape talk

By Douglas Brown

AS HAS BEEN PREDICTED in *TAPE Recording Magazine* so frequently the Compact Cassette story is one of ever increasing successes. Latest move comes from Philips Records Ltd. In a single decisive stroke they have reduced the cost of Musicassettes dramatically. From a single price of 55s. 11d., 8s. 5d. has been knocked off the popular repertoire to arrive at a new price of 47s. 6d. inclusive of purchase tax. Classical Musicassettes will cost a little more at 49s. 11d. inclusive of purchase tax.

A spokesman for Philips Records Ltd. said that this substantial price advantage has been made possible through the enormous increase in sales and in improvements to the manufacturing processes in their high-speed copying plant. There is an interesting reason why classical music costs a little more than the popular repertoire. All classical Musicassettes are being dubbed in bulk at the main Philips' factory in Holland using some highly sophisticated American equipment. Assembly is still carried out in London. In the very near future the London factory will be equipped with the same copying machines as are now being used in Holland.

Congratulations to Philips Organisation on this very important move which will do much to bring Musicassettes into line with the cost of gramophone records and so materially assist in bringing about the inevitable break-through of music-on-tape.

* * *

IT'S NEVER too late to turn to a new hobby—and latest reminder of the fact comes with news from the Federation of British Recordists and Clubs that they have just signed up as a new member 85-year-old Albert W. Bright, of Andover, Hants.

Mr. Bright's main leisure activity in the past has been gardening. Now he feels like a rest from that. He has bought himself a recorder and now he wants to hear from the Federation just how he can get maximum enjoyment from the hobby.

* * *

PRESENTATION OF AWARDS to the prize-winners in the British Amateur Tape Recording Contest will take place at a special gathering during the Audio Festival at Olympia in October. Exact details will be announced later.

Ken McKenzie, who will collect two awards, has already heard his winning tape broadcast—first by BBC North Region and subsequently by Radio Durham. It is anticipated that several other prize-winning tapes will go out on the air during the next few months. And discussions are taking place about the possibility of issuing the best tapes as a collection on disc.

* * *

RADIO DENMARK is going to play host to representatives of amateur tape recordists from all over Europe when they gather in Copenhagen in October for the annual congress of the International Federation of Sound Hunters. And this year's International Contest, to be judged at the same time,

presents an opportunity for amateurs to have their work broadcast by radio stations all over Europe.

The Copenhagen gathering will mark the centenary of the birth of Valdemar Poulsen, the Dane who first devised the means of magnetic recording of sound. And the international contest includes a special section for tapes which feature Poulsen's work and show its importance during the last 100 years in cultural and educational development and communication.

The best tape on this theme is assured of transmission by a number of the radio concerns in Europe. As the organisers point out, those who wish to enter will be able to get all the raw material they require about Poulsen and his inventions by consulting books in their local libraries.

I hope we shall hear of good British tapes in this contest.

* * *

THE PROJECT for an electronic studio seems to be getting off the ground. Some of the critics have given it enthusiastic backing. But what it really needs—and what similar projects in several other countries have enjoyed—is generous financial aid from the industry.

Until now the composer of electronic music has been in a worse position here than in almost any other western European country. But, apart from the major project now developing, a pilot course on electronic music has recently been instituted at the Royal College of Music. And at York University and at Goldsmiths' College in London useful pioneering work is being done.

There is the most exciting potentiality in this field of recording activity.

* * *

THERE IS ONE specialised field of tape recording that has taken great strides forward in recent years, not in the sense that vast numbers of people are involved, but because a number of real enthusiasts have found a way to work closely together. I refer to the natural history group, about which our readers have been kept well informed by Richard Margoschis, who has played a leading role.

What is the secret of their success? Firstly, I suggest, that they have a fairly clearly defined objective; and secondly that they have the support of the BBC.

But why, I wonder, have other specialised groups of a comparable kind not come into existence to record and catalogue, for example, regional dialects or country dances. Considerable work is already being done, but there's still great scope for the amateur. If there was a nucleus of people with real interest, regional and now local radio stations would undoubtedly have to take them seriously.

We may yet discover that the most natural form of organised club movement for the hobby is not geographical, but by specialised interest. I'd be glad to hear from readers with a particular interest which might form the basis for organised recording activity of this kind.

LISTENING—'REAL LISTENING'—CONSIDERED
BY DENYS KILLICK IN

THE PASSIONATE LISTENER



Proper listening demands personal involvement with sounds being heard. This can even include following the score of a musical work as is seen here where our "passionate listener" is using Truvox equipment, including the new Truvox LS300 speaker units

A GREAT deal has been said in these pages about the art of sound recording. Very little is said about the equally sensitive art of listening. I have called this piece "The Passionate Listener" because in my opinion listening—real listening—demands passionate involvement.

Certainly it is possible to hear in a casual, absent-minded manner. This is the kind of "listening" that is encouraged by the proliferation of background music. Hardly aware of its existence one cannot even remember the items that glide with wanton promiscuity from numberless concealed speaker grilles in restaurant, pub and supermarket in a positive orgy of passionless seduction. Never was there such a loveless relationship as that between the unwilling victim and the purveyor of background noises.

At the other extreme we have complete and absolute abandonment to the task and pleasure of consciously listening. To paraphrase Elizabeth Barrett Browning: "How

do I listen? Let me count the ways . . ." For there are many, many ways in which to listen but the passionate listener will be involved with all of them.

Attention to the programme material itself is the first and obvious primary consideration. If it is music we shall hear the melody—and a great deal more besides. There is the standard of performance (both by instrumentalists and/or conductor) perhaps even the validity of composition if it is a new or unknown work. There is the internal balance between the various sections of an orchestra and the solid reality and presence of good stereophonic reproduction. However that is only a start.

In addition there is the technical excellence of the recording itself and there is the effect of the reproducing equipment on which it is being played back. When we begin to appreciate all these factors we have made a start towards total personal involvement in the listening process.

This is no more than a start however.

In his series "Project Alpha" Cyril Clouts has pointed out the very long periods of time required for a listener to really absorb all the significant aspects of a sound spectrum. Since music consists of the juxtaposition of very large numbers of spectra of varying amplitude, duration and make-up this obviously indicates the possibility of a much deeper involvement. Equally significant and perhaps more easily discernible are the perspective relationships within a recording. Distances from artistes to microphones result in changes of acoustics, all of which are telling us something about the work. These are aural signposts erected by the recording engineer and musical director to point the way for the listener.

As yet we have said nothing about possible emotional involvement with the music itself. This can be so great as to make attention to other detail difficult or even impossible. Which raises the very interesting question: Just how far can the listener's mind be divided in the attention it gives to all the different facets of one single recording?

However devoted or passionate the listener might be he is always limited by his own capacity to absorb a stream of conflicting pieces of information at one and the same time. Indeed it is questionable whether such divided attention is really desirable. However one cannot dispute the fact that the experienced listener hears a very great deal more than the inexperienced. And who obtains the more enjoyment: the one who hears most or the one who hears least?

The end product of any recording enterprise, whether it be a commercial gramophone record or a humble do-it-yourself home produced effort, is the sound that will be made at the loudspeakers when it is reproduced. To hear that sound one has to listen and if one listens with passionate attention to detail then a whole new world of experience will be opened up. I believe that this is what listening is all about.

MORE AND MORE STEREO

By Basil Dawson and John Claxton

WHEN last writing in the July issue we told of our experiences recording the London Bach Society. Our description of that project concluded with the expression of our determination to continue with yet more and more live recording sessions until the quality standard attained meets our satisfaction. Since then we have had two further opportunities to test both our equipment and our own abilities, both of them in London churches.

The fact that we so often find ourselves reporting on recordings taking place in church should not be taken as indicating an exclusive pre-occupation with such subject-matter. To the contrary, we welcome the chance to record as diverse a variety of material as is possible under the widest possible variety of recording conditions. But it so happens that churches represent one of the few remaining active centres of serious amateur or amateur and professional music in this country. We constantly find them to be a prolific source of potential material and would strongly recommend other enthusiasts who might be "looking for something to record" to investigate the musical events taking place at local parish churches. Not only will it be found that suggestions for recording musical items are frequently welcomed but performance standards are often surprisingly high.

Of our next two appointments the first was a recital by the St. Nicholas Consort (choir of boys and men) with two organists to be given at the church of St. Margaret the Queen, Streatham Hill, and the second was a liturgical High Mass at the Church of St. Augustine, Queens Gate, Kensington where the Non Nobis choir and orchestra were to perform the Mozart Mass in D.

Unusual difficulties can arise when working in strange buildings. An amusing incident occurred before we formed our partnership when one of us was recording in this same church of St. Margaret the Queen. The tape recorder—monophonic in those days—was set up in the vestry where with complete acoustic separation from the body of the church it was possible to monitor from a loud-speaker. The machine was a Brenell 5 M.

Unfortunately on that occasion the recording was marred by the presence of a faint but none-the-less obtrusive click at regular thirty second intervals. This was something of a mystery until traced to a master clock feeding some fifteen or more slave clocks scattered about in the church and adjacent halls. On investigation it was found that the master clock, battery operated, emitted a pulse at half minute intervals and this

was either being picked up by the microphone cables passing close by on their way to the vestry or perhaps even by the deck itself. Although the vestry was separated from the clock by a solid brick wall it would still be possible for electrical interference to break through.

Having learnt from that unfortunate experience the precaution was taken of asking the church authorities to be kind enough to disconnect the master clock the next time a recording was taken. With their usual willing helpfulness they only too readily obliged and as a result the recording was excellent without any interference at all.

The rub came a few weeks later when it was learnt that the gentleman who kindly stopped the clock got himself into serious trouble. When re-starting he discovered that every single one of the fifteen slave clocks had to be individually set to precisely the right time in order to get the whole time-keeping system working accurately. Since they were scattered throughout distant parts of the church building complex the enormity of his task and the physical agility which must have been required to perform it can only be imagined.

Thinking over the more unfortunate aspects of that little episode we decided regretfully that when recording the St. Nicholas Consort we would not ask for the privilege of having the clocks stopped again. The only solution would be to keep our cable runs clear of the master clock itself and that ruled out using the vestry as a recording station. We would have to set up our equipment in the body of the church itself, a position which carries with it many disadvantages. Most serious is the need to abandon monitoring by loudspeakers because such standard practice is obviously impossible when working in the same acoustic as the sound source.

From our preliminary discussions we established that the choir was to be

arranged across the chancel steps. We knew that in this church there is a lady chapel situated at the south side of the chancel and separated from it by a curtain, and so decided to take up our recording station there. This position would have the advantage that we should be out of sight, but by pulling the curtain back slightly and craning our necks we should just about be able to see the conductor around the pillar which supports the chancel arch. That same point also provides an unobstructed view of the organist as the console and organ chamber are on the other side of the chapel.

After arriving on the site with the equipment we soon located a mains power point. Unfortunately it was one of the old-fashioned, two-pin, no-earth type, so we ran a separate earth wire from the hot water pipes hoping this would be better than nothing. If, by the way, you should ever find yourself stuck under similar circumstances without an obvious earth connection you should be very careful indeed about connecting to any pipework in a building. Connection to a gas pipe is extremely dangerous and could cause an explosion whilst connection to water pipes is often inefficient in these days of plastic plumbing.

To return to our own project we found ourselves with the minimum of time to set up the equipment. All the pundits repeatedly tell us that simplicity is the key to good live recording techniques so we decided to work with a single stereo pair of Sennheiser MD 411s. To match the low impedance microphones to the Truvox PD 202 deck we used one channel of our mixer for the left-hand channel and a microphone pre-amp unit for the right, feeding into the Auxiliary inputs on the deck. The two microphones were mounted on a short cross member on a tall stand placed immediately behind the conductor in the central aisle of the nave and tilted slightly downwards towards the choir with an

angle of about eighty degrees between them.

Monitoring was a problem as we only had a single set of headphones wired for mono; this meant we would only be able to monitor one channel at a time. Fortunately the Truvox deck does provide a suitable output for monitoring on headphones and so at least we saved ourselves the trouble of transporting and using a separate stereo amplifier. Under such circumstances we have found the biggest problem to be separating the actual sound from the headphone signal. We have no doubt at all that monitoring via loudspeakers in a separate room is the only really satisfactory solution.

Time was certainly pressing on this assignment. There was no rehearsal in the building before the recital and so we had no chance to set levels. Everything had to be literally "played by ear." We were soon made uncomfortably aware of yet another snag. Liaison between conductor and recording engineers is essential as otherwise the tape transport cannot be set in motion and (approximate!) levels set before the first note of an item is performed. Usually communication is easily established by a prearranged system of hand signals or nods. In the present case we found it difficult to follow the conductor's intentions, although quite obviously his choir was well used to his signs. Once or twice the pause control was released just that little bit too late and the recording started with a wow on the opening phrase. However much of the material recorded was quite good and presented a very satisfactory stereo image. We found the excellence of the stereophonic side of the recording to be extremely interesting since, as mentioned earlier, we had been confining ourselves to the use of the simplest possible microphone arrangement. Perhaps those experts who advocate simplicity are right after all!

Those of you who might have read the second article of this series published in the May issue of *TAPE Recording Magazine* will recall our first experience in stereophonic recording at St. Augustine's Church, South Kensington. We then explained how we fell into serious error by assuming that the disposition of performers would be the same as it had been for a previous monophonic recording taken in the same building. That original monophonic recording had been a performance of a Mozart Mass by the Non Nobis choir and orchestra and so we were delighted to hear that they were to perform another Mozart Mass in connection with the church's Patronal Festival. Remembering the difficulties encountered when we last

Fig. 1. Layout of the church of St. Margaret the Queen, Streatham Hill, showing microphone positions and cable runs for the recording of the recital by the St. Nicholas Consort. Note the position of the Master Clock which caused interference on a previous occasion

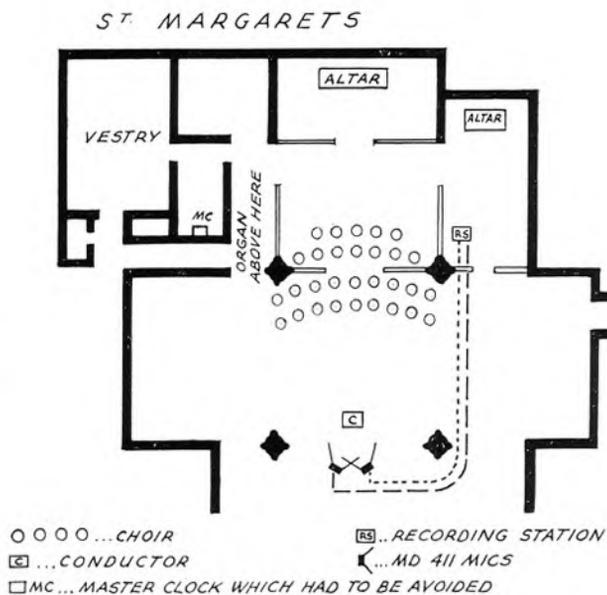
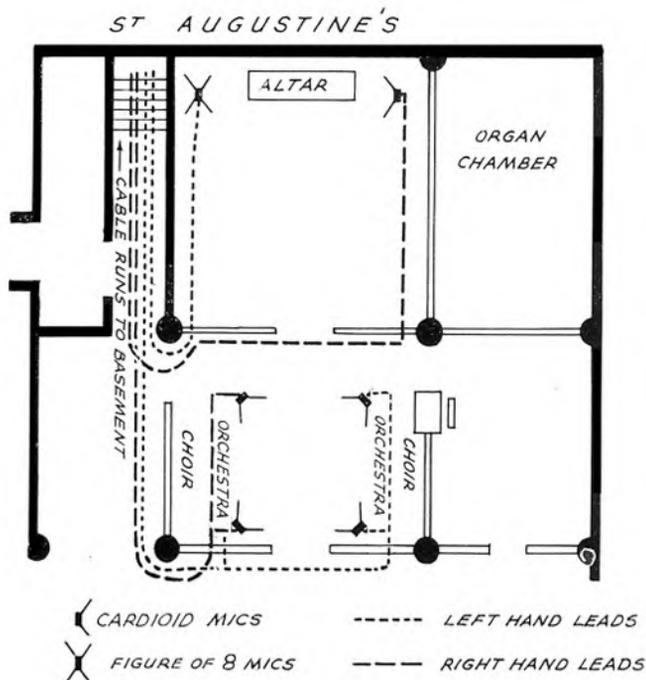


Fig. 2. St. Augustine's Church, Kensington, the location for the recording of the Non Nobis choir who sang the Mozart Mass in D. Here an underground vestry was used as a recording station, so the diagram shows the cable runs disappearing down the stairs



recorded at this church we took special precautions to check the layout of the choir and the orchestra. It was explained that the choir was to be situated in the existing choir stalls at either side of the chancel and the orchestra would be in front of the choir pews. It so happens that the chancel of this church is wide enough for such a convenient arrangement whilst leaving a considerable passageway down the centre for the normal ceremonial to take place.

