

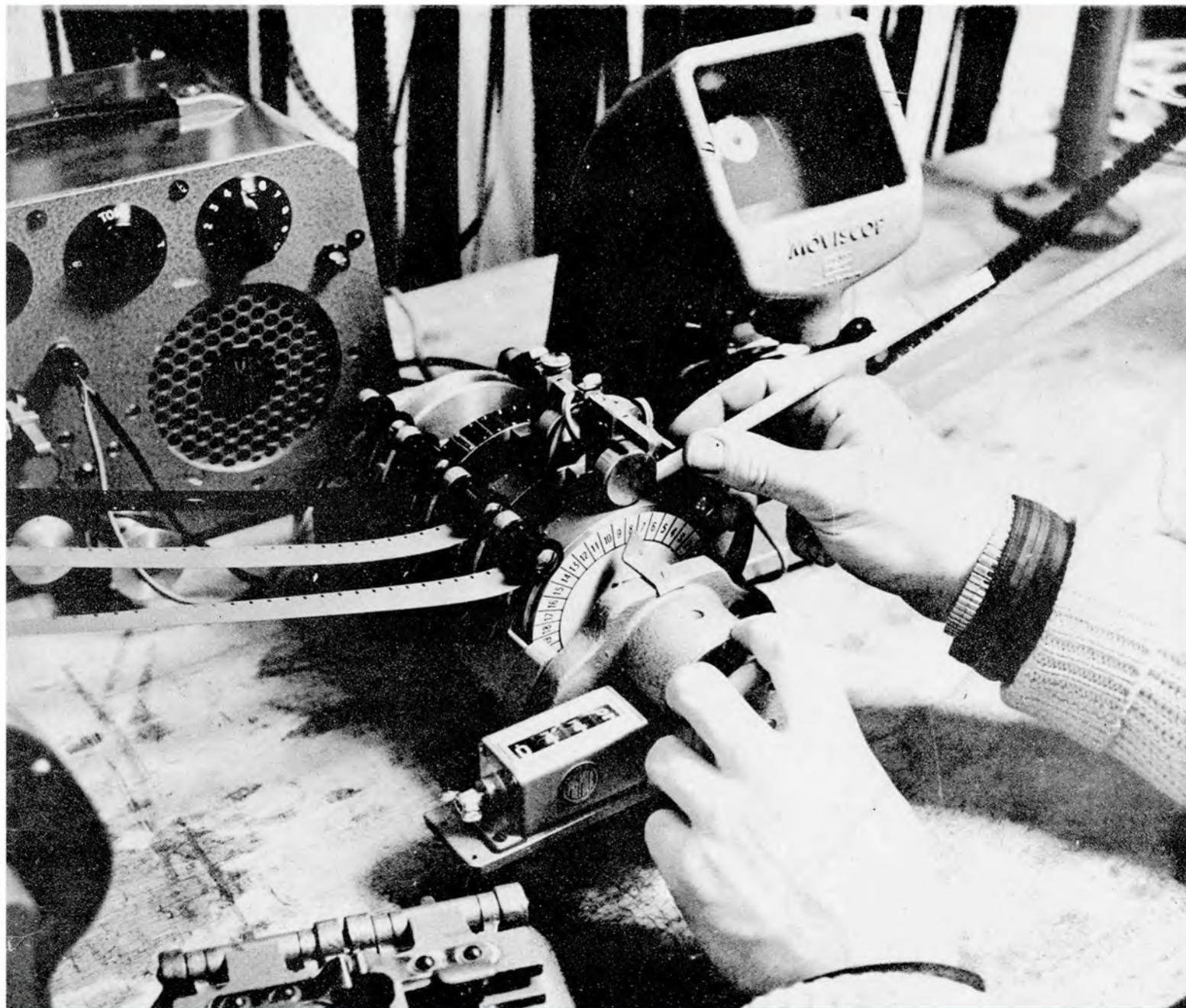
the TAPE

PRICE 1/6

JUNE 1963
VOL. 5 No. 5

RECORDER

INCORPORATING "SOUND AND CINE"



AUDIO FESTIVAL REPORT



SEE
ALL
MAKES

Hear all makes. At the Tape Recorder Centre showroom you can see, hear and compare them *all*, on the spot. The country's leading specialists in tape recording are there to give you unbiased help in choosing from the country's largest stocks of equipment. At The Tape Recorder Centre there is the model best suited to your needs (and your pocket). And everything else for tape recording, office dictation and hi-fi, plus excellent HP terms. See all makes, hear all makes, at

THE
**TAPE
RECORDER
CENTRE**



**Philips
Elizabethan
Grundig
Ferrograph
Stella
Vortexion
Brenell
Ampex
Tandberg
etc**

82 High Holborn, London, W.C.1.

Tel: CHAncery 7401

CHATEAU PRODUCTIONS LIMITED

proudly announce

**WORLD
DISTRIBUTION
RIGHTS**

for the



MICROKIT CONDENSER MICROPHONE

For the first time, an AUTHENTIC Condenser Microphone of outstanding quality at a down-to-earth price.

- ★ Precision-made capsule.
- ★ Possibility of limiting Response to suit individual needs.
- ★ Very smooth Frequency Response extending over the whole audible range.
- ★ Feeds directly into any amplifier/tape recorder with a "radio" or high impedance input—thanks to its unusually high output (150 mV.).
- ★ Substantially omni-directional but cardioid in axis of capsule.
- ★ Output Impedance: 600 ohms cathode follower.

The MICROKIT Condenser Microphone is available as a COMPLETE kit of parts, with a comprehensive manual incorporating unique "Step-by-Step" instructions written in very clear terms, finished in attractive "matt-chrome" and complete with swivel bracket and tripod adaptor. **Price 20 gns.**

MICROKIT Condenser Microphone—including power pack—ready assembled and tested. **Price 25 gns.**

Both the kit and the assembled version include our unique One Year Free Replacement/Service Guarantee.

We are now in a position to accept your order for early delivery. Write, call or 'phone for further details.

Trade Enquiries Invited

CHATEAU PRODUCTIONS LIMITED

25 DENMARK STREET, LONDON, W.C.2

Distributors of Professional Electronic Recording Equipment

Telephone: Covent Garden 3026

Cables: Kassmusic London



LOEWE OPTA

Hi-Fi Tape Recorders

FOR PERFECTION IN SOUND

THE LATEST ADDITION TO THE OPTACORD RANGE

OPTACORD 414

With the first ever high frequency motor ensuring long life and constant speeds. Unsurpassed for a portable tape recorder. For use on mains, batteries and car batteries.

47 Gns.

Ask our Representative to call, or see the complete range at our Showrooms.



HIGHGATE ACOUSTICS

71/73, GT. PORTLAND STREET, LONDON, W.1

Telephone: MUSEum 2901/6

FRANCIS OF STREATHAM

LEADING STOCKISTS OF EQUIPMENT FOR TAPE and HI-FI

... and NO EXTRA FOR CREDIT TERMS

- ★ Minimum Deposit
- ★ No Interest or Service Charges on H.P. up to 18 months
- ★ Free Service during Guarantee Period

Akai M6 1/2 & 1/2 Tr. St. ...	130 gns.
*Brenell Stereo STB. 1 ...	£120
Brenell Mk. V Model M ...	88 gns.
*Brenell Mk. V Series 2 ...	69 gns.
Cossor 1604 2 sp. ...	39 gns.
Cossor 1605 4 Tr. 4 sp. ...	62 gns.
Cossor 1603 4 Tr. ...	28 gns.
Elizabethan Popular ...	22 gns.
Elizabethan LZ ...	32 gns.
Elizabethan LZ29 ...	36 gns.
Ferguson 3200 ...	26 gns.
Ferguson 3202 2 sp. 4 Tr. ...	33 gns.
*Ferrograph Series 5 ...	85 gns.
*Ferrograph 422 or 424 ...	110 gns.
Fidelity Minor ...	22 gns.
Grundig TK14 ...	35 gns.
Grundig TK18 "Magic Eye" ...	39 gns.
Grundig TK23 4 Tr. ...	45 gns.
Grundig TK40 4 Tr. ...	75 gns.
Grundig TK41 2 Tr. ...	75 gns.
*Grundig TK 46 ...	99 gns.
Loewe Opta 403 ...	45 gns.
Philips 4 Tr. 3541 ...	36 gns.
Philips 4 Tr. 3549 ...	62 gns.
Philips Starmaker 4 Tr. ...	27 gns.
*Philips 3535 4 Tr. Ste. ...	92 gns.
*Reflectograph 'A' 1/2 Tr. ...	105 gns.
Robuk ...	36 gns.
*Simon SP5 ...	93 gns.
Sony Stereo 462 4 Tr. ...	75 gns.
Sony 521 Stereo ...	124 gns.
Stella 4 Tr. 459 ...	62 gns.
Stella 456 ...	28 gns.
*Tandberg Series 6 ...	110 gns.
Tandberg Series 7 ...	93 gns.
*Telefunken 85 De Luxe ...	83 gns.

*Telefunken 95 ...	59 gns.
*Telefunken 96 4 Tr. ...	69 gns.
*Telefunken 97 4 Tr. Ste. ...	95 gns.
*Telefunken 98 1/2 Tr. St. ...	95 gns.
Truvox 60 2 or 4 Tr. ...	39 gns.
Truvox Series 80/2 Tr. ...	55 gns.
Truvox Series 80/4 Tr. ...	59 gns.
*Vortexion WVA ...	£93.13.0
*Vortexion WVB ...	£110.3.0
*Vortexion C Stereo ...	£148.10.0
*Vortexion CBL Stereo ...	£160
Wyndor Trident ...	33 gns.

BATTERY PORTABLES

Uher 4000 ...	93 gns.
Cossor 1620 ...	25 gns.
Philips Portable ...	24 gns.
Loewe Opta 414 ...	47 gns.
*(Mains/Battery/Car)	
*Butoba ...	66 gns.
Clarion Phonotrix ...	39 gns.
*Fi-Cord 202 ...	66 gns.
Stella ...	25 gns.
Stuzzi Memo-Cord ...	25 gns.
*Microphone extra	

Mains Power Pack for Philips, Stella or Cossor ...	£5.0.0
Grundig Mains Power Pack ...	8 gns.

TRUVOX DECKS WITH PRE-AMPS

PD 82—Standard Twin Tr. ...	£42.0.0
PD 85—Professional 4 Tr. ...	£52.10.0
PD 86—Professional 4 Tr. Stereo ...	£63.0.0

Tape Decks by Brenell, Wright & Weaire. Tape to disc and copy service.

MICROPHONES, MIXERS ETC.

AKG D. 19c Mic. ...	£17.10.0
AKG D 88 Stereo ...	£19.19.0
Grampian Reflector ...	£6.0.0
Lustraphone VR/64 Ribbon ...	£7.17.6
Lustraphone LFV/59 ...	£8.18.6
Grampian Ribbon ...	£11.0.0
Grampian DP/4 Dynamic ...	£8.0.0
Simon 'Cadenza' Ribbon ...	£10.10.0
Reslo Cardioid ...	£10.2.0
Reslo Ribbon ...	£10.2.0
Reslo Dynamic Cardioid ...	£10.15.6
TSL 3 Channel Mixer ...	£2.7.6
Grundig Mixer Stereo ...	18 gns.
AKG K 50 Headphones ...	£7.10.0
Telefunken D.11/B ...	8 gns.

Also in stock microphones by ACOS, FILM INDUSTRIES, TELEFUNKEN, etc.

ALL WALGAIN PRODUCTS

- Splicers, Matching Transformers, Plugs and Sockets, Reels, etc.
- Stands of all types and accessories.
- TAPES by all leading makers in all grades and sizes as advertised.
- Pre-recorded by Columbia, H.M.V. Saga, Music-on-Tape.
- Defluxers by Wearite, Walgain.

Prices subject to alteration as announced by manufacturers.

HI-FI

STEREO AND MONO AMPLIFIERS

Quad H.M.V. Rogers Pye
Leak Aveley Armstrong
Tripletone Scott B & O
Chapman Eagle

TUNERS

Quad Rogers Pye Leak
Aveley B & O H.M.V.
Armstrong Chapman
Tripletone

LOUDSPEAKERS by

Quad Pye Rogers
W.B. Wharfedale
Goodmans Tannoy Kef
Mordaunt Leak Lowther
Lockwood Colrad

MOTORS, PICKUPS

Garrard Tannoy EMI
Goldring Lenco Shure
Connoisseur Decca Stereo
Decca Deram Philips Ronette
BSR B & O Pickering
Eagle Ortofon SME Mk. II
Acos Thorens ADC
All types of Diamond and Sapphire
styli, stereo and mono. Microlifts,
Garrard, Goldring and Acos Pressure
Gauges. Acos Dust Bug. Disc
Preener.

CABINETS by Record Housing and GKD.

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

Between St. Leonard's Church and Streatham Station

STreatham 0466/0192

PLEASE NOTE THIS IS OUR ONLY ADDRESS. OPEN ALL DAY SATURDAY

For highest
quality equipment



at lowest
possible prices

TO ALL MUSIC LOVERS AND HI-FI ENTHUSIASTS



TA-IS

TAPE AMPLIFIER UNITS

Models TA-IM and TA-IS

The monophonic version (TA-IM) can be modified to the stereo version (TA-IS) by modification kit (TA-IC). Special features include the provision of a bias level control; easy-to-read thermometer-type recording level indicators; large printed circuit boards. Both models have identical presentation.

