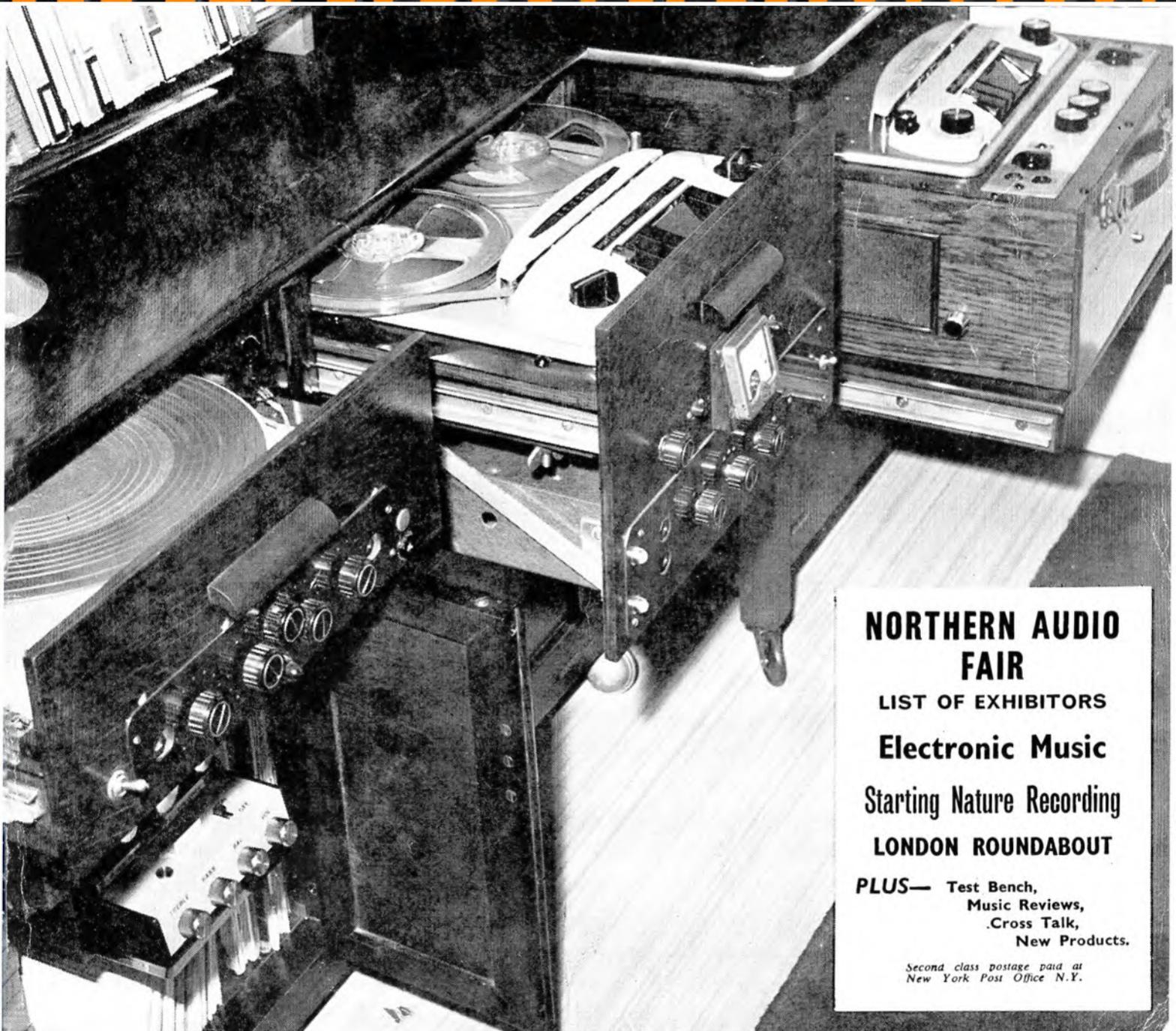


OCTOBER 1968

TAPE

RECORDING MAGAZINE

2¹/₂



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SEE THIS EQUIPMENT

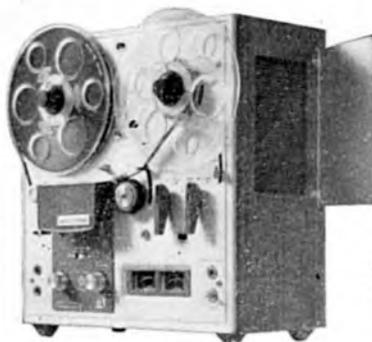
AKAI

SPECIALISTS

See, hear and compare the complete range of Akai Stereo Tape Recorders. Our experienced staff are able to give expert advice and also demonstrate the many outstanding features of this wonderful range of equipment.

MODEL 1710W - 4 track, 3 speed complete stereo recorder.

A FEW AVAILABLE AT OUR SPECIAL PRICE OF £89.10.0 (Manufacturer's list price £109.17.3)



Come to The Tape Recorder Centre, the largest showrooms in Great Britain devoted exclusively to Tape Recorders and Tape Recording Equipment. Whether you are interested in a general purpose tape recorder or a de luxe professional machine, the staff of The Tape Recorder Centre will be pleased to give you the benefit of their many years experience of selling everything in 'Tape.' Every make and model of tape recorder is available for immediate demonstration. Make your choice at The Tape Recorder Centre and be certain of purchasing the machine that is ideally suited to your individual requirements.

Remember—the Tape Recorder Centre Showrooms are the only showrooms in Great Britain specialising exclusively in the sales and service of tape recorders.

- Over 100 Models on Display
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THE TAPE RECORDER CENTRE



*PART OF THE *NuSound* ORGANISATION

THE TAPE RECORDER CENTRE LTD. 82 HIGH HOLBORN, LONDON, W.C.1. TELEPHONE: CHAncery 7401/8354

Ferguson make 'more for



Model 3232

LOOK! a Ferguson stereo recorder with track transfer and 2nd channel monitoring.

This sophisticated 3-speed $\frac{1}{4}$ -track Stereo Tape Recorder is packed with special features – much more than you could expect for the money. It has 7" reels and accommodates standard pre-recorded tapes. Employing all transistor circuits it is, in effect, two recorders and replay amplifiers independently controllable and integrated to provide stereophonic recording and reproduction. Housed in an attractive teak veneered cabinet with transparent lid.

- Twin all transistor amplifiers • 3 speeds, 7" spools play up to 17 hours on double play tape (mono) • Automatic end of tape stops • Clutched dual concentric controls • Input mixing facilities • Latching pause control • Calibrated meter record indicators • Monitoring while recording on built-in speakers • Track transfer on mono • Second channel monitoring • Comprehensive input and output sockets • Suitable extension loudspeaker available • Supplied complete with two dynamic microphones, reel of tape (1200'), take-up spool and connecting leads.

Model 3232-£91.13s.

LOOK! a Ferguson mono tape recorder with 3 speeds and input mixing.

Outstanding value is offered by this 3-speed 4-track mono Tape Recorder. With 3-Watts audio output on speech and music, interlocking controls that prevent accidental 'wiping' of tapes, a metal foil operated automatic stop and a solenoid operated remote pause control. The unit incorporates a new symmetrical motor with low hum field and extensive signal head shielding reduces mains hum to minimum. The cabinet is attractively veneered in teak with a transparent lid.

Model 3216-£64.19s.

your money' tape recorders



Model 3238

LOOK! a new Ferguson portable tape recorder.

A 3-speed, 4-track Tape Recorder with 7" spools, presented in black leathercloth with a teak-veneered loudspeaker grille. A removable cover at the rear provides access to input and output sockets, storage space for mains lead and microphone, etc.

- Four tracks, 3 speeds, 7" spools play up to 17 hours on double play tape
- Automatic end of tape stop
- Input mixing controls
- Remote control from microphone
- Latching pause control
- Double track replay
- Monitoring while recording
- Meter record level indicator
- 4-digit, push-button position indicator
- Graduated dials on rotary controls
- Tape editing index
- Comprehensive input and output sockets
- Powered socket for accessories
- Microphone with remote control switch
- 1200 ft LP tape, take-up spool and connecting lead included.

Model 3238 - £58.11s.

A wide range of accessories are available for all Ferguson Tape Recorders.

**To: British Radio Corporation Ltd.
284 Southbury Road, Enfield, Middlesex**

Please send me your free full-colour fact-filled leaflets about Ferguson Tape Recorders.

Name _____

BLOCK CAPITALS PLEASE

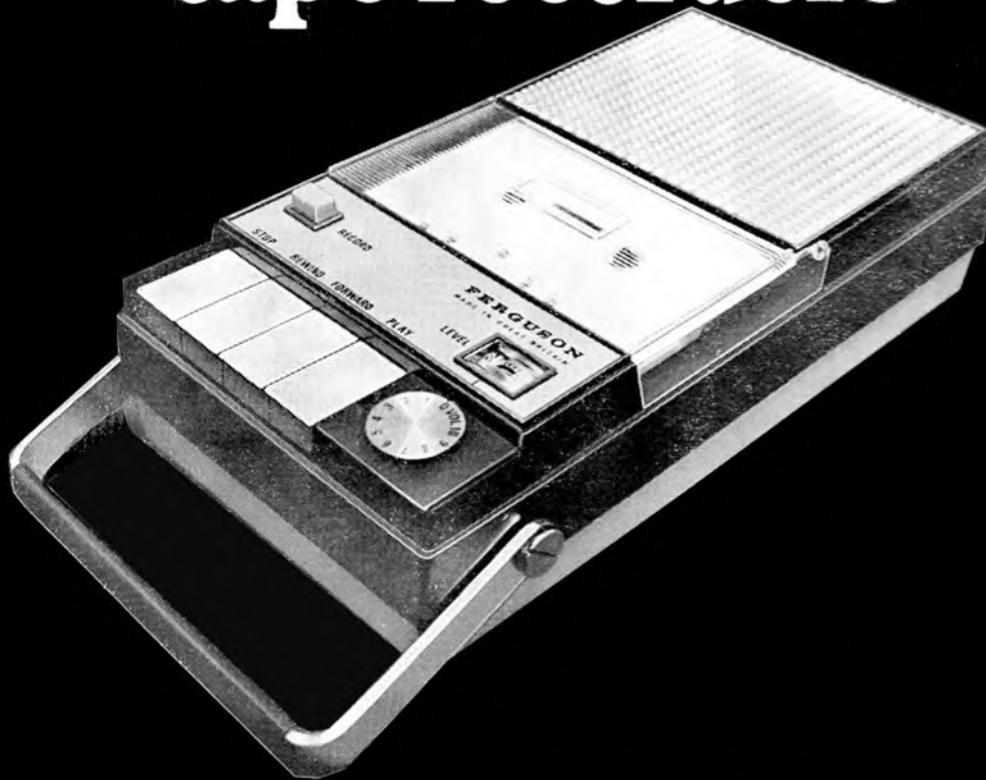
Address _____

THORN British Radio Corporation is a member of The Thorn Group

T.27

Fine! It's a FERGUSON

Ferguson make 'more for your money' tape recorders



LOOK! a superb compact Ferguson Cassette Recorder

This Ferguson Cassette Recorder is the enthusiasts sketch-book and enables you to pick up material for transfer later to the tapes in your library. It is housed in a cabinet moulded from high impact material in black, contrasted with light grey and has a silver coloured metal grille. This machine is battery powered utilising the new instant loading 'Compact Cassette'. It may also be used to reproduce 'Musicassette' pre-recorded tapes monophonically. It has simple piano type keys for tape motion control and a dynamic microphone with remote stop/start control. It is powered by 5 HP 11 type cells and a socket is provided for external power supply. The dimensions of this recorder are: Length 8 $\frac{1}{8}$ "", width 5", depth 2 $\frac{1}{8}$ " and it weighs only 3 $\frac{1}{2}$ lbs.

Model 3236 **£26.14s.**

- Moulded black cabinet with light grey contrast and silver coloured metal grille.
- Ideal for indoor and outdoor use and as a dictating machine.
- Simple piano keys for tape motion control.
- Dynamic microphone with remote stop/start control.
- The instant loading 'Compact Cassette' of tape provided, plays for one hour.
- Meter level and battery condition indicator.
- Will reproduce 'Musicassettes'.
- Operates on five HP 11 batteries or external power supply.
- Comprehensive input/output socket.
- Supplied complete, with remote control microphone, cassette of tape, radio connecting lead and muting plug.
- Like all Ferguson tape recorders, the 3236 is British made.

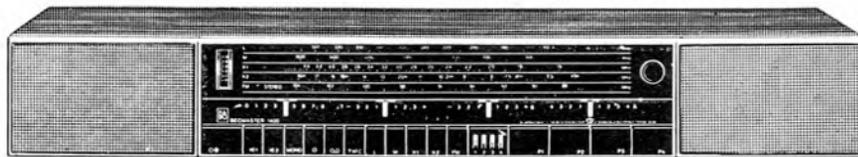
Fine! It's a FERGUSON

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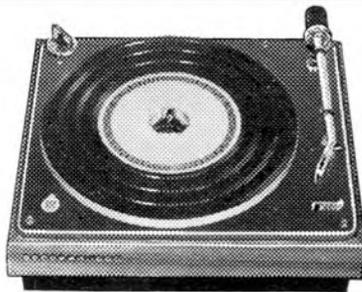


Bang & Olufsen— for those who consider design and quality before price.

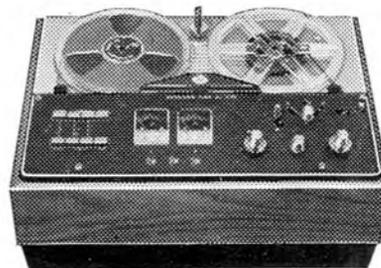
Bang & Olufsen audio equipment is made for those who consider design and quality first. There is a wide range of radios, record players, amplifiers, loudspeakers and radiograms, all designed to give unprecedented pleasure to ear and eye. Your B & O dealer will advise you how to start a system that will give you enjoyment for the years ahead. Here is just one selection.



