

SEPTEMBER 1968

2¹/₂

TAPE

RECORDING MAGAZINE



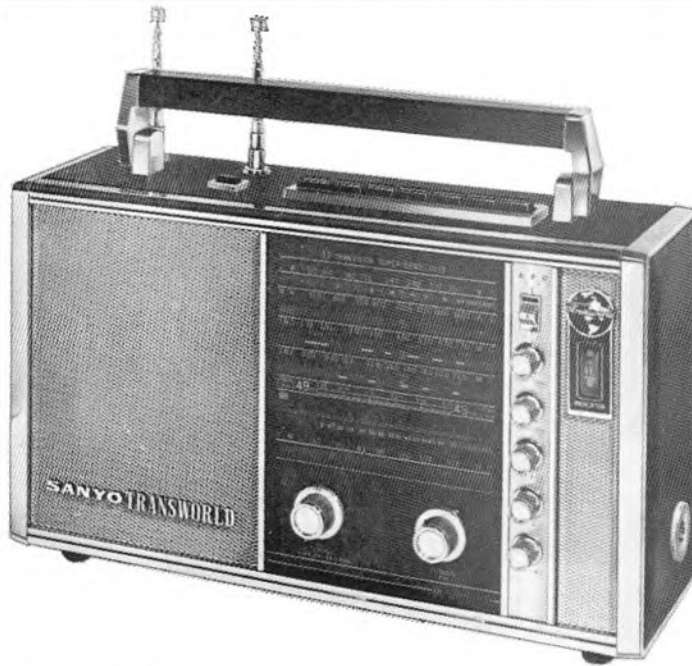
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Sanyo 17H-815

A really magnificent radio—it's got everything! Full range, 2 short waves, medium wave, long wave, FM. Fitted sockets for record player, tape recorder and car aerial. Mains or battery powered. 17 transistors, 7 diodes. Speaker 5" x 7" oval. Power output undistorted 2,000 mW, max. 3,000 mW. Batteries 6 x U2. Dial lights. Battery saver switch. Earphone ext. speaker, multiplex sockets. Mains adapter available as extra. Ferrite rod cut out button for car use.

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Even if you've a roomful of fixed hi-fi in your home, you'll still be impressed with the performance of these special SANYO portable radios and tape recorders. Everything about them is designed to give the highest possible

performance within a reasonable compass of size and price.

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The missing Link

that puts stereo tape into your Hi-Fi system!

This superb tape unit completes *your* system. You already have a power amplifier and a pair of speakers! Now add the Akai 3000D. The Akai 3000D has: ● three heads — erase, record and playback ● frequency response 30 to 22,000 Hz ± 3 db at $7\frac{1}{2}$ ips. ● Signal to noise ratio: better than 50 db. ● first class tape transport. ● two speeds $3\frac{3}{4}$ and $7\frac{1}{2}$ ips. ● Headphone monitoring (or listening) when the unit is used away from your system. Everything you've ever wanted—ever needed in a stereo tape unit for 85 gns.

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Please send me details of the 3000D.

NAME

ADDRESS

Ferguson make 'more for



Model 3232

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

This sophisticated 3-speed 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.

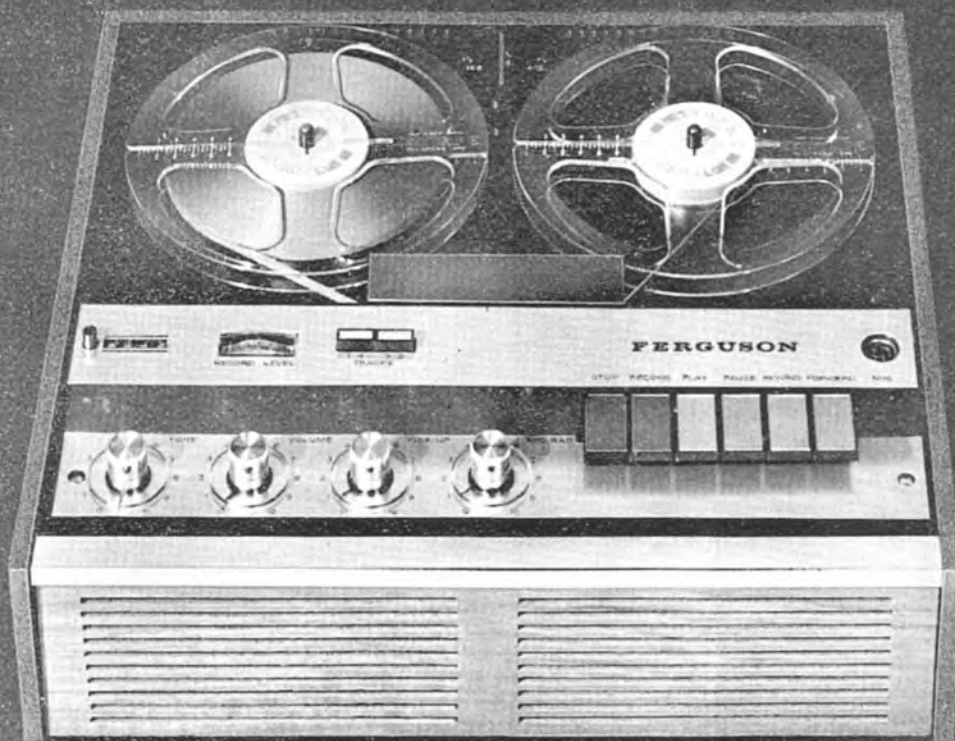
Model 3232 – **£91.13s.**

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

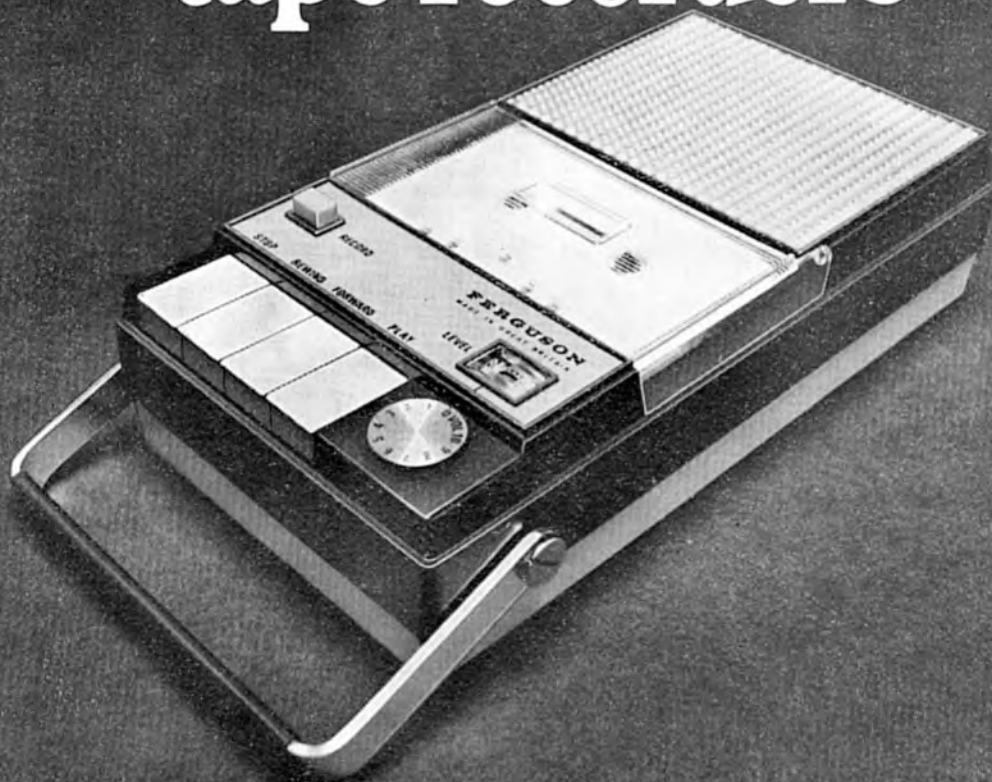
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THORN British Radio Corporation is a member of The Thorn Group

T.25

Fine! It's a FERGUSON

Ferguson make 'more for your money' tape recorders



LOOK! a superb compact Ferguson Cassette Recorder

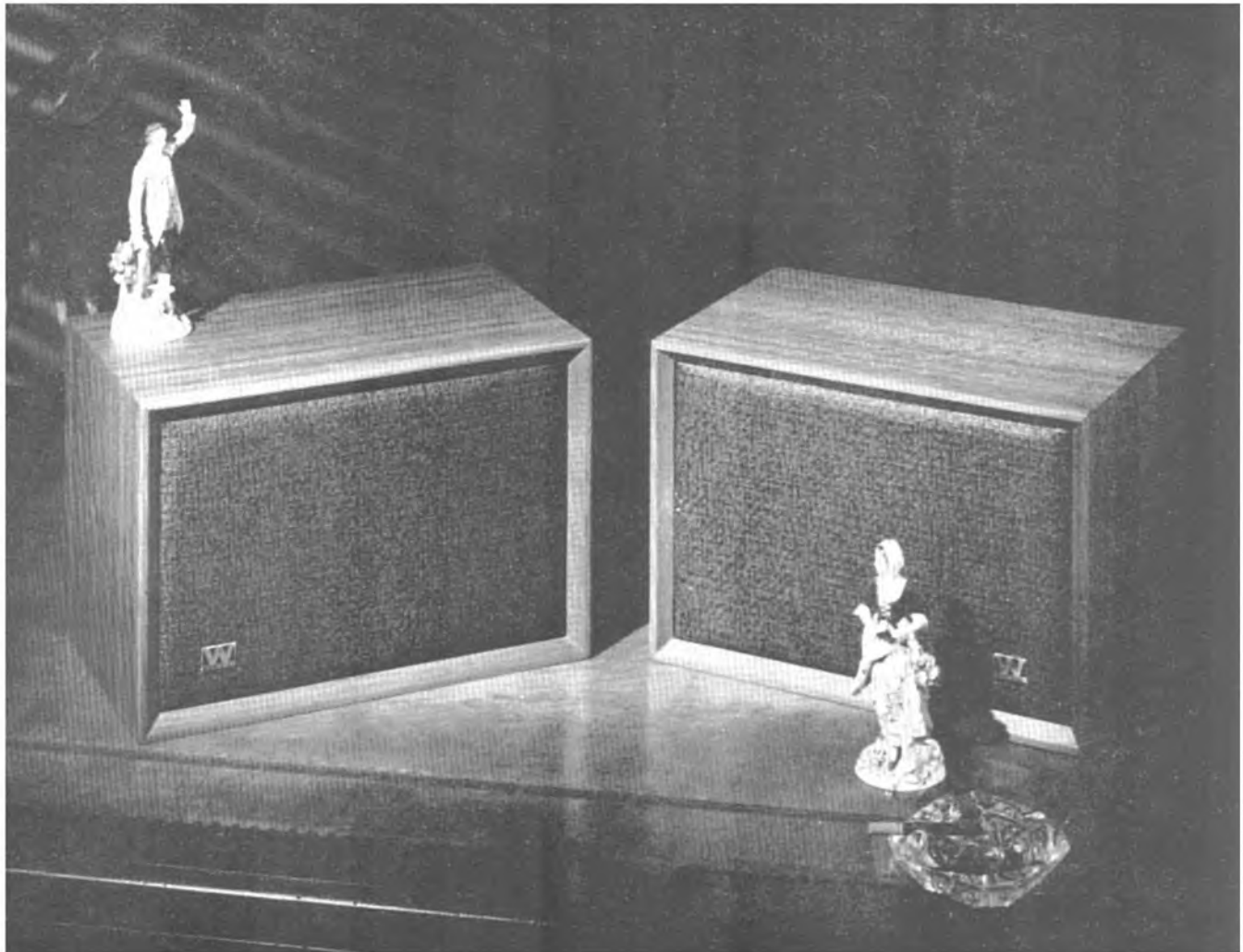
This Ferguson Cassette Recorder is the enthusiasts sketch-book and enables you to pick up material for transfer later to the tapes in your library. It is housed in a cabinet moulded from high impact material in black, contrasted with light grey and has a silver coloured metal grille. This machine is battery powered utilising the new instant loading 'Compact Cassette'. It may also be used to reproduce 'Musicassettes' 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 $8\frac{7}{8}$ " , width 5" , depth $2\frac{3}{8}$ " and it weighs only $3\frac{3}{4}$ 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.

Fine! It's a FERGUSON

THORN British Radio Corporation is a Member of The Thorn Group.



High fidelity stereo starts with Wharfedale **DENTONS** at 30gns. per pair.

The new Denton speaker system brings stereo sound within the reach of everyone. Dentons are excellent operating at less than 10 watts from the existing amplifier in your record player or tape recorder. They are superb when driven by a high fidelity amplifier. Each Denton contains 2 Wharfedale speakers in a beautiful cabinet that is small enough to stand on a bookshelf or mantelpiece. Ask your dealer for a demonstration and prove its superior quality.

- The Dentons are sold in matched pairs for stereo.
- The cabinets are hand veneered and rubbed; each pair made from the same tree — perfect matching of both sound and appearance.
- Each cabinet has two speaker units with a carefully designed cross-over network.
- The dimensions are perfect for mounting on a shelf — so the Denton takes up virtually none of your precious room space.
- Size 9 $\frac{3}{4}$ " high x 14" wide x 8 $\frac{3}{4}$ " deep.
- Response: 65 Hz to 17,000 Hz.
- Finish: Oiled Teak or Polished Walnut.



