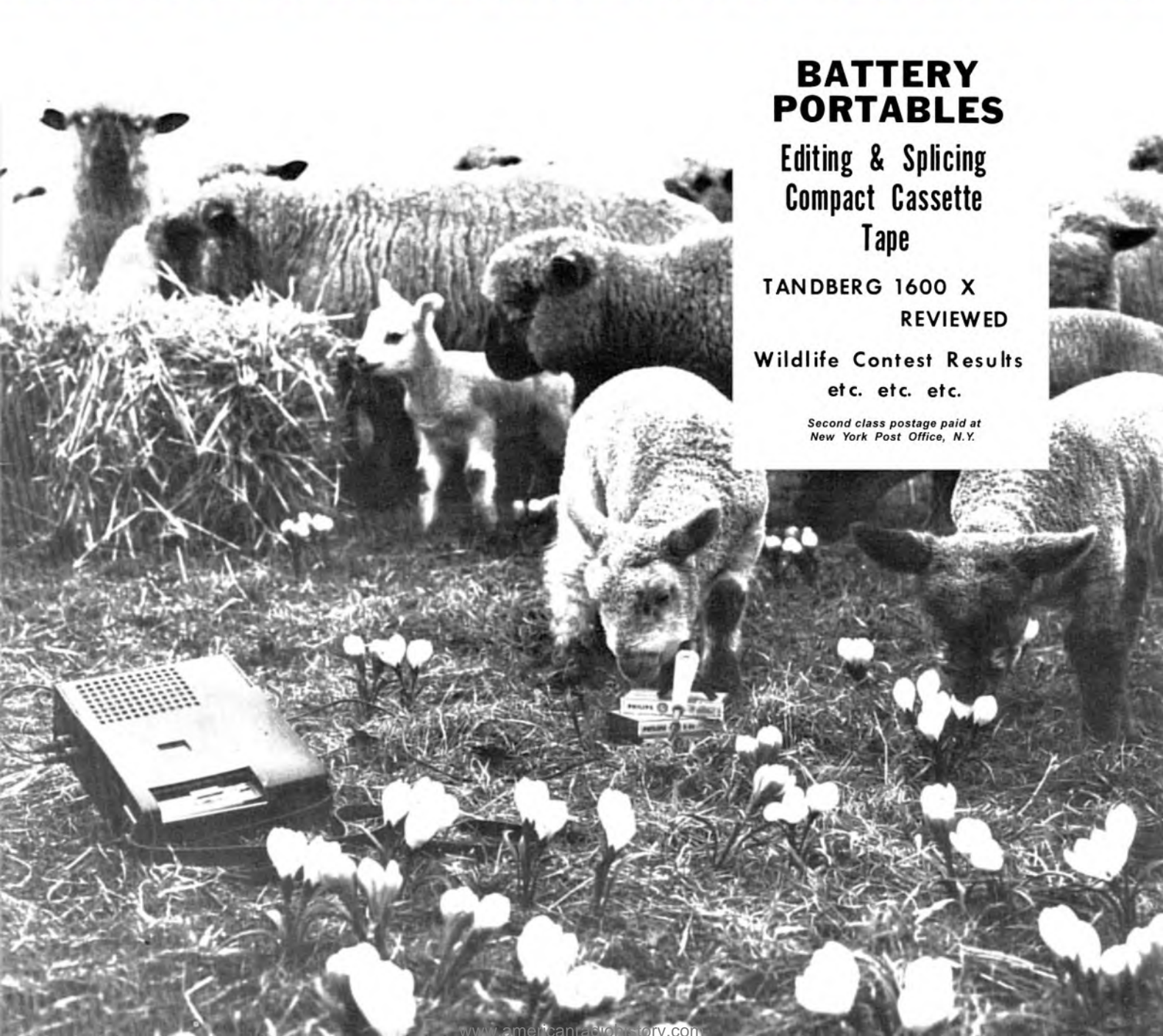


MARCH 1970

TAPE

RECORDING MAGAZINE

2 1/6



BATTERY PORTABLES

Editing & Splicing
Compact Cassette
Tape

TANDBERG 1600 X
REVIEWED

Wildlife Contest Results
etc. etc. etc.

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

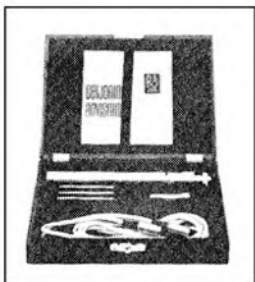


Microphones and Pick-ups by Bang & Olufsen

MICROPHONES



Beomic 1000 Omni-directional moving coil microphone. Response 50 – 17,000 Hz +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.

INCREDIBLE OFFER FROM R.E.W. SAVE £68
on the incomparable **AMPEX 1100** Stereophonic Tape Recorder



Here is value beyond compare. A unique tape recorder with features unknown outside the professional field, offered by R.E.W. at only 138gns – a saving of £68 on the list price of £213! The Ampex 1100 gives you the supreme advantage of automatic threading and electronic reversing. To load, simply place a reel of tape on the recorder, drop the end of the tape in the 'magic slot' and you're ready to play. Then sit back and enjoy a complete 4-track stereo tape without reel switching – the recorder reverses automatically at either or both ends of the tape. And there are many more impressive features, 3-speed operation, VU meters to constantly monitor the record level input with unerring accuracy, and precise dual capstan drive to reduce wow and flutter to a point where it is inaudible. The Ampex 1100 also incorporates silicon solid state electronics and special deep-gap heads which give a quality that never varies – year in, year out. Complete with stereo amplifier giving 6 watts R.M.S. output per channel, the Ampex 1100 can be used with any pair of good quality speakers. It all adds up to one of the finest tape recorders ever – at an incredibly low price from R.E.W.!

List Price: £213
R.E.W. Price 138 GNS
£48.18.0 DOWN and 12 monthly payments of £8 (INTEREST FREE)

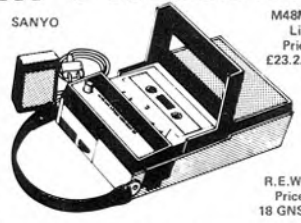
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A compact, light, cassette tape recorder which operates on four U11 batteries. Features include automatic record level and remote control. Comes complete with microphone and carrying handle. A/C adapter available as optional extra.

R.E.W. Price 18 GNS

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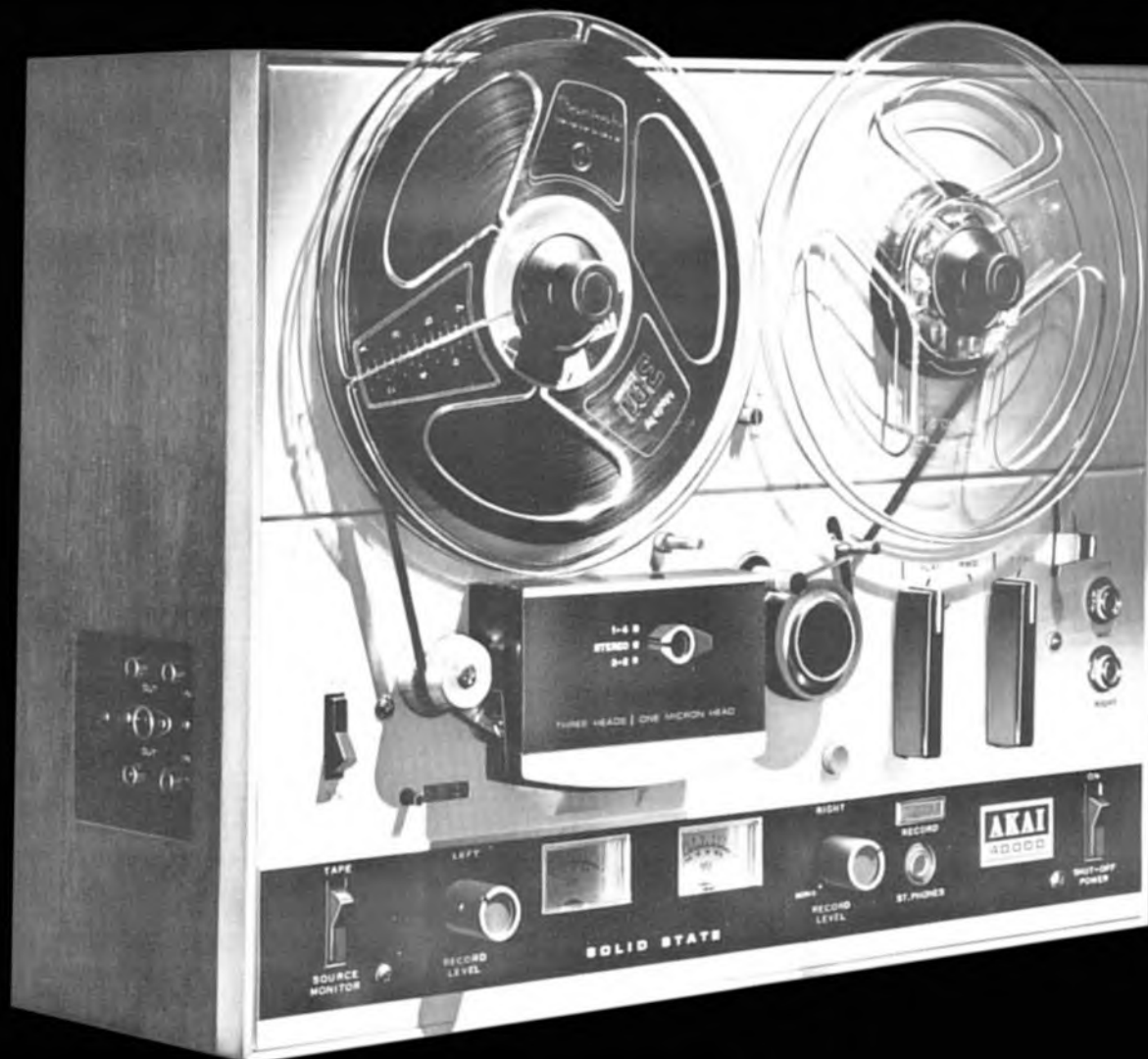
R.E.W. AUDIO VISUAL CO

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Name
Address TRM





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 $\frac{3}{4}$ 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

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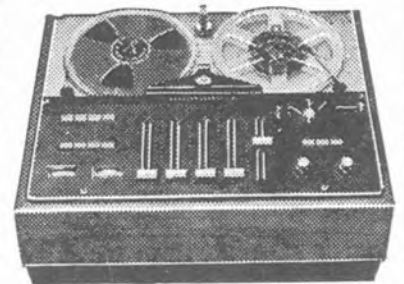


Our manager, Bob Hookings, is a keen tape recording enthusiast. Bang & Olufsen's are his speciality, having used B. & O. equipment for several years, his knowledge of this wonderful range is second to none. He is able to give personal callers his expert advice (please avoid telephoning) not only on B.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

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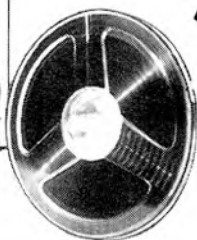
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7" 1200' ...	35/7	25/6	5" 1200' ...	43/3	30/3
			5½" 1800' ...	56/5	39/6
			7" 2400' ...	79/7	55/6
LONG PLAY			TRIPLE PLAY		
3" 210' ...	9/6	6/9	3" 450' ...	23/-	16/-
4" 450' ...	15/7	10/9	4" 900' ...	40/1	28/-
5" 900' ...	29/3	20/6	5" 1800' ...	67/3	47/3
5½" 1200' ...	36/5	25/6	5½" 2400' ...	91/5	64/-
7" 1800' ...	51/7	36/-	7" 3600' ...	116/7	81/6
BASF LOW NOISE COMPACT CASSETTES					
C.60 ...	17/7	12/3			
C.90 ...	25/1	17/6			
C.120 ...	33/7	23/6			



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AT THE LOWEST PRICE!**



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	POLYESTER				
3"	150' 3/3		225' 4/3	300' 6/6	600' 13/-
4"	300' 6/6		450' 7/6	600' 12/-	900' 17/6
5"	600' 11/6		900' 14/6	1200' 22/6	1800' 35/-
5½"	900' 14/6		1200' 17/6	1800' 29/6	2400' 48/6
7"	1200' 17/6		1800' 25/-	2400' 37/6	3600' 62/6

Half the price you might expect to pay in a shop for tape of similar quality. Supplied to us by a leading British manufacturer for sale under our own brand name, TAPE 70 is designed to meet the requirements of the most discriminating user and carries our own UNCONDITIONAL REFUND GUARANTEE.