BEOMASTER 1400K



BEOGRAM 1000



BEOCORD 1500 DE LUXE

BEOMASTER 1400K A sophisticated and versatile five waveband stereo radio receiver/audio amplifier. Completely modern in Danish styling, this new Beomaster is available with or without built-in pressure chamber loudspeakers—making it a complete table radio of the highest quality, or a central unit in a comprehensive stereo audio system. Five wavebands cover F.M., Long, Medium, Shortwave 1 (66—200m) and Shortwave 2 with bandspread (16—49). Special features

include 4 pre-tunable pushbuttons in the F.M. waveband, giving instant programme selection, and a built-in decoder for stereo radio broadcasts. Facilities for using gramophone, tape recorder and two sets of stereo loudspeakers via the high quality stereo amplifier, which gives an output of 15 watts per stereo channel. Available in teak or rosewood finish, to match other equipment in the Bang & Olufsen range. Price £124. 0. 0d.*

BEOGRAM 1000 A stereo transcription turntable unit mounted on a suspended shockproof plinth and featuring the world famous ST/L 15° tone arm, hydraulic lowering device and SP7 cartridge with diamond stylus. Specially engineered speed selector with vernier adjustment. Available in teak or rosewood finish. Price £40. 15. 0d.*

BEOCORD 1500 DE LUXE stereo/mono tape recording deck. Working through a quality radio/amplifier—such as Beomaster 1400—with tape recorder connexion, the Beocord 1500 gives the facilities of a complete tape recording system. Available in teak or rosewood finish. £122. 10. 0d.*

*Recommended retail price.

Fully descriptive literature is available from your B & O dealer or direct from
Bang & Olufsen United Kingdom Division, Eastbrook Road, Gloucester. Telephone: 0452 21591
London Showrooms: 70/71 Welbeck Street, W.1. Telephone: 01-468 2144



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Model 999 (illus.)
Solid state, 4 track, 3 speed stereo tape recorder, in teak case
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Every make and model of Hi-Fi Unit and Tape Recorder is available for immediate demonstration by our specialist staff who will be delighted to assist you in selecting equipment to suit your individual requirements. Only from NuSound can you benefit from all these invaluable features—the most comprehensive range of equipment on display in the country, expert staff, free technical advice, immediate demonstration of any model and the finest after sales servicing available

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Three NuSound Centres specialise in High Fidelity Equipment and Tape Recorders and the other four NuSound centres are devoted exclusively to Tape Recorders and Accessories

Visit any NuSound Centre and you'll be certain of 100% Service and Satisfaction



TAPE RECORDER CENTRES

- CITY** 228 BISHOPSGATE, E.C.2. Tel.: 01-247 2609 (Opp. Liverpool St. Stn.—Closed Sat. Open Sun. 10-2)
- WEST END** 82 HIGH HOLBORN, W.C.1. Tel.: 01-242-7401 (200 yds. Kingsway—Half-day Saturday)
- E. LONDON** 2 MARYLAND STATION, E.15. Tel.: 01-543 5879 (Adjacent Maryland Point Stn.—Half-day Thursday)
- N.W. LONDON** 360 KILBURN HIGH RD., N.W.4. Tel.: 01-624 1656 (Opp. Kilburn Tube Stn.—Half-day Thursday)

Snap-in sound

At home...

Our mains stereo recorder EL 3312 brings you all the exciting 3-dimensional sound realism of Musicassettes: Push-button controls include cassette ejector, fast wind and re-wind and pause. Playback or recording (on blank

Compact Cassettes) is simply superb.

Matching teak-finished loudspeakers are available. And the 3312 has socket facilities for microphone, radio, gramophone, amplifier and second recorder, too.

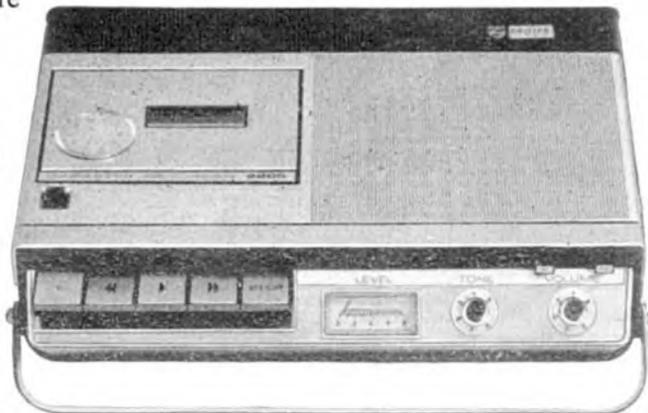


And away...

Our battery/mains cassette recorder 2205 is great for 'music on the move'. In fact, you can play your favourite recordings absolutely anywhere — from the bathroom to the beach.

The 2205 gives 120 minutes recording/playback from a single C120 Compact cassette. It's small, light,

easy to carry. But the wide frequency range and high efficiency speaker give true big-recorder reproduction.



The all-transistor amplifier needs no warm-up time.

And Musicassettes or Compact Cassettes are loaded quick-as-a-flip.

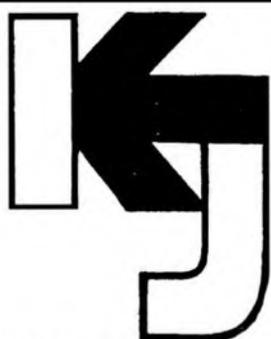
You've hundreds of Musicassettes to choose from . . .

There's a magnificent selection of pops and classics available on Musicassettes. They play as long as an EP or LP record. And they're permanent good value, because the tape, sealed in its dustproof cassette, can't get scratched or broken. Special offer — 3 EPs for only 34/6 and the voucher packed with every Philips cassette recorder.

Send for full colour brochure.

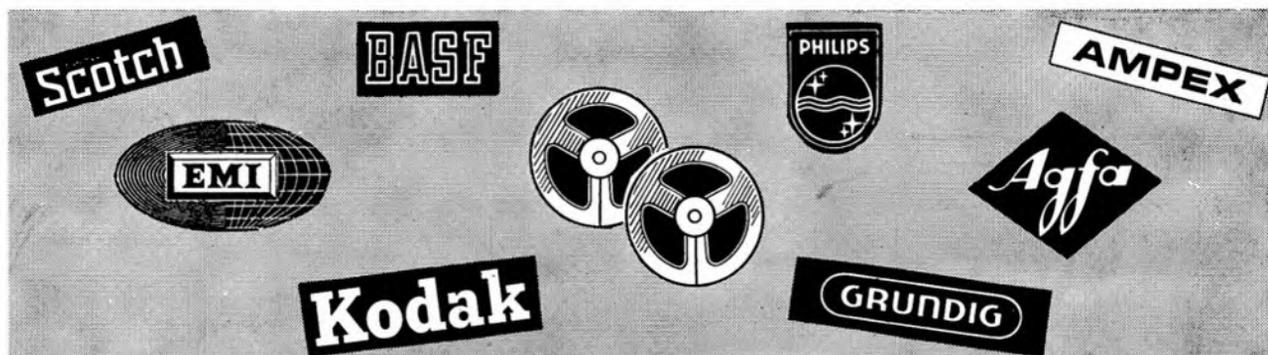
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STANDARD PLAY	LIST PRICE	OUR PRICE	DOUBLE PLAY	LIST PRICE	OUR PRICE
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5 1/2" 900' } Except Agfa	29/5	24/-	3" 400' Not Scotch only	16/7	13/3
7" 1200'	36/7	29/6	4" 600'	26/-	21/-
LONG PLAY			4 1/2" 900' Agfa, BASF only	31/-	25/-
3" 210' Not Scotch	9/3	7/6	5" 1200'	43/2	35/-
3" 300' Scotch only	9/7	7/9	*5 1/2" 1800'	56/11	46/-
4" 450'	14/9	12/-	*7" 2400'	79/-	63/6
4 1/2" 600' BASF, Agfa only	22/-	18/-	10" 4600' Agfa only	140/9	112/9
*5" 900'	29/2	23/9	TRIPLE PLAY		
*5 1/2" 1200'	36/5	29/6	3" 450' Not Scotch	22/3	18/-
*7" 1800'	51/7	41/9	3" 600' Scotch only	24/10	19/9
8 1/2" 2400' BASF Scotch only	74/-	59/6	4" 900'	40/-	32/3
10" 3200' Agfa only	85/9	68/9	*4 1/2" 1200' Agfa, BASF only	50/-	40/3
10" 3600' BASF only	96/6	77/6	5" 1800' Not Scotch	67/2	54/-
10 1/2" 4200' Agfa, BASF only	113/6	91/6	5 1/2" 2400' } Agfa, BASF	91/4	73/6
			7" 3600' } only	116/6	93/6
SCOTCH DYNARANGE (L/P)			QUADRUPLE PLAY		
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7" 1800'	58/1	46/6	4" 1200'	64/6	51/6
8 1/2" 2400' (Metal Reel)	84/3	67/6			
BASF PES.35 L/P Low Noise			COMPACT CASSETTES		
5" 900'	36/10	29/9	C.60	17/6	14/3
5 1/2" 1200'	45/6	35/6	C.90	25/-	20/3
7" 1800'	63/-	50/9	C.120	33/6	27/-
10" 3600'	115/-	91/-			

Postage and Packing 2/6. Order over £3 post free.



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900' on 5" reel Long Play P.V.C.	29/1	17/6	50/6 96/-
1200' on 5 1/2" reel Long Play P.V.C.	36/1	22/6	65/- 125/-
1800' on 7" reel Long Play P.V.C.	51/4	29/6	86/- 165/-
1200' on 5" reel Double Play (Polyester)	43/1	27/9	81/- 157/6
1800' on 5 1/2" reel Double Play (Polyester)	56/1	36/-	105/- 204/-
2400' on 7" reel Double Play (Polyester)	78/10	49/6	145/6 285/-

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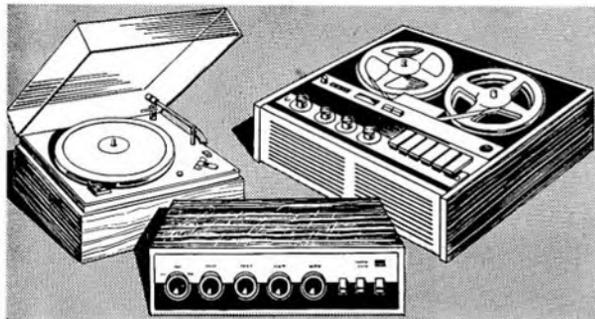
TYPE	DESCRIPTION	LIST PRICE	ONE	THREE	SIX
P.150/12	1200' Long Play on 5 1/2" reel	38/6	25/6	75/-	144/-
P.150/18	1800' Long Play on 7" reel	55/-	37/6	111/-	216/-
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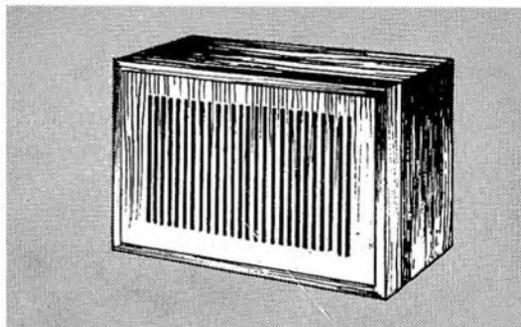
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SAVE £6.10.0d. on this SPEAKER SYSTEM

The fabulous bookshelf speaker system designed and manufactured by Plessey, one of the country's largest electronic groups. Acoustically designed two-speaker system with crossover network.

THIS OFFER REMAINS OPEN ONLY WHILE STOCKS LAST!

Technical Specification.
Cabinet Size 14" x 9" x 8½"
Woofer 6½", 10,000 Gauss, 1" pole.
Tweeter 3½" Acoustically loaded
Frequency response 40—20,000 cps.
Power Handling 12 watts.
Impedance 8 - 15 Ohms.
(4 Ohm if specified)
Scandinavian-style finish.

WHAT THE REVIEWERS SAID:

"Recommended without reservation for this category of Loudspeaker." David Phillips and Donald Aldous.
"Sonotone 'Solent' deserves to reach a wide Public." John Borwick.
"A worthy member of the Hi-Fi family." R. L. West.

ORIGINAL LIST PRICE £18. 0s. 0d.

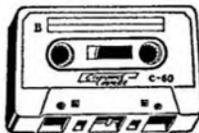
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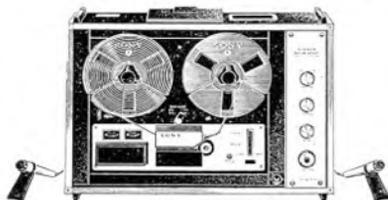




Akai X-IV Stereo Batt/Mains Tape Recorder. List price £169.7.11

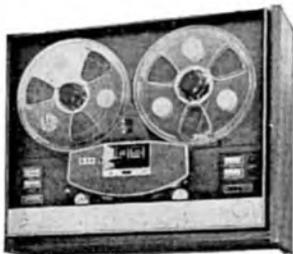
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Sony 260 Stereo Tape Recorder. List price £116.5.2

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Ampex 753 Stereo Tape Unit. List price £117.16.8

Our price 91 gns.
CASE EXTRA 7 gns.



Akai 1710W Stereo Tape Recorder. List price £109.17.3

Our price £89.10

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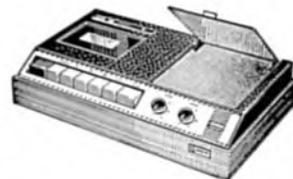
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Ferrograph 632 Stereo Tape Recorder.

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OUR PRICE 55 gns. (Including Two Speakers.)

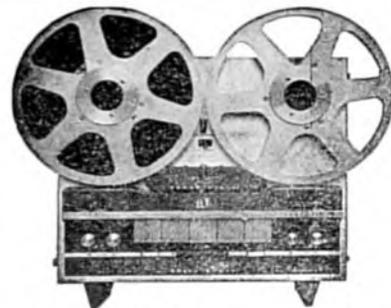
N4304 Mains 2-Track, current price £33.2.10
OUR PRICE 26 gns.