With such a divided sound source we decided to use four Sennheiser MD 411s to cover the choir, all mounted on tall stands. Two would be placed at each

side of the choir on the north side of the chancel and angled slightly inwards towards the south thus covering one half of the choir and orchestra. These two microphones, wired in parallel, were fed by way of one channel of our mixer into the right-hand Auxiliary input of the Truvox PD 202. A similar microphone arrangement on stands on the south side covered the other half of the choir and orchestra and these two, also wired in parallel, were fed via a microphone line transformer into the left-hand Microphone input of the Truvox deck. A Reslo RBTL was mounted on the north side

Please turn to page 305

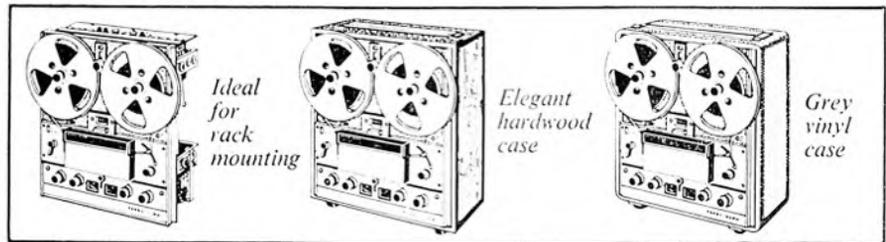
Ferrograph Series 7 - a lifetime of recording

Ferrograph Tape Recorders have been famous ever since 1949. A lifetime's experience of making fine recorders goes into every one of Ferrograph's brilliant new Series 7.

And there is a lifetime's recording *in* every Ferrograph instrument. Many of the earliest Ferrographs are giving perfect service today - twenty years later. You can be sure your Ferrograph will do the same for you. It will give dependable service for many, many years to come. It will keep its value. It will need the minimum of service. Spare parts will remain available for a lifetime's recording. That's how Ferrograph got its name.

Available in Mono, and in Stereo with and without end amplifiers; combining a unique range of 30 recording facilities, including:

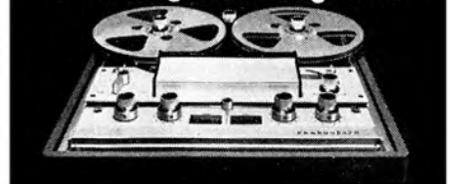
- All silicon solid-state electronics with FET input stages and wide input overload margins.
- Vertical or horizontal operation.
- Unit construction: The 3 individual units i.e. tape deck, power unit and amplifier complex are mounted on a single frame easily removable from cabinet for service or installation in other cabinets or racks.
- 3 motors (no belts). 3 tape speeds.
- Variable speed spooling control for easy indexing and editing.
- Electrical deck operation allowing pre-setting for time-switch starting without need for machine to be previously powered.
- Provision for instantaneous stop/start by electrical remote control.
- Single lever-knob deck operation with pause position.
- Independent press-to-record button for safety and to permit click-free recording and insertions.
- 8½" reel capacity.
- Endless loop cassette facility.
- Internal loud speakers (2)—1 each channel on stereo, 2 phased on mono.
- 4 digit, one-press re-set, gear-driven index counter.
- 2 inputs per channel with independent mixing (ability to mix 4 inputs into one channel on stereo machine).
- Signal level meter for each channel operative on playback as well as record.
- Tape/original switching through to output stages.
- Re-record facility on stereo models for multi-play, echo effects etc, without external connections.
- Meters switchable to read 100 kHz bias and erase supply with accessible preset adjustment.
- Three outputs per channel i.e. (1) line out—level response. (2) line out—after tone controls. (3) power output—8-15 ohms.
- Power output 10W per channel.
- Independent tone controls giving full lift and cut to both bass and treble each channel.
- Retractable carrying handle permitting carrying by one or two persons.



U.K. Retail prices from £175 incl. P.T.

Please see next page for list of Ferrograph Stockists

**the tape recorder with
the hearing-is-believing sound**



FERROGRAPH

The Ferrograph Co Ltd, Mercury House, 195 Knightsbridge, SW7

Telephone: 01-589 4485

Listen for yourself

To *know* the Ferrograph Series 7 you must look at it, listen to it, for yourself. You will find it in stock at many of the best tape-recording and Hi-Fi specialists in the country, including the following:

Ferrograph stockists

- | | | | | |
|---|--|---|--|--|
| <p>London Dealers
C C Goodwin (Sales) Ltd
7 The Broadway Wood Green
N22</p> <p>Francis of Streatham
Tape Recorder Specialists
169-173 Streatham High Road
SW16</p> <p>Hampstead High Fidelity
91a Heath Street NW3</p> <p>Imhofs
112-116 New Oxford Street
WC1</p> <p>Largs of Holborn
76-77 High Holborn WC1</p> <p>Nusound
242-244 Pentonville Road N1</p> <p>Nusound
82 High Holborn WC1</p> <p>Nusound
228 Bishopgate EC2</p> <p>Nusound
360 Kilburn High Road NW6</p> <p>Nusound
36 Lewisham High Street
SE13</p> <p>Nusound
2 Maryland Station E15</p> <p>The Recorder Co
186-188 West End Lane
West Hampstead NW6</p> <p>REW (Earlsfield) Ltd
266-268 Upper Tooting Road
SW17</p> <p>REW (Earlsfield) Ltd
146 Charing Cross Road WC2</p> <p>Telesonic Ltd
92 Tottenham Court Road W1</p> <p>Teletape Ltd
33 Edgware Road W2</p> <p>Teletape Ltd
84-88 Shaftesbury Avenue W1</p> <p>Aberdeen
Aberdeen Radio Co
12 Hadden Street</p> <p>Aberdeen Sound Centre Ltd
25a Belmont Street</p> <p>Banstead
Raylec Ltd
43 Buff Parade High Street</p> <p>Birmingham
Chas H Young Ltd
170-172 Corporation Street
Birmingham 4</p> <p>CH (Hi-Fidelity) Ltd
167-169 Bromsgrove Street
Birmingham 5</p> <p>Cine-Equipments Ltd
Audio Visual Department
9a Dale End Birmingham 4</p> | <p>Blackburn
Holdings Audio Centre
39-41 Mincing Lane</p> <p>Blackpool
F Benfell Ltd
17 Cheapside (Abingdon St)</p> <p>Bolton
Harker & Howarth
Churchgate</p> <p>Boscombe
Tape Recorders
(Bournemouth) Ltd
874 Christchurch Road</p> <p>Bournemouth
Forrester's
National Radio Supplies Ltd
70-72 Holdenhurst Road</p> <p>Brighton
Averys
77 St James's Street</p> <p>Lanes Radio Ltd
11 Gardner Street</p> <p>Bristol
Audio Bristol
Park Street Avenue Bristol 1</p> <p>Bristol & West Recording
Service Ltd
6 Park Row Bristol 1</p> <p>Tape Recorder & Hi-Fi
Centres Ltd
82 Stokes Craft</p> <p>Bromley
Bromley Sound
32 Letchworth Drive</p> <p>Bury
J Smith & Son
(The Rock) Ltd
184 The Rock</p> <p>Cambridge
University Audio
1 & 2 Peas Hill</p> <p>Canterbury
Canterbury Hi-Fi Centre
26 St Dunstan's Street</p> <p>Cardiff
The Roath Radio &
Television Co
23-27 Morgan Arcade
Cardiff CF1 2AF</p> <p>Sound Film Services
(Cinema Liaison Ltd)
27 Charles Street</p> <p>Tape Recorder & Hi-Fi
Centres Ltd
Oxford Arcade The Hayes</p> <p>Castle Douglas
John Mitchell
141 King Street</p> <p>Coventry
Coventry Hi-Fi Centre
13 City Arcade</p> <p>Coventry Tape Recorder
Services
33 King William Street</p> | <p>Crewe
Charlesworths of Crewe Ltd
28 Hightown</p> <p>Darlington
McKenna & Brown Ltd
11 Bond Gate</p> <p>Derby
Bucklands of Derby
41-49 London Road</p> <p>Doncaster
Tom Jaques Ltd
Sound & Electronic Engineers
16 Wood Street</p> <p>Dorchester
Suttons
Hardye Arcade</p> <p>Edinburgh
J B Fulton Associates Ltd
16 Howe Street Edinburgh 3</p> <p>J J Mitchel (Cameras) Ltd
Haymarket Corner
Edinburgh 11</p> <p>Epping
Chew & Osborne Ltd
148 High Street</p> <p>Farnham
Lloyd of Keyworth Ltd
26-28 Downing Street</p> <p>Glasgow
McCormack Ltd
33 Bath Street</p> <p>Goodmayes
Unique Radio Ltd
The Facade High Road</p> <p>Gravesend
Bennett & Brown
(Gravesend) Ltd
58 60b 60c Wrotham Road</p> <p>Grimsby
Lincolnshire Instrument Co
Hi-Fi House 69-71 Cartergate</p> <p>Guildford
Marrow Sound Ltd
229 Epsom Road Marrow</p> <p>P J Equipments Ltd
3 Onslow Street</p> <p>High Wycombe
Hughes Photographic & Hi-Fi
Specialists
7 High Street</p> <p>Huddersfield
Woods
The Music Shop New Street</p> <p>Ilford
Nusound
87-100 Ilford Lane</p> <p>Kettering
Paul Taylor & Partners Ltd
1 Silver Street</p> <p>Leeds
Beckett Film Services Ltd
Audio-Visual Specialists
46-48 The Headrow Leeds
LS1 8EL</p> <p>Vallance Audio Lab
20 New Market Street</p> | <p>Leicester
United Film Service
13 King Street</p> <p>Liverpool
Beaver Radio (Liverpool) Ltd
20-22 Whitechapel</p> <p>Lowestoft
Hughes (Lowestoft) Ltd
62 London Road North</p> <p>Maidstone
Sloman & Pettitt
Pudding Lane</p> <p>Manchester
Lancs High Fidelity Ltd
248 Wilmslow Road
Manchester 14</p> <p>Mansfield
Syd Booth
11 Queen Street</p> <p>Middlesbrough
McKenna & Brown Ltd
Linthorpe Road</p> <p>Newcastle
Clement Wain Ltd
Redlion Square</p> <p>Newcastle upon Tyne
Turners (Newcastle upon
Tyne) Ltd
Camera House Pink Lane</p> <p>Norwich
Suttons
16-18 Exchange Street</p> <p>Nottingham
The Audio Centre
28-30 Pelham Street</p> <p>Peter Anson Electronics
165 Arkwright Street</p> <p>Nottingham Tape Recorders
Ltd
11 Burton Street</p> <p>Oxford
Westwoods
46 George Street, Oxford</p> <p>Plymouth
Albert E Ford Ltd
84 Cornwall Street</p> <p>Portsmouth
H R Knight Ltd
71 Tangier Road</p> <p>Ramsgate
Tom Joyce
147 Boundary Road</p> <p>Redcar
McKenna & Brown Ltd
135 High Street</p> <p>Reigate
Alan Laursen & Co
9 Bell Street</p> <p>Salisbury
Suttons Music Centre
Blue Boar Row</p> | <p>Sheffield
Sheffield Sound Centre
101 Ecclesall Road</p> <p>Solihull
C H (Hi-Fidelity) Ltd
12 Drury Lane</p> <p>Southampton
Hamilton Electronics
(Southampton) Ltd
35 London Road</p> <p>Suttons
421 Shirley
South Shields
Savilles
5-7 Keppel Street</p> <p>Stafford
Tom Reekie Ltd
10 Bridge Street</p> <p>Stockport
W J & M Baylis Ltd
611 Gorton Road Reddish</p> <p>Stockton-on-Tees
Bond & Mason
Radio-TV-Hi-Fi-Electrical
94 Church Road</p> <p>Stoke-on-Trent
Wilson's Radio Ltd
30-32 Liverpool Road</p> <p>Sudbury
The Record Shop
King Street</p> <p>Sunderland
Saxons (Sunderland) Ltd
Photographic Dealers
20-22 Waterloo Place</p> <p>Swansea
Holt
Radio, TV Hi-Fi, Audio
Electronics
Picton Arcade Oxford Street</p> <p>Teddington
Daytronics Ltd
119a High Street</p> <p>Truro
Fords (Prop E J E Vivian)
9 Pydar Street</p> <p>Wealdstone
K J Enterprises
17 The Bridge</p> <p>Wilmslow
The Hi-Fi & Tape Recorder
Lounge
Green Lane</p> <p>Woking
D H Hughes & Sons Ltd
29 High Street Knaphill</p> <p>Wolverhampton
M R Warner & Son Ltd
26 Chapel Ash</p> <p>Worthing
Bowers & Wilkins Ltd
1 Becket Buildings
Littlehampton Road</p> |
|---|--|---|--|--|

If none of these is near enough to you, in case of difficulty, or for free literature, send us the coupon, or give us a ring on 01-589 4485

FERROGRAPH

To The Ferrograph Co. Ltd., Mercury House, 195 Knightsbridge, London SW7

- Please send me a free brochure on the Ferrograph Series 7
- or the new Ferrograph Manual for which I enclose £1
- NAME.....
- ADDRESS

TRG



IT has always been our belief that the uses of magnetic tape in educational applications are limited by the suitability of the equipment available. No one would deny that a conventional domestic tape recorder, costing perhaps best part of £100, is not an ideal instrument to place in the hands of a young—or even not so young—student. But modern trends in educational techniques rightly favour personal involvement by the individual members of the class, whether at kindergarten or university level. It is primarily this conflict between the need to allow maximum participation and the rigid limitations of ordinary recording machines that has inspired the design of completely new devices whose facilities are tailored to specific educational requirements and yet at the same time can be handled safely and usefully by a five-year-old.

As might be expected, the basis of the new system, designed by Tape Systems Ltd. for E. J. Arnold & Son Ltd. of Leeds, is a cassette. Using the sealed-in spool-to-spool principle and called a "Packette" it contains ordinary ¼-inch tape and runs at a speed of 1½ ips. The Packette is not compatible with any other cassette system and can only be used in one of the Arnold Packette playback or record/playback machines. Details of the system were made public for the first time at the recent NAVEX 69 exhibition at Olympia when we were given facilities to handle the equipment and to discuss its features and potentialities with the design staff of Tape Systems Ltd.

One of our first questions was: why yet another cassette system? The simple answer as given by Dr. Peter Shardlow is that in his opinion none of the existing cassette or cartridge systems is sufficiently flexible or robust to fulfil the very stringent requirements of his original concept. Not only has he designed into the Packette equipment all the facilities required in the classroom, even including the sophisticated needs of the language laboratory, but it also had to be fool-proof in every way, undemanding in its service requirements and, finally, have a price-ticket that makes absolute sense in this period of restricted financial resources. With such a brief to work to, it is not surprising that the Packette system is quite different to any other product, and we feel that the use of a non-standard cassette is fully justified by the efficiency and flexibility it has brought to the "hardware," the machines themselves.

Fabricated in brilliantly coloured high-impact plastic, the three models provide all that could be required for teaching the widest possible range of age groups. AV200, orange in colour, is a simple playback mechanism complete with its own internal speaker, headphone connection and output of 5 watts for external speaker.