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Please supply me with the following tapes by return of post:

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Post & Packing 2s 6d
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Philips N4404	90 0 0	26 13 4	4 8 11
Ferguson 3232	93 5 0	33 5 0	5 1 10
Sanyo MR929	97 4 9	33 4 9	5 6 10
Sony TC 252	99 15 0	33 5 0	5 10 10
Philips N4407	103 15 4	33 15 10	5 13 4
Akai 1710L	109 0 0	36 6 8	6 1 2
Sanyo MR939	112 0 2	38 13 6	6 2 3
Grundig TK247	112 10 0	37 10 0	6 5 0
Sony TC 230	121 11 9	40 11 9	6 15 0
Philips N 4408	136 3 10	46 19 5	7 8 9
Telefunken 204TS	124 19 0	41 19 0	6 13 4
Tandberg 1241X	149 0 0	49 0 0	8 6 8
Beocond 2000K	159 12 0	53 4 0	8 17 4
Beocond 2000T	165 18 0	57 18 0	9 0 0
Akai 1800SD	199 0 0	66 6 8	11 1 2
Ferrograph 722/4	204 16 9	68 16 9	11 6 8
Revox 1122/24	236 5 0	78 15 0	13 2 6
Philips Pro 12	239 0 7	79 13 7	13 5 7

4-TRACK MONAURAL

	Cash Price £ s d	deposit £ s d	12 Monthly Payments £ s d
Fidelity Braemar	34 4 8	11 12 8	1 17 4
Fidelity Studio	46 0 10	15 17 10	2 10 2
Grundig TK149	55 18 10	18 18 10	3 1 8
Philips 4307	48 11 11	16 15 3	2 13 1
Ferguson 3228	48 16 0	16 16 8	2 13 4
Telefunken 201	51 9 0	17 3 0	2 17 2
Ferguson 3238	59 12 0	20 12 0	3 5 0
Philips 4308	60 0 10	20 14 2	3 5 7
Ferguson 3216	66 2 0	22 16 0	3 12 2
Tandberg 1541	82 0 0	28 0 0	4 10 0

STEREO TAPE UNITS

	Cash Price £ s d	deposit £ s d	12 Monthly Payments £ s d
Sanyo MR801	72 9 0	24 3 0	4 0 6
Sony TC252	72 15 0	24 9 0	4 0 6
Sony TC355	100 2 6	34 2 6	5 10 0
Tandberg 1641-X	89 10 0	30 0 0	4 19 2
Akai 4000D	89 18 8	30 18 8	4 18 4
Tandberg 62/64-X	157 0 0	52 6 8	8 14 6
Ferrograph 702/4	194 15 8	64 15 8	10 16 8

MAINS TWIN TRACK

	Cash Price £ s d	deposit £ s d	12 Monthly Payments £ s d
Fidelity Braemar	31 0 0	10 14 0	1 13 10
Ferguson 3224	33 14 0	11 12 8	1 16 10
Grundig TK120	39 5 0	13 5 0	2 3 4
Tandberg 1521	77 0 0	27 0 0	4 3 4
Beocond 1100	82 19 0	27 13 0	4 12 2
Ferrograph 713	174 13 6	58 13 6	9 13 4

BATTERY OPERATED

	Cash Price £ s d	deposit £ s d	12 Monthly Payments £ s d
Philips RR290	31 10 0	10 10 0	1 15 0
Grundig C200	37 17 6	12 7 6	2 0 10
Philips RR482	54 12 0	18 4 0	3 0 8
Telefunken 300 TS	57 15 0	19 5 0	3 4 2
Telefunken 302 TS	68 5 0	22 15 0	3 15 10
Uher 4000L	133 13 1	44 13 1	7 8 4
Uher 4200/4400	162 10 7	54 10 7	9 0 0

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SANYO MR-910 STEREO

- * 4 Track
- * 2 Speeds, 7½ & 3¼ i.p.s.
- * 7" Reels
- * 2 x 4" Permanent Dynamic speakers
- * Sound-On-Sound with optional adapter
- * Sound-With-Sound
- * Supplied complete with 2 Microphones, 7" Tape, Audio leads, Makers 12 months guarantee and full instructions.

62 GNS. List price £84. 15. 0

Initial Deposit £32. 12. 2. 12 Monthly Payments of £3. 11. 8.

SANYO MR-990 STEREO

- * 4 Track
- * 3 Speeds
- * Sound-On-Sound
- * Sound-With-Sound
- * 2 Detachable Speaker Boxes
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- * Natural Wood Cabinet
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April 24th-26th, 1970

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Organised by British Audio Promotions Ltd for the Federation of British Audio

Telefunken



M501 de luxe



Recommended Price 42 GNS.

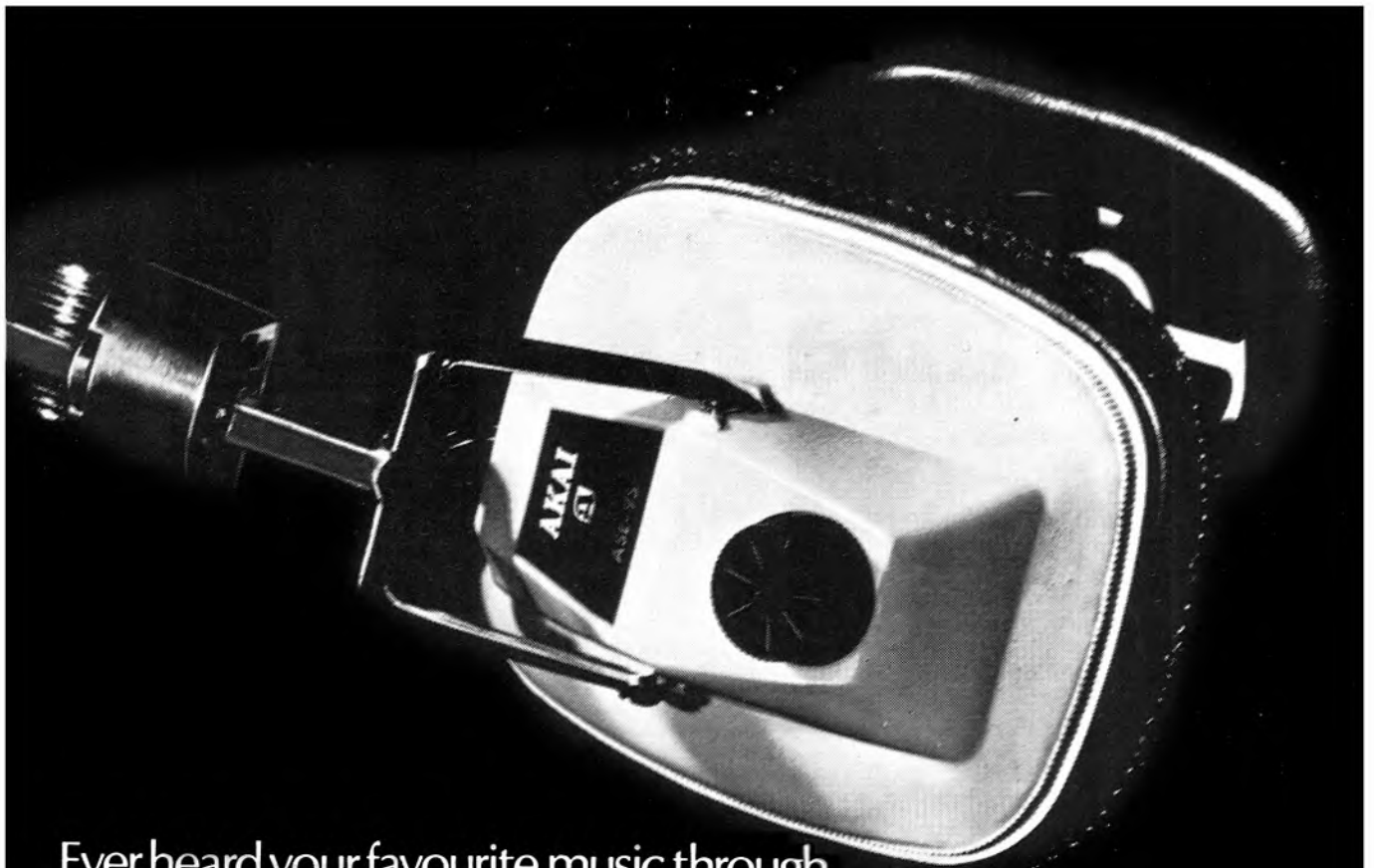
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Ever heard your favourite music through headphones with acoustic tone control?

Listen to the Akai ASE-9S at only £6.10.0 (recommended)

About this tone control, 'Audio Record Review' said: "It is a definite plus feature as it provides something by way of sonic control which is not normally available to the listener." They also said that "The

frequency response was found to be rather superior to the printed specifications" and claimed 23 HZ to 14.2 KHZ instead of 25HZ to 13 KHZ.

The 'Audio Record Review' noted that "Any enthusiast seeking

to experiment with stereo headset listening would be well advised to make an effort to hear the Akai ASE-9S stereo headphones." So we didn't say it, they did. Your dealer can arrange a demonstration.

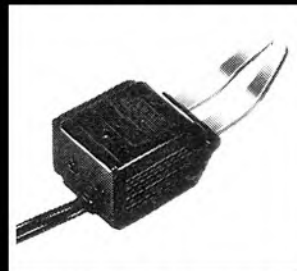
Here are four more quality accessories from Akai



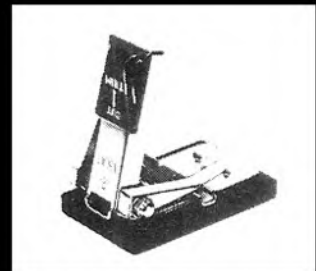
DR-110 Connection Cord
W/Din Plug on one end with four separate RCA Plugs at the other end. Recommended price : £1.7.6.



ADM-8 Microphone
A high-impedance, general-purpose dynamic microphone. Recommended price : £5.10.0.



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Telefunken M501. Tried, tested & true by Tape Recording.

We were going to try to tell you how good the Telefunken M501 is, but Tape Recording Magazine did it for us, so here are a few of their unadulterated words.

'With quite remarkable accuracy the M501 was shown to be producing an outstanding flat response curve well within tolerance limits of plus or minus 3dB over the specified range of frequencies.'

'Laboratory technicians tend to be suspicious of equipment at the

bottom of the price-list. In the present case they were more than pleasantly surprised with the performance standard recorded by this remarkable little machine.'

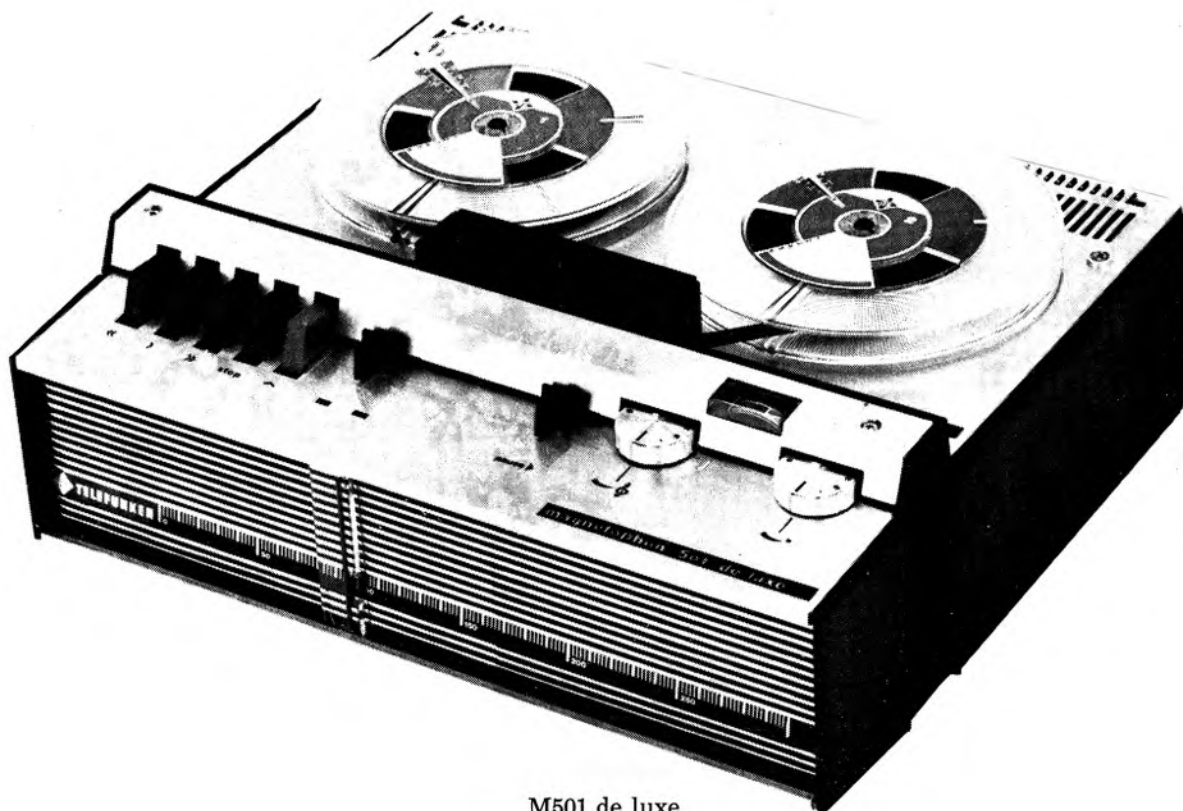
'We concluded that the M501 was functioning so well that it was a credit to the great name of Telefunken which it bears.'

'So we would have no hesitation in recommending the M501 to those who are interested in acquiring a 4 track mono machine of good

quality at a realistic price level. We believe the M501 will do much to maintain the popularity of open spool recording at this very competitive price level.'

But in the final analysis let the M501 speak for itself at your nearest dealer.

AEG/Telefunken
27 Chancery Lane
London WC2
01-242 9944



M501 de luxe

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BRITAIN'S ONLY TAPE RECORDER MART

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TYPICAL BARGAINS

ALL WITH 3 MONTHS WRITTEN GUARANTEE

(Note: M=Mono, S=Stereo, BP=Battery Portable, 4=4 track, 2=2 track)

GRUNDIG TK40 (M,2)	Our price ONLY 35 gns.
SONY TC500 (S,4)	Our price ONLY 57 gns.
AKAI M9 (S,4)	Our price ONLY 115 gns.
SONY TC800 (BP,M,2)	Our price ONLY 49 gns.
VORTEXION WV8 4 (M,2)	Our price ONLY 52 gns.
TANDBERG 1241 (S,4)	Our price ONLY 69 gns.
REVOX 736 (S,4)	Our price ONLY 95 gns.
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PHILIPS EL3534 (S,4)	Our price ONLY 59 gns.
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PHILIPS EL3549 (M,2)	Our price ONLY 29 gns.
FERROGRAPH 631 (M,2)	Our price ONLY 72 gns.

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TANDBERG 74 (S,4)	Our price ONLY 49 gns.
VORTEXION VVA 4 (M,2)	Our price ONLY 45 gns.
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Vol. 14 No. 3 March 1970

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Cover Photograph: In a Spring setting of new-born lambs with crocuses bursting through the fresh, green grass we have a reminder of the fine, warm days to come. The microphone that appears to be the centre of interest of the animal world is connected to a Philips Compact Cassette machine, Model EL 3302. On page 83 this month we discuss the pros and cons of the various kinds of battery portables, including cassette equipment.