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5½" 900' } Except	28/-	22/6
7" 1,200' } Agfa	35/-	28/-

LONG PLAY	LIST PRICE	OUR PRICE
3" 210'	9/-	7/3
(Not Scotch or Kodak)		
3" 300'	9/6	7/6
(Scotch only)		
3½" 300'	12/-	9/6
(Kodak only)		
4" 450'	14/6	11/8
(Except Kodak)		
4½" 600'	21/-	16/10
(BASF, Agfa only)		
*5" 900'	28/-	22/6
*5½" 1,200'	35/-	28/-
*7" 1,800'	50/-	35/-
8½" 2,400'	72/6	58/-
(BASF, Scotch only)		
10" 3,280'	85/-	68/-
(Agfa only)		
10" 3,600'	95/-	76/-
(BASF only)		
10½" 4,200'	112/-	90/-
(Agfa, BASF only)		

SCOTCH DYNARANGE (L/P)	LIST PRICE	OUR PRICE
5" 900'	32/3	25/10
5½" 1,200'	40/6	32/6
7" 1,800'	57/6	46/-
8½" 2,400'	83/6	66/10

COMPACT CASSETTES	LIST PRICE	OUR PRICE
C.60	17/6	14/-
C.90	25/-	20/-
C.120	33/6	27/-

Grundig Tape available only where marked with asterisk.
Postage and Packing 2/-. ORDERS OVER £3 POST FREE

FERROGRAPH TAPE—20% OFF!

Brand New. Fully guaranteed and in normal manufacturer's pack.	LIST PRICE	ONE	THREE	SIX
BN7 1,200' on 7" reel (Dynarange)	50/-	40/-	117/6	230/-
BN8 1,800' on 8½" reel (Dynarange)	71/-	57/-	168/-	330/-
BL7 1,800' on 7" reel (Dynarange)	70/-	56/-	165/-	324/-
BL8 2,400' on 8½" reel (Dynarange)	90/-	72/-	213/-	420/-

Post and Packing 2/-. ORDERS OVER £3 POST FREE.

ILFORD TAPE NEAR HALF PRICE

A BULK PURCHASE OF PREMIUM GRADE, TOP QUALITY, POLYESTER MAGNETIC TAPE FROM ONE OF THE WORLD'S FOREMOST EXPERTS IN FILM COATING TECHNOLOGY, WITH FULL LEADER, STOP FOIL, POLYTHENE WRAPPING, AND IN ORIGINAL MANUFACTURER'S BOXES. AVAILABLE IN LONG-PLAY BASE ONLY AT THESE BARGAIN PRICES.

	One	Three	Six
900' on 5" reel	List Price 28/-	16/6	48/-
1800' on 7" reel	List Price 50/-	32/6	95/-

Please add 2/- P. & P. ORDERS OVER £3 POST FREE

SENSATIONAL NEW HALF-PRICE OFFER!

A bulk purchase of top quality Recording Tape manufactured by one of the country's leading makers. A polyester based tape with superlife black coating. Polythene wrapped boxed and fully guaranteed. Available while stocks last in one size only.

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	50/-	26/-	72/-	150/-

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TYPE	DESCRIPTION	LIST PRICE	ONE	THREE	SIX
541-9	900' L/P 5" reel	28/-	21/-	61/6	120/-
541-12	1,150' L/P 5½" reel	35/-	28/-	82/6	162/-
541-18	1,800' L/P 7" reel	50/-	32/6	96/-	189/-
551-12	1,200' D/P 5" reel	42/-	35/-	103/6	204/-
551-16	1,650' D/P 5½" reel	56/-	45/-	133/6	264/-
551-24	2,400' D/P 7" reel	72/6	55/-	163/6	324/-

'600' SERIES PROFESSIONAL AUDIO TAPE (MYLAR BASE)

TYPE	DESCRIPTION	LIST PRICE	ONE	THREE	SIX
641-9	900' L/P 5" reel	30/6	23/-	66/6	127/6
641-18	1,800' L/P 7" reel	52/6	39/6	116/-	226/-
651-12	1,200' D/P 5" reel	46/-	34/6	101/-	197/-
651-24	2,400' D/P 7" reel	80/-	60/-	177/-	348/-

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SPECIAL OFFER COMPACT CASSETTES

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Compact Cassettes with 60 mins. playing time. Brand new and packed in normal plastic library box—available at this exceptional price.

NORMALLY 17/6 OUR PRICE 13/-

Standard pattern to fit Philips, Stella, Elizabethan, Dansette, Sanyo, etc.

3 for 38/3 6 for 75/- 12 for 144/-

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BASF TAPE—30% Reduction

A SPECIAL OFFER OF THIS FAMOUS PREMIUM GRADE TAPE Brand new, boxed, with full leader, stop foil and polythene sealed. Multiples of three 4" size can be supplied in the BASF 3 compartment plastic library cassettes at no extra cost.

Type	Description	List Price	One	Three	Six
LGS 26	600' D/P 4" reel	25/-	17/-	49/-	93/-
LGS 26	1200' D/P 5" reel	42/-	29/6	86/-	166/-
LGS 26	1800' D/P 5½" reel	55/-	38/6	112/6	219/-
LGS 26	2400' D/P 7" reel	77/6	49/6	145/6	285/-

Post and Packing 2/-. ORDERS OVER £3 POST FREE.

TRIPLE PLAY TAPE—40% OFF!

A large purchase from TWO world renowned manufacturers enables us to make this unique half-price offer. Brand new, fully guaranteed, premium grade Polyester Base Tape with FULL LEADER and stop foil. In original maker's boxes and polythene wrapped at these EXCEPTIONALLY LOW PRICES.

	List Price	One	Three	Six
450' on 3" reel Gevasonor	22/-	14/-	40/6	78/-
600' on 3" reel Gevasonor	27/6	17/6	51/-	99/-
900' on 4" reel Gevasonor	39/-	24/6	72/-	140/-
2400' on 5½" reel Zonal	90/-	55/6	165/-	324/-

Post and Packing 2/-, ORDERS OVER £3 POST FREE.

20% off all Grundig and Philips equipment.

SEND FOR LISTS OF OTHER TAPE AND HI-FI BARGAINS

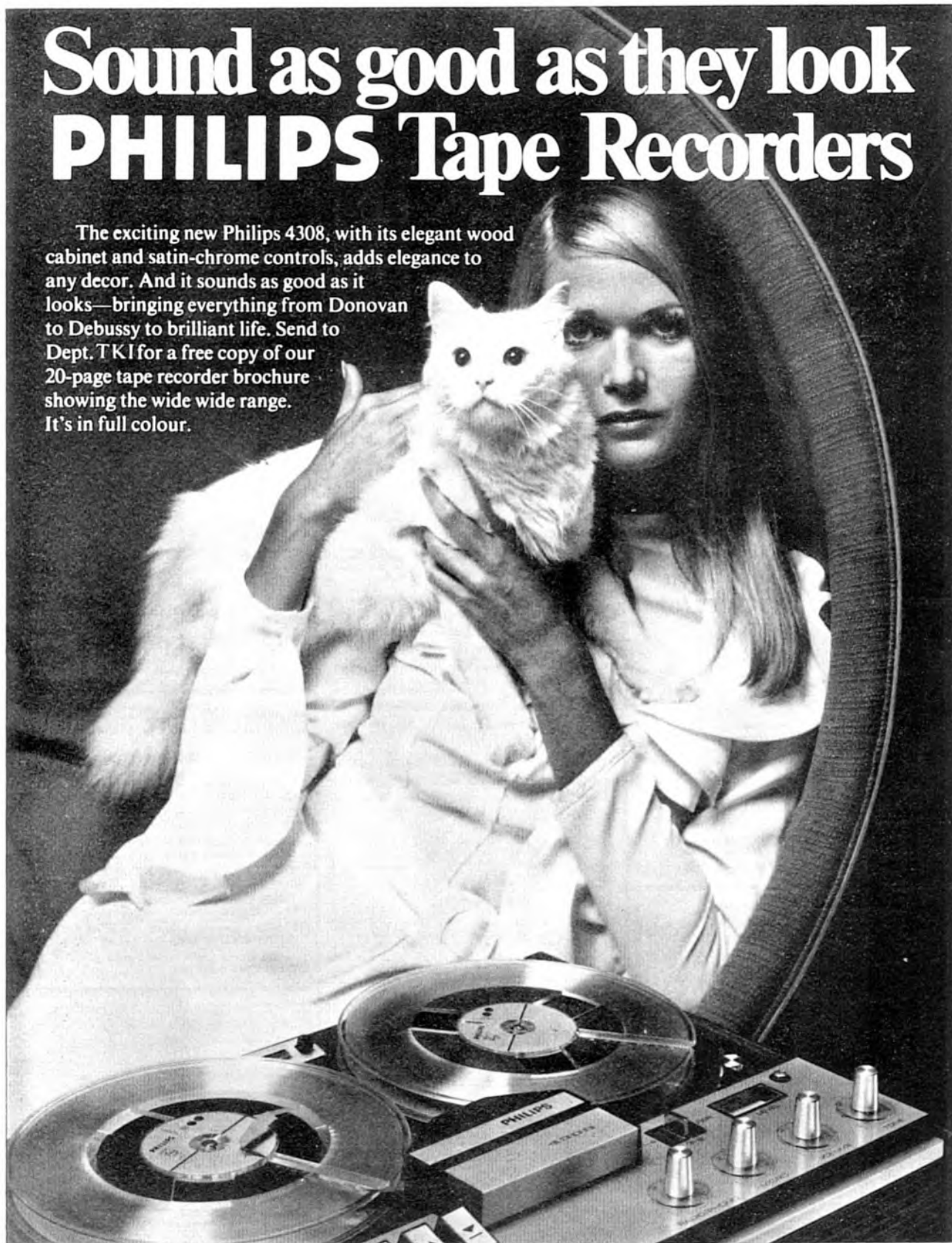
K. J. ENTERPRISES, (Dept. T), 17 THE BRIDGE, WEALDSTONE, MIDDLESEX (OPPOSITE HARROW & WEALDSTONE STATION) 01-427 0395 (CLOSED P.M. SAT.) REFUND GUARANTEE

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The exciting new Philips 4308, with its elegant wood cabinet and satin-chrome controls, adds elegance to any decor. And it sounds as good as it looks—bringing everything from Donovan to Debussy to brilliant life. Send to Dept. TKI for a free copy of our 20-page tape recorder brochure showing the wide wide range. It's in full colour.

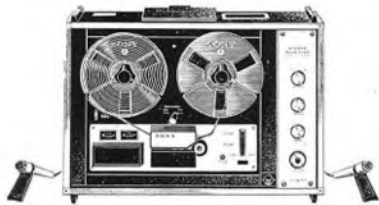


PHILIPS ELECTRICAL LIMITED, CENTURY HOUSE, SHAFTESBURY AVENUE, LONDON, W.C.2.



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

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Akai I710W Stereo Tape Recorder. List price £109.17.3

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Ferrograph 632 Stereo Tape Recorder.

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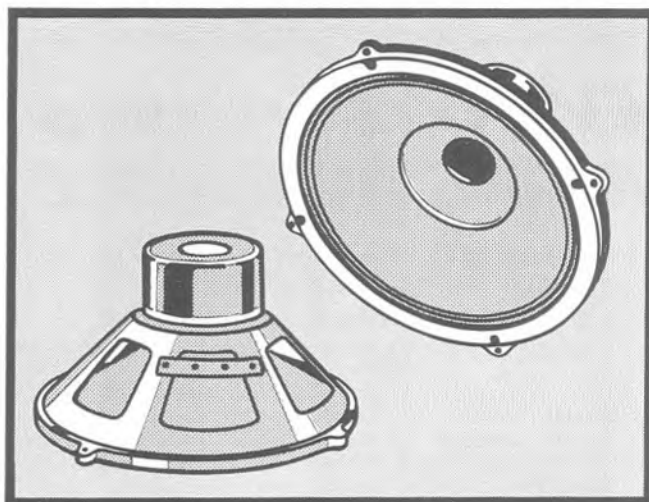
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The Grampian TC12 loudspeaker is a high quality twin cone unit at a reasonable price. The loudspeaker is built of high quality materials to a rigid specification and is eminently suitable for good quality sound reproduction. Let us send you full details or better still go and hear one at your local dealers now.

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



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- CITY** 228, BISHOPSGATE, E.C.2. Tel. 01-247 2609 (Opp. Liverpool St. Stn.—Closed Sat. Open Sun. 10-2.
- 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.6. Tel. 01-624 1656 (Opp. Kilburn Stn.—Half-day Thursday)

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Snap-in sound

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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,

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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.

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Here is a complete music reproduction system which blends the beauty of Danish design with technical excellence and simplicity of use. The Beolab series comprises the Beolab 5000 stereo amplifier, the Beomaster 5000 FM tuner, two specially designed pressure chamber loudspeakers (either Beovox 5000 or 3000), a high frequency sound diffuser (Beovox 2500) and the Beogram 3000 transcription turntable. An individual test certificate is supplied giving the exact

results obtained from both the Beolab 5000 and the Beomaster 5000. *The Beolab System is a world where music attains its purest dimensions.*

Bang & Olufsen also manufacture a range of tape recorders – the semi-professional Beocord 2000 being the natural choice to supplement the Beolab Series.

Bang & Olufsen audio equipment is made for those who consider design and quality first – and remember that your B & O appointed dealer can advise

you of the best way to start a B & O system that will give you pleasure for the years ahead.