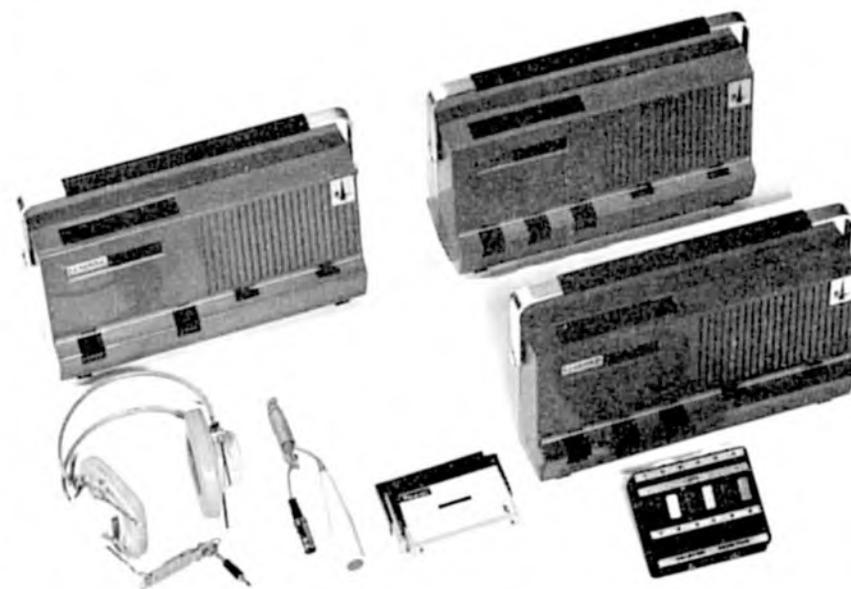


Fig. 1. The range of three different models of Packette machines by E. J. Arnold & Son Ltd. Specially developed for educational use, this equipment uses a new cassette containing standard width recording tape and running at a speed of 3½ ips. All the research and development has been carried out by Tape Systems Ltd., and their brief was to evolve a machine that could be used by the youngest child and yet, in the most advanced model, also offer the basic requirements of a sophisticated language laboratory. Finally, the cost had to be kept down—right down to under £50. At the bottom right-hand of the illustration is the Radio Tuner, an accessory which slips into the machine in place of a Packette cassette and immediately converts it to an effective A.M. radio receiver

AV250, colour green, has all the facilities of a four-track tape recorder plus the 5 watts output of the AV200. Lastly, the AV275, colour blue, includes all the facilities of the other two machines plus the necessary switching to make it a self-contained language laboratory. The most expensive of these, the AV275, will be available to schools and educational establishments at a price that will cause quite a few eyebrows to rise. Just £33 plus £8 1s. 4d. purchase tax. Not bad for a miniature language laboratory? And the least costly of the range, AV200, is priced at £22 plus £5 7s. 6d. purchase tax. We have confirmed with E. J. Arnold Ltd. that they will supply at these same prices to members of the public by post from

their Leeds address, Butterley Street, LS10 1AX.

It will be seen from the illustrations that the equipment is thoroughly unconventional in layout. Weight we guess to be around seven to eight pounds, and the machines can be conveniently carried by the substantial handle provided. Power requirements are ordinary 240 Volts AC mains, but the power-pack can be simply disconnected when the machines will run from 12 Volts DC.

The Packette itself is dropped vertically into a slot at the top and when pressed into place is ready for instant use. Depression of the Playback key gives audio output at the internal speaker, the

A NEW LOW-COST CASSETTE SYSTEM PROMISES LANGUAGE LABORATORY FACILITIES FOR ALL

EDUCATION - A NEW DEVELOPMENT

TRM Report

EDUCATION - A NEW DEVELOPMENT

CONTINUED FROM PREVIOUS PAGE

socket for headphone connection and the external speaker socket. The student can play back pre-recorded material, record his own response and then compare the two. On model AV275 the master tutorial track is fully protected against accidental erasure and on all models the rewind key provides a very necessary back-space facility for instantaneous repeats of any section. Operation of the piano-key type controls has been carefully adjusted to suit the strength of a five-year-old child.

A comprehensive range of accessories is available, including a very reasonably-priced AM radio tuner which when slipped into the Packette slot immediately converts the machine to a four-station pre-tuned receiver. A very useful distribution box enables either the output of one machine to be fed to six students at one and the same time or, alternatively, six audio machines can be monitored by a single teacher.

Pre-recorded Packettes with twenty minutes programme time on each of the four tracks are being published by E. J. Arnold & Son Ltd., and they will include not only language courses but also titles such as *Listening to Sounds* and *Mathematics in Sound* as well as a repertoire of classical and other music specially suitable for school use. Costs vary from 42s. plus 15s. 6d. each to 57s. plus 21s. purchase tax. High-speed copying facilities are also available so that the teacher can record his own lessons and then have them duplicated so that his students will hear the sound of the voice that is most familiar to them.

We were so impressed with the Packette system that we feel sure it will rapidly be accepted for a wide variety of applications wherever training is involved. It is so simple to use. The individual parent could invest in the equipment to help his child's education with every confidence—and at least as important—without making a very great financial sacrifice. And in industrial training the Packette system could provide one of the most useful and lowest-cost tools that have ever been devised.

Fig. 2. A cut-away of the tape transport system used in Packette equipment showing a cassette in place and the three control keys which operate the functions and the transport. Rewind is so arranged that immediately the key is released the mechanism automatically assumes the playback mode. By this means repetition of short passages is merely a matter of lightly touching a single key for a second or two

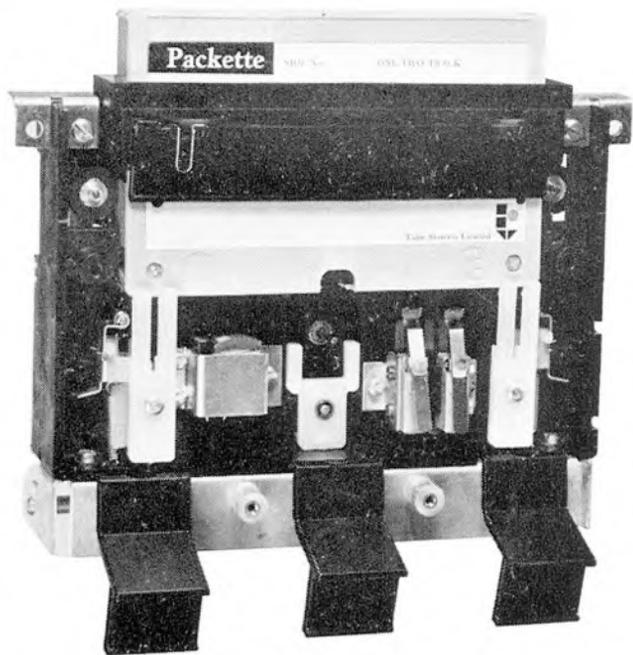


Fig. 3. Production of Packette equipment is well under way as can be seen from this picture of the assembly lines. The latest integrated circuit techniques will shortly be built into the machines so that the manufacturer is able to claim ultimate standards of reliability and longevity



NATO, RN, NASA, BBC, use Uher tape-recording equipment...



4000 Report - L

Royal De Luxe Stereo

4000 REPORT SERIES

Three different models of the Uher 'Report' are now available.

4000 Report - L Specification. 2 Tracks conforming to international standards. Tape reels diam.—5". Tape speeds (ips) $\frac{1}{8}$, $1\frac{1}{8}$, $3\frac{3}{8}$, $7\frac{1}{2}$. Frequency range (cps) 40-4, 500/40-10,000 and 40-16,000/40-20,000. Dynamic volume range (db) 40 at $\frac{1}{8}$ ips, 46 at $1\frac{1}{8}$ ips, 50 at $3\frac{3}{8}$ ips, 52 at $7\frac{1}{2}$ ips. Wow and flutter (max \pm %) 0.2 at $7\frac{1}{2}$ ips. Recording mono. Half-track. Playback mono half-track. Power output one watt.

Monitoring via headphones or speaker. VU meter+ three digit tape counter. Tape stop-start remote control, collectorless motor controlled by 8 transistors. Power supply from 6V, 12V, 24V car battery, from rechargeable accumulator or 5 type L.P. U2 batteries or mains unit. 17 transistors. Inputs: Microphone :-1mv at 200 ohms. Radio :- 2mv at 47K ohms. Pick up :- 30mv at 1 megohm. Weight 6 lbs (approx). 125 gns. +10% tax surcharge.

4200 Report Stereo Affording all the advantages of the successful 4000 Report-L in size, style and specifications—plus stereo. 152 gns. +10% tax surcharge.

4400 Report Stereo Again with all the advantages of the 4000 Report-L—plus stereo and maximum economy of tape on four tracks without deterioration of reproduction quality. 152 gns. +10% tax surcharge.

ROYAL DE LUXE STEREO

Horizontal or vertical operation. Optimal hi-fi quality. Four track operation (convertible to two track). 2 x 10 watts power output. Straight through amplifier operation. Built-in dia pilot for automatic slide projection. Switchable A-B monitoring. Mixing and echo facilities. Multi-play Syncro-play and physiological volume control. Four speeds—to mention some of its facilities. 238 gns. +10% tax surcharge.

...so does John Harding.

Engineer by trade, music-lover and stereo enthusiast by inclination.

He knows that Uher is chosen to record signals from space. To help train the Royal Navy in weapons systems. To capture the sounds of history being made.

He knows that Uher equipment is best for his own purposes as well.

Tough yet sensitive, compact yet versatile, it gives him the finest sound reproduction he could wish for.

The first happy gurgling of his first-born child, the racket of a machine under test, the full grandeur of a symphony orchestra—John Harding has them all taped.

Taped by Uher because he

doesn't reckon he can do any better than that.

Professionals pick Uher equipment as the tools of their trade.

But they're equally available, equally accurate, equally satisfactory, for the discerning amateur. There's a Uher tape-recorder to meet *your* requirements.

Post coupon for details from
Bosch Limited, SR Uher Division, Watford, Herts.

Name _____

Address _____

_____ T M/S

BOSCH LIMITED A member of the Bosch Group

UHER

DISTRIBUTED IN THE U.K. BY

BOSCH

BOSCH LIMITED, WATFORD, HERTS. TELEPHONE: WATFORD 44233

NONE of us can be unaware of the fact that we have just lived through what some Americans are calling the most important week in the history of mankind since the Creation. For the first time that curious biped, man, has left his home environment to travel to—and return back from—another stellar body. No one would wish to undervalue such a magnificent achievement. We cannot fail to be filled with admiration for the technology and the men responsible for taking this stupendous step forward.

Unfortunately some people who should know better have allowed their enthusiasm to run away with themselves. To talk at this stage of “conquering space” is absurd. In truly cosmic terms the lunar landing represents no more than a single step outside our own front-door. It is only too easy to forget that our own solar system in its entirety is little more than an insignificant speck in our own galaxy—and after looking deeply into the most distant parts of the universe astronomers have concluded that the total number of galaxies must be too great to count.

The ordinary mind is incapable of understanding the significance of dimensions measured in thousands or even millions of lightyears. Excursions on an inter-galactic scale are as far removed from the bounds of possibility today as ever they were. Something more than sophisticated technology will be required to send mankind spinning through the uncharted voids of deep space. It seems to me that travel as we know it today—that is transporting the body physically from point A to point B—is quite impractical for such journeys. And that is a thought which should lead the imaginative mind into all manner of intriguing speculations. Perhaps the final answer will come from the philosophers rather than the engineers; perhaps an attitude of mind will prove to be of greater usefulness than the crude thrust of a mighty rocket engine.

But leaving such conjectures aside did you notice what an important part magnetic recording played in the Apollo 11 mission? Conversations between ground control and the space-ship made constant references to the operation of tape recorders. These appeared to be of the conventional audio frequency kind, although of course statistical recorders would have been widely used as well.

When you come to think of it there is something rather homely about the thought of astronauts using such common-or-garden devices such as domestic-type tape recorders. And, as we heard in the broadcasts, using them with quite a keen sense of humour.

So with congratulations to all those who took part in this great adventure let us at least remember that even when we have

CROSS TALK

By Audios

“conquered” the planets of our solar system we will still hardly have begun to explore our own back garden.

* * *

HOWEVER attractive men might find it to reach for the stars they will still find an equally compulsive gravitational force flowing discreetly from those charming doll-like creatures which nowadays pass for the female of the species. But how rapidly and how frequently does attraction become repulsion when a dolly-girl opens her mouth to speak?

I was both amazed and gratified to find that one of our leading women's magazines, “Woman's Own,” recently ran a special eight-page supplement covering what it called “The Three Graces.” These were listed as Grace of Movement, Grace of Speech and Grace of Manners. How often are these sadly missed in the otherwise smartly dressed young ladies of contemporary society? On Grace of Speech “Woman's Own” says—and I quote verbatim—“A lovely speaking voice has untold charm, fascination—and as much sex appeal as a quart of perfume.” And to acquire this Grace of Speech “Woman's Own” recommends the use of the tape recorder.

Whilst viewing with unashamed horror the total sex appeal represented by a whole quart bottle of perfume (will those responding be provided with gas masks free of charge?) I really must compliment that magazine on having the courage to refer at length to such “old-fashioned” attributes. If a pleasant voice could be acquired only through the medium of the purchase of expensive accessories then you could be quite sure that the advertisers would ensure that all our young ladies were painfully aware of their weaknesses in the voice department. Unfortunately there is no profit in good speech, just as there is no profit in good manners or good movement. So these three qualities, once thought to be the prime requirements for any attractive young lady, are both neglected and derided.

Perhaps “Woman's Own” is bringing to us a new trend in female awareness. If so it will be more than welcome to this columnist. And although magnetic recording might not assist in grace of movement it can help in grace of manners as well as in grace of speech. If you secretly believe that the ladies of your own household could do with a gentle hint in this direction just leave a copy of “Woman's Own” dated July 19 open at page 49 on the tape recorder and hope for the best.

REMINISCING in nostalgic mood I began to glance through a pile of old recordings the other day. When I say old I do mean really old; one or two really hoary old acetate tapes had begun to “weep.” A nasty, sticky, gummy substance was exuding from the cut edges. If they had been placed straight on a play-back machine it could have made a frightful mess. Has anyone else had this trouble with weeping acetate? The newer plastic bases appear to be quite immune from trouble of this kind; I suspect that the only tapes showing this fault will be acetates purchased perhaps eight or ten years ago.

A little judicious cleaning tidied things up but I suspect those same spools will be in a similar condition again in the future. All this is very annoying as those tapes are of particular personal value just because they are so old. The recordings on them are awful. As I listened to some I couldn't believe that I had ever been guilty of perpetrating such technical crimes. But the programme content is irreplaceable—old family records and recordings of events long since past that I would like to be able to hand on to my descendants. Casting a jaundiced eye on some of this messy acetate I wonder if I shall be able to. The moral, of course, is to always use the best tape one can afford.

* * *

ARE you an inveterate weather grumbler? Have you been complaining about the heat/cold/rain/snow/fog recently? If you have it has probably been about the first of my list of horrors—heat.

Have you noticed how your boss completely ignores the obvious fact that it has been much too hot for any self-respecting person to even pretend to work, let alone actually do any? Personally I have been gradually dissolving away in rivers of perspiration with a headache powerful enough to split a pretty hefty log in two.

The last straw was when I planned to do some particularly tricky editing and tape copying in the cool of the evening to avoid total collapse from heat exhaustion. The editing room where I had to attend was at the top of a large private house—really a converted attic. At night the ventilation system was turned off. On arrival the thermometer showed 88° with a strong inclination to explore further into the upper register. After a few minutes the tape recorders were so hot they were more suited to Fanny Craddock's artistry than my own particular brand of cleverness. There was a wet pool growing larger every minute on the seat of the leather chair with me stranded in the middle of it. Splices stuck. It was hard to decide which was the worst: the heat or the woe. If that isn't sheer misery then I would like to know what is?

Don't tell me, I know. Working in such cold that the tape goes solid and the cables freeze. But on this day of July 1969 it's nothing more than wishful thinking.

* * *

HAS Chairman Mao at last come up with a new secret weapon that will ensure the supremacy of the East over the West? Could be. A recent classified advertisement gives a hint of the horrors to come. “For sale. Large quantity of high-powered audio noodles . . .!”

AT VISIT TO THE PLEASANT LAND OF DENMARK - FAMOUS FOR ITS BACON AND ITS HI-FI

IN this age of hydrofoils, hovercraft and jet airliners the Continent of Europe is rapidly becoming an extension of the grass-covered slopes that end so abruptly at Dover. At one time we insular Britons used to regard everything that happened the other side of Dover harbour as foreign, slightly inferior and fit only for patronising amusement. Times have changed, thank goodness. The more one travels the more absurd become those last vestiges of nineteenth century nationalism, the frontier posts. Perhaps before the twentieth century is out we shall be able to rid ourselves of these anachronisms for ever.

Such were the thoughts inspired by a very kind invitation from Highgate Acoustics to join a party of dealers who were to visit the Arena factory in Horsens, Denmark. On the return from Denmark it was proposed to spend a night in Germany at Hamburg. All very casual; it could just as easily have been a visit to Swindon stopping off at Reading on the way back. In fact the journey was probably somewhat shorter since the flight time from Luton to Copenhagen by BAC 1-11 was only a few minutes over an hour.

Of course we were delighted to accept and so were able to have some most interesting discussions with Danish engineers at the factory and also see quite a lot of the very soft and lovely landscape of Denmark. As an unexpected bonus we were able to take a flip across the Sound between Denmark and Sweden in a hydrofoil and so could claim to have visited three countries in four days.