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Tape trends and tape talk

By Douglas Brown

THE ESTABLISHMENT of Britain's "Open University" – the first students enrolled last month – is giving a great stimulus to manufacturers working on pre-recorded video tapes. No one doubts that the new breed of undergraduates working by their own firesides would benefit enormously if their material was available on tape for replay at any time.

As things have been planned to date, the B.B.C. will have the duty to transmit the programme material for the various courses; but, as with established schools broadcasting transmission times will not suit all students, and the possibility of recording and replaying later, or even of hiring the broadcast material on video tape, would revolutionise the whole operation.

Another aspect of the matter is that professors and lecturers working for the Open University are the people who will know most about the preparation of educational programmes suitable for taping – they are the people who have already done much work on the coming B.B.C. programmes. These will begin transmission in January next year.

It looks at present as if the first useful equipment on the market will use film, rather than magnetic tape. An international consortium, in which I.C.I. has a 30 per cent interest, hopes to be turning out this summer large quantities of cassettes providing educational programmes on 9mm film. The players which will be required for viewing should be available at about the same time, handled in this country by Rank Bush Murphy.

But how will this equipment stand up to the competition of magnetic tape, recording direct from TV and playing back in colour? That is the key question. It is too early to forecast precisely when the tape equipment will be available, but Sony promise a model before the end of this year and the big European manufacturers may not be far behind.

To complicate the picture further, R.C.A. are pressing ahead with their "Selectavision" technique, which they hope will come to the market in 1972. Some more details of this were revealed recently by the Financial Times Science Editor, David Fishlock.

"Selectavision has features which have excited the electronics industry much more than EVR (the film cassette)," he wrote. "For example, R.C.A. proposes to record in the form of a plastic hologram, on cheap vinyl tape. Such a tape, it believes, can be made from a nickel master simply by pressing it into the tape. To recall a strong image from such a record requires laser light, and the R.C.A. system seems likely to offer the first

mass use for the laser. But this device could be made very cheaply at the power levels needed. Holograms, moreover, have the immense advantage that no matter how badly abused – cracked, scratched or soiled – they remain almost unaffected . . . R.C.A.'s hologram is a much closer analogy to the long-playing record than anything involving film or videotape – and in colour, too."

It is always difficult to foresee future technical development, but I doubt if there was ever a time when it was quite so tricky.

* * *

EXPO 70 is going to put Japan very much in the headlines this year. And there is no question but that the Japanese have an interesting story to tell the world.

When recently I contacted three of the leading Japanese manufacturers of tape equipment I was deeply impressed by their reactions. The managing director of the giant Sony Corporation himself wrote back by return of post and within a fortnight I had received a sheaf of documents about the concern. The other firms were almost as quick off the mark.

The Sony story is a fabulous one. The last annual report shows net world-wide sales of about £82½ millions, a fifty per cent increase in two years. Studying the Sony company reports for the last five years, the expansion of its tape recorder sales is staggering. The 1964 report showed tape recorder sales up 36 per cent in a year, the next report showed a 14 per cent jump, the next one a 26 per cent increase, and then in 1967 a 34 per cent increase. Last year sales levelled off, with a 9 per cent increase.

All this began in May 1946 when two young graduates, Masaru Ibuka, now President, and Akio Morita, now Executive Vice-President, together established a £200 company to research and market telecommunications equipment. In 1950 they marketed the first magnetic tape and recorder in Japan, and they have never looked back.

Matsushita, who market the National range of recorders, have a similarly dramatic growth pattern. Its new plant, completed just over two years ago, has 122,000 sq ft of floor space. This concern's tape recording division was not established until November 1955, but it has now turned out well over eight million recorders. Details of new National equipment introduced in Japan in recent months shows a notable emphasis on language teaching aids.

BATTERY PORTABLES

DO YOU OWN a battery portable tape recorder? If not are you thinking of buying one? If you had one what would you use it for? Would you need a mains machine as well to play back the tapes recorded outdoors or to use as a copying machine? What is the best machine to use, cassette or open spool? What tape speeds should be used outdoors: 1 7/8, 3 3/4 or 7 1/2 ips? What is the right kind of microphone to use for outdoor recording?

These are all questions that are bound to arise at this time of the year when we look forward to some of the pleasures of outdoor life. Many people would not dream of going for a stroll on a Sunday afternoon without taking a camera. The recording enthusiast should be equally determined never to leave his battery portable machine at home on such an occasion. The world of sound is all around us all the time. All it needs is a man with a machine and a microphone to record it.

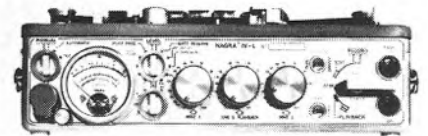
Arguments on the "best" kind of battery portable tape recorder rage as fiercely as do those on the equally futile discussions about what is the "best" kind of camera to use. One can only say that different people have different preferences and much depends on the kind of recording they intend to do and also on the quality standard it is hoped to achieve.

At the present time the battery portable market is dominated numerically by the sale of low-cost Compact Cassette models. Light in weight and easy to use they represent a very significant break-through for the enthusiast. Unfortunately there is a certain rather snobbish reaction against such equipment on the part of many serious recordists. Because they are so ("relatively!") inexpensive they can't be any good . . . Because the tape only runs at 1 7/8 ips. recorded quality must be awful . . . Because the Compact Cassette system uses narrow tracks . . . Because you can't edit . . . Because,

because, because.

All these arguments are based more on prejudice than on fact. Properly used a cassette machine is capable of producing results to an exceptionally high quality standard — often as good as we would have expected to get from mains equipment of a few years ago. It would have been thought that the low cost should have been regarded as an advantage rather than a disadvantage; very much on the credit side is the light weight and convenience of use. People who complain about Compact Cassettes have obviously never tried to thread an open spool machine in sub-zero temperatures when the fingers are so numb with cold that the only sensation they feel is one of pain. Neither have these people had to walk over ten or fifteen miles of rough country with a heavy open-spool machine on their backs. Neither I suspect have such people had to pay the cost of excess baggage when travelling by air with a heavy tape recorder tucked away in the suitcase.

No, the Compact Cassette system has many advantages. Naturally one could wish that it had a frequency response extending to 20,000 Hz., just as one could wish that its wow and flutter content were to be below 0.1% RMS. But the fact that it will not meet either of these requirements does not mean that it is not worthy of consideration. To the contrary for many, many applications it is the perfect economical solution. When working under difficult conditions a decision on the choice between cassette and open-spool could mean the difference between success and failure. There are many situations where the weight and bulk of the bigger machine would make it quite impossible to work at all. The truth is that the Compact Cassette battery portable should not be regarded as a toy but as a most useful and versatile weapon in the recordists' armoury — a weapon which he need never hesitate to make



The impressive control panel of the Nagra



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Four-track stereo portable from Akai.



The Sony portable now provides 7 1/2 ips.



One of the many Compact Cassette machines, this one by Pye

fullest use of.

One must be sensible, however, and admit that if the desire is to take recordings up to the highest standards of broadcast quality – which also means potential contest winners – then there are many advantages in using open-spool equipment. For such purposes the machine should be capable of running at 7½ ips. and it is going to be expensive to buy and possibly heavy to carry around. Typical of the models that come to mind are the Akai X6 (unusual because it is a ¼-track stereo machine), the Uher 4000 series which is also available in a stereo version, the Tandberg Series II, and then up the price range to the lordly Nagra which will leave little change out of £500 and the new Stellavox which is not yet generally available in this country. The other machines mentioned will cost best part of £150 or even more.

These are the choices for the enthusiast who is determined to put quality first. He will pay for them not only in money but in the sheer physical effort that is required to carry the equipment but he will get the benefit of a quality standard that can only vary from “very good” to “superb”.

From what has been said it will be seen that there is a vast price gap between the lowly under-£30 Compact Cassette models and the top grade 7½ ips. open-spool portables. From about £30 to about £150 represents a price differential of 5 times.

There are a number of machines available with either a single speed of 3¾ ips. or two speeds, 1 7/8 and 3¾ ips., and their price label is usually somewhere between about £50 to £80. These are the in-between family of battery portable tape recorders and they *should* offer better quality than Compact Cassette equipment whilst not coming up to the very high standard of their more costly relatives.

Before acquiring equipment of this kind careful comparisons should be made between it and the Compact Cassette equivalent, bearing in mind that the price differential is a factor of approximately two times as opposed to the five times for the more expensive 7½ ips. machines. With this family of equipment we have to decide whether the quality standard and the convenience facilities are worth roughly twice the cost of the cassette machine. To help in reaching this decision specifications should be carefully studied and one should also bear in mind the use to which the equipment is expected to be put.

The choice of a battery portable tape recorder is essentially a personal decision. Much more personal than the

acquisition of any other piece of recording equipment. What satisfies one man will not satisfy another; my choice might not necessarily be your choice. And as much as anything else choice should be influenced by the uses to which it might be put.

The uses of battery tape recording equipment are legion. We can simplify the matter by saying that the *correct* use of a battery portable is in a location and under circumstances where it is not possible to use mains powered equipment. Actuality recordings of all kinds come under this heading as, of course, do recordings taken in places where a mains power supply is not available. The use of a battery portable is not confined to wild tracts of open country. It might be at its most useful in taking interviews in the crowded streets of a busy city when the recordist is surrounded by possible sources of mains power. But to attempt to use mains under such circumstances would be to court disaster. With his battery machine on his shoulder the operator is free from all other encumbrances; there are no trailing wires, there is no dependence upon a power socket and his equipment is smaller and lighter than its mains powered equivalent.

The *wrong* situation for the use of battery portables is where we have a static event taking place with adequate power points available. Typical might be, say, an organ recital given in a church. For such an event the chief advantage in using battery equipment would be ease, convenience and portability. Unfortunately in the final analysis the convenience of the operator should not be taken into account and such an occasion should be covered by the use of a mains machine. If one is fortunate enough to own something like a Nagra operating at 15 ips. then the final recorded quality from the battery portable will probably not be inferior to that which would have been obtained on a high-class mains machine.

At the other extreme a battery Compact Cassette machine will undoubtedly give inferior quality as compared to that which would have been obtained from a good mains powered recorder. On the other hand if the location of the church were to be, say, Italy and the recording was being taken on one's holiday then the choice is likely to come back to the use of a Compact Cassette machine or no recording at all. Under those circumstances the use of a cassette machine is more than justified.

But the great advantage of owning portable equipment is the ability to take it around and use it on any and every occasion. A battery machine is – or

should be – always ready for use. It is the tool with which the recordist can secure all those elusive sounds that are quite impossible to record in any other way.

Which brings us to the important question of the correct kind of microphone to use. There is little doubt about the answer to this one. Ideally it should be a moving coil instrument with either a cardioid or omni-directional configuration. Its impedance should match that of the input on the machine or alternatively a transformer or miniature transistorised transformer/pre-amplifier must be used in the circuit. Since microphones used with battery machines are frequently hand-held the intending user should carefully investigate any instrument he is considering acquiring to see if it is liable to transmit hand noises through either the case or the cable. Some microphones are very prone to interference from this source. Many even quite expensive moving coil microphones are suitable only for studio use because of their failing in this respect. It is virtually impossible to hand-hold a microphone that is sensitive to noise interference in this way. To check a microphone for “hand-noise” it is only necessary to couple it to a machine and then run the fingers lightly over both it and the cable as it exits from the instrument. In bad cases the resultant recording will sound as if sacks of coal are being delivered throughout the “programme”. A good microphone for outdoor use should only betray the tiniest noise if the fingers are run over the casing.

In our monthly Nature Notes Richard Margoschis is constantly referring to one highly specialised form of outdoor recording activity. Nature recording is an all-absorbing and fascinating occupation presenting a challenge of the highest magnitude to the enthusiast. It is recommended that any reader who feels that he might be interested in this kind of activity should write to Richard, who is secretary of The Wildlife Sound Recording Society, care of this magazine. He will be only too pleased to give his personal assistance and to advise.

But nature recording is only one aspect of the limitless possibilities of exploiting the freedom that battery portable equipment endows. There is hardly a field of human activity to which the battery portable cannot be brought with good effect. So the possibilities are endless. It only remains to acquire the equipment and then to use it. Why not make 1970 the year in which the number of people carrying battery portable tape recorders exceeds the numbers with miniature cameras?



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NATURE NOTES FOR MARCH

BY RICHARD MARGOSCHIS

BY THE TIME you read this, Clive Lloyd, a go-ahead young man of twenty-three, will have been shut away in the Welsh mountains for a couple of months. 'Shut away' is not really the correct term because he is undertaking an experiment in social isolation which is to last for one complete year. He is depriving himself of contact with other humans and has gone to great lengths to ensure success in his venture — I am sure he will come back with some very interesting and useful information.

During his year alone he will be carrying out certain studies. He is a zoologist and intends primarily to study the effects of this isolation on himself but will occupy his time with a study, among other things, of the flora and fauna in the immediate locality in which he will be living. The fact that he wants to include sound recording brought him to see me; this is something new to him and so he wanted advice on what equipment to use and how to go about it. His final choice of recorder was the Uher 4000 L; this he will be able to operate on a re-chargeable cell — he has mains electricity laid into his farmhouse — and so eliminate the long-term storage of dry cells, always a chancy business. A couple of Grampian microphones (DP4 and DP6), a reflector and some microphone cable, complete his equipment.

A year alone in the heart of the Welsh mountains — what a chance to make natural history recordings — and am I envious! I think that one of the main points is that he will be able to take full advantage of weather conditions, and he should not have a lot of trouble from extraneous noise! Obviously, he will soon get to know his area intimately and will have the opportunity of working with both open microphone and reflector; through the seasons his subjects can be birds, mammals and 'atmosphere'. I hope that, in due course, I shall be able to tell you how he gets on.