Fully descriptive literature is available from your B & O dealer or direct from:

Bang & Olufsen

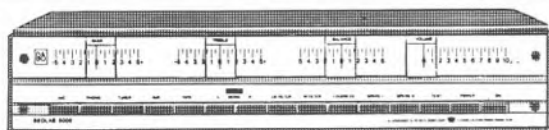
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BEOLAB 5000



BEOMASTER 5000



BEOGRAM 3000



BEOVOX 2500



BEOVOX 5000

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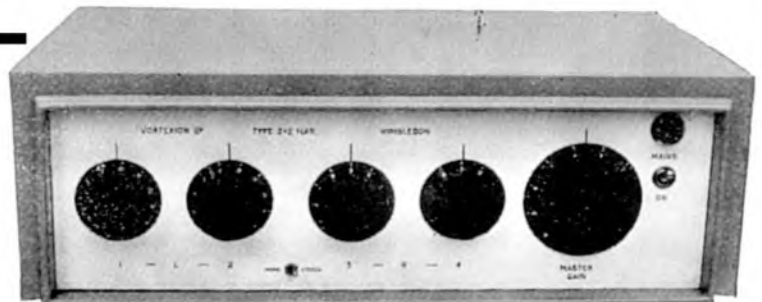
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TAPE RECORDING MAGAZINE

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

Vol. 12 No. 9 September 1968

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COVER PHOTOGRAPH: On our front cover this month we see a versatile modular mixer by Astronic being used with the latest Series 77 Revox recorder. The mixer is based on a wide range of modules for various types of Microphone, Gram and Radio inputs; additional modules provide Master Gain, Monitor LS, VU Meter etc. The modules are selected to suit the user's requirements, fitted into a mounting case and so make up a complete unit. John Borwick discusses mixers and mixing on page 370 of this issue.

Note: Test Bench will return next month after our reviewers return from holiday.

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

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Tape trends and tape talk

By Douglas Brown

LATEST FIGURES from the Ministry of Technology give some cause for apprehension about the future of the British tape recording industry. In the first three months of 1968 it produced £1,100,000 worth of domestic tape recorders, compared with £1,083,000 worth in the same period of 1967—but only £149,000 worth were exported compared with £296,000 worth.

Now look what happened with recorders of foreign manufacture, factored in this country. In the first quarter of 1967 over £835,000 worth were delivered and £1,900 worth exported; in the same period this year £1,402,000 worth were delivered and £3,317 worth exported.

Taking the month of March alone, and comparing it with March 1967, deliveries of British-manufactured domestic recorders dropped 5 per cent (though their value increased by 11 per cent), exports of domestic recorders dropped 56 per cent (and 45 per cent by value), while deliveries of foreign factored machines were 73 per cent higher by number (and 82 per cent by value).

THE NEED for more aggressive selling techniques seems apparent. Cyril Rex Hassan has provided the manufacturers and the retailers (who have a key role) with a new opportunity to campaign. On September 20 he will revive, in Harrogate, the Northern Audio Fair.

"Come over the moors for a weekend of sound" he sloganises, and I've no doubt he will be packing 'em into the Majestic Hotel in Harrogate as successfully as he does at the Hotel Russell in London each Spring.

September, in fact, seems to me a much more appropriate time to stage an audio exhibition. From time to time I have heard discussion about the way in which the London Audio Festival might be developed, with the possibility of moving to a big exhibition hall. There are considerable practical difficulties, but this year's September Fair at Harrogate may provide powerful evidence in favour of a big national Audio Exhibition in the autumn rather than the Spring.

Be that as it may, Harrogate will be well worth a visit. At least four dozen manufacturers will be demonstrating and the exhibition hall will be occupied entirely by retailers' displays—a departure, this, from the London practice.

Trade Day is Friday, September 20, and the Fair will then be open to the general public on Saturday and Sunday. Free tickets are available from *TAPE Recording Magazine* (Dept. A.F., and please send a stamped, addressed envelope), or you should be able to get them from your local audio or photographic dealers.

PLANS have been laid for the 1969 British Amateur Tape Recording Contest. A leaflet and entry form will shortly be ready, obtainable from John Bradley, 33, Fairlawns, Maldon Road, Wallington, Surrey; write for a copy now. In addition to the usual classes for entries,

there will be a "special theme" category for tapes entitled "Home, Sweet Home." And special emphasis on the fact that the merest beginner can hope to produce a fascinating tape on a theme like that!

The organising committee—composed, as last year, of the country's best-known audio journalists—believe that many people hold back from submitting tapes because they think that their work will not be good enough, that the competition is too stiff. This is an entirely mistaken idea. Some of the tapes submitted in the Contest are, indeed, impressive technical achievements. But others that have appeared in past prize lists are extremely simple, so far as the recording part of the exercise is concerned, owing their merit to the quality of the original idea or the success of the competitor in getting good sound material on to tape—usually the result of patience rather than skill!

This year it is hoped that we may tempt a record number of entries from people who have never entered the Contest before. The closing date is not until January 1969. Get the information from John Bradley now and start planning.

I HAVE information about three other contests which may interest readers. The Schoten Tape Recording Club in Belgium is organising at the beginning of November a contest of a kind which, so far as I know, has never been attempted in Britain. Competitors—individuals or groups—will be given the script of a five-minute play, for one female and two male voices, and will have 24 hours to record the play in sound, however and wherever they wish.

Full information can be obtained from Johan van Dam, Akkerlaan 50, Schoten, Belgium, to whom entry forms must be submitted by October 1. The rules are available in English and the text of the play will also be available in English.

The Belgium club is making a real weekend of it. Competitors will be welcomed to Schoten on Friday afternoon, November 1, and briefed at 3 p.m. Their entry tapes must be submitted by 3 p.m. on the following day and will be judged immediately. That afternoon there will be a sightseeing tour of Antwerp, a Town Hall reception and a banquet, and on Sunday, November 3, there will be a "reception and academic meeting" at Agfa-Gavaert and prize distribution.

Accommodation can be provided, if desired, at the Antwerp Youth Hostel.

The second contest is being organised as part of the Thornbury (Gloucestershire) Festival. Wanted: "A tape recording or an item suitable for broadcasting . . . choice of content and treatment left entirely to the competitor." Length: up to 20 minutes. "All entrants will receive a list of advice prepared by the BBC," say the organiser and the BBC will be represented among the judges.

There are two classes—one for the under-19s and the other for we older veterans. Full information is available from P. J. Holland, 12, Blakes Road, Thornbury, Bristol.

And lastly there is the Wildlife Recording Contest referred to at length by Richard Maroschis in his *Nature Notes* this month. Never has there been more opportunity for the enthusiast.

THE USES OF TAPE are legion. Did you notice the recent advertisement in the financial pages: "Fully comprehensive commentary upon the 1967 Companies Act on 3½ ips Tape . . . aimed at busy people . . . in 45 minutes playing time the Act is explained as simply as is possible."

AN APPEAL from West Germany. Thomas Böhme, of 5800 Hagen-Wehringhausen, Pelmkestr. 73, West Germany, is a member of a tape recording club known as "Westfalenstudio 2." The Club wants to make contacts with English enthusiasts willing to correspond either in German or English. Mr. Böhme will be visiting London for a week in September.

IF ever a man had stars in his eyes it must be Ted. With his head perpetually in the clouds Ted spends most of his time with the planets, the stars and other heavenly bodies that move so majestically across our night skies. Just in case you should be imagining that Ted wastes the whole of his working life in one long perpetual daydream let me hasten to explain that he is the engineer in charge of sound reproduction at the London Planetarium.

Just over ten years ago the great dome of the Planetarium rose on the site of the old bomb damaged Madame Tussaud's cinema. Within this building can be seen a man-made version of the universe. The audience is seated in a darkened auditorium beneath the great hemispherical dome. On its white painted surface the whole picture of the heavens unfolds. Stars, planets, constellations all in their correct places shine as brightly—or as faintly—as they would do in a clear cloudless sky. Across the magnificent pattern of jewelled splendour the moon and the other planets proceed on their proper courses. The events of many hours are speeded up and revealed in a few minutes. Shooting stars, comets, all the wonder of the night sky is revealed to the audience as they have never seen it before. The display leaves one with a feeling of silent wonder at the grandeur of the universe. It is truly a memorable experience.

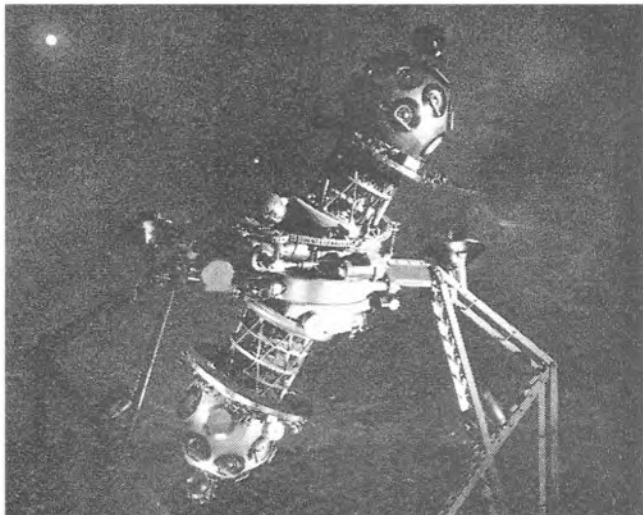
The apparatus that made the Planetarium possible is the fantastic Zeiss Universal Projector. Costing around £100,000 this machine contains about 29,000 individual parts including nearly 200 optical projectors and weighs more than two tons. It projects approximately 8,900 stars, all of them correctly graded according to brightness and spaced amongst themselves according to the corresponding spacing in the actual sky. It is said that the basic astronomical and technical calculations required before the production of the very first projector (1919) required some 600 folio sheets of paper. The instrument in London, the thirty-third to leave the German factory, is a modified version of a design worked out in 1926 and called "Universal" because it is capable of displaying both the northern and the southern hemisphere sky patterns.

But however dramatic the display inside the Planetarium might be—and those who have not seen it can have no idea of its true splendour—it would be valueless without a spoken commentary to guide the visitors' eyes from star to star and to explain at least some of the almost unbelievable facts about the universe in which we live.

No expense was spared in designing, building and equipping the Planetarium.

TALKING ABOUT STARS

A TRM Report



At the heart of the London Planetarium is the fantastic Zeiss Universal Projector. Costing around £100,000 it is made up of a complex mass of mechanical and optical parts

More than 20,000,000 holes in the Planetarium dome allow sound to pass through the inner dome to be captured by special noise absorption material to prevent echoes. These holes are also part of the ventilation system. The beams of light from the Zeiss projector must be invisible, making it essential for the air within the auditorium to be kept free from all impurities so that dust will not scatter the light. Not only is the air filtered to remove all but the most microscopic particles, but it is changed eight times an hour and maintained at a pressure about 2 lbs. greater than that outside the building. With such meticulous attention to detail and accuracy the spoken commentary must obviously be of unimpeachable authority and must be presented in a thoroughly professional and polished manner.

In the early days of the Planetarium all shows were accompanied by "live" lectures delivered by some of the finest astronomers in the country. But with shows being given every hour the strain must have been enormous. Today magnetic tape makes the whole job very much easier.

Commentaries are pre-recorded and they are given either by John Ebdon, the Administrator of the Planetarium, or by Peter Henchie. Their qualification is a rare one indeed. Not only must these gentlemen be technically expert in the highly complex science of astronomy but they must also have a good sense of "theatre" so that their recorded voices have that deceptively relaxed professional polish. The programme we heard was spoken by Peter Henchie who succeeded in this most brilliantly. Sound quality in the auditorium was excellent and the voice had just the right intimate quality to make one feel that the comments were being addressed personally, rather than to the audience as a whole.

All recordings are made on the premises—they have to be in order to synchronise the commentary to the visual image. The equipment used includes an E.M.I. TR50, a Vortexion CBL and AKG D19 microphones. The technique is for the lecturer to first prepare his script. That might sound simple, but in fact it involves condensing a mass of technical data into an interesting ("thrilling"

Please turn to page 379

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Many musical ensembles are easier to balance with separate microphones judiciously placed and their gain controls carefully adjusted. In recording drama too it will usually be impracticable to group all the actors and the sound effects props round a single microphone. Half your rehearsal will be taken up with pushing people back and forth to get the relative loudness and perspective right. It is much better to run out separate microphones for actors and effects operators so that you have some control over the balance while monitoring the mixture.

Another mixing situation arises at sporting events, processions, etc., where you have a commentator's microphone and an atmosphere or effects microphone. You must have separate control of the commentator's level in case he gets excited and starts shouting. Similarly you must be able to keep the atmosphere at a steady level or be able to suppress it when necessary without affecting the commentary.

Types of Mixer

When mixer units can cost anything from £2 to £100 or more, you don't need me to tell you that there is a wide spread in the quality of their performance. Let's consider the available types in increasing order of excellence, using as our criteria the following features of an ideal mixer:

1. The mixer should give *independent* control of each channel: i.e., the signal from one channel should be unaffected by changes in the settings of others.
2. The mixer should introduce no *noise*: i.e. (a) the output signal level at maximum should be the same as the input or higher (to preserve signal-to-noise ratio), (b) the faders themselves should operate quietly, (c) hum pickup should be zero.

Three basic connections of a variable resistor (otherwise known as a fader, potentiometer or "pot.") are possible. These are shown in Fig. 1 and are (a) series, (b) shunt and (c) voltage divider. The series type passes on the full signal when set to the left hand end and progressively reduces the volume as it is tracked to the right. But the maximum attenuation depends on the ratio of R to the load impedance Z , so it is practicable only with low impedance amplifiers. For example, a 1 Megohm fader could only cut the volume in half (a reduction of 6 dB) if connected to a 1 Megohm amplifier but about 70 dB attenuation range would be possible with an amplifier of 300 ohms input impedance.