Denmark is of course predominantly an agricultural country and the fine modern roads sweep through a succession of small villages with individual farm-houses interspersed between. One could so easily be travelling through parts of Essex or Suffolk. Many of the older country dwellings are thatched, whilst on the outskirts of a large city such as Copenhagen there is every evidence of wealth and luxury.

The Danes themselves are a most delightful people, only too pleased to

extend the very friendliest of welcomes to their British visitors. On arrival at Copenhagen airport we were greeted by two "Norsemen" in full dress costume, complete with metal helmets and cloaks. Our ceremonial reception was a salute played by these ancestors of the Vikings on ancient brass instruments called "lures." The lure is basically an enormous coil of metal tubing with a bell at the end some four feet above the player's head. We were told that no more than half-a-dozen men in the whole of Denmark can still perform on these instruments which are claimed to be the best part of 3,000 years old. Lures have been discovered in many parts of Denmark and the interesting story is that they are always found in pairs—one with its coil twisted to the right and the other with its coil twisted to the left. That is such a good yarn it could even be true!

We will not sow seeds of discontent amongst our British readership by dwelling too long on the excellence and the variety of the food offered to us. A Danish "open table," a long buffet of cold dishes in what appears to be infinite profusion and variety, has to be experienced to be appreciated. In fact we found that dazzled by the artistry of the display and the bewildering assortment of temptations one tended to eat rather less than perhaps one would at home. That was the only frustration of our visit.

The town of Horsens where the Arena factory is situated is on Jutland, and this involves a sea crossing from Copenhagen in North Zealand. We crossed the Kattegat on a modern comfortable ferry and soon found ourselves being driven up to the smart new Hede Nielsen factory where Arena products are made. Built only eighteen months ago some 600 people work here in spacious, light and airy conditions. They not only make the audio equipment that has made the name famous in the United Kingdom but also a wide range of associated electronic products including radios, radiograms, record players, hearing aids, video tape recorders and of course television sets. One of the Hede Nielsen executives told

AT HOME WITH ARENA

The Editor

us that in Denmark the name Arena means television to the ordinary man-in-the-street, and so it will be appreciated that much of their production capacity is devoted to this product.

However the working areas of the factory are arranged in such a way that the individual production lines are quite separate and completely self-contained. Down one side of the main floor area one can see television sets being assembled whilst parallel lines on the other side are producing audio products. The advantages of modular construction for electronic circuits were appreciated here many years ago and they believe they were one of the first firms to use the technique in standard production items.

As is usual in modern factories there is a lavishly equipped machine room with all manner of giant powered tools fabricating the various metal parts of the equipments. In another room printed circuit boards are etched to very fine tolerance limits. We were impressed by the obvious efficiency and scrupulous cleanliness of the establishment. Many a British worker would be delighted to have the opportunity to work in such conditions.

One of Arena's newest products of

AT HOME WITH ARENA



Fig. 1. The impressive, modern lines of the Hede Nielsen factory at Horsens in Denmark, home of the Arena brand of audio equipment

us that in Denmark the name Arena means television to the ordinary man-in-the-street, and so it will be appreciated that much of their production capacity is devoted to this product.

However the working areas of the factory are arranged in such a way that the individual production lines are quite separate and completely self-contained. Down one side of the main floor area one can see television sets being assembled whilst parallel lines on the other side are producing audio products. The advantages of modular construction for electronic circuits were appreciated here many years ago and they believe they were one of the first firms to use the technique in standard production items.

As is usual in modern factories there is a lavishly equipped machine room with all manner of giant powered tools fabricating the various metal parts of the equipments. In another room printed circuit boards are etched to very fine tolerance limits. We were impressed by the obvious efficiency and scrupulous cleanliness of the establishment. Many a British worker would be delighted to have the opportunity to work in such conditions.

One of Arena's newest products of

which they are extremely proud is their T 9000 Hi-fi equipment. It comprises a high grade amplifier with a rated power output of 75 watts RMS per channel together with a sensitive FM stereo receiver. Although the equipment might be regarded as "integrated," in fact separation between tuner and amplifier has been emphasised by the design. Encased in Brazilian rosewood or American walnut the long, low, slim-line has been adopted with the overall appearance of two separate units standing one on top of the other. This helps to give a feeling of lightness when the equipment is viewed from the front or sides; viewed from the back it is obvious that one is looking at a single appliance instead of two.

The T 9000 uses 64 silicon transistors and 39 diodes built in to no less than 15 Arena audio modules. Of these 15 modules 6 are completely new developments which the manufacturer claims to represent an entirely new concept in electronic engineering, putting the tuner amplifier into a class of its own.

It was not our job to conduct a technical investigation into the performance of the appliance so we can only report that it presents one of the most pleasing

AT HOME WITH ARENA

continued



Fig. 2. Assembly of the T9000 integrated tuner amplifier. From this illustration it can be seen that the device is built as a single unit, although the final styling emphasises the separateness of the tuner and amplifier sections

which they are extremely proud is their T9000 Hi-fi equipment. It comprises a high grade amplifier with a rated power output of 75 watts RMS per channel together with a sensitive FM stereo receiver. Although the equipment might be regarded as "integrated," in fact separation between tuner and amplifier has been emphasised by the design. Encased in Brazilian rosewood or American walnut the long, low, slim-line has been adopted with the overall appearance of two separate units standing one on top of the other. This helps to give a feeling of lightness when the equipment is viewed from the front or sides; viewed from the back it is obvious that one is looking at a single appliance instead of two.

The T9000 uses 64 silicon transistors and 39 diodes built in to no less than 15 Arena audio modules. Of these 15 modules 6 are completely new developments which the manufacturer claims to represent an entirely new concept in electronic engineering, putting the tuner amplifier into a class of its own.

It was not our job to conduct a technical investigation into the performance of the appliance so we can only report that it presents one of the most pleasing

and satisfying examples of Scandinavian styling that has come to our notice. The T9000 would certainly grace any British living room and if any ladies should be terrified by the appearance of a few push buttons let us hasten to add that it is no more difficult to use than any other tuner amplifier on the market—in other words it could be safely and properly operated by any seven-year-old child.

We were given a demonstration of the equipment using a pair of Arena HT 25 speakers switched alternatively with a pair of HT 26's. Unfortunately the one facility lacking in the Hede Nielsen factory is a proper demonstration auditorium. This is a serious omission because the acoustics in the listening area in which the demonstration took place were very far from perfect—so much so that we felt sorry for the engineers who were trying hard to do justice to their equipment. It would be unfair to comment critically on audio quality as heard under such difficult conditions. On our return to London we took steps to arrange to attend another demonstration locally in more favourable surroundings. We shall report on this editorially in due course.

We opened our report on this visit to Denmark with comments on the near-

ness of our European friends. This feeling was underlined when we were told that the drive units in the loudspeaker enclosures are manufactured by our old friends KEF Electronics Limited of Tovel, Maidstone in Kent with Mr. Raymond Cooke, a figure well known to British audio enthusiasts, acting as consultant. And when we looked at the range of record players we were delighted to see that they were all fitted with Garrard units also made in this country. In fact Hede Nielsen are sales agents for the whole of Denmark and Sweden for Garrard products.

Leaving Denmark was rather like leaving home. Some eighty of our leading audio retailers had taken part in this visit and they were unanimous in their appreciation of the hospitality and helpfulness of their hosts. For all of us it was a memorable experience, bringing yet another Continental manufacturer of high quality audio products into closer perspective. Thank you Hede Nielsen and thank you Highgate Acoustics. We shall watch the progress of Arena products in this country with a much more lively interest in the future knowing now what thoughtful care goes into their design and manufacture.

Action speaks louder than words. Telefunken 202 automatic.

Talk's cheap.
It's not words you want but
action.

Easy action.
So Telefunken have made their
new 202 automatic.

In the once-only situation when
everything has to be right first time,
just switch to automatic and you'll
get a perfect recording.

Everytime.
Telefunken have even made it
easy to do it yourself, a flick of
the switch and you're on manual.

7" spools give 6 hours playing
time at 3 $\frac{3}{4}$ ips.

Large frontal speaker and 2 or 4
track models available.

Horizontal or vertical operation
and transistorised to save space.

But there's too much to the
202 automatic to mention here,
we're short on space too.

Hear it for yourself at your
Telefunken dealer now, or write
for details.

AEG/Telefunken
27 Chancery Lane London WC2





NATURE NOTES

FOR SEPTEMBER

BY RICHARD MARGOSCHIS

It is generally accepted that natural history sound recordings are made of animals that are wild and free. This, like most other similar statements, requires some qualification. It can be argued that sounds made by farm animals are sounds of nature and I would agree that they are, but could one say that being domesticated they are truly wild and free? The fact is, I think, that having been domesticated for so many years we can accept the sounds they make as being their natural and normal vocalisations.

We cannot, however, say the same thing about a truly wild animal, such as a fox, which has been taken young and kept as a pet. The various sounds that it makes when its master is about, perhaps with food, might have no bearing whatsoever on the sounds it would make in its normal habitat. The same applies, in my opinion, to the halfway state where animals are left to live in the wild but are conditioned to come to a certain place at a certain time for food. They come to know that their food supply is assured and so their *truly* wild state must be destroyed to some degree. I do not want to suggest that the study of animals in this way is wrong; I know that many facts come to light from such work, facts which would otherwise be very difficult to determine. There is no doubt room for a study of recordings made of captive animals compared with the same species in the wild.

Nevertheless, there are instances when it is accepted practice to make recordings of natural sounds under controlled conditions with the animal held in *temporary* captivity. This particularly applies to insects and may also be applied to certain small mammals. On the other hand there is no reason why attempts should not be made to record them in the wild state, a project which offers a very great challenge.

So far as insects are concerned, in this country the various species of crickets and grasshoppers probably come to mind first; their stridulations can still be heard on warm days in August and early September. These stridulations produce sounds in the high frequency register, in fact some are ultrasonic, and considerable care must be taken to prevent overmodulation. With an open microphone the great difficulty is in getting it near enough without disturbing the insect, and even with a reflector the signal to *ambient* noise ratio is normally bad because of the low level of the signal and the high amplifier gain required.

There are two answers. Background noise is generally at a very much lower frequency than the wanted signal and so can be filtered out. The alternative is to capture the subject and make the recordings in more suitable conditions such as a quiet room at home—if you have a really quiet room! Even in these conditions background rumble can still be a problem and filtering might be necessary.

My friend Jack Skeel, who lives in Kent, has done a considerable amount of this work and I have seen a very interesting “mini-studio” which he has developed especially for the purpose; it is virtually soundproof and when I have more space I will describe its construction.

The aural identification of birds is a great asset which comes only with long practice; as well as assisting visual identification it can quickly tell you—just by standing to listen—what birds are in a particular area. The hard way, and perhaps the best, is to learn it in the field but it can be assisted by listening to birdsong on records of which the latest addition to a growing list is *Birdsong in*

Close-up, just released by Pye Records under the Marble Arch label No. MAL 1102. All the recordings are by Victor Lewis, one of the leading birdsong recordists in this country, who is known for his open microphone technique. He makes himself familiar with a particular bird's movements and habits before attempting to record it and then places his microphone close to the song-post—he never uses a reflector. The disc carries recordings of 40 species—over 100 different items—from Farm and Homestead, Open Countryside, Woodland and Copse, Gravel Pit and Marshland. There is no spoken commentary on the disc, instead valuable needle time is saved by a printed leaflet which describes each sound sequence and is of great assistance to the uninitiated; a special sound signal keeps the reader in step with the sound. At 14s. 6d. this 12-inch L.P. is a really good buy.

About the time that these notes were completed I attended, on July 2, the opening of the British Library of Wildlife Sounds, a new section of the British Institute of Recorded Sound—more about this next month.

There has been a change in the rules of the 3M Wildlife Recording Contest. The special class for rarities has been discontinued but there is nothing to prevent such recordings being entered in Classes 1 and 2. I think that the new subject for Class 3 will have a much wider appeal, it is “outdoor ‘atmosphere’ recordings featuring wildlife sounds.” The duration of such an entry must be not less than 40 seconds and not more than three minutes.

An atmosphere recording is really a character story, for just as any particular piece of countryside has its own visual characteristics, which can be recorded on film, so it has its aural ones which can be recorded on tape. To be true the recording must contain all the sounds of the area but none must be predominant, not for more than a few seconds anyway. The balance, therefore, must be just right. In nature this balance is changing all the time and there is very little that you can do about it beyond moving nearer to or further away from any fixed sound source, such as a stream. I find that generally the best approach is to make really long runs, sometimes the whole of a tape, and select the best parts when back at home. Remember, for the purposes of the competition it must be a natural recording; you are not allowed to *add* any sound but you are allowed to *edit out*. and so use should be made of the razor blade to remove any small blemishes. One final point, documentation is every bit as important with atmosphere recordings as it is with any other natural history recording.

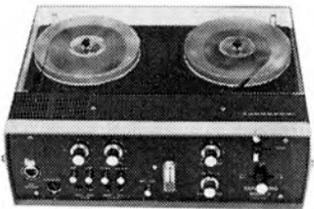
Scotch

MAGNETIC TAPE

WILDLIFE SOUND RECORDING CONTEST

FIRST PRIZE

Tandberg Model 11
Field Recorder plus
Grampian 24"
Parabolic Reflector
(Total value £183)
for 3M Wildlife Sound
Recordist of the Year



JUNIOR AWARD

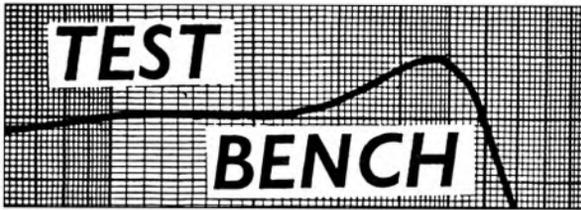
Bush TP.60 Cassette Recorder (value 26 gns)

Rules and Entry Forms from
W. R. Bowles, 3M Company Ltd., 3M House,
Wigmore Street, London, W1A 1ET
(closing date November 30th 1969)

Sponsored by 3M in conjunction with
The Wildlife Sound Recording Society

3M and 'Scotch' are trade marks





FERROGRAPH 702

INVESTIGATED BY R. HIRST AND D. KILLICK

FERROGRAPH 702 TEST CHART

Frequency Hz	Overall Response dB					Playback Only dB	Signal/Noise Ratio dB	Distortion	Crosstalk dB			
	7½ i.p.s.		3¾ i.p.s.		1¾ i.p.s.							
	Bias -2 dB	Bias -1 dB	Bias -3.5 dB	Bias -2.5 dB	Bias -2.5 dB							
30.....	+0.2	+0.3	-0.9	-0.7	0	+0.1	57	1.8%	56			
40.....	+0.5	+0.5	-0.5	-0.4	+0.3	+0.3						
50.....	+1.1	+1.1	-0.3	-0.4	+0.4	+1.0						
60.....	+1.1	+1.0	-0.4	-0.4	-0.4	+0.5						
100.....	+0.6	+0.6	-0.4	-0.3	+0.4	+0.5						
250.....	+0.2	+0.3	-0.2	-0.2	+0.6	+0.2						
500.....	0	0	-0.2	-0.2	+0.2	0						
1000.....	0	0	0	0	0	0						
2000.....	+0.2	0	-0.1	-0.2	0	+0.1						
4000.....	+0.2	0	-0.1	-0.4	0	+0.1						
6000.....	+0.4	0	-0.1	-0.4	0	+0.1						
8000.....	+0.8	+0.2	0	-0.4	-3.0	+0.1						
10000.....	+1.0	+0.2	+0.3	-0.2		+0.2						
12000.....	+1.3	+0.3	+0.5	-0.2		+0.3						
14000.....	+1.3	+0.3	-2.8	-3.2		+0.3						
16000.....	+1.3	+0.2				+0.2						
18000.....	+1.0	+0.2				+0.2						
20000.....	-0.6	-2.7				+0.1						
Wow and Flutter	0.07%		0.12%									

NOTES.—The Overall Response figures relate to record and playback, see text for further information. Playback Only relates to the reproduction of a 50 microsecond test tape at 7½ i.p.s.

For Signal-to-Noise Ratio the tape was recorded at 3 dB above 0 VU and then the input signal was removed from the record amplifier, but see text for further information. By reference to the signal level recorded and the resultant tape noise, the noise voltage was read off, with the tape still in motion. Distortion is quoted against a 1,000 Hz signal recorded at the correct maximum level as indicated by the manufacturers and the figure is an R.M.S. value (see text).