TA-IM £19.2.6
TA-IS £24.10.0
TA-IC £6.15.0



TRUVOX D83 AND D84 TAPE DECKS. High quality mono/stereo tape decks. D83, 2-track for highest fidelity. £31.10.0

With TA-IM, £47.2.6
With TA-IS £52.6.0
D84, 4-track, for most economical use of tape (same presentation) £29.8.0
With TA-IM £45.5.0. With TA-IS £50.9.6



COLLARO "STUDIO" TAPE DECK. Operating speeds: 1½ in., 3½ in. and 7½ in. p.s. Wow and flutter not greater than 0.15% at 7½ in. p.s. £17.10.0

With TA-IS £35.14.0 With TA-IM £30.10.0

"MOHICAN" GENERAL COVERAGE RECEIVER Model GC-1U. Fully transistorised. 4 piezo-electric transistors. To overcome the problems of alignment, etc. the R.F. "front end" is supplied as a pre-assembled and pre-aligned unit. £39.17.6

GOLDRING-LENCO TRANSCRIPTION RECORD PLAYER Model G.L.58. Fitted with the G.60 pick-up arm, it has infinitely variable speed adjustment between 33½ and 80 r.p.m. and four fixed speeds. 3½ lb. turntable to reduce rumble, "wow" and "flutter". £19.12.6



AUDIO SIGNAL GENERATOR Model AG-9U. Delivers up to 10 volts pure sine-wave (less than 0.1% distortion, 20 c/s to 20 kc/s). Decade switch-selected frequencies from 10 to 100,000 c/s. Internal 600 Ohm N/I load, or external. £21.9.6

TRANSISTORISED TELEPHONE AMPLIFIER, Model TTA-1. Provides instant group listening and conversation. Freely portable for use with any telephone; hands-free operation; automatic switch; 9v battery operated; compact and elegant cabinet. £7.9.6

SUGDEN MOTOR UNIT "CONNOISSEUR CRAFTSMAN". Heavy duty motor operating at 33½ and 45 r.p.m. Very heavy 12 in. turntable. Virtually no rumble. £18.3.6

No electronic or soldering experience is necessary to build any Heathkit model: our simple, well illustrated manual guides you step by step. A FREE CATALOGUE of the full range, and detailed specifications of any item, will be gladly sent without obligation on your part, on request.

"COTSWOLD" SPEAKER SYSTEM

This is an acoustically designed enclosure 26" x 23" x 14" housing a 12" bass speaker with 2" speech coil, elliptical middle speaker, and a pressure unit to cover the full frequency range of 30-20,000 c/s. Capable of doing justice to the finest programme source, its polar distribution makes it ideal for really Hi-Fi Stereo. Delivered complete with speakers, cross-over unit, level control, Tygan grille cloth, etc. All parts pre-cut and drilled for easy assembly and left "in the white" veneered for finish to personal taste. Assembled weight 61 lb. £23.4.0



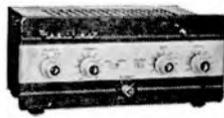
"THE MALVERN"

HI-FI FM TUNER, Model FM-4U

For your convenience, this model is available in two separately sold units: Tuning Unit (FMT-4U—£3.2.0, including P.T.) with 10.7 Mc/s I.F. output, and Amplifier Unit (FMA-4U—£12.6.0). Built-in power supply; 7 valves. Total £15.8.0

HI-FI AM/FM TUNER, Model AFM-1

Also available in two units as above: Tuning heart (AFM-T1—£5.5.6, incl. P.T.) and I.F. amplifier (AFM-A1—£20.13.0). Printed circuit board; built-in power supply; 8 valves; consecutive FM limiting and ratio detector. Total £25.18.6



S33

HI-FI STEREO 6-WATT AMPLIFIER Model S-33

Attractively styled, completely self-contained. Printed circuit makes it easy to build. Only 0.3% distortion at 2½ W/chal. 20 dB N.F.B.; sensitivity 200 mV. U/L output, ganged controls. £13.7.6

HI-FI STEREO 18 WATT AMPLIFIER Model S-99

Within its power rating, this is the finest stereo amplifier available, regardless of price. Printed circuit board construction; ganged controls. U/L push-pull output. 0.2% distn. at 9 W/chal. £27.19.6



S-99



REMOTE XIR-1U

TRANSISTOR INTERCOM, Models XI-1U & XIR-1U

Designed for use in the business office or the home, the Master unit (XI-1U) can operate up to five Remote units (XIR-1U) which give instant service without warming-up delay. "Private" switch. 9 volt battery operated. Supplied with assembled sapele-mahogany cabinets XIR-1U £4.7.6 XI-1U £10.19.6



MASTER XI-1U



USC-1

STEREO CONTROL UNIT

Model USC-1

Push-button selection, accurately matched ganged controls to ±1 dB. Negative feedback rumble and variable low-pass filters. Printed circuit boards. Accepts inputs from most tape heads and any stereo or mono pick-up. £19.10.0

TRANSISTOR PORTABLE RADIO Model UXR-1

Presented in elegant real hide case with gold relief. Can be assembled in 4 to 6 hours. Pre-aligned I.F. transformers, printed circuit and a 7 in. x 4 in. high-flux speaker. £14.3.0



UXR-1

4-wave TRANSISTORISED PORTABLE RADIO Model RSW-1

Using 7 latest type transistors and three diodes this highly sensitive set is specially designed for Short and Medium wavebands (250-500, 90-200, 18-50 and 11-18 m.). In leather case fitted with retractable whip aerial. £22.8.0



RSW-1

HEATHKIT ELECTRONIC WORK SHOP KIT, Model EW-1

This kit will help your boy to understand electronics, by making at least 20 exciting experiments, including Transistor Radios, Intercom Sets, Burglar Alarm, Electric Eye, etc. £7.18.0

POWER AMPLIFIER 12-WATT Model MA-1Z

Single channel, ideal for stereo conversion. £11.9.6

HI-FI SPEAKER SYSTEM Model SSU-1

This kit is easily assembled. It contains twin speakers and balance control in its ducted port reflex cabinet. It is equally suitable for stereo or mono in average room. (Legs 14/6). Less legs £11.5.0



SSU-1

A WHOLE RANGE OF PACKAGED DEALS (INCLUDING "CONNOISSEUR CRAFTSMAN" TURNTABLE and DECCA f55 PICK-UP) NOW AVAILABLE TO SAVE YOU FURTHER MONEY.

ALL MODELS ARE ALSO AVAILABLE ASSEMBLED. PRICES ON REQUEST.

All prices include free delivery in U.K. Deferred terms available on orders over £10.

JUST POST THIS COUPON FOR FURTHER INFORMATION

Without obligation please send me

★ FREE BRITISH HEATHKIT CATALOGUE . . .
FULL DETAILS OF MODEL(S).....

Kindly write below in BLOCK CAPITALS

NAME

ADDRESS

TICK
HERE

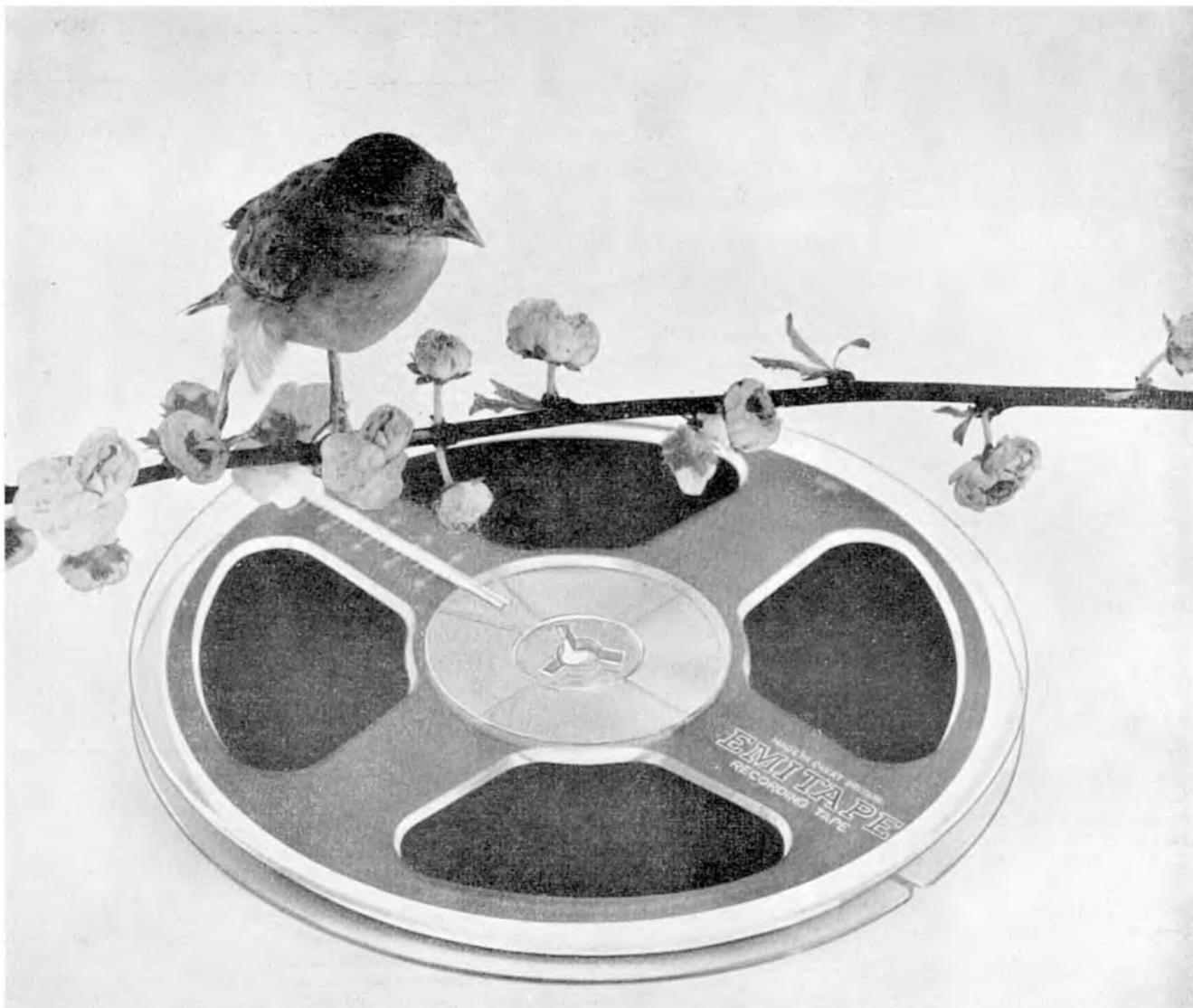
HT10

SOME OTHER HEATHKIT MODELS AVAILABLE

World's largest-selling VALVE VOLTMETER	...	Model V-7A	£13.18.6
G/P OSCILLOSCOPE (5 in. Flat-face screen)	...	Model O-12U	£38.10.0
AMATEUR TRANSMITTER	...	Model DX-40U	£33.19.0
VARIABLE FREQUENCY OSCILLATOR	...	Model VF-1U	£11.17.6
TRANSISTOR RADIO for the youngsters	...	Model UJR-1	£2.13.6
RESISTANCE/CAPACITANCE BRIDGE	...	Model C-3U	£9.5.0
AUDIO VALVE MILLIVOLTMETER	...	Model AV-3U	£14.17.6
AUDIO WATTMETER	...	Model AW-1U	£15.15.0

DAYSTROM LTD., DEPT. HT.10
GLOUCESTER, ENGLAND

A member of the Daystrom Group, manufacturers of
THE LARGEST-SELLING ELECTRONIC KITS IN THE WORLD



How to find summer with Emitape

This summer, don't leave your tape recorder at home gathering dust. Get another reel of Emitape. Then take it out and about, and give it a chance to hear what's going on in the world.

Children are playing outdoors. Lawnmowers are cricketsing. There's birdsong, and a buzz of insects. Mix these and other effects into your own tapes, and hear how evocative they

sound. Or try adding an 'on-location' sound track to a cine-film, or to a programme of colour slides.

DON'T KNOW HOW TO START? Then write in for the first of a new series of leaflets, *Tape Outdoors*. It's free! It was written specially for Emitape by John Borwick. And it tells you how to start outdoor recording. Also available—John Borwick's leaflet on *Tape Indexing*.

Get another reel of **Emitape**



Please send me your free leaflets, *Tape Outdoors* and *Tape Indexing*, by John Borwick.

NAME

ADDRESS

.....

.....

E.M.I. TAPE LIMITED, HAYES, MIDDLESEX

the TAPE RECORDER

Editor - - - - - MILES HENSLOW
 News Editor - - - - - Alan Lovell
 Advertisement Editor - - - - - Julian Berrisford
 Editorial Offices - - - - 99 Mortimer Street, London, W.1
 Telephone - - - - - MUSEum 3967 to 3969



MEMBER OF THE
 AUDIT BUREAU
 OF CIRCULATIONS

★ EDITORIAL

TWO months ago, in this column, we wrote about tape editing and we said that we intended to return to the subject. We do so now. Readers who have been with us since our first number, and who file their back numbers, will know that we published the first of a series of articles on tape splicing and editing on page 21 of February 1959. This very fine series of articles by I. W. Jarman of the BBC was subsequently re-edited and published in booklet form (*How to splice tape*). Thousands of copies of the booklet have been sold, and if we add that readership to our regular *Tape Recorder* readership of five years ago, we know that at least 20,000 people have the professional know-how required for the job. However, even that fairly large total represents only a small fraction of the total number of tape recorder owners in these islands, and we know from countless letters and conversations that the majority of tape recorder users *do not* edit their tapes. The main reason for this is that they do not know that they should. If every tape recorder dealer had made a point of telling every customer who visited his shop during the past five years, the picture might have been a very different one today.

There is something rather shocking in deliberately slicing through a length of tape for the first time. Many readers will think twice—and *not do it*—even after this editorial urge to do so! Therefore, for those who really cannot bring themselves to the point, we recommend the purchase of a small message spool specifically for that purpose. This is not the place for a lesson on tape editing, neither is there space for it here; but if we can instil the desire to “cut and splice” in even a few thousand minds of interested readers, this short column will have done its monthly job very well.