The shunt fader (Fig. 1b) can be used into a high impedance but may cause loss of treble frequencies with some (inductive) microphones. This leaves the familiar volume control type (Fig. 1c) which we find in radio sets and elsewhere. This presents a more consistent load to the source, being at any setting the resistance of the top portion in series with a parallel combination of the lower portion with the amplifier impedance Z (see Fig. 1d). So-called logarithmic or

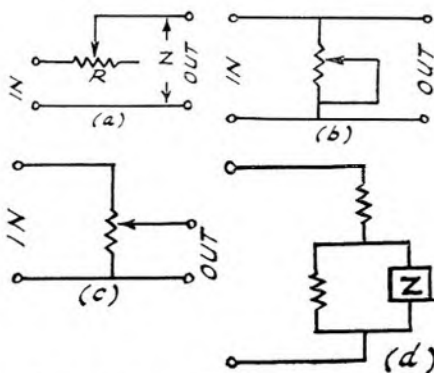


Fig. 1. Three simple circuit faders, (a) series, (b) shunt, (c) voltage divider, (d) effective circuit of voltage divider

"log" law faders are used for all volume controls, to give more sensitive control at low settings and correspond more closely with the ear's estimate of changes in loudness. The logarithmic and linear laws for resistance with percentage rotation of the fader are compared in Fig. 2.

The simplest possible fader mixer unit would consist of two such fader controls wired together as in Fig. 3a. In fact this arrangement is not very good. Each fader "sees" the load Z in parallel with the variable output of the other. If either channel is faded right down, an effective short circuit is applied to *both* channels and indeed any change in the setting of either fader affects the signal level from the other. This hopelessly goes against the first of our requirements—for independent control.

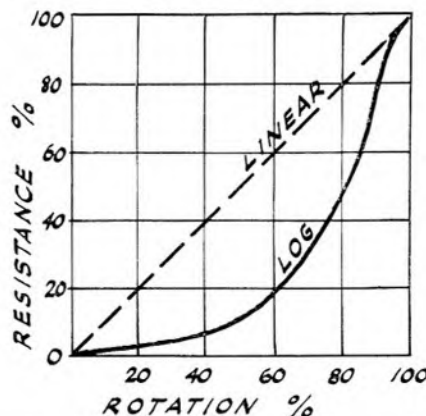


Fig. 2. Comparison between linear and logarithmic faders

The standard method of reducing this interaction is to insert fixed resistors in the variable arm as shown in Fig. 3b. These "padding out" resistors give a useful reduction in inter-channel effects but of course they introduce a fixed loss overall. Where the fixed resistors roughly equal the source impedance of the microphones and the faders, this insertion loss is about 6, 9.5 and 12 dB for 2, 3 and 4 channels respectively. This loss can easily be made up by increasing the amplifier gain or building an ampli-

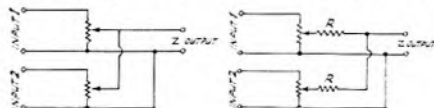


Fig. 3. Left, simple two-channel mixer with, right, addition of padding-out resistors R to avoid short-circuits and reduce interaction

HOME STUDIO

John Borwick discusses important aspects of

MIXERS AND MIXING

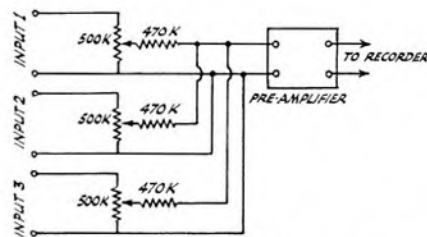


Fig. 4. Practical three-channel mixer for high impedance inputs with addition of pre-amplifier to restore insertion loss due to 470K padding-out resistors

fier into the mixer as in Fig. 4 (which is then identical to the circuit shown by F. C. Judd in his article in the June 1968 issue).

But the signal-to-noise ratio will have been impaired, which goes against our criterion No. 2, and more sophisticated mixers have individual pre-amplifiers in each microphone channel so that the actual mixing takes place at "high" level (see Fig. 5).

High level mixers have another big advantage in that fewer dBs of gain follow the faders. Any noise generated by the fader itself is therefore less serious than in the simple resistive mixer where fader noise is subjected to the full amplification of the system. I have said that log law faders must be used and it goes without saying that they should be of good quality. Ordinary carbon track controls have improved in recent years, particularly the close tolerance ones supplied as ganged two-way units for stereo amplifiers, etc. Wire-wound faders are less noisy and more accurate but best of all (and more expensive) are the multi-stud contactor types. These have fixed close tolerance resistors wired between polished studs over which a wiper arm moves in "Make-before-Break" fashion. The values of the resistors are calculated to give a calibrated level change from stud to stud of, say, 1.5 dB and the control knob can be rotary or in-line. A further refinement is to use "constant impedance" faders which simultaneously vary the resistance in series and shunt arms to maintain the same input and output impedance.

Using Mixers

So much for the technical points to watch in choosing a mixer. But the practical points are just as important. The control knobs must be large enough and spaced sufficiently to allow comfortable handling. Series preset resistors in each channel are useful, or at least on-off switches. Make sure that you have allowed for enough inputs and that they match your microphones and other sources. The output impedance is important too: this should match one of the inputs to your recorder or be of the "cathode follower," low impedance type which permits long connecting leads. A metal case is almost essential, to minimise mains hum pick-up, though of course transistorised mixers largely avoid this trouble. A reasonably heavy case is best, mounted on rubber feet so that

MIXERS AND MIXING

John Borwick discusses important aspects of



Fig. 9. A mixing console by Elcom (Northants) Ltd.

it won't "walk away" when you are using it.

Building your own mixer is quite practicable, using the valve and transistor designs available from Mullard or published in the technical press. However, most of the better ready-made mixers can be supplied with inputs to suit individual requirements. A main control is a useful extra, though of course the control on the tape recorder itself fulfills this function. You need to keep one hand on or near an over-riding control like

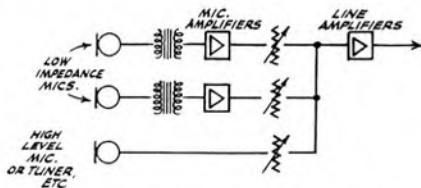


Fig. 5. Circuit for a more ambitious three-channel mixer

this during most types of recording, just as you need to keep one eye on the level meter or magic eye. So I suppose the ideal mixer unit has both the main gain control and level meter built in.

Microphone phasing

We have spoken about interaction between mixer channels, but what about interaction between the microphones themselves? If you are using two microphones many yards apart, then they will have little effect on each other and you will really get the feeling that you can control them independently. But as soon as the microphones are close together, so that the voices or instruments you have set out to pick up on one microphone spill over on to the other, you are in trouble. Instead of controlling hot and cold water on two taps, it is as if you had different degrees of luke-warm water to mix.

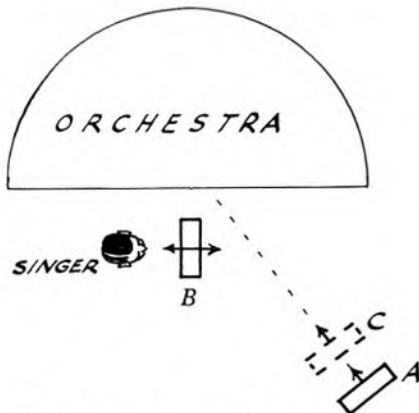


Fig. 6. For the same balance of reverberation on the orchestra, A alone would be used for instrumental items and B plus C for vocals

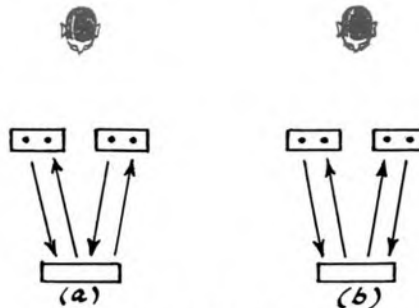


Fig. 7. When two or more microphones are used together phasing becomes as important as with stereo. (a) Shows two microphones correctly wired in the same phase; (b) shows the connections of the right-hand microphone reversed

Let's take as an example the voice with orchestra set-up in Fig. 6. Suppose that the best position for the orchestra microphone on purely instrumental items has been found to be A and that you then mix in a vocal microphone at B. You try to arrange this second microphone so that it picks up as little of the orchestra as possible. (I have indicated a bi-directional microphone edge-wise on to the orchestra). But of course some of the ambient reverberation from the

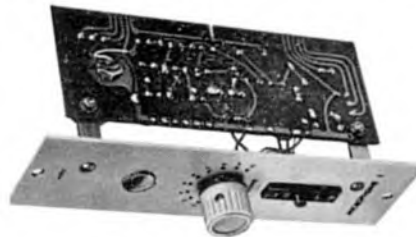


Fig. 8. A typical module from an Astronic mixer

orchestra is bound to come over on the vocal microphone. This will add to the total and you may well find that the thing to do is use microphone A for instrumental items then change to B plus a closer orchestra microphone, as at C, for vocals.

This lack of complete separation between microphone outputs becomes increasingly tricky as you add more microphones—generally for pop music or complicated stage shows—and are forced to place them closer together. Bi-directional and uni-directional (cardioid) microphones help, of course, plus experience and, when all else fails, the erecting of screens or multi-track recording.

One important aspect of microphone interference to be avoided is phasing. Take the simple case illustrated in Fig. 7, where a speaker is equi-distant from two identical microphones. In Fig. 7a the microphones have been connected correctly with the "live" and "return" leads in the same sense so that the signals are additive at the mixer. But it is possible to have the situation shown in Fig. 7b where the phasing of one microphone has been reversed. The signals would then tend to cancel each other out. The cure would be to reverse the leads to one microphone or, in the case of a bi-directional microphone only, turn the microphone through 180°.

In the general case, with the microphones at different distances from the speaker, there would be no risk of complete cancellation but distortion is possible since path length differences at multiples of half a wavelength can still cause interference at certain frequencies. The best rule is to choose the positions and angles (of directional microphones) so that no performer is reproduced by two microphones at anything like the same volume.

Next month I shall turn to the subjects of incidental music and sound effects.

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Who are the artists? What are their methods?
Fred Judd explains in

THE FINE ART OF ELECTRONIC MUSIC



1. Edgar Varese instructing a student in the mysteries of the "new music"

MUSIQUE concrète, once a fashionable musical innovation contrived with specific sounds and tape recording techniques, is no longer so popular with the new music enthusiasts. Originating from France, this particular form of music is usually composed from a single basic sound although some composers resorted to the use of many sounds and experimented with the "noises" produced by conventional musical instruments. For example, the open strings of a piano, when struck, produce a pleasing sound which can be recorded, but from thereon it can be changed in various ways by many of the techniques outlined in my last article. I gave an illustration of the "single sound" technique some time ago in a BBC broadcast, and for this the sound was first recorded and looped. The loop was then reproduced on a variable speed recorder and copied to give a sequence of sounds in "scale" form. From this the sounds were derived for building the entire theme. The various notes required for bass, counterpoint and melody were simply cut from the tape, joined in the appropriate order and mixed. Musique concrète is probably most effective, like some electronic music, for film and play backgrounds but offers interesting exercise for the tape recordist, particularly in splicing. Even a short composition, lasting perhaps only a minute or two, may entail splicing together dozens of pieces of taped and shaped sound.

Specific rules for the composition (?) of musique concrète are non-existent; one has to experiment with various sounds and all the recording and electronic treatment techniques that equipment will allow. You may well ask what kind of sounds are used by those determined to dabble in this musical field. Well the photo (Fig. 1) may provide one suggestion. Here a professional composer of music, Edgar

Varese, is giving instructions for the making of sounds for musique concrète. The sounds? A hammer and screwdriver being tapped on blocks of wood. What happened to the sounds afterwards is anyone's guess, but they were no doubt re-shaped out of all semblance to the original. This in fact is one of the secrets of successful musique concrète. The listener should not be able to recognise the original sound or sounds. Try taking a recording of any everyday sound, such as that made by a train or passing car, or sounds made by ordinary kitchen implements, and by using some of the recording techniques listed in part 2, see if you can make them unrecognisable. It might amuse friends, but it will certainly amuse you and will also demonstrate the dramatic changes in character that can be achieved by very simple methods.

Rhythm Loops

Tape looped sounds are used extensively in electronic music and musique concrète; they offer interesting possibilities in multi-track music-making with conventional musical instruments. Percussive sounds can be looped in two different ways. One can first record a rhythmic sequence of one or two bars and loop this so the rhythm is continuously repeated. Alternatively several bars of rhythm with variations in the sounds and rhythmic patterns could be recorded and then looped for continuous running. The second more difficult method is to record the sounds individually and join these into a loop with pieces of leader tape for the resting period between actual beats. A loop can of course be played in reverse or at twice or half speed and echoed whilst being copied on to a master tape. When this is done the requisite number of bars are counted off and the tape is cut accordingly. Whilst the loop is being copied

other percussive sounds could be added to enhance the basic rhythm.

