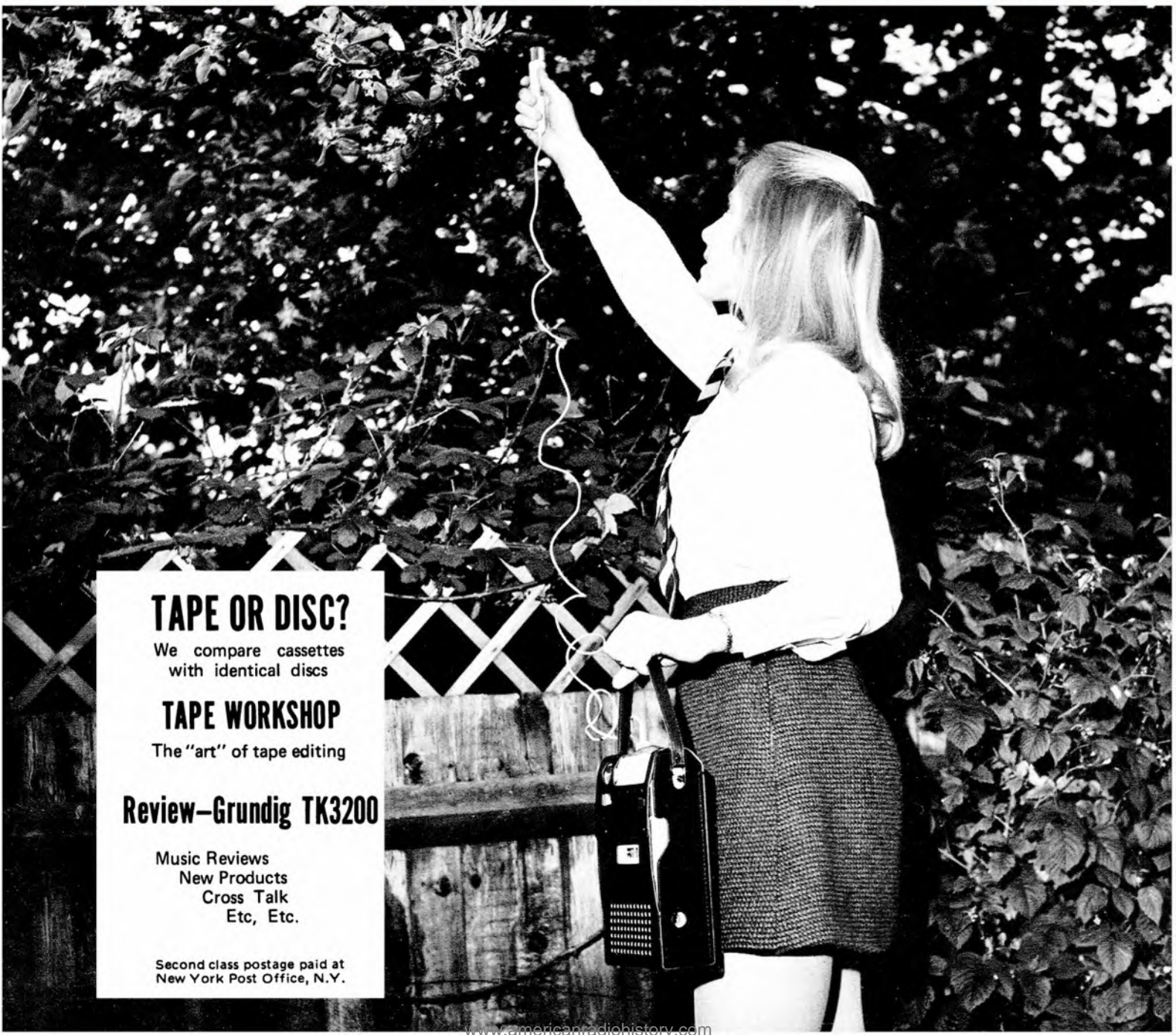


MARCH 1971

TAPE

RECORDING MAGAZINE

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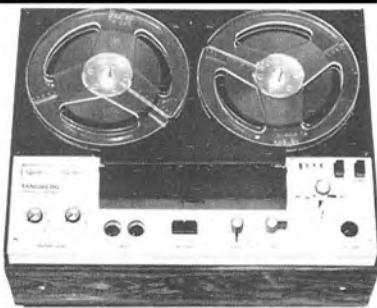
Special offers for Tape Recorder enthusiasts

TAPE RECORDERS AT BRITAIN'S BEST DISCOUNTS!

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Take a close look at the outstanding features and facilities incorporated in this new model: 1. 4 heads. 2. Tandberg cross-field recording technique. 3. Mixing in mono. 4. AB-test switch. 5. Sound-on-sound and echo 2 recording controls and indicators. 6. 3 speeds. 7. Listening during fast and rewind. 8. Pause button. Instant start/stop. 9. Automatic end stop.

Features like these and Tandberg's usual high quality and attention to detail continue through the range of Hi-fi equipment. Ask for details and special discount prices.



FERROGRAPH Series 7

Available in mono or stereo, Ferrograph Tape Records incorporate an unrivalled range of facilities including two inputs per channel with independent mixing, independent tone controls, and signal level meters for each channel for playback and record. They are available in elegant hardwood or in vinyl case to suit any interior or requirement.

FOLLOW THE PROFESSIONALS, RELY ON FERROGRAPH.

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High quality sound recording without fuss is the keynote of the Grundig Range. With concise easy to operate controls and at Cave's low prices a Grundig gives you real value for money. Compare our prices before you buy. Take these examples.

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Grundig TK149	£57 12 8	£46 19 0
Grundig TK146	£68 2 10	£57 3 0

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Prove for yourself the outstanding merits of the Akai 4000D. Having all the essential functional facilities, it also has many extras normally found on more expensive machines. The Akai 4000, the full tape recorder version of this excellent deck adds playback amplifiers and a pair of fine built-in speakers for stereo monitoring or just listening. And the Akai 1710 is surely one of the best complete tape recorder buys on the market to-day, combining all the best features of Akai engineering and construction. The above three models and the whole Akai range are available from Cave's at very low prices.

TELETON FBX510 D

The quality of recording on this amazing stereo tape deck, has to be heard to be believed. Features include two vu-meters for record level and adjustable record level, three speeds, provision for seven inch spools, two microphone inputs, and a very attractive walnut finished case. List price £62/0/0. Cash price £52/15/0.

8 Track Stereo Cassette Players and Recorders

Are now in stock at Caves and available for demonstration. The equivalent of 2 LP records' playing time in full stereo is now possible even in your car. Find out more about these fascinating units. Ask for details and Cave's bargain prices.



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Revox 1122/1124	£236 5	£208 10
Revox 1302/1304	£204 15	£180 10
Revox 1322/1324	£236 5	£208 0
Revox 1222/1224	£246 15	£217 10
Revox 1997 Dust Cover	£5 5	£4 18
Ferrograph 713	£188 10	£166 0
Ferrograph 702/704	£207 7	£180 10
Ferrograph 722/724	£242 10	£202 19
Ferrograph Cover	£6 5	£5 16
Akai 4000D	£89 19	£79 19
Akai 1710L	£89 0	£77 12
Akai 4000	£124 18	£102 19
Akai X5000W	£177 19	£156 13
Akai M10L	£245 1	£215 13

TANDBERG SPECIAL PRICES ON APPLICATION

Philips 4302	£35 17	£29 19
Philips 4307	£49 10	£42 10
Philips 4308	£60 10	£51 19
Philips 4404	£83 0	£71 5
Philips 4407	£105 0	£90 2
Philips 4408	£139 0	£119 6
Philips 2502	£49 10	£42 11
Philips 2200	£14 18	£12 5
Philips FL3302	£28 7	£21 10
Philips 2400	£69 0	£60 13
Philips 2400 inc. Speakers	£86 0	£75 13
Philips 2401 inc. Speakers	£99 0	£87 0
Philips N2202	£29 18	£26 18
Philips N2602	£42 0	£29 19

Uher 4000L	£145 10	£130 18
Uher 4200	£187 5	£168 10
Uher 4400	£187 5	£168 10
Uher 714L	£55 10	£49 18

Sanyo Cassette £20 19

Telefunken M501	£43 11	£38 8
Telefunken M204TS	£124 19	£109 18

Grundig TK120	£39 5	£28 18
Grundig TK124	£44 18	£35 7
Grundig TK144	£49 19	£42 5
Grundig TK149	£57 12	£46 19
Grundig TK121	£54 15	£45 19
Grundig TK141	£59 4	£49 14
Grundig TK146	£68 2	£57 3

Truvox R44 £45 10

Teleton T710	£34 15	£30 10
Teleton 5L40	£37 10	£32 19
Teleton FBX 510D	£62 0	£52 15

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(Illustrated: Series Seven Stereo machine)

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(Illustrated: F307 stereo amplifier)

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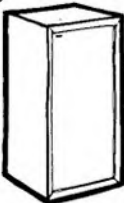
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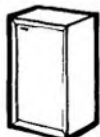
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PHILIPS RH 591	76.75	59.00
PHILIPS RH 590	51.75	39.50
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PIONEER SA700	98.00	70.00
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PIONEER Reverberation	45.50	33.00
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SINCLAIR 3000	45.00	36.00
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VOLTEX 100w Stereo Discotheque, eight electronically mixed inputs	185.00	139.00

Starred items above take ceramic cartridges only
All others take both ceramic and magnetic cartridges

TUNERS	Rec. Price	Comet Price
* ARMSTRONG 523 AM/FM	53.76	45.00
* ARMSTRONG 524 FM	41.89	35.00
ARMSTRONG M8 Decoder	9.50	8.00
* DULCI FMT. 7 FM	22.05	18.00
DULCI FMT. 7S Stereo	31.00	25.25
GOODMANS Stereomax	82.52	49.95
LEAK Stereofetic Chassis	66.50	52.00
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PHILIPS RH 690	44.50	35.50
PHILIPS RH 691	89.00	75.50
PIONEER TX500 AM/FM	77.94	64.00
PIONEER TX900 AM/FM	153.69	125.00
ROGERS Ravensbourne	61.89	50.00
ROGERS Ravensbrook	45.01	40.00
ROGERS Ravensbrook (cased)	51.26	43.00
* SINCLAIR 2000	26.73	19.25
SINCLAIR Project 60	25.00	21.00
TELETON GT 101	45.50	34.00
TELETON 201X FM	36.00	30.00

All above Tuners are complete with MPX Stereo Decoder
except where starred

TUNER/AMPLIFIERS	Rec. Price	Comet Price
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ARENA R500	82.00	67.00
ARENA 2400	90.30	72.00
ARENA 2600 Stereo AM/FM	111.30	94.00
ARENA 2700	105.00	85.00
ARENA T1500F	72.45	60.00
ARENA T9000	303.45	258.00
ARMSTRONG M8 Decoder	9.50	8.00
ARMSTRONG 525	91.89	77.00
ARMSTRONG 526	104.71	87.00
GOODMANS 3000	77.73	53.00
* PHILIPS RH 781	74.98	55.00
* PHILIPS RH 790	135.00	109.00
PIONEER KX330 AM/FM/SW	78.62	63.00
PIONEER SX770 AM/FM	160.43	126.00
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* TELETON F2000	51.50	32.00
TELETON 7 AT 20	105.00	80.00
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* TELETON R8000 with Speakers	63.25	50.00
TELETON CR55	120.00	95.00
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Starred items above take ceramic cartridges only
All others take both ceramic and magnetic cartridges

All the above Tuners and Tuner/Amplifiers include MPX Stereo Decoder with the exception of Armstrong where decoder is extra as listed

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GARRARD SP25 Mk III	16.45	11.90
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GARRARD SL75 B	38.95	28.50
GARRARD SL95 B	53.27	38.50
GARRARD 401	38.07	29.50
GARRARD SL72 B	32.77	26.90
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GARRARD 408	13.84	10.97
GARRARD AP 76	28.88	21.50
GOLDRING 705/P with 850 Cartridge and Cover	26.00	23.90
GOLDRING GL69 Mk II	26.63	22.50
GOLDRING GL69 P Mk II	35.14	29.50
GOLDRING GL 75	36.41	33.90
GOLDRING GL75 P	46.94	41.90
GOLDRING Covers for 69P and 75P	4.21	3.50
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plinth and cover for G99	11.45	9.90
GOLDRING G99	26.00	23.90
GOODMANS 3025	37.74	26.90
McDONALD MP 60	15.75	12.25
McDONALD 610	20.00	15.90
Base and Cover for		
McDONALD MP60 and 610	Special	4.50
PHILIPS 228	20.00	17.00
PHILIPS GA 146	31.50	25.00
PHILIPS 217	33.00	28.00
PHILIPS 202 Electronic	69.00	57.50
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THORENS TX 25 cover	8.22	6.53
THORENS TD125	75.89	62.00
THORENS TD150A Mk II	43.63	33.00
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CELESTION Ditton 15	29.00	23.00
CELESTION Ditton 25	59.85	47.00
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	Rec. Price	Comet Price
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KN 824/3 3 speaker system (pair)	23.00	18.97
KN 104/3 3 speaker system (pair)	16.75	12.97
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LEAK 300	32.50	23.50
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LOWTHER Acousta (with PM7)	53.00	46.00
LOWTHER Ideal Baffle	35.50	30.00
METRO SOUND HFS 20	18.50	13.50
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SME 3012 with S2 Shell	33.36	29.00