Forgetting for the moment that tape editing is a necessary art when it comes to making good tapes—and incidentally, *saving* a lot of tape in the long run, let us just say that tape editing is an amazingly absorbing pastime in itself, with no end in view other than amusement and satisfaction. It will probably surprise many readers to learn that more interest and genuine entertainment can be found in one evening's tape editing than will normally be extracted from any month's average use of the recorder for recording and playback. This, however, is most definitely true. Further, the ability to cut, edit and splice tape will immediately show up the instrument as a far more interesting and amusing possession than the average owner has ever imagined it to be. One professional recording engineer of our acquaintance regularly entertains his friends with evening sessions of cutting and editing. His star turn is to record a broadcast talk, and then to cut out bits and put them into different places, finally turning the “talk” into a complete nightmare of what it originally was! This trick is, of course, practised every day in the serious course of editing, when a nervous speaker begins with dozens of “ums” and “ers”. Sometimes the tapes are

JUNE - - - - - 1963

VOL. 5 - - - - - No. 5

CONTENTS

	Page
Tape at the Audio Festival	192
Notes on Permanent Magnetisation of Tape Heads By R. G. Woods	195
Tape Recorder Service No. 18. Ferguson Recorders By H. W. Hellyer	196
Sound and Cine By Richard Golding	199
Bulk Erasing—What, Why, How By John Berridge	202
Tape Recorder Workbench No. 47. Mixer Units By A. Bartlett Still	207
Equipment Reviewed	208
Readers' Letters	215
Classified Advertisements	216
Advertisers' Index	218

de-ummed and de-erred altogether: and sometimes a few ums are put into place in later parts of the speech (where the speaker has gained his confidence) in order to balance it all out. One professional tape editor once saved all “ums” and “ers” that he had cut out, and then strung them together as a separate, short tape.

For the initial experiments the only necessary tools are a *Chinagraph* pencil (light coloured to show up on the shiny tape back), a pair of scissors and some proper jointing tape—not ordinary “sticky tape”, because the “sticky” part of it will be squeezed out by pinch wheel and capstan, and will collect dirt and clog up tape heads. Later, an editing block and a razor blade should be used. By stopping the tape and marking the spot for a cut, and then by re-jointing the cut ends temporarily, rough editing can be done very simply. Tape can be run at half speed to make the trying-out process easier. At first, whole sentences can be removed. Later, with more skill, words can be neatly sliced out and, later still, even the tail ends of odd syllables. And, even later still, a complete dubbing on to a second machine of the edited tape will begin to point the way to the useful and serious end for this art.

One spool of tape, crammed from end to end of its two or even four tracks, is virtually un-editable without a second machine. And so it is that tens of thousands of tapes lie sterile in cupboards and on machines till the interest in the recorder dies. *Three* spools of tape, with two of them recorded on one track only, mean that two can be cut and cut and cut; and the end product will be one usefully filled spool, plus two spools of most usable spliced lengths—and so on and on. We recommend readers to make “the first cut”, and to find out for themselves what a lot of value they have so far been missing. More on this score later.

COVER PICTURE

THIS month's front cover photograph shows a recording engineer editing a tape which has just been recorded at Livingstone Recording Studios' new premises at New Barnet, Hertfordshire. The machine is an E.M.I. TR 52 and the splicer an E.M.I. Jointing Block.

SUBSCRIPTION RATES

The subscription rate to *The Tape Recorder* is 27/6 per annum (U.S.A. \$4.00) from The Tape Recorder, 99 Mortimer Street, London, W.1. Subscription + Index, 30/- (U.S.A. \$4.25). The same rates apply to *Hi-Fi News*.

TAPE AT THE AUDIO FESTIVAL

THE eighth Audio Festival and Fair closed at 8 p.m. on Sunday, 21st April, 1963, after 37,600 visitors had passed through the turnstiles. This figure was lower than last year, but this must have been due to the continuous rain that fell on London on the Saturday.

Altogether seventy-four manufacturers demonstrated equipment in hotel bedrooms spread over four floors of the Russell Hotel. The organisers appear to have realised that demonstration rooms last year were far too close together and it was remedied by taking extra floors. This was ideal from the visitors' and manufacturers' points of view, but it gave one the impression that there were not so many firms at the Festival. As usual the ground floor was occupied by a static display of each manufacturer's equipment. This gave visitors the opportunity of examining the piece of equipment before passing on to the demonstrations.

Live Artistes Featured

Live artistes were featured in two demonstration rooms, those of *Truvox* and *Cosmocord*. The first of these featured a harpsicord played by Mrs. Eleanor May. Stereo recordings were made using two single Reslo ribbon microphones fed into a Truvox PD 87 stereo recorder. Within seconds of the live performance finishing the recorder was brought into action showing how it had recorded this magnificent instrument. After four days at the show it could be said that not once was the Truvox room lacking an attentive audience. The *Cosmocord* demonstration featured disc and tape. The compere was Mr. R. Wells, who, in a very light hearted way, introduced the various items. A trio consisting of an accordion, guitar and a Spanish guitar player assisted in a "live versus recorded" test. *Acos* microphones



★
GEVAERT
NEW STYLE
TAPE
BOXES

were used throughout. The comedy was slightly overplayed and the audience appeared to be embarrassed by some of the items. Several people on leaving the room were hard to say that they had waited a year to listen to equipment being demonstrated and would have preferred a thirty-minutes' programme of a more serious nature. However, it takes all sorts. . . .!

Transistorised Recorders

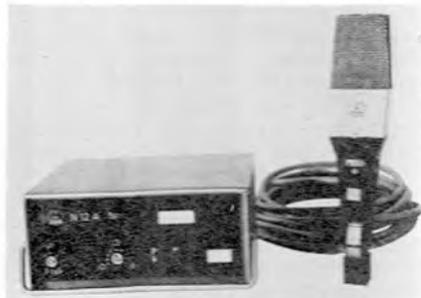
The slogan of the Festival "You've never heard it so good" seemed very appropriate. The quality of the equipment and the sound produced has certainly improved since last year, another point worth noting was the fact that although manufacturers of pre-amplifiers, amplifiers and tuners seem to be rather loathe to move on to transistors, tape recorder manufacturers have not wasted any time. *Philips, Grundig, Clarke and Smith, Garrard, Fi-Cord, Loewe-Opta, Siemens*

Norge, Butoba, Sony, Stuzzi, not forgetting the microphone manufacturers *Lustraphone, A.K.G.* and *Grampian* all featured transistors in some of their equipment.

Tape Demonstrations

Tape manufacturers also put on some excellent shows. Agfa, with the use of a 21 in. cathode ray tube and an excellent lecturer in the shape of Mr. D. S. Cox gave an impressive demonstration of the standards that have been reached by this company. In simple language, so that every visitor could understand, it was explained what was meant by signal to noise ratio, distortion, drop-outs and print-through. These were illustrated by black-and-white images on the cathode ray tube called a "Visualiser". *M.S.S.* with a demonstration entitled "This is your Tape" gave the enthusiast the opportunity of hearing comparisons between tape manufactured in 1959 with the tape manufactured today. Three recorders were used to

★
A.K.G.
C 12A
CONDENSER
MICROPHONE



show how a drop-out compared on $\frac{1}{4}$ - and $\frac{1}{2}$ -track machines at various speeds. Bias was also dealt with with the help of an illuminated board showing the effects obtained by increasing and decreasing the bias voltage. For the technical enthusiast a drop-out counter produced by *M.S.S.* was in operation in the room. *B.A.S.F.* featured a complete four position tape language laboratory and visitors had the opportunity of hearing what happens when this latest aid to teaching is used. For those interested in tape exchanging a booth was provided and tape supplied for messages to be sent to relatives and friends at home and abroad. The main theme of the *C.B.S.* stand was the new range of tapes produced for $\frac{1}{2}$ -track heads. Mr. L. Guest gave a programme entitled "High Fidelity in Sound and Colour" in the *Gevaert* demonstration rooms. This consisted of music recorded on Gevasonor tape and colour slides on Gevacolour film.

Other Manufacturers Showing Tape

Other firms showing and demonstrating tape included *E.M.I., Zonal, Irish, Scotch, Ampex* and *Sony*. With such a wealth of tape manufacturers in this country it is surprising so very little is used by individuals who appear to consider tape non-expendable and non-cuttable.

Returning to tape recorders, possibly one of the most interesting was the *E.M.I.* 311 professional recorder believed to be the first tape recorder in the world to have a head block that can be reversed to meet both American and English standard. Other recorders featured included the RE 321, TR 90 and TR 52/2. *Vortexion* with their C.B.L. stereo recorder fitted with the latest stereo deck aroused much interest as did their mixers. Turning the faders on the units gave the impression that everything was encased in oil. Judging by the comments of some

TAPE AT THE AUDIO FESTIVAL

of the visitors in this room some bank statements will go from black to red! *Brenell* with the Mark 5 Series 2 and the STB 1, two newcomers to the show, proved that as one of the first manufacturers in the tape recording field they are still very much up at the front. *Ferrograph*, *Tandberg* and *Revox* gave their usual impressive demonstrations. The *Grundig* room was always full of keen interested enthusiasts studying the new models produced during the past year. The TK 46 stereo and TK 41 recorders collected most attention. *Philips*, on the other hand, with virtually a complete new range of recorders since the last Festival gave visitors the opportunity of hearing some of the recordings made on transistorised machines.

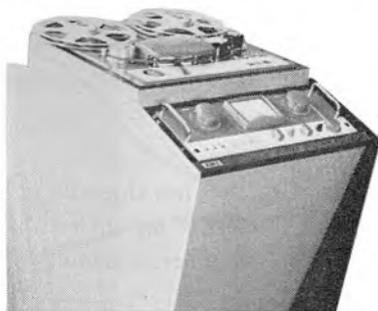
Clarke and Smith with the TR 634 and TR 635 featuring the *Wearite* and *Truvox* decks respectively. Both machines use speeds of $7\frac{1}{2}$ and $3\frac{1}{2}$ i/s and are two track. 10 watt outputs allows the machines to be used in large halls and schools without the use of additional amplifiers.

Radio Controlled Microphone

A radio controlled microphone developed since last year's show was featured in the *Lustraphone* room. A roving reporter was sent into the park opposite the *Russell Hotel* and excellent results were heard at the receiving end. A reverberation unit, produced for use with tape recorders and amplifiers was demonstrated by *Grampian*. Using a *Ferrograph* recorder this unit, which can be remotely controlled showed the varying amounts of reverberation that can be obtained. The unit completely transistorised, operated from one 9 volt battery.

Two completely new microphones were to be seen in the *A.K.G.* room. The C 12A condenser and the D 77A Dynamic Stereo microphone. Although the price of the condenser is possibly too high for the average individual at £139, the D 77A is modestly priced at £15 10s. *Standard Telephones and Cables*

★
E.M.I.
MODEL 311
PROFESSIONAL
RECORDER

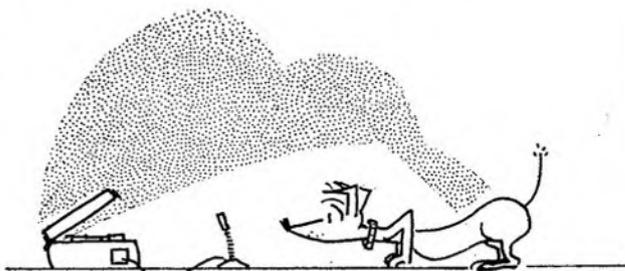


also introduced two new models in the medium price bracket—the 4113 ribbon cardioid and the 4114 moving coil priced at £11 11s. and £3 13s. respectively. Stereo dynamic headphones were also shown for the first time weighing only 10 ozs. and priced at £6 6s.

Summing Up

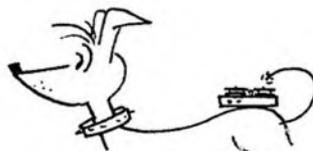
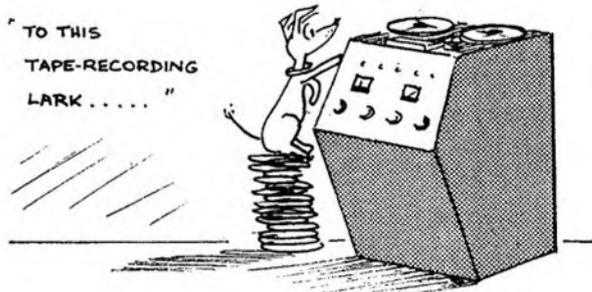
Summing up, the 1963 Audio Festival once again gave visitors the opportunity of making comparisons between different models on show. It also gave them the chance of meeting the designers and salesmen and even the directors of recording organisations. Searching questions were asked and frank answers given, but anyone contemplating the purchase of a recorder, microphone, mixer tape or splicer in the next few months, must, after visiting this show, have a clearer idea of what is required.

OUR WATCHDOG HAD A TOUCH
OF THE AZIMUTHS AT THE FAIR . . .



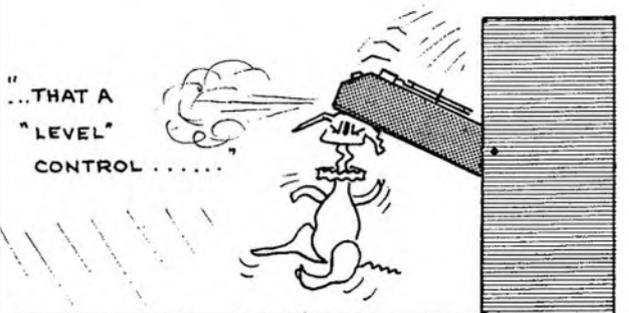
"UNACCUSTOMED AS I AM . . ."

"TO THIS
TAPE-RECORDING
LARK . . ."

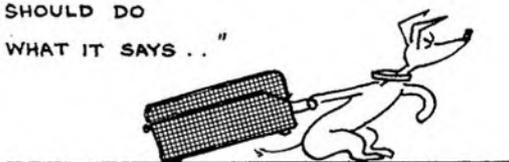


"... I FEEL . . ."