Movement in sound is quite easy to accomplish with a stereo recorder by "panning." For example, a single sound or series of sounds are recorded mono but are to be given movement. The mono recording is fed simultaneously to both channels of a stereo tape recorder and from thereon it is simply a matter of fading the sound from one channel to the other. For the left hand direction the sound is recorded to full level on that channel. To make the sound move from left to right simply fade down on the left hand channel and fade up on the right. When the two gain controls are at approximately half setting the sound will be recorded at equal level on both channels and consequently appear in a central position when the recording is replayed. A sound can therefore be held to the left or right or at any intermediate position. The "movement" can be produced more accurately if the "off tape" (stereo) signals can be monitored. Fixed spacing, that is some sounds on the right and some on the left, can be produced simply by recording them separately on each channel. A quite interesting effect can be created by taking the sounds off one channel ("off tape") and feeding them at lower level on to the other channel. The result is an echo from another direction.

Tone Shaping

The primary tone sources for electronic music are audio signal generators of one kind or another; for example, the ordinary sine tone generator used by engineers for laboratory and servicing work. More sophisticated forms of generators are "keyboard" systems with multiple tone generators from which music can be played instantly in tempered scale. However, all

Please turn to page 379

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CROSS TALK

By Audios

FOR one whole blissful week yours truly escaped from the world of journalism, tape and microphones to lose himself amongst the fairyland castles of the River Rhine. We were on an extremely low-cost "package" trip and didn't really know what to expect. What we actually got was excellent hotel accommodation, more than enough really good food and a full week in one of the most beautiful places I have visited.

But the main impression with which I am left is not so much of the place as of the people. The Rhinelanders must surely be the most hospitable and friendly people in the world. And if any of my readers should be fortunate enough to make their way down this famous river valley I earnestly suggest that they make a halt at St. Goarshausen. There ask for Gasthaus Fransiska. You will receive the very warmest Rhineland welcome and will be served by the motherly Frau Rössler and her daughter with home-made wine, home-made sausages and home-made bread. And to set the whole roomful of locals linking arms and singing at the top of their voices you only have to put a small coin into the record machine.

This is an ideal location for recording genuine German drinking songs—or it would be if Frau Rössler's white wine were not so potent. A couple of glasses (not much more than 1s. each) and you'll realise there are other things in this world besides tape recording!

The courier attached to our party was a typical tall, blonde, blue-eyed, German goddess. Or so it seemed until she told us she came from Hornchurch and had only been in Germany for a few weeks. Her name is Rosalind and she really was the greatest of sports. The hotel was situated within four or five miles of the famous Lorelei Rock where traditionally a mythological maiden lures sailors to their deaths in the swift flowing currents of the Rhine several hundred feet below. Determined to investigate the truth of this legend we organised a midnight walk complete with coloured candle-lanterns. Arriving on the top of the rock dead on the stroke of twelve o'clock Rosalind sang the Lorelei song but I regret to report that we saw no manifestations of the lady we were looking for.

However, adjacent to the rock is the remains of an ancient Roman amphitheatre. This has now been reconstructed, fitted with a wooden stage and seats and is used as an open-air theatre. So there we stood on the stage at one o'clock in the morning in bright moonlight declaiming Shakespearian verses to the empty circular tiers of seats. It was an experience I shall never forget. The acoustics in that open-air theatre were as near perfect as one could wish for. You could hear your voice go rolling around the amphitheatre with a hard clear resonance such as I have never heard before. What a place for an open-air recording—there surely could be none better.

So if you do visit the Rhineland and you hear rumours of three ghostly figures with glowing red lanterns wandering across the hills at the dead of night don't worry. They weren't supernatural beings, but just Mr. and Mrs. Audios and Rosalind out on the spree.

* * *

THE secretary of the Cardiff and District Tape Recording Club, Mr. A. Mansfield of 94, Moorland Road, Splott, Cardiff, has received a letter from a young lady who is the champion roller skater of Toledo, Ohio, USA. She would like to exchange correspondence tapes with a young man aged from 16 to 18. So if any young gentleman would like to correspond with a champion roller skater in the States would they please drop a note to Mr. Mansfield at the address above.

* * *

PROBLEMS of communication are often solved very ingeniously by adapting magnetic recording methods. The Ford tractor centre at Basildon, Essex had a major problem of this kind. Every month about 800 visitors have to be conducted on tours of the works; unfortunately the noise produced by some 700 production and assembly machines is so great that normal conversation is extremely difficult.

Recently Fords have installed a completely new electronic guided tour system produced and marketed by Fi-Cord International. This uses a number of permanently installed wire loops into which is fed a programme from pre-recorded tapes, a microphone or a radio receiver. This programme is then picked up by an induction receiver in the individual headsets worn by the visitors. As the visitor progresses around the works he hears the descriptive material appropriate to the section he is then in. One side benefit of the system is said to be to discourage stragglers in a party—if individual members stray too far from the main group they will not be close enough to the loop to receive at reasonable volume and so will be unable to hear the commentary.

The idea of conducting tours by means of pre-recorded commentary is by no means new. In the future we are sure to see such methods adapted to many different purposes. Tape certainly makes its impact on modern living.

* * *

IN a violent storm on Tuesday, July 2, a section of the Wharfedale factory was seriously damaged. An accumulation of water rose some seven feet up an outside wall which eventually collapsed into the factory crushing the contents.



Wharfedale works after the great storm

The entire stock of WHF20 amplifiers which was awaiting test was completely destroyed along with a considerable batch of WFM1 stereo FM tuners and GP50 public address amplifiers. Both manufacturing and testing equipment were hurled together with all the assembly benches against the opposite wall. Several employees were hurt, although fortunately none of the injuries was serious.



Ruined amplifiers and tuners awaiting destruction

The automatic coil winding equipment which accounts for about 80 per cent of voice coil manufacture was also damaged. A spokesman has stated that 36 hours after the event it was hoped that they would be able to restart this machinery on test runs. Once the coil winder is in operation production of the various Wharfedale speaker systems will be able to go ahead but Wharfedale Limited regret that deliveries of amplifiers, tuners, crossovers and transformers will be affected for some time. Every effort will be made to ensure that this inevitable delay will be minimised as far as possible and both customers and dealers are asked to bear with them as they do their best to overcome this unexpected catastrophe.

* * *

THE Great Lakes Tape Club, USA, is in trouble. For the past two years they have tried to form an English membership but have not been successful.

They now have a list of fifteen members who want to correspond by tape with English teenagers. Any reader interested is asked to spend a couple of shillings to cover airmail postage to 13346 Sherwood, Huntingdon Woods, Michigan, USA. In reply you will receive the fifteen names and addresses of young Americans anxious to tapespond. And, in addition, your name and address will be published, if you so request, in the Great Lakes Tape Club bulletin. So will all young readers please prove that we are not backward in coming forward by sending their couple of shillings to Bruce Sherman at the address above. They will be assured of a warm welcome.

HOW often do you actually edit tape by cutting? The answer to that question gives a very good guide to the extent of your creative activities in the recording world. People who are content to merely dub music from the radio (and there are plenty of them and there's no reason why they shouldn't limit themselves in that way if it's what they really want) rarely if ever get down to surgery with the razor blade. But as soon as the recordist begins to think and work creatively he finds that simple editing is an indispensable skill.

The basic editing techniques were fully described in an article in this series which appeared in November 1957. This month I want to talk about specific applications as related to more advanced amateur and professional work.

First let's consider one aspect of editing that is often uppermost in the mind of the amateur. Cost. Tape is expensive. Chopping up tape with a razor blade can be as depressing an occupation as mincing up bank notes. This is a point of view with which I fully sympathise. A brand new spool of tape has that indefinable virgin quality of pristine newness which defies violation. This psychological barrier must be broken down, just as one must come to accept the indisputable fact that the *programme* itself is—or should be—worth far more than the mere material on which it is recorded. If you feel diffident about carving up a new tape that represents a cash value of 40 or 50 shillings, how do you imagine the professional feels when he is carving up an original recording of a musical performance which represents an actual outlay in cash of many hundreds of pounds in studio and musician's time? That is what literally happens.

The amateur acquires his programme material without incurring frightening costs of this order. But to get his recording he goes to a great deal of trouble in both organising the event and attending with his equipment. It is this investment of time and energy both on his own part and on the part of the performers as well that endows the programme with greater value than the unrecorded tape. In ninety-nine cases out of a hundred that tape must be cut and spliced to bring together the recorded extracts into their proper uninterrupted programme sequence. To balk at editing simply means that not only the time and energy, but also the new tape as well, will probably have been wasted.

During the entire duration of the recording session (or sessions since the material may be taken down on one or more different occasions) the recordist will always have his editing requirements well in mind. The knowledge that one can cut the tape, discard unwanted or spoil

sections and insert identical replacements from other "takes" to construct a complete and near perfect entity has a significant effect on the way in which the recording is undertaken. Long works can be sub-divided into short sections so as not to overstrain or overtire performers. Each one of these sub-sections can be repeated as many times as is thought necessary to achieve a good performance standard and freedom from break-through of outside noise from traffic or other interference.

When a work is sub-divided in this way the recordist should insist on having a minimum of two takes of each section. You will be surprised how many performance fluffs pass unnoticed at the recording session but are revealed all too prominently at subsequent playback. The first difficulty is one of identification. Every section must be clearly "marked" by a spoken identification announcement that will be recorded on the tape immediately preceding the item itself. Back in the control room one of the assistants must devote all their time to keeping a strict written note of everything being recorded and its location on the various tape spools. The form of the spoken announcement will depend solely on the amount of information required for positive identification. A typical announcement might be: "Fantasy in G Second Movement to Bar 35 take 4." When faced with unusual conditions or complications I have recorded as many as 30 takes of the same short section.

Why is all this trouble necessary? There are very few people who can read a script without making a small fluff here or there; in just the same way even the

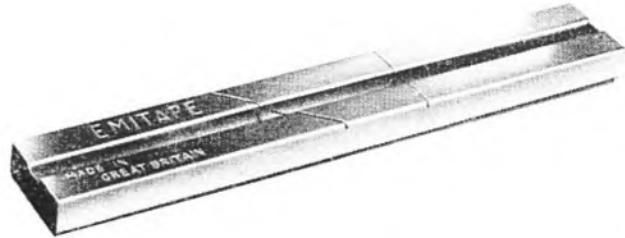
very best of our musicians (and I do mean that literally) are liable to small errors in performance or interpretation. These are the little "humanities" that pass by quite unnoticed at an ordinary performance. As soon as we record that performance we are rendering permanent something that had previously been transient. All the performers' weaknesses and errors take on concrete tangible form; the recording can be played back time and time again and the performance analysed and criticised. It is this certain knowledge that tends to make even professional actors or musicians gib at the microphone. One way to restore their confidence is to assure them of your faith in your own editing ability and then to prove the point by finally submitting a perfect—or should I say *perfected*—version of their performance.

So editing might be considered as a courtesy service to the performer; a service which he has every right to expect of the recordist and which the recordist should give willingly and without hesitation.

Besides using a fast speed and accurately "marking" every recorded item the job is made very much easier if worked through from one logical editing point to the next. No one likes to have to undertake what is known as a "cold edit." This means cutting more or less blindly directly into continuously recorded material. The editor must have a definite reference point from which to work; preferably a pause which might be a "rest" marked on the musical score or a breath pause in a speech recording. If there should be no

Please turn to page 379

PRACTICAL EDITING



The simplest editing tool is often the best. Typical is the editing block above made by E.M.I. Ltd.



NATURE NOTES

FOR SEPTEMBER

BY RICHARD MARGOSCHIS

EARLY this year I felt it was very gratifying to learn that, for the first time, tape recording was being included in the syllabus for a Festival of Arts; together with the recognised annual competitions it indicated that at last amateur tape recordists were really being recognised.

Now we hear that the 3M's Company is sponsoring its own tape recording contest. You can imagine my pleasure when I learned that the subject chosen was natural history, and that the sponsors turned to the newly formed Wildlife Sound Recording Society for assistance in organising and judging the competition. There is every chance that it will become an annual event, but for this to be certain it must, of course, receive good support. Time is rather short this year but I feel sure that most people interested in the subject will have recordings already stored away from which to select entries; *your* entry in this new field might well be a winner.

What should you look for when selecting your entry? There are three classes. The first two are for individual species of (a) birds, and (b) mammals, reptiles and amphibians. Note the word *individual*; the recording will be entered as of a particular species and so that species must be predominant even if others are heard in the background.

The third class is for rarities, which might be of two kinds. It might be of a species which is accepted as being uncommon in the British Isles, but it must have been recorded on your tape in these islands. On the other hand, there are species which are common here but of which known recordings are very few, and in some cases, even non-existent; such a recording is also eligible as a rarity.

The calls of some species are very short and this explains why, unlike most other competitions, a minimum duration of 10 seconds is specified.

Your recording should be as natural as possible and so some background "atmosphere" might be advantageous. It is well worth taking the trouble to remove any unwanted noise such as plops and bumps caused by switching and handling the microphone or reflector; this you are allowed to do by editing out but are not allowed to mix two recordings in order, for example, to add atmosphere.

Two other points that the judges are looking for are quality and interest value. Any recordist will know that tape speed and equipment will have a bearing on quality but do not allow this to prevent you from entering an interesting recording made at a slow speed. Incidentally, the tape speed of the original must be quoted.

Quarter or half track recordings are acceptable but only one track must be used and do be sure that the other tracks are clean. An easy trap to fall into is to use a tape for $\frac{1}{2}$ -track recording which was previously used for $\frac{1}{4}$ -track; if it has not been properly cleaned on either a $\frac{1}{2}$ -track machine or bulk eraser extraneous noise left between the $\frac{1}{4}$ -tracks will spoil your recording when played on a $\frac{1}{2}$ -track machine for judging.

Finally; carefully study the rules before sending in your entries.