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

THE subject of our investigation this month is a machine that will be of the greatest interest to all readers—one of the new Ferrograph Series Seven. First seen at the Audio Fair before last this new generation of Ferrograph equipment has been creating quite a stir ever since. Completely re-styled and re-designed since Series Six, we now have a fully solid state machine using a deck incor-

porating variable speed rewind amongst other new features. The whole represents a really exciting development by this essentially traditional firm. With great courage they have broken right away from everything that has gone before to bring us with the Series Seven a new British-made tape recorder to challenge the markets of the world. The Ferrograph Co. Ltd. hasten to add that there has

been no change in their policy of building into their equipment the rugged reliability for which they have been famous for so long.

Model 702, the machine submitted for review, is a half-track, three-head, mains stereo record/playback unit complete up to but excluding the final audio output stage and loudspeakers. It is therefore intended for use with a separate high

quality stereo amplifier, and for review purposes we coupled it to one of the new Ferrograph models. A comprehensive report on the performance of this amplifier will be published by us within the next month or two.

Turning first to our laboratory findings, it will be noted that the test chart showing frequency response tables has a couple of extra columns. Overall response at both $7\frac{1}{2}$ and $3\frac{3}{4}$ ips is quoted at two different bias settings. One of the important features of the Series Seven is the facility to adjust bias levels to suit the particular requirements of the recording tape being used. Adjustment is very simple. A small slide switch, marked Signal/Bias, is thrown to the Bias setting. Both Record Level Meters then read relative bias values. Two small pre-set screw-headed attenuators, deeply recessed for safety, can then be easily turned with the help of a thin-shanked screw-driver.

The instruction manual advises on approximate bias settings for various

MANUFACTURER'S SPECIFICATION

Ferrograph 702

Recording Medium: Magnetic tape $\frac{1}{4}$ -inch wide on reels up to $8\frac{1}{2}$ inches in diameter.

Operating Speeds: $7\frac{1}{2}$, $3\frac{3}{4}$ and $1\frac{7}{8}$ ips. (Alternative model, suffix H, 15, $7\frac{1}{2}$ and $3\frac{3}{4}$ ips.)

Tape Speed Accuracy: Better than $\pm 1\%$.

Fast Wind Time: Continuously variable in either direction; at fastest less than 1 minute for 1,200 feet tape.

Wow and Flutter: Less than 0.08% at $7\frac{1}{2}$, less than 0.15% at $3\frac{3}{4}$, less than 0.20% at $1\frac{7}{8}$ ips.

Overall Frequency Response: $7\frac{1}{2}$ ips 30 to 17,000 Hz ± 2 dB; $3\frac{3}{4}$ ips 40 to 14,000 Hz ± 3 dB; $1\frac{7}{8}$ ips 50 to 7,000 Hz ± 3 dB.

Replay Characteristic: $7\frac{1}{2}$ ips 50/3180 micro-second.

Signal-to-Noise Ratio: Unweighted, including hum, better than 55 dB referred to 2% distortion. Weighted (C.C.I.F.) better than 60 dB.

Bass Control: Continuously variable up to ± 15 dB at 50 Hz, ± 20 dB at 20 Hz.

Treble Control: Continuously variable up to ± 10 dB at 10 kHz, ± 15 dB at 20 kHz.

Input Levels: Microphone, 300 microvolts to 15 mV at 10 kOhm, recommended source 250 to 2,000 Ohms Line, 50 mV to 10 V at 2 MOhm, recommended source any impedance.

Output Levels: 600 Ohm, 2 V at 600 Ohm; Low Level, 300 mV into 10 kOhm or greater.

Power Supply: 200 to 250 V 50 Hz (Suffix A 117 V 60 Hz).

Power Consumption: 100 Watts approx.

Channel Separation: Stereo operation approx. 50 dB, mono better than 65 dB at 1,000 Hz.

Overall Dimensions: $16\frac{3}{4}$ inches wide \times $17\frac{1}{2}$ inches \times 10 inches.

Weight: 49 $\frac{1}{2}$ lbs.

Alternative Models: Various. $\frac{1}{4}$ -track, full track, mono, stereo, complete with audio output, high speed, etc.

Recommended Retail Price: Model 702, £155 plus £39 15s. 8d. purchase tax.

Manufacturer: The Ferrograph Co. Ltd., Mercury House, 195, Knightsbridge, London, S.W.7.

kinds of tape, and for Scotch 150 this is said to be when the needle shows -2 dB with the switch in the Bias position. Accordingly our first readings for Overall Response at $7\frac{1}{2}$ ips were taken at that bias level. The results show a remarkably straight line, maximum deviation plus 1.3 dB between 12,000 and 18,000 Hz. That is well within the manufacturer's specification of plus or minus 2 dB and is a curve that many a fully professional machine would be only too proud to display. One of the best we have had the pleasure to publish, in fact.

However, not content to allow the matter to rest there we thought it might be both amusing and instructive to force these figures to their limits. After all, the bias setting was only the published approximation, not a level established for the spool of tape actually being used. One cannot really talk about a "peak" of 1.3 dB—molehill would be more accurate!—but we wondered if this already excellent performance could possibly be improved on by careful bias adjustment. The difference in bias level was very small. Optimum for the tape in use was found to be represented by a reading of -1 dB instead of -2 dB. A tiny change. But look at the change in the response table. From 250 to 18,000 Hz. the line is within half a dB of flat. After 18,000 Hz. it will be noted that the curve tails off to -2.7 dB as compared to -0.6 dB at the slightly lower bias setting. This is typical of the effect of bias change and demonstrates the point very well indeed. By increasing bias by a fraction we have lost a tiny bit at the extreme upper end of the range but have improved the flatness of the curve in the more important sections.

These results are so good they are difficult to believe. Not so very long ago they would have been quite impossible—at any price level. Overall Response at $3\frac{3}{4}$ ips was again duplicated at two bias settings, the first that automatically applied when $3\frac{3}{4}$ ips equalisation is switched in, -3.5 dB, and the second, -2.5 dB, an established optimum level. Differences between the two tables are fairly insignificant, but the purpose-set level has a slight advantage. Again we find a table of figures so flat that they are truly incredible.

Performance is still up to this very high standard at the slowest speed of $1\frac{7}{8}$ ips; although not shown in our table the fall-off at 7,000 Hz. was -2 dB which can be taken to indicate that the response usefully extend to 8,000 Hz. at that speed.

To check the replay amplifier we reproduced a 50 micro-second calibration tape to show once again the best set of figures ever published by us. From 250 to 20,000 Hz. the deviation from flat was

less than half a dB. One could be forgiven for exclaiming: "There ain't no such animal!" Technicians are hard, unromantic people, and we would certainly have thought that a test chart like this could be no more than a flight of the fancy. But it is not. These are the figures produced by the Series Seven under conditions identical to those under which all our review machines are investigated. Congratulations Ferrograph. It is no exaggeration to say that so far as frequency response goes the new model just could not be better.

We have stressed before, and will continue to stress, the fact that frequency response is only part of the story. Signal-to-noise, distortion and speed stability are at least as important. It is not difficult to achieve a brilliant response curve if one is unconcerned about the effect it is having on these other parameters. No one would imagine for a single moment that Ferrograph would be content to "cook the figures" in this way and, as we might have expected, all our other technical measurements reflect the same critically high standards.

It should be remembered that signal-to-noise ratio of better than 50 dB can be regarded as very good for domestic equipment; similarly distortion of under 3 per cent can be taken as indicating true "high fidelity." For review purposes both these readings were taken using a 1,000 Hz. signal fed into the machine at a level of 3 dB above 0 VU. This gives us signal-to-noise of -57 dB and distortion of 1.8 per cent. Both these figures are exemplary. That signal-to-noise reading, by the way, is *unweighted* and was not taken on special low-noise tape—we used the ordinary Scotch 150. Had we referred the signal to 2 per cent distortion as quoted in the specification an even better reading would have been obtained.

With such a performance we were hardly surprised to find that wow and flutter was well under 0.1 per cent at $7\frac{1}{2}$ ips (the actual measurement was 0.7 per cent RMS) and only 0.12 per cent RMS at $3\frac{3}{4}$ ips. Crosstalk between tracks: 56 dB.

After such a successful investigation we were eager to turn to the user part of our review. Since the machine holds the promise of such unusually good audio quality we wondered if there could possibly be any snags when it came to practical use. Well, there is just one: that of weight. At a few ounces under fifty pounds the Series Seven is quite a chunk to cart around. But precision engineering still means heavy components, and as the manufacturer emphasises the new generation Ferrographs are built to last. So we can't complain too much about the sheer

dead weight—not when that standard of audio quality goes with it, anyway!

In appearance the Series Seven is quite unlike any preceding model. Styled in black with silver and grey trim, the machine presents a rather severe aspect. Since the severity is strictly functional we find it to be pleasing. It is a machine that grows on one. Perhaps we are too conservative to take such a drastic change all at once, because it was found that the longer the recorder was around the more we came to appreciate its styling.

Most prominent feature is the very large head cover. When swung back it reveals the three heads, capstan, pinch-wheel, various tape guides and the pressure pad assembly. This latter is most ingenious; it is arranged so that it can pull right back out of the way to facilitate editing and tape loading. The tape itself is simply dropped into slots in the vertical sides to the sound channel, first passing a tape guide on the way. It is really the simplest “straight line” loading one could have. Only complication is that unlike other machines the operator must remember to bring the pressure pad assembly back to normal before running, although the lever is so shaped that it will be knocked back into place when the head cover is closed. That little refinement does not help people like us who usually work with the head cover in the raised position.

The spools themselves are retained in place for vertical use by means of metal screw-caps. We have seen neater methods of doing the same job. By the way, a screw adjustment on the deck allows one to compensate the microswitch arms for whichever is the preferred use position, vertical or horizontal. Another screw adjusts reel height to prevent scraping on the spools.

All the operating knobs are similarly styled: large with silver trim and black central bosses. The main rotary controls are arranged in two pairs at the front of the deck plate with the two VU meters between. Although reasonably easy to read the meters are, unfortunately, not lighted. Above the meters is a three-position switch labelled Record Mode which selects upper track only, lower track only or, in the central position, stereo.

Operation of the Record Level Controls (separate for each channel but divided with Microphone controlled by the top half and Line In by the lower) is absolutely excellent. Very precise and accurate adjustment can be made, all by reference to numeric scales on the plastic escutcheon plate. The double knob on the extreme right-hand controls output level at one of the *three* outlet sockets provided, and the similar knob on the

extreme left is the equalisation control for the three speeds. Surprisingly equalisation is not automatically linked to the speed change switch, so manual adjustment is required. However, this control is linked to a very sophisticated protection circuit, and if the user tries to run the machine with a different equalisation characteristic to the selected speed a little red light labelled “Reset” is illuminated and the motors will not turn. In fact if any malfunction is set this red warning light immediately shows that something is wrong. All one does is to turn the function switch to Stop, correct the malalignment and carry on as before.

The function switch itself is a rotary control on the left of the sound channel. Its marked positions are: Fast, Stop (Reset), Pause and Run. It is linked to a Lock Release immediately above it, a small lever conveniently placed for use whilst the hand is on the function switch. It must be operated when coming out of the Stop position into Pause and Run and is a safeguard against accident. Before recording a red-coloured bar immediately behind the sound channel has to be depressed; this is also linked to a special release catch so that one can come out of Record without turning the function switch to Stop. This Record bar can be depressed, thus throwing the machine into the record mode with the erase heads operative, whilst operating in the Run position—that is whilst playing back—without touching any other controls. A useful facility, but one which must be watched very carefully whilst valuable tapes are being reproduced. It only needs a pair of meddling fingers to press the red bar to wipe the lot clean! With all the many safety measures built into this machine we were surprised to find that recordings could be erased accidentally so easily, although of course this should never happen when the equipment is operated by someone who is familiar with it.

As mentioned earlier, one of the unusual features of the Series Seven is the variable fast-wind. When the function switch is turned to Fast (note that no direction is indicated) the tape movement is governed by the position of a rotary control to the right of the sound channel. When set centrally the tape will be stationary; when turned to the left the tape will move to the left, its speed of travel depending on how far left the knob is twisted. Turning the knob to the right gives the same result in the opposite direction. This control is very sensitive and “fastwind” can be as slow, or slower, than normal running speed, or as fast as one likes to give a rewind time of less than one minute for 1,200 feet of

tape. As the playback head is live during this operation a “tweeting” signal can be heard at the speaker, and so for monitoring recorded tapes to find any given place in a programme this variable speed rewind is invaluable.

It does take a little getting used to, however, and owners are advised to always leave the rotary control in its central position—otherwise the tape will go charging off in one direction or the other as soon as the function switch is turned to Fast—and also to come out of rewinding by bringing the tape to a halt with the variable speed control instead of going straight into Stop on the function switch. Actually this variable speed arrangement is not in the least temperamental; one can twist the knob rapidly from full-speed left to full-speed right without doing any harm at all to either tape or machine—in fact that is one way of bringing the tape to a halt quickly. This new system does need getting used to but we suspect that those who are familiar with it would hate to go back to the old fixed speed fast-wind.

Also on the main deck plate are a pair of microphone sockets, a four-digit position counter, speed change switch and mains On/Off, together with an amber pilot light in the centre. All very simple and uncluttered. Yet one has the feeling that something must be missing. Indeed, something is. And to uncover it one merely flips what appears to be an ornamental plate at the front of the deck to reveal a whole range of additional controls mounted on a narrow, recessed panel.

On the extreme left is a three-position slide switch to control the monitoring functions and also the signal that the meters will be reading. The marking is Source, Normal and Tape. The first and last are self-explanatory, giving the usual “A/B” monitoring; when in the Normal setting both the meters and the signal at the outlets will be correct for whatever function is selected. Set at Normal it is impossible to suffer the embarrassment of dead silence on playback because the monitor switch is set to Source instead of Tape. We have all had to endure that one at some time or another! Next comes a little screw pre-set control marked simply A. This is further evidence of the careful thought that has gone into the machine at the design stage. If the owner is in the habit of using the newer high-output tapes he can adjust the playback level at this point to suit the increased signal strength, so making the balancing of A/B monitoring rather more easy. Then we find a pair of edge-type rotary controls, neatly calibrated with numeric scales and one labelled Bass and the other Treble.

No, this is not a mistake. Although there is no audio output directly from the 702 the first audio stage with tone controls *has* been included, but can be by-passed by using the appropriate socket at the rear. So we can either have a dead flat response to the 50 microsecond time constant at 7½ ips, or we can tailor the response at will to suit individual requirements. The instruction manual gives a table of tone control settings that will approximate the many conflicting equalisation standards at present or recently in use. That is real efficiency for you, showing as it does an excellent understanding of the problems of magnetic recording today.

Following along the line of controls we come to another little pre-set, marked B. This varies the bias level, and, like A, must be deliberately turned with a screw-driver. All the controls so far mentioned run along the panel from left to right and are duplicated on the other side from right to left for the other channel. In the centre are two slide switches, the only ones not repeated. The first is marked Meter, with Bias on one side and Signal on the other. It is used in the Bias position in conjunction with pre-set B. Signal enables the meter to read whatever is routed through it by the monitor selection switch. The other slider is a three-position control with Off in the centre, Lower to Upper on the left and Upper to Lower on the right. It is labelled Transfer and is of course used for multi-play appli-

cations or any other use where an existing recording on one track is to be copied on to the other.

We must apologise if this list of facilities and controls is apparently endless and rather dull. It is really not our fault—blame the manufacturer for building so many features into his machine. Almost everything you can think of is here. At the rear, for instance. Not just a single output socket, duplicated for each channel, but no fewer than *three* for each channel—six in all. They are: Low Level (fixed and by-passing tone controls), 600 Ohm (also fixed and by-passing tone controls) and lastly Low Level Adjustable (governed by the main deck volume control and influenced by the tone control settings). Line In is mercifully a single socket for each channel. All these connections at the rear have so far been standard GPO jacks, so we next have a seven-pin DIN socket to give alternative playback connections, remote control facilities and a 50 Volt DC supply for powering other equipment if necessary. Mains fuses, DC fuses and voltage selectors, together with the socket for the removeable mains lead complete the array at the rear.

All these rear facilities are neatly protected by a hinged flap which, very sensibly, has a clearly printed key that can be read whilst the machine is in use either horizontally or vertically. There's no need to tip the whole thing to a dangerous angle to try to see which plug

goes in which hole. And also at the rear is mounted the very substantial (it needs to be) retractable carrying handle.

As we said at the opening of this review, the new generation Series Seven Ferrograph recorders obviously represent a range of machines of the greatest interest and importance to all readers. So instead of concluding with brief user notes we have, through the courtesy of Ferrograph Co. Ltd., been able to arrange to retain the tape recorder so that it can be used under practical conditions in the field. The result of this investigation will be reported at length in a future issue of *TAPE Recording Magazine*.