"... THAT A
"LEVEL"
CONTROL"



"SHOULD DO
WHAT IT SAYS . . ."



63



THIS IS A REVOX

This is the machine that has three Papst motors, three heads, no pressure pads or tensioning pins, takes up to 25 cm. spools and winds 2,400 feet of tape in less than 80 seconds. Hum level is negligible due to the use of screened heads and face covers, D.C. heated pre-amplifiers and low stray field mains transformer. Stereophonic recordings may be made, replayed and amplified to cathode follower level (0.7 volt). A monitoring amplifier is provided which may be switched into any one of the two input and two playback pre-amplifiers or to the combined output of both channels. This monitor amplifier is of real Hi-Fi quality, and has an output of more than 6 watts (push-pull) with very low distortion content. More detailed information available on request. **PRICE: 112 gns. in portable case, 107 gns. chassis only.**

Please send details of Revox F36, and Local stockist to:

Mr

Address

REVOX (U.K. Concessionaires) Ltd.

296 Kensington High Street, W.14. WES 4342

6TR63

—REVOX for the quality you desire but so seldom find.

NOTES ON PERMANENT MAGNETISATION OF TAPE HEADS

IN considering the causes of remanent magnetisation of heads one must appreciate that every ferromagnetic material will display the phenomenon of "magnetic remanence", i.e. every preceding magnetic excitation will leave behind a certain magnetic bias.

The strength of the residual magnetisation will depend on the magnetic antecedents, coercive force of the material and the effective permeability of the magnetised circuit. Most recorder heads use very high permeability core material and sensitive heads which do not use rear gaps are particularly prone to high residual magnetisation.

From investigations it has been found that there are several causes which can contribute to this effect; some of these are:—

- (a) Use of bias frequency having a rich even harmonic content (asymmetrical waveform).
- (b) Switching surges caused by track switching or change-over from play to record, etc.
- (c) The passage of D.C. through the head winding such as that caused by leakage current through a coupling capacitor of a transistor input stage or an incorrectly positioned diode rectifier in the modulation indicator stage.
- (d) The passage of a D.C. magnetised tape over a play-back head.
- (e) Incorrect dimensioning of head feed stage of an amplifier where sudden high input levels can be rectified and the use of a too high value coupling capacitor to the head feed which transfers large peak voltage impulses.

Close attention to these points can help in reducing remanent head magnetisation but may not completely avoid it and it is common practice to provide for head demagnetisation by

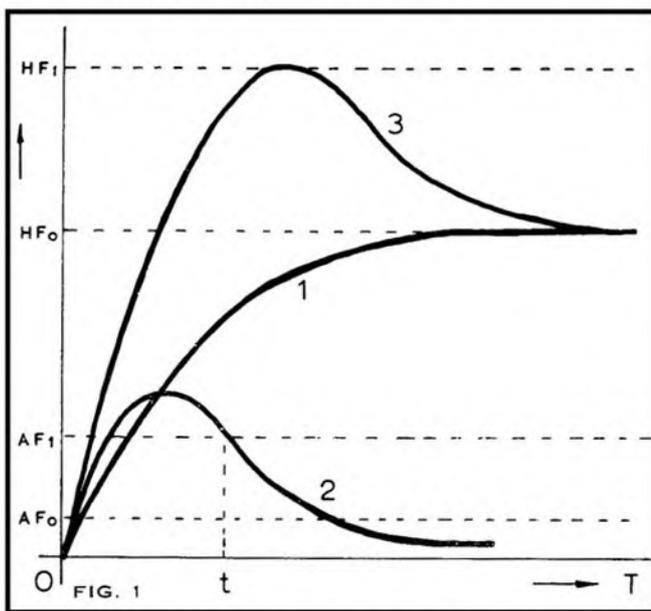


FIG. 1 having a large capacitor in the H.T. feed to the oscillator which will provide a slow decay of the bias to the record head when the record switch is turned off Tests have shown that this * Miniflux Electronics Ltd.

measure is not always fully effective since magnetisation may occur when the record switch is turned On and it can also be shown that the amount of demagnetisation provided by the set bias level is usually insufficient to demagnetise the head to a level below which its effect is not noticeable.

Details are now given for a simple circuit modification which can be arranged to overcome these defects.

In this circuit the demagnetisation of the record head is effected when switching On to record by arranging that bias

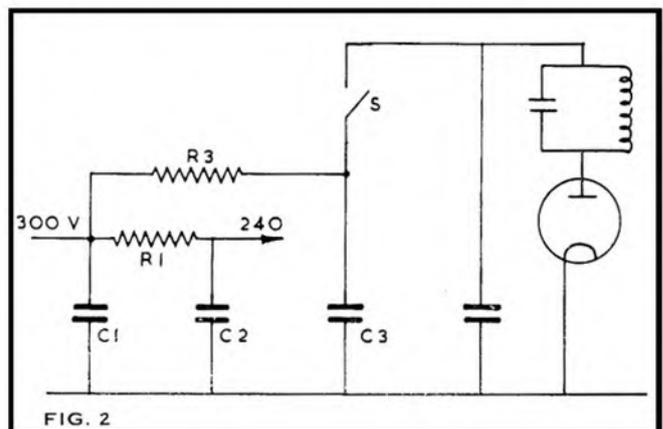


FIG. 2 level is momentarily increased to a much higher value over a time period longer than that of any "switch on" magnetising impulse. Operation of the circuit can best be explained from fig. 1.

Normal Operating Bias Level

The normal operating bias level of the oscillation is shown as curve 1 where it is seen to rise gradually from switching On at $T=0$ to a steady value HF_0 . Now the maximum operating AF current to the record head is represented by a level AF_0 . From experiments it is found that the maximum permissible D.C. impulse level (that will not magnetise the head with the given bias level) is shown as AF_1 .

If on switching On an impulse (curve 2) is generated which exceeds the maximum permitted level (AF_1), magnetisation of the head will occur, but if the circuit is arranged so that there is a temporary increase in bias level (curve 3) the duration of which is longer than the D.C. impulse (say up to it) then the D.C. impulse will be harmless.

A Simple Circuit

A simple circuit is shown in fig. 2 which performs this function. The components C_1 , C_2 , and R_1 are the normal HT supply filter arrangements where an elevated HT of approximately 300 volts is available at C_1 from the rectifier. This high voltage is applied via a resistor R_3 to a storage capacitor (50-100 μ FD) C_3 . When the switch contact S is closed for recording operation, the oscillator receives the full increased HT for a time period dependent on the time constant of the circuit after which the voltage falls due to the passage of current through the resistor R_3 to the normal operating level of the oscillator which corresponds to the predetermined bias level.

This circuit is given for its simplicity but quite obviously other arrangements can be used to give the same effect.

TAPE RECORDER SERVICE

No. 18 FERGUSON FTD3 AND FTD4

By H. W. HELLYER



Ferguson 3202
Four-track
Recorder

It was a bold venture by Thorn Electrical Industries, in mid-1962, to bring out, in quick succession, two versions of a British-designed tape deck in their medium priced tape recorders.

Bold, because this was by no means the most affluent period in the trade, and because the existing models which used the popular B.S.R. deck (the 441 and 445) were quite competitive. Indeed, most of the machines on the popular front were based upon one of the principal three—B.S.R. TD2, Collaro "Studio" and Garrard Magazine deck. We cannot assess the economic result of this venture, and can only wish their enterprise the luck it deserves. We can, however, take a look at the special problems of servicing that may arise, and point out the individual features of the Ferguson decks that are worthy of attention.

Two Track Machine

The FTD3 is a single-speed, two-track deck, which was first fitted to the Ferguson 3200 tape recorder. With a $3\frac{1}{2}$ i/s speed, spool size of $5\frac{1}{2}$ in., and a Rewind time of $2\frac{1}{2}$ minutes in either direction, this single-motor deck is built to meet standard requirements. There were several features incorporated to give it that little extra which will appeal to the enthusiast: an EM87, fast-rise recording level indicator; digital tape position indicator with a reset button, and a "decay" switch setting that comes into action during rewind or "off" to help reduce the effect of head magnetisation. There are also inching and pause facilities and a very easy form of piano key control.

For the benefit of owners who wish to know more about their machine than is published in the sales brochures, we might add the following specifications. Wow and flutter: better than 0.2 per cent. rms. R/P head impedance, 500 mH, (D.C. resistance 300 ohms); Erase head impedance 0.5 mH (D.C. resistance 1.7 ohms); Bias frequency, 55 kc/s. Frequency response 60-10,000 c/s ± 3 dB. Bias voltage is 25 volts, measured across the head with a valve voltmeter, and the erase voltage is 40 volts, measured in a similar manner. The signal-to-noise ratio is better than 40 dB, input sensitivity: microphone, 1.5 mV into 10 Mohms; radio, 1.5 mV into 22 Kohms; pickup, 75 mV into 1 Mohm. Output levels are: radio, 500 mV at 22 Kohms; ext. 1/s, 3 watts into 3 ohms.

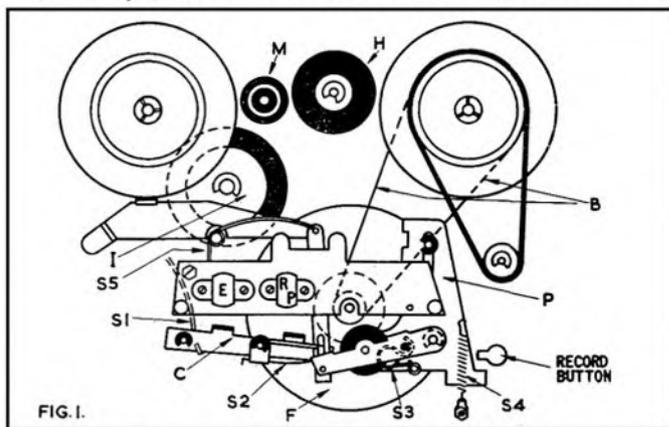
The principal mechanical features are shown in fig. 1. To forestall criticism, I should again point out that the drawings in this series of articles are prepared from my workshop notes and are not precision layout diagrams. What they lose in exactitude, I hope they gain in presenting the basic information necessary to underline these service notes.

Spring Tension

It can be seen that this is a lever-operated deck, and a number of springs are incorporated for positive engagement and lever return. It is important that these springs are correctly tensioned and that levers are free to move properly. There are two main strictures: levers should not bind at pivot points, especially where circlips are used for holding in place; and over-enthusiastic lubrication should be avoided. Excess of grease and oil on moving parts is one of the bugbears that the service engineer comes to expect. It picks up dirt and ultimately causes an aggravation of the very fault it was first applied to prevent! The only parts requiring occasional—very sparing—lubrication are the spool bearings, intermediate wheel bearings and the

upper bearing of the flywheel. A clean, dry, polished surface is the best finish for other moving parts.

The deck is easily removed. Control knobs pull off, as does the moulded cover protecting the heads, then the four screws securing the top cover can be released and the cover lifts from its location in the grommets set in the top plate of the mechanism. There are two screws securing the socket panel cover and the voltage selector "window" and two screws at each side of the top plate. Remove these, and the whole assembly can be lifted clear. The loudspeaker can be disconnected, if required, by pulling off the tags. No soldering is needed—but



there is one point worth mentioning, which applies to all decks. When servicing, always reconnect the loudspeaker, either by removing it and joining the original wires, or by fitting an extension lead. This gives protection to the output stage, which should never be allowed to operate unloaded. Switching transients, etc., can do immense harm to an output transformer, and output valves, like technical writers, dislike hollering into a void.

Alternative Motors

The printed circuit board comes away from the base of the mechanism if it is required to get at the components, but if this has been disturbed, take great care with the location of the switch bracket. With the board in position, the switch lever arm should just touch the baseplate. The method of adjustment is to slacken off the two screws in the plate near the front edge, and adjust the board itself until this condition is achieved. The fixing holes are slotted to allow for this adjustment. Finally, retighten the two screws.

Note that there have been alternative motors fitted. On some early models, the motor had a 0.7 in. lamination stack. Later models had a 1 in. stack and these were connected to the 225 volt tapping instead of directly across the transformer primary. A larger clutch pad was also fitted on these later models, and some had an adjustment screw in the latch plate, which will be described later, when we come to the two-speed version.

On the single-speed machine, the intermediate wheel *I*, in fig. 1, is brought into contact with motor pulley and flywheel, to give primary drive. The diagram does not show a third dimension, but the relative depth of these parts is evident as soon as the deck is inspected.

The idler is mounted on a plate, with lever movement pivoting

TAPE RECORDER SERVICE

No. 18 FERGUSON FTD3 AND FTD4

By H. W. HELLYER

it into place and a spring, located beneath the right hand spool carrier, which supplies tension to the upper corner of this plate. A clutch belt *B* drives the right-hand take-up pulley from the flywheel *F*. If take-up is erratic or sluggish, check that this belt is correctly positioned, especially on the small pulley section of the flywheel.

Pressure Pad Assembly

There are four other important springs, denoted on fig. 1 as S1-5. When the Record/Play key is depressed, the operating plate *P* moves forward against the tension of spring S4. The pinch wheel is carried in to engage the flywheel capstan and pressure is regulated by the movement of the plate and bracket, aided by S3. If this spring relaxes (a similar fault to the operating arm spring on the BSR tape deck), the pinch pressure may be inconstant, leading to wow. Usually, this spring has a reverse effect if damaged; the return action to neutral when the Stop Key is depressed becomes sluggish. But note that the pressure pad assembly is interconnected, and the lift-off spring S2 can impose too great a pressure on the pinch wheel bracket if the pressure arm bracket is binding. Engagement of the pressure bracket *C* is aided by S1.