EL3303 De luxe Cassette Tape Recorder, current price £37.5.9. **OUR PRICE 29 gns.**

N4306 Mains 4-Track, current price £56.1.8
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EL3575 Stereo 4-Track, current price £101.19.4
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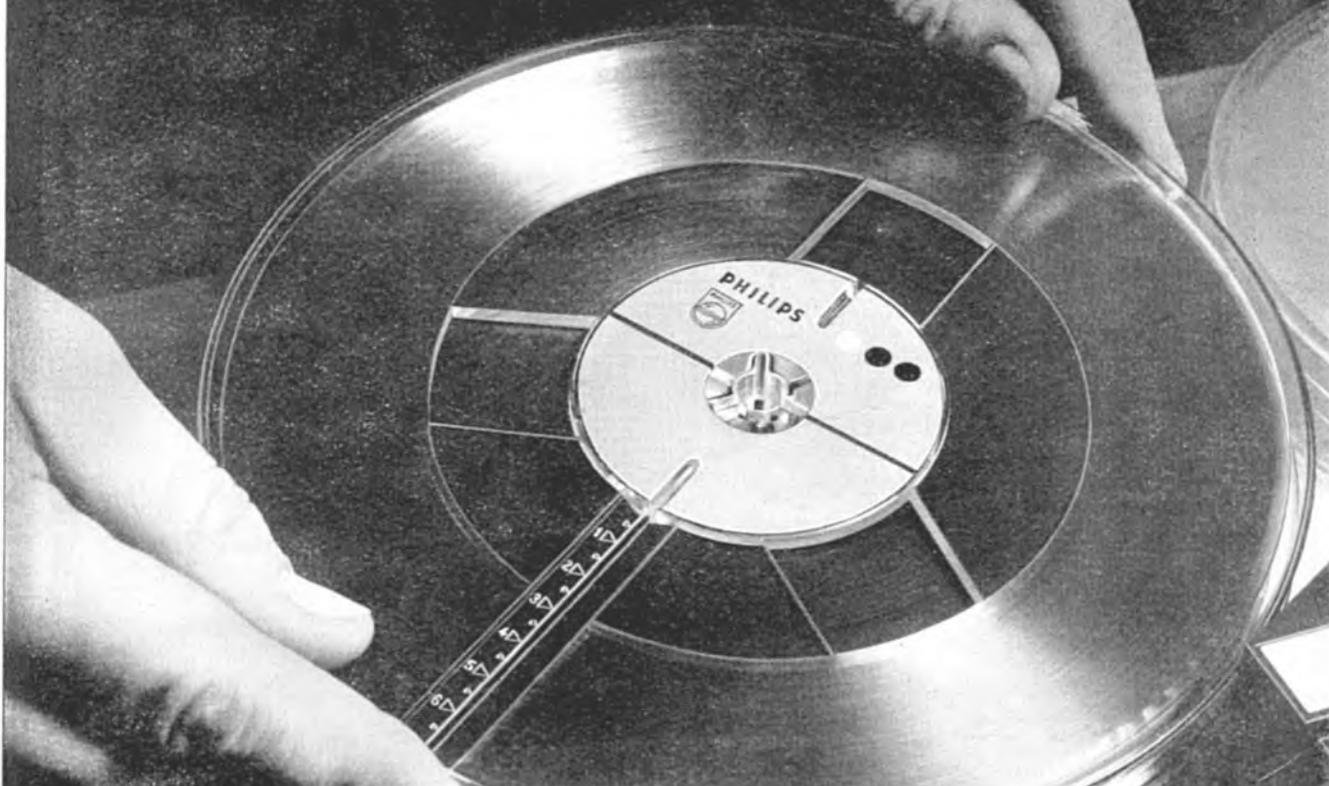
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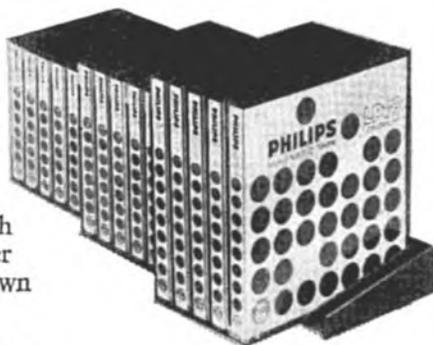
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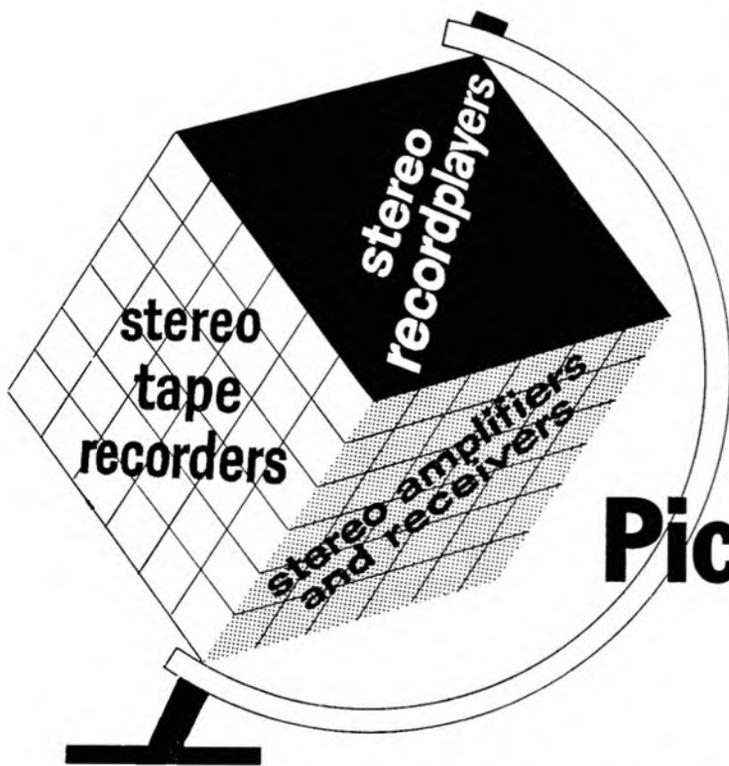


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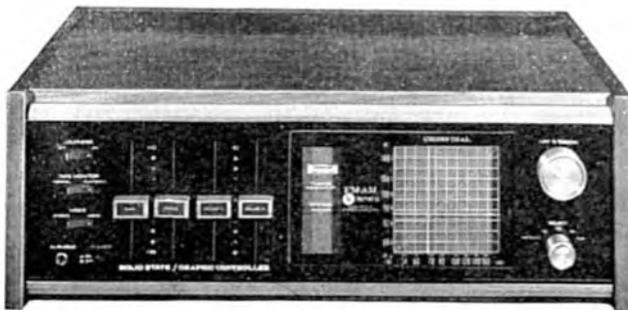
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Vol. 12 No. 10 October 1968

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COVER PHOTOGRAPH: Considerable ingenuity has been shown by the owner of this installation. Not only has he built many of the electronic components himself but they have been designed to suit his own particular domestic needs. On page 426 Eric Cushman describes his equipment in detail under the title, "One Man's Hi-Fi."

NOTE: John Borwick's Home Studio will be back with us next month after his return from holiday.

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Tape trends and tape talk

By Douglas Brown

IF YOU LIKE the thought of a few letters after your name, you may soon be able to qualify as an F.F.B.T.R.C. or as an A.F.B.T.R.C. The F stands for Fellow and the A for Associate; as every reader should know, the other initials stand for Federation of British Tape Recordists and Clubs.

A scheme to elect Fellows and Associates of the Federation has been under discussion for some time—it was referred to the annual meeting earlier this year. Now the proposal is hardening up and the possibility of “qualifying” should soon be with us.

There is, of course, an analogy with the Royal Photographic Society, which elects Fellows and Associates, and the Federation has it in mind to adopt a similar procedure. This will entail amateurs seeking recognition submitting up to half-a-dozen examples of their recording work for judgment by a special panel set up by the Federation.

Election of Fellows or Associates would not involve any sort of professional recognition, but would be an amateur award for proficiency in recording.

I understand the Council of the Federation is now tying up the details and that an announcement may come soon.

* * *

THE “BETTER SOUND” series of broadcasts put out by the BBC last May had a fairly good listener response and they are being repeated at present on Radio 4 at 11.30 a.m. on Saturday mornings.

The two additional programmes in which the panel of audio experts will deal with questions raised by listeners who wrote in—a number of these questions dealt with tape recording—will be broadcast on September 21 and 28.

I do not know whether this series has enhanced the prospect of more regular programmes to interest tape recording enthusiasts; I rather fancy it will have re-emphasised the problem that has always existed—that there are too few listeners who want a programme with a high level of expertise, and that a programme with sufficient general interest must justify itself as general entertainment and, therefore, deal only incidentally with amateur recording. In England, this latter approach has not really been tried, in my view—the nearest approach was the North Region’s programme on the 1967 BBC Contest, presented by humorist Basil Boothroyd, but I would like to see something like the programmes produced by Jean Thevenot in Paris and Joop Smits at Hilversum for many years past.

From Copenhagen I hear from my old friend Dannefeld Bothner that the Danish Radio have just agreed to a series of six programmes on “Better

Sound on the Tape Recorder” and his main concern is to get a good listener response.

* * *

THINKING ABOUT RADIO and tape recording, my mind turns to Prague, where the 1969 International Contest and Amateur Recording Congress are due to take place in mid-October. Shall we, I wonder, have the opportunity to meet again next month the old friends who, during the past year, did so much to stimulate amateur recording in Czechoslovakia and contact with amateurs in the west?

At the time of writing nothing has been heard from our contacts with Czech radio since the events of mid-August. If it should prove impossible to hold the International Contest in Prague this year, the event will not be cancelled—alternative arrangements will be made elsewhere in Europe.

* * *

I NOTICE the advertising campaign for Musi-cassettes for motorists is well under way. Philips are pushing their car radio-cum-cassette player—“first of its kind in the world”—and I forecast a healthy market for this equipment by the end of the year. This has been the most spectacular growth area for tape in the United States during the past couple of years, and there is no reason to suppose it will be different over here.

Philips’ announcement of their cassette playback-only machine (forecast in this column a couple of months ago) is also welcome and significant news. There are many of us who have been in difficulties of late because our recorders do not handle cassettes.

The playback-only machine, I have always been sure, has a big future, although those of us who are interested in *creative* recording will observe its forward stride with some misgivings. I only hope we shall not be flooded with too many very cheap products of this kind or many youngsters will not only lose the opportunity to record, but also the chance to hear good reproduction.

* * *

I THINK it is true that tape recording has always flourished more in the North than in the South (although efforts at organising clubs don’t necessarily reflect this pattern). At any rate I have little doubt that Cyril Rex Hassan will be packing in the enthusiasts again at Harrogate at the Northern Audio Fair.

Denys Killick, our Editor, will be there during most of the Fair and I hope to look in myself for a few hours on Friday. We hope to meet many old friends.

OR

“THE TORTILLA METHOD”

By Gerald Denley



WHEN General Pancho Jaramillo Restrepo Reilly made his election speech in Spanish (with an Irish accent), the class applauded loudly and his immortal words were recorded on the school tape-recorder. When a shy little Indian girl sang a song about the rainy season in India there was a hush in the classroom, and her song, so delicate and high-pitched, was recorded for ever on my portable tape-recorder. When I strolled into the Sikh Temple near the school to meet some of the parents and children I recorded their hymns and bhajans on my portable tape-recorder. Later on these recordings were edited and provided three fifteen-minute programmes on the BBC Home Service.

The first recordings I made were by children in a Secondary Modern School where I was a teacher. It was my job to teach Spanish to a class of children of mixed abilities, some of whom were unable to read. It was useless teaching in the orthodox way, so I invented a country called the Republic of Macaroni and let the children make up plays, tell jokes and stories, hold simple conversations in Spanish and sing songs, all of which was recorded. Even during their free play and drawing I left the recorder on, although at first they were unaware of it. At home I studied the tapes and assessed by their

conversation how much they had understood and how much I could successfully teach them in one session. The classroom was soon transformed into a cross between a Mexican supermarket and a recording studio.

One day we decided to cook a Mexican meal in the classroom. Everyone brought something to eat. We cooked so many tortillas that a lot were left over, and the more revolutionary types had a marvellous time hurling the greasy ones at their enemies.

When the BBC Midlands TV sent a reporter and a camera team along to my classroom I thought they probably wanted to investigate and report on “Learning Spanish by the Tortilla Method.” The children sat there like angels, but the preparations for doing a programme for TV are rather lengthy, and after a while they got restless. Then the arc lights were scorching the backs of their necks, but this did not stop them from gabbling in Spanish and helping themselves to tortillas, chili-beans and boiled bananas. One boy who was trying to dodge a camera slipped up on a banana skin and collided with another boy who was carrying a large dish of boiled bananas. In a second a white pulpy hash landed right into the lap of another boy who was grumbling because nobody had given him any-

thing. The children who were interviewed showed confidence and were unafraid of the microphone. They were so accustomed to the tape-recorder that the reporter found them easy to interview. When the programme appeared two nights later I was pleased to see how self-assured and confident they were.

In spite of their low I.Q. the more backward children had quite a good vocabulary and a passable accent. Some time after this TV programme I thought it might be a good idea if I were to make my own programme for the BBC. I submitted a script to the Head of Talks at Broadcasting House, London, and about four months later I was asked to come along to the Birmingham studios and record my talk. I took along my recordings of the children and these were incorporated into the programme.

When I left that school I found myself teaching mainly Indian children in a Junior school. There was already a system of teaching in the school whereby the Indian children learnt to speak English by wearing head-phones, looking at pictures, and repeating the English names of the things in the picture. This was all very well, but I think it put a strain on the children and provided them with little or no opportunity to express them-

Please turn to page 415

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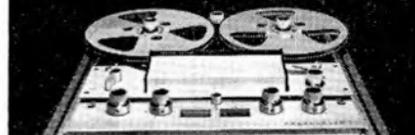
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THE FINE ART OF ELECTRONIC MUSIC

BEFORE concluding this series of articles with details of useful but fairly simple circuits for tone shaping, etc., may I remind those particularly interested in electronic music that there is a section for this in the annual British Amateur Tape Recording Contest, the closing date for entries being January 31, 1969. We would like to see more entries in the experimental recording class (I speak here as a member of the committee) which includes multi-track music recording, electronic music and musique concrète and even "one actor" playlets, etc., complete with sound effects produced by multi-tracking techniques. Last year's entries were very good and I hope that those who didn't make a first prize will enter again this year.

For the benefit of new readers I should mention that this series on electronic music and multi-track recording has included some useful circuits such as a sine-wave generator, a three channel high level signal mixer and a tuneable square-wave signal source (multi-vibrator). A sine-wave generator and multi-vibrator provide between them two primary tone sources covering the audio spectrum but which can be modified and/or mixed to produce tones of different timbre.

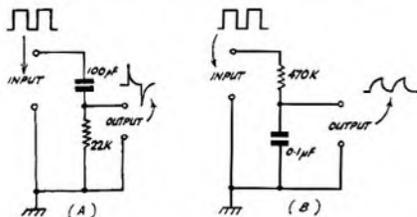


Fig. 1. Simple tone shaping circuit for use with a multi-vibrator

First the multi-vibrator which has an approximately square-wave output. The simple RC networks shown in Figs. 1A and B will modify the multi-vibrator fundamental square-wave as shown. The differentiating circuit (Fig. 1A) will produce a thin "reeby" sound whilst the integrating network, which takes out most of the upper frequency harmonics, will produce a more flute-like tone.