In the meantime we can say that all our normal user tests have been carried out—copying 15 ips masters, recording from stereo radio transmissions and reproducing pre-recorded tapes of known quality, and in every case the results were outstanding, as might be expected from the technical findings. But this is a very sophisticated equipment and as such requires prolonged field trials to properly establish its convenience of use and relative advantages. These we shall report in due course, and will content ourselves for the present by summarising the Ferrograph 702 by describing it as one of the very best tape recorders we have had the pleasure of handling—a British machine that far outstrips its specification in every respect and which both user and manufacturer can be proud of.

MORE AND MORE STEREO

—from page 291

of the high altar and an AKG DE 24D was mounted on the south side of the altar. The Reslo was fed via a microphone pre-amp unit to the left-hand Auxiliary input of the Truvox and the AKG via the second channel of our mixer into the right-hand Auxiliary input on the machine. As on previous occasions when working in this building we had set up our recording station in the basement vestry where our monitoring speakers could be powered by a Heathkit amplifier.

Apart from normal testing to check that each microphone was live there was nothing we could do about setting suitable levels before the performance began. This was a normal service and there had been no rehearsal with choir and orchestra in their scheduled places.

The service started with a procession in which the Non Nobis choir and orchestra sang and played whilst the church dignitaries processed around the nave. This gave us an opportunity to balance up the two pairs of MD 411s quite quickly. The balancing of the two micro-

phones at the altar was done as soon as possible afterwards. To record all the essential parts of the service (but excluding the sermon for which we were not able to make adequate microphone provision) we had allowed ourselves two 7-in. spools of LP tape, which at 7½ ips, gave us a total possible recording time of 1½ hours. The sermon was well before the middle of the service so we decided we could not risk changing spools at this stage lest we should find ourselves short of tape on the remainder. We came to the conclusion that we must sacrifice some of the spoken prayers in the middle.

The final result was one of the best recordings we have made so far. The Epistle Sonata by choir and organ proved to be particularly effective. Parts of the sung sections of the Mozart Mass were slightly marred by the weakness of one or two of the solo voices; these singers were in the middle of the choir and it would have been impossible for us to make separate microphone provision for them. One fine piece of recording came strangely enough from the organ after the service had finished. Although we had made no special arrangements for

recording this instrument our microphone set-up produced a brilliant and very lively result. As so often happens on such occasions people started wandering around as soon as the service was over; no matter how good the performance by the organist no-one appeared to have any interest in listening to it. So although we have an excellent organ recording it is to the accompaniment of footfalls, coughs and general high level audience noises.

The vicar has since spent an evening listening to our recording and was so impressed that he asked us to edit the tape to a suitable length so that a stereo disc could be cut for his own personal pleasure and as a memento of a memorable occasion. This is indeed success!

Our most elaborate exercise to date has yet to come. This is the recording of the Gregorian Association's Festival Evensong which is shortly to be sung at Christ Church Priory. We shall be there with our stereophonic equipment and we shall report to you on the result of this project in a later issue. In the meantime we have quite a lot of work to do with the editing block and chinagraph pencil.

AKG Headsets:

High fidelity reproduction with comfort



With any AKG Headset, you can be sure of perfect reproduction with no unnecessary background disturbance. Every AKG Headset is superbly designed to give maximum comfort combined with maximum efficiency



AKG K20 Dynamic/Stereo Headphones

The best value in quality headsets: unparalleled reproduction at such low cost, with large cushioned ear pads. Balanced reproduction from 30-20,000 Hz.



AKG K50 Dynamic Moving-Coil Mono/Stereo Headphones

High-fidelity reproduction due to wide frequency response of 20-20,000 Hz. Available with 400 or 75 Ohm Impedance.



AKG K60 Dynamic Moving-Coil Mono/Stereo Headset

Robust double headband, soft ear cushions. Gives faithful reproduction with smooth bass response, and balanced middle and upper ranges. Frequency 20-20,000 Hz.

Find out more about AKG head-sets and microphones from:



Politechna (London) Ltd. 182-184 Campden Hill Road, London, W.8. 24 Hr. Telephone: 01-727 0711 Telex: 23894

AKG microphones

PHILIPS FAMILY TAPE RECORDER

OUR PRICE

36!^{GNS}

List Price
£46.13.11



ALSO COMPLETE PHILIPS RANGE INCLUDING—

N 2200 CASSETOPHONE—
Your choice of music anywhere. Trim, streamlined musicassette player. 76-hour batteries. All transistor amplifier. Our price 9½ gns. List price 13 gns. Only a few left.

GL559 Smart, attractive loudspeaker. 6 watt. Size: 10½" x 7½" x 7½". List price £11. Our price 8½ gns.

EL 3575 Full stereo tape recorder. Duoplay and multiplay integrated. First class frequency response and reproduction with full tonal values. List price approx. £101. Our price 72 gns.



EL 3302

PHILIPS CASSETTE PORTABLE RECORDER

OUR PRICE A real gem from Philips.

Record or playback, anywhere, instantly. Just snap a Compact Cassette or Musicassette. Powered by five 1.5 volt batteries—mains unit available. Lockable record control with playback, re-wind and fast wind. Microphone with remote stop/start control. External speaker sockets. Supplied with carrying case, demonstration cassettes, library rack, etc.

22^{GNS}
LIST PRICE
£28.7.0

**DON'T MISS THESE VALUE
FOR MONEY OFFERS...**

Send coupon for interest-free easy terms, available over 12 months, one-third deposit required.

range of the biggest names in the sound business. Our amazing "Specials" and offers will delight you. Interest-free easy terms are available. If you can't call, write or phone for details. Our rapid reply mail order system is very popular.

N 4305

Everything the family could want in a tape recorder. Record your children's first words, music lessons, etc. A lifetime's enjoyment. Superb quality, won't let you down. Four tracks, two speeds. Excellent reproduction and many features of much more expensive recorders. Supplied complete with microphone, recording playback lead, reel of long-play tape, empty spool.

Ferrograph



FERROGRAPH MODEL 713

A mono machine of professional quality. 3 motors. 3 heads. Half track. Tape speeds 1½, 3½, 7½. Output: 10 watts RMS.

OUR PRICE £153.6.3

List Price £174 13s. 6d.

MODEL 722 4 A masterpiece in stereo equipment. 2 x 10 watt output. A speaker for each channel. All-silicon solid-state amplifiers with FET input stages and wide input overload margins. Adjustable reel height control. 8½" capacity. Re-record facility on stereo models for multiplay, echo effects, etc., without external connections. The ultimate machines for the enthusiast and professional. Model 722 half track. Model 724 quarter track.

OUR PRICE £194.3.1

List price £204 14s. 9d.

**IN EXTREMELY SHORT SUPPLY.
PREFERENCE GIVEN TO R.E.W.
CUSTOMERS!** (The above are pre-increased prices.)

Come along to either of our showrooms and you can see and hear the equipment of your choice. R.E.W. are the only authorised Philips Audio Centre in South London. Our experienced staff will help you select from a comprehensive range of the biggest names in the sound business. Our amazing "Specials" and offers will delight you. Interest-free easy terms are available. If you can't call, write or phone for details. Our rapid reply mail order system is very popular.

R.E.W. AUDIO VISUAL CO

HEADQUARTERS SHOWROOMS AND MAIL ORDER: DEPT. TRM9
266-8 UPPER TOOTING RD., LONDON, S.W.17. Tel.: 01-672 4471/2 and 9175.

WEST END SHOWROOMS:
146 CHARING CROSS ROAD, LONDON, W.C.2.
Telephone: 01-836 3365 (opposite Astoria Cinema).

Name

Address

..... TRM



MUSICCASSETTE

REVIEWS

MOZART. Violin Concerto in D Major, K. 218 and Violin Concerto in G Major, K. 216. Arthur Grumiaux with the London Symphony Orchestra conducted by Colin Davis. Philips CPC 0062. 49s. 11d. including purchase tax.

One only needs to hear the first bar or two to realise that here we have something really good. That feeling only increases as the cassette plays on. Quality is absolutely first-class and as such completely justifies the use of this medium for serious classical repertoire. Apart from the music, which from Mozart can be nothing short of superb, the clarity and definition of the sound is in itself thrilling; when allied to great composition and excellent performance as we have here the sum total cannot be other than a very moving experience.

The sleeve notes use words like "mastery" and "genius". They are not misplaced. My only quarrel is with the comment: "one may discreetly add that Mozart showed genius nowhere more abundantly than in his concertos". Such a statement holds more than a hint that his other works are of a lesser stature, and many would argue the truth of that.

However, we do not need to be pedantic. Mozart stands in such splendid isolation that to quibble on matters of degree is churlish. The two concertos proceed with their own gracious dignity as fine examples of all that is best in recorded music. Without a blemish from beginning to end this album is a real gem and as such can be awarded the strongest recommendation.

SCHUBERT. Symphony No. 8 in B Minor, D. 759 (The Unfinished), Dresden State Orchestra conducted by Wolfgang Sawallisch.

BEETHOVEN. Symphony No. 8 in F Major, Opus 93. Concertgebouw Orchestra conducted by Bernard Haitink. Philips CPC 0065. 49s. 11d. including purchase tax.

We could perhaps dub this album "The Double Eight". By coupling Schubert's Eighth with Beethoven's Eighth we have two of the most popular items of the concert repertoire on the same record. But there are other reasons for such a coupling apart from the obvious twist of juxtaposing two works of similar title. A fine contrast exists in the emotive forces under which the two composers worked, each on his Eighth Symphony. Schubert was inspired by lofty thoughts of spiritual matters, and as a result his Eighth can raise the listener to the highest planes of human experience. As might be expected the work has its own plaintive air of melancholia, a feeling rarely absent from deep contemplation.

Beethoven, on the other hand, is concerned with humour and light-heartedness. All is gaiety and good spirits. Which is more than remarkable when one remembers that at the

time he was suffering from deafness, money worries and personal family troubles.

Both works are so well known that it is really only necessary for me to comment on recorded quality and performance. The Unfinished is a particularly dangerous work for the cassette medium since its quietest passages could so easily sink into the system noise and be lost. In this cassette we do get away with it, but only just. There is not the brilliance I should have liked to hear and an occasional wobble on a sustained note is distracting. Technically the Beethoven is the better side with some quite exciting moments.

But we can't have everything, and Philips are to be congratulated for issuing these two works in the cassette medium. When speaking about quality I have to adopt a purist point of view—to do otherwise would be unfair to readers. However, it would be equally unfair not to add that in my opinion these two great works are well worth acquiring on this Musicassette from which I derived much satisfaction in spite of the minor technical weaknesses.

FINIAN'S RAINBOW. Original Film Sound Track with Fred Astaire and Petula Clark. Warner Bros. CWP 555. 47s. 6d. including purchase tax.

Unfortunately, I do not have the advantage of having seen either the show or the film of Finian's Rainbow. Having now heard the music I know what I have missed.

How could I with names like Fred Astaire and Petula Clark? Certainly this sound track of the film version is bubbling over with exuberance as the sleeve notes claim. Perhaps that jollity is singularly trans-Atlantic in character with heavy-handed touches of the Irish, but then that is Finian's Rainbow. It could hardly be other.

The selection offered includes: *Prelude, This time of the year, How are things in Glocca Morra, Look to the rainbow, If this isn't love, Something sort of grandish, That great come-and-get-it day, Old devil moon, When the idle poor become the idle rich, When I'm not near the girl I love, Necessity, Rain dance ballet, and The begat.*

A rumbustuous entertainment that will delight lovers of The American Way of Life whilst at the same time probably irritating true Irishmen the world over. Not that one can really be cross with its naivety—that's all part of the show.

Recorded quality is mixed with some excellent presence on some of the vocals and a typically cinematic "boxiness" on the brief spoken continuity dialogue.

If a certain reserve is detected in my notes then they have been read aright. Recommended with reservations.

CABAL. John Dummer Blues Band. Mercury CMP 7019. 47s. 6d. including purchase tax.

Cabal. Soul from South London. Together with notes on the genesis and demise of bread pudding in Dan's Cafe, Morden.

Seriously, the John Dummer Band have a lively talent and individual style well suited to their repertoire which includes: *I need love, When you got a good friend, No chance with you, Young fashioned ways, Sitting and thinking, Low down Santa Fé, Just a feeling, Welfare blues, Hound dog, Blue guitar, After hours and Daddy please don't cry.*

This "music of the fringe" is rapidly moving, by its own impetus, towards the centre where it belongs. Essentially, it needs to be heard rather than talked about, so I will content myself with noting that the engineers have overcome frightening difficulties with great success to give us some very clean atmospheric sound. I am surprised I liked it so much—you might too.

THE STUDENT PRINCE. John Hanson. Philips CPP 1066. 47s. 6d. including purchase tax.

It comes as something of a surprise to read in the sleeve notes that John Hanson opened in *The Student Prince* at the Cambridge as recently as June of last year. One feels that this production of the operetta has been with us very much longer. Not that familiarity breeds contempt—to the contrary the melodies return with all the freshness of today. A freshness that is coloured with nostalgia.

The programme comprises: *Overture, Golden days, To the inn we're marching, Drinking song, Come boys, Gaudeamus igitur, Deep in my heart, Serenade, When the spring awakens, Students' life, Just we two, Vision sequence, I like you more and more, Do you love me and Deep in my heart.*

As I have found with most of these "songs from the shows" albums, technical quality is really fine. A firm stereo image together with dramatic presence serve to increase enjoyment. With the romantic action of the plot set in the appropriately romantic town of Heidelberg, the *Student Prince* will always have a place in our hearts. And if, when you visit Heidelberg, you are disappointed to find it a major tourist centre with more souvenir shops than students—well, that's life, isn't it? But the pubs are still there, and although not obvious to the casual visitor, the University is too. The place has a unique atmosphere of its own, so strong that even the tourists cannot destroy it. And it's all there in Romberg's music.

An excellent cassette that will be especially enjoyed by those who refuse to believe that illusions are illusory.

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

makers of the famous
PARABOLIC REFLECTOR
FOR WILDLIFE RECORDING
JACW/X/1



SUSIE COULD NEVER GET ENOUGH...

**...but now that more and more
people are buying Philips Musicassettes
we're able to cut production costs.
And knock shillings* off the price
to you. And to Susie—who can now
afford as many as she fancies.**

*Recommended
retail prices now:

Popular Musicassettes: 47s 6d

Classical Musicassettes: 49s 11d

P.S. Susie has a Philips EL3302 cassette player.

MUSIC ON TAPE

7½ ips STEREO

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

MAZOWSE. The Polish Song and Dance Company, Volume I. Monitor MF 360
7½ ips, four-track stereo. 57s. 5d. including purchase tax.

Another American import, this brilliant album of Polish traditional songs has a delightful naïvety which is revealed in the titles—or rather in the translations of the titles!

The thirteen numbers include: *Polonez Warszawski* (Warsaw Polonaise), *Kukuleiczka* (Little cuckoo), *Furman* (The coachman), *Nie Zginaj Kaliny* (Do not bend the guelder-rose), *A czemuzes nie przyszedi* (Why didn't you show up?), *Mazowsze* (Mazovia), *Oberek Opoczynski* (Oberek from Opoczyn), *Co ja myslę* (What I think), *Dwa serduszka* (Two hearts), *Ges woda* (Goose in the water), *Cyt cyt* (Hush hush), *Trudno* (Too bad) and *Przypiewki Wielkopolskie* (Melodies from Wielkopolska).

As might be expected from Eastern Europe, performance is really good. The choir is faultless in its ensemble and it produces the authentic blend of sound to give an exciting reality to the vigorous songs and a plaintive lilt to the more romantic numbers. All this is helped along by very fine sound quality—the stereo image gives a fine sense of depth and perspective to what is obviously quite a large choral group.

I have listened to this album a number of times and I find it to be quite absorbing. In spite of the language difficulty none of the pleasure is lost; to the contrary, it is so evocative and full of local atmosphere it can be strongly recommended. It is also very fine music.

3¾ ips STEREO

BLUE ACKER. Mr. Acker Bilk and the Stan Tracey Big Brass. E.M.I. Columbia TD-TWO 230, 3¾ ips, ½-track Stereo. 41s. including purchase tax.

In a recent review of another Acker Bilk album I had to comment on the lethargic quality of the performance. In Blue Acker we have langour without lethargy, and there's a world of difference between the two.