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AKAI X330	342.57	269.00
AKAI X-3300	312.56	245.00
AKAI X-360	380.08	284.00
AKAI X-360 D deck	318.92	243.00
AKAI 1710L	89.85	68.90
AKAI 1800Sd	199.42	167.00
AKAI 4000 4-track Stereo	124.90	100.00
AKAI 4000 D 4-track Stereo deck	89.96	70.00
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FERGUSON 3245 Twin track	37.05	30.00
FERGUSON 3246 4 track	43.00	34.00
FERGUSON 3247 4 track	48.45	39.00
FERGUSON 3248 4 track	54.30	42.00
FERGUSON 3249 4 track	64.30	50.00
FERROGRAPH 722	242.54	199.00
FERROGRAPH 724	242.54	199.00
FERROGRAPH 702/W 2 track tape deck	207.35	175.00
FERROGRAPH 704/W 4 track tape deck	207.35	175.00
GRUNDIG C200 Cassette	39.90	30.00
GRUNDIG TK 141 (4-track)	61.85	50.00
GRUNDIG TK 121 (Twin-track)	56.85	44.00
GRUNDIG TK 146 (4-track Auto)	68.14	53.98
GRUNDIG TK 124 Twin-track	44.90	35.00
GRUNDIG TK 149 4-track	57.64	48.00
PHILIPS 4302 Twin Track Auto	39.00	32.00
PHILIPS 4307 4 track	49.50	39.00
PHILIPS 4500 4-track Stereo Tape Deck	126.00	99.00
PHILIPS 4408 4-track Stereo	139.00	109.00
* PHILIPS N4404 4-track Stereo	83.00	70.00
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TELETON FXB 510 D 4-track Stereo	62.50	48.00
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Sony MR929	33	4	9	5	6	10	97	4	9
Sony TC252	33	5	0	5	10	10	99	15	0
Philips N4407	35	0	0	6	13	4	105	0	0
Akai 1710L	36	6	8	6	1	2	109	0	0
Sony MR939	38	13	6	6	2	3	112	0	2
Grundig TK247	37	10	0	6	5	0	112	10	0
Sony TC630	66	15	0	11	18	0	199	15	0
Sony TC230	40	11	9	6	15	0	121	11	9
Telefunken 204TS	41	19	0	6	13	4	124	19	0
Philips N4408	47	0	0	7	13	4	139	0	0
Tandberg 1241X	49	0	0	8	6	8	149	0	0
Sony TC540	50	15	0	8	5	0	149	15	0
Akai 1800	53	0	0	8	13	0	158	0	0
Akai 1800SD	66	6	8	11	1	2	199	0	0
Akai M9	65	0	0	10	16	8	195	0	0
Ferroglyph 722/4	82	10	9	13	6	8	242	10	9
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Philips RR290 + Radio	11	10	0	1	17	6	34	0	0
Sony TC100A	14	9	3	2	6	8	42	9	6
Mns/Bat.	16	15	0	2	15	0	49	15	0
Sony MR411	22	14	0	3	15	6	68	0	0
Philips 2400 Stereo	22	14	0	3	15	6	68	0	0
Philips 2400 incl. L. Spkrs.	28	14	0	4	15	6	86	0	0
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Telefunken 302TS	22	15	0	3	15	10	68	5	0
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Ferguson 3238	20	12	0	3	5	7	59	12	0
Philips 4308	20	14	2	3	5	7	60	0	10
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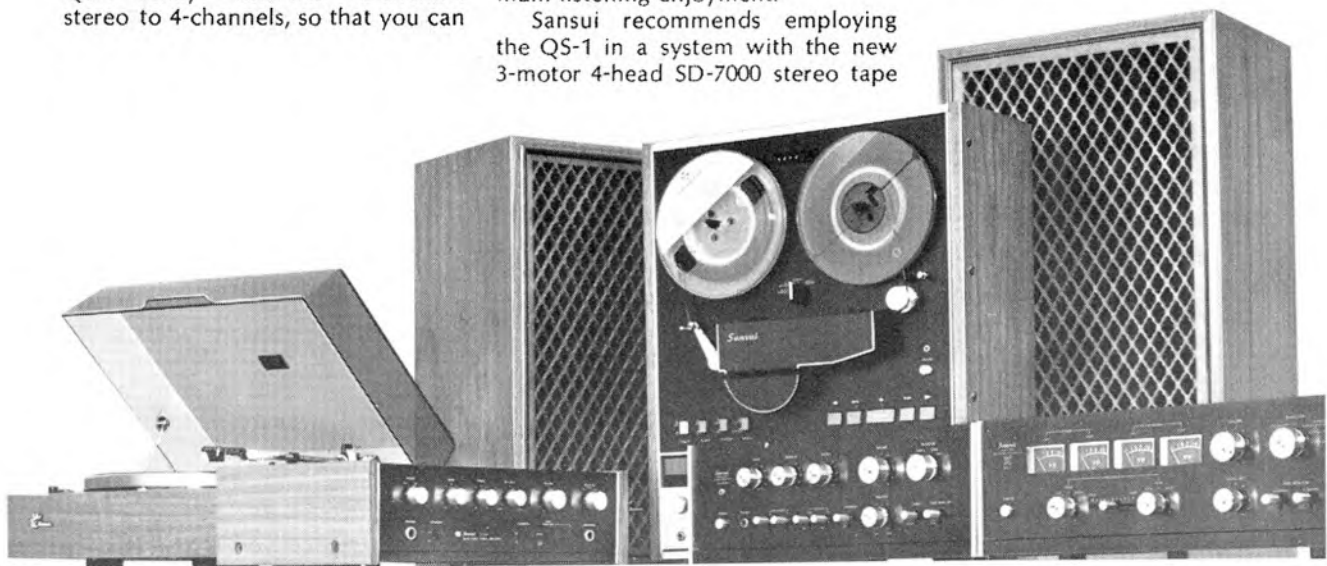
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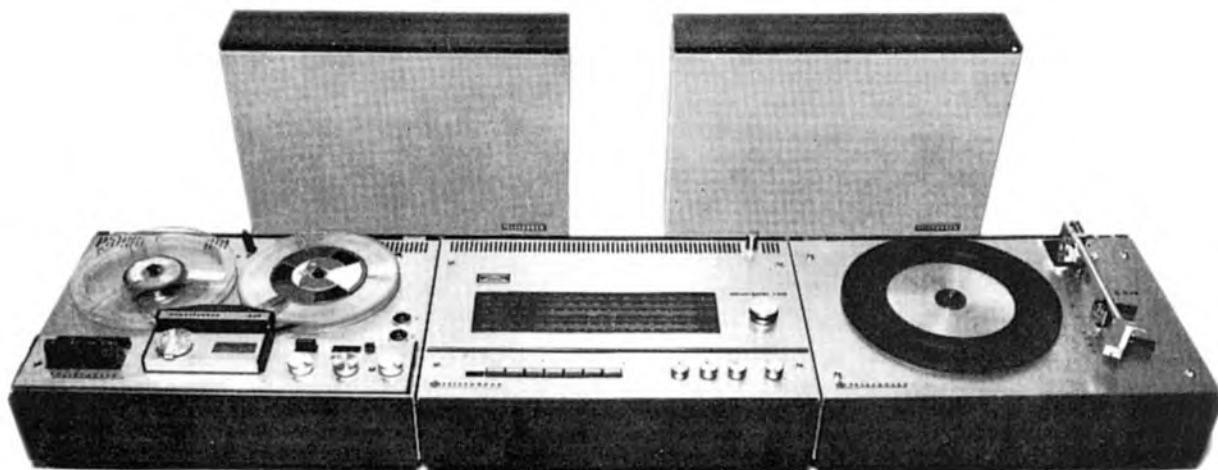
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and STEREO SOUND MAGAZINE

Vol. 15 No. 3 March 1971

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Cover Photograph: Out and about with her cassette recorder, Susan Harrison finds that birdsong is not an easy subject. The more experienced have better luck and for the names of the winners of the Scotch Wildlife Recording Contest sponsored by the 3M Company please turn to Page 97.

"TAPE Recording Magazine" is published on the third Wednesday in the month by Anglia Echo Newspapers Ltd, from 16a Bevis Marks, London, EC3A 7LN.

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EDITORIAL

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Tape trends and tape talk

By Douglas Brown

LOOK FOR A DIFFERENT COVER when you buy your copy of *Tape Recording Magazine* next month. On the right you see an artist's "rough" of the new title design. This will be superimposed on a front-cover illustration in full colour. The price will remain unchanged at 15p, although the magazine will be bigger and better.

The title alongside tells the essential story of the coming changes. *Tape* remains the most important word, but there is a new emphasis on the word *Recording*. We shall not be "just another magazine" in the hi-fi audio field. We shall develop our editorial service as the only magazine in the world devoted exclusively to the interests of amateur recording enthusiasts.

The new title will be prefaced by the words *Sound and Picture*. We are whole-heartedly committed to video recording as well as audio; we believe that in the future home recording will embrace sound and picture. Just as, when this magazine was founded nearly 15 years ago, we were able to guide and inform the amateurs who were just beginning to comprehend that sound recording could be a fascinating home hobby, so now we shall guide and inform the pioneers in home video recording.

Of course, we shall not turn our back on audio reproduction. Tape recording inevitably involves reproduction, and we shall continue to give our full service. Everyone with a tape recorder wants sometimes to use it simply as a music-player, and our reviews of tape records will continue to be an important feature of this magazine.

But, overall, we shall now revert to our earlier policy whereby there will be heavy emphasis on tape recording.

* * *

WE PROPOSE TO ENROL a team of the most authoritative contributors on audio and video matters. Many have already been approached and their co-operation is assured. Writing for us will be experts from many other countries, as well as the leading British journalists. We shall draw upon world-wide experience — for example, there is at present more information available in Germany, Holland and Japan about video recording than in Britain, and we shall therefore employ German, Dutch and Japanese contributors.

Our news service will be extended, so that we get reports direct from all leading manufacturers and organisations in Europe, America, Japan and any other country where significant developments are taking place.

Not only shall we become world-wide in our editorial service; we propose to develop the sales of the magazine throughout the world. At first there will be special concentration on Europe. There is every prospect that Britain will soon become a member of the Common Market. In any case, tape recording is no longer a national activity: it is continental or

Sound & Picture
Tape
Magazine
RECORDING

international in its organisation, whether we are thinking about research, production, marketing, or consumer use.

* * *

I HAVE RECENTLY been elected President of the International Federation of Sound Hunters. Already I have been able to meet representatives of almost all the great commercial interests who have an interest in amateur tape recording. I have visited several of their headquarters. I hope, during my term of office, to be able to discuss the development of amateur sound and picture tape recording with every important manufacturer in the world and to work out with them the right strategy to advance the common interest of manufacturer and consumer. That is part of the function of this magazine.

The idea of a magazine on amateur tape recording first flashed into my mind during an autumn morning in 1956 and the first issue was published in February 1957. For over ten years I was myself both editor and publisher, until other publishing activities diverted my attention. I consider the opportunities for development of the new-style, enlarged magazine to be so exciting that I shall resume the active editorship as from the next issue. I look forward to re-establishing close contact with many old friends.

* * *

THE OWNERSHIP OF *Sound and Picture Tape Recording Magazine* has passed from Print and Press Services Ltd, a company I established in 1956, to Anglia Echo Newspapers Ltd, a larger company, of which I am managing director. This will open the way for the bold development plans I have outlined above.

Anglia Echo Newspapers has also acquired the publishing rights of all other publications launched by Print and Press Services — except the *Tape Recording Handbooks*, which remain with P and P.

Denys Killick and Vivienne Gooding remain Editor and Advertising Manager respectively of *Hi Fi Trade Journal*, the audio retailers' journal launched a year ago, which is also developing very rapidly and now requires more of their time and energy.

Future plans for *The Encyclopedia of Tape Recording* will be announced shortly.



The Garrard AP 76 transcription unit

TAPE OR DISC?



The BSR MP60, one of the McDonald BSR range.

A NEW LOOK AT AN OLD PROBLEM

RECENT DEVELOPMENTS in Compact Cassettes have once again brought to the fore the old, old question: which is better, tape or disc? A proper understanding of the relative values of the two media is essential to those who are considering buying new equipment. If the prime interest lies in the reproduction of pre-recorded music should one buy one of the latest cassette machines or should it be a good quality transcription turn-table? Or if money is tight can economies be made by acquiring a lower cost gramophone deck? Are the latest Dolby B machines (as yet in very, very short supply indeed) really necessary to get the best off tape?

The subject is a very complex one without any clearcut, straightforward answers at present. One fact emerges with unquestionable clarity: whenever the recording facility will be an advantage it increases the value of any kind of tape machine enormously. But leaving that aside for the moment we have been looking at a simple comparison between two disc records and their cassettes equivalents. They are: *Pastoral* ("Lie Strewn the White Flocks") with *A Knot of Riddles* by Sir Arthur Bliss on disc Virtuoso TPLS 13036 at £2.40 and in its cassette version recorded to Dolby B by Precision Tapes Ltd., ZCPC 507 at £2.60, and *Symphony No. 1.*, (The Titan) by Mahler on disc Virtuoso TPLS 13037 and the cassette equivalent Pye ZCPC 506, also Dolby-ed, at the same relative prices.