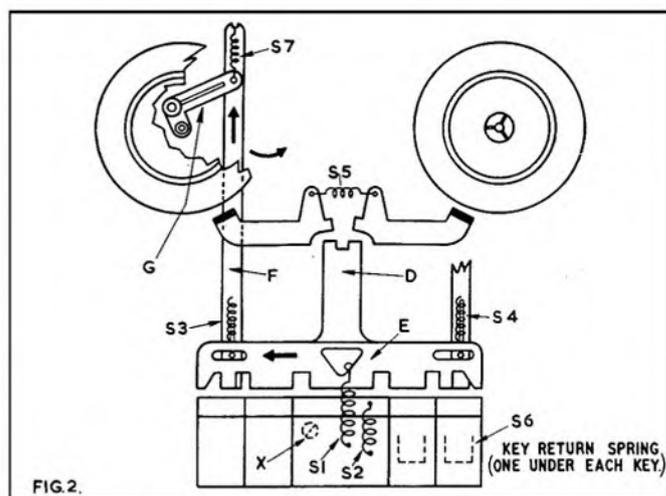
The pause brake is coupled to the operating bracket by S5, sufficient braking power being applied by a single pad to the left-hand spool carrier, the lower end of the bracket holding off pinch wheel and pressure pad assembly while the key is held. These "wire" springs are especially vulnerable, and no attempt should be made to regulate the various pressures by bending them. Hardened steel cannot be reformed without annealing and re-tempering, so a spring that has to be bent is invariably weakened. Tension springs are a different proposition: they



can be stretched slightly by opening the pitch of the turns, but an increase in tension is best effected by cutting a small portion from the end of the coil spring and then adjusting by slight expansion. Obviously, care must then be taken that too much is not lopped off.

Latch Plate Mechanism

The next important part of the mechanics is the latch plate beneath the operating keys. This has a locking action when any key is depressed, and is neutralised by depression of the Stop Key. Two springs assist this double action. Referring to fig. 2, these are S1, the brake link spring, and S2, which provides the upward pressure. If the keys do not lock into position when



depressed, the latter spring may be at fault. But note that the pressure of this plate can be adjusted on the four-track deck and also on some later production runs of the two-track. A screw will be found (dotted X in fig. 2) and should be adjusted until the plate clears the bottom edge of the control keys by 0.02 in. If the brake link spring S1 is dislodged, the latch plate action will be impaired.

Braking Arrangements

Also shown in fig. 2 is the braking arrangement, and the fast wind spooling links. The brake arms are pivoted, and held off the spool carriers by the forward position of the arm *D*, against the tension of spring S5, which acts to assist engagement when this preventative pressure is removed by depression of the Stop Key. The spring S1 helps to hold the arm *D* away, and the interlock plate *E* has slots through which the pillars of the brake plate *D* are fitted. This interlock plate slides sideways during Rewind and should be checked if spillage is reported when the brakes are applied at the end of fast winding.

Direct engagement of the left-hand spool carrier with the motor pulley is effected during Rewind by the movement of the spooling link *F* in the direction showed arrowed. It can be seen that this movement pulls the angle arm *G* upward with the aid of S7, and S3 provides clean return action. S4 is the matching spring on the right-hand link, with the rest of the assembly omitted from the drawing for ease of presentation. The action, however, is similar, with the difference that the right-hand spool carrier engages drive wheel *H* (see fig. 1), which in turn engages the motor pulley to give the appropriate direction of rotation.

Important Differences

FTD4. The four-track deck has several important differences, but is basically similar to the foregoing. Most important, of course, is the speed change assembly for the additional slow speed of 1 1/4 i/s. There is a bracket and a cam, with two more springs; one for the lift arm that changes the level of the idler wheel, and the other from the secondary arm on which the idler rides to the primary pivot point. If speed changing is not in order, check that the ramp has full movement and that this latter spring is not relaxed.

Other differences are the additional braking arrangements, with two solenoids. One is for the facility of remote control pause, the circuit of which is shown in fig. 3, and the other is the main braking solenoid. The solenoids are powered by a 32.5 volt negative and depend on the discharge of the 450 microfarad electrolytic capacitors for the high starting current. The "Holding" current is then supplied via the series resistors. Action is initiated by short-circuiting the series circuit; in the case of the Stop solenoid, by the metal foil of the tape leader; the Pause solenoid is operated by remote switch S1. Note the safety device of the series switch S2. The purpose of this is to avoid inadvertent action of the Pause mechanism while switching the machine between functions (when switching from Record/



for the professional

IRISH

—the recording tape that gives the finest fidelity possible. How? Through the unique Ferrosheen process. Exclusive to Irish tape, this process produces a mirror-smooth surface to a magnetic tape with distinct technical advantages to satisfy even the most meticulous professional. The Ferrosheen process makes for exceptional high frequency response (due to precise perfection of tape/head contact) . . . head wear is minimal . . . external lubrication unnecessary — less oxide abrasion, no lubricant build-up on recorder head . . . minimum drop out . . . maximum reduction of background noise. Your Irish Tape stockist, and other details including technical data, from A. C. Farnell Ltd. Hereford House, Vicar Lane, Leeds 2 Tel: 35111.

* IRISH', 'FERROSHEEN' and 'Signature Binding' are registered trade marks of Orradio Industries Inc., Opelika, Alabama.

TAPE RECORDER SERVICE—(continued)

Play to any other function, particularly). The circuit is rather more complicated than as shown, having an auxiliary socket position and continuation through the microphone plug and socket. Setting of the solenoids is done with the R/P switch depressed.

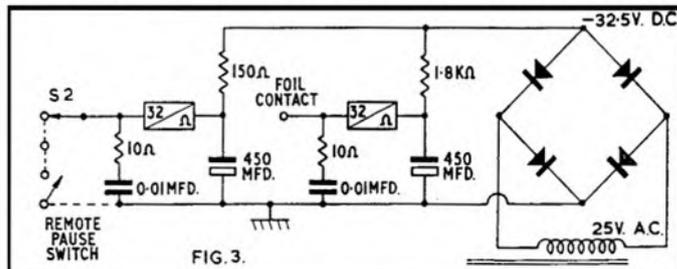
The Stop solenoid link screw is adjusted until the latch plate just trips to release the key, provided that the setting of the latch plate—as described earlier—is correct. The Pause solenoid, energised, should have correct braking pressure and should allow a clearance of between 0.01 and 0.015 in. between the pinch wheel and capstan.

Note that the pressure pad assembly also differs on this deck, having a rocker pad and direct linkage to the pressure bracket.

Different Heads

Some models, bearing the suffix *M*, had other differences. Alternative heads were fitted. It is important, if carrying out subsequent modifications to bring machines up to date, to check that there is a clearance of 0.09 in. between the head face and screen, and that the erase head is level with the edge of the mounting plate.

An alternative oscillator coil, with a white spot, may be fitted. In this case, three capacitors may be changed in value to 50 pf. These are the 220 pf across the head input (erase), the 220 pf



from the oscillator coil to the head switch and the superimpose bypass, normally 100 pf, which shunts the oscillator coil to chassis, and which is beneath the switch.

Once more, lack of space prevents our going into the electronics of the two principal machines that employ these decks, but a final note should be made about Hum.

Humdinger Fitted

A humdinger (200,000 ohms, wirewound preset resistor) is fitted across the heater winding of the transformer, with the tapping taken to chassis. This should not be disturbed, normally, but if valves are changed, some regulation may be necessary to reduce hum pickup. First, remove the tape spools, switch to Record and turn the tone control to minimum, gain to maximum. The chassis should be electrostatically screened (do not disturb the input stage screening). Connect a sensitive valve-voltmeter between the junction of the 0.05 mfd (0.02 mfd in earlier models) connecting to pin 9 of the ECL86 and the 0.04 mfd that joins it and chassis. Short out the 1 megohm resistor to the tapping on the oscillator coil to stop oscillations. Connect a dummy input of 1,000 pf between pins 4 and 5 of the microphone plug. Adjust for minimum reading on the meter. Approximately 50 mV should be expected.

Important Note

As with all electronic tests on tape recorders, remember to allow the machine to warm up for at least ten minutes before making any adjustments.

VOLUME FOUR INDEX FOR TAPE RECORDER
NOW AVAILABLE PRICE 2s. 6d.

SOUND AND CINE

STUDIO FILM CRAFT
FOR ACTORS

By RICHARD GOLDING

The photograph on the right shows one of the leading students at the Television and Film Craft school taking part in an "Emergency Ward 10" type setting.



IT is fashionable to make comparisons between the various international film technique schools, to compare the merits, say, of the Centro Sperimentale in Rome with the Polish school at Lodz, and to lament the lack of similar establishments in our own country. It is the lot, also, of some of our film intellectuals to campaign unceasingly for the setting-up of a national, State subsidised, film school here where the curriculum would follow that of Lodz with its five faculties: Direction, Camerawork, Theory and Criticism, Production Organisation, and Acting. This course, at Lodz, lasts four years and costs the State £100,000 a year to run and if each student were to pay his own fees, board and lodging, and filmstock costs he would need over £3,000 to cover him for the four years. There is no doubt that the Polish Film School is a great success and that the present high prestige that the Polish feature film enjoys is due in part to the high quality of these young technician graduates who have been accepted readily by the industry. We must remember, however, when we make these comparisons that Poland had no studios, no equipment and practically no technicians at the end of World War II and virtually had to start from nothing.

A.C.T.T. System of Grading

With the British film industry we have a different situation entirely. The main studios have been running continuously for a great number of years, there is no shortage of quality technicians, the A.C.T.T. system of grading seems to work to satisfaction and there are dozens of training schemes all along the line. Some Polytechnics run film technique classes as an extension to their still-photography courses, there is the London School of Film Technique with a full-time six months' practical Cinema course and then there are the Television training schools.

What we do not have, and this seems to me to be important, is some sort of intensive training school for actors. Some drama schools do dabble but there seems to be precious little specialisation and we are faced with a situation where, in a country where Film and Television now predominate, we have a large number of actors emerging who know everything about movement under the proscenium arch but nothing about movement in front of a camera.

Spare-time Hobby

This sort of situation is not only frustrating for the actor but also for the film casting director when placing new talent. One such casting director, Ronald Curtis of Merton Park Film Studios, has sought for a number of years some way out of this problem. As a professional with thirty years' experience in feature films and all kinds of documentaries he knows only too

well what the young, inexperienced actor is up against when he applies for his first film part and just how much a completely new technique is required when acting for the film.

To help both himself in his casting problems and the young actor, too, Ronald Curtis began teaching film acting technique in his spare time as a hobby in Max Rivers' rehearsal rooms. The experience was most rewarding but not complete enough for there was a lack of suitable equipment and adequate space for permanent set building. Late last year, however, he decided that the only way to back theory with extensive practical work was to set up his own professional filmcraft school.

The Auricon Sound-on-Film Studio Model 16 mm Camera

In November 1962, he found a suitable suite of rooms at Laystall Street and there he started his Television and Film Craft School. He decided that the course should revolve around one practical asset—a filmed record of the student's progress—a talking example of what the actor's capabilities really were. With this film in his possession, an actor, desiring a specific part, could simply show the casting director how he shaped in certain roles, how his voice sounded and how he moved in the limited space. A living testimonial of his ability. The obvious choice in equipment was a film camera that could shoot lip-sync dialogue and the first buy was the new Auricon Sound-on-Film camera. This 16 mm recording camera is fitted with a magnetic head for recording on pre-stripped film inside the camera. The complete outfit consists of camera, headset, microphone, amplifier and a constant speed motor. Six-hundred feet magazines are used giving a run of 16½ minutes at 24 f.p.s. The 10-1 Angenieux Zoom lens with 12 mm to 120 mm was chosen to complement the camera by reason of its versatility. Other equipment included a Vortexion tape recorder and Film Industries microphone for use in rehearsals and commentary training, a full range of lights and a variety of flats, staging and other useful properties.

Fencing Instruction

Ronald Curtis himself was the obvious choice for the school director and chief lecturer but he needed experienced personnel to back him up. Tony, his son, who also works for Merton Park Film Studios offered his assistance as art director, a field he is experienced in having served his apprenticeship with one of the leading architects, Mr. A. J. Northclift. The actor, Tony Wall, was appointed to take charge of commentary reading, Voice-Over tuition and all sound matters. Jack Craig, a well-known make-up man, was brought in and the lecturing team was completed by Ian Mackay as fencing master. Fencing plays a large part in the instruction of correct movement and is not taught primarily for those who are required for swordplay.

STELLA SUPREME!

**NEW 4-SPEED, 4-TRACK
STELLAPHONE GIVES 34
HOURS' RECORD/PLAYBACK
WITH SUPERB SOUND
QUALITY**

Meet the great new Stellaphone – Model ST 459! This – the most magnificent tape recorder in the whole Stella range – is a truly impressive instrument that features no less than four international tape-speeds: 15/16"/sec., 1 7/8"/sec., 3 3/4"/sec., and 7 1/2"/sec. In conjunction with the latest 4-track recording technique, the ST 459 can therefore achieve no less than 34 hours' playback with a 7" reel of DP tape.

4 SPEED
4 TRACK **3** **4** HOURS



Other notable advantages include: Unsurpassed sound quality at all tape speeds from 5" x 7" elliptical speaker • Fully labelled controls for easy operation • Unusually 'clean' and tidy deck layout • A transistorised amplifier cuts the weight of the complete recorder to only 26 lbs • No warming-up time required • Stereo socket giving, with additional equipment, facilities for duo-play, multiplay, and stereo replay • Wooden cabinet covered in washable two-tone PVC cloth • Supplied complete with sensitive moving coil microphone, reel of 7" long-play tape, and an empty take-up spool

HEAR IT
AS SOON
AS YOU
CAN!
62 GNS



Stella
The ideal companion

SOUND AND CINE—continued

The Curriculum

The course was split up into twelve evening sessions of two hours each lasting over six weeks and took the following pattern:

Lesson 1. Script reading. Camera lecture. Studio procedure. Interviewing with tape recorder. Fact finding and corrections.

Lesson 2. Film and Television make-up. Recap on first lesson using Studio "Know How" sheets. Continue make-up lesson.

Lesson 3. Camera positioning. Rehearsal of given scripts. Layout of scenes. Run through for recording of Commercials. Questions.