Earlier in the series I also gave a circuit for a white noise generator employing an EF86 valve. For the benefit of those who prefer transistor circuits, Fig. 2 is also for a white noise generator and the output signal of approximately 100mV peak to peak is comparable with that of the valve circuit. The ht should be 12 volts which helps to provide a higher noise output although up to 14 volts ht can be safely used with a consequently higher noise output. The noise signal will contain most frequencies within the audio spectrum and can be filtered so as to produce a very high pitched "hiss" by using another amplifier stage coupled to the output via a low value capacitor, say 220 to 500 pFd. The extra amplifier could

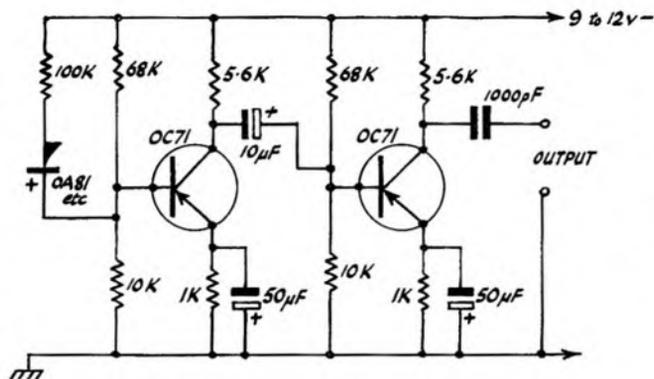


Fig. 2. A transistor circuit for a white noise generator. This is one of the most useful accessories in electronic music applications

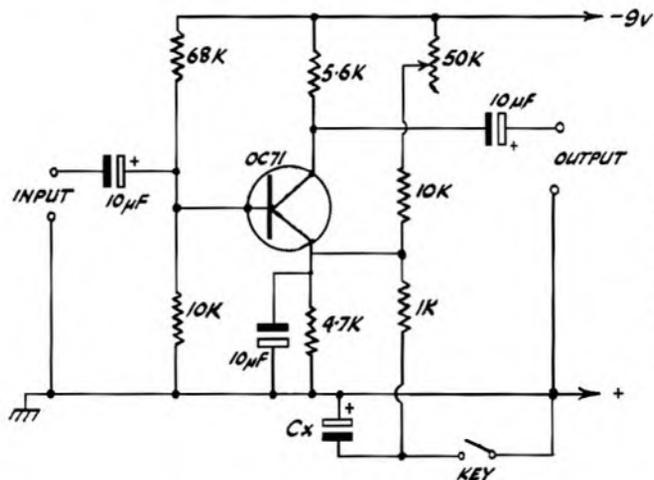


Fig. 3. Circuit for producing artificial decay to a sound or tone. Operated by a key contact the length of the decay time may be altered by changing the value of capacitor CX

in fact be the keying circuit shown in Fig. 3.

Artificial Decay

Primary sounds can be given an artificial decay, or dying away, by means of a simple keyed gate circuit as in Fig. 3. The transistor is biased to cut-off by means of the variable resistor (50K). When the "key" contact is made but instantly released the transistor will conduct and then gradually return to cut-off at a rate depending on the value of CX. The decay time of the sound is therefore dependent on CX. For a short decay time CX will be about 25 to 50 uFd. For a long decay time (bell effects) CX will be around 100 to 250 uFd. The continuous input signal should not exceed about 500 mV. The circuit does not produce a key click.

Ring Modulation

Another interesting circuit (Fig. 4) is the ring modulator which, as the name implies, will allow one signal to be modulated by another. When two tones, each of a different frequency, are fed into the ring modulator there will appear at the output additional tones equal to the sum and difference of those fed into the circuit. Note however, this can only apply to tones of single frequency and not to complex signals composed of a number of frequencies such as music. Music signals fed into one input (or both) will only produce a noisy, distorted sound.

When tones of single frequency are used (sine or square) the resulting mixture is a chord of pleasing sound. The

Concluded opposite

TORTILLA METHOD

From page 411

selves. They said P.E. was a bore; games were a bore; listening to stories in a language they couldn't understand was a bore; in fact everything, except arithmetic, seemed to bore them.

"What would you like to do then?" I asked them.

"Why not let us do Indian dancing," they said. "We know all the dances and Munjit can play on the drums." Another boy said, "Why not let Kamala sing? She can sing very well and you will be loving her beautiful thoughts."

"All right," I agreed. "We'll start this afternoon."

I brought along my tape-recorder and asked Kamala to come forward. At first she shook her head, but encouraged by several of the boys she got up, came to the centre of the circle, joined her hands together and started to sing:

"Chhalia mera nam,
Chhalia mera kam,
Hindu, Muslim, Sikh, Asai,
Sab ko mera salam!"

"Chhalia is my name, and my profession is to play tricks on people. My salutations to all Hindus, Muslims, Sikhs and Christians alike!"

She made all the appropriate gestures, and all the time she was singing she swayed slightly from side to side. When the song was finished everyone clapped and shouted for more. So she joined her hands together again and said she was going to sing a song composed by the Princess Mira Bai who lived four hun-

dred years ago. "And I am sure you will be loving her beautiful thoughts," she said shyly.

"Gobind kabhun mile piya mera. . . .
When shall I see my spiritual lover?"

I am craving to see the lotus of His feet,

And I am pining for a glance of His face."

Half-way through the song the sound of a flute came from the back of the class, and then later the sound of drums. The music was so beautiful that some of the children shook their heads from side to side. Gurmukh and Surinderjit beat out a rhythm with their hands, while Parminder undulated his entire body to the music. Two little girls, their eyes filled with tears of joy, were lost entirely to this world. Even the English children who couldn't understand the language felt the force of the music, and drank in the sounds greedily. At the end of the song there was a dead silence; it seemed no one wanted to be the first to break the spell of the Princess Mira of Rajasthan. It was a pity the tape recorder was unable to capture the atmosphere of devotion which pervaded the classroom, but the clear, high-pitched voice of the child came through with exceptional clarity. All these songs were recorded at 7½ ips.

After I had already left this school I thought it might be a good idea to send some of these recordings to the BBC with a suitable script. Both recordings and script were accepted, and I went along to make my broadcast from the Birmingham studios.

Religious music of the Sikhs and Hindus is so impressive I decided to record a service from the local Sikh temple. First it was necessary to attend the services for a month or two so as to get accustomed to the place. I had a chat with the priest and other officials, and often joined them in a cup of tea. Then I asked them about the possibility of making a recording of their hymns and bhajans. They were keen on the idea, and the following Sunday I went along with my recording equipment. There were a few difficulties with making recordings in a holy place, but everyone was very helpful, and I believe the recording was a success. I sent it along to the BBC with a script, and a month or so later the programme was broadcast.

I have just completed a tour of Galicia in the North-West corner of Spain and now have plenty of recordings of old peasants singing songs in the Galician language. These old half-forgotten songs should make a good programme.

I am now teaching in a Special school, and have more material on tape from here than any other school I have been in. All that needs to be done is to supply a suitable script, edit the tapes, and send them off to the BBC.

Even if I hadn't sent anything to the BBC I would have hours of pleasure listening to the antics of my former Spanish class, or "loving the beautiful thoughts" of a shy ten-year-old Indian girl who transformed a bored, uninterested class into one of wrapt attention and devotion.

ELECTRONIC MUSIC

From page 414

ring modulator can also be used to produce "Dalek" speech, with a kind of fluttering and somewhat ethereal effect. Pre-amplified signals from the microphone are fed into one input (about 500mV of signal is required) with a sine-wave of 10 to 30 Hz into the other also at about 500 mV.

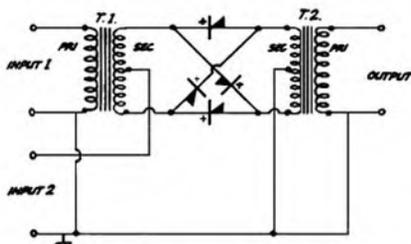


Fig. 4. The ring modulator. See text for component details

The transformers for the ring modulator must be identical but are used back-to-back, the secondary of T2 is coupled via the diodes to the secondary of T1. Transformers suitable for this circuit can be obtained from Henry's Radio Limited,

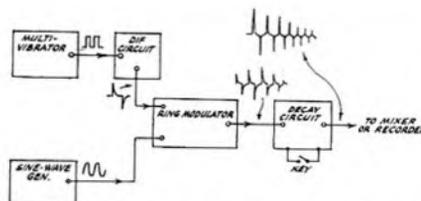


Fig. 5. Block diagram showing one of the dozens of arrangements or combinations possible using the circuits given in this and previous articles in the series

303, Edgware Road, London, W.1. They are transistor transformers type 758 which have centre tapped secondaries of 100 ohms and primaries of 250 ohms. The diodes are any ordinary crystal type such as Mullard OA 81, etc.

There are many ways in which these simple circuits can be used, for example as in the block diagram of Fig. 5 where two tones are fed into the ring modulator the output of which is coupled to the keyed decay circuit. This would produce unusual bell-like sounds. The noise circuit of Fig. 2 can also be coupled to a tape recorder via the decay circuit (Fig. 3) to produce "cymbal" effects, a sound

like that of a brass cymbal struck and followed by the decay. The only thing to remember when using such circuits is that input signal levels must be adjusted to prevent overloading and consequent distortion and that attenuation or additional amplification may therefore be needed after the requisite sound has been generated. Connections between circuits of this nature must be screened and the circuits themselves protected from hum pick-up by screening in metal boxes.

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CONCERT RECORDING

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IT was a Sunday in June. From a cloudless sky the mid-summer sun sparkled on the broken waters of the channel and reflected a hard white light back from the chalk cliffs of the downs. The hot turf was resilient under foot, the coarse wiry grass cushioned every step more delicately than the finest carpeting. Every breath was fragrant with the smell of the sea and the country. White gulls screamed overhead and then perched on the extreme edges of the cliffs; inland the skylarks wheeled and sang ceaselessly.

Stretched out at full length on the ground my nostrils were filled with the scent of the hot earth as I aimed a parabolic reflector at the nearest of the skylarks. He appeared to be no more than a dot in the sky—a dot equipped with fluttering wings and producing an endless flow of what must surely be one of the sweetest of our rural melodies.

This then is a picture of one aspect of wild life recording. Extremely pleasant and not at all difficult. From a relaxed position under what can only be called idyllic conditions another recording was in the bag. But natural history recording isn't always quite like that.

Recording the sounds of nature is one of the most fascinating activities for any recording enthusiast. Although it has its pleasant moments as described above it can also be so difficult and so frustrating as to make any but the very stoutest hearts falter. I am very proud of the fact that *TAPE Recording Magazine* is the only publication which offers a regular monthly feature devoted entirely to nature recording. Our author, Richard Margoschis, is one of the leading authorities on the subject in this country. These notes of mine in this single article are intended to do no more than supplement the information he regularly gives and at the same time to encourage those who might feel that the subject is "too difficult" to take their courage in both hands, gird up their loins and then to get started.

First of all let us be quite clear about what we mean when we talk of "recording the sounds of nature." My own interpretation is the widest possible, since it embraces all the sounds that are made both by living creatures and also by natural phenomena. To my mind a recording of a thunderstorm is as valid a piece of "nature" recording as the recording of the cry of the deer in the rutting season.

All too often recordists think only in terms of bird song. A stroll in the country quickly reveals a serious lack of knowledge; few people recognise more than a handful of different species of birds by sight, let alone by song. Since recording sounds of unknown origin is a rather fruitless occupation the project of nature

TECHNIQUES

NATURE RECORDING

How to start in an absorbing occupation that is open to all



The author of our monthly Nature Notes, Richard Margoschis. He is also Vice-Chairman of the newly formed Wildlife Sound Recording Society and is most anxious to hear from all recordists interested in nature recording. Please write to him c/o this Magazine, and do please remember that you do NOT need to own expensive equipment. All he asks for is enthusiasm. Do you have it?

recording is dismissed as impractical before it is ever begun.

So the first thing I want to do is to make it quite clear to my readers that there are only two essential requirements for nature recording. With these anyone can do it. It doesn't matter if you live in the heart of a city or in the country—all you need is some kind of recording equipment plus time and patience. Nothing more. Ask yourself honestly, does this mean *you*? If it does then you have all that is required to embark on an adventure that will take you in the footsteps of the great pioneers whose names are now household words. This is no exaggeration, but one must have the impetus to take the very first step.

One can dream up plenty of acceptable excuses for *not* attempting nature recording. One can sit comfortably back and declare an eager willingness to be out there amongst the vanguard of the enthusiasts if only one's personal recording equipment were of better quality—or if only one had a little more specialised knowledge of the subject. Unfortunately neither of these are valid reasons; they merely betray a lack of sincere enthusiasm without which that initial impetus will be lacking.

There are many who would quite honestly like to take their recording equipment out into the open country to record the sounds of nature but they don't because they just don't know how or where to begin. It is for them that I now write.

There is no finer beginning than to contact other people with similar interests; and the simple way to do that is to write to Richard Margoschis either at 80 Mancetter Road, Mancetter, Atherstone, Warwickshire or c/o *TAPE Recording Magazine* for details of the Wildlife Sound Recording Society. Let me tell you a little bit about this organisation. It was first formed only a few months ago. Already it has a membership in the seventies and new applications are coming in all the time. But the interesting thing about the membership of the Wildlife Sound Recording Society lies in the fact that the great majority of members are naturalists—not recordists.

Now the naturalist who wants to record the birds and animals he observes is frustrated because of his lack of recording equipment or experience. He is in urgent need of help and co-operation from the recording fraternity. In just the same way the recordist is frustrated because of his lack of experience in naturalist field work. If his recordings are to be successful he equally urgently needs the help and co-operation of the naturalist. And the point of contact is the Wildlife Sound Recording Society.

The term "wild life" was deliberately chosen; too often the recordist thinks only in terms of bird song, ignoring all the other natural sound sources. We tend to think of wild animals as only inhabiting jungles—what about the fox, the badger, the deer? These and many others are all wild animals and they are all native to our country. There are smaller mammals; the field mice, the rats and the voles. The whole countryside is literally teeming with living sound sources. The challenge is there for any who would accept it.

I said earlier that it didn't matter if one lived in the country or in town. Every city has its park and most houses have their gardens. Even those without access to either park or garden can hardly miss the sight or sound of the common house sparrow. Too common to be of any interest perhaps? Well, the fact is that a great deal of research has still to be carried out on this ubiquitous bird. Admittedly the "song" is not particularly inspiring, but to the best of my knowledge a complete sound record of the life cycle of the common house sparrow has never yet been made by anyone. All right

—it's not as exciting as recording the golden eagle on the blue heights of Scottish mountains or as thrilling as recording the howl of a dog fox as it breaks the still night air from the depths of a neighbouring coppice. Perhaps that's why it has never been done. But then nature recording is full of strange anomalies like that.