The first comparison is a purely visual one. Despite the fact that the cassettes cost a little more than the discs the latter look far more impressive and appear to give far better value for money. This feeling is reinforced as soon as one looks inside. The Mahler record is presented in a magnificent double folder with copious sleeve notes and illustrations. The Bliss is in a single sleeve with notes on the reverse but included is a slip sheet setting out the words of the vocal parts.

What do we get with cassettes? A tiny illustration because of the small size of the cassette box. And then nothing. No sleeve notes. No words. Just a note about

the warranty terms under which the cassettes are sold.

Now this is just not good enough. What possible justification can there be for such a different approach? Why should it be assumed that those who play discs will take an intelligent interest in what they are hearing whereas those who have chosen tape as their medium require no information at all about the repertoire? It is a very strange distinction indeed and one that *must* be removed in the near future.

Of course there are difficulties in compressing the amount of printed material that can appear on a record sleeve into the more restricted space of a cassette card. But that is no excuse for ignoring the whole thing, and in fact Decca do use a system of multiple folds in their cassette inserts to accommodate very long and informative sleeve notes, so the problem is not insuperable.

Cassettes will always have the advantage of smallness of size together with the disadvantage of insignificant illustration. There is a great deal of good sense in using identical covers for both formats but it doesn't always work. In the Mahler, for instance, the disc picture with its somewhat shadowy tapestry effect is quite brilliant; when reduced to cassette size all the impact is lost and the subtlety of the larger version is degraded into what at first glance could appear to be poor quality printing.

But most would agree that the real value of either lies in the quality potential of the contents, although all the gramophone companies know only too well that the design of the sleeve on a record has a powerful influence on sales. For the purpose of comparative tests we used a Kellar Dolby B playback machine for the cassettes and for the discs three different systems were employed, a BSR MP60, a Garrard AP 76 and a Thorens TD 124 Mark II with a 12-inch SME arm.

The fact that we used only one cassette machine but three disc reproducers underlines one important difference between the two media. The gramophone depends more on mechanical perfection

than the tape reproducer; the interaction between the tip of the stylus and the groove is very complex with considerable physical forces at work, but in a tape system we are mainly concerned with speed stability and head-to-tape contact. Further, a poor quality cassette machine is unlikely to cause permanent damage to a tape even if the sound is bad, but inadequate disc reproducers will not only spoil audio quality but can easily ruin the disc as well.

Our choice of gramophone equipment was deliberate, enabling us to take a close look at two "budget" units each of which claims to be made with sound quality in mind and to compare them with the very much higher cost Thorens unit that is acknowledged generally to represent a true high fidelity product.

So we find ourselves concerned not only with differences between repertoire on cassette and disc but also with differences between different kinds of disc reproducers. The added complication cannot be avoided if the subject is to be dealt with adequately. Similarly it is necessary to use a number of different cartridges in the various pickup arms. Because cartridges are transducers changing one form of energy to another they can make profound changes to the *kind* of sound that one hears. Loudspeakers are transducers too, and they can also radically alter the sound heard by the listener.

These are just some of the variables with which one must contend. They are valid within the context of this piece because they are considerations that must be borne in mind whenever comparing tape to disc. Since within themselves they hold sufficient interest to warrant a book on the subject it will, we hope, be understood why they are not dealt with in depth here. We will discuss the gramophone equipment itself in greater detail in another issue and for the present will confine our attentions to the more simple aspects of direct comparison.

Initially we started by listening carefully to the discs during which process, by the way, it was noted that

both the lower-cost systems acquitted themselves extraordinarily well. Any defects in the records were noted and these mainly comprised static clicks and other more or less unobtrusive noises. However the first side of the Arthur Bliss record had a very serious fault; at a number of points loud grating sounds were heard, presumably due to a surface aberration of some kind, and this was very apparent when the disc was played on any of the three gramophone units. A fault of this kind is quite unacceptable in a new record.

Surface noise on the two records was very low indeed; frequency response and dynamic range was excellent. One reason for selecting this particular repertoire was because it involves some very delicate instrumentation, sections for solo voice (male and female) and in contrast some extremely loud orchestral passages. It is difficult material to handle on either disc or tape and so offers interesting comparisons.

There was disappointment at the amount of audible distortion heard from the discs and it was noted that this can and does vary in relation to the efficiency of the system in use. When referring to a "system" in this way the cartridge must be included since the overall relationship of cartridge-to-arm and cartridge/arm-to-turntable influences the result. It is in this area that investment of greater amounts of money is likely to pay dividends. Adjustment is critical and we found that both the lower cost gramophone units *could* give disturbing distortion on certain passages. When the same sections were played on the Thorens the distortion was still present but to a very much less marked degree.

So one can say that either recorded on the record itself or inherent within the disc reproducing system there is the possibility of distortion approaching and entering into levels of audibility. It is likely to be more obtrusive on lower cost equipment than more expensive, but in all cases precise alignment and adjustment of the cartridge/arm turntable is necessary.

Purely for the sake of additional experiment we also used a number of different loudspeaker/amplifier combinations from which we conclude that a parallel situation exists at this end of the reproducing chain. Given a certain distortion content from the record the *audible* interference will vary in relation to the quality and performance of the other components. A very harsh, tippy loudspeaker enclosure will accentuate record distortion out of all proportion, whereas a speaker with a smoother action will help to keep it in perspective. Similarly the amount of distortion that is acceptable will vary according to the

discrimination of the listener. Some will object strongly to what is apparently inaudible to others . . . Obviously a complicated and contentious subject.

We were most impressed by the general solidity and reality of the sound heard from the records. It was a sound which, if heard off tape, we should classify as very, very good indeed. So what of the cassettes?

First there was a complete absence of the kind of surface noises that one associates with disc. No static clicks or sounds originating from dust. And the fault on the first side of the Bliss was, of course, not on the tape. Thanks to the Dolby B noise reduction system there was little difference between the two media in terms of overall background noise but there was more *variation* of noise on the records than in the cassettes. The discs could be both noisier and quieter than the tapes, while the noise level on tape was constant.

Again speaking generally there was not a great deal of difference in sound quality between the two. Perhaps a little more brilliance from the disc; certainly less distortion from the tape. Listening critically over a period of time we were able to distinguish the one from the other with reasonable accuracy during comparative switching and attributed this to the brighter top that the disc was producing, a quality that tended to enhance what we have called the "solidity" of the sound. This caused us to express a preference for that medium.

However the full story is much more complex than that. To summarise our final conclusions so far we could say:

1. There is greater possibility of hearing more distortion when reproducing disc rather than the tape equivalent. To avoid distortion on disc one must use good equipment properly aligned.

2. A *new* disc played on first-class equipment is capable of giving somewhat better sound quality than its tape equivalent. We must question *how long* (in terms of playing hours) that improvement would last and suspect that even after only ten or twenty hours' tracking at very light stylus pressures some of the initial brilliance would "wear off".

3. Disc records are subject to surface faults that do not occur with tape, although we have experienced tape faults of other kinds in the past, but not with either of the two cassettes being discussed here.

4. Tape has (or should have!) absolute freedom from the static and dust noises that are prevalent on disc.

5. From the point of view of appearance and information we would much prefer to own a collection of discs

rather than tapes.

6. If we could confine our listening to the playing of brand new records on transcription equipment then the evidence of these tests suggests that this would give the best sound quality.

7. Under practical conditions of everyday use there would appear to be many reasons favouring tape, not least of which is the durability of the medium and the repertoire recorded on it.

So lastly we come to the question of cost. £100 is not too much to allow for a good transcription turn-table, arm and cartridge. That is approximately the price one would pay for a cassette stereo record/playback deck with Dolby; perhaps the recorder would be ten pounds or more dearer than the gramophone. Both would require an amplifier and loudspeakers, so there's no difference there.

Where we do find a wide discrepancy is at the lower cost end of the market. Here it is quite possible to fit oneself up with a turn-table complete with its own arm, a medium-priced cartridge and plinth and cover for some thirty pounds. There is very little, if any, quality stereo cassette equipment available within that price range. Philips used to sell a cassette stereo playback-only deck at something under £30 but it was abandoned because they found that the public demanded a record facility in tape equipment. Which is very interesting indeed! But it does have the effect of increasing tape equipment prices disproportionately as compared to disc.

So even here comparisons are difficult. Either of the two budget systems we have been using are capable of accepting modern cartridges tracking at very light weights – just over 1 gramme. Neither is expensive. At this cost level they probably represent better investment for music reproduction than tape equipment. But they lack both the convenience of tape and the advantage of a record facility. For these one must expect to pay more.

As we said at the beginning, there is no simple answer to this question. For that reason tape is highly unlikely to sweep disc off the board within the space of the next year or two. We did not mention the fact that in spite of the many titles in cassette format that are now available the repertoire on disc is still vast in comparison. And budget discs are still cheaper than budget tapes. And so on.

But in the future those of us who use both media are going to shift away from the gramophone and towards the cassette. Those who are thinking of buying new equipment should consider tape very seriously and make up their minds whether or not it is worth waiting a little longer to save a little more for the system that takes better care of their music.

SONY

Sound heart for your sound system . . . The Sony TA-1010 stereo amplifier provides a powerful and reliable hi-fi centre-piece at moderate cost.

This solid-state unit employs high quality transistors for trouble-free, reliable operation, and a rated output of 15 watts per channel ensures smooth amplification over a wide frequency range. A full selection of input/output facilities, including headphone output, provide complete freedom to create the sound system of your choice.

Model TA-1010 – the perfect choice for discerning listeners.

Recommended retail price £59.15.0

GENERAL

Circuit 20 transistors, 5 diodes.

Power requirements AC 100, 117, 220 or 240V, 50 or 60 Hz.

Power consumption Approximately 75 watts.

AC outlets Two switched, one unswitched, total 300 watts.

Dimensions 16 $\frac{3}{8}$ in. (w) x 4 $\frac{1}{2}$ in. (h) x 9 $\frac{1}{8}$ in. (d).

Weight 10 lb.

POWER AMPLIFIER SECTION

Power output Rated output, 15 watts per channel both channels operating.

Harmonic distortion Less than 0.5% at rated output (at 1 kHz).

Intermodulation distortion (60 Hz : 7 kHz = 4 : 1)
Less than 1% at rated output.

PREAMPLIFIER SECTION

Frequency response Tuner, Aux-1, Aux-2, Tape: 20 – 60,000 Hz 0 dB;

Phono-1, Phono-2, RIAA equalization curve ± 1 dB.

Tone controls Bass 100 Hz ± 10 dB; Treble 10 kHz ± 10 dB.

Filter High filter 6 dB/oct. above 5 kHz.

Loudness control 100 Hz + 8 dB, 10 kHz + 4 dB (Att. –30 dB).

Signal-to-noise ratio Phono-1, Phono-2, better than 70 dB, 3 mV; Tuner, Aux-1, Aux-2, Tape, Rec/PB, better than 90 dB, 250 mV.

Supplied accessories Plug, polishing cloth.

Optional accessories Stereo headphones DR-4A, DR-5A (low impedance), DR-4C (high impedance), Rec/PB cord, connecting cord RK-74, RK-81.



SONY[®]

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Sony (UK) Ltd, Ascot Road, Bedfont, Feltham, Middlesex

TAPE WORKSHOP

ONE OF THE great pleasures of tape recording lies in the fact that once the basic equipment has been acquired the enthusiast can undertake much work at little or no additional cost. Tapes can be recorded, erased and recorded again and again. Cost, apart from the initial expenditure, can be nil. Editing and splicing requires the investment of only a few shillings in the necessary editing tool, razor blade, chinagraph pencil and splicing tape. These accessories, once purchased, will last a very long time indeed.

Most amateurs do not do enough editing. There is a reluctance to cut or otherwise mutilate a spool of tape that might have cost a couple of pounds or more. That is understandable, but editing is *necessary* if the best results are to be obtained, so let's look at the cost aspect.

The art of editing can be a source of great satisfaction to the operator; through its use he is able to create sound sequences that are both personal and original. Editing skill and speed is only achieved by practice and practice means chopping up tape. No one other than a rich man or a fool would dream of buying good quality branded tape just for the sake of cutting it up in editing practice. There's no need to waste money like that. Instead search through your equipment for any odds and ends of poor quality tape. Should there be none check through the advertisements in this magazine for low-cost, perhaps un-branded, tape. It is not suggested that this material is of poor quality — to the contrary it might well be very good indeed — but it does offer the chance to experiment with editing techniques without breaking the bank.

Why not buy a couple of 5-inch spools and devote them exclusively to editing practice? Although there is some degree of skill required to achieve noiseless and precise edits, that skill is not so difficult that it cannot be acquired before our two reels of tape have been completely reduced to mincemeat, so it's not really such a formidable prospect after all.

Another aspect of "tape wastage" is the fact that when cutting and joining magnetic tape the result could be disastrous if more than one recorded programme should be on adjacent tracks. When cutting with the blade one must, naturally, cut across the full width of the tape. If the recording being edited was "full track" (with the signals registered on a single track over what is virtually the entire width of the tape) there will be no problem. We have no other adjacent programmes to worry about and our blade will not slice into other repertoire on track 2. That is one reason why professionals still favour full track working.