Lesson 4. Continue lesson three with artistes word perfect. Rehearsal of acting scene and Commercials. Questions and Talks.

Lesson 5. Timing dialogue for acting scene. Acting Commercials and recording scene. Speech correction and use of words.

Lesson 6. Continuation of the fifth lesson.

Lesson 7. Fencing. It is essential that in all film and TV work the Artiste obtain a rhythm of movement with a preconceived idea to co-ordinate the action to dialogue. This lesson is important and a vital part of television film training. It includes certain exercises designed for grace and deportment. The Artiste is taught the fundamental principles of fencing under a skilled instructor. Dress required: black tights, blouse or sweater, white plimsoles and a right-hand leather glove. The lesson is repeated each Monday until the end of the course.

Lesson 8. Completion of make-up lesson. (Artistes now make themselves up.) Mistakes rectified. Continuation of film acting lesson.

Lesson 9. Continuation of Commercials and television lesson.

Lesson 10. Continuation of film acting lesson. Recap on Studio "Know How". Continue acting lesson. Recap on all previous work.

Lesson 11. Movement. Voice recording (Commentaries and Commentators).

Lesson 12. Final recording of memorised commentary and commercials. Complete run through of scenes previously timed and played. Movement—fencing. Questions. Advice and talks regarding Agencies.

The actual production of the film examples takes place on a Saturday or Sunday preceding the last lesson. Students are notified of the time and of what wardrobe to wear. They must be prepared to spend all day at the studios.

Quite obviously, everything is not detailed in the curriculum, for instance, a vital part of Voice-Over is the post-synching to film loops. The school places special emphasis on this training as dubbing to picture is a very difficult process and actors experienced in this technique are in short supply.

The Films

There are three kinds of films produced and of these the most important is the Actor's film. In this he chooses his various roles, portraying, for instance, a gangster in one scene, a comic Frenchman in the next and a Television Commercial announcer in the last. This is the small composite film, lasting perhaps five minutes, which is to help the Artiste sell himself. The second type of film is designed for the Model or Film Employment Agency and can contain up to ten characters. Each character plays a scripted part of his own in a scene of not less than one minute's duration. The third type of film is designed to help the smaller agent and is primarily a parade of his avail-

able talent. Agents find these of infinitely more value than the normal selection of stills when sending off information to their clients.

The evening I was there in the studio the atmosphere was quite exciting for one of the actors was tuning into his part as a tough, vicious drug addict who was giving his girl friend some strong-armed treatment. Later I found that this actor was really a professional film stunt man whose ambition was centred on higher things than acrobatics. While I was there, watching, I sat at a most authentic looking bar in the corner. It was dry, of course, for it had been constructed as a set but it had the most fabulous collection of bottles that it just about gave me the thirstiest evening of my life. It had been left as a permanent fixture because it looked so good. And there at the bar I had the opportunity of discussing the course with an actor. "For me," he said, "the most vital part of the whole business is the example film one receives at the end of it all. It is a valuable record of my progress but, more than that, I now have visible and immediate evidence of what I can do. I can, if needed, even send the film off to New York if there is a part going which I think I can fill and all that it will cost me is the postage. Of course, in the first place, there is the expense of the course and the filmstock but this is only a fraction of what I would normally spend for a year's supply of good still pictures."

More Than a Commercial Effort

I left with a most agreeable feeling for the whole enterprise for it seems that Ronald Curtis regards this as much more than a commercial effort (the initial outlay on equipment is going to take a long time to be recovered in any case). In fact his last words were: "It's no fun working with anyone who hasn't got it!" I applaud his attitude for it seems that he, at least, is taking a step in the right direction. The address: Television and Film Craft Ltd., 10 Laystall Street, E.C.1.

BINDERS

for
THE TAPE RECORDER

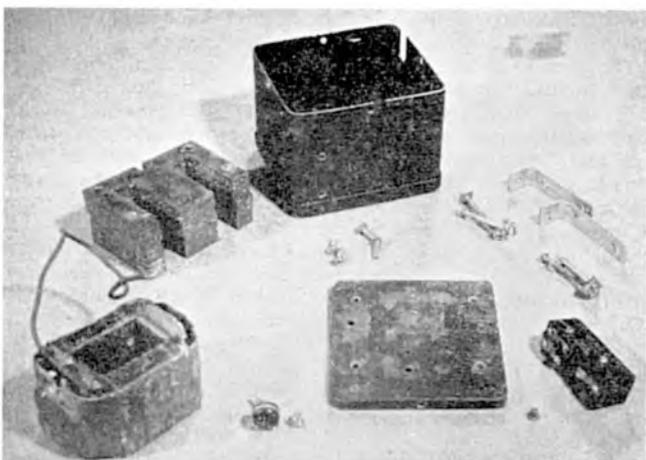


Semi-permanent Binders for Volume 5 now available.

From the first number keep your copies clean and ready for easy reference. Semi-permanent binders are available for volume 4. Each case will take twelve copies plus index and will open flat at any page. They are covered in black buckram and gold blocked on spine with name and volume number. Also available, volume 3.

Price 15s. post free.

MILES HENSLOW PUBLICATIONS LTD
99 MORTIMER STREET, LONDON W.1



The bits and pieces necessary to assemble a simple but effective bulk eraser. Not shown is a length of mains cord and appropriate plug, plus the remaining parts of the transformer which were not used.

THE disadvantages inherent in erasing a tape to the blank state using the erase head built into the recorder are many and arguable, but the main one is the impractical length of time involved. For this reason more than any other, bulk erasers of one sort or another are becoming regarded as an essential accessory to the serious recordist. The pros and cons of both methods will be presented later in this article, and since recorder erasure has been well covered over the years in many articles, I will not touch on it here.

The What

One important aspect of magnetic tape erasure is frequently overlooked. There is no simple way to demagnetise the applied magnetisation *directly*. You cannot simply remove the magnetic signal (an inaccurate phrase I realise, but not ambiguous) in the same sense that you can wipe chalk marks off a blackboard. To continue the analogy, it can only be done by filling in the total surface of the blackboard with chalk, so that any markings there previously lose their identity in a sea of white, then wiping off the whole blackboard until all the chalk is removed. In other words, tape can only be erased by the roundabout process of first magnetising it so that all oxide particles are at the same level of magnetisation and then removing this one level of magnetism.

One practical aspect of this lies in trying to determine at exactly what level to magnetise the tape. Rather than try to estimate what field strength was achieved by the strongest recorded signal voltage, it is far easier simply to apply a signal which will magnetise any tape to the saturation point. We simply apply a strong voltage to saturate the tape completely.

Logically this would seem to be sufficient (and some recorders in the past achieved this state by using a permanent magnet against the tape), since there would be no variation in field strength along a length of this tape, and thus no voltage variations across a playback head and no audio information. There will, however, still be a strong steady voltage produced across the head by the motion of a magnetic field past it (the whole principle of tape playback). In practice this reproduces as a pronounced hiss. Furthermore, such a tape will only record a signal voltage of one polarity, that which tends to magnetise the tape in the opposite polarity to its existing saturated state. Any voltage which tends to assist the existing magnetism will not be recorded since the tape is already saturated. To imply the remainder of the logic, such a tape will record only every alternate half-cycle of signal voltage, a state of affairs leading to extreme distortion. Thus, complete demagnetisation of the tape is also necessary.

The Why

Achieving the initial saturation is no problem, it can be done with a permanent magnet or a strong D.C. electro-magnet.

BULK ERASING— WHAT, WHY, HOW

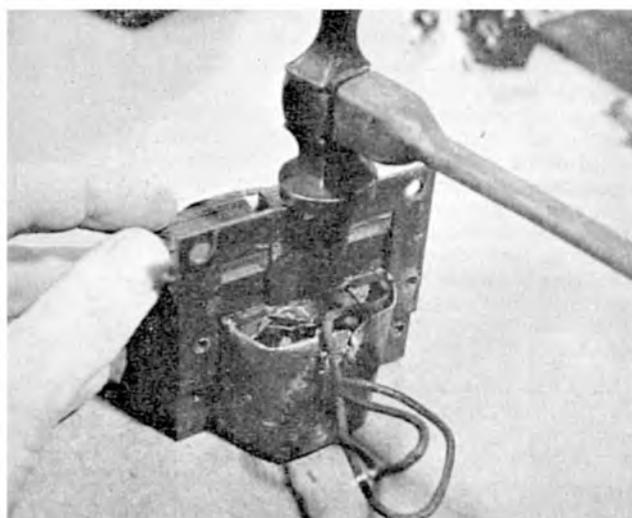
BY JOHN BERRIDGE

The increasing popularity of the degausser has put it well up on the list of required accessories. Here is an explanation of its function and details on building a simple one.

Let us examine what happens, however, when we use an A.C. electromagnet. We also assume a voltage strong enough to produce a saturable field.

At the peak of the first half-cycle of voltage, the field will saturate the tape in one polarity, at the second peak it will be saturated in the reverse polarity. Successive half-cycles keep reversing the polarity, each time saturating the tape. The first requirement of erasure is answered every half-cycle. Halfway between the two extremes of saturation is a state of zero magnetisation and if we could arrange to turn off the electromagnet at the precise moment that the magnetisation has been brought to zero, we would then have a completely demagnetised tape. Quite obviously, this is a practical impossibility, but this continual cycling of magnetisation can be viewed from another aspect.

As the oxide particles cycle from saturation in one polarity to saturation in the other and back, the average level of magnetism over a long period is zero. Once the tape has been saturated and all previous magnetic signals obliterated, this average level of zero will hold true for any field strength right down to zero over a long period. This is the crux of the bulk erasing process. If the field from the electromagnet, which keeps magnetising the tape to saturation, can be reduced to zero slowly enough then the level of magnetisation will end up at zero and the tape becomes completely demagnetised, and the erasure process is complete. Slowly enough means at such a rate that there is relatively little difference, no more than a few per cent., between the amplitudes of successive peaks of field strength (and therefore of applied voltage). For example, if there is a 5 per



All the E laminations are replaced in the former facing in the same direction, with the last few tapped in gently to avoid cutting through the insulation. Tapping on a flat surface will also line up the bolt holes.

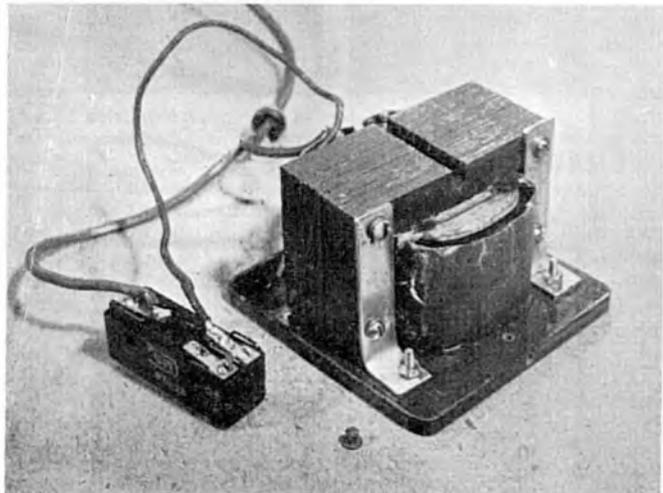
BULK ERASING— WHAT, WHY, HOW

cent. drop in amplitude between peaks then zero will be reached in 20 cycles. Let us say then that we can accomplish erasure in no less than 25 cycles (just for convenience). If the applied voltage is a 50 Kc/s sine-wave then the whole erasure can take place in $\frac{1}{4}$ millisecond. Tape can be pulled past an erasure head at playback speed quite easily and still have the individual oxide particles leaving the proximity of the erase field at a slow enough rate to pass through 25 cycles or more. However, I have already pointed out that playback erasing is a tedious method so turn instead to a much larger electromagnet fed from 50 c/s mains.

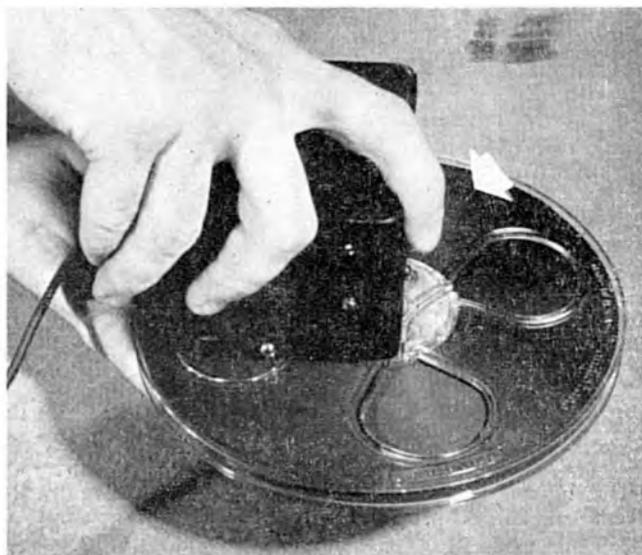
A good-sized coil will put out a heavy enough field to erase even a large reel of tape in very short order simply by passing the coil close to all parts of the tape. Reducing the field can be accomplished in one of two ways. The obvious is by using a Variac (variable-voltage transformer) to decrease the applied voltage to zero. Obvious and practical, but expensive and, as it happens, unnecessary. Since magnetic field strength varies inversely as the square of the distance from source, then the field can be reduced to zero by the simple expedient of removing the tape slowly from the coil. I will outline the handling of a bulk eraser in a coming paragraph.

The How

Bulk erasers are expensive to buy mainly because originally only professional outfits used them and they were therefore specially designed to do the job as efficiently as possible. This has produced a bottleneck since this very price system has prevented the average amateur from considering them (which would



Simple brackets are made and the coil mounted face down. The leads from the primary winding (all others are cut back) are wired in series with a push-button switch and the A.C. lead. The small stud in the foreground protrudes through the metal case.