Under the Columbia "Studio 2 Stereo" label the recording is technically good. With the plaintive lament of the Blues ideally suited to Mr. Bilk's tender handling of his clarinet we have a nostalgic collection of numbers including: *Royal Garden blues*, *Stranger on the shore*, *Festival junction*, *Blues for last year*, *Tin roof blues*, *Baby blue*, *Blues for this year* and *Mood Indigo*.

No doubt about it, the mood is blue, blue, blue right the way through. And most of the time I liked it very much. There are, however, a few incongruously noisy passages that introduce a singularly raucous note into an otherwise melancholic reverie. Such irrational jumps out of context are disturbing, revealing as they do the underlying weakness of the album. One has the feeling that the blueness is assumed rather than genuinely experienced. Lacking sincerity, perhaps?

No other criticism can be made, so apart from that one reservation all is sweetness and light—or bitter gloom if you see what I mean. The recommendation is therefore qualified; if you like this kind of thing it could be for you whereas otherwise you might be disappointed.

3¾ ips MONO

THE BEST OF DEAN MARTIN. Dean Martin. Capitol TA-T 21194. 3¾ ips half-track mono. 41s. including purchase tax.

Dean Martin is not the greatest. Throughout his singing there is an inherent modesty that is becoming. No histrionics, just a modest voice modestly produced. Which is fine, but it can be dull in too great a quantity. Even his tonal quality is modestly poor at times—but this is Dean Martin and we can afford to be generous when faced with such a lack of pretention.

The album includes: *Volare*, *Sway*, *Memoories are made of this*, *Please don't talk about me when I'm gone*, *I'm yours*, *Pretty baby*, *That's amore*, *Come back to Sorrento*, *Just in time*, *Dream a little dream of me*, *Sleepy time gal*, *Arrivederci Roma*, *Non dimenticar*, *You're nobody 'till somebody loves you*, *My one and only love* and *Return to me*.

My only complaint is of a too resonant acoustic. The voice occasionally has a somewhat bathroom-like quality, but I suspect that this was deliberate. A modest voice must get support from somewhere, if only from the reverberation! Actually it is disturbing, having the effect of placing the vocalist too far back on some of the items.

We really cannot help liking the avuncular Dean Martin, even though it might be against our better judgment.

THE BEST OF HERMAN'S HERMITS. Columbia TA-SX 6332. 3¾ ips half-track mono. 41s. including purchase tax.

"The Best Of . . ." is a standard title format which all too often presents its own excuse for re-issuing the same old repertoire. But the present collection is fully justified, giving us as it does a first-class programme on a single record. Quality is good—so is the vocal-instrumental balance. Of course we have all heard these numbers before but this tape offers an opportunity to acquire the lot in one go.

The Best consists of: *I'm into something good*, *Show me girl*, *Silhouettes*, *Can't you hear my heartbeat*, *Wonderful world*, *Just a little bit better*, *A must to avoid*, *You won't be leaving*, *This door swings both ways*, *No milk today*, *East west*, *There's a kind of hush all over the world*, *I can take or leave your loving*, *Sleepy Joe*, *Sunshine girl* and *Something is happening*.

There's not a great deal to be said—it's all so familiar. It's still a pity they have to suffer the pangs of "true lerv", whilst the rest of us content ourselves with the more

prosaic emotion of "love", but perhaps "lerv" is the more commercial product. Plenty of good fun here, with a few serious thoughts thrown in for good measure. In particular I like *This door swings both ways* and *A must to avoid*. And of course *No milk today*. And so on.

An album you should have, because it really is "The Best Of . . ."

HITS OF GOLD. The Mamas and the Papas. Stateside/Dunhill TA-SL 5007. 3¾ ips half-track mono. 41s. including purchase tax.

I would be the first to admit that the Mamas and The Papas have got something, and whatever it is they have got certainly comes out in this record. It only remains to decide whether what they have is what you want. Don't let the fact that they irritate me put you off, because that "something" is very tangible and it might well please you.

The album gives us a good mixture with: *California dreamin'*, *Dedicated to the one I love*, *Safe in my garden*, *Dream a little dream of me*, *Spanish Harlem*, *My girl*, *Do you wanna dance*, *Monday Monday*, *Dancing in the street*, *You baby*, *I saw her again last night*, *Creeque alley*, *California earthquake*, *Twist and shout*, *Look through my window* and *Glad to be unhappy*.

Perhaps my own dissatisfaction with the group lies in the too-frequent lapses into sugary sentimentality. Musical arrangements are good, solo voices, particularly the female, teeter dangerously at times and recorded quality is fine. So from my point of view it's rather a mixed bag. Best of the lot is their well-known *Monday Monday*. This I like. Much of the rest leaves me feeling frustrated. Perhaps it will be different for you.

12 OF THOSE SONGS. Shirley Bassey. Columbia TA-SX 6204. 41s. including purchase tax.

I once knew a guitar player . . . in fact he was a member of the band I used to play clarinet with . . . who had accompanied Shirley Bassey in various Cardiff Clubs. Of course, those were the days when she was an "unknown" . . . before she even made an initial impact as "the girl from Tiger Bay." Listening to this tape, I wonder if he would recognise her. Maybe, maybe not. She undoubtedly possesses one of the most powerful voices in contemporary show business, and on these tracks, that power comes to the fore beautifully. Every word is clear, and the orchestral backing never obtrudes. Mind you, personally, I can't bear Shirley Bassey. I think she's too loud . . . too overpowering. But then, that's just my own personal opinion. I would have to be extremely biased and vindictive to fault this particular tape.

You like Bassey? Then buy it. That's really all I can say. Your expectations will be fully realised.

Tracks are: *Come Back To Me*, *I'm A Fool To Want You*, *A House Is Not A Home*, *If Love Were All*, *Moon River*, *Don't Rain On My Parade*, *Something's Coming*, *Days Of Wine And Roses*, *Call Me*, *Charade*, *I Wish You Love*, and *One of Those Songs*.

Monitor are distributed by Ronlex Productions Ltd. of 36, High Street, Salisbury, Wilts. Columbia, Capitol and Stateside/Dunhill are distributed by E.M.I. Records Ltd. of 20, Manchester Square, London, W.1. Philips, Warner Bros. and Mercury are distributed by Philips Records Ltd. of Stanhope House, Stanhope Place, London, W.2.

YOUR LOCAL DEALER
LONDON

Masseys Centre of Sound
West London's Hi-Fi tape Recorder Specialist
—Demonstration Room with Comparator
APPOINTED FERROGRAPH DEALER
AT
CHISWICK, W.4
Accessories, All Kinds—Servicing—Pre-Recorded
Tapes Mono/Stereo
121-123 High Road—10 a.m.—7 p.m.
◀ TEL: CHI 2082 ▶
(not closed for lunch)

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.

Lee Electronics
THE TAPE RECORDER & HI-FI AUDIO SPECIALISTS
400 EDGWARE RD., LONDON, W.2 (PAD 5521)
London's leading Stockists of High-Fidelity and Audio Equipment. Many bargains in new and reconditioned equipment.
SEND FOR FREE LISTS OF RECORDING TAPES, RECORDERS, AMPLIFIERS, ETC.
APPOINTED B. & O. AGENTS

THE SOUTH

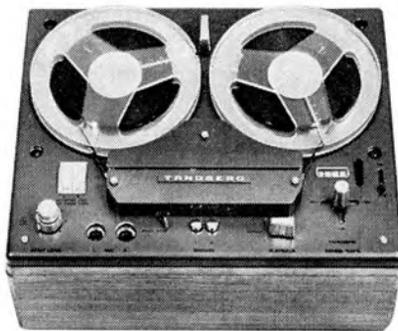
THE SOUTH WEST
TOM MOLLAND LTD.
Invite you to visit their well-equipped Demonstration Theatre and compare all the leading makes of Hi-Fi and Tape Equipment at
110 CORNWALL ST., PLYMOUTH
Telephone 69285
Immediate delivery to ALL Areas

NEW PRODUCTS

TANDBERG
SERIES 1600X

THE latest addition to the Tandberg catalogue is a new tape deck known as the Series 1600X.

It is stated that the new machine has been designed for the customer who requires mono or stereo recording and playback facilities of very high quality but with the utmost simplicity of operation. It includes all the basic features necessary for a simple stereo tape deck and will sell in a much lower price bracket alongside the more sophisticated Series 6X deck.



Available in four-track teak cabinet versions only, the 1600X is suitable for vertical or horizontal operation using the established Tandberg tape transport system. It also uses the cross-field technique with combined heads (as in the Series 1200X) and this is said to be the reason for the outstanding technical specification.

Operation is from normal 50 Hertz AC mains and frequency response is given as 40-18,000 Hertz, 40-14,000 Hertz and 40-8,000 Hertz, plus or minus 2 dB, at tape speeds of 7½, 3¾ and 1⅝ ips respectively. Wow and flutter at those speeds is said to be less than 0.1 per cent RMS, 0.15 per cent RMS and 0.35 per cent RMS. Signal-to-noise ratio is referred to as better than minus 55 dB at 7½ ips and crosstalk as better than -60 dB. The output is 0.9 volts per channel for replaying into a high quality amplifier system and output selector switching enables the user to parallel both tracks of recorded information or to separate both tracks for stereophonic reproduction. Two DIN microphone input sockets are provided, impedance 200 ohms, and the dimensions are length 15 in., breadth 11 13/16ths in., height 6¾ in. Recommended retail price is £89 10s. including purchase tax.

Elstone Electronics Limited, Hereford House, North Court, off Vicar Lane, Leeds LS2 7NS, Yorkshire.

MIXER PRE-AMP
UNDER £12

A NEW low cost mixer pre-amplifier manufactured by DJ Electronics (Hackney) Limited now appears on the market for the

first time. Costing as little as £11 19s. 3d. the DJ 101 is a battery (9 volt) operated all silicon transistor mixer pre-amplifier said to have been designed as a versatile high quality unit suitable for use with tape recorders, amplifiers, etc. Provided with six fully mixed input facilities the unit is housed in an attractive all-metal cabinet laid out for simplicity of use and a 9 volt (PP6) battery is supplied.

Of the three microphone inputs two are 8 mV at 50 k ohms and the other 8 mV at 600 ohms. The auxiliary input and two phono inputs are all 50 mV at 500 k ohms. Output is 250 mV (RMS) at 100 k ohms for rated input and frequency response is quoted as 20-20,000 Hz plus or minus 1 dB, signal-to-noise ratio minus -65 dB and harmonic distortion less than 0.5 per cent at 1 volt. Dimension are 10½ in. x 2¾ in. x 4¾ in. and the equipment is fully guaranteed (labour and parts) for twelve months.

The same manufacturers are also producing high quality public address mixer/amplifiers with rated outputs of 30 and 70 watts.

Distributors: *Norman Rose (Electrical) Limited, Norman House, 8 St. Chads Place, Grays Inn Road, London, W.C.1.*

STEREO MIKES
WITH PRE-AMP

AN unusual approach to microphone equipment is revealed in the release of the Foster FSA 1 stereo microphone system. It comprises two moving coil microphones together with a two-channel amplifier and is designed for use in either stereo or monophonic recording.

As can be seen from the illustration the equipment comprises a pair of transducers (moving coil) packed into a substantial carrying case which also includes the pre-amplifier unit. This provides switched adjustment for either low gain or high gain and in the former function it is said to be equalised for a "flat" response (25-15,000 Hz plus or minus 2 dB). A mode switch for stereo or mono operation is also incorporated together with a power on/off switch.



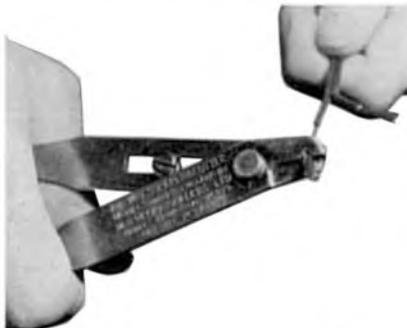
The wide range of accessories includes windscreens, table stands, stand adaptors for use with floor stands and output connection unit. The complete system, including all accessories, is available at an inclusive price of £19 10s. plus post and packing 5s. from:

Lasky's Radio, 3/15 Cavell Street, Tower Hamlets, London, E.1.

STRIPPING TODAY?

SEVERAL improvements have been made to the well-known Bib Model 3 Wire Stripper and Cutter.

The new tool is said to enable insulation to be removed precisely and quickly from the ends of flex and cable without nicking the wire. The aperture setting for different wire diameters is adjusted by means of a sliding screw set in one of the handles. In addition the Wire Stripper features two cutting positions, one for normal work and the other on the tip of the tool for cutting wire in confined spaces such as the removal of overhang from a tag or bolt in electronic construction. The same cutting tip is also said to be suitable for separating extruding twin flex.



Each Wire Stripper is packed on an instruction card and is available at the recommended retail price of 5s. 6d. from the usual stockists.

Multicore Solders Limited, Hemel Hempstead, Herts.

SECOND GENERATION PHILIPS AUDIO PLAN

IN announcing the release of their "second generation" of Audio Plan compatible equipment, Philips Electrical Limited acknowledge the rapid growth of interest in the quality of sound reproduction in this country. This firm's new Audio Plan is said to retain the same high standards of sound reproduction and reasonable cost that typified the earlier models. Now, however, new qualities gained from both experience and technical advances are incorporated.

Three new stereo amplifiers are announced the RH580 giving a claimed 2 x 9 watts Music Power, the RH590 giving 2 x 15 watts Music Power and the RH591 giving 2 x 30 watts Music Power. Two AM/FM stereo tuners (RH690 and RH691) are available as well as a 2 x 30 watt Music Power integrated tuner amplifier RH790. The new Audio Plan range includes a number of loudspeaker systems of various sizes and prices and also a transcription unit and arm, GA202, complete with magneto-

MANUFACTURER'S ANNOUNCEMENT

The Ferrograph Company Limited announces the appointment of Mr. S. G. Griffiths to the position of Director of Commercial Affairs in succession to Mr. R. W. Merrick. This appointment took effect on 5th May, 1969.

Mr. Griffiths has been on the staff of Electric and Musical Industries Ltd. for 23 years, during the last five of which he has held the position of Sales Manager with responsibility for product planning and for world-wide marketing of professional tape recorders and associated equipment.

Mr. R. W. Merrick, who has this year completed 41 years' active association with Wright & Weaire Ltd. and The Ferrograph Company Limited, of which he was a founder in 1949, retires from active participation in the commercial affairs of Ferrograph, but continues as a member of the Board with special duties until his retirement in the foreseeable future. He will continue to serve as an executive Director of the Ferrograph subsidiary, Rendar Ltd., and will devote more time to its affairs.

dynamic cartridge (GP411) with diamond stylus which has recommended tracking weight of from 2-4 grams.

Most of this equipment will be available now, although the tuner amplifier is not scheduled to come on sale until September. All information including full specifications and recommended retail prices can be obtained from:

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

SMALLEST STEREO RECEIVER EVER?

WHAT is claimed to be one of the smallest portable stereo radio receivers was recently shown at the RTRA Conference in Brighton by Lee Products (Great Britain) Limited. The Hitachi KS 1700 is described as a true stereo radio with drift-free FM reception.

Although essentially a home radio it is extremely portable and can be used anywhere. The power source is 4 U2 dry cells or alternatively it can be run from AC mains since the necessary adaptor is included. A pair of loudspeakers are provided and the cabinet work is finished in black leather. Dimensions are 9½ in. x 5½ in. x



3½ in. the weight is 4 lb. and the recommended retail price is 45 guineas tax paid.

Lee Products (Great Britain) Limited, 10/18 Clifton Street, London, E.C.2.

YOUR LOCAL DEALER

THE NORTH

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

CUSSINS & LIGHT LTD.

YORK'S LEADING RADIO
TV & ELECTRICAL STORE

Visit our First Floor
TAPE RECORDER
CENTRE

LARGEST RANGE
OF RECORDERS
& ACCESSORIES
IN THE NORTH

KING'S SQ.
YORK



TAPE RECORDER CENTRE (HALIFAX)

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

REVOX
specialist

30 King Cross Street, Halifax
Phone 66832

MUSICASSETTES

- LIBRARY SERVICE
- PART-EXCHANGE
- MACHINES
- LANGUAGE COURSES

Send 1/- stamp for comprehensive list.

THE MUSICCASSETTE SUPPLY COMPANY
2, Hopmarket Yard, Worcester
For Jiffy-fast Postal Service

CLASSIFIED ADVERTISEMENTS

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

BUSINESS OPPORTUNITIES

Start your own publishing business without experience in association with and with the help of an international publishing company. Apply in writing to The Franchise Director, 184 West Regent Street, Glasgow, C.2.