Take the blackbird or the ordinary garden thrush. These two of our most brilliant songsters can be found within a stone's throw of almost any city house. Strongly territorial in habit you can be pretty sure that the bird who sang so sweetly on the roof opposite last week is the same bird who sits and sings now. And if he survives he will sing again from the self-same spot next year—and the year after. By taking recordings of the same bird's song at intervals over a period of time one can establish just how the bird's melody develops as it gets older. A mature two- or three-year-old will have a more complex "vocabulary" than a youngster in his first adult plumage. These are just two thoughts that come immediately to mind. In reality there is almost no limit to the original research work that can be undertaken by anyone who is determined to do it.

But what about the equipment? Does this not require expensive battery portables running at 7½ ips? Does the real nature recordist not own a collection of expensive microphones plus an array of parabolic reflectors? Just think back a few years to the period before the last war. Those years, the twenties and the thirties, were the heyday of the greatest of all natural history recordists, Ludwig Koch. He didn't use a 7½ ips tape recorder neither did he have the benefit of a tiny 1⅞ ips battery portable cassette machine. If you want to see how the maestro himself undertook most of his recording work go and look at the collection of photographs in the Science Museum, South Kensington. There you will find pictures of Ludwig Koch with a great pantechnicon full of heavy disc recording equipment. This unwieldy mass of mechanical and electronic gadgetry was only capable of producing the quality standard we associate with 78 rpm gramophone records. And yet this great man produced the countless discs which were later to form the nucleus of the BBC Natural History Library. Although I am sorry to mention the name of the Wildlife Sound Recording Society yet again I must add that this Society is honoured to have Ludwig Koch as its Honorary Life President.

Whatever kind of recording work one undertakes the final quality should always be related to the efficiency (and therefore the cost) of the equipment used. But this is by no means the beginning and the end of the story. Even the most humble and inexpensive recorder *can* be used for nature recording. It's not even essential to own a battery portable machine; a mains machine run from a 12 volt converter will give better audio quality and will leave one only with the problem of portability. The only machines that are wholly unsuitable are those extremely cheap recorders that do not run to any fixed standard speed.

For a long period of history mankind has thought of the animal world as being nothing more than a target for his weapons. Thank heaven there has been a revulsion away from this insane killing and today most of the "shooting" is done with the camera (a weapon far more difficult to use effectively than a rifle). But now we have the boon of magnetic tape. It offers all the thrill of the chase and demands all the skill and patience of the hunter. It brings to the recordist the pleasures of the countryside in spring and summer and an understanding of the ways of the fields and the woods in the depths of winter. It gives the merest beginner an opportunity to attempt things that have perhaps never been undertaken before. It puts you, the enthusiast, in a unique position to use this exciting medium of recorded sound in a truly positive and creative manner.

So may I conclude with a plea. Don't just think about nature recordings and then dismiss it as possible for some but impossible for you. You will find that the friendliest bunch of people imaginable are ready and anxious to help you and in no time at all you will be one of them extending an equally helping hand to others. So why not take the first positive step now and join that small band of happy adventurers who look for and find some of the biggest thrills in the world by taking their recording equipment out into the great open air?



TRM REPORT

AROUND THE LONDON ROUND- ABOUT

FOR the second successive year a “trade only” Radio Show has been held in London. Many of our major manufacturers and importers have been showing their products in a large number of different hotels around the Kensington area. Last year representatives of the Press were unanimous in their condemnation of an arrangement which spreads exhibits throughout a number of buildings scattered over several square miles of the metropolis. Retailers and journalists have been subjected to a dizzy round of obligatory visits to buildings as far apart as the Thames Embankment on one side and the Bayswater Road on the other. One cannot help wondering if this arrangement is intended to benefit London taxi drivers—it could not by any stretch of the imagination be said to benefit the electronics trade generally.

Footsore and weary the *TRM* staff have returned with their stories. And the big story from the 1968 Radio Show is of course *colour*.

Whilst it might be considered that coloured television is outside our immediate province we must place on record the impact it is making. It is not merely a question of “seeing black and white television in colour” but rather the addition of colour endows the medium with an entirely new dimension. There is just no comparison between black and white and colour viewing. Neither, unfortunately, is there any comparison in the price.

One of the first sets we saw, from Bang & Olufsen, was very impressive indeed.

Viewing an outside broadcast of the Test Match we were delighted to find the colours to be wholly natural—the grass of the pitch was neither washed-out nor garish but precisely the right shade of green with a slight brownish tinge from the sun; the worn patches of ground revealed all too naturally through the green turf. But the price was impressive too—398 guineas.

At lower cost the Rank Bush Murphy Organisation provide equally realistic colour, but not content with this they have adopted some really advanced thinking on cabinet decoration. Our illustration shows some of their more way-out experiments. We are printing this photograph not because we intend to cover domestic television in *TAPE Recording Magazine* but because it perfectly displays the current trend towards more colourful equipment. Designers are no longer concentrating merely on technical efficiency and conventionally polished hardwood. Throughout the Radio Show we were impressed by the number of amplifiers, tuners and other items that are now available in coloured finishes (usually in the form of a hard stain- and burn-resisting polyurethane lacquer) to bring a completely new and fresh appearance to what have always been rather ugly and heavy looking pieces of equipment.

Amused by the psychedelic television sets we wondered why no one had attempted to extend this treatment to loudspeaker enclosures. With only one or two notable exceptions all loudspeakers

comprise basically a rectangular wooden box. However well they might be manufactured and however well their teak or walnut finish might be oiled they cannot be regarded as anything more than ugly encumbrances in a domestic living room. One or two firms more daring than the rest are beginning to produce white speaker enclosures. But that is as far as they have dared to go. So we have been suggesting that the same courageous experiment that Murphy have conducted with their “pop art” television sets could well be tried with loudspeaker enclosures. A great many people won’t like them; we probably shan’t like them. But at least the effort will have been made to introduce some colour and some change into audio equipment. Eventually a formula may well be evolved that we *shall* like. Why should the customer put up with these monotonous teak speaker enclosures for ever and ever? It must be possible to give them different treatment and it’s up to the manufacturers to show initiative and start experimenting.

Before anyone writes to tell us that the loudspeaker should be as unobtrusive as possible because ideally the listener should be unaware of its presence let us hasten to add that we are well aware of this. In reply we would point out that in many modern contemporary settings a pair of enormous teak boxes are as obtrusive and as out-of-place as they possibly could be. So let’s stop being stodgy and demand a little bit of visual fun with our equipment for a change.

Returning to more sane topics the general trend of equipment follows a highly predictable line. Many firms, both foreign and British, are showing excellent quality amplifiers and tuners at prices ranging from around £30 per unit. This low cost equipment together with the smaller speaker enclosures is designed to appeal to the newcomers to quality sound reproduction. These are the people who are finally disillusioned by the poor quality of their radiograms and who have at last woken up to the fact that unit audio not only gives better sound but is also a very much better investment. Many manufacturers are rather frightened of the term “hi-fi” when referring to this lower cost equipment. In fact they go out of their way to point out that they do not claim it to be high fidelity in the accepted sense of the word. Which just goes to show how far manufacturers have been indoctrinated by the mumbo jumbo of the hi-fi world.

The truth is simply this. The actual quality of sound heard will depend upon the capabilities of the loudspeaker equipment more than any other single factor. When selecting a low cost amplifier one must therefore ensure that it has sufficient power to drive a pair of good speakers which might perhaps be acquired at a

later date. About eight to ten watts is the minimum with which I would be happy. Remember that small infinite baffle enclosures are relatively inefficient and need a disproportionate amount of power to drive them properly, whereas a horn or reflex enclosure (such as the Lowther) will be highly satisfactory on much less power.

In the tape world we have not seen anything dramatically new apart from portable video equipment by Sony (which will not be distributed through normal retail channels) and some new Compact Cassette equipment from Philips. The video equipment comprises a portable recorder and camera but it is purely a recording instrument. A standard mains machine must be used for playback. The long promised playback only stereo cassette machine has now arrived from Philips with their Model 2500. Costing only £24 it comprises a deck and preamp stage only without any record facility and is intended for linking with almost any existing stereo or mono amplifier and speaker system. This will enable owners of existing hi-fi equipment to play back pre-recorded Musicassettes at minimal equipment expense. In addition we have the Model 2502 stereo cassette auto change player. This mechanism accepts up to six cassettes at a time and as each cassette drops down into position it is played and then ejected into a separate compartment. Like the



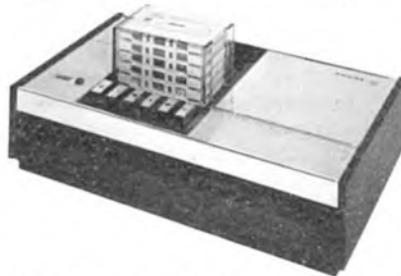
Stereo playback only. For owners of existing equipment who wish to reproduce Musicassettes

2500 cassette player it comprises deck and pre-amp only having an output level of 1 volt into 20,000 ohms for connection to existing hi-fi installations or other mono or stereo amplifier/speaker combinations.

Whilst it would be invidious to single out individual exhibitors for special mention we must refer to the comprehensive range of accessories now being marketed by Grundig and in particular a collection of highly practical little gadgets they have christened with the frightful but appropriate name of "DINDAPTORS." They comprise short leads fitted with DIN plugs and/or sockets at one end and a vast range of alternative type plugs at

the other. They did not say in so many words that these will enable the user to connect "anything to anything" but so far as we can see this will be the practical result of investing in a set of these handy little fellows.

Coming as it does just before the Northern Audio Fair the London Radio Show is obviously overshadowed by forthcoming events. Nevertheless we leave the manufacturers with an overwhelming feeling of confidence — confidence that the industry is going all out to produce the equipment that the consumer really wants



The long awaited Compact Cassette autochanger will accept up to six cassettes at one time and will then play back in sequence automatically

and at prices he can afford. In spite of purchase tax changes there is no depression—to the contrary the trade is looking forward to an unparalleled period of development and expansion.



The four track recorder with a one track mind!

The Telefunken 204 TS all-stereo recorder. Offers you an interesting combination of features. But one thing above all, it has its mind set on the most important single requirement, totally faithful reproduction.

What you get out of the 204 TS is exactly what you put in. It adds nothing of its own. Takes away nothing from the original sound. That's the Telefunken philosophy:

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Vertical or horizontal operation. Front controls. Multiple 6 function switch. Sound on sound recordings. Separate controls for recording and playback, 2 level (each with calibrated meter), 2 volume and 2 tone. 2 built in speakers. Mains 'pre-select' switch.
Response characteristics (Din 45,511)
40-15,000 cps at 3½ ips*

*40-18,000 cps at 7½ ips
40-8,000 cps at 1½ ips
Signal to noise ratio
50 db at 7½ ips, 48 db at 3½ ips
Wow and flutter, $\leq \pm 0.25\%$ at 3½ ips
 $\leq \pm 0.15\%$ at 7½ ips, $\leq \pm 0.4\%$ at 1½ ips
£136.12.5
Telefunken,
dedicated to faithful reproduction
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THE NORTHERN AUDIO FAIR

FROM Friday, September 20th, to Sunday, September 22nd, The Hotel Majestic, Harrogate, will be the scene of the 1968 International Northern Audio Fair. There are many arguments in favour of holding a major exhibition in some part of the country other than London. Why should Londoners be privileged to enjoy the delights of all that is annually offered at the Russell Hotel to the exclusion of those who happen to live in the far North? Or East or West, for that matter? It would be a brave—or foolish—man who would suggest that an appreciation of the good things of sound reproduction is only to be found in the limited area around the capital. High fidelity (for want of a better term) is something that knows no boundaries of town or city, or indeed of race, creed or any of the other invidious categories by which people are artificially separated. *Tape Recording Magazine* believes that it is equally in the interest of manufacturers, retailers and the public for exhibitions of this kind to be made available to as many people as possible. So we wish the Northern Audio Fair every success and would urge our readers who live within reach of Harrogate to support it by attending.

The organiser has had quite a problem in arranging dates that would be acceptable to everyone. Inevitably he has not succeeded. We have received a joint letter from a number of well-known British manufacturers which clearly sets out their point of view. It reads as follows:—

“There seems to be some implication that British audio manufacturers are unwilling to support Northern dealers because many are not taking part in the Northern Audio Fair. This is by no means the intention. The International Audio Fair committee which fairly represents most British audio manufacturers held a meeting on the 20th February, 1968. It was pointed out that there were some twelve similar exhibitions in various parts of the world in which many of us have to participate, and it was for this reason that the committee elected by a majority vote to support only one Audio Fair in England each year.

Mr. C. Rex Hassan subsequently organised a high fidelity exhibition in Harrogate . . . however, the following manufac-

turers are not taking part in accordance with their earlier decision.”

*Armstrong Audio Limited. Acoustical Manufacturing Co. Ltd.
Goodmans Loudspeakers Ltd. Ltd.
K.E.F. Electronics Limited. Rogers Developments (Electronics) Ltd.
Lowther Manufacturing Co.*

The decision whether or not to take part in a Fair of this kind is the private and personal concern of the individual firms. We can only say that the presence of the six named companies will be sadly missed as together they represent a goodly proportion of the first rank of British manufacturers.

We, too, have been faced with a problem. A considerable amount of editorial space is devoted each year to the London Audio Fair, and we feel it would be impractical to give an equal coverage to the Northern Fair. Instead we are now publishing a complete list of exhibitors, together with their room numbers, and would ask our Northern readers to be kind enough to refer back to our April issue for our notes on how to get the best out of this kind of exhibition. We shall follow this up by reporting on new or outstanding equipment on show at Harrogate provided it was not mentioned in our “Audio Fair Retrospect” in the June issue.

Tape recording is a part—although a very specialised part—of the wider subject known as “high fidelity sound reproduction.” Every year more and more people are disposing of their old, inefficient radiograms and are beginning to appreciate for the first time just what good sound really is. We, the recording enthusiasts, do not merely sit back and listen; we are the creative fraternity who derive as much or more pleasure from actually making a recording as we do from listening. Many of those for whom Harrogate offers the first chance to visit an Audio Fair will be amazed at what they hear. As they investigate the possibilities of magnetic tape they will be even more amazed at what they can do. To them, and to all the old friends we are sure to see again, we offer the hand of friendship in the finest hobby in the world.