In use the eraser is held in contact with the reel which is rotated underneath it to ensure complete erasure of the tape. The position of the stud for the push-button switch is shown by the arrow, under the tip of the index finger.

have increased the market and brought the price down). Bulk erasers are very cheap to build, however, and here is how.

The quickest and cheapest way to get hold of a 230 volt A.C. electromagnet is to convert any old mains transformer. Why? Well, both an electromagnet and a transformer are designed to produce a strong magnetic field, the difference being that a transformer keeps it within the bounds of a closed core so that it will induce a voltage in any secondary windings. Open out the core and ignore the secondary windings altogether and the field gets radiated off the open poles of the core quite nicely, turning the transformer into a nice usable electromagnet. It will not be as efficient as a properly designed coil but it does very well for the job of erasing.

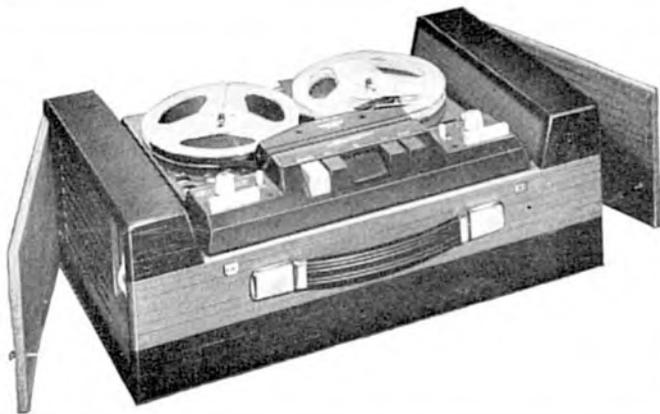
Since the secondary windings are not needed, then a power transformer which has been junked because of burned-out secondaries can be resurrected to serve as a bulk eraser coil. Almost every service shop in existence has replaced a bad mains transformer at some time in its history and these can often be obtained for a few pence. And this is one of the very few instances when a cheap component is much better than an expensive one. Good transformers have electrostatic shields, grounded cores and use potting techniques which often solidify the whole thing into one lump. This is excellent as a transformer but this one has to be pulled apart, so pick one of the cheap ones that falls apart just by looking at it. It does the job just as well.

Remove Unwanted Leads

Start by breaking the transformer down into its component parts. Covers and terminal boards (if any) are usually held on by long bolts which pass through holes drilled in the laminations. The bolts will be needed later so be careful not to damage them unduly. Make absolutely sure which are the leads to the 230 volt primary winding and cut off all others, right down to the coil former, they will not be used and could be a nuisance. The best way to remove the laminations is to use a small hammer and old screwdriver to tap the first few out from the coil former (taking care not to damage the former or any windings). Once the first few are free, the rest should be loose enough to be pulled out by hand. This is usually a little messy since nearly all transformers have been dipped in either wax or shellac, so an old newspaper is recommended. The laminations take two shapes, E's and I's and they are usually inserted so that each E (or group of E's) is put in the opposite way to its neighbour.

Pick of the **WORLD'S** best!..

a new class
SIEMENS
TAPE RECORDER
for the connoisseur



SIEMENS NORGE Model 12
4 TRACK STEREO/ALL TRANSISTOR
HIGH FIDELITY TAPE RECORDER

The world's most experienced professionals have made this brilliant newcomer for you. You will immediately appreciate the technical perfection and ingenuity of this incomparable tape recorder. There are 3 Tape Speeds, 3 Heads-Record, Playback and Erase—with Sound-on-Sound trick recording and many other facilities. The Model 12 has two Hi-Fi speakers built-in. Rewind time is 2 mins. for 1,200 ft. of tape. Weight 35 lbs. Strongly made and finished. Beautiful to hear and see.

The SIEMENS Range comprises

Model 10, 89 gns. Model 12, 93 gns. Model 14, 87 gns.



12 months' guarantee.

Full details from

DENHAM & MORLEY LTD.

DENMORE HOUSE

173-175 Cleveland Street, London, W.1

Telephone: EUSton 3656-7

Introducing
THE WHARFEDALE
BOOKSHELF 2

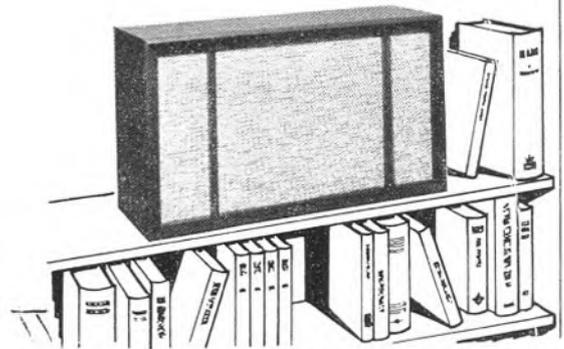
Where space is limited or where mobile external speakers are required for use with a mono or stereo Tape Recorder or Record Player, the "Bookshelf 2" gives a remarkable performance judged on a size/price/mobility basis. Its outstanding performance is due mainly to the efficiency of its modern 10-in. unit (with the very low resonance of 25/30 c/s) and is fitted with flexible roll surround and polystyrene diaphragm to improve the bass and act as an acoustic filter. The special 5-in. treble unit is fitted with a volume control so that H.F. response can be adjusted to suit listening room conditions and position of speaker. Two of these handy speakers give very good results on stereo.

SIZE: 19 in. x 11 in. x 6½ in. deep. IMPEDANCE: 8-16 ohms.

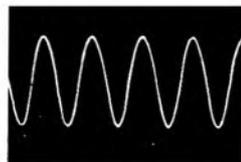
UNITS: Specially designed 10 in. WEIGHT: 18 lb. and 5 in. Speakers are fitted with Wharfedale Silver Magnets 12,500 lines flux density.

Polished walnut, oak or mahogany veneers **£16.10.0**

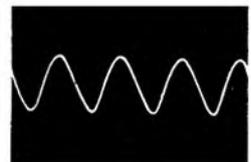
Unpolished **£15.15.0**



The clean low-frequency performance is clearly illustrated by the wave form oscillograms taken with an input power of 3 watts.



50 c/s



60 c/s

LOAD MATCHING: When used with a set or tape recorder with small output at 2/3 ohms a WMT. 1 transformer is worth fitting for optimum results.

Free leaflet on request



WHARFEDALE WIRELESS WORKS LTD.

Idle, Bradford, Yorkshire

Telephone: Idle 1235-6

Telegrams: 'Wharfdel' Idle, Bradford

BULK ERASING — Continued

The three legs of each E are bridged by an I forming a closed loop through and around the coil former. At this stage you should now have all the windings, still on the former with all but the primary leads cut off, two stacks of laminations, securing bolts, nuts and washer, and a random collection of covers, bits of wire and such. Out of this you retain the coil, the securing bolts and so on, and the E laminations. Everything else goes in the dustbin.

The E's now go back into the coil former but this time all facing in the same direction (the last few can be tapped in gently and carefully with the hammer). Some more judicious tapping on a hard, flat surface will even up the laminations like a pack of cards and also line up the bolt holes. You now have a perfectly good electromagnet which, when connected to the mains, will radiate nicely off the three pole pieces.

Installing the Transformer

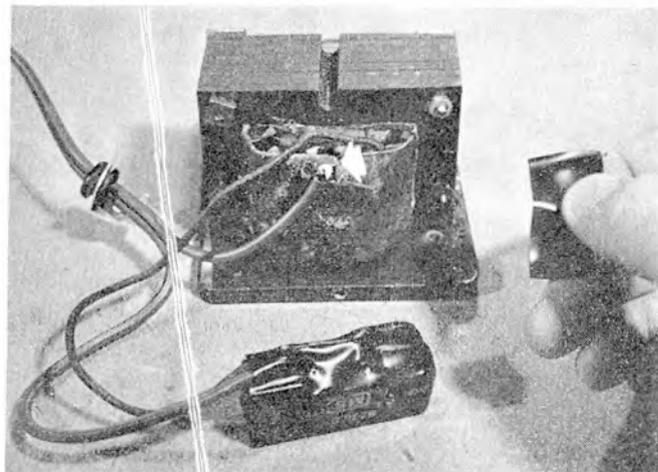
The remainder of the work consists of fabricating (or buying) some brackets with which to mount the coil, and then installing it in a suitable enclosure together with associated wire and an on/off switch (and pilot light if you want to be really fancy). The original covers or brackets could have been used for mounting but were thrown away because they would have acted as a bridge across the pole pieces of the laminations. If any of the original hardware can be used for mounting without this happening, then fabricating brackets will be unnecessary. The ones used by the author were simply bent with a pair of pliers out of strips of alloy, but Meccano brackets would be twice as handy.

The case used here happened to be the right size and came off an old Government-surplus timer mechanism. Its biggest asset was that the base was a sheet of quarter-inch thick phenolic. The coil was mounted on it with the pole pieces facing down and this then became the face of the finished eraser. The phenolic protected the pole pieces without shielding the field radiated from them, and any similar protective face over your own eraser must be plastic. A metal face acts as a shield and destroys the effectiveness of the coil as an eraser. The timer cover on the author's unit was a one-piece metal case, black wrinkle finished and this saved a lot of extra effort, but if you cannot locate anything similar then a light wooden enclosure can be made up in very short order and given a couple of coats of varnish.

Switching

The on/off switch in the unit shown was a microswitch which happened to be part of the original timer. It was connected in series with the coil leads as shown and an A.C. lead which was fed through a grommeted hole in the side of the case. The switch itself was mounted inside the metal case in such a fashion that a small red plastic stud (found in the scrap box) could be used as a push-button to press down on the actuating pin. The whole layout happened to fit into the case so neatly that when the assembled unit is picked up as shown in the final photograph, this push-button comes very conveniently under the tip of the index finger.

Apart from its availability, however, the microswitch was used for a better reason. Not only will it handle 230 volt A.C. without trouble, it is also spring loaded. Now a coil made up in the fashion described here will overheat if left on for more than a couple of minutes. Transformers are not designed to be operated with open cores and unloaded secondaries, and power and losses which are normally absorbed by the load get dissipated in heat. If such a coil were left switched on inadvertently for an hour or so it could easily get hot enough to catch fire. A spring-loaded switch eliminates this possibility, and if you make up your own eraser in the hand-held fashion I have shown here, then it is a good idea to plan the layout (and use a suitable switch type) so that you can operate the switch and hold the eraser with one hand. You may not be lucky enough to come up with the arrangement that I was able to, so planning the layout is a problem that will have to be solved by each individual.



All electrical joints are covered with tape to avoid possible shorts. As shown by the arrow, this particular transformer was rejected because of a short primary lead. The mains lead was soldered to the short length of wire left exposed and the joint was taped down to the outside surface of the insulation.

Such an eraser can, of course, be arranged to sit face up on a table top (with rubber feet on the underside to protect the surface of the table), thus leaving both hands free to handle switches and reels of tape. This is a matter of personal preference (switch placement would not be critical in the face-up version), it makes no difference to the operation of the eraser.

Using a bulk eraser requires a certain explanation. Since the field between the pole-pieces will be strongest in one plane, then tape oriented in one direction will be erased far more efficiently than tape at right-angles to it. The result would be partial erasure of all the tape with the unerased portion coming up every half-revolution of the reel. To avoid this the reel of tape should be rotated across the face of the eraser while it is switched on.

Furthermore, switching the eraser on or off while in contact with the tape will impose a heavy transient on the tape which will be difficult, if not impossible, to remove. It shows up as a regular thumping on any subsequent recordings. As already shown, erasure takes place when the tape is withdrawn slowly from contact (or proximity) with the eraser. Establish a procedure of turning on the eraser, bringing it and the reel together and rotating the reel a few times then, still rotating the reel, separate them slowly for three feet or more before turning off the eraser.

Even such a simple degausser as this should reduce the residual noise level of the tape to a level much lower than can be achieved by even a good erase head. In fact, bulk erasing brand-new tape can lower its noise level to a measurable extent. Bulk erasure, or degaussing if you prefer the word, should be a standard procedure for the serious tape fan.

CRAIGHALL RECORDING STUDIOS

(Geo. Jeffrey Ltd., Edinburgh)

These modern and fully equipped studios offer the following services:

Commercial and Private Recording Sessions.
Hire of Studio for Practice and Rehearsal Work.
Tape to Disc Transfer Service.

Mobile Recording Unit also available.

Send for our Fully Detailed Price List

GEORGE JEFFREY LTD.

23 Earl Grey Street, Edinburgh 3. Tel.: FOU 8389
(Studios: 68 Craighall Road, Edinburgh 6. Tel.: GRA 3685)

for Professional Performance... **Tandberg**

SERIES 6

STEREO TAPE DECK



3 SPEEDS
3 HEADS
4 AMPLIFIERS
***4 TRACK**
and 2 TRACK

- High and low level mixer inputs and cathode follower outputs.
- "On and off the Tape" monitoring.
- Sound-on-Sound simultaneous record and playback.

110 gns

Booklet of Technical Reviews on request.

SERIES 7

STEREO TAPE RECORDER



3 SPEEDS
2 HEADS
and 2 Power Amplifiers

***4 TRACK**
and 2 TRACK

- Two Indicators.
- Two Monitor Speakers.
- Two outputs for additional speakers or Hi-Fi.

Send for leaflet.

BUILD-IT-IN OR CARRY-IT-AROUND!

93 gns

4 track model 74
 2 track model 72
 (Luggage type carrying case. £7 1s 8d. extra).

Tandberg GB

ELSTONE ELECTRONICS LIMITED,
 Edward St., Templar St., Leeds 2.
 Telephone: Leeds 3-5111 (7 lines)

BRITAIN'S LARGEST TAPE RECORDER AND HI-FI PART EXCHANGE SPECIALISTS

If you have outgrown your present tape recorder or hi-fi equipment and would like to own a more advanced machine, as used by professional and serious tape recorder enthusiasts. Contact us today !!!