VACANCIES

WANTED RECORDISTS. Details S.A.E. Trans World Radio and Television Service, Fleet Street House, Great Wakering, Essex.

FOR SALE

MINIFLUX 4-Track stereophonic/monophonic Ferrite Erase Heads. List Price £3 10s.—Special Offer 32/6 each, SKN4 3-Track stereophonic record/play heads for Transistor Circuits 55/- each. SAE for details. LEE ELECTRONICS, 400 Edgware Rd. Paddington 5521.

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

WANTED

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

TAPE RECORDS

ABSOLUTELY EVERY AMERICAN 4-TRACK STEREO TAPE released in America can be obtained through our special postal service. For complete and up-to-date catalogue of all releases send only 4s. to: MUSIC U.S.A., 146a, Lower Baggot Street, Dublin 2, Eire.

PRE-RECORDED AMERICAN STEREO TAPES, 7½ ips. Cheap as records. Bernsteins, Mahler, Maazels, Sibelius, 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 DUBBING

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

GRAHAM CLARK RECORDS. Tape to Disc Pressings. 23, The Grove, Walton-on-Thames, Surrey. Tel.: WALTON 25627.

J. & B. RECORDINGS. Tape to Disc—latest high level disc cutting, all speeds. Mastering, pressings, studio, mobile. 14, Willows Avenue, Morden, Surrey. Telephone: 648 9952.

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.

REPAIRS

SERVICE and professional independent evaluation of "quality" equipment. Normally 3-day turn-round. On-site service by appointment. HF ENGINEERING, 3, Willowbank, Sunbury-on-Thames, Middlesex. Telephone Sunbury-on-Thames 83232 (24-hour service).

TAPE RECORDER REPAIRS. Executed expertly, efficiently, economically by The Tape Recorder Centre. See page 282 for branch address.

EDUCATIONAL

Respond 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.

TAPE EXCHANGES

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

WORLDWIDE TAPESPONDENTS, 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.

MISCELLANEOUS

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

HIGHEST CASH PRICES offered for good quality Tape Recorders and Hi-Fi. See our advert. page 306 this issue. R.E.W., 266-8, Upper Tooting Road, London, S.W.17.

IF QUALITY MATTERS consult first our 70-page illustrated catalogue with technical specifications (5s. 6d.). Members enjoy unbiased advisory service, preferential cash terms. Membership 7s. 6d. Our Associates also manufacture records from your own tapes, or record thru 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.

BOOKS

Watch out for the new series of TAPE HANDBOOKS that will shortly be available from TAPE BOOKSHOP, Prestige House, 14/18 Holborn, E.C.1. We are planning to issue one exciting new title each month.

BASF 30% OFF!

Fantastic offer of world-famous BASF magnetic recording tape at near wholesale price! Brand new, fully guaranteed. Each tape supplied in the superb BASF plastic swivel box. (3" tapes in plastic mailing boxes).

STANDARD PLAY	List Price	Our Price
5" 600'	22/3	15/-
5½" 900'	29/5	20/6
7" 1200'	36/7	25/6

LONG PLAY	List Price	Our Price
3" 210'	9/6	6/9
4" 450'	15/7	10/9
5" 900'	29/3	20/6
5½" 1200'	36/5	25/6
7" 1800'	51/7	36/-

BASF LOW NOISE COMPACT CASSETTES	List Price	Our Price
C.60	17/7	12/3
C.90	25/1	17/6
C.120	33/7	23/6

DOUBLE PLAY	List Price	Our Price
3" 300'	15/-	10/6
4" 600'	26/1	18/3
5" 1200'	43/3	30/3
5½" 1800'	56/5	39/6
7" 2400'	79/7	55/6

TRIPLE PLAY	List Price	Our Price
3" 450'	23/-	16/-
4" 900'	40/1	28/-
5" 1800'	67/3	47/3
5½" 2400'	91/5	64/-
7" 3600'	116/7	81/6

POSTAGE and PACKING 2/6 per Order

LEDA TAPES (T)

17 LEIGH PARK ROAD, LEIGH-ON-SEA, ESSEX
London Office Tel: 01-226 7004

INDEX

TO ADVERTISERS

AEG/Telefunken	300	Tom Molland Ltd.	310
Audio Fair Ltd.	282	Mora Trading Co.	313
Bang & Olufsen U.K. Ltd.	287	Musicassette Supply Co.	311
Berean Tape Service	313	Nusound	282
Bosch Ltd.	296	Philips Records Ltd.	308
Charlesworth's of Crewe Ltd....	311	Politechna (London) Ltd.	306
Cussins & Light Ltd.	311	Pullin Photographic (AKAI) ...	283
Documentary Programmes on Tape	284	Recorder Co.	284
The Ferrograph Co. Ltd. ...	292/293	R.E.W. (Earlsfield) Ltd.	306
Francis of Streatham	315	Sanyo-Marubeni Ltd.	Back Cover
Grampian Reproducers Ltd.	307	Tape Book Shop	315
Leda Tapes	312	Tape Recorder Centre (Halifax)	311
Lee Electronics	310	Tape Recorder Hi-Fi Centre (Sheen) Ltd.	310
Massey's Centre of Sound	310	Tel-Lee-Radio	313
Minnesota Mining & Manufacturing Co. Ltd. (Scotch)	301	Year Book	285
		Vortexion	286

The Berean Tape Service

(NON-DENOMINATIONAL)

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



To all TAPE Recordists: P.V.C. & Polyester Tapes
BUY BRITISH
YOU SAVE MONEY AND



SAVE THE POUND

"A STERLING IDEA"
"..... high quality and rapid service I have found in you....."

N.F.H. of Canterbury.
The playbacks are crystal clear and I am sure no better results could be obtained by other dearer brands on the market.

Yours sincerely,
W.S., Hants.
FREE Library case with £5 orders

	3"	5"	5½"	7"
Standard Play each	150'	600'	850'	1200'
3 for	2/-	5/6	7/-	8/6
6 for	5/9	16/-	20/-	25/-
	11/3	31/9	39/6	49/-
Long Play each	240'	900'	1200'	1800'
3 for	3/-	7/6	9/6	12/6
6 for	8/6	22/-	27/9	36/9
	16/9	43/3	54/9	82/6
Double Play each	300'	1200'	1800'	2400'
3 for	4/3	11/-	15/-	19/9
6 for	12/3	32/3	44/-	58/3
	24/6	63/9	87/-	115/3

Mora Trading Co. (T24) Postage 1/9 per order.
Mora Works, Mora Road, N.W.2. Posted the same day.
Money-back gtd.

WIMBLEDON'S TAPE RECORDER CENTRE

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

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

PLEASE MAKE USE OF THE ADVERTISEMENT INQUIRIES COUPON BELOW

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.

ADVERTISEMENT INQUIRIES SERVICE

I should like further information about
Messrs 's advertisement

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

NAME.....

ADDRESS

September 1969

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

I should like further information about
Messrs 's advertisement

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

NAME.....

ADDRESS

September 1969

I should like further information about
Messrs 's advertisement

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

NAME.....

ADDRESS

September 1969

I should like further information about
Messrs 's advertisement

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

NAME.....

ADDRESS

September 1969

I should like further information about
Messrs 's advertisement

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

NAME.....

ADDRESS

September 1969

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 STILL ONLY 25/- 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 25/- as a subscription for one year (USA \$3.75, AUSTRALIA \$3.75).

NAME

ADDRESS

Post to: TAPE Recording Magazine, Prestige House, 14-18 Holborn, London, E.C.1.

CUT ALONG DOTTED LINE

THIRD FOLD HERE

BUSINESS REPLY FOLDER
Licence No. ND 922

TAPE RECORDING MAGAZINE,
PRESTIGE HOUSE,
14-18 HOLBORN,
LONDON, E.C.1

SECOND FOLD HERE

POSTAGE
WILL BE
PAID BY
PRINT AND
PRESS
SERVICES
LIMITED

FIRST FOLD ALONG THIS LINE

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

FLAP A

FLAP B

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.

**TAPE
BOOKSHOP**

FRANCIS OF STREATHAM

We are specialists for all TANDBERG Equipment

The new 1600X Stereo Deck and Pre-Amp now in stock

MAINS OPERATED TAPE RECORDERS

Ampex 1100 Stereo
Ampex 2100 Stereo
*Akai 1710W Stereo
*Akai 4000D Pre-amp Deck Stereo
*Akai M.9 Stereo
*Akai 1800 Dual-purpose stereo 8-track cartridge and tape recorder
*Brenell Mk. 5/M Series III Mono
*Brenell Mk. 5 Series III Mono
*Brenell ST200 2Tr. St.
*Brenell ST400 4Tr. St.
Ferguson 3232 Stereo 4 Tr.
Ferguson 3226 Mono
Ferguson 3224 Mono
Ferguson 3216 Mono
*Ferrograph 713
*Ferrograph 702/4
*Ferrograph 722/4
Fidelity Studio 4 Track Mono
Fidelity 'Braemar' 2 or 4 Tr. Mono
Grundig TK120 DL 2 Track Mono
Grundig TK144 DL 4 Tr. Mono
Grundig TK149 DL 4 Tr. Automatic
*Grundig TK245 DL Stereo/Mono
*Grundig TR247 DL 4 Tr. Stereo
*Grundig TK 340 DL 4 Tr. Stereo/3 sp.
Philips 4307 4 Tr. Single speed Mono
Philips 4308 4 Tr. 2 sp. M.
*Philips Professional PRO.12
Philips Stereo 4404 2 sp. 4 Tr.
Philips Stereo Cassette 3312 with 2 sp.
Philips 4407 St. 3 sp. 4 Tr.
*Philips 4408 Prof. 3 sp. 3 Tr. Stereo
*Revox 77 Stereo 2 or 4 Tr.
*Sanyo 801 St. Pre-amp.
Sanyo 929 4 Tr. 2 sp. Stereo
Sanyo 939 4 Tr. 2 sp. Stereo

*Sanyo 990 3 sp. 4 Tr. Stereo
Sharp RD.706 2 sp./2 Tr./Batt. Mains
*Sony 801 Pa/Deck 3 sp. 4 Tr. St.
Sony TC230W
*Sony 335 Deck and Stereo Pre-amp.
*Sony 255 Deck and Stereo Pre-amp.
Stella 9123 4 Tr. 2 sp.
Tandberg 15 2 or 4 Tr. 3 sp./M.
*Tandberg Series 6X Pr. A/Dk Stereo
3 sp. 2/4 Tr.
*Tandberg Series 12X 3 sp. 2/4 Tr. St.
Telefunken 204 T.S. 4 Tr./St.
Telefunken 501 4 Tr./M.
Telefunken 203 Stereo/Mono 4 Tr. 2 sp.
Telefunken 201 Mono 4 Tr.
*Uher Royal De Luxe 4 Tr. 4 sp. St.
*Vortexion WVB/7 3 sp. 2 Tr. Mono
*Vortexion CLB/7 Stereo 2 Tr. 3 sp.
Wyndor Vanguard 3 sp. 4 Tr. Mono

BATTERY PORTABLES AND CASSETTE TYPES

*Philips 2205 Batt./Mains Cassette
Philips EL3302 Cassette
Akai 10 V 4 Tr. St. BM
Tandberg Cassette Series II 2
Ferguson Cassette 3236
Grundig Cassette C200
Sanyo Cassette
Aiwa Cassette/Batt. Mains
Sharp 504 2 Tr. 2 sp./Batt. Mains
Sharp 505 2 Tr. 2 sp./Batt. Mains
Stella 473 Cassette
National 4 Tr./2 sp./Batt. Mains
National Cassette Batt./Mains
Telefunken 302 4 Tr. 2 sp. Mono
*Uher 4000L 4 Tr. 2 sp. Mono
*Uher 4200/4400 2/4 Tr. 4 sp. Stereo

*Microphone extra

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

● MICROPHONES, MIXERS, etc. by

AKG, Hammond, Grampian, Reslo, Acos, Film Industries, Telefunken, Beyer, Sennheiser, etc.
Bib and E.M.I. splicers, Matching transformers, Defluxers, Bulk Erasers, etc.
Uher Mixer
Eagle Mixer
Hammond 5-way Mixer
Philips Pre-amp.
Also stands, booms, fittings.
Pre-recorded tapes and music cassettes by Columbia, H.M.V. and all E.M.I. labels, etc.
Tapes in all grades and lengths by: B.A.S.F., Scotch, Philips, E.M.I. Cassettes by Philips, etc.
Headphones by AKG, Ampex, Akai, Sansui, Nikko, Philips.

MAINS POWER PACKS

Philips Stella
Telefunken 300 with cell
Uher 4000 with cell

NOTE. When writing, please quote TRM 8 and include s.a.e. for reply.

**GARRARD SP25 MARK II
Less Cartridge, Special Price
£12 0 0**

Brand new, in maker's carton.
Guaranteed.

HI-FI DEPT.

● AMPLIFIERS

Quad Rogers Arena Philips
Goodman Nikko Leak Arm-
strong Tripletone Tandberg
Sansui Sanyo English Audio
Linear Sinclair

● TUNERS

Quad Rogers Leak Armstrong
Tripletone Arena Philips
Nikko Goodman Huldra

● LOUDSPEAKERS

Quad Rogers Kef Wharfedale
Goodman Tannoy Lowther
Leak Celestion Tandberg
Arena

● MOTORS, PICKUPS

Garrard incl.	Sonotone
SP.25 401, etc.	SME Mk. II
Goldring	BSR
Connoisseur	Pickering
Thorens	Audiotec
Shure	Neat TTC
Empire	Acos

All types of Diamond and Sapphire styli, stereo and mono. Microlifts, Garrard, Goldring and Acos Pressure Gauges. Disc Preener, Acos Dust Bug. Cabinets by Clearview

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

Between St. Leonard's Church
and Streatham Station

01-769 0466; 01-769 0192

Please note this is our only address ● Free parking Prentis Road, 2 mins. away
OPEN ALL DAY SATURDAY—EARLY CLOSING WEDNESDAY



Model MR 939

Solid-state, 4-track, 3-speed stereo tape recorder

"In summarising our conclusions we can say that the Sanyo MR-939 is the most complete and compact stereophonic record playback unit we have come across with a performance well within its manufacturer's specification"
Tape Recording Magazine July 1968

Solid state circuitry delivering 7-watts maximum music power per channel. 4-track stereo/monaural operation. 3 speeds selected by single lever. Recording levels controlled by 2 illuminated VU meters. Sound-on-sound, sound-with-sound facilities. Jacks for line out, speaker, stereo headphone outputs, microphone and auxiliary inputs, DIN (Record/Playback Connector). Automatic shut-off device. Vertical or horizontal operation.

SPECIFICATIONS

Recording system AC bias 4 track
Erasing system AC erase 4 track
Tape speeds
7½ ips (19cm/sec)
3¾ ips (9.5 cm/sec)
1⅞ ips (4.8 cm/sec)
Wow & Flutter
7½ ips : 0.15% R.M.S.

3¾ ips : 0.20% R.M.S.
1⅞ ips : 0.30% R.M.S.
Recording time
64 min at 7½ ips (Stereo 1200 ft. tape)
128 min at 3¾ ips (Stereo 1200 ft. tape)
256 min at 1⅞ ips (Stereo 1200 ft. tape)
Level indication VU meter x 2
Output power
Music power 7W x 2
Undistorted 4W x 2
Frequency response
7½ ips 20-20,000 c/s (30—15Kc ± 3db)
3¾ ips 30-13,000 c/s
1⅞ ips 30-8,000 c/s
Signal-to-noise ratio 45 db
Crosstalk
50 db (channel-channel)
65 db (track-track)
Output impedance
Line out : 2 Kohm
Speaker out : 8 ohm
Headphone : 10 Kohm
Input impedance
Microphone : 50 Kohm
Aux : 100 Kohm
Record/play DIN connector
Input : 10 Kohm
Output : 2 Kohm

Microphones
Two dynamic microphones
Speakers
Two 4" free edge permanent dynamic speakers
Voice coil impedance 8 ohm
Power source
AC 100V, 117V, 125V, 220V, 240V
50-60 c/s
Dimensions
Main unit: 18½ x 6" x 13¾"
(470 x 150 x 350 mm)
Speaker boxes: 9" x 5" x 13¾"
(230 x 130 x 350 mm)
Weight 36.3 lbs (16.5 kg)

The MR-939 is available from the Sanyo dealer in your area, specially selected for first-class before-and-after-sales service. Or you can write for an illustrated leaflet to :

Sanyo Marubeni (U.K.) Ltd.,
Bushey Mill Lane, Watford, Herts.
Telephone : 92 25355



People the world over agree there's something about a Sanyo