I have often been asked if it is possible to insert a switch in the motor circuit of a field tape recorder. There is a very valid reason for this idea and it is one which really becomes apparent only after you have done an amount of natural history recording. It is a point which manufacturers might take note of. Sometimes you will find yourself waiting for an animal in *really* quiet conditions, and it is then that you will realise what a noise the controls make when you put the machine into the record condition; it's enough to scare off any self respecting creature! No machine is *absolutely ideal* for all purposes but there are usually ways and means of overcoming difficulties.

The point is that when you are waiting for long periods (an hour or more) with machine running so as to prevent noise of starting, you use up lot of battery power even if tape is held on the pause control. I have found that when I am working with the Uher 4000L the answer is to have it ready in the record condition and then use the main control switch (speed selector) to start and stop; this is a very silent action. With my favourite machine, the Tandberg II — which has the great advantage of A/B monitoring and an overload limit—the

situation is different because the main switch must be operated to go into record and it is very noisy. However, the matter is easily and conveniently overcome; a plug in the accessory socket with a press button switch across pins one and two is all that is necessary. In this way I can start and stop the machine with the small switch held in my hand, and it takes only about one and a half seconds to get going.

When using this technique with any machine you must be doubly sure to see that it is put into the neutral condition when the session is over, otherwise you will get 'flats' on the rollers and find yourself in real trouble.

If you have not already done so, now is the time to give all your field recording equipment a thorough checkover ready for the busy period; be warned — it is upon you. Already, most of our resident birds will be paired up and at any time you should be hearing the early arrivals of our summer visitors, the Chiffchaff for instance. Courting displays will be going on in the woods, in the fields and on the the moors, offering opportunities of recording other than pure song. It is an agonising experience to be in a position to record some unusual display calls only to find that a microphone lead is defective, or, upon replay, to find that the tape was not running smoothly through the machine because of dirty heads and tape guides.

A few days before writing these notes I came home from my favourite pool and replayed a tape recorded there. I was somewhat surprised to hear a rendering, if only faint, of 'Hark the Herald Angels'; I realised then that the Salvation Army band had been in the town — about a mile and a half away! This illustrates, among other things, how you miss some sounds at the time of recording because you are concentrating on your subject. Oh, the hazards of this wonderful game!

Judging entries to the Wildlife Sound Recording Contest organised by the 3M Company, makers of Scotch magnetic recording tape in conjunction with the Wildlife Sound Recording Society took place on January 16th. In classes 1, 2 and 3 the selection was for First, Runner-up and Highly Commended in each. In the Junior Class selection was for First, Runner-up and two equally Highly Commended. The "overall" winner — who will receive for his prize a Tandberg Series II battery portable tape recorder — will not be announced until the prize-giving in March.

Class 1. Individual bird species.

- | | |
|-----------------|---------------------------|
| 1. Meadow Pipit | Richard Savage, Somerset. |
| 2. Willow Tit | Enid Allsopp, Leicester. |
| 4. Dipper | T. W. Rudd, Westmorland. |

Class 2. Mammals, insects, amphibians etc.

- | | |
|--|-------------------------------|
| 1. Frogs spawning | E. Legge, Derbyshire. |
| 2. Fox fight | John Gittins, Worcestershire. |
| 3. Fallow buck patrolling herd of does | Anne Dunn, Southampton. |

Class 3. Atmosphere

- | | |
|--|------------------------------|
| 1. Dawn Chorus & thunderstorm | Alan Ferry, Gloucestershire. |
| 2. Dawn Chorus | Ray Goodwin, Worcestershire. |
| 3. Before cock crow — on Scottish Loch | Kenneth Haselock, Middx. |

Class 4. Junior.

- | | |
|-----------------------|--|
| 1. Lesser Whitethroat | C. J. Barratt, Surrey.
(16 yrs) |
| 2. Thrush | Rosemary Bran, Winchester.
(14 yrs) |
| 3. Bumble Bee | J. Wardle, Berks.
(16 yrs) |
| 4. House Martin | A. J. Lazzarini, Notts. (14 yrs) |

Judges — John Burton, B.B.C. Nat. Hist. Unit; Lawrence Shove, Professional Recordist; Phillip Hodson, Technical Executive, 3M Co.; Richard Margoschis.

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AT THE PRESENT time there is a great deal of discussion going on in the trade about audio exhibitions. This talk is centred largely on the two questions: when should they be held and where should they be held?

The Audio Fair, combined with the Photo-cine Fair and held at Olympia for the first time last year, was reckoned by many to be a great success. Certainly if success can be measured by sheer weight of numbers there is little doubt about it. But many thoughtful people have wondered whether an exhibition of this kind held in a vast hall provides the right answer for the specialised requirements of audio. Much of the social atmosphere of the old Russell Hotel Fairs was missing. And was October the right time of the year anyway?

There is a strong weight of opinion amongst manufacturers in favour of an exhibition earlier than the Autumn. September has been suggested, but that would clash with the Trade Radio Shows. August is a bad month because so many people are away on holiday, and anyway it would clash with the German exhibition at Dusseldorf. July is also a holiday month, so May or June are possibilities. The new Sonex '70 exhibition goes a month further back to April which is approaching closely to the time of the old Easter Audio Fairs.

At the present time it looks as if we shall have two exhibitions in 1970. Sonex from April 23rd to 26th at Skyway Hotel, London Airport, and Audio Fair at Olympia at approximately the same time in October as last year. This duplication of effort is bound to put a great strain on the resources of the Industry, both in terms of finance and manpower. Many firms will probably enter both shows, whilst others will favour one and not the other. All will be watching results very carefully to try to assess the relative values of the two projects.

But what of the public? What does the consumer prefer? Would you rather go to Olympia in October or would you instead be prepared to travel to London Airport in the Spring? Do you vote in favour of the Olympia-type exhibition or do you appreciate the hotel-room-type of show?

The one section of the Industry that does not seem to have been consulted is the consumer. It could be said that by attending Olympia in such large numbers the general public expressed a tacit support for that event. But perhaps the truth is that there is such a vast interest in audio that any exhibition held anywhere at any time will always command a capacity attendance. If my

CROSS

TALK

By Audios

hunch is right then we shall get reports of Skyway Hotel bursting at the seams . . .

I am in no way confused about my own personal preference. Without having the slightest regard for who might be organising the show I feel that the combination of the intimacy of hotel rooms plus the early part of the year offers great advantages. In my opinion the ideal solution would be for the two rival factions to come together and jointly stage a comprehensive event in, say, May. It's a pity that in this country there should be no real alternative in the choice of premises. It seems that we must either use a gigantic, barn-like hall or a hotel. Each has its own peculiar disadvantages. What is needed is a proper exhibition complex, but the provision of such costly facilities could only be tackled at government level.

So the argument goes on. Whatever agreements might or might not be reached the fact remains that the end product of any exhibition must be an increase in sales, and purchasers of audio equipment are members of the general public, people like you and I. In the final analysis it is the wish of the public that should influence decisions. I hope it is going to be taken into account.

* * *

THE OTHER DAY I spent quite a few hours chatting to one of our leading audio retailers. An interesting gentleman, dedicated to solving problems for his customers, a job he does rather well so that he is assured both appreciation and reasonable profits.

He told me that much of his time is spent discussing turn-tables, tone arms and cartridges. The interest in gramophone equipment is enormous. And with it goes the sale of amplifiers, speaker enclosures and probably radio tuners as well. Tape recorders? Not moving so fast as the other items of equipment. There is a resistance on the part of the buyer against laying out the fairly large sum of money required to acquire good recording equipment.

As he was an obvious expert in the field of audio I enquired what equipment he used himself for his own pleasure at home? I expected a list of aristocratic items: S.M.E., Shure, Thorens, etc., etc. Instead he smiled apologetically and admitted that he was strictly a "tape man" at home.

Now this is very significant. Here we have someone with access to all the finest equipment through his own showroom and with the knowledge and experience to form valid judgements on the quality of the sound he is hearing. What does he choose? Tape.

There has been such a lot of propaganda in favour of discs and against the magnetic medium that such a confession surprised even me. His machine, by the way, was named, and it comes modestly in the under-£90-price bracket.

Surely it's time we all of us realised that magnetic recording offers more - not less - than gramophone record reproduction? Much of the money now being invested in disc reproducers would be better spent on good quality tape recorders. It's the medium that people who are really "in the know" prefer to use.

Naturally cost is a limiting factor. But even £90 does not go too far at the upper end of the gramophone price lists. Transcription arms, cartridges and turntables might be less costly as individual items, but add their prices together and the answer can be soberingly high. Add to that the cost of the records that must be bought and the total approaches astronomical proportions. Against that the price of the tape recorder and a few reels of tape is much more attractive.

So if you have friends who are thinking of spending money at the local hi-fi shop ask them to stop and think twice - or even three times - before parting with their money. Good sound reproduction is worth every penny that can be legitimately spent on it, and it's an investment that will give pleasure and enjoyment for years to come. But best value for money is not necessarily in what appears to be the first obvious choice.

* * *

TALKING of gramophones, the picture on Page 47 of last month's issue has raised quite a lot of amused comment. If you remember it was an old, horn, wind-up instrument, but it was fitted with two tone arms, each with its own "needle" and each with an enormous bell-like horn. I have actually seen and used this machine, and great fun it is.

The problem is to get the two needles into the same groove on the disc. When successful the resultant sound has a strange bathroom-like quality; miss the right groove with one needle and the programme sounds like the worst case of crosstalk ever! The machine, together with dozens of other audio curiosities and historical pieces, is beautifully preserved in the Tage Schouboe Museum in Copenhagen. Every exhibit there is in working order in spite of the fact that many of the items have been salvaged from junk shops, old attics and other unlikely sources. Many of them are classic examples of the superb skill and high-grade workmanship that were thought to be necessary in the manufacture of consumer goods at the turn of the century. Mahogany case-work with brass strapping and hinges - all of it a delight to see.

Today we have different skills and different standards. Our equipment works better, but will it last longer? It sometimes seems a pity to think that the days of mahogany and brass have gone for ever.

* * *

A YOUNG CHILD, impressed by his father's purchase of a new tape recorder, had just heard the recorded sound of his own voice for the first time in his life.

"Daddy", he said, "I know the fairies brought me, but did they bring my voice as well . . .?"

TAPE

WORKSHOP

NEW SERIES

By DENYS KILICK

LAST MONTH in Tape Workshop we investigated the inadvertent recording of unwanted sounds — sounds that are generally described as “noise.” Now we can turn to the recording of the sounds we actually do want to register on the tape. For convenience we can subdivide all recording activities into two quite separate categories: Recordings might be “live,” meaning that an actual sound is made in front of the microphone which will then convert it to electrical energy in a form that can be handled by the electronics of a tape recorder, or alternatively we can have “non-live” sound which implies the use of material which has already been converted into electrical energy. This latter category embraces copying from a second tape recorder, from the radio or from disc (and is always subject to copyright restrictions of course!). It frequently happens that in the handling of sound one finds oneself dealing with both categories of recording, but for the sake of convenience we are going to confine ourselves here to “live” sound.

In our experiments last month we showed sound to be a form of energy and drew parallels between it and other forms of energy, in particular electrical and mechanical. If we think once again of sound as being equivalent to a mechanical force it would be reasonable to suppose that under certain conditions it could inflict physical pain or even injury on the listener. A sharp slap on the face (a mechanical force) hurts. If the slap is hard enough it can even cause physical damage. If sound is truly another form of energy then it should be capable of producing the same effect. Yes, it does.

We are all familiar with the highly imaginative fictional character of the “mad professor” who invents the ultimate weapon in the form of an ultra-sonic “sound gun”. This gentleman — usually bearded, foreign and with an evil glint in his eye — is doing no more than making practical use of the theories we have been discussing. The fact is that if a sound is loud enough the listener becomes conscious of a sensation of pain. Many high-grade professional microphones have their distortion figures quoted by referring to a sound level described as “at the threshold of pain.” This is a known and accepted standard. If one passes through the threshold of pain a point will be reached where the energy is so intense that the machinery of the human body can no longer stand it and injury follows.

It should be noted that investigation has recently been carried out on the effects of the very high noise level produced by some of our pop groups and it was shown that both the musicians and their audiences are liable to suffer permanent physical injury through the sound intensity. Fortunately for us our fictional criminal who attempts to use these principles as the basis of a secret weapon is faced with

difficulties that can only be solved in the highly imaginative pages of a novel. His nefarious plans would probably stand a better chance of success if he were to use a bow and arrow instead . . .

It is not suggested that we should experiment with sound levels that approach anywhere near the threshold of pain. Such fooling about is dangerous since it can easily inflict permanent damage to the listener. The only time the ordinary person is likely to find himself in danger is when using headsets. Because the sound produced by headsets is projected directly at close range into the orifice of the ear and because a relatively low level of audio power is required to produce an exceptionally high sound output headphones should always be connected to equipment with the volume level turned down to minimum unless the headphone socket has been specially wired to give a safe listening level.

In our experiments we shall be investigating some of the aspects of recording live sounds. But at the same time we shall also be investigating the effect on the listener of playing those sounds back. This very obvious point is specifically mentioned because it is frequently overlooked. One cannot discuss *recording* without at the same time discussing *playback*. The whole point of making any recording is to enable the sound to be preserved and then heard again at will. The playing back is at least as important as the recording and the two should always be thought of together.

The ideal record/playback mechanism would not only register with absolute fidelity all the sounds fed to it but would also be capable of reproducing them with an equal fidelity and at precisely the same levels as when the sound was first made. By merely altering volume levels on playback the character of a recorded sound can be changed almost out of recognition. So our practical experiments are going to relate recording to playback in order to establish a relationship between them.

Let us suppose we have a recording of a person speaking very quietly. Subsequently we wish they had spoken more loudly. Can we use the existing recording and merely play it back at a higher volume level? Alternatively, should we have increased the gain when the recording was in progress? Or perhaps we should have moved the speaker rather closer to the microphone? Lastly we could have maintained the same voice to microphone distance, the same recording level, but asked our subject to “give more voice.”