Had our original recording been half-track stereo we should be in precisely the same situation. The two parallel half-tracks that are being cut are the only recordings on the tape, so there is no waste. Again this is why professionals prefer half-track when working stereo. Trouble arises when the recording to be edited is half-track mono with the other track carrying another recording, four-track stereo or mono when any of the tracks other than that to be edited have been recorded. Many an eager enthusiast, amateur and professional, has at some time or the other had the painful experience of undertaking a major editing job only to find that another recording on another track of the tape has been hopelessly destroyed. So care is needed.

One should *know* that the possibility

of editing exists *before* taking any particular recording and the tape used should be selected accordingly. *After* editing has been completed there is no reason why any unused tracks on the edited tape should not be recorded for programme material that will *not* require to undergo surgery with the knife. If the edits have been properly and carefully carried out they should be quite soundless when the new recording is reproduced, although the chances of such noise occurring will increase as the speed is decreased.

And recording speed is something else to bear in mind when taking a recording that is likely to have to undergo the editing process. The simple rule is that the *faster* the tape speed the *easier* will be precise cutting and joining. For critical musical editing the professional prefers, and often insists on using, the "old fashioned" speed of 15 ips.

The reason for this is not difficult to understand. Consider a sound whose duration is just one second. When running at the fastest speed the corresponding signal will be registered along fifteen inches of tape and so can be located and identified with ease. Had the recording been taken at 3¾ ips then that same signal representing a sound of one second's duration would take up no more than three and three-quarters of an inch of tape. Not only does it become extremely difficult to locate with accuracy, but the spaces or silences separating it from preceding and subsequent sounds also cover proportionately short lengths of tape. Editing under such conditions is very, very difficult indeed. At the slowest speed of all, 1½ ips, critical editing is impossible — all that can be done is to insert or remove

at points where substantial gaps in the programme make identification obvious. At the fastest speed single notes, or even parts of notes, can be "doctored" and it is here that the greatest interest lies with the maximum creative possibility.

Although a number of amateurs do sometimes work at 15 ips they are a very select minority. On the other hand many have and use the speed of 7½ ips, a fair compromise for editing purposes. It is the speed at which all creative work should be undertaken if 15 ips is not available. Apart from the ease of editing the faster speeds also bring their own advantages in terms of improved signal-to-noise ratio and better wow and flutter figures.

We all know of the great strides that Compact Cassette has taken recently, but this is an area in which cassette can never hope to compete with open spool recorders. As soon as the operator wishes to use his own imagination to *create* programmes or material on his own initiative he finds the cassette system to be hopelessly inadequate. For successful "manipulation" of tape and sound the open spool machine using the fastest possible tape speed is essential.

Tape editing is undertaken for one of two reasons: either to remove an unwanted sound or sections of sounds or to insert new material. The art of editing is made up of two techniques: the process of cutting and re-joining and, more important, the precise location of the exact places at which cuts are to be made. Editing deserves the status of "art" because of the imagination and sense of judgement that is required both to decide *what* to remove (or insert) and to interpret the recorded signals so as to be certain *where* to cut.

Most editorial articles on editing explain at great length just how to use the various editing tools, how to slice with a blade and how to affix the splicing tape. They concentrate on the purely *mechanical* aspects of the task. This is strange because almost all instruction manuals with open spool recorders give detailed information about how to perform these simple tasks, and this is often repeated in the instructions provided with editing blocks or tools, and even with some makes of splicing tape. What none of these sources of information discuss is the *aesthetic* or creative aspects, dealing with sound rather than tape.

The truth is that anyone can learn how to cut and join tape. With the help of modern accessories the job is simplicity itself and could be successfully accomplished by a child. There is, therefore, no intention of repeating here what should be regarded as no more than dreary details of routine methods. Instead

let us think rather more deeply on the more significant questions of *what* to cut and *where* to cut.

If the insertion or removal of sections of recorded tape (or even of silences) does not *improve* the overall recording being edited then the job must be regarded as a failure. So we can say that one of the functions of editing is to improve. Make better. More interesting. Less dull or boring. More perfect.

So in any programme we look for dull, uninteresting or boring, or badly recorded or performed sections. We must have the ability to recognise these parts of the programme for what they are — poor sound for one reason or another — and we have to decide whether those bits can be dispensed with completely or whether they can be replaced from other recorded material, perhaps from other "takes" of the same performance in the case of a reading or musical work.

When recording performances of this kind it is standard practise to repeat either the entire work, or parts of it, expressly so that within the final collection of recorded tapes there will be the possibility of building up as nearly a perfect version of the programme as can be obtained. At the time of recording these takes or inserts are "marked" by a spoken announcement. After the recording session all the tapes have to be listened to carefully and assessments made on the merits of all the various parts. A certain amount of paper-work has to be undertaken with comprehensive notes on just where the individual sections are on the recorded tapes so that during editing one can fastwind swiftly to the parts required.

Even when working at a speed of 15 ips there are edits that are impossible — owing to differences in balance, levels or resonances the most skilful edit in the world would still be obvious to a discriminating listener. And the commandment for all tape editors is: *Thou shalt not be found out!* The operator has to know with certainty what cuts are practicable and what are not. Usually it will be found that when needing to replace a single note or word it is necessary to cut out a more clearly defined passage with fractional silences at beginning and end. Silences, however brief, are invaluable to the editor and it's surprising how frequently they occur in many musical works and in all spoken word recordings.

Reference has been made to the difficulties created by differences in levels or balance. Ideally these should *never* happen. Before the session starts in earnest all problems of balance and levels should have been solved and then allowed to remain unaltered. How rarely is the ideal achieved! In fact there will be

changes in performance, imperceptible differences in source-to-microphone distances that will colour and alter the recorded sound. Often the tiniest change will be only too apparent to the recordist who has listened to the comparative sounds many, many times. These discrepancies will be less obvious to persons hearing them with "innocent ears". Aware of this fact some tape editors will cheerfully get away with murder — but should the crime be detected retribution will be certain. Such are the perils of editing.

The editor is faced with quite different problems when working on an *ad lib* recording such as an interview or an actuality where there will not be a number of takes from which the final selection and choice can be made. In such cases it is usual to record very much more material than will be required for the finished programme so that in the editing process only the best or most interesting parts are used, dispensing with sections that are spoilt by extraneous noises, wanderings from the point, unintentionally silly remarks, coughs and splutters or other blemishes.

In many ways this is a more skilful task than working on a musical performance or reading where one must stick to score or text. There are no such printed guides in an extemporised programme so the final result will depend almost entirely on judgement. It often happens that such tapes are improved in direct proportion to the amount deleted so that one could almost formulate a general rule: *the more material edited out the better will be the programme.* It doesn't always follow, of course, but it does in nine cases out of ten.

One has to learn to be ruthless. Often the sections that the recordist is most proud of securing are just the parts that should go. If he gives way to his personal feelings the programme will suffer. Another danger is of leaving in too much of any given sequence. In these sophisticated days it takes the listener no more than a few seconds to appreciate any given point. If he should be made to endure listening to that sequence for some sixty seconds when he knew what was being conveyed after the first ten he will be bored. The programme is dull. It is a failure. And the fault will lie in a lack of ruthlessness at the time of editing.

It should also be remembered that through the use of the razor blade it is possible to change the sequence of recorded material. Often remarks or sounds recorded towards the end of a session stand out as being eminently suitable to serve as introductions. Provided they do not, through their change of position, alter the logic or sense of what is to follow they should be

re-arranged in the new order. It is possible to insert names or other "guide sounds" into the programme out of their original context so as to help the listener to grasp the action or situation more easily. These are the professional touches that distinguish competent work from amateur attempts. It is the kind of thing that judges are looking for and so will help to win contests.

Once the reasons for editing are fully understood it only remains to make the cuts and joins, but before doing that we are faced with the mysterious problem of finding just where to cut. To do this we have to know with certainty exactly where every sound—or even part of a sound—is recorded on a given length of tape. How is it done?

Identification and location is best accomplished by "inching" the tape by hand over the playback head whilst listening to the rather strange sounds that this process produces at the loudspeaker. First lace up the tape on the machine. Next switch to playback with the volume control turned well up. Then drag a section of recorded tape across the head. It might be found on some recorders that when switched to playback the spools automatically revolve, thus preventing pulling the tape manually. Should this occur, try using the Pause control to keep the spools stationary whilst remaining in the playback mode.

It's a good idea to practice this technique by deliberately recording some simple words on a spare tape. Try counting out the numbers from one to ten, leaving a pause of about one second between each. If the tape is dragged slowly past the head each sound will comprise an almost unintelligible muddle of low frequency noises. The faster the tape is pulled the more the sound will rise in pitch until it approximates the actual recorded voice. If the speed of pulling is increased still further the pitch will rise to a squeak.

The sound of the slow pull is the one we have to learn to recognise. Although we described the sound as almost unintelligible it is not quite meaningless. Knowing what the word is one can pick out its distinguishing features. The beginning of "one" is quite different to the beginning of "two" with its sharp attack on the letter "t".

Keep listening to these differences. Note how you can even detect the sound of the breath being inhaled *before* the word is spoken. Note the lengths of the pauses between the words. Observe how, even without thinking about it, the intonation of your voice changed as you spoke this simple progression of numbers. It probably rose in pitch and then fell at the end. Although it is technically possible to remove one of the numbers

and then re-insert it out of sequence there would be a danger of it sounding "wrong". And if we did attempt that edit we should have to remember to include sections of the one second pause between words so as to preserve the rhythm of the original. The tape editor works as much with silences as he does with sounds.

When pulling the tape across the playback head and listening to the noises resulting one has only to realise that the sound heard is registered on that part of the tape then in contact with the head to understand how marking is carried out. Consider the beginning of the word "two". The explosive sound of that letter "t" is quite unmistakable and with very slow hand pulling will give a clearly defined noise at the loudspeaker. Try pulling backwards and forwards. The very first modulations of that word can be located with accuracy.

All that remains is to mark the positions on the *rear* of the tape (the shiny side) with chinagraph pencil. If we were to be editing out that word "two", we should need to mark the *end* of "one", the beginning of "two", and then add a third "cut mark" half-way between them. Different colours can be used, say yellow for marking the guide points and white for the actual cut positions.

Marking can be done up against the head itself if it should be accessible. Do take care not to scratch or damage the polished surface as you do this. Alternatively if the head cannot be exposed without going to a lot of trouble it's a good plan to mark a couple of "datum lines" on the deck plate itself. To do this take any fixed point within the tape path and establish the exact distance between it and the centre of the playback head. A piece of sticking plaster or similar material cut to that length is then permanently stuck on the front of the deck plate. Instead of marking against the head one marks to the fixed point, lifts the tape out of the sound channel, lays it against the length of plaster and so measures off the distance to the head. Such a method is a little more complicated because it requires another mark (use a different colour so that you don't get muddled) but it avoids fiddling around the delicate playback head itself.

As for the cutting and joining—just follow the instructions with whatever editing tool you are using.

Modern equipment is capable of a standard of performance that will match that of the professionals. Where the amateur falls down is in his reluctance to cut and join. Yet there is even more satisfaction to be obtained from a skillful edit than there is in taking the entire recording. So for the sake of good finished programmes do try a little surgery.

CROSS

TALK

By Audios

IN SPITE of some people's gloomy prognostications that chromium dioxide tape would never have any application to amateur sound recording I was always confident that one day we should be able to walk into a shop and buy a spool of "chromium" just as we now purchase a spool of "iron". But when shopping for tape one doesn't think in those terms. Tape is tape and that is that. It might be "low noise" or "ordinary", but apart from thicknesses there is no other distinction. There very soon will be.

I have just seen a sample of "Stereo Chrome", a new Compact Cassette containing chromium dioxide tape. And it's not a laboratory prototype but a standard commercial pack. Very contemporary in appearance, the cassette itself is packed in one of those plastic trays rather like the things that the airlines use for meals, and included with the cassette is a little booklet (printed in German, alas!) telling the consumer some of the facts about the new recording medium. And the whole thing is being produced and will be marketed by Agfa.

Congratulations to Agfa for making the first of what I am sure will become a long line of different brands and kinds of tapes manufactured to the new formula. They say that this product will not be available in the U.K. before mid-year, but I prefer to change that somewhat negative statement into a more positive one. If what they say is true, and I have no reason to doubt it, then it could equally well be said that their chromium cassettes *will* be on sale by about June or shortly thereafter.

There has been insufficient time since receiving the sample for us to conduct a proper investigation, but initial tests suggest that the new material will be very interesting indeed, with particularly good noise levels. In a recent editorial we examined one of the first samples of open spool chromium dioxide tape and came up with what many will have regarded as surprising answers. Our conclusion was that in order to take advantage of the benefits of the new medium we should need what we called "a new breed" of tape recorders to handle it. I believe that

Continued at foot of next column.



NATURE NOTES

FOR
MARCH

BY RICHARD MARGOSCHIS

IN RECEIVING ENTRIES for this year's 'Scotch' Wildlife Contest I have noticed that an even higher number of entries have been made at 7½ ips; this also applies to the originals. Now I do not wish in any way to discourage people from using equipment running at slower speeds, better this than to make no recordings at all, but I think that people are realising the necessity for higher tape speeds to produce really good quality where bird song is involved. Granted, much bird song falls within the frequency range of the lower tape speeds but there is plenty of evidence that frequencies as high as 20kHz. are present in many songs, and they are present at considerable amplitude. Because of the presence of these frequencies copying birdsong is by no means an easy job if full quality is to be maintained. When you realise that for some purposes third and fourth generation copies have to be used you will see that this is a very important point to watch – the amount of distortion present increases with each copy. In the course of the next few months I hope to be able to write more about these problems.