The Autumn migration will have started by the time September comes in. Many people look upon this as the most exciting period in the ornithologist's year for it is a time when almost anything can happen. Coastal reserves are the places to visit now, the accent is on waders but always keep your eyes open for other species as well; if a rarity does turn up the news spreads very quickly among people on the reserve. Weather conditions have a great bearing on both the number and variety of birds and in this the recordist is rather unfortunate because it is often the bad weather which brings the birds in. However, remember that generally calmer conditions are found early in the morning and late in the evening.

Along these coastal mudflats there are often dykes and embankments which can be used as a very effective wind shield even if they do restrict the direction in which you face; they can also greatly reduce noise from the sea.

Some of the waders are more gregarious in their habits than others and so you will find both flocks and individuals. It is difficult to get near to them because they are usually out in the open and easily disturbed, and in any case it is not easy to get on to some of the mud flats.



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ELECTRONIC MUSIC

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musical sounds are determined by the "waveform" of the sound which gives it recognisable timbre and its "envelope" which provides the attack time i.e., the beginning of the sound and the decay to the end of the sound. A continuous pure tone or sine-wave has no special characteristics, except that the sound is more like that of a flute because it contains no harmonics. The sound of a saxophone on the other hand is distinctive and is characterised by the number of harmonics in the waveform and its sound envelope which has a fairly soft attack and a short dying away or decay.

A pure tone (sine-wave) can be shaped into another sound by adding harmonics and providing an "envelope" of attack and decay. First the sine-wave must be squared or a generator with a square-wave output employed. Now the process involves subtracting the unwanted harmonics since a square-wave contains harmonics up to at least the 30th. The process of doing this accurately in order to produce exact imitations of known musi-

cal instrument sounds is a complex one requiring expensive special filters. However, for amateur electronic music experiments and productions, quite elementary tone shaping devices can be employed but we must begin with a square-wave or near square-wave signal. The output from the pure tone generator described last month could be used but must first be squared. The alternative is a multi-vibrator oscillator which together with a sine-wave generator allows a choice of square or sine-waves at all audio frequencies. A circuit for an audio frequency range multi-vibrator is given in Fig. 2. The pitch control will cover at least three octaves beginning at approximately two octaves above middle C, i.e. at 1046.5 Hz and going downward in pitch to the limit of VRI. The circuit will run quite economically on an Ever Ready PP9 battery. Next month I will provide some simple tone shaping circuits for use with the multi-vibrator and also a circuit for a ring modulator, a device which, used in conjunction with both sine and square-wave generators, can produce some very effective "electronic" sounds.

TECHNIQUES—EDITING

From page 376

pauses at all then he must look for a very pronounced percussive sound which can easily be picked out when the tape is inched past the playback head.

Although in musical recording one likes to work from the rests written into the score it is extremely dangerous to actually record literally from rest to rest in this way. Consider a pause in performance marked with the value of one crotchet in the score. The note immediately prior to the rest would have been played, the musicians will be silent for one beat, and then they will play the next note. But during that pause we shall not have silence in the literal sense; the room will be filled with the receding reverberation from the last sounds made. If in a retake we were to start on the note following the rest, the insert would sound quite wrong when edited into the master tape. The correct method is to commence the re-take one bar *before* the rest (or at some other equally convenient spot) so that we shall record the reverberation present in the room when the musicians are silent. Only in this way can one be quite sure of achieving an invisible edit.

There is a fascination and indeed a deep satisfaction to be derived from skilful editing. To the uninitiated it appears to be a miraculous procedure which transforms a collection of scrappy little bits into a complete and satisfactory whole.

All the oddments of tape left over from an editing session should be preserved. Carefully wound on small spools they will be very useful for all kinds of purposes. I recently recorded a master tape for a 12 inch LP, and because every item was either short or broken down into short episodes the whole thing was recorded on a couple of dozen small spools of off-cuts. Not a single brand new tape was used on that job—and in fact from it there remains yet another pile of overs that will be used in similar future work. Such economy is only possible if one uses a single brand-type of tape. Never use different kinds of tape for a single recording job.

Once one realises that editing is not a wasteful process but the only means to polished programme building which will finally enhance rather than decrease the value of the tape then the door to success is wide open. Just as the development of a new surgical technique in our hospitals requires a great deal of courage from both patient and surgeon, so does the tape editor and his performers need to have faith in the curative properties of the knife. So with sharpened blade in one hand, a spool of splicing tape in the other, plus a certain amount of trust in the goddess of good fortune, start cutting.

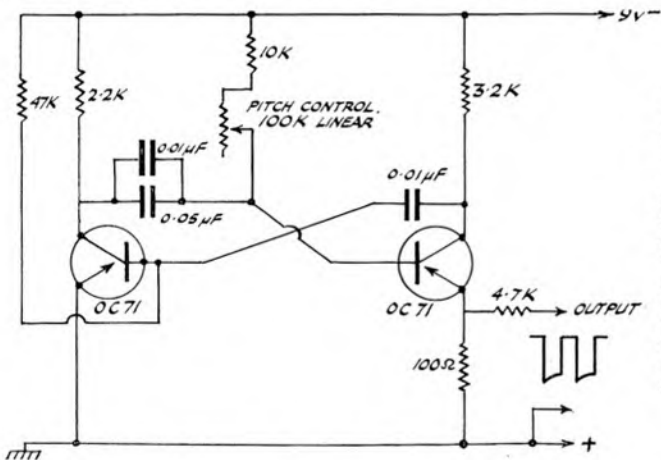


Fig. 2. The simple circuit of the multi-vibrator with variable audio frequency range, an equipment that could provide the basis for serious work in "tone shaping" and electronic music. There is no reason why amateurs should not play an important part in the creative activities that modern electronics have made possible

TALKING ABOUT STARS

From page 367

would probably be a better word) logical story phrased in such a way that it will be understood and appreciated by the average visitor who is assumed not to have any specialised knowledge of the subject. When the script has been written it is read back in the auditorium with all the visual effects operating. Only in this way can a correct balance be achieved between the spectacle and the sound. At the same time other specialised visual effects are cued in from the main control console—colour slides of planets, constellations, galaxies, all are brought into huge magnification and brilliant detail in the midst of the star studded sky on the roof of the dome.

When all the spoken word has been recorded on one track of ordinary quarter-inch tape, sound effects and

appropriate background music are dubbed in synchronisation on the other track. From this a composite programme tape is produced ready for playback via a pair of Brenell Mark 5 decks.

As we said at the beginning, Ted has his head way up in the clouds—but his feet are firmly on the ground. The list of equipment at his disposal is not impressive by studio standards and yet with it he produces fine studio quality work. Our intention was to listen critically to the recorded quality. Instead, we found ourselves absorbed in the beauty of the firmament, with a friendly voice guiding us from star to star. And that is the measure of the success of the engineers at the London Planetarium. Even we, who came specially to listen to their work, forgot they existed. Surely there can be no greater tribute than that?

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MUSICASSETTE

REVIEWS

TRUMPET CONCERTOS. L. Mozart, G. P. Telemann, T. Albinoni and A. Vivaldi; Maurice André, trumpet, Danièle Artur, violin, with the *Orchestre de Chambre de Rouen* conducted by Albert Beaucamp. Philips CPC 0034, 54s. 6d. including purchase tax.

There is really no way of describing this album other than in the rather banal words, "gems of baroque melody". To my ear the music of the eighteenth century is the most satisfying intellectually of any music that has ever been written. And this Musicassette gives us some of the best examples of the concerto form of that period.

Of the four items in the programme the first, *Concerto for Trumpet, Two Horns, Strings and Continuo in D Major* by L. Mozart displays most perfectly all that I find so admirable in this music. The cadenza in the first movement sparkles with sheer beauty and virtuosity as an object lesson in all that brass can and should be. The second movement displays a perfection of exposition with such intellectual simplicity and unquestionable logic as to induce in the listener that feeling of completeness and satisfaction that is all too often lacking in more contemporary works.

L. Mozart was, of course, the father of Wolfgang, and the affinity between father and son is only too obvious in this concerto. The status of musicians in this period of history is underlined by the fact that in 1740 L. Mozart took up an official appointment to the then Canon of Salzburg—as musician and valet!

The *Concerto for Trumpet, Strings and Continuo in F Minor* by G. P. Telemann abounds in contrasting moods, which, with its simplicity of composition, nicely sets off the grandeur of the Mozart. Against the genius of the Mozart family it might appear to be a less substantial work; in fact it is a completely different approach to identical problems and is a quite remarkable achievement in its own right.

Sweeping strings reflect the solo trumpet and provide a majestic backdrop for yet another jewel from this baroque collection in the *Concerto for Trumpet, Strings and Continuo in D Minor* by T. Albinoni. Having reached this point in the programme the listener may well be dazed by all the fine music he has heard. Yet there is still more to come.

The one and only Vivaldi provides the concluding item to this brilliant album with his *Concerto for Trumpet, Violin, Strings and Continuo in B Flat minor*. To sit and listen to all four concertos in succession is really too much. For fullest enjoyment they should be heard separately on different occasions.

The performance of Maurice André, trumpet, is a perfect example of musicianship at its best offering sympathetic interpretation with delicacy and feeling. Recording is excellent throughout to prove yet again that the Philips organisation take their Compact Cassette system very seriously and are determined that it should provide a real alternative to more conventional media through the widest possible breadth of musical repertoire. Which of course it does.

PERGOLESI. STABAT MATER. Evelyn Lear, soprano and Christa Ludwig, contralto, with the Women's Voices of the Rias Chamber Choir and the RSO Berlin conducted by Lorin Maazel. Philips CPC 0035. 54s. 6d. including purchase tax.

This sacred work by Pergolesi, written in 1736 and known collectively by the first of its twelve episodes, *Stabat Mater*, is chiefly of interest for its widely divergent musical styles. Ranging from comic opera to traditional baroque, a lesser composer would have achieved little more than a monstrous ragbag from such a polyglot mixture. As it is Pergolesi has given us a perfect example of musical thought and evolution in the early eighteenth century.

Frankly, this work lacks the sustained melodic themes of the Trumpet Concertos also reviewed, and for that reason it is likely to have a less popular appeal. Nevertheless it will hold great interest for all lovers of choral music and is invaluable to those concerned with following the musical development of the period.

Recording? I am not altogether happy about it. There are traces of distortion "on the edges," but this is not at all uncommon in choral works, which are notoriously difficult to handle. More important, I was left with a feeling of lack of solidity and presence, possibly due to over-cautious undermodulation by the engineers. I like my choirs to step right into the room—this one seems to be at least one stage removed from real personal contact.

12 OF THOSE SONGS. SHIRLEY BASSEY. EMI TC-SCX 6204. 54s. 6d. including purchase tax.

The inimitable Shirley, bursting with energy, flings herself breathlessly into the opening number. In a flash the mood changes to nostalgic soliloquy. But that's our Shirley, and I for one wouldn't be without her for anything.

Few singers today have such a range of vocal accomplishment, or indeed of artistic ability. Whether she is purveying sunshine or showers, the heat of demanding passion or the quiet tranquillity of remembered moments she always sounds sincere. Perhaps her greatest quality is her irreproachable humanity—a quality revealed only too clearly in this excellent album.

All the numbers are well recorded, the programme has been thoughtfully constructed and of course every word sung is clearly heard. The collection includes: *Come Back To Me, I'm a Fool to Want You, A House is Not a Home, If Love Were All, Moon River, Charade, Something's Coming, Days of Wine and Roses, Call Me, Don't Rain on My Parade, I Wish You Love and One of Those Songs.*

This Musicassette pleased me greatly in every respect. I shall be very surprised if it fails to please you too.

TO SIR WITH LOVE. Lulu and the Mindbenders. Fontana CFB 4023. 54s. 6d. including purchase tax.

Taken from the original sound track of the James Clavell film of the same name, this album captures the youthful exuberance of our little Scottish bombshell Lulu. The scores by Ron Grainer are particularly interesting. He has been playing around with ideas derived from electronic techniques for a good many years and the affinity between modern pops and musique concrète is only too evident in his work.

Recording and stereo presentation is good,

and the whole offers a succession of pleasing items which are perhaps more significant as a tribute to the composer than to the solo vocalist. They include: *To Sir with Love, School Break Dancing, "Stealing My Love From Me," Thackeray meets Faculty, Then Alone, Music from Lunch Break, "Off and Running," Thackeray Loses Temper gets an Idea, Museum Outings Montage, "To Sir With Love," a Classical Lesson, Perhaps I could Tidy your Desk, Potter's Loss of Temper in Gym, Thackeray reads letter about Job, Thackeray and Denham Box in Gym, The Funeral and End of Term Dance, "It's Getting Harder All the Time," concluding with *To Sir With Love.**

I will not be patronising and say that Lulu has promise. But to me, as an old square, I find her chief attraction lies in the possibility of her development during the next few years. However good an adolescent artiste might be the lack of maturity is always evident. But then perhaps that is at least part of her appeal. A thoroughly good album lacking the superficiality of some of today's collections.

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THE BEAUTIFUL BALLADS. Nat King Cole. Capitol TA-T 2820. 47s. 9½d. including purchase tax.

What can you say? Surely Nat King Cole is one of the greatest singers of our time. Or rather, was. His death, I firmly believe, leaves a gap in the entertainment world that can never completely be filled.

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Oh yes, there are giggles. Especially perhaps from ardent King Cole subjects like myself. I would have liked to have seen what I consider to be the most touching song he ever recorded included on this tape—that wistful rendering of *That Sunday, That Summer*. I would have liked perhaps one of the earlier pieces . . . the magnificent *Sweet Lorraine*. But this is a sort of romantic nostalgia, and like all romance, it accepts . . . blindly.