For the sake of convenience the sound source we are going to use is that of the human voice. It is very useful for experimental purposes because not only is it always readily available but when we come to play back the wide differences in sound quality under a variety of recording conditions

should be immediately apparent. For all our experiments this month the basic equipment required comprises a tape recorder, a microphone, a spool of tape and the best possible quality playback chain that is available. Ideally this should comprise a separate amplifier and full-range loudspeaker, but don't worry if you are limited to using the built-in speaker in the tape recorder or even a pair of headphones. Often the latter will give better sound quality than a small monitoring loudspeaker, but please do remember to observe the safety precautions mentioned earlier. Similarly with regard to tape speed, if the recorder in use has more than one speed then the fastest should be employed so as to derive the benefit of the highest possible quality potential. Finally remember to take advantage of the lessons learnt from last month's article – a good separation between microphones and machine is essential and preferably one should insulate against the breakthrough of unwanted noise.

Since starting this series of practical investigations into the problems of sound recording it has been pointed out that tape recording clubs, schools and other organisations might well be glad to use our suggestions as the basis of a group activity. This is an excellent idea and it is sincerely hoped that the regular practical section of our feature will provide instructive and entertaining ideas that will be capable of deeper exploration and discussion. Additional experiments could be devised in such a way that individual members of a group could participate. Why not try it at the next club meeting?

EXPERIMENT 1. THE "NORMAL" VOICE.

Equipment required: One tape recorder with tape
One microphone
Two tables
Foam rubber for insulation
A sound source (human voice)

We are all used to hearing people speak to us in "normal" voices. The differences between shouting and whispering are obvious. If a subject to be recorded addresses the microphone in his ordinary speaking voice and then listens to the playback of the tape he is often surprised at the resultant sound. Frequently he will ask: "Is that really me?" The differences he can hear might be due to a poor quality recording (or poor quality reproduction of a good recording, remembering that the two must always be considered together) or it might be due to the fact that he doesn't really know what his own voice actually sounds like to other people. We all hear the sounds of our own voices by direct conduction through the bones in the head, whereas the listener hears by the transmission of sound waves. This different method of hearing means that we never really hear ourselves as other people hear us. For this reason assessments on the quality of a voice recording should always be made by persons other than the speaker himself.

Method.

- (A) Set up the recording equipment as described in Experiment 3. last month.
- (B) Place the subject to be recorded so that his mouth is about 10 inches away from, and slightly above, the microphone.
- (C) Adjust the gain control on the tape recorder so that the record level indicator shows maximum permitted deflection when the subject speaks in his ordinary speaking voice.
- (D) Take a recording at this level by asking the subject to either read a passage from a book, recite some poetry, or just extemporise.
- (E) Play back the recording with the volume control carefully adjusted so that the sound intensity at the

loudspeaker is as nearly as can be judged the same as the sound intensity from the speaker's live voice.

- (F) Repeat the playback several times and compare the actual sound to the recorded version. At the same time carefully note any extraneous recorded sound and aberrations such as whistling sibilants etc.
- (G) Play back the recording again at a much lower volume level. Decide if the resultant sound is like a genuine whisper or if it merely leaves the impression of a full level recording being reproduced at too low a volume setting.
- (H) Repeat the playback yet again, but this time at a much higher volume level than was originally used. Does this sound like a shout or is it just too loud?
- (I) Repeat all the above processes using other voices.

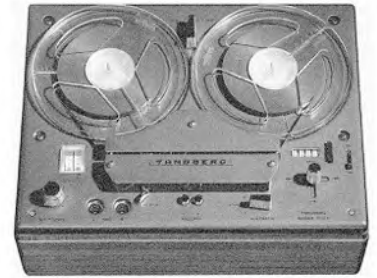
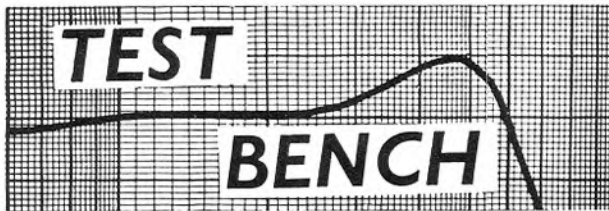
A great deal can be learned from the comparisons in this experiment. Above all else we should discover that the word "fidelity" can hardly be applied to any of the recordings we have taken. There is one way to judge whether a really good voice recording well reproduced is as good as one believes it to be. It should be played in a darkened room so that the listeners are not distracted in any way (eyes closed is the daytime alternative) and a really first-class recording should leave the impression that if the light were to be suddenly switched on (or the eyes suddenly opened) one would just be able to catch sight of the speaker before he or she disappears into the loudspeaker. That is not as far-fetched as it might sound. It is the final test that one of our well-known professional specialists in voice recording always applies to his own work. Particularly note the differences in sound quality as the same recording is played back at different levels. It should be observed that a very low volume level results in a substantial loss of low frequency content, whereas a very high level gives a "boomy" effect. In both cases it should be found that the voice loses its naturalistic qualities. Carefully observe evidence of unwanted noise being recorded and try to arrange the microphone position away from sources of unwanted sound. Drawing curtains will materially assist in cutting down the breakthrough of outside street noises and also in reducing reverberation within the recording room. If obtrusive sibilants have been recorded attempt to get rid of them by altering the angle between microphone and speaker. If several speaking voices are available it will probably be noted that sibilants sound worse from some people than others, thus showing that highly emphasised sibilants are characteristics of individual voices.

EXPERIMENT 2. MODIFYING THE RECORDING TECHNIQUE

Equipment required: As in Experiment No. 1.

In all probability none of the results from our first experiment will have been wholly satisfactory. Corrections have to be made and the easiest of these is to modify the recording technique. For our first experiment we recorded by setting the level control at a point where the normal speaking voice of the subject gave us the maximum permitted deflection in the record level indicator. The interaction between what we see visually from this indicator and the setting of the record gain control is the only means we have of influencing recorded results by adjustment at the tape recorder itself. Unlike a camera which has the possibility of a vast range of control through adjustment to both shutter speed and lens aperture we, working with sound, have only a single control knob to bother about – the record gain control. It is useful to think of increasing the gain at the tape recorder as having the effect of making the microphone "more sensitive" and conversely of making the microphone "less

Please turn to Page 99



MANUFACTURER'S SPECIFICATION

Tandberg Series 1600 X

Power Requirements: Standard model 230V 50 Hz. Convertible to 115V or 240V. Alternative U.S. model available.

Power Consumption: 40 Watts

Tape: Maximum reel diameter 7-inches. Low Noise tape should be used.

Tape Speeds: 17/8ths, 3¾ and 7½ ips.

Speed Tolerance: Absolute tolerance ± 1.5%

Fast and Rewind: Approx. 1 min. 40 secs. for 1,200 feet.

Magnetic Heads: Model 1641 one each erase, record / playback and crossfield bias, four-track. Model 1621 ditto half-track.

Inputs: 2 x Microphone, 200 Ohm unbalanced, DIN. 2 x High In, impedance 1 Megohm, sensitivity 100 mV at 400 Hz., max. 20V, Phono. 2 x Low In, impedance 57 Kohm, sensitivity 5 mV at 400 Hz., max. 1V, Phono/DIN.

Outputs: Min. load impedance 200 Ohms. 0.9V output for 0 DB at 400 Hz. Phono/DIN.

Tape Distortion: Less than 5%.

Frequency Response: 40 to 20,000 Hz. + 2 dB at 7½ ips. 50 to 16,000 Hz. ± 2 dB at 3¾ ips. 50 to 9,000 Hz. ± 2 dB at 17/8ths ips.

Wow: 0.07% RMS at 7½ ips; 0.14% RMS at 3¾ ips; 0.28% RMS at 17/8ths ips.

Signal/Noise: 55 dB RMS unweighted.

Crosstalk: Stereo, better than 50 dB.

Dimension: L 15· 3/8th inches, H 6 11/16th inches, D 11 13/16th inches.

Weight: 19lbs 2 ozs.

Recommended Retail Price: £89.10.0 including purchase tax.

Distributors: Farnell - Tandberg Ltd., Hereford House, Vicar Lane, Leeds LS2 7NS.

TANDBERG 1641 X

INVESTIGATED BY R. HIRST AND D. KILLICK

TANDBERG 1641X TEST CHART

Frequency Hz	Overall Response			Playback Only dB	Signal/Noise Ratio dB	Distortion %	Crosstalk dB
	7½ips	3¾ips	1¾ips				
40.....	-1.0	-2.7	-3.6	-0.5	58	3.9	58
50.....	+0.8	-2.0	-2.0	+0.5			
60.....	+0.5	-1.8	-1.2	+1.0			
100.....	0	-1.2	-1.0	+1.0			
250.....	-0.4	-0.4	-0.6	0			
500.....	-0.3	0	-0.5	0			
1000.....	0	0	0	0			
2000.....	-0.2	0	+0.6	0			
4000.....	+0.1	+0.9	+1.8	+0.2			
6000.....	+0.3	+0.9	+2.0	+2.0			
8000.....	+0.3	+0.6	+1.1	+0.4			
10000.....	+0.4	+0.2	-1.8	+0.6			
12000.....	+0.5	+0.1		+0.5			
14000.....	+0.6	+0.3		+0.7			
16000.....	+1.0	-1.2		+0.9			
18000.....	+1.2			+1.0			
20000.....	+1.4			+1.0			
22000.....	+1.0						
24000.....	-0.9						
Wow & Flutter	0.05%	0.11%	0.22%				

NOTES. - The Overall Response figures relate to record and playback. Playback Only relates to the reproduction of a DIN calibration tape. For Signal-to-Noise Ratio the tape was recorded at OVU and then the input signal was removed from the record amplifier. By reference to the signal level recorded and the resultant tape noise, the noise voltage was read off, with the tape still in motion. Distortion is quoted against a 1,000 Hz signal recorded at the same level 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.

IN JANUARY and February of this year our reviews dealt with tape recorders in the "budget" class. Mono machines operating at the single tape speed of 3¾ ips they provide an interesting contrast with this month's model, the Tandberg 1600 X, although relating facilities to cost we could also say that this machine too comes in the budget category.

The 1600 X is a deck and pre-amp intended for use with an existing quality amplifier/loudspeaker set-up. It is mains

powered running at three speeds, 17/8ths, 3¾ and 7½ ips, giving full stereo record/playback facilities. Model reference 1641 X (which was the one submitted for review) is four-track, model reference 1621 X is the identical half-track version.

At first glance we find the familiar Tandberg layout and configuration, very similar to other Tandberg machines reviewed by us. And what a joy it is to see once again the beautifully finished cabinet work of this equipment. Here

we have no apology for sharp corners or box-like appearance; instead the satin smoothness of machined woodwork that is a delight to both the eye and the touch.

But it is too soon to rhapsodise about such matters - we mention them so early in our notes simply because they are part of our very first impression of the machine. More important, how does it behave technically? Before commenting on our technical findings we should just like to mention that

although the 1600 X Series models could be said to have "three heads", those heads comprise: Erase, Record/Playback, and Crossfield Bias. Since the "business" head is combined Record/Playback it does not have the Before and After monitoring facilities of models where separate Record and Playback heads (with separate amplifiers) are used. But it does incorporate the well-known Crossfield Bias system, which, by means of a separate bias head applies the bias current to the rear of the tape. The inclusion of this facility is indicated by the "X" in the model number.

A quick reference to the recommended retail price, under £90, and we find that for that money we are offered a machine of real breeding with a quality specification lacking only the advanced (and costly) facilities that go with the duplication of electronics involved by separating the Record and Playback heads. In other words the manufacturer is plainly offering what is claimed to be a high-class product at an economy price by cutting out all the frills. Let's see if that is what has really happened.

As usual we will begin our technical discussion by looking at the frequency response figures. A glance at the specification gives us some very clear no-nonsense information. At 7½ ips performance is claimed to be 40 to 20,000 Hertz plus or minus 2 dB and there cannot be the slightest argument about that. The same tolerance is quoted for the slower speeds, with ranges of from 50 to 16,000 Hertz and 50 to 9,000 Hertz respectively. That is how we like to see specifications written. The manufacturer says what he means in plain, unambiguous language. There can be no doubt about it whatsoever.

And the claims he makes are really rather extraordinary when one bears in mind the price. Stereo, and under £90. Yet he quotes exceptionally wide frequency ranges with very close tolerance limits.

Is the promise kept? Reference to our test chart reveals that it is most handsomely – with plenty of room to spare. Playback of a standard calibration tape gives us a curve that is flat to within plus or minus one dB, not two, over the whole of the quoted range of frequencies. In the highly sensitive middle range area we find we are flat to within about half a dB, and you just can't get flatter than that.

Turning to overall response, which measures the relationship between signals fed into the equipment, recorded and then played back, we find an almost

similar situation with a maximum deviation from flat of no more than 1.4 dB, with only minus 0.9 dB at 24,000 Hertz. Again the sensitive middle area shows a rise of no more than about half a dB.

We were sceptical about the claimed response at 3¾ ips. Pushing the curve up to 16,000 Hertz within 2 dB seemed to be just too much to expect. How wrong can one be! In fact the curve travels happily along right up to 18,000 Hertz and even there it is only minus 1.2 dB. Incredible! Similarly at 17/8th ips we extended the response to 10,000 Hertz instead of stopping at the claimed 9,000, and again found we were still well within specification.