More people are also beginning to realise that pure song is not the only interesting sound made by birds. You may remember that just a year ago I wrote about Clive Lloyd, a young zoologist, who was going to spend a year alone in the Welsh mountains to carry out certain studies. A long letter from him arrived today in which he says that he now gets very little pleasure out of mere snaps of birdsong, the meaning of which he does not know. He would like to see records 'with a theme': why not, he asks, a disc devoted to very few birds but carrying a complete repertoire of their calls and song from chick to adult, and accompanied by a write-up describing the meaning of the calls? I entirely agree with him on this, but I am afraid that a lot more work has to be done before we see many such discs on the market because so little seems to be known about animal

language.

It is a fascinating subject which covers not only birds but mammals and insects too; I think it requires the joint approach of the naturalist and the scientist. For instance, it seems to me that a study of the frequencies present, as well as the relative amplitude and pattern of the notes, will be a great help to this end. However, analysis of this type will be of little value unless the recording being studied is accompanied by as much detail as possible of the animal's activity at the time when the recording was made. It is not always as easy as it might appear to be to obtain this information, birds can usually be seen when they are singing or calling and after a little practice it is not too difficult to describe, in a few words, what they are doing, but how do you do this in the case of a nocturnal animal such as the fox or the badger? I have just spent another four nights out in the valley at Woodchester Park Field Centre and, as you might guess, I was listening for fox calls during the rut. I heard them all right, plenty of them, and I am sure most of the calls came from dog foxes, but the type of bark I heard varied very considerably and at times I could not be sure how many animals were calling, and whether or not a vixen was present. It is only by making your notes as detailed as possible that the full value of nature recordings can be obtained, and do not forget that weather conditions and locality are also of prime importance.

Now is the time to be sure that all your equipment is ready for instant action, because with March on the doorstep the sounds of nature will be increasing. Our native birds will be coming into song, but don't think of birds only. What about amphibians, for instance? There are several species of frogs and toads which make some interesting sounds, particularly in the mating season which runs through March into April. The Common Frog is found generally all over the country but the Edible Frog is more restricted and found principally in the Eastern Counties and, locally, in Norfolk. A third species, the Marsh Frog, is now well established in the area of Romney Marsh where it was introduced in the mid-1930's.

The Common Toad is found all over the British Isles. Unlike the frog, the male has no vocal sacs but both male and female can produce a variety of croaks. The Natterjack Toad is found locally and can be distinguished from the Common Toad by its smaller size and the fact that it runs rather than hops. Its presence is often first advertised by the trilling croak of the male, which lasts for several seconds at a time, during the breeding season which runs through May and June.

Although the real enthusiast finds something to record from nature all year round I have no doubt that many machines will have been little used during the winter. When you do go out will your recorder work; and even if it does, will it work to full efficiency? If it has been standing idle during the winter months it will more than likely require some attention; at least demagnetise the heads and give it a good clean.

Continuation of Cross Talk

a parallel situation will be found to exist in the cassette field.

The evolution of a new recording medium as drastically different as chromium dioxide raises profound questions relating to the standardisation of equalisation characteristics. At present the accepted equalisation for cassette tape running at 1½ ips. is 120 microseconds at the upper end and Agfa refer in their literature to 70 microseconds for chromium. There is a very considerable difference between the two.

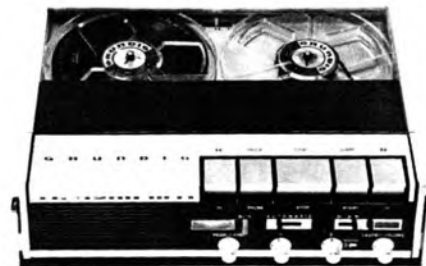
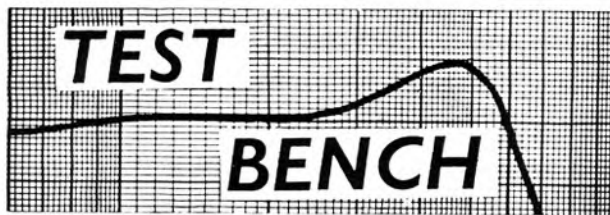
This is an important question because without agreement on an international basis there is a danger of different

equipment manufacturers adopting different standards. If that should happen we should then find ourselves in the kind of chaotic situation that existed in the early days of the long playing gramophone record when almost every repertoire company recorded to a different characteristic; enthusiasts had to use all manner of complicated charts and adjustments to get a flat response from the amplifier before playing a record. In those days hi-fi was indeed an occupation for the dedicated, full of terrors for the uninitiated. It must not be allowed to happen in the world of tape.

Then there is the question of head design. I know of one investigator who has already suggested that record heads

should, ideally, be modified to suit chromium dioxide. A head gap of slightly different length is, in his opinion, likely to be needed if we are to get optimum top response. Such a change cannot be achieved as easily as alterations to bias values, which through the use of a little simple circuitry could be brought into play at the touch of a switch.

And what about Dolby B? Will the new noise reduction system be affected by the advent of chromium tape? This is a fairly easy one to answer. Even if there should be any noise advantage in the new tape an efficient noise reduction system will bring down noise levels still further. In other words Dolby B can make poor good – or good better.



GRUNDIG TK 3200

MANUFACTURER'S SPECIFICATION

Grundig TK 3200

Power Supply: 6 1.5 volt cells, 6 DEAC accumulators type RS 3.5, mains unit type TN 30 or external power supply 6.5 to 9 volts DC.

Track system: International twin track.
Tape Speeds: 7½, 3¾ and 1⅞ ips.

Frequency Response: At 1⅞ ips 40 to 8,000 Hz. At 3¾ ips 40 to 12,500 Hz. At 7½ ips 40 to 16,000 Hz. All measured with Grundig Hi-Fi tape in accordance with DIN 45 511.

Signal/Noise: At 1⅞ ips 48 dB, at 3¾ and 7½ ips 50 dB.

Wow & Flutter: At 1⅞ ips 0.4%, at 3¾ ips 0.2%, at 7½ ips 0.1%.

AGC: Off, Speech, Music.

Connecting Sockets: Microphone 0.22 to 22 mV/10 kOhms. Radio Input ditto. Amplifier Output 500 mV, source impedance 15 kOhms approximately. Pick-up 45 to 4500 mV/2.2 MOhms. 9 volt external power supply, 6.5 volt minimum 9 volt maximum. Loudspeaker 4 Ohms.

Output Stage: Internal 0.8 Watts for built-in loudspeaker. External 2.0 Watts/4 Ohms at 10% distortion.

Loudspeaker: Elliptical 9 Ohms.

Tone Controls: Separate treble and bass.

Monitoring: Whilst recording or "via tape" through loudspeaker or headphones.

Record Level & Battery Condition Meter: Illuminated edgewise meter.

Position Indicator: 4-position digital, illuminated.

Dimensions: 12 ¼ x 3 ½ x 10 ¼ inches.

Weight: 11 lbs approximately.

Included Accessories: 5¼-inch spool double play tape, connecting lead, tape cleaning device, dynamic microphone with stand and windshield.

Recommended Price: £178.65 including purchase tax.

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

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

GRUNDIG TK 3200 TEST CHART

Frequency Hz	Overall Response dB			Playback Only dB		Signal/Noise Ratio dB	Distortion %
	7½ ips	3¾ ips	1⅞ ips	7½ ips	3¾ ips		
31.5	-5.5	-5.0	-5.0	-4.0	-6.0	?	4.5
40	-3.0	-2.0	-3.0	-4.0	-5.5		
63	-1.0	-1.0	-1.5	-3.0	-4.5		
125	+0.5	-1.0	-0.5	-1.0	-3.0		
250	0	0	0	-1.0	-1.0		
500	0	0	0	0	0		
1000	0	0	-0.5	0	0		
2000	0	0	-0.5	0	-0.5		
4000	+0.5	0	0	-1.0	-1.5		
6300	+1.0	+0.5	+0.5	-1.0	-2.5		
8000	+1.0	+0.5	0	-1.5	-4.0		
10000	+1.0	0	-6.0	-2.0	-4.0		
12500	0	-1.0	-13.0	-2.0	-5.5		
14000	-0.5	-3.0		-2.5	-6.0		
16000	-1.0	-5.0		-3.0	-8.0		
18000	-3.0	-10.0		-4.0			
20000	-4.0						
Wow & Flutter (DIN)	0.08%	0.16%					

Notes: The Overall Response figures relate to record and playback using the spool of double-play Grundig tape provided with the machine. Playback Only relates to the reproduction of a 3180/50 calibration tape at 7½ ips and 3180/90 tape at 3¾ ips.

For Signal-to-Noise a number of measurements were taken with conflicting results; these are all quoted and fully explained in the text. Distortion is quoted against a 1,000 Hz tone recorded at 7½ ips at maximum modulation as shown on the built-in meter.

Wow and Flutter is given weighted to the DIN standard to conform to the manufacturer's specification.

Test equipment used includes: Bruel and Kjaer Signal Generator, B & K Frequency Analyser Type 2107, B & K Level Recorder Type 2305, B & K Distortion Factor Analyser and ME Wow & Flutter Meter.

ALTHOUGH THERE EXISTS a vast range of different kinds of audio appliances the number of battery portable tape recorders using open spools and including an operating speed of 7½ ips. is strictly limited. We have always felt the restriction of choice in high grade equipment of this kind to be singularly unfortunate; these are the machines that will particularly appeal to discerning amateurs. So it is with added interest that we now examine a completely new model from Grundig, the TK 3200.

This machine runs on six 1.5 volt dry cells, an external 9 volt power source or from mains via an optional extra mains adaptor unit. The recorder has three heads (separate erase, record and playback) to give monitoring facilities "off the tape" whilst recording. The equipment is half-track mono, incorporates its own small loudspeaker and has an audio outlet at the extension speaker socket of a claimed 2 watts.

Unfortunately miniaturisation is never

cheap and the majority of the few comparable equipments available from other manufacturers come within the £150 to £200 price bracket. The Grundig TK 3200 is no exception. The basic cost of the tape recorder is £178.65 to which must be added a further £10.7½ for the optional extra shoulder-slung carrying case that is essential for almost all outdoor recording work. So there's going to be little change from £200, and at such a price level our investigation must be conducted to the most stringent standards. When investing a sum of this magnitude the consumer is entitled to expect design, construction, performance and versatility of an exceptionally high order. In the case of the Grundig TK 3200 he is encouraged in this anticipation by the use of the term "hi-fi" coupled with the model number on the machine, and also by the appearance of the word "professional" on at least one of the descriptive leaflets. Our job was to discover just how the machine behaved under critical laboratory investigation.

It was first noted that the manufacturer's specification gives no indication of the machine's equalisation characteristic. It is essential for this to be known when testing so that measurements can be taken from the reproduction of the correct calibration tape. It must also be known when tapes are to be replayed on other equipment, as in broadcasting or serious amateur work. Since the professional standard at 7½ ips. is 70 microseconds at the upper end we carried out a rough check at that time-constant. This quickly revealed an incorrect response and so we changed to the domestic standard of 50 microseconds. Things at once improved at the top, but both these calibration tapes revealed a significant lack of extreme bass.

We would not complain unduly about a lack of low frequency response in "budget" equipment. However the TK 3200 cannot under any circumstances be regarded as coming within that category and so the fall-off between 31.5 and 63 Hertz cannot be regarded other than with concern.

After giving the matter a little more thought we came to the surprising conclusion that there is a strong possibility that the equalisation characteristic of the TK 3200 is neither professional nor domestic, but is non-standard. Both the calibration tapes referred to above are corrected at their lower ends to 3180; a tape corrected to 1590 would give a reasonably flat low frequency response when reproduced on this machine. If we are correct in our assumption it is difficult to understand why the machine should have been adjusted in that way and why the

consumer is not informed in the specification. What might be called "non-standard standards" are always to be deplored since they make a nonsense of everyone's efforts to maintain a flat response. The professional would certainly reject them out-of-hand.

As a great deal of the amateur work undertaken through the use of equipment of this kind is of the most serious nature, often intended for final broadcasting, competition entry or for playback on standard mains equipment of one kind or another, we should have thought that the maintenance of acknowledged equalisation characteristics should have been a primary design consideration.

Referring now to other aspects of our frequency response tables it will be seen that there is a commendable flatness in the record to playback curve with the fall-off becoming apparent at around 18,000 Hertz. at 7½ ips., 14,000 Hertz. at 3¾ ips and 10,000 Hertz. at 1⅞ ips. These figures were obtained using the 5¼ inch spool of double-play tape provided with the machine and included in its purchase price.

We did however run into another complication when setting up the machine for test. It is our normal practice to take readings from the line-out socket so as to avoid including any aberrations that might be caused in the main amplifier if one should be present (as in the TK 3200). To our surprise we found that in this tape recorder the line-out socket is muted when the machine is in the record mode. This means that monitoring whilst recording can only be carried out via the extension speaker socket (or the small built-in loudspeaker which is, of course, far below the standard required for critical monitoring purposes) and so much of the benefit of the three heads and separate amplifiers giving AB monitoring is lost. This is a most unusual arrangement and we can see no advantage in it.