So all romantics who feel the genius of the late, truly great Nat King Cole, get this beautifully recorded tape . . .

These are the titles: *Felicia, Miss Me, Marnie, Here's To My Lady, A Fool Was I, Bend A Little My Way, You'll See, If I Knew, Back In My Arms, When It's Summer, and I'll Always Be Remembering.*

THERE MUST BE A WAY. Frankie Vaughan. Columbia TA-SX 6200, 47s. 9½d. including purchase tax.

This tape is exactly what you'd expect. Frankie Vaughan, the perennial "nice guy" of show business, sings effortlessly through twelve well-recorded and nicely balanced numbers that are sure to go down a treat with Mum and Auntie Flo. This is a quiet, sentimental sort of tape that defies the selection of one particular track for special mention.

There Must Be A Way; I Can't Begin To Tell You; Call Me Irresponsible; I Don't Know Why; That Old Feeling; There, I've Said It Again; Maybe You'll Be There; Serenata; If I Had A Dozen Hearts; Time After Time; The One I Love Belongs To Somebody Else, and I'll Never Smile Again.

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It gives me the greatest pleasure to be able to announce the distribution in this country of a new catalogue of high quality stereo tapes under the CBS label. Both classics and lighter music are included in the list and I am happy to say that the recorded quality of the few I have so far heard is all that could be desired. Unfortunately, classical repertoire is rather more expensive than light music.

The tape now being reviewed is a recital on the Flentrop organ in the Busch-Reisinger Museum at Harvard University. Construction of the instrument was based on the tonal and mechanical principles of classic organs and the recorded version of the sound it produces is impressive in every way—perhaps almost a little too impressive.

Bach had been Music Director at St. Thomas' Church, Leipzig, up until 1750. In August 1840 Mendelssohn gave a concert in that church playing the very instrument on which Bach himself must have performed countless times. The present recital by E. Power Biggs is based on the music that Mendelssohn played on that "warm summer day of 1840".

The choice of programme gave Mendelssohn in the first place, and now E. Power Biggs, ample scope to display the great depth of sonorities of which a fine church organ is capable. If the recording has a fault it is of perhaps a too clinical quality to the sound. Every note is crisp and sharp, almost with the edge of stringed or brass instruments. I found myself missing the more rounded, mellow sound which I suspect is heard in reality in the auditorium. As a result there is rather more of the "hi-fi" character than is justified—in fact, my description of the recording is that it is just a little bit too good to be really true. But to err in this direction is divine compared to the gross sin of producing woolly, booming sounds, of which there is not a single trace in this excellent tape.

No one instrument has a larger band of enthusiastic followers than the classic organ. None of them will be disappointed in this album. The performance of the organist is at times breathtaking and his pedal notes are a joy to hear. I shall look forward to listening to more organ recordings up to this very high standard on the CBS label in the future.

RAVEL. COMPLETE ORCHESTRAL WORKS. Volume 3. *Ma Mère L'Oye* and *Valses Nobles et Sentimentales*. The Paris Conservatoire Orchestra conducted by André Cluytens. Angel ZS 36110 4-

track stereo 7½ ips. 102s. 5d. including purchase tax.

We have now come to the third of the four volumes of the complete orchestral works of Ravel. *Ma Mère L'Oye* is, of course, "Mother Goose," and it is remarkable for its extreme delicacy and whimsical treatment of this well-known childhood subject. Fairy tales and nursery rhymes have often been subjected to orchestral interpretation and all too often the banality of the result antagonises the adult mind. A musician of Ravel's stature could never fall into that trap. He has given us a piece of delightfully impressionistic music in which he speaks in a language that can be understood and appreciated by all ages and conditions of men. There are some truly humorous passages that will bring a smile to every lip, but they are contrasted against a sweeping lyricism that transmutes the whole far above the level of the mere musical joke into the realm of great composition.

Valses Nobles et Sentimentales. The name speaks for itself. To be sentimental with nobility must be one of the most sought after of human attainments. Even Ravel separates his dances into sentimental and noble. But each has some quality of the other and the whole is satisfying in every way.

There is nothing brash, noisy or brassy about this album. All is finely woven tracery—gossamer threads of music glittering as freshly as on the day the notes were first written. As with the other volumes, recording is excellent and the performance of André Cluytens and the Paris Conservatoire Orchestra rises to the occasion without any feeling of "preciousness" which these works could arouse so easily.

Volume 3 is a most worthy successor to the first two volumes of the series.

HOLLYWOOD IN RHYTHM/BROADWAY IN RHYTHM. Ray Conniff. CBS C2Q 701 4-track stereo 7½ ips. 150s. 3d. including purchase tax.

Now here's a collection to delight the heart of every man, woman and child who hears it. The dozen or more cinema favourites on Side 1 are followed by selections from *Oklahoma!*, *The King and I*, *My Fair Lady* and *South Pacific* on Side 2. All that—plus a really polished performance by Ray Conniff and superb recording by the CBS engineers. It is a joy to hear an album where the man twiddling the knobs uses taste, discretion and restraint, which is precisely what happened here.

There's not really a lot one needs to say about this tape. It is of course, a "double feature" album equivalent in length and content to two complete LP records, hence its high price. The best thing I can do is to merely list the items and allow the reader to reflect upon the implications of such a dazzling collection in a single album. They are on Side 1: *Love is a Many Splendoured Thing*, *Thanks for the Memory*, *Easy to Love*, *Pacific Sunset*, *Cheek to Cheek*, *My Heart Stood Still*, *Please, Love Letters*, *Laura*, *Stella by Starlight*, *Yesterdays* and *It Might as Well be Spring*. On Side 2 we have *Oklahoma!*, *People Will Say We're in Love*, *The Surrey with the Fringe on Top*, *Oh What a Beautiful Mornin'*, *Hallo Young Lovers*, *Getting to Know You*, *I Whistle a Happy Tune*, *On the Street Where You Live*, *I Could Have Danced All Night*, *I've Grown Accustomed to her Face*, *A Wonderful Guy*, *Bali Ha'i*, *Younger than Springtime* and *Some Enchanted Evening*.

It's all brilliant stuff. Don't tell the taxman, but it's really worth even more than he makes us pay for it. As such very strongly recommended indeed.

NEW PRODUCTS

THE FIRST CARTRIDGE AND OPEN REEL MACHINE

TWO new tape recorders from Akai and introduced by Pullin Photographic (The Rank Organisation) are claimed to be completely different from any tape recorder currently available and are said to be the only recorders of their type available in the world.

One of these is the Akai 1800, a multi-purpose reel-to-reel and reel-to-cartridge stereo recorder. This machine offers all the usual four-track stereo/mono record playback facilities plus the facility for recording and/or playing back from an integrated eight track stereo cartridge system.

The cartridge tape is provided with a total of eight tracks so offering four choices of two channel stereo programme material. When the tape comes to an end the next channel is automatically set in position for recording or playback. Programme time for a single channel is ten minutes giving a continuous forty minutes for all four channels when using 200 feet of cartridge tape. Any desired channel may be pre-selected by manually pushing the cartridge programme selector button.



Specification of the 1800 includes tape speeds of $3\frac{1}{2}$ and $7\frac{1}{2}$ ips. reel-to-reel, $3\frac{1}{2}$ ips. only when on cartridge. Wow and flutter is given as less than 0.18 per cent RMS at $7\frac{1}{2}$ ips. and less than 0.3 per cent RMS from the $3\frac{1}{2}$ ips. cartridge. Frequency response for reel-to-reel operation is claimed as from 40-18,000 Hertz at $7\frac{1}{2}$ ips. (50-15,000 Hertz plus or minus 3 dB) and 40-14,000 Hertz at $3\frac{1}{2}$ ips. on both open reel and cartridge. Signal-to-noise ratio is given as better than 50 dB on the reel system and better than 45 dB on cartridge. Dimensions are 15" high \times 13 $\frac{1}{2}$ " wide \times 9" deep and the weight is 35.2 lbs. Recommended retail price of the 1800 is £129 plus £29 6s. 11d. purchase tax.

The second new Akai machine designated X-1800 SD is similar to the 1800 but incorporates the Akai Crossfield Head which is claimed to give a greater frequency range. The slower tape speed of $1\frac{7}{8}$ ips. is included in the reel-to-reel section (15 ips. with

special adaptor kit) but the cartridge speed is of course the standard $3\frac{1}{2}$ ips.

Claimed response figures include 30-23,000 Hertz plus or minus 3 dB at $7\frac{1}{2}$ ips. and 30-18,000 Hertz plus or minus 3 dB at $3\frac{1}{2}$ ips.

Price of the X 1800 SD is £164 plus £37 6s. 2d.

Pullin Photographic Limited, The Rank Organisation, 11 Aintree Road, Perivale, Greenford, Middlesex.

SEVEN INCH REELS ON NEW AKAI X5

LAATEST release in the high quality battery portable field is the new Akai X5—a completely new machine evolved from the earlier X4.



One of the more obvious and extremely ingenious facilities included in this new stereo mains/battery tape recorder is an "outrigger" system for the spool hubs which, when swung out away from the main deck plate, will accommodate 7" spools. The four operating speeds are 15/16ths, $1\frac{1}{4}$ ths, $3\frac{1}{2}$ and $7\frac{1}{2}$ ips., and the claimed frequency response (each set of figures plus or minus 3 dB) are respectively: 30-5,500 Hertz, 30-11,000 Hertz, 40-17,000 Hertz and 40-20,000 Hertz. Wow and flutter is claimed as less than 0.15 per cent RMS at $7\frac{1}{2}$ ips. and the signal-to-noise ratio is given as better than 50 dB for DC operation and better than 45 dB when operated from mains.

Three heads are provided, one erase, one record/playback and one to apply cross-field bias to the rear of the tape. The motor is a newly designed brushless DC mechanism which the manufacturers claim will maintain a constant tape speed as efficiently as the highest class hysteresis synchronous motors. Equalisation is to NARTB and a pair of 3" speakers are built into the equipment. Dimensions are 5 $\frac{1}{2}$ " high \times 11" wide \times 12" deep and the weight is 13.4 lbs. when complete with battery. The alternative power supplies are by rechargeable 6 volt battery or by direct connection to AC mains 100-240 volts.

Cost of the X5 complete with a pair of dynamic microphones, battery and mains cord is £180 inclusive of purchase tax and the price of the 7" reel adaptor is £8 10s. 3d. plus £1 18s. 10d. purchase tax.

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TWO SONY MACHINES

LAATEST releases from Sony (U.K.) Ltd. are two new stereo tape decks. Model TC 255 supersedes the earlier Model TC 250A and it now offers a wide range of facilities including sound-on-sound and language/music training.



Tape speeds are $7\frac{1}{2}$, $3\frac{1}{4}$ and $1\frac{7}{8}$ ips., maximum spool size 7" and the claimed frequency response is 30-20,000 Hertz at $7\frac{1}{2}$ ips. (50-17,000 Hertz plus or minus 3 dB). Signal-to-noise ratio is given as better than 52 dB, the dimensions are $15\frac{1}{2}$ " wide \times $7\frac{1}{2}$ " high \times $13\frac{3}{4}$ " deep, weight is 18 lb.; the cabinet work is finished in walnut and the recommended retail price is £82.

Model TC 355 is a completely new four-track stereo tape deck using the three head system giving tape source monitoring with mode selector switch.



Tape speeds are $7\frac{1}{2}$, $3\frac{1}{4}$ and $1\frac{7}{8}$ ips and the frequency response is claimed to be 20-25,000 Hertz at $7\frac{1}{2}$ ips. and 30-20,000 Hertz plus or minus 3 dB. Signal-to-noise ratio is given as better than 52 dB and wow and flutter less than 0.15 per cent at $7\frac{1}{2}$ ips. With a weight of 22 lbs. the dimensions are $15\frac{3}{16}$ " wide \times $7\frac{1}{16}$ " high \times 14" deep and the recommended retail price is £99.

Sony (U.K.) Limited, 36/40 Wigmore Street, London, W.1.

ELECTRONIQUES HOBBIES MANUAL

LAST year saw the publication of the first edition of the *Electroniques Hobbies Manual*. Now the new enlarged and entirely revised 1968 edition is available.

The new manual—double the size of the previous edition—contains 960 pages and is divided into twelve sections. It includes a full range of tips for the practical man who enjoys the satisfaction of building his own equipment as well as an extensive components section incorporating both commercial and professional grade products.

Not only does the new manual also include ready built equipment for every audio activity but it also includes a wide range of hobby products such as microscopes, telescopes, engine tuning kits, etc., etc. The price is now 16s. 6d. but this has been offset by the inclusion of vouchers up to a total value of £25 which can be used when purchasing certain listed items so giving the customer the opportunity of saving more than the original cost of the book.

Electroniques, Edinburgh Way, Harlow, Essex.

BLADES FOR EDITING

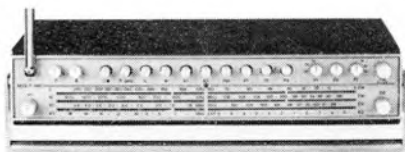
SURELY the simplest tool in the recordist's kit must be the ordinary single-edged razor blade upon which he depends for accurate editing. Yet it is strange how often that blade is either missing or blunt. To avoid this difficulty Multicore Solders Limited have introduced a useful accessory comprising of a pack of four recording tape cutters, each fitted with special plastic grips and intended for cutting and splicing all types of magnetic recording tape.