Credit for this exemplary performance must surely go to the Crossfield Head system, which appears to be as beneficial at slow speeds as it is at fast. At one time, however, it was rumoured that this new bias method might cause a deterioration in signal-to-noise as it pushed up frequency response. Well, we measured RMS unweighted (which is our normal practice) to get a reading of 58 dB compared to the claimed 55 dB. At this point we really must congratulate the manufacturer on the way his claimed specification is set out. Figures can mean anything – so much depends on the measurement methods used. Tandberg *always* say how their measurements are taken, and they even go further by quoting the figures for some of the parameters in two different ways, clearly stating the measurement procedures used. Signal-to-noise, for instance is given as 55 dB RMS unweighted *and* as 60 dB according to IEC standard (A-curve) unweighted. Lack of space prevents us from publishing all these figures in our specification panel, but they are all there on the literature for any-one to read. Instead of leading to confusion they make crystal clear what they are saying, and they speak in the language of engineers, the language of precision.

Distortion next. This has been the subject of controversy in the past, but once again Tandberg leave us in no doubt whatsoever as to their meaning. They say, and we quote verbatim: "*A 400 Hz signal recorded at 0 dB deflection on the recording meter gives less than 5% tape distortion in playback*". They say, in the simplest manner, what they have done, how they have done it and what they claim. Our own laboratory figure was 3.9%, again well within specification.

This is the only respect in which we feel the specification to be a little wide. Under 3% is commonly accepted as a "hi-fi" norm, although under 5% used to

be the rule not so very long ago. In view of all the other credits being chalked up to the 1600 X we would not carp too much about this, although compared to the highly professional-type figures obtained for the rest of our readings it must be said that 3.9% distortion is a return back to a domestic spec. For other than purely professional applications (with which this machine was not specifically designed to cope) it probably matters very little.

Crosstalk on stereo was measured at 58 dB (claim, better than 50 dB) and the wow and flutter figures, measured RMS, were shown to be 0.05% at 7½ ips (claim 0.07%), 0.11% at 3¾ ips (claim 0.14%) and 0.22% at 1 7/8th ips (claim 0.28). All admirable in every way.

Looking back over this laboratory investigation we can see how very well the manufacturer has fulfilled his original purpose – that of offering a quality product at a down-to-earth price. In fact results are so good we should perhaps take this opportunity of stating quite clearly that our laboratory readings are taken *without* making any reference to the manufacturer's specification. This is a rule that is strictly observed in *all* our reviews as we believe it is the only way for a technician to remain completely uninfluenced by other figures. So we say what we find, and what we find here far exceeds what one might expect in relation to cost.

So we turned to our user investigation with light hearts and hopeful anticipation. Back to that delightful Norwegian woodwork! We know it's only a small point, but it is typical of the care that obviously goes into the products from this firm. The casing is not only perfectly machined it is also neatly moulded at the upper edge and even has a contrasting shade of wood inlaid at the rounded corners. And, why not? If a machine is designed to give many years of use it might just as well look good during that long period of time. The 1600 X certainly does that.

The deck plate is thorough-bred Tandberg all the way, from its bronzed finish to its joy-stick lever control. One difference to previous models is a change from "magic eye" to edge type meters as level indicators. Calibrated in dBs these are of rather unusually austere design, but they are completely and absolutely functional. Brilliantly lit by white lights when the Record control buttons situated on the front of the deck plate are depressed, they are amongst some of the most legible meters we have come across. A great improvement on the older magic eye system.

The Gain controls, a pair of very substantial metal knobs, are located on the left of the deck plate, and they rotate against a single numeric scale. Pause is controlled by a positive swing lever protruding from the sound channel cover, and a Playback Selection lever gives a choice between Right, Left and Stereo. The transport control is 100% Tandberg — a massive joy-stick with Run when pulled towards the operator, Free when pushed in the opposite direction and Fastwind and Rewind when pushed to the right and left respectively. The centre position is neutral. A four-figure digital counter is provided, and this is illuminated when mains is applied by the operation of the adjacent On/Off switch. At the rear of the deck plate positioned between the spools is a very heavy speed change lever; as with other Tandberg models this *can* be operated with the tape in motion although the Instruction Manual does not say so.

This Manual, by the way, is brief but well illustrated and it makes the basic operation of the equipment very clear. Once again, however, it does not sufficiently stress the need to take special care to return the joy-stick to its neutral position from Run if the microswitch should have been activated or if mains power should have been switched off or cut for any reason. As the capstan and pinch-wheel are brought into contact mechanically without the use of solenoids they can, under the circumstances mentioned, be left under pressure accidentally when the capstan is stationary. Prolonged periods of such pressure could produce flats on the composition surface of the pinch-wheel, and these in turn would give some very nasty wow. So always check that the joy-stick is in neutral when the motor is not turning.

At the rear of the machine we find a cut-out panel with a housing for the permanently attached mains cable in one side and the connection sockets and mains fuse in the other. Three Phono sockets for each channel give: High In for connection of record player with ceramic or crystal pick-up, Low In for connection of radio/amplifier and Output for connection of headphones, radio or amplifier playback. An alternative Record/Playback facility is provided by an additional 5-pin DIN socket. All these connection points are easily accessible and clearly marked.

One advantage in simplifying a machine's functions lies in the accompanying simplification of controls and connections.

The benefit of this philosophy is evident as one begins to use the 1600 X.

Not that we believe that even the most complex machine is really difficult to operate, but we must stress the fact that this tape recorder could be safely handled by a child or a non-technical lady without the slightest difficulty. There are so few controls to have to worry about, and those are plainly marked with their functions on the main deck plate.

After connection to the mains power supply we switched on and noted the pilot light in the position counter. As with other Tandberg models the visible surfaces of the counter are fully protected by a transparent cover. The joy-stick was a little more stiff than it was on the last machine of this make that we looked at, but it is still easy to use and positive in action. Tape threading is "straight line" into the slot of the sound channel and there are no arms or pivots to negotiate. The microswitch arm is concealed beneath the head covers; a warning note reminds purchasers that the machine will not run if no tape is laced up.

We were very impressed by the silence of the transport system and this would seem to be an improvement in the Series 1600 X. A certain amount of noise must be produced by the movement of the tape across the heads and this is louder than the whisper of the motor. The Pause control on all Tandberg machines is very well designed and this one is no exception. It gives as nearly as possible an instantaneous start and should always be used when the tape is run during a programme to avoid that very nasty "slur" as the spools pick up speed. The time taken from Stop to Run at 7½ ips is very brief (we should guess at a fraction of a second) but the use of the Pause lever removes even this for all practical purposes.

During our user tests we followed our familiar formula of reproducing recorded tapes of known high quality, recording and playing back from 15 ips masters and recording from stereo radio broadcasts. Everything performed so well that there is really little to say, except to comment once again on the clarity of the level meters and the ease of level setting thanks to the very large Gain knobs.

At 3¼ ips recorded quality is really outstanding; this speed is certainly adequate for handling radio transmissions provided good tape is used. The Instruction Manual points out that the machine has been set up for the use of the new Low Noise tapes, so all our tests were carried out on Scotch Dynarage. As with any other tape recorder, best results will only be obtained when using the kind of tape

for which the machine has been adjusted, so if you want to take full advantage of the technical superiority of this equipment please do not use any tape other than Low Noise.

Even at 17/8th ips we were getting a sound quality that would satisfy many people, but the ideal notch to use on the 1600 X is undoubtedly 3¼ ips. With a response up to 18,000 Hertz what more could one want? And, of course, economy of tape.

As a matter of interest we recorded the same passage at both 3¼ and 7½ ips and then played back to a listening panel asking them to judge which version was running at the faster speed and which at the slower. The only listeners who could tell were those who noticed the tiny increase in hiss level as the 3¼ ips equalisation came into circuit.

As the Record and Playback controls are switchable for individual tracks the machine is quite suitable for working monophonically, and used in this way with the output of the single track paralleled at the amplifier we had some very acceptable sound at the middle speed. Instrumental separation was excellent with a crisp brilliance to delight the ear.

Just one complaint. Why is this machine supplied *without* a cover of any kind? Surely when the fashion is for free-standing equipment one should have a transparent plastic dust cover as a matter of course?

We can summarise the 1600 X Series by saying that it does just what its makers set out to do: to offer a machine with a genuine top-flight performance capability at a budget price. It is strongly recommended for the purchaser who requires quality without frills and who appreciates the appearance and the feel of a real thorough-bred piece of equipment. It should do much to popularise high quality sound recording because it sets a new technical standard within its price range. Congratulations to Farnell-Tandberg for making it available to us.

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ELSEWHERE in this issue we have referred to the impossibility of editing Compact Cassette tapes as being one of the reputed disadvantages of that system. Up until now that has been the state of affairs. We have all of us said that when working with a Compact Cassette system it is necessary to copy the tape on to standard-width open-spool equipment and then to proceed with the editing in the normal way. But now the situation is different. For the first time we have available a Compact Cassette tape editing kit with the help of which it is relatively simple both to cut and to join the narrow tape contained within the plastic cassette package.

There are obvious problems in editing cassette tapes. For one thing the ¼ inch wide tape on a spool-to-spool machine has the non-oxide side available for marking with a chinagraph pencil. When working at the faster speed 7½, or better still 15 ips., editing can be carried out with astonishing accuracy so that either syllables of a word or individual notes in a musical performance can be accurately removed or inserted.

With the cassette system we find that the tape is wound with only the oxide surface visible (therefore marking with a chinagraph is impracticable) and we have the difficulty of precisely locating positions at the very slow tape speed of 1 7/8 ips. Another complication lies in the fact that cassette tape is generally thinner than that used in open spool work. For instance the tape used in the C60 cassette is equal to double play tape and that in the C120 to quadruple play. Those who are used to open spool splicing and editing will at once realise that the tendency to curl in thin tapes is going to be quite a problem. Successful editing is going to demand a splicer that will hold the tape rigidly in position, a requirement that can only be met by using a very positive clamping system.

Those familiar with the editing techniques on open spool equipment will know that it is essential to have access to the "shiny" side of the tape. Not only is this the side that is marked but it is the side that goes uppermost in the splicing tool to receive the adhesive surface of the splicing tape. Now the firm of Multicore Solders Ltd. have introduced their Size 24 Cassette Tape Editing Kit which contains a specially designed splicing tool for use with the narrow width tape and also a most ingenious, though very simple, method of marking. By means of these anyone can cut and join with one hundred per cent success. The only remaining problem is the accurate location of brief passages and this is something which no

EDITING AND SPLICING COMPACT CASSETTE TAPES



splicing kit could possibly overcome when the tape is recorded as slowly as 1 7/8 ips.

The uses of a Cassette splicing kit are bound to be limited to:

- 1) The repair of accidentally broken or damaged tapes.
- 2) The removal (or insertion) of separated sections of the recording.
- 3) The removal of excess tape from a cassette or alternatively the adding of an extra quantity of tape.

But these three uses represent an enormous step forward. The enthusiast has always felt to be at a disadvantage when using cassettes because of the inaccessibility of the tape itself. Like so many other problems associated with cassettes this one has now been solved and we have been experimenting with the editing kit so that we can pass on our comments to you.

Packed in a neat plastic container the contents comprise: a 1/8th inch tape splicer, 2 razor cutters (1 spare), splicing tape on dispenser, a tape piercer, 3 tape extractor and winder cards (2 spare), and 10 cassette and container labels (self adhesive). Also included in the plastic wallet is a comprehensive illustrated instruction leaflet.

The splicing tool itself follows the general appearance and principle of the larger ¼ inch splicer. Mounted on a base board with a non-slip rubber backing it comprises a metal block with 2 clamping arms at the extremities. A single 90° guide cut is provided.

Given the splicing tool it only remains to mark the tape and extract it from the cassette. From thence onward all is in accordance with standard splicing procedure.

To find the cutting point the tape is merely inserted into the cassette playback machine and run through with the Stop key being smartly depressed as soon as the desired point has been reached. It is recommended that this operation should be carried out once or twice in order to practice this stopping at exactly the spot required. It was said earlier that it is recommended that clearly defined sections of the recording only should be removed in this way. This requires that the programme to be removed (or inserted) should have an obvious pause at both the beginning and end. It will be found that with a little practice such sections can be easily located and the tape stopped dead on cue.

The cassette is removed from the machine with one finger being quickly placed over the tape to prevent any accidental movement. One of the small slips of cardboard provided is then gently inserted between the tape and the felt pressure pad. As this is being done it is important to avoid damaging the pressure pad itself. Now comes the ingenious method of tape marking.

Included in the kit is a "tape piercer." This very simple tool is merely a piece of wire with a sharpened point at one end and a twist at the other to give the operator a reasonably good grip. Taking the piercer in the right hand the point is pressed firmly into the tape against the card. This produces a very obvious indentation which is equally visible from either the front or the back of the tape. In many ways it is even more clear than the mark produced by chinagraph pencil. Like all good ideas it is very efficient and yet so simple.

Please turn to Page 97

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Seen here in use, the size 24 Bib Cassette Tape Editing & Joining Kit costs 29s.

SPLICING from Page 95.

Having marked the tape it is then gently withdrawn from the cassette container by pulling on the slip of card until a sufficient length is available to enable it to be turned, shiny side up, and inserted in the splicer.

Naturally if a length of unwanted material is to be removed from a cassette then it is necessary to make two piercer marks, one at the beginning of the unwanted section and the other at the end. Where it is desired to wind the tape either backwards or forwards by hand the cardboard slip is merely inserted into the left-hand or right-hand spool apertures when it will be found that it engages the drive teeth that are located inside. All one then does is to twist the card and the tape is wound either forwards or backwards according to which hole the card is engaged in.

Again basically very simple indeed. It could perhaps be fatiguing to wind the cassette from beginning to end in this way, but we must remember that for normal applications only short lengths would be either inserted or removed. For this purpose the tool works admirably.

Thanks to the courtesy of Multicore Solders Ltd. we have been able to experiment with this cassette tape editing kit and have now made a hundred or more splices with its help. At no time did we experience the slightest difficulty. As with all things practice makes perfect and those who

are familiar with the use and operation of the standard Bib ¼ inch splicer will find it very easy to adapt to this new narrower gauge model. The splicing tape used is standard width material and the cutters are identical to those provided with the larger tool. They are also sold separately in an accessory pack. The tape extractors and winder cards are nothing more than slips of cardboard such as might be cut from the stout back of a pad of notepaper. The tape piercer is merely a tool to make a positive indentation mark.