In order to avoid complications due to possible voltage changes occurring in dry cells the majority of our tests were carried out through the use of an external regulated power supply adjusted to give the required 9 volts. By reducing this voltage we were able to simulate the conditions that would obtain as the internal dry cells became exhausted and we found that the battery life indicator on the control panel of the machine showed "batteries flat" at between 6.2 and 6.4 volts.

If a battery portable machine is used when its internal dry cells are delivering insufficient power there is a danger of changes in tape speed which might be so gross as to produce an audible alteration to the pitch of the recording. We therefore checked for long-term speed

accuracy at 7½ ips. with a full drive of 9 volts and found that a 1,000 Hertz tone was registering on our electronic counter as 1,006, representing 0.6% fast. Such a discrepancy is acceptable. The power was then reduced until the needle in the meter was positioned precisely on the point at which the black and red coloured segments of the scale adjoin (this is the point at which the instruction manual advises an immediate change of cells) and our voltage reading was checked at 6.3 volts. Driven in this way our 1,000 Hertz tone was counted out as 971, or 3% slow.

A speed variation of that magnitude is of course quite unacceptable. We therefore proceeded to investigate speed changes in relationship to declining power and found that there is reasonable constancy until the driving voltage falls to 7 volts. At this voltage – which is the point at which we would strongly recommend cells should be changed – the needle in the battery life indicator is still within the red segment but a fraction of an inch away from the black. We feel that this metering arrangement is inadequate since proportionately large changes in voltage around this critical "good/bad" area result in only tiny needle deflections and so do not give positive indications of battery usefulness and therefore of speed stability.

The situation at 3¾ ips. is somewhat better since the drain on the cells is rather less. With full power of 9 volts (the equivalent of a brand new set of cells) the reference tone of 333 Hertz was counted out as 331.6 representing 0.5% slow. With the power reduced to around 6 volts the same tone was counted as 329.2 or fractionally more than 1% slow.

Measurements of signal to noise ratio on the TK 3200 became very complicated indeed; so much so that we felt it would be unfair to include any single figure in our test chart. As a result of certain investigations we decided to simplify matters initially by measuring on a restricted bandwidth of from 22.5 Hertz to 22,500 Hertz. This was done by the actuation of filtering circuits within the measuring instruments and it had the effect of limiting our investigation at this stage to the audible sound spectrum and so preventing any noise or interference outside the range of human hearing from confusing the figures.

Firstly we took the basic system noise, that is the noise of the machine only, and compared it to the reference level on the calibration tape. To do this the machine was set in the playback mode, but with the Pause Control actuated, and the noise levels were: at 7½ ips. 64 dB RMS unweighted (or 72.5 dB weighted to the A scale) and at 3¾ ips. 60 dB RMS unweighted (or 67.5 dB weighted to the

A scale).

Next we included erasure and tape noise by running a tape in the record mode and again compared the resultant output to the level of the reference tones on the calibration tapes. This procedure gave us: at 7½ ips. 59 dB RMS unweighted (or 65.5 dB weighted to the A scale) and at 3¾ ips. 57 dB RMS unweighted (or 62.25 dB weighted to the A scale).

These figures are good but it must be remembered that they were deliberately arrived at by introducing filters to restrict the bandwidth. We had reason to suppose that the review sample was producing unwanted noise of extremely low frequency and so we removed the 22.5 Hertz filter and checked the basic system noise once more under those conditions. This was with the machine set in its playback mode but Pause Control operating and the bandwidth could be said to be from 2 to 22,500 Hertz. In this situation the unweighted noise at 7½ ips. was 52 dB below reference level and at 3¾ ips. 44 dB below reference level. This involved a deterioration of 12 dB at 7½ ips. and 16 dB at 3¾ ips., so revealing a considerable noise content below the level of human hearing and probably below 20 Hertz.

Unfortunately it would not be correct to assume that because a sound cannot be heard it will not have any effect on playback quality. When noise of this order is contained within a signal fed to a wide range amplifier it is going to cause unnecessary and unwanted movement in the cone of a loudspeaker driven by that amplifier and so is liable to produce all manner of side effects within the audio spectrum. We would suggest that in order to overcome this fault the tape recorder should be connected to a main amplifier incorporating an ultra low frequency cut such as a rumble filter.

Regretfully our report on low frequency noise existing in this machine does not end there. We explained earlier that we had been driving the TK 3200 through the use of an external regulated power supply. It was with the use of this accessory appliance that the above measurements were taken so we next disconnected the external voltage and loaded the recorder with its six 1.5 volt dry cells and measured the signal-to-noise ratio once again at 7½ ips. over the wide bandwidth. To our consternation it was found that the previously noted deterioration to 52 dB unweighted was greatly increased. For some reason dry cell operation produced even more low frequency noise to give a figure of 40 dB RMS at 7½ ips. We cannot do other than regard this as representing a most unfortunate state of affairs.

Discussing this phenomenon with the

manufacturers we are advised that they will recommend the TK 3200 to be driven from a rechargeable accumulator instead of the six 1.5 volt cells recommended in the handbook. We have not been able to investigate what difference this will make to the low frequency noise that we noted from dry cell operation but the manufacturers state that it would be eliminated. Another advantage of changing from dry cells to a rechargeable power source would be added economy. The power drain on the six 1.5 volt cells is considerable and we consider it unlikely that the probable battery life would be very much in excess of two hours for a complement of new cells. Prolonged operation is therefore going to be costly unless the owner also invests in an accumulator.

Looking next at distortion levels generally we found that when working at 7½ ips. a tone of 1,000 Hertz recorded at maximum modulation as indicated on the internal meter had a total distortion content of 4.5% but was 2 dB below reference level on the calibration tape. When working at 3¾ ips with a 333 Hertz tone the total distortion under similar conditions was found to be 5% and the signal was 0.75 dB above reference level. It should be noted here that the German DIN standard calls for recorded distortion to be below 5% whereas we feel that a more appropriate high fidelity standard – and certainly the minimum professional standard – should be 3% or lower. We accordingly altered the record level at 7½ ips. until the distortion content in a 1,000 Hertz tone was just 3%. We found then that the internal meter was reading -2 dB and the signal was 3.5 dB below reference level. Changing speed to 3¾ ips. the 3% distortion level was reached in a 333 Hertz tone when the internal meter showed -2.5 dB and in this case the resultant signal was 1 dB below reference level. Referring back to our signal-to-noise measurements (which were quoted against reference levels), these can be easily related to our other reviews of other equipment by merely deducting 3.5 dB from the 7½ ips. figures or 1 dB from the 3¾ ips. figures to refer them to a distortion content of 3%. This correction will then conform to the formula generally adopted in our recent equipment reviews.

For wow and flutter measurements we used the DIN weighted standard to conform to the manufacturer's specification and at the beginning of a spool of tape found the figures to be: 0.08% at 7½ ips., 0.16% at 3¾ ips. and 0.3% at 1⅞ ips. These are all significantly better than the specification. Next we checked again towards the middle of the same 5¾-inch spool of tape and found

there were slight improvements. At this point the figures were: at 7½ ips 0.06%, at 3¾ ips 0.12% and at 1⅞ ips 0.28%.

All the above wow and flutter measurements were taken with the machine standing on the work bench. However under practical conditions of use it is likely that a battery portable recorder might well be operating whilst hand-held or even whilst the recodist is walking along. We therefore measured wow and flutter at 7½ ips. once again, but this time with the machine hand-held whilst "marking time". This showed a deterioration to 0.2%, a figure that is rather better than one might expect to get from many machines if operated under such unusual circumstances.

Our final technical investigations concerned the record amplifier and the main audio amplifier in the TK 3200. During the course of our various tests it had been noted that the record amplifier tended to be somewhat noisy (mainly hiss) and so we checked at maximum gain. This showed the unweighted noise of the record amplifier in relation to reference level on the calibration tape to be 40 dB (or weighted to the A scale 44 dB). Separate tone controls affect the output at the external loudspeaker socket (not the line-out socket) and these function as treble cut and bass cut respectively. For the nearest approach to a flat response they should each be set to position 6 (maximum clockwise), but even with that adjustment the low frequency output is still down by 3 dB at 100 Hertz. In the opposite condition (maximum anti-clockwise) with both these controls set at position 1 there is attenuation of both high and low frequencies but it was also noted that the output over the entire audio spectrum then falls by approximately 8 dB. The specification refers to an output of 2 Watts with 10% distortion and we were able to confirm those figures. If the output is reduced to 1 Watt the distortion content falls to a more acceptable 1%.

Before leaving the laboratory it was noted that guides in the tape path in the sound channel appear to have been fabricated from unplated brass or a similar relatively soft metal. The abrasive action of the tape across such members is bound to cause the cutting of "flats" and in the review sample we could detect the beginning of such wear in spite of the fact that the machine had been used for a relatively short space of time.

It might be thought that our review so far has been exceptionally critical. We can only point out that the value to the reader of any investigation of this kind is strictly proportional to the sincerity and honesty of those who conduct the examination. It has always been our

policy to say just what we think without fear or favour since we believe this to be in the interests of the manufacturers as well as our readers. In the case of this particular machine we must make allowances for the fact that as far as we know it represents Grundig's first excursion into the "semi-professional" field. Most of the aspects of the machine's performance that we have criticised could be corrected during production without undue expense or trouble, and if all these points were to receive effective action we should then have a machine that would undoubtedly measure up to the best of the top flight battery portables available.

After such an extensive technical enquiry and its essentially lengthy report the space for our user notes is strictly limited. The general appearance will be apparent from the accompanying illustration; dimensions are 12 7/8 x 3 1/2 x 10 1/4 inches and the weight is approximately 11 lbs. without batteries. Tape transport is controlled by 5 press keys with Stop centrally, Rewind and Pause to the left, and Start and Fast Forward to the right. These keys, which are extremely positive and pleasant to use, are designed and positioned in such a way that they can be operated from the shoulder-slung position. All other controls, including a 4-digit Position Counter and the Record Level Meter, are compactly arranged on a panel in the upper surface and these too are accessible from the normal operating position for battery equipment. There are three push buttons, one coloured brilliant red for Record and two black ones, one to provide excellent internal illumination of the meter and the other to read battery life. There are also two slide switches, one to select between microphone and line inputs and the other with 3 positions for automatic out, automatic speech recording and automatic music recording. These automatic level facilities can be extremely useful in a portable recorder but as usual we advise their use only when for any reason manual operation is impossible.

All rotary controls have numbered scales and they comprise Record Gain, Bass, Treble, and Playback Volume. The treble control incorporates a switch giving Before/After monitoring facilities as the knob is pulled out or pressed in. DIN sockets for microphone, radio and gram pick-up together with remote control are provided on one side of the machine whilst on the other is a DIN extension speaker socket together with a facility for connecting an external 9 Volt power source or the appropriate Grundig mains adaptor.

The underside cover of the machine has to be removed by giving three catches

a half-turn to expose the battery housing and a slide switch on the underside of the chassis enables a choice to be made between dry cells or rechargeable accumulator operation. Much of the construction of the casework is in aluminium casting of considerable strength and a transparent perspex plate gives a good view of the spools. The head cover is easily removable for cleaning and the heads are accessible for demagnetising. Access to the playback head for marking during editing is not quite so simple since the front of the head is obstructed by the tape transport control escutcheon plate. Speed change is by a simple 3-position slide switch set centrally at the rear of the main deck plate. Generally we regard the construction as being of a commendably rugged nature to suit the rough and tumble to which battery machines are often exposed, apart from the flimsy nature of the cover to the underside which appears to have been fabricated from some cardboard-like composition. Designers often forget that the underside of a battery portable is as vulnerable as any other part of the machine. Neither can we approve of the provision of an ordinary DIN socket for microphone connection in this class of equipment. A good quality portable should be fitted with a microphone socket providing positive locking, either by a bayonet type of fastening or by the use of a screw ring.

Unlike some of the other few machines within this category the TK 3200 comes complete with its own microphone, microphone stand and even including a wind shield. It is usually considered that purchasers of equipment within this price range will almost certainly already own microphones of one kind or another, alternatively they would wish to purchase quality instruments suited to their own specific needs. It is a matter of contention as to whether it is right to include a general purpose microphone in the cost of a quality battery portable tape recorder — many prospective owners will not re-

quire it.

In use we found the tape transport mechanism delightfully sweet in its operation and the entire machine was very quiet apart from a slight high-pitched whine when running. The meter is easy to use and thanks to its illumination button the movement of the needle can be observed under the most difficult conditions. We sadly missed the provision of monitoring facilities at the line-out socket in the record mode but were pleased with the general compactness and efficiency.

To summarise our feelings about the Grundig TK 3200 we can only repeat what we have said earlier in this review. Its arrival is most welcome to augment the small number of high quality 7 1/2 ips open spool battery tape recorders. We feel that its manufacturers have not paid sufficient attention to the very rigid operating requirements that are demanded by purchasers of such machines in the United Kingdom. The serious amateur in Great Britain — who after all is the potential customer for such a machine — expects to receive for his money a tape recorder that genuinely approaches professional standards. Unhappily in its present form the TK 3200 falls short of that very stringent requirement. Nevertheless we feel sure that Grundig Germany will investigate the matters we have raised and we look forward with enthusiasm to examining another modified sample at some future date. There are not so many firms who are capable of producing top flight equipment of this kind. We know Grundig can.

3M Wildlife Contest winners

Class 1. Individual bird species.