LIST OF EXHIBITORS

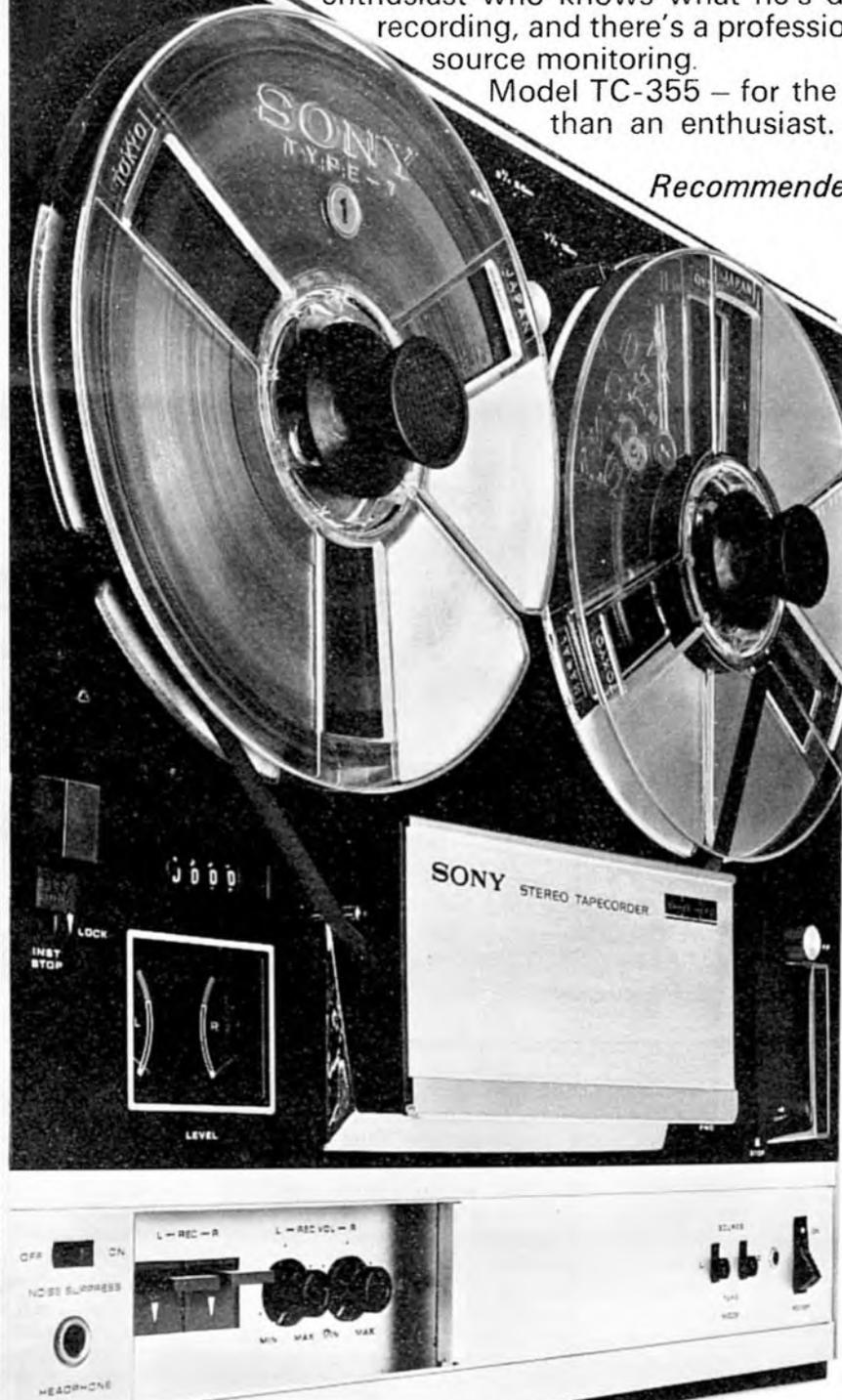
Trade Name	Demonstration Room No.		
Akai	123/105	Daystrom	158/160
Arena	162	Diamonds Stylus	211/212
Audio Fidelity	137	Drury	118
Audio Technica	251/252	Dual	243/245
BASF	247/249	Elizabethan	143/145
Beyer	224	Farnell	Ground Floor Room
Bowers and Wilkins	109/121	Ferroglyph	116/117
Braun	223 Office 205	Goldring	138/161
Celestion	132/133	Hi-Fi Sound	Front Booth
Chilton	111/112	Hi-Fi News	Display
Colton	Booth	Helme	209/220
Connoisseur	139/140	Leak	232/233 and Booth
		Luxor	163
		Metrosound	238
		Mordaunt Short	155 and Booth
		Ortofon	237
		Phillips	229/230 and Office
		Richard Allan	234/235
		Reslo	Front Booth
		Revox Studer	216/217
		Sansui	208/221
		Sanyo	147/149 Office 150
		Sinclair	108/121
		Shure	134/135
		SME	Front Booth
		Stereosound	151/152
		Tandberg	102/130
		Tannoy	226/227
		Telefunken	239/240
		Trio	258/260
		Thorens	261/262
		Uher	129/103
		W. B. Stentorian	201/202
		Wharfedale	126/127 and Booth
		Wireless World/Electrical & Electronic Trader	Front Booth

SONY

Something new for the record . . . Here's the TC-355 tape deck – four tracks and two channels for stereo/mono recording and playback. Superb finish on the outside and SONY expertise inside – the TC-355 is for the enthusiast who knows what he's doing: allows sound-on-sound recording, and there's a professional three head system for tape/source monitoring.

Model TC-355 – for the man who is something more than an enthusiast.

Recommended Retail Price £99



Specifications

Recording system:	4-track stereo/mono recording and playback
Power requirement:	AC 100, 110, 117, 125, 220 or 240V 30 watts, 50/60 Hz
Tape speed:	7½ ips, 3¾ ips, 1½ ips
Reel capacity:	7" or smaller
Frequency response:	20 – 25,000 Hz at 7½ ips 30 – 20,000 Hz = 3dB at 7½ ips 30 – 17,000 Hz at 3¾ ips 30 – 9,000 Hz at 1½ ips
Signal-to-noise ratio:	Better than 52 dB
Wow and Flutter:	Less than 0.15% at 7½ ips Less than 0.25% at 3¾ ips
Harmonic distortion:	Less than 1.6% at normal recording level
Level indication:	Dual VU meter
Inputs:	Microphone input jack: Sensitivity: -72dB (0.19mV) Impedance: 600 ohms Auxiliary input jack: Sensitivity: -22dB (0.06V) Impedance: Approx. 560K ohms
Outputs:	Line output jack: Output level: 0 dB (0.775V) Impedance: 100K ohms Headphone jack: Output level: -28dB (0.031V) Impedance: 8 ohms
Dimensions:	15 3/8" x 7 1/8" x 14"
Weight:	22 lbs
Optional accessories:	Microphone F-98 or equivalent (600 ohms) Stereo headset DR-3A, Microphone mixer MX-6S

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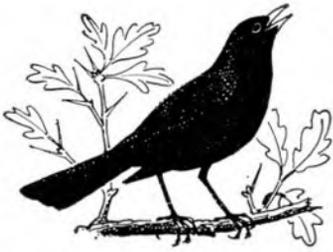
Sony (U.K.) Limited,
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Telephone: 01-935 3546/3391.

Akai can think of 24 reasons why you should go for the new M9 stereo tape recorder

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- Finely oil-finished wooden cabinet.
- Vertical and horizontal operation.
- Universal voltage selector (from 100V to 240V; 50/60 cps).



but you will probably choose it simply because it's the best.



NATURE NOTES

FOR OCTOBER

BY RICHARD MARGOSCHIS

DURING the last few years a lot has been done by various authorities to protect the countryside and to provide access for pleasure and recreational purposes. Among other things this activity has brought about the introduction by the Government of National Parks in areas of the country which are recognised as being of outstanding beauty.

In addition nature reserves and field study centres are to be found up and down the British Isles; when you start looking for them you may be surprised at their number and variety, and the organisations sponsoring them are just as varied. Access to the reserves varies; at some it is forbidden completely except to permit holders whilst at others the public has restricted access. There is a very good reason for this, of course, particularly where special care is being taken of a species and where detailed observations and experiments are being carried out. Some of the field centres are privately owned and others are run by public bodies.

The Forestry Commission has control of large tracts of forest in various stages of growth providing a varied fauna. I have found their Forest Wardens most helpful and an approach to the local man will usually result in the necessary permission to use forest tracks.

A great deal has been done too by smaller authorities, often helped out by private organisations such as ramblers' and walkers' associations, to make sure that in other parts of the country public footpaths are kept open and a right of way maintained.

Generally speaking National Parks are accessible to the majority only at holiday times and, perhaps, weekends. The importance of the local public footpath is in the short term ramble and in giving access to places near one's home but as far as possible from roads, railways, etc. These footpaths are worth sorting out in your locality, and if you come across one which is badly obstructed it would be a public service to do what you can to get it opened up.

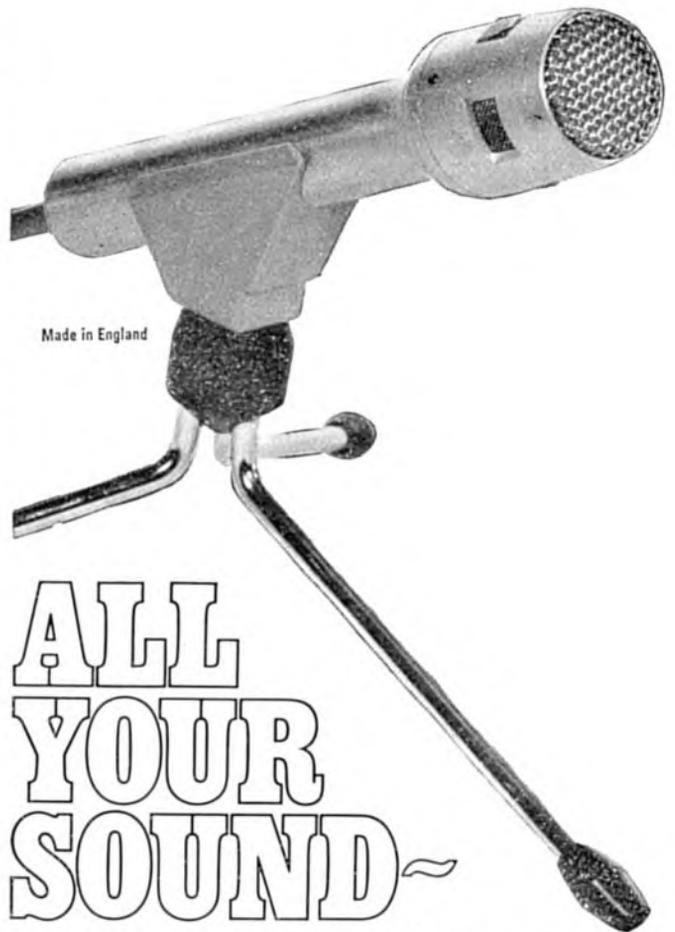
There is a wide network of canals, or inland waterways as they are now called, covering a lot of the country; the two paths along them frequently provide an excellent and easy access to quiet places. I have often thought that a small boat, particularly one without an engine, would be a very good way of approaching wild life along these waterways.

Another interesting access can be provided by British Rail's reduction in track mileage. As they go out of use cuttings and embankments along these old lines are reverting to nature and in many places they are rich in both flora and fauna. If the tracks have not been removed do be sure that the line is closed; remember that some tracks disused by British Rail are being opened up again by preservation societies.

Access such as I have been talking about is of extreme importance to the naturalist, whether he is interested in sound recording or any other branch. In fact special access is frequently necessary to carry out the work being attempted. Only too frequently I have found myself on a path listening to a bird calling from an area to which access is forbidden me; the situation can become very tempting. On many reserves the permits are there for the asking; on others a charge is made.

In a very informal way the same sort of thing applies when visiting your local countryside. An approach to farmers and land-owners with an explanation of what you are doing generally brings not only the necessary permission but also help. A farmer usually has a very good idea of what goes on on his land and, with perhaps a little persuasion, he will keep you informed of any unexpected activity.

Another useful fellow to know is the gamekeeper. I made friends with one quite accidentally when I was wandering along a public road running between his woods. A gamekeeper is naturally suspicious of any stranger and I think my equipment had him guessing a little. However, we are now firm friends and he lets me go into his woods, but I always honour any instruction of his as to where and when *NOT* to go. He is a man who makes his living by dealing with nature, but often we find that our views are opposite. It is inevitable that they should be, but so long as we are able to see each other's point of view there is no reason why we should not remain firm friends.



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DEVELOPED over the past 15 years the domestic set-up seen on our front cover this month started as a straightforward record player on a pull-out drawer with record storage below and an external main amplifier based on the Osram 912 circuit, i.e., the left-hand half of the main cabinet. This cabinet was later extended to accommodate a Collaro Studio tape deck with Mullard Type C amplifier mounted immediately beneath, again on pull-out runners. Below this unit is a drop-down door enclosing a microphone, cables and accessories cupboard behind which the main amplifier is now housed.

Next acquisition was the portable mains recorder on the right built from Magnavox components which were being sold off cheaply at the time. When the pull of television could no longer be resisted, about four years ago, the right-hand cabinet was built to support the TV set and provide a slide-out home for the second recorder, the side-by-side arrangement being devised to facilitate tape transferring. There is also another cupboard beneath this recorder.

Most recent development was the addition of a Pye AM/FM car radio beneath the Collaro transcription turntable unit powered by a Sinclair mains unit. Below this is a stereo Compact Cassette player which, at the time the photograph was taken, fed its own speakers at the other end of the room. Since then the cassette player has been displaced by a Radiomobile battery-operated portable cassette recorder which when placed in the cabinet is also supplied by the Sinclair unit and its output on re-play fed into the output stage of the car radio using the jack socket provided for this purpose.



Our front cover picture this month

ONE MAN'S HI-FI

By Eric Couston

Accessories Editor, "Motor" Magazine

A switching arrangement connects the car radio direct to a pair of balance-controlled speakers at the far end of the room, the main one being a G.E.C. metal cone unit in its approved octagonal cabinet while the other, a 7 in. x 4 in. elliptical in the opposite corner and discretely hidden, simply serves to give a spread of sound and negate the point-source effect of a single speaker.