So, intrigued by the possibilities we proceeded to make ourselves some of these simple appliances and attempted to edit and splice cassette tapes *without* the aid of the splicing tool. After about an hour's frustration we abandoned the unequal struggle. It just will not work satisfactorily, even when attempting to make use of the standard ¼ inch splicer. If you want to edit cassette tape then it is essential to use the proper tool and to our knowledge the only one available is this one made by Multicore Solders Ltd. It is noted that the very simple "piercer" is subject to an application for patent rights, and we can only add that we wish we had thought of it first!

We believe that the arrival of this editing kit will enormously increase the versatility of the already versatile Compact Cassette system. It is an accessory that no user of cassettes should be without and we thank its makers for their initiative and imagination in producing it.

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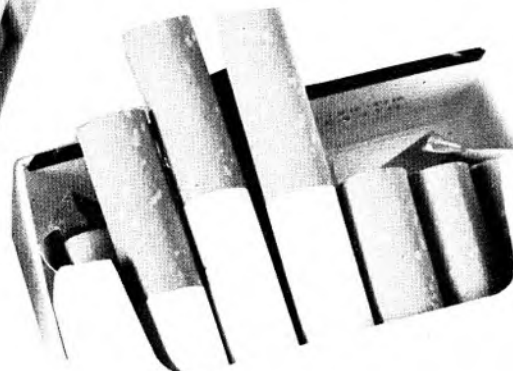
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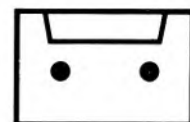
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Tape Workshop from Page 91

sensitive” when the gain is reduced. In fact the sensitivity of the microphone remains constant at all times, but it is most helpful to think of the gain control as having this relative effect.

Method.

- (A) Set up all the equipment and the sound source, as indicated for the first experiment.
- (B) Adjust the level of the gain control so that on the loudest passages the deflection of the indicator is no more than two-thirds of maximum.
- (C) Record the normal speaking voice of the subject at this level.
- (D) Play back the recording, again attempting to reproduce precisely the same intensity of sound as was originally heard from the live voice. It will be helpful to allow the person who was being recorded to take up a position immediately adjacent to the loudspeaker so that adjustments to volume level and assessments of quality differences can be more easily made.
- (E) Since we know that playing back at too high or too low a volume level impairs quality, comparisons with the recording made in Experiment 1 will be confined to listening to both versions when in each case the output from the loudspeaker approximates that of the subject. Note that the last tape to be recorded will require an increase in volume on playback to achieve the same sound level as that in the first recording.
- (F) Repeat using other voices if available.

It is probable that comparative results will show that this recording is more life-like than the first. The voice should have a more natural quality and there should be a marked reduction in the recorded room reverberation and extraneous noise break-through. To continue the investigation the procedures should be repeated at a number of different settings of the gain control, each progressively lower than the last, until finally one is recording at a level where practically no movement in the record level indicator occurs at all. Quality assessment from these tapes will be invaluable in establishing the best recording procedure but these results will apply only to this particular set-up. If we were to change the tape recorder, the microphone, or the room in which we are recording we might well get a completely different set of results. However, this second experiment makes clear the wide breadth of quality differences that can be obtained by modifying the recording technique, and this knowledge can be adapted and used when one finds oneself with different equipment in a different location.

EXPERIMENT 3. MODIFYING THE SOUND SOURCE.

Equipment required: As in Experiment No. 1.

Having investigated the flexibility of the one control available on the tape recorder we must next come to the variations that will be introduced when we alter the sound source/microphone relationship. This can be done in two ways: we can either maintain the same distance between the two and ask our speaker to speak more loudly or more softly, or we can drastically alter the voice/microphone distance. In practice a combination of the two is often used – the subject withdraws a little and speaks more loudly or approaches more closely to the microphone and uses less voice. To demonstrate the relative effects of such changes it is desirable to exaggerate in each case so as to make the points quite clear.

Method

- (A) With the recording equipment set up as previously adjust the record gain control to give the same level as that

which produced the best voice quality in Experiment No.2.

- (B) Position the subject about 3 feet or more away from the microphone.
- (C) Record the normal speaking voice and note the drastically reduced movement (if any) in the record level indicator now that the sound source is far removed from the microphone.
- (D) Continue the recording but increase the gain until the deflection in the record level indicator approximates that which was obtained for the “best recording” in Experiment 2.
- (E) Move the subject to a distance of about 4 inches away from the microphone. Repeat the recordings at two levels, but in this case the record gain control will have to be turned down instead of up in the second version.
- (F) Play back and evaluate results.

If properly carried out this third series of recordings should give us widely different results, most of them highly objectionable! With the voice too far away from the microphone we shall get a faint, far-away boomy sound at low modulation level and the effect of increasing the gain will have been to increase the boominess and also to bring in any extraneous sounds at a thoroughly objectionable intensity. By any reckoning a normal speaking voice recorded at a distance of some 3 feet from the microphone should give poor results. When too close the reverse is going to be the case but results will still be bad. Now we should find the background noises have been eliminated entirely (a most useful fact to remember when forced to operate under conditions of extremely high ambient noise) but the voice will utterly lack any feeling of naturalness with heavily accentuated sibilants, mouth and breath noises. If a ribbon microphone is being used there will also be a very nasty increase in low frequency content as well.

Our three experiments this month have all been extremely simple. Do not treat them with contempt for that reason. The lessons learned form the basis of the whole art of sound recording – the art of recording the sounds we want without recording the sounds we don't want. Neither should the reader be discouraged if his equipment is not of the highest standard. I have personally carried out these investigations using an ordinary portable cassette machine and have found them to be thoroughly practical. In fact the knowledge gained is all the more necessary to users of cassette equipment since the record level indicator provided is often rather primitive and success more often than not depends upon the recordist's judgment rather than anything else.

Do extend the range of experiments to cover every possibility. Explore shouting and whispering as well as varying microphone to voice distances and record level settings. This investigation is not something that can be successfully carried out in the space of an hour. At least half a day is needed to get results of practical value but the lesson learned will, if meticulously observed, improve the quality of every recording that is subsequently taken.

We have used the voice as a sound source as a matter of convenience. The same general results will apply when working with other sounds, such as musical instruments, the chief difference being in the establishment of a “correct” sound source to microphone distance. A church choir recorded with the microphone placed at the opposite end of the building away from the choir will sound terrible – just as did the voice when placed too far away from the microphone. Whenever taking any recording always think in terms of sound to microphone distance and modulation level.

These are the variables and when deciding what settings to use the recordist is in truth deciding whether his recording will be good or bad.

Music

Musicassette Reviews

Consultant Critic Katinka Seiner

MOZART. Piano Concerto No. 17 in G Major, K 453 and Piano Concerto No. 21 in C Major, K 467. Camerata Academica des Salzburger Mozarteums. Soloist and Conductor Géza Anda. DGG 923 052 49s 6d including purchase tax.

Who could say that Mozart was a "pleasing" composer? How could anyone dismiss the genius of such a great musician as a merely pleasing facility? The truth is that throughout the entire breadth of his staggering repertoire of compositions he shows a depth of feeling – and understanding of his medium – which has rarely been equalled.

Of his twenty-five concertos for piano and orchestra we have here just two, the 17th. in G Major and the 21st. in C Major. Both were written during his Viennese period, the G Major in 1784 and the C Major a year later. Whilst living in Vienna at this time he also composed the famous G Minor and C Minor Concertos. In spite of his many concert engagements during these years he always found himself to be short of ready cash. Hardly a trouble peculiar either to him or his age.

Through his own personal suffering he acquired a deep knowledge of human nature, a knowledge which is reflected in his music. In both the concertos being reviewed there is an obvious, superficial sense of gaiety, yet if one listens carefully the underlying melancholia will be revealed. More wistful than tragic it presents us with the human contradiction in musical terms.

In the scoring and recording of a piano concerto the solo instrument must always be allowed to assume its own relative importance. In the present case the orchestration can only be described as masterly, showing a certain structural freedom which is unusual for Mozart. With rich harmonisation the piano appears to literally grow out of the orchestral introduction to the first movement of the G Major concerto.

These works depict strength, masculinity and purposefulness. With an unusually high standard of performance Géza Anda both conducts and takes the solo part. It is interesting to note that during Mozart's lifetime it was usual for the soloist to conduct; in those days orchestras were smaller and so it would be reasonable to suppose the overall sound would differ somewhat from that to which we are used to hearing today. Recently there has been a trend towards a return to the original concept. In this album the result is fully justified.

Only criticism is of the picture of the young lady on the sleeve: Who, or what, is she? Apparently quite unconnected with the recording she appears to serve no purpose other than that of decoration.

Recorded quality is good and the album represents an admirable addition to any library of serious music.

SCHUMANN. Concerto for Piano and Orchestra in A Minor, Opus 54. GRIEG. Concerto for Piano and Orchestra in A Minor, Opus 16. Géza Anda, Piano, with the Berlin Philharmonic Orchestra conducted by Rafael Kubelik. DGG 923 016. 49s 6d. including purchase tax.

In this album we have two of the most popular piano concertos. Both these works are similar in mood, being romantic, lyrical, emotional and extremely beautiful. But there are other relationships between them as well.

Firstly each is the only piano concerto by its respective composer, both of whom were famous pianists in their own right. Both concertos are in A Minor and in both the second movement leads into the third without a break (*attacca*).

Unlike Schumann, however, Grieg was a strongly nationalistic composer and this bias is evident throughout his works. In the music of his piano concerto one can feel the sense of pride in his native Scandinavian homeland, a country of fine scenic landscapes and majestic natural beauty. As a matter of interest this was the work he performed on his first visit to the United Kingdom.

Listening to this album I was reminded of my old 78 rpm version by Gieseking, a recording I acquired some twenty years ago. The highest praise I can give Géza Anda is to say that his performance is the best I have since heard. The excellent musical phrasing of the Berlin Philharmonic under Rafael Kubelik provides a perfect foil to the sincerity of Anda's interpretation.

The same qualities which endear the Grieg to me are also to be found in the Schumann. In fact of the two works this is the one I personally prefer, although perhaps the Grieg has acquired more general popularity. Both will be equally familiar to the non-musical listener, and both will be equally enjoyable. It is surprising to recall that during his lifetime Schumann's music was thought by some to be rather eccentric. As an individual he was certainly eccentric, trying to invent a method of piano playing without using the thumb and finally ending his days in a lunatic asylum at the age of 46.

Such depressing thoughts need not worry us as we listen to this cassette. Here we have fine music well recorded, and it is a joy to listen to. Strongly recommended.

SAMMY DAVIS JR. *Doctor Dolittle* (complete set of hits) Reprise CRP 365 47s 6d including purchase tax.

The great Sammy Davis Junior. Idol of millions. By chance I have also listened to O. C. Smith, and what an interesting comparison that makes. Both are first-class performers whose professionalism and artistry one can only admire. But whereas admiration is both

men's due I could not help feeling just a little disappointed at Sammy Davis's lack of personal involvement with his repertoire. To me he seemed to be detached from the music. Perhaps the music itself is to blame. Although well played and well recorded its mediocrity prevents it from being a substantial enough vehicle to carry him along.

However, Mr Davis has not only an excellent voice but also a clarity of diction that should be the envy of many other male singers. So the whole makes for pleasant listening on the popular level.

In the album we find: *My friend the Doctor, Beautiful things, Fabulous places, I've never seen anything like it, Where are words, At the crossroads, Doctor Dolittle, Something in your smile, I think I like you, When I look in your eyes, After today and Talk to the animals.*

Having seen the film I find this collection an acceptable reminder of a happy occasion. It hardly bears repeated listening, but this is as much due to the lack of meat in the music as to Sammy's performance. For what it is it can be recommended – the music is so familiar that the purchaser will know what to expect. For serious listening I prefer O. C. Smith.

O. C. SMITH. *Hickory Holler Revisited*. CBS 40-63362 47s 6d including purchase tax.

As mentioned in the Doctor Dolittle review, I found O. C. Smith an interesting comparison to Sammy Davis Junior, and in fact prefer this album. Recorded quality unfortunately tends towards "boxiness" occasionally, but that is the only real criticism of the album. As I write I am listening to his version of *Little green apples*. A particularly good track. Also excellent are: *Take time to know her, Honey and The best man*. Other items include: *Seven days, Sitting on the dock of the bay, Main Street Mission, By the time I get to Phoenix, Long black limousine, The house next door and The son of Hickory Holler's tramp.*

The art of O. C. Smith is the art of the story-teller – the troubadour who strolls from place to place with tales to excite one and all. Such is the story of *The son of Hickory Holler's tramp*, a tragic history of a mother of fourteen children who adopts the oldest profession in the world to keep starvation at bay. Total involvement is O. C.'s recipe. Careful listening is therefore a rewardingly moving experience.

Perhaps the singer's sincerity is born of personal experience; the notes suggest it is and I am inclined to believe them. One feels he must have known the people about whom he sings. They live for him and they live for me. Real people, not the glossy magazine facsimiles that pass for humanity today.

So to get down to earthy reality why not try O. C. Smith? I don't think he will disappoint you.

Music

Open Spool Reviews

Consultant Critic Katinka Seiner

3 $\frac{3}{4}$ ips STEREO

Equipment used for review tapes: Amplifiers—Quad valved and Ferrograph F307. Loudspeakers—Celestion and Jordan-Watts. Tape Recorders—Akai 3000D and Tandberg 64X

STEREO SHOWPIECES. The Bournemouth Symphony Orchestra conducted by Constantin Silvestri. Columbia TD-TWO 221 3 $\frac{3}{4}$ ips four-track stereo. 41s including purchase tax.

Stereo Showpieces is the title and showpieces are what they are. Here we have a collection of orchestral pyrotechnics to delight the ear of any hi-fi fanatic. But do they? Let us take the programme item by item.