- | | |
|-----------------------------|------------------------|
| 1. The Gold Crest | Ray Goodwin, Stourport |
| 2. Tawny Owls | Mora O'Hanlon, Swanage |
| Highly Commended: Night Jar | John Fisher, Farnham |

Class 2. Mammals, insects, etc.

- | | |
|-------------------------------|-----------------------------|
| 1. Dog fox and vixen | Alan Ferry, Gloucestershire |
| 2. Hoverfly | Ray Goodwin |
| Highly Commended: Dor Beetles | Ray Goodwin |

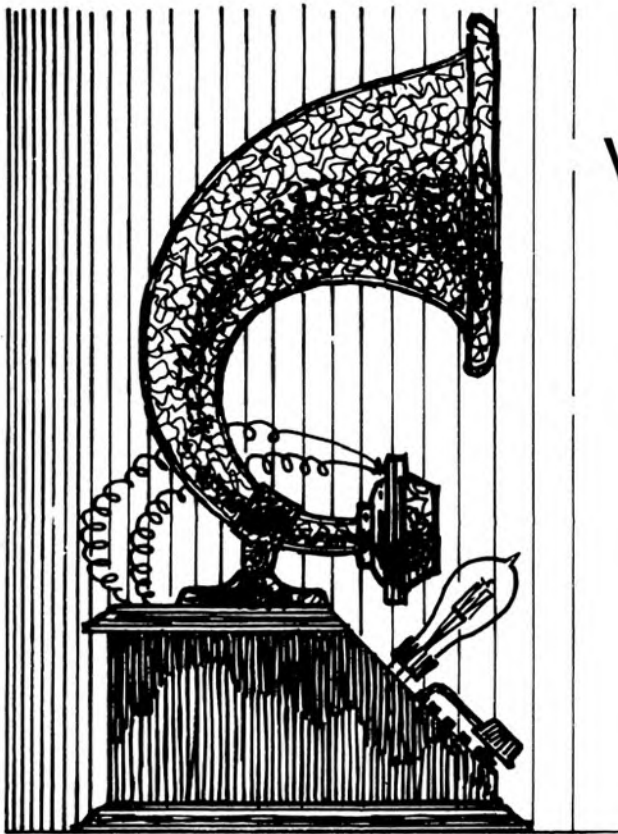
Class 3. Atmosphere

- | | |
|--|--------------------------------|
| 1. Curlew and herring gulls | Ivor Robinson, Shoreham-by-Sea |
| 2. Foxes, owl, deer and sheep | John Gittens, Kidderminster |
| Highly Commended: Black-headed Gulls in mist on seashore | Yolande Kemp-Robinson, Fareham |

Class 4. Junior. Winners:

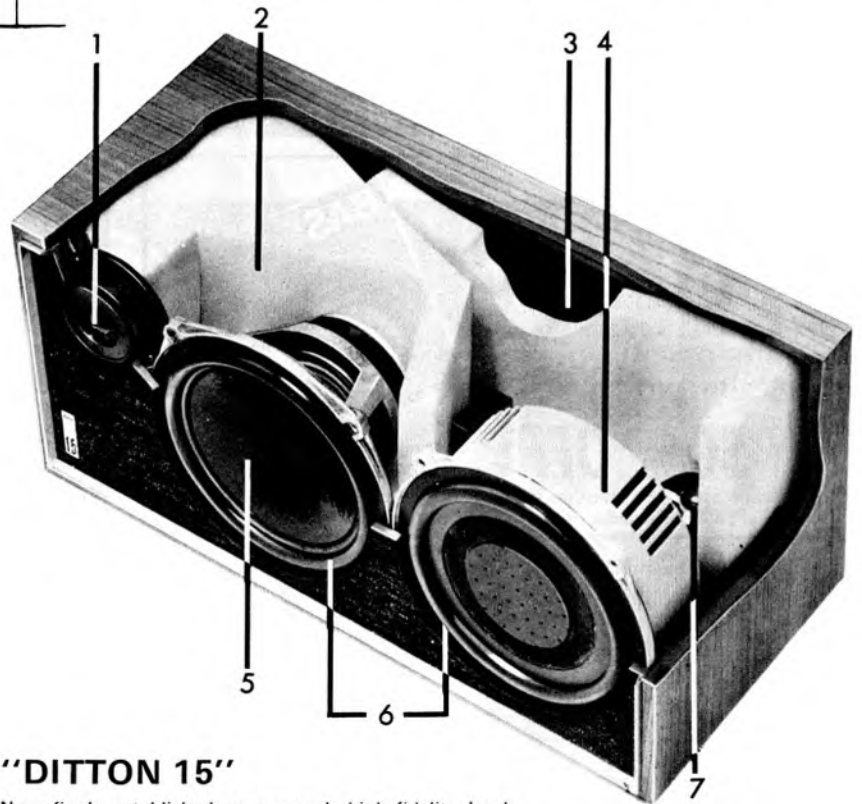
- | | |
|---------------------|--|
| Quail | S. J. Gantlett, Aldershott
(16 years) |
| Robin | Ian Pilbeam, Portsmouth
(16 years) |
| Grasshopper Warbler | Jonathan Hickling, Malvern
(15 years) |

Winners of Class 1, 2 and 3 have been further judged to select overall winner who receives main prize. The name will not be announced until the prize-giving in London on the 10th March. Prizes to be presented by Robert Dougall.



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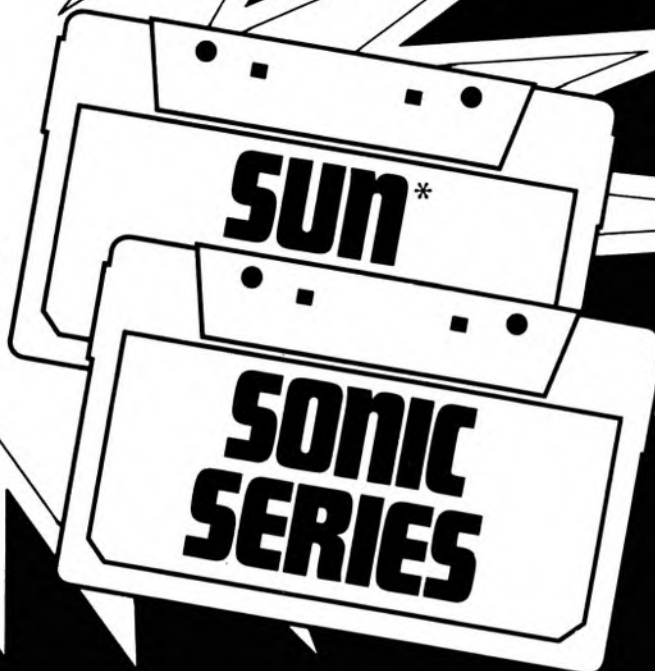
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Julie Felix Going to the Zoo 7176012

Johnny Gregory Serenade in Blue 7176003

Sid Phillips High Society 7176001

Cha Cha Cha with los Mercumbes 7173002

Ramsey Lewis Trio 7173004

Waltzes of Strauss 7152002

Carl Perkins Blue Suede Shoes 7182003*

Dave Dudley 7175003

Francis Bay Latin American Beat 7173001

Hawaiian Troubadours Aloha Ohe 7179001

Szeryng MSO Vivaldi: The Four Seasons
7317001

Beethoven: Symphony No. 6 7317002

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Music

Musicassette Reviews

Consultant Critic Katinka Seiner

MARCHES FROM THE OPERA. Reinhard Linz conducting The London Philharmonic Orchestra. Marble Arch ZCMA 556. £1.50 including purchase tax.

We have been suggesting for some time that the cost of Musicassettes *must* come down. That simple statement really covers a very complex situation with regard to price structure. The cost of a gramophone record will vary considerably – some budget labels are priced at less than £1 for a full 12-inch l.p., whereas “full-price” repertoire and labels leave little change from £2.50.

In any commercially mass-produced music medium one of the prime costs originates in the performance. Can you imagine how much money is involved when a full symphony orchestra is engaged for a series of recording sessions? It can cost thousands. Then there are the various copyright fees. Dare one suggest that the payment of these fees represents one of the reasons why the repertoire companies tend to favour “classical” as opposed to “contemporary” composers? There is good commercial sense in such an attitude.

All these prime costs have to be met, and one way of doing it is to maintain a catalogue of full-priced records. But once accounts have been balanced there is the possibility of re-issuing the same repertoire on a “budget” label at greatly reduced price. In practice that is what often happens. The recording and the music are just as good as ever it was; all that has changed is that the gramophone company has recovered all or most of its original outlay and so can offer the product at a bargain price.

Precisely the same conditions apply to music on tape, and so by following the same reasoning we can expect to find that there will always be a selection of full-priced Musicassettes on sale, but we have all been hoping to see low-cost budget issues appearing as well. Now Precision have produced a new pack and a new price structure for a new, and very welcome, low-cost issue.

The cash saving is considerable. An ordinary l.p. budget cassette (equivalent to a 12-inch disc) costs just £1.50 against £2.37½, a double l.p. (programme time the same as two 12-inch discs) is £2.50 against more than £3.50. And remember – the cassettes, the tape and the manufacturing process is identical to that of the standard production.

In the case of the Precision budget issue, however, the pack is different. With a card identical to the sleeve of a 7-inch disc we have a large illustration in full colour together with suitably bold titling. The cassette itself is housed in a slide “drawer” at the rear.

This is a radical change from the small plastic boxes we are used to, and one can smile at the thought that at a single stroke the repertoire company has destroyed many of the advantages of tiny size and ease of storage normally associated with cassettes. I like the larger cover picture, but feel that there will be quite a problem in housing this new pack in any quantity; certainly it is less convenient for

motor car use. Precision tell me they are going to modify the “drawer” arrangement at the rear to give it a “flip top” similar to cigarette packs. I have reason to suppose that other companies will soon follow suit and market budget cassettes in new styles of packaging.

Whether or not one likes the new arrangement is very personal. Frankly I prefer the convenience of the older style of plastic box (which Precision still retain for their full-priced issues), but others might well not agree. I am pleased to find a new look being taken at an old problem and such a colourful answer coming up.

So for the first of our review notes on these newly priced and newly packaged Musicassettes we have *Marches from the Opera* performed by The London Philharmonic Orchestra conducted by Reinhard Linz and costing only £1.50. In this album Reinhard Linz is appearing with The London Philharmonic as guest conductor from the Hamburg State Opera, an appropriate appearance for an operatic selection.

All the music offered here will be familiar since not only are the operas represented amongst the most popular, but their march tunes are as stirring as they are well known. On side one we have marches from: *Aida* (Verdi), *Faust* (Gounod), *Tannhauser* (Wagner) and *The Magic Flute* (Mozart). On the other track we find: *Carmen* (Bizet), *Die Meistersinger* (Wagner), *The Marriage of Figaro* (Mozart), *Fidelio* (Beethoven) and *The Prophet* (Meyerbeer).

Despite the low cost, recording and production are excellent. One could hardly ask for better sound quality than this cassette gives us – and all at bargain price.

HIDE AND SEEKERS. The Seekers with Bobby Richards and his Orchestra. Conquest ZCOB 443. £1.50 including purchase tax.

Many regretted the passing of The Seekers, but now we have the chance to acquire a budget-priced album with many of their firm favourites. Some accused this group of being “pedestrian”. Within the context of contemporary popular music their style and repertoire certainly appeared to be out of place. But their refusal to modify the kind of sound through which they were so easily identified is to be admired rather than criticised; what they did they did well and the customer knew just what to expect when he saw their name on a record.

In this album they give us: *Little light of mine*, *Morningtown ride*, *The water is wide*, *Well we'll well*, *Chilly winds*, *We're moving on*, *The ox driving song*, *Kumbaya*, *Blowin' in the wind*, *The Eriskay love lilt*, *Lady Mary* and *What have they done to the rain*.

I have no complaints at all about recorded quality – it's up to the very best cassette standards with voices well in the foreground and every word can be heard and understood. Choice of numbers is interesting with its sprinkling of protest songs. *What have they*

done to the rain? refers to the effects of contamination from atomic explosions and it was written by Malvina Reynolds, composer of *Little boxes*. Perhaps it is even more meaningful today than it was some seven years ago, except that now pollution from chemical waste presents a bigger threat.

I always did have a soft spot for The Seekers and, as I expected, thoroughly enjoyed these recorded performances. A really good buy at the price (I would still like it even if not a budget album) and so strongly recommended, especially to frustrated Seeker fans.

LATE NIGHT SOUNDS IN STEREO. Double Play. Marble Arch ZCMAD 23. £2.50 including purchase tax.

I wonder if the letters “MAD” in the reference have any significance? When one looks at the vast repertoire, listens to the quality of the sound and then glances at the price ticket there would appear to be more than a hint of commercial madness in this collection. How much used we to pay for a 10-inch 78 with about three minutes programme time per side? I forget exactly, but it was quite a few shillings. Bearing in mind the “inflation” we all hear so much about it's a sobering thought to consider that relative to today's money values that 78 must have made a big hole in a modern pound note. This cassette gives us no fewer than *nineteen* numbers for fifty bob! And some forty minutes a side playing time.

The sounds we can enjoy late at night are: *Somethin' stupid* (Cyril Stapleton and his orchestra), *Guantanamera* (Sounds Orchestral), *You can't hurry love*, (John Schroeder and his orchestra), *Moon river* (Sounds Orchestral), *Wives and lovers* (The Tony Hatch Singers and Swingers), *Michelle* (Sounds Orchestral), *I'd do anything* (The Tony Hatch Singers and Swingers), *Where did our love go?* (John Schroeder and his orchestra), *Carnival* (Sounds Orchestral), *Strangers in the night* (Cyril Stapleton and his orchestra).