Although the pack has been devised as replacement cutters for the well-known Bib Model 20 quarter-inch tape splicer they can also be used with most other makes of splicing blocks. The stainless steel cutters with red plastic grips are packed in a plastic bag and the recommended retail price is 2s. 10d. per pack including purchase tax.

Multicore Solders Limited, Hemel Hempstead, Hertfordshire.

QUALITY RADIO

MEETING the demand for ever better quality lightweight transistorised portable radios Bang & Olufsen announce the release of the Beolit 1000. This new portable radio is claimed to have a technical specification superior to most mains table sets; it covers all five wavebands and has an output of 2.5 watts from internal batteries—mains or car battery operation boosts output to 7.5 watts.



Exceptionally good reception and selectivity is claimed for FM, long, medium and short wave 1 and 2. The long wave is extended to include the marine band and there is band-spread on short wave 2. The FM section has a separate dial drive plus 3 preset controls giving push button selection of three tunable stations anywhere on this band. Separate bass and treble controls are fitted. Other features of the comprehensive specification include sockets for an external aerial and speaker, gramophone or tape recorder and power supply via a mains converter (not supplied by B & O). Car opera-

tion is catered for by a special lockable mountable bracket which can be switched for six or twelve volt use and either positive or negative earthing. Insertion in the car case cuts in the car battery, aerial and extension speaker if this is fitted.

With a weight of only $6\frac{1}{2}$ lbs. dimensions are $14" \times 8" \times 2\frac{3}{4}"$ and a choice of finishes is available. Prices are: In teak or rosewood £76 5s., in black goatskin £78 5s. The car mounting bracket is an extra costing £11 10s.

Bang & Olufsen U.K. Division, Eastbrook Road, Gloucester.

Trade Announcements

On Friday, July 12, a delivery of Uher tape recorders was hi-jacked in Lockets Road, Wealdstone. Four men leapt from a stolen white Jaguar car, dragged the Bosch Limited driver, Mr. K. Klompfen, from the truck and bundled him into the car. He was taken for a long ride lasting about an hour and was finally dumped at Euston.

Police are searching for the consignment of tape recorders which is valued at about £1,000. Any persons being offered Uher tape recorders under suspicious circumstances are asked to advise their local police station or Messrs. Bosch Limited—telephone number WA 44233.

B. H. Morris & Co. (Radio) Limited announce that as from July 1, 1968 they have been appointed the sole UK distributors for the Teac Corporation of Japan. The firm of Teac specialise in tape recording and replay equipment of the highest quality. As with the Trio products already handled by B. H. Morris & Co. distribution will be directed through specialist hi-fi and tape recording outlets.

The latest catalogue from the **Musicassette Supply Company** price 2s. 6d. is now available. Its seventy pages list all Musicassettes now available and also give full details of their part exchange and library services. The cost is 2s. 6d.—postal orders or stamps should be sent to 13, Angel Street, Worcester.

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Sony TC200 ...	23	15	0	5	18	9	95	0	0
Sanyo MR929 ...	24	0	0	6	0	0	96	0	0
Philips EL3555 ...	25	19	4	6	5	8	101	19	4
Aiwa TP1012 ...	26	0	0	6	8	2	102	18	0
Akai I710W ...	27	17	3	6	16	8	109	17	3
Sanyo MR939 ...	28	0	0	6	16	8	110	0	0
Sony TC260 ...	29	5	0	7	5	0	116	5	0
Tandberg 12/21/41 ...	31	10	0	7	17	6	126	0	0
Telefunken 204' E ...	34	12	5	8	10	0	136	12	5
Philips EL4408 ...	33	16	8	8	6	8	133	16	8
Sony TC530 ...	41	10	0	10	6	3	165	5	0
Beocord 2000K ...	39	10	0	9	13	4	155	10	0
Beocord 2000T ...	40	10	0	10	2	6	162	0	0
Ferroglyph 722/4 ...	46	15	0	11	10	5	185	0	0
Akai M9 ...	49	3	5	12	3	4	195	3	5

STEREO TAPE UNITS									
Sanyo MR-801 ...	20	0	0	4	13	4	78	0	0
Sony TC250A ...	20	10	0	4	18	4	79	10	0
Akai 3000D ...	26	11	4	6	11	8	105	11	4
Sony TC350 ...	27	5	0	6	16	3	109	0	0
Beocord 1500 ...	31	10	0	7	11	8	122	10	0
Tandberg 62/64X ...	34	10	0	8	12	6	138	0	0
Ferroglyph 702/704 ...	40	6	8	10	0	0	160	6	8

4-TRACK MONAURAL									
Fidelity Playtime ...	8	2	9	2	0	9	32	11	0
Fidelity Studio ...	11	5	9	2	16	6	45	3	0
Grundig TK140 ...	11	14	6	2	18	4	46	14	6
Philips EL4305 ...	11	17	9	2	16	8	45	17	9

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Telefunken 201 ...	11	18	9	2	19	7	47	13	9
Ferguson 3228 ...	11	19	0	3	0	0	47	19	0
Philips EL4306 ...	14	1	8	3	10	0	56	1	8
Ferguson 3230 ...	14	13	0	3	13	2	58	11	0
Ferguson 3216 ...	16	19	0	4	0	0	64	19	0
REPS M10 ...	18	17	0	4	14	7	75	12	0
Truvox R54 ...	18	17	3	4	15	0	75	17	3
Wyndor									
Vanguard	18	18	0	4	14	6	75	12	0
Tandberg 1526 ...	20	19	0	5	3	4	82	19	0
Truvox R204 ...	31	14	2	7	15	0	124	14	2

MAINS TWIN TRACK									
Fidelity Playtime ...	7	18	6	1	16	8	29	18	6
Ferguson 3224 ...	8	6	0	2	1	4	33	2	0
Grundig TK120 ...	9	17	6	2	9	2	39	7	6
Philips EL3310 ...	10	5	10	2	11	5	41	2	10
Tandberg 1521 ...	18	19	6	4	10	0	72	19	6
Truvox R52 ...	18	17	3	4	15	0	75	17	3
Brenell MkV/3									
Std.	26	17	9	6	10	0	104	17	9
Brenell MkV/3 Mtr.	28	0	2	7	0	0	112	0	2
Beocord 1100 ...	24	10	0	6	2	6	98	0	0
Truvox R202 ...	31	14	2	7	15	0	124	14	2
Brenell V/3/M ...	32	16	8	8	5	0	131	16	8
Ferroglyph 713 ...	33	18	4	8	9	7	135	13	4
Ferroglyph 713/H ...	35	16	8	8	16	8	141	16	8

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Philips EL3302 ...	7	18	0	1	19	4	31	10	0
Philips EL4304 ...	8	5	10	2	1	5	33	2	10
Grundig C200 ...	12	7	0	3	1	8	49	7	0
Telefunken 300 ...	16	3	0	7	18	9	63	3	0
Telefunken 301 4T ...	17	12	0	4	6	8	69	12	0
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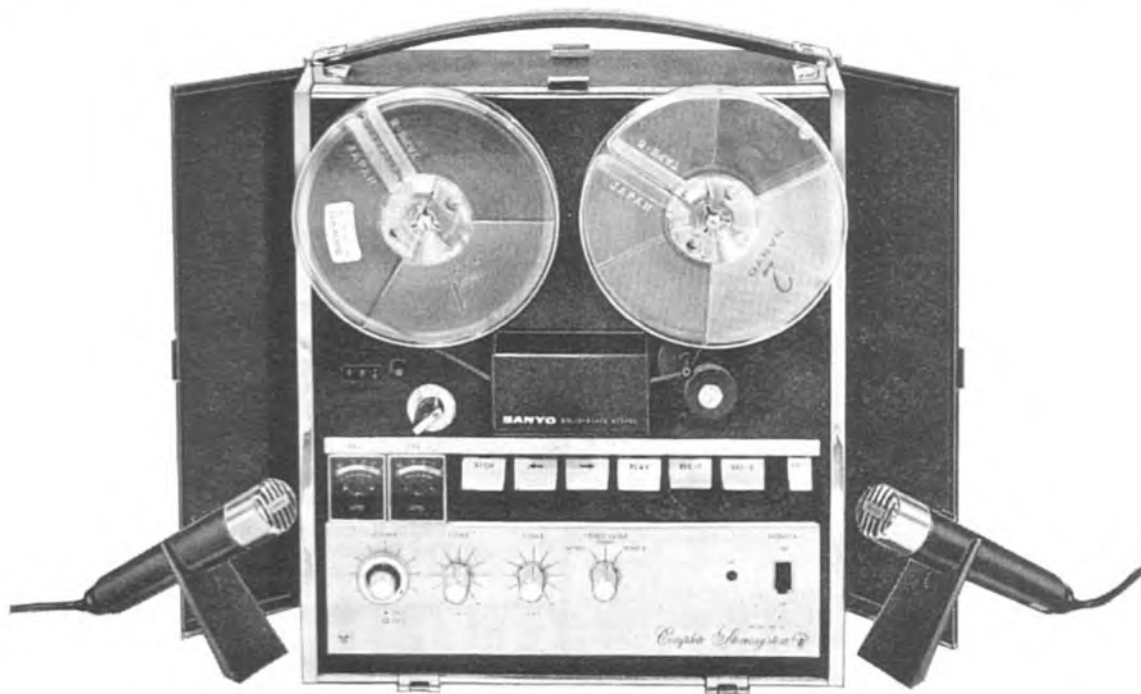
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 (stereo 5", 50 μ tape)
 128 min x 2 at $1\frac{1}{2}$ ips
 (stereo 5", 50 μ tape)
 256 min x 2 at $15/16$ ips
 (stereo 5", 50 μ tape)

Frequency Response
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 $1\frac{1}{2}$ ips: 100-5,000 c/s
 $15/16$ ips: 100-2,500 c/s

Output Power
 Maximum 800mW
 per channel Undistorted
 750mW per channel

Output Impedance
 Ext. SP.-8 ohm x 2
 Headphone-8 ohm

Weight
 17 lbs (8 kg) approx.

Accessories
 Microphone x 2,
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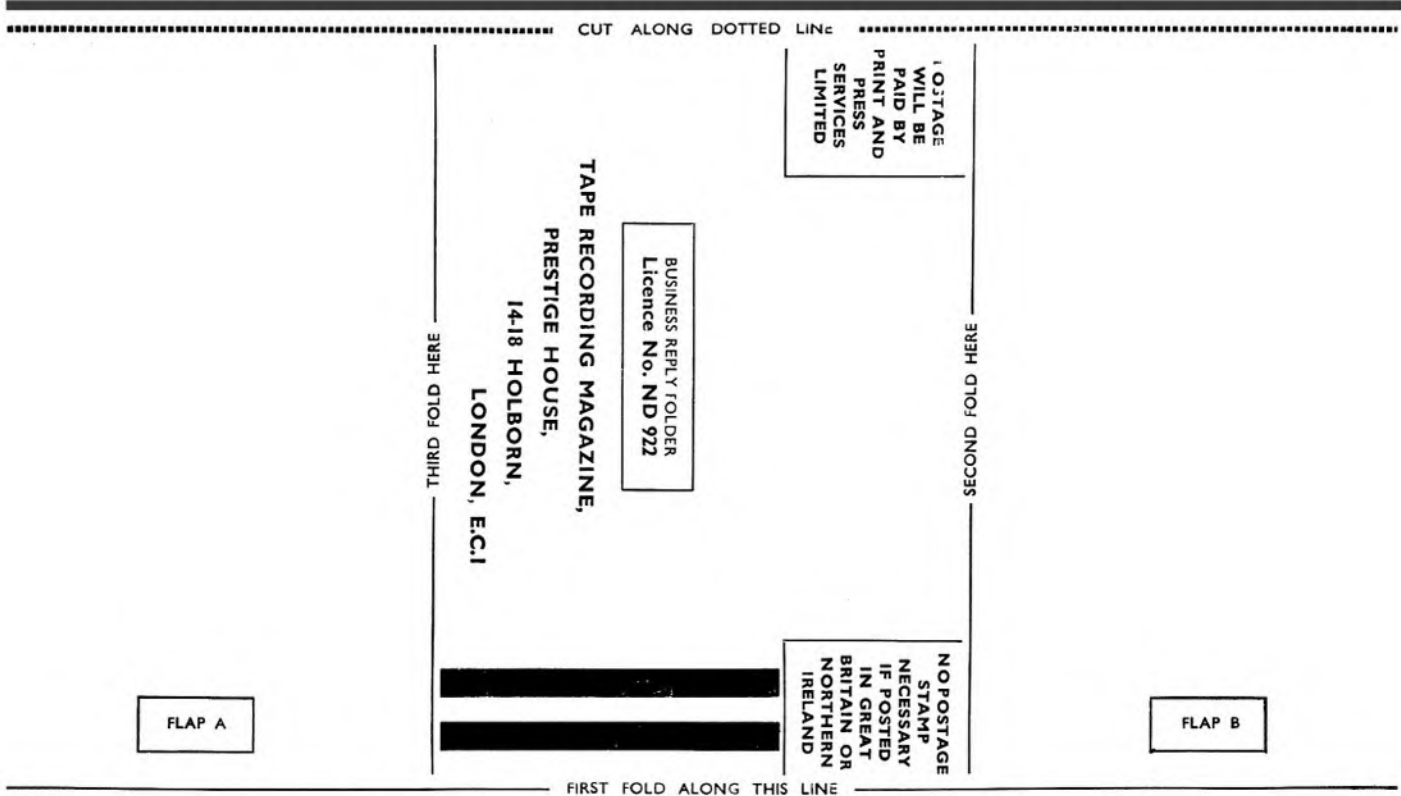
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