First we find we have to endure another *Night on the bare mountain* through the courtesy of Moussorgsky. Here we have a fantasy — an exposition of supernatural life which the composer imagined would be found at the summit of his Bare Mountain. The terrors of the hobgoblins are only dispelled by the sound of the church bell from the village. Much of the success of recorded versions of this piece depend on their sound quality; here we have a tape up to the usual standard of the latest EMI releases. Plenty of drama — plenty of fireworks.

Moussorgsky was one of "The Five" who collectively formed the nucleus of the New Russian School in the second half of the nineteenth century. Lacking formal musical education most of his works were orchestrated or edited by his close friend (also one of "The Five") Rimsky-Korsakov. The *Night on the bare mountain* is an example of such co-operation.

There is a link between this item and the next in the tape through our second composer, Ravel. The well known *Pictures at an exhibition* (not in this collection) was written by Moussorgsky and orchestrated by Ravel, but now we have *Pavane pour une infante defunte*. This was originally scored by Ravel for the piano and was orchestrated by him some nine years later.

Last item on side 1 is *Dance macabre* Opus 40, a symphonic poem by Saint-Saëns with Gerald Jarvis solo violin. Again this is such a popular and well-known piece that it really requires no programme notes from me. It is worth mentioning, however, that it does provide an excellent vehicle for a display of virtuosity on the part of the solo violinist. Gerald Jarvis expresses the composer's moods with artistry and accomplishment.

Dance macabre is one of four symphonic poems by the same composer. They all follow in Liszt's footsteps without copying his style.

Side two opens with *Finlandia* Opus 26 No. 7 — a tone poem by Sibelius. Although this piece is on a plane of popularity equal to those on the other side, it is in fact a much more serious musical composition than any of the other three. The dramatic brilliance of *Finlandia* reveals the composer's sincere love of his native country. The recorded quality of this album does more than justice to the breadth of this impressive work. Inspired by his acute sense of public duty he nevertheless produced music which expressed that noblest of loyalties — that of pure patriotism — without ever a hint of the narrower and often evil influence of nationalism. He provides us all with an example in how to be proud of one's own country whilst at the same time respecting the rights and view of others.

Earlier in this review reference was made to "The Five" of the New Russian School. Last of the five was Borodin who is represented here by *In the steppes of Central Asia*, a symphonic sketch. It was composed for a representation of *tableaux vivants* to celebrate the 25th anniversary of Alexander the second's accession to the throne. Second to *Prince Igor* this is his most popular work. Perhaps it was not deliberate on the part of the publishers, but I could not help noting this correlation between Moussorgsky, Sibelius and Borodin.

Perhaps more to the point this particular version does seem to suffer from a slightly accentuated top; this can be corrected by appropriate treble cut at the amplifier.

To end the collection we have Dukas' evergreen showpiece, *L'apprenti sorcier*. Telling the story of the young apprentice to the master sorcerer and the plight into which he falls when he attempts to emulate his master's magic to avoid a little hard domestic labour, there can be few pieces in the concert repertoire that are so well known. Except, perhaps, the other items used in Walt Disney's *Fantasia*. With brilliant instrumentation and furious animation it has an appeal to listeners of all ages. Perversely it was the item I least looked forward to hearing, yet once the first notes awakened so many memories I found myself enjoying it as much as ever. I would never go to a concert hall to hear it, but if I found myself by chance listening to a live performance there is no doubt that I would revel in it. Such is the power of good music, however popular it might be.

To summarise this tape we can say that it offers a collection of popular pieces that are well performed by the Bournemouth Symphony Orchestra. One can really not criticise either performance or recording — they are both very competent. Choice of repertoire? Well, that is what makes the album exceptional value for money — if these "lollipops" should be missing from one's music library. As such strongly recommended.

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THE BEST OF DEAN MARTIN. Volume 2. EMI Capital TA-T 21369. 3 $\frac{3}{4}$ ips half-track mono. 41s including purchase tax.

Does an admiration of Dean Martin betray an inborn weakness? A character defect, perhaps? If so then I must plead guilty and confess to a love for that insolent, sleepy smile that comes across so forcefully with every item of music he touches. They call Liberace "Mr Showbiz"; I would rather give that title to Dean Martin. An old-timer perhaps, but he wears better than the others.

Perhaps what I admire most is his thorough professionalism. Every song he sings rings true; with heartwarming sincerity his style is unmistakable which is quite an achievement in these days of uniformity. If the screaming idols of the pop world have really swept the board as some would have us believe how does one account for the continued — and deserved — success of Dean Martin? Perhaps the answer lies in his personal charm, a quality in short supply in the contemporary world of popular music. I know I can rely on Dean Martin. He has never let me down yet and this tape is no exception.

Dean takes us through a collection of old favourites like: *Cha cha cha d'amour, Buona sera, You're breaking my heart, Standing on the corner, Mean to me, Vieni su, Cuddle up a little closer, Is it true what they say about Dixie, I've got my love to keep me warm, The things we did last summer, I can't believe that you're in love with me, Somebody loves you, On an evening in Roma, I feel a song comin' on, Wrap your troubles in dreams and Hey brother pour the wine.*

Who could resist him singing *Vieni su*? I don't even mind when he's slightly out of tune — it fits the picture he presents of himself and his songs. With excellent recorded quality — voice firmly placed in the foreground with enough fidelity to give us realistic presence — and really good accompaniment from the orchestra one can sit back and actually hear every word he sings. And what a change that is!

Old-fashioned? Perhaps, but not for me. I think it will be a sad day when the good old tunes well sung have no place in our collections of music. So my advice is to invest in this tape for good entertainment value — and for good value for money too.

Quantity might not be everything but here we have both quantity and quality with a variety of interest that is well sustained by Dean. Truly a tape to hear, enjoy and then hear again.

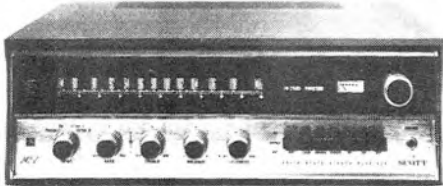
NEW PRODUCTS

SCOTT AMPLIFIERS

FOLLOWING the recent appointment of A. C. Farnell Limited as the new U.K. distributor for the full range of American Scott audio equipment a new 100 watt FM stereo receiver has been introduced. This model, the 342-C is the latest in the Scott range and it is claimed to incorporate six new technical developments.

These are: automatic tuning indicator claimed to be more accurate than normal meters, Scott quartz crystal lattice filter which is said to eliminate all IF realignment problems, wire-wrap technique which eliminates all soldered joints and is claimed to give maximum reliability up to military and aerospace standards, a new IC complex which is said to give improved stereo separation, a new full complementary output circuitry which is described as giving "virtual distortion-free listening at low volume levels" and printed circuit modules which snap into the main chassis for fast and inexpensive servicing.

Other interesting design features include the use of a line cord antenna to eliminate the need for outside aerials other than in areas of



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Output power per channel is claimed at 30 watts into 8 ohms at 0.8% distortion and frequency response 20-20,000 Hertz plus or minus 1 dB. Recommended retail price of the Scott 342-C FM stereo receiver is £199 including purchase tax.

A. C. Farnell Limited, 81 Kirkstall Road, Leeds LS3 or Kenyon Street, Sheffield S1 4BD or 25a Hermitage Road, London, N.4.

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DESCRIBED as a solution to domestic and commercial audio systems requiring high power output and sensitivity compatible with high quality ancillary equipment the Centurion 100 watt amplifier has been released by Adastra Electronics Limited. The equipment features a hand assembled twenty five transistor six diode printed circuit construction and has four individually gain-controlled inputs with a sensitivity range from 1 mV to 20 V.

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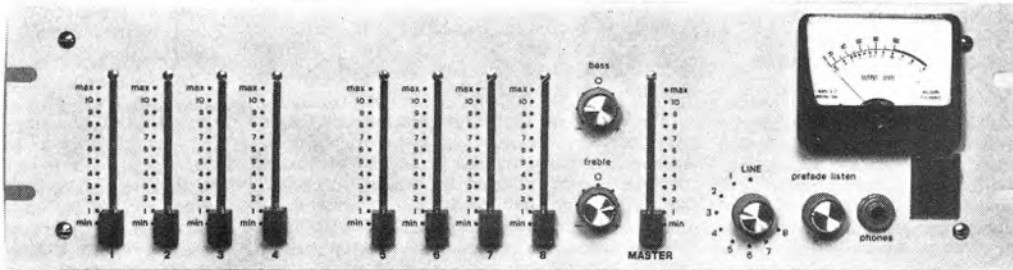
TRADE NEWS

A new Company, A. C. Farnell (London) Limited has been incorporated with Mr. George East as manager. Premises have been obtained for this new company, the incorporation of which emphasises the group policy of developing specific markets by devoting specialised local interest to them.

Electroniques, a member of I.T.T. Components Group, Europe, suppliers of kits, equipment and components for electronic and radio enthusiasts has moved to new larger premises. The move gives space for expansion urgently needed under increasing business pressure. The address remains unaltered as: Electroniques, Edinburgh Way, Harlow, Essex, but the telephone number becomes 0279-6 (Harlow) 26811.

Bang & Olufsen (UK) Limited have launched a "promote accessories" campaign and in doing so have announced twenty-nine considerable price reductions on their accessory price list. Examples of reductions are: A/B monitor lead was £2 now £1 9s 6d, MD8 microphone was 9 guineas now £8 19s, V-type FM aerial was 2 guineas now £1 15s, SP8 and SP9 cartridges were £16 5s now £12 19s 6d.

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Outputs Line: output level 0 dB (0.775V), impedance 100k ohms.

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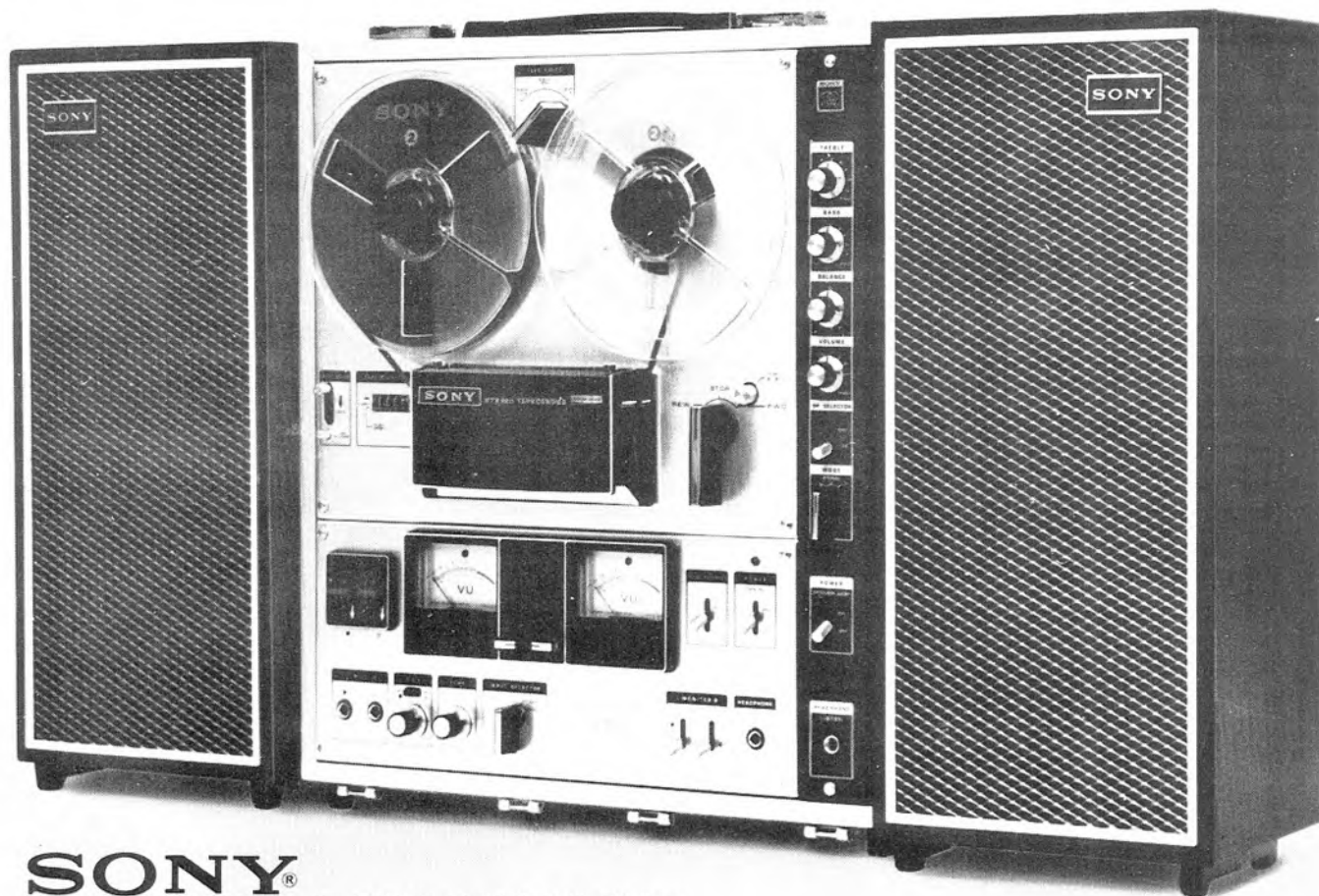
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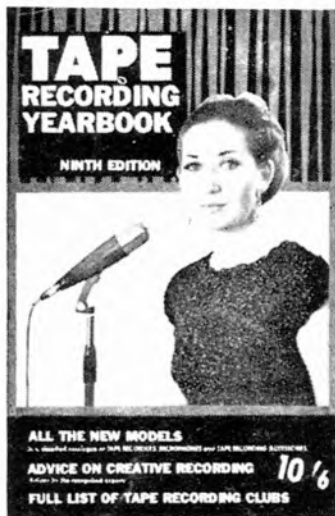
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