If it's not yet bedtime the cassette can then be turned over to side two . . . ! I will not repeat the names of the performers again because it will be obvious from those appearing on the first side that there has been no scrimping or saving there. Anyway the second side gives us: *Somewhere my love*, *The lonely sea*, *Call me*, *Love me a little more*, *Pink panther*, *Cast your fate to the wind*, *Girl talk*, *Candlelight and roses* and *While the city sleeps*.

Recorded quality is first-class with a commendably quiet background and wide frequency response. In repertoire of this kind one does not get the wide dynamic range of classical music and so it is, in my opinion, more suitable for motor car use than the more dramatic orchestral pieces.

But to hear it at its best the listener should be comfortably installed in a deep easy chair with the lights turned down low and a pleasant drink at the elbow. As to the company – Precision leave it to you to find the companion of your choice . . .

One of the happiest features of this collection lies in the variety of interest which is well maintained throughout. I have had to complain in the past about monotony in some of our double play albums devoted to a single artist; here we have a mixture of subtle blends of different kinds of sounds that goes to make up a most palatable whole. It is just the right way to make use of the extended playing time available ensuring uninterrupted pleasure. I am listening as I write and find the album to be one of the best of its kind I have come across. Strongly recommended.

12 CLASSICAL MASTERPIECES. Double Play. Philips 7506 007. £3.72½ including purchase tax.

In this (full-priced) double play album from Philips we have twelve classical pieces, all of them firm favourites, with performances by what can only be described as a host of famous orchestras and conductors. Since the repertoire is so vast I will first list the contents so that readers can judge whether or not the items are likely to appeal personally.

On the first side we find *The Moldau* by Smetana from "My Country" played by The London Symphony Orchestra conducted by Antal Dorati, *Etude in E*, Opus 10 No 3 by Chopin and played by Adam Harasiewicz, piano, the Overture from *Il Barbiere di Siviglia* by Rossini performed by Orchestre des Concerts Lamoureux conducted by Roberto Benzi, *Coronation march* from "Le Prophète" by Meyerbeer played by The London Symphony Orchestra under Charles Mackerras, *Dorfschwalzen aus Österreich*, Opus 164 (Village swallows from Austria), Josef Strauss, by The Philharmonia Hungarica conducted by Antal Dorati and lastly Johann Strauss senior's *Radetzky march*, Opus 228, again by The

London Symphony Orchestra and Charles Mackerras.

The double play classical collections from Philips do make up formidable lists, but the choice here is absolutely excellent. The second side has an equal variety and interest with: Tchaikovsky's *Flower Waltz* from "The Nutcracker" by Wiener Symphoniker conducted by Tibor Paul, *Hungarian Dance No 1* by Brahms played by The London Symphony Orchestra under Antal Dorati, the Overture from *Banditenstreich* ("Jolly Robbers") by Suppé performed by The London Symphony Orchestra under Charles Mackerras, Johann Strauss Junior's *Wein Weib und Gesang*, Opus 333 (Wine, women and song) performed by Wiener Symphoniker under Paul Walter, and by the same composer *Champagner-Polka*, Opus 211 played by the Minneapolis Symphony Orchestra under Antal Dorati. The collection concludes with *Capriccio espagnol*, Opus 34, by Rimsky-Korsakov with a final appearance of the L.S.O. under Dorati.

It would be quite impossible to properly evaluate such a wide range of pieces and performances. Taking all together the whole is very, very good indeed. Quite an outstanding "library" within a tiny cassette box. Much of the repertoire is dramatically brilliant and the recorded quality does it full justice. One can only marvel at the sound that is produced nowadays from the Compact Cassette system. If anyone doubts that Musicassettes are really as good as all that I suggest they should invest in this cassette. The only problem will be whether the playback equipment is capable of handling the music properly! For best results one needs to use a really good amplifier and the best loudspeaker enclosures that can be obtained. Then you can enjoy this and other fine cassettes. Strongly recommended.

A BEARD OF STARS. Tyrannosaurus Rex. EMI TC-SLRZ 1013 £2.37½ including purchase tax.

Produced by Toni Visconti this selection by Tyrannosaurus Rex certainly does not lack character, whatever else might or might not be missing. With typical verve they give us item after item, all of them stamped indelibly with the mark of Rex.

The collection comprises: *Prelude, A day laye, The woodland bop, First heart might dawn dart, Pavilions of sun, Organ blues, By the light of a magical moon, Wind cheetah, A beard of stars, Great horse, Dragon's ear, Lofty skies, Dove and Elemental child.*

Should one really look for deep philosophical thought in the work of Tyrannosaurus Rex? I'm quite sure they would laugh at the idea and yet one of the things that makes their numbers so distinctive is an underlying perception that is not too far removed from philosophy. Of course it's all done in a spirit of fun - they seem to making fun of themselves as well as their audience, and that's an attitude to which I would never object.

Recording here is good, enabling some of their "further out" effects to be heard with advantage. Personally I would have preferred some of the vocals to have been better placed so that the words could be heard without too much strain, but every item has a cohesion that speaks highly for the skill of the producer.

This is an album that will stand listening to more than once. It gave me a rather wistful pleasure that I find difficult to describe. *A beard of stars*, the title piece, is typical of this rather sad, yet at the same time exciting, mood that is invoked,

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NEW PRODUCTS

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FOLLOWING CONSIDERABLE consumer demand the 3M Company, manufacturers of Scotch Dynarange low-noise recording tape, are now marketing type 203 long-play on 10½-inch NAB spools. These metal reels are the kind used by professional recording studios, and will hold 3,600 feet of long-play tape.



In addition to professional equipment, 10½-inch NAB reels can be used on advanced specification high capacity recorders such as those manufactured by Akai and Revox; the new length spool offers a programme time of up to six hours (three hours per side half-track operation) at 3¼ ips. The recommended retail price is £6 5s. (£6.25) plus 1s. 5d. purchase tax (£0.07) and the tape is available from usual Scotch stockists.

Dynarange tape will, of course, still be available in the usual reel sizes in standard, long and double play versions on 5-inch, 5½-inch and 7-inch spools supplied in plastic "library" cases. It is also used in Scotch C60, C90 and C120 Compact Cassettes.

3M Company, 3M House, Wigmore Street, London, W.1.

"MICROCOSM" OF HOME HI-FI

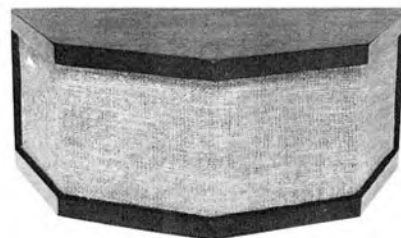
"MICROCOSM" is not a new word; it means any miniaturised (microscopic) system or activity. Now, for the first time, it has been applied to audio. The term is appropriate because when stereo is reproduced under domestic living conditions one is endeavouring to re-create a "microcosm" on a very small scale of a performance which, in life, was relatively larger in all respects. No listener at home really wants to turn his living room into a full scale concert hall; what he endeavours to do is to reproduce the effects and qualities of that hall "in microcosm".

The firm that has introduced this highly appropriate word is called Micro/Acoustics and it is a new company in America devoted to the development and manufacture of new kinds of audio products. And, as the name suggests, its prime concern is claimed to be to bring the

microcosm of home listening closer to the acoustical realism of actual live performance. To accomplish this they will work on two different kinds of components: those intended to be used in conjunction with existing high-quality audio products to improve their original sound quality and a range of completely new appliances that will operate independently.

One of their first releases, called the Microstatic, comes in the former class and is described as the first total coverage high frequency speaker system designed to improve the performance of AR and KLH loudspeakers. Coming in the form of an "add-on" unit it is said to have an 180 degree radiation pattern and flat frequency response within its operating range of from 3,500 Hz. to 25,000 Hz. The advantages of what the manufacturer calls "total coverage dispersion" are claimed to be: to let the listener hear optimum high frequency response in any area of the listening room, to improve stereo localisation of individual instruments and to allow greater aesthetic choice of speaker placement without sacrificing performance. It is further stated that both total coverage dispersion and total coverage high frequency response improve performance without altering the basic sound quality of the original enclosure.

The new company's brochure about the Microstatic is of considerable interest. It makes a special point of stating that both AR and KLH loudspeaker enclosures are in several important respects prime representatives of the most advanced acoustical design available today. Both enclosures produce extraordinarily deep, well damped bass and have a relatively smooth on-axis frequency response. (See our review of AR-4X enclosures in the February edition of *TAPE Recording Magazine*.)



Micro/Acoustics stress the fact, however, that the specified frequency responses for these enclosures are only valid from an on-axis listening position. (Our tests were carried out in this way; we did not test off-axis.) It is said that frequency response deteriorates when listened to off-axis and deviations from flat become worse as the listening position is shifted further away from the central line.

The function of the Microstatic unit is to make up for these deficiencies by dispersing high frequencies uniformly over an 180-degree arc so that each listener, regardless of seating position, will be able to hear optimum high frequency performance. It is further claimed that the accurate perception of left, right and composite stereo images will then be possible throughout the listening area.

The Microstatic contains four dynamic acoustical radiators across an arc of 135 degrees. The dispersion pattern of each driver overlaps with that adjacent to it to create a smooth transition and uniform output across 180 degrees. The diaphragms are said to have extremely low mass and small area so they can accurately reproduce high frequency pressure levels without causing listening fatigue. Special treatment of the suspension is intended to eliminate resonances and to enable transients to be reproduced without ringing or overshoot.

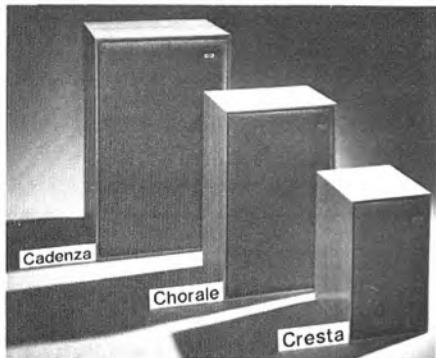
At present the products of this company are being distributed in this country direct from the U.S.A. where the recommended retail price of the Microstatic add-on unit is \$77. Application to the address below will bring full details and it is hoped to arrange for a British agent in the near future.

MicroAcoustics Corporation, Box 302, White Plains, New York 10602, U.S.A.

NEW KEF LOUDSPEAKER DESIGN

WITHIN THE RANGE of four KEF loudspeaker enclosures, Cresta, Chorale, Cadenza and Concerto, the Cadenza is a completely new system employing a passive bass radiator to augment the response from 35 to 70 Hz.

Inside the enclosure is a three-way system using a high flux version of the 8-inch B200 bass and mid-range unit, a T27 hemispherical super tweeter and a new KEF development, the BD 139 acoustically coupled bass diaphragm which is claimed to produce full low distortion bass in the vital range from 30 to 70 Hz. Cabinet styling is designed to match the Chorale and the new version of the Cresta.



Size of the enclosure is 23.6 x 14.2 x 11.8 inches, its weight is 34 lbs. and the claimed response is from 30 to 30,000 Hz. Power rating is 25 Watts and impedance 8 Ohms. The cabinet is constructed of high density chipboard with internal bracing partitions to inhibit panel resonances and reduce coloration caused by cabinet vibration. The double layer grille construction with micro-porous foam is said to give optimum dispersion and acoustical transparency with no unit "see through". The interior is lined with a precise amount of specially formulated high hysteresis polyurethane foam to give optimum sound absorption and acoustic coupling.

Recommended retail prices of the KEF enclosures are: Cresta £23.63 Chorale £34.84 Cadenza £38 and Concerto £53.5.

KEF Electronics Ltd., Tovil, Maidstone, Kent.

CATALOGUE AVAILABLE FROM EAGLE INTERNATIONAL

PRODUCTS under the name of Eagle have long been handled in Great Britain by B. Adler & Sons (Radio) Ltd. This firm feels that its title could be somewhat misleading since although it is a family concern it does not comprise

"three men and a boy repairing crystal sets in a back room". To the contrary, it is an international organisation marketing Eagle products with offices in Tokyo, New York and Brussels in addition to London. So now the name has been changed to "Eagle International".

Eagle International's operation, which is concerned with the marketing of hi-fi equipment and accessories, public address and intercommunications systems and electronic test equipment and components, will be expanded during 1971. With an existing product range of more than 400 items no fewer than 80 new ones will be introduced shortly. It aims to achieve a turnover approaching £1,000,000 during the present year and plans for new premises are in hand.

Copies of their comprehensive catalogue, price 4s. (£0.20), are available from:

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March, 1971

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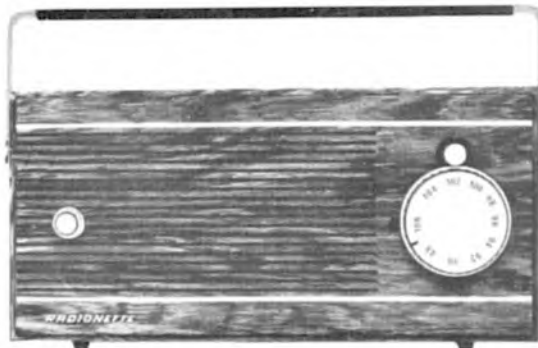
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