With the speaker switch set for radio or cassette reproduction a third speaker

(a partially hidden 7 in. x 4 in.) is linked to the main amplifier so that alarm signals from a microphone in the children's bedroom upstairs fed into the pre-amplifier can also be heard. Turning this selector switch transfers the main speakers from the solid state radio/cassette system to the valved amplifiers, at the same time cutting off power to the transistor units so that they cannot be operated while their speakers are disconnected. In this setting the upstairs alarm signals are balanced in inverse proportion to the output from the record player or tape deck using ganged volume controls so that rotation raises the output from one source and, at the same time, lowers it from the other.

Another feature that has proved of value is that each section, the Mullard designed 2-valve pre-amplifier, Osram 912 based main amplifier, the Type C tape amplifier and the radio/cassette unit all have their own mains units. This helps considerably when a breakdown occurs (fortunately very infrequently) as each unit can be quickly checked and rectified without disturbing others. Furthermore both the record turntable and tape deck "drawers" can be easily removed merely by releasing four bolts and two plugs on each.

As a further refinement, the turntable section can be transferred to a carrying case and with the main amplifier and two 10 in. WB speakers in portable cabinets, quickly converting part of the outfit into a low-power PA system which has been used successfully for several indoor social functions and garden parties.

Incidentally all the cabinets and the layout of the components were designed and made by the writer in addition to assembly of all the amplifiers.

MUSICASSETTE REVIEWS

CINDERELLA ROCKEFELLA. Esther and Abi Ofarim. Philips MCP 1008. 19s. 9d. including purchase tax.

For some time now Philips have been marketing "EP" Musicassettes and they seem to have escaped our review net. So here goes with the first of them.

These EPs differ from standard Musicassettes only in the packing and in the length of the programme. Sold at a price that will make them competitive with EP gramophone records they offer two hit numbers on each side. The actual cassette itself is of course identical to those we are accustomed to handling (except there is naturally not so much tape inside!) but instead of the familiar hard, transparent outer casing these come in a lightweight inner container which slips inside an illustrated cardboard sleeve. Certainly not so durable, but then does a pop record need to be packed as if it were to endure for a lifetime—or longer?

Recorded quality is generally excellent and the sound produced via a good main amplifier and pair of full-range speakers leaves nothing to be desired. EP pops are invariably played on small, inadequate record players

with the stylus ploughing out the grooves on the first time round. All too often the discs themselves are blamed for the inevitably nasty noise that results, but in fact the crime is usually committed by the owner himself.

Whether one uses tape or disc a good amplifier/loudspeaker system is essential. But if one then uses tape instead of disc at least the owner has the certain knowledge that he is not destroying his programme source as he plays it. It's one of those obvious facts of life that are so obvious they escape the notice of a great many people. I know we have to pay more for tape, but I'm afraid it's a case of the more expensive being the cheapest in the long run.

So to come to this particular album. Esther and Abi made an enormous impact—due as much to their charming personalities as to their vocal ability. But their voices provide such a pleasant blend of easy sound that we could none of us help falling in love with them. Listening to these four numbers, *Morning of my Life*, *Lonesome Road*, *Cinderella Rockefeller* and *Garden of my Home* one is again reminded of the contrast between their melodic exuberance and the more harsh, raucous sound that is now declining in popularity. They don't just sing—they enjoy singing and it's infectious. So having been infected I can do no more than thoroughly recommend it as a fine example of the EP Musicassette.

CABARET. Frankie Vaughan. Philips MCP 1014. 19s. 9d. including purchase tax.

I wonder why Frankie Vaughan always sounds faintly breathless? Whatever the reason he breathlessly makes his way here through: *Cabaret*, *Someone Must have Hurt You a Lot*, *Hello Dolly* and *I Gotta Have You*.

Of these numbers *Hello Dolly* stands head and shoulders above the others, both in composition and performance. It suits the Vaughan voice precisely—fits him like a well-made glove, in fact. Which, after all, is the formula for a top hit. By comparison I found the rest of the album to be lacking in appeal. Not that there's anything wrong with the recording—it's just that the repertoire could have been more imaginative. A pity, really, because he deserves better treatment.

By the way, I should make it clear that these EP Musicassettes are, of course, "stereo compatible" like the standard ones. In other words they will reproduce mono on a mono player but will also give true stereo when reproduced on a stereo machine with a pair of speakers.

I don't think this one is really for me, but only because three of the numbers do not have sufficient interest. Others may not agree.

THERE BUT FOR FORTUNE. Joan Baez. Fontana MCF 5013. 19s. 9d. including purchase tax.

The one and only Joan Baez gives us on this EP: *Don't Think Twice It's All Right*, *Plaisir D'Amour*, *There But For Fortune* and *Silver Dagger*. This list of titles underlines an important fact about these Musicassettes; EP discs usually offer two top hits on one side coupled with two second-raters on the other, whereas the intention with cassette is to give four hit tunes in every album. This certainly helps to make up for the 6s. 10d. price differential.

Whatever one might think of the more flamboyant Baez the vocalist lacks nothing. Haunting and tender, she has a quality that represents—for me at least—all that is best in the folk/protest idiom. And personally I would rather have a single song than a thousand bricks through diplomats' windows.

There could be many reasons for buying this collection, but the one that would influence me most is the simplest in the world—I like it very much indeed. Sound quality could hardly be improved and the performance need not be questioned. Amongst all the other things that Baez might or might not be she is thoroughly professional in every way. Well worth the money, this is an album I would hate to be without.

SONGS OF GRIEF AND GLORY. Robin Hall and Jimmie Macgregor. Fontana MCF 5012. 19s. 9d. including purchase tax.

With boistrous good humour Robin and Jimmie make their rollicking way through: *Back Buchanan Street*, *There must be something wonderful about Fighting*, *Folk Nativity*, *Irony Road* and *The Folk Singer*. Five for the price of four.

One gets rather tired of repeating the tedious phrase, "recorded quality is excellent," but again there is no fault to find in this EP except, perhaps, a rather noisy run-in at the very beginning. But after that all is thundering good fun in the traditional manner, even when the theme is sacred as in *Folk Nativity* and (partly) *Irony Road*. *The Folk Singer* is my favourite in this collection, and they really do put it over with a verve and sardonic humour that does one good to hear. It's a gem of an "anti-protest," that one. The coupling here offer an unusual collection that will appeal to all the duo's fans, and that must mean pretty nearly everyone.

THE LEGEND OF XANADU. Dave Dee, Dozy, Beaky, Mick and Tich. Fontana MCF 5011. 19s. 9d. including purchase tax.

With whips lashing and pistols cracking one should definitely turn all levels down to avoid getting hurt by the first number, the title-piece, *The Legend of Xanadu*. This is followed, more peacefully, by *Please* on side one and then *Over and Over Again* and *Nose for Trouble* on side two.

This album chiefly impresses me for the high level of its recording, which has been achieved without sacrificing quality. On the other hand obtrusive technical gimmickry in *Please* is very tiresome.

Not a collection that I would buy myself, but all the items are well known and if this is your kind of poison then you will surely enjoy it. Personally I prefer a more delicate flavouring to my cyanide!

CROSS

TALK

By Audios

ONE topic that was on all the manufacturers' lips as I walked around the trade Radio Show was the uncertainty of the effect of purchase tax changes, particularly in relation to tape recorders. Although this iniquitous tax was imposed as long ago as mid-March it is still too early to assess the effect it will have on the trade in general. Owing to deliberate high level encouragement from the government we endured what the newspapers were pleased to call a "spending spree" during the first two and a half months of the year. The public were warned of heavy taxation increases about to be announced in what was then the forthcoming budget, and so everyone with both a little commonsense and a little money hurried to make their purchases.

Inevitably the result was a boom, particularly in tape recorders and hi-fi equipment. Retailers could sell all the goods they could get hold of and manufacturers were working overtime in their rush to supply. This state of affairs continued even after the budget in the scramble to purchase goods that were still tax free.

But now we have come to the summer, which is traditionally a slack time in the audio world. The combination of purchase tax and summer holidays, in conjunction with the aftermath of the spending spree, have contrived to achieve a mild recession in retail sales. The question the businessmen are asking is whether the present level of sales is permanent or whether trade will pick up again during the coming winter?

I don't know if I have better eyesight or if my crystal ball is more accurately tuned to the correct wavelength, but it seems to me that the answer is obvious. Tape recorders are now part of the pattern of modern living and it will take a great deal more than governmental ineptitude to extinguish the market. In fact I would stick out my neck and forecast not decline but a progressive rate of expansion, although at a somewhat slower pace than we visualised before that catastrophic budget. The reasons are simple. Not only is the industry continuously developing and producing better and more versatile products but at the same time ever-increasing numbers of people are acquiring good quality sound reproducing equipment of which the tape recorder will

always be an integral part. A more fruitful line of speculation would be to conjecture what changes, if any, will take place in buying habits within the existing market. Will the consumer tend to favour the lower cost equipment because of the increased prices of top quality machines? Strangely, all my investigations so far indicate the contrary to be the case. Displaying a wisdom with which they are rarely credited the public are veering towards the upper end of the price bracket because they reason, quite rightly, that it is far better to invest £100 or so in a really fine piece of equipment rather than possibly waste £30 on something inferior. Yet another side effect of these tax changes is the inescapable fact that in this perversely twisted society of ours an aura of respectability is often associated with the words "purchase tax" when they are applied to a product in a retail shop. Strange though it may sound we have come to equate the fact that all the really good things in life are taxed with the corollary that if the thing is not taxed it's probably not worth buying. Which to my simple mind represents the ultimate confusion of muddled thinking.

* * *

HAVE you ever thought about taking a course in tape recording or sound reproduction? This is the time to find out just what is available in your own area. Most Evening Institute classes begin in mid-September and I would strongly advise would-be students to make inquiries before that date.

I have details of a course run by the London Borough of Hounslow Education Committee held at Brentford and entitled "High Fidelity and Tape Recording." The syllabus states that the course is designed to give an insight into the technique of high fidelity, tape reproduction and recording and to get the best out of existing apparatus and machines including notes on construction and maintenance. Programming and special applications, both stereo and mono, will be dealt with as well as sound on tape or film for cine work. The fee is 35s. and the address for letters is:—

The Organiser of Adult Education, Hounslow Manor School, Holloway Street, Hounslow.

Another class of which I have personal knowledge is that held at the Mayfield Secondary School, Wandsworth, S.W.18 under the title "Tape Recording Techniques." One of the features of this particular course is the very informal and friendly spirit—more like a club. In fact some of the students have been attending for several years and the present instructor, Mr. Peter Bowden, is himself a "graduate" of the class. Inquiries should be addressed to:—

The Principal, Central Wandsworth Institute, Merton Road, London, S.W.18.

* * *

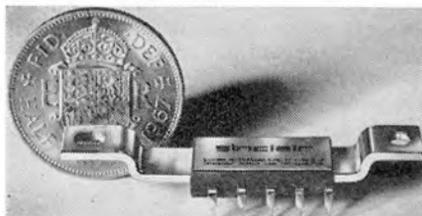
A HOT news item has just arrived on my desk in the form of a press release from one of the major firms in the tape business. It tells an exciting story of a brilliant new idea from the States. You will be thrilled when I tell you about it. Over there, so I'm told, people have actually begun to send voice recordings instead of letters! Well, well! Whatever will they think of next?

NEW PRODUCTS

IT'S AN AMPLIFIER!

DESCRIBED as "the world's first monolithic integrated circuit high fidelity amplifier and pre-amp" Sinclair announce the introduction of their IC 10.

The circuit is a specially processed silicon chip 120th of an inch square by 0.001 in. thick. It contains thirteen transistors, three diodes and eighteen resistors. Said to be a true high fidelity amplifier possessing distinct advantages over conventional types it is claimed that battery operation is perfectly satisfactory due to freedom from thermal run away and very low distortion level. As an audio amplifier the IC 10 requires only the addition of the usual tone and volume controls.



Specification includes a claimed 10 watts peak, 5 watts RMS output with frequency response 5 to 100 kHz plus or minus 1 dB with total harmonic distortion less than 1 per cent at full output. Supply voltage is 8 to 18 volts, sensitivity 5 mV with input impedance adjustable externally up to 2.5 megohms. Size is 1 in. x 0.4 in. x 0.2 in. and the price including instruction manual 59s. 6d.

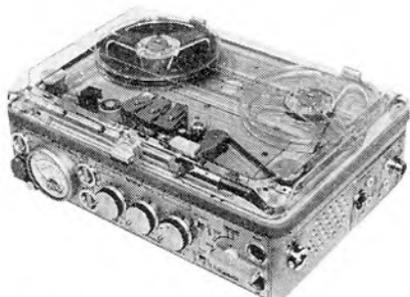
Sinclair Radionics Limited, 22 Newmarket Road, Cambridge.

NAGRA IV

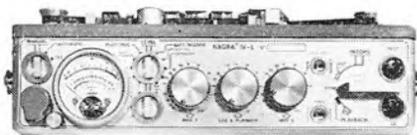
NEW has just been released of the Nagra IV. This new model has many improvements over its predecessors yet is smaller and 1 lb. lighter. The adoption of modular design offers a wide choice of facilities merely by plugging in different printed circuit boards and allows rapid repair by the exchange of modules.

A two microphone input (standard) gives a useful mixing facility.

Improved speed stability results from the capstan being positioned between the bearings instead of overhanging them. The motor, specially designed and manufactured by the Kudelski Company, is servo speed stabilised. Self-checking features prevent damage to the



recorder in the event of an accidental short circuit or overload.



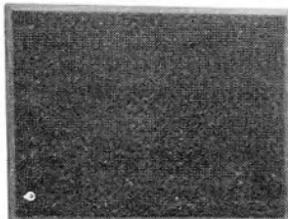
A level switch on the front panel allows manual or automatic level control of both microphone channels or automatic level control of channel 1 and manual control of channel 2. The major innovation of the circuit is that the control voltage is derived by two independent means. The first which has an ultra rapid response time is designed to attenuate transients over the normal level of the signal. The second operates after the signal has lasted for a short time and so is no longer treated as transient but as the signal which it is desired to control. Perhaps even more important the Nagra IV uses a new recording process which reduces the overall distortion by one order of magnitude. This permits the recording level to be increased by 4 dB whilst reducing distortion, for example the Nagra IV produces only 0.8 per cent distortion at + 4 dB at 1 KHz. One result of this feature is a claimed signal-to-noise ratio of 73 dB with Scotch 202 Dynarange tape.

Size is 12½ in. x 8½ in. x 4½ in. and the weight excluding batteries 11 lb. 9 oz. The three speeds are 15, 7½ and 3½ ips and speed stability is quoted as 0.1 per cent. Prices of the new Nagra Model IV are obtainable on application from the distributor:

Hayden Laboratories Limited, Easthouse, Chiltern Avenue, Amersham, Bucks.

SPACE SAVING SPEAKER UNIT

A NEW loudspeaker of unusual design is now announced by the Oakland Trading Company. The P20 unit is claimed to have an excellent response curve within a frequency range of from 40-20,000 Hertz but even complete in a solid teak waterproof cabinet is only 2½ in. deep.



Sensitivity rating is 85 dB/M for 1 watt and the power handling capability is given as 20 watts peak or 10 watts RMS.

Measuring 18 in. high x 14 in. wide the P20 offers an unusual and space saving solution for those considering new speaker equipment at modest prices. The cost of the P20 is approximately 12 guineas.

The Oakland Trading Company, 68 Lupus Street, London, S.W.1

TELEFUNKEN LATEST MODELS

MODERN styling and outstanding quality performance are claimed for the Telefunken M250 half-track stereo tape recorder. Fitted with separate record and playback heads before and after record monitoring is available together with echo and reverberation effects. Both channels are individually and separately controlled so that if required two different programmes can be run at the same time in different rooms.

An unusual feature are the two Vernier slide controls for record gain and also the inclusion of two pre-set level controls for special effects. Frequency response is to DIN 45500 giving 40-18,000 Hertz at 7½ ips and 40-15,000 Hertz at 3½ ips. Signal-to-noise ratio is given as 54 dB at both speeds.



The front and back of the M250 cabinet are finished in wood veneers but in addition the manufacturers offer as extras coloured metal facings to fit over the front and back of the equipment. These are available in red, white and green and will enable the owner to "personalise" the machine to suit individual taste or decor.

Dimensions are 18½ in. x 12½ in. x 4½ in., the weight is 26 lb. and price is 150 guineas.



A new version of the Magnetophon 204 designated 204 TS is now available. Following popular demand the input and output socket panel has been removed from the front deck plate to the rear so that connecting cables may remain invisible. This four-track mono and stereo machine offers three speeds, 7½, 3½ and 1½ ips with a frequency response claimed to conform to DIN 45511 standards having a lower limit of 40 Hertz with an upper figure of 18,000 Hertz at 7½ ips, 15,000 Hertz at 3½ ips and 8,000 Hertz at 1½ ips. Signal-to-noise is given as 50 dB at 7½ ips and 48 dB at 3½ ips and wow and flutter 0.15 per cent at the former speed and 0.25 per cent at the latter.

Dimensions are 19½ in. x 13½ in. x 7½ in., the weight is approximately 28 lb and the cost £136 12s. 5d.

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TK140 DE-LUXE 4/track

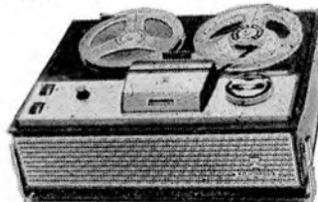
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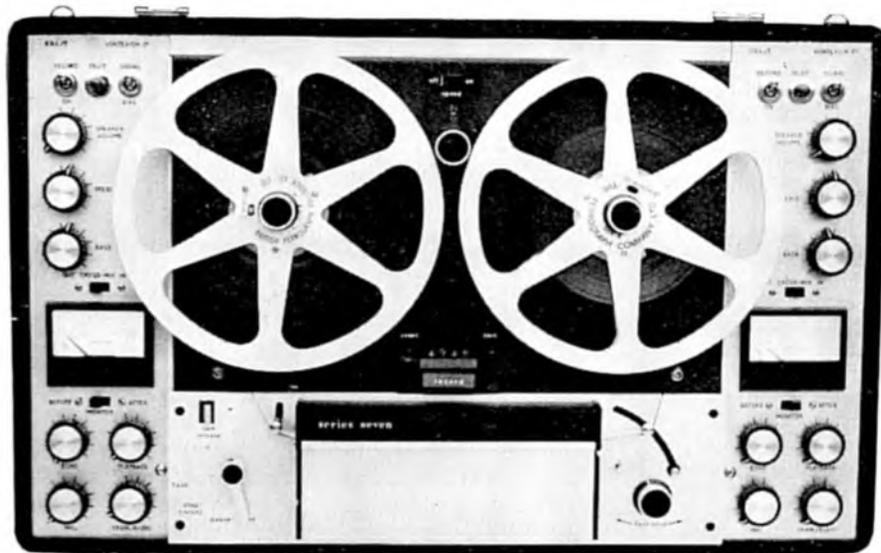
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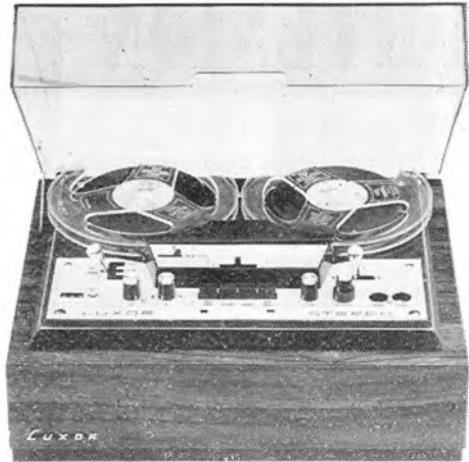
MP613 MALAR

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- Sound-on-sound and sound-with-sound capabilities
- Stereo record, stereo playback, mono record and playback on either channel
- 18 transistor circuit for cool, instant and dependable operation
- Moving coil record level indicator
- Digital counter with thumb-wheel zero reset
- Stereo microphone and auxiliary inputs and controls, speaker headphones and external amplifier outputs . . . front panel mounted for easy access
- Push-button controls for operational modes
- Built-in stereo power amplifier giving 4 watts rms per channel
- Two high efficiency 8" in. by 5" in. speakers
- Operates on 230V ac supply.



The New Heathkit Stereo Tape Recorder has built-in audio amplifiers and speakers giving you complete recording and playback facilities in one compact cabinet that's easy to carry from room to room or house to house. The kit is complete with a good quality moving coil mono microphone, $5\frac{3}{4}$ " spool of long play (1,200 feet) magnetic tape and one spare spool. Cabinet finished in Black Rexine with Grey panel.

Versatile Recording Facilities. The Heathkit Recorder can record "live" from microphones or from auxiliary sources such as radio tuners, records, etc., and playback . . . in $\frac{1}{2}$ track stereo or mono at either $7\frac{1}{2}$, $3\frac{3}{4}$ or $1\frac{1}{8}$ ips. And you can make sound-on-sound recordings by playing back through one channel and recording through the other channel . . . stereo record and playback . . . mono record and playback on either channel.

Other Features. Two audio amplifiers produce 4 watts rms per channel into two high efficiency 8" x 5" speakers giving high quality sound in a portable instrument. Gives startling realism to stereo reproduction . . . jacks are provided for connecting to external speakers if required. Moving coil level indicator for visual monitoring of recorded signal level. Separate inputs and controls for microphones and auxiliaries, separate outputs for speakers/headphones and external amplifiers . . . all front-panel mounted for easy access. Ganged controls for easy operation.

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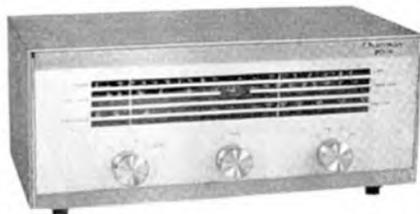
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- Stereo record, stereo playback, mono record and playback on either channel
- 18 transistor circuit for cool, instant and dependable operation
- Moving coil record level indicator
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- Stereo microphone and auxiliary inputs and controls, speaker headphone and external amplifier outputs . . . front panel mounted for easy access
- Push-button controls for operational modes
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Other Features. Two audio amplifiers produce 4 watts rms per channel into two high efficiency 8" x 5" speakers giving high quality sound in a portable instrument. Gives startling realism to stereo reproduction . . . jacks are provided for connecting to external speakers if required. Moving coil level indicator for visual monitoring of recorded signal level. Separate inputs and controls for microphones and auxiliaries, separate outputs for speakers/headphones and external amplifiers . . . all front-panel mounted for easy access. Ganged controls for easy operation.

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record of it had probably never been made. It was held in the sparsely lit courtyard of a temple where several hundred members of this sect were gathered round the area reserved for the dancing and their magnificent robes and masks. I kept carefully because the songs were rather unsatisfactory, suppressed to some extent by the instrumental accompaniment (the had rendered in front of me recording)

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The Proprietors of British Patent No. 958622 for "DEVICES FOR STABILIZING A CONTACT BETWEEN A MAGNETIC HEAD AND A MAGNETIC TAPE," desire to enter into negotiations with a firm or firms for the sale of the Patent, or for the grant of Licences thereunder. Further particulars may be obtained from Marks & Clerk, 57-58, Lincoln's Inn Fields, London, W.C.2.

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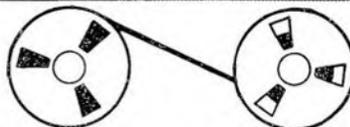
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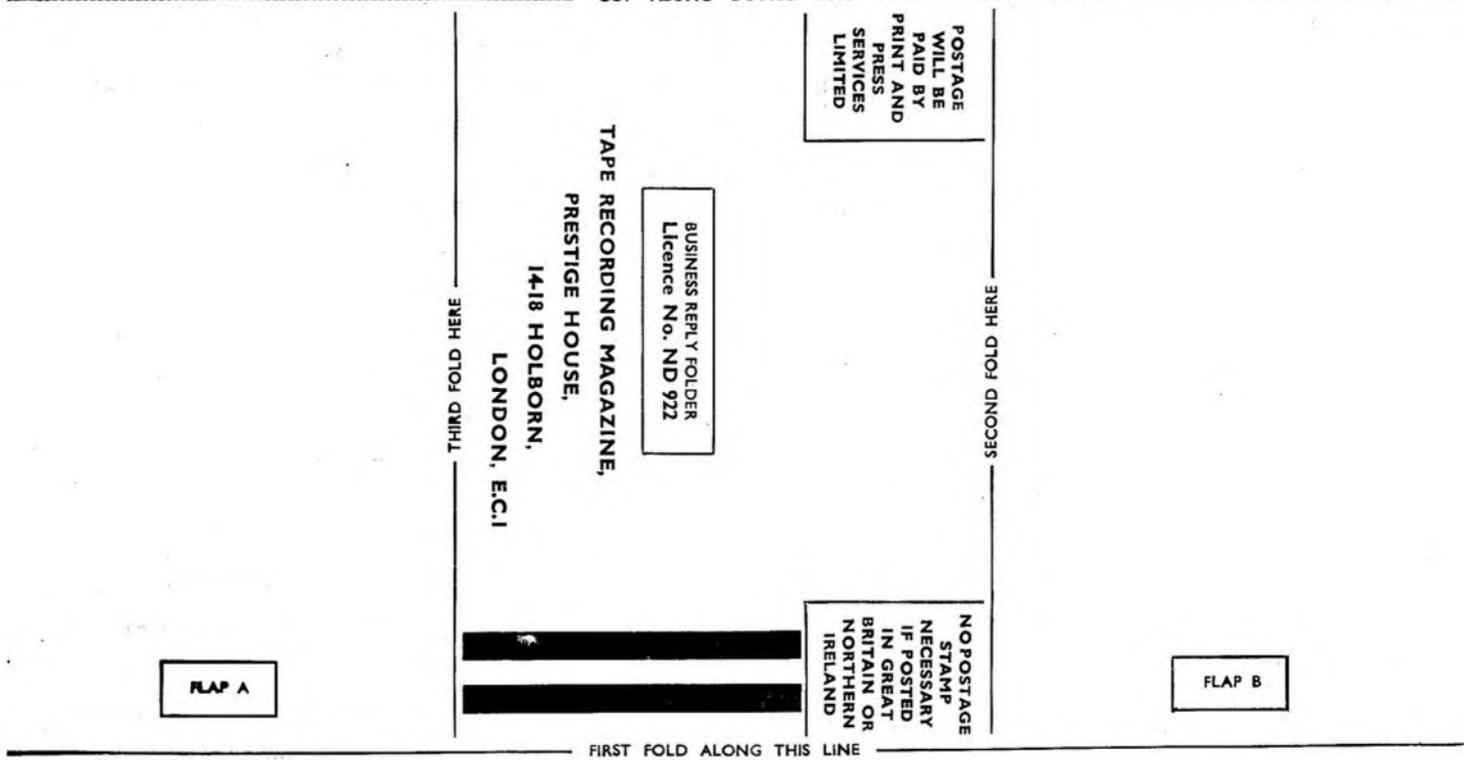
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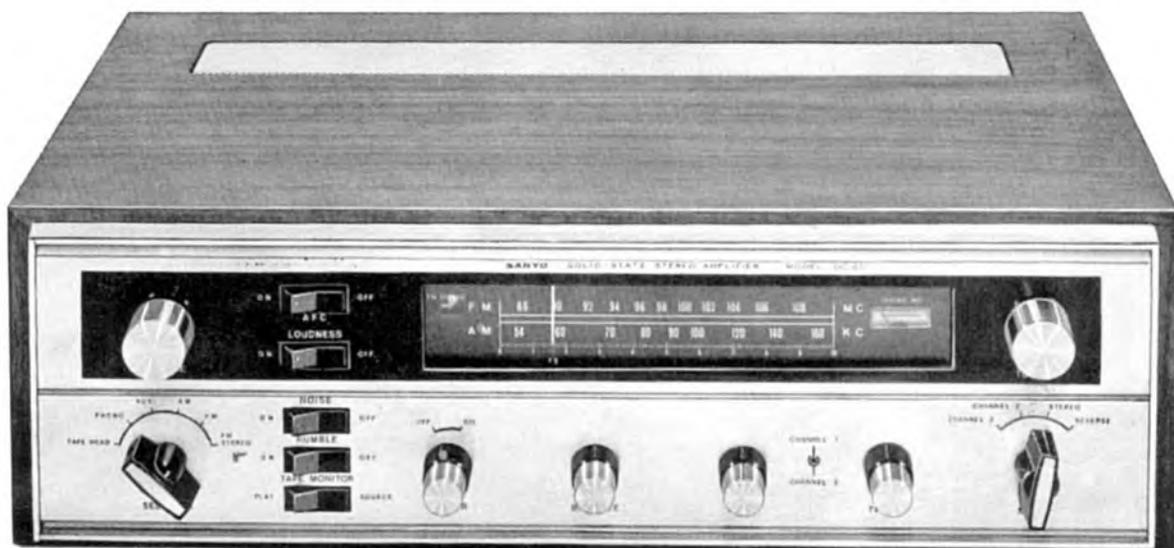
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