MAIL ORDER EXPERTS



Ferrograph Series 5

Your H.P. Payments can be insured against Unemployment, Sickness and Accident.

AND APPOINTED AGENTS FOR

Ferrograph 5AN	... 85 gns.
Wyndor International	75 gns.
Ferrograph 422/4	... 110 gns.
Reflectograph 'A'	... 105 gns.
Tandberg 6 Stereo	... 110 gns.
Vortexion WVA	... £93.13.0
Brenell Mk. 5 'M'	... 88 gns.
Simon SP.5	... 93 gns.
Brenell Mk. 5	... 64 gns.
Akai M6 Stereo	... 130 gns.
Philips Stereo	... 92 gns.
Sony 521 Stereo	... 124 gns.
Reps R10	... 59 gns.
Ampex Stereo 1273	... £290.0.0
Revox Stereo F.36	... 112 gns.

WE HAVE THOUSANDS OF SATISFIED CUSTOMERS THROUGHOUT THE BRITISH ISLES

TRANSISTOR-BATTERY

Stella ST 470	... 25 gns.
Optacord 414	... 47 gns.
Butoba MT5	... 69 gns.
Fi-Cord 202	... 69 gns.
Philips EL3585	... 24 gns.
Stuzzi Magnette	... 59 gns.
Uher 4000	... 93 gns.

Complete High-Fidelity systems supplied in parts or built to customers' requirements. The latest equipment and cabinets in stock. Agents for all leading makes.

Large stocks of new and used tape recorders at bargain prices. Ask for list. 30% to 60% reductions on original price.

ALL GOODS AVAILABLE ON OUR FAMOUS NO INTEREST TERMS

10% deposit, balance 12 months. 18 to 24 months terms available

FREE SERVICING—FREE DELIVERY—300 MACHINES ON DISPLAY—OUR MAIL ORDER DEPARTMENT WILL DEAL WITH YOUR ENQUIRY BY RETURN. WRITE—PHONE—CALL FOR A QUOTATION ON YOUR MACHINE. A LARGE SELECTION OF USED TAPE RECORDERS. HOME DEMONSTRATIONS IN THE LONDON AREA.



REW

EARLSFIELD LTD., 266 UPPER TOOTING ROAD, LONDON, S.W.17
 Telephone: BALHAM 7710

100 yards from Tooting Broadway underground station: opposite Tooting Market

... tape recorder workbench

No. 47 MIXER UNITS

by A. Bartlett Still

THERE is one subject that continually excites interest amongst readers—Mixer Units. This is, after all, understandable in view of the usefulness of a mixer unit as soon as anything more than a completely straightforward recording is required. There are a few commercially designed and built units available, but requirements vary so widely that no maker can ever really hope to sell the sort of quantities that a low price requires.

This sort of accessory would seem to be an ideal subject for this column, and I have, in fact, devoted space to mixer units on a couple of previous occasions at least. However, that does not preclude me from having another look, and putting forward what I hope are some fresh ideas on how you can build the sort of unit that you will find useful, in spite of the fact that your ideas on the number and type of channels, etc. may be shared by few others. Nevertheless, certain fundamentals exist, and these may be used to establish a number of "building bricks", any of which can be put together to produce the desired combination.

Outputs

Let us consider the output first. The output impedance should be low, so that we can use a useful length of cable between the unit and the tape recorder, without having to worry too much about the effectiveness of the cable screening. The signal voltage available has obviously got to be suitable for the recorder in question—in most cases a level of about 10 mV should be ideal, with a minimum of about 2 mV. To obtain the low output impedance necessary an emitter follower stage is required, representing one of our building bricks as shown in fig. 1.

For microphone channels, input amplifiers will be required. If moving coil or ribbon microphones of low impedance are used the input amplifier brick will be as in fig. 2. In this instance we are able to make use of the low input impedance of a transistor amplifier to match the microphone. With crystal microphones, however, a high input impedance is required if the frequency response is to be satisfactory and so the arrangement in fig. 3 is suggested.

Inputs

Where inputs require to be taken from higher level signal sources, such as a radio tuner, no amplifier is required. All that is needed is the level control and isolation resistor, as in fig. 4.

Any of these various units may be connected to the output unit, the three lines B, S, and E interconnecting. Under these conditions the signal applied to the tape recorder from, say, a moving coil microphone would be about the same as that microphone directly connected via an input transformer. There should, however, be the absence of hum that can be associated with such transformers. If more signal is required, or greater sensitivity of the microphone is needed, additional amplification must be applied. This would take the form of the circuit shown in fig. 5, connected at X,X—Y,Y—Z,Z in fig. 1. It will be noted that an additional emitter follower stage has been included, this is to allow the mixing to be done at a higher impedance, and permit the use of more standard values of gain control potentiometer.

It will, perhaps, be noted that I have given some different component values, notably resistances, in circuits that are virtually performing a similar function. They do not, in practice, need to differ. I am not able, however, to check performance over a wide enough range of actual transistors to accommodate the sort of variations that can occur. Resistance values that are suitable for one transistor may tend to be noisy with another, though this is not so likely if a reputable make (such as the Mullard OC71) is used. Should you experience transistor hiss, I hope the variations I have offered will allow you to obtain the best operating conditions.

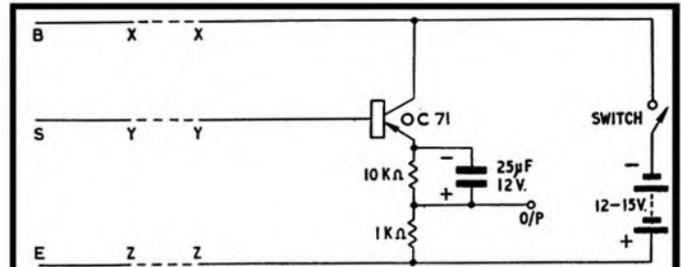


FIG. 1.

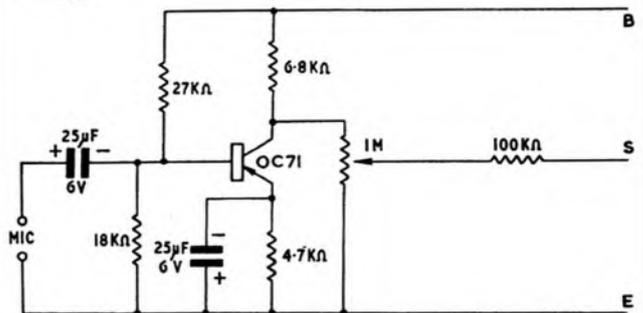


FIG. 2.

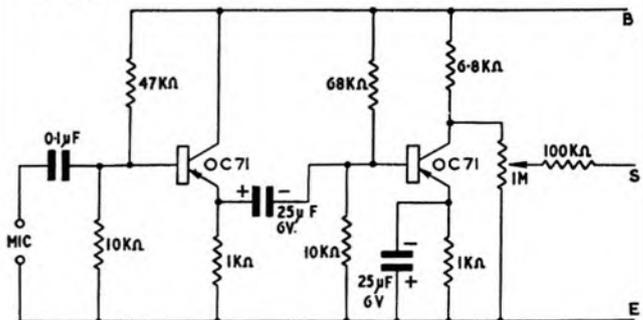


FIG. 3.

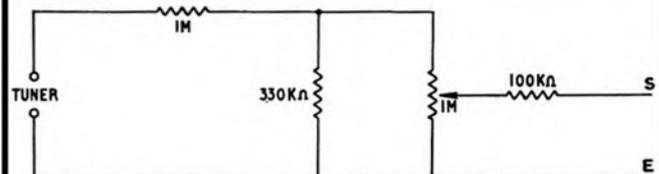


FIG. 4.

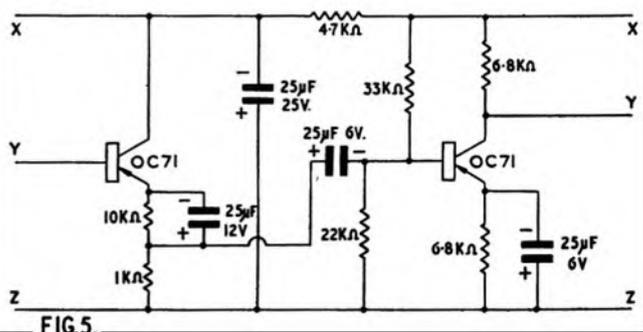


FIG. 5.

EQUIPMENT REVIEWED



*
STELLA
ST 459
FOUR-TRACK
FOUR-SPEED
RECORDER
 *

Manufacturer's Specification: Operates on the four track system. **All transistor:** no warming up time required. **Four speeds:** $\frac{1}{8}$, $1\frac{1}{2}$, $3\frac{1}{2}$ and $7\frac{1}{2}$ i/s. Adjustable to mains voltages of 110, 127, 200-250 v, A.C. 50 c/s. (Can be adapted for 60 c/s by dealer.) The recorder is provided with a "stereo" output socket for the reproduction of pre-recorded stereo tapes, providing that a suitable preamplifier is connected to this socket. Also for "duo-play" and "multiplay" purposes. Mixing of microphone with Radio/Gramophone inputs. Can be used as an amplifier for microphone or record player. Suitable for long-play and double-play tape on 3 to 7 inch reels. **Maximum playing time:** 4 times 8 hrs. **Monitoring facilities:** during recording by means of headphone or via the built-in loudspeaker. **Tape pause button.** Connection for foot switch. **Meter type modulation level indicator.** **Record safety interlock.** **Frequency range** at a speed of $\frac{1}{8}$ i/s: 60-4,500 c/s, $1\frac{1}{2}$ i/s: 60-10,000 c/s, $3\frac{1}{2}$ i/s: 60-13,000 c/s, $7\frac{1}{2}$ i/s: 60-16,000 c/s, all plus or minus 3 dB. Built in 2.5 watt amplifier. **Automatic stopping:** at the end of the tape when in the record, playback, fast wind or fast rewind position. **Rapid winding in both directions:** 1,800 ft. of tape in 180 seconds. **Power consumption:** Approx. 55 Watt. **Signal to noise ratio:** better than 40 dB. **Three inputs:** diode 0.02 meg., 3 mv, record player 0.5 meg., 150 mV, microphone 1,000 ohms, 1 mv. **Four outputs:** diode 0.02 meg., 1 v. **Loudspeaker:** 3-7 ohms, 2.5 W, headphones 1,500 ohms, 200 mv, stereo c. 300 ohms-c. 0.4 mv at 1 Kc/s. **Dimension:** 17 in. by $15\frac{1}{2}$ in. by $8\frac{1}{2}$ in. **Weight:** 28 lbs. **Tropicalised.** **Price:** £65 2s. **Manufactured by Stella Radio and Television Co. Ltd., Astra House, 121-3 Shaftesbury Avenue, London, W.C.2.**

THIS machine, like the Philips Stereo recorder reviewed last month, illustrates a trend in Continental design away from valves towards transistors, even in mains operated units. The advantages are many: no heater hum problems, instant operation, low operating voltages, smaller power unit, cooler running, light weight, etc., etc. The usual objections put forward by technical purists of higher distortion, particularly in class B output stages, have been overcome by using a class A single ended output stage—a steady current drain is no snag in a mains machine—and by plentiful use of negative feedback at appropriate points in the circuit. Hidden virtues, not yet appreciated by most engineers, are the low working impedance of all transistor circuits leading to the use of low impedance heads, microphones, gain controls, etc., with consequent elimination of most electrostatic hum and screening problems.

Externally, this recorder has been given a "new look" by fitting edge operated electronic controls and tab tape motion controls together with a modern functional layout and cabinet design.

All input and output sockets are at the rear of the machine, and the two core screened connecting cable is fitted with a

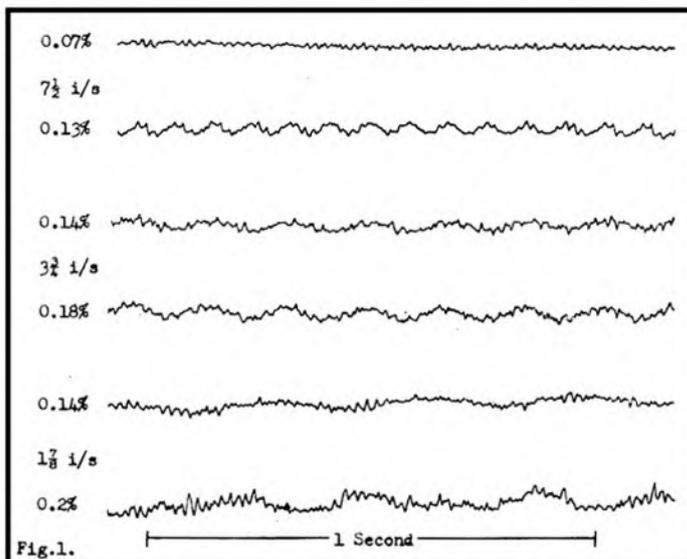


Fig. 1. D.I.N. plug at one end (to plug into the 'diode' input-output socket) and three loose cores at the other to simplify connection to most British auxiliary equipment.

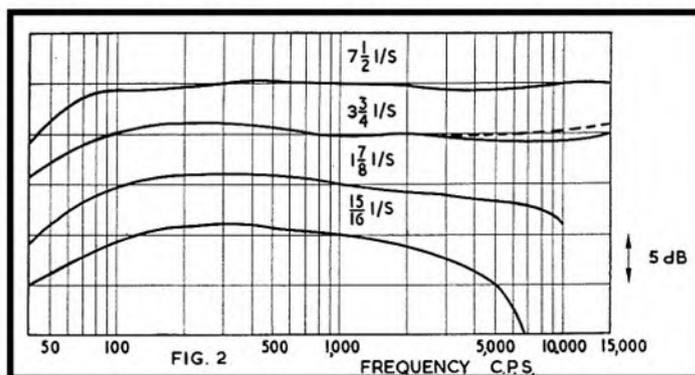
Wow and Flutter

Fig. 1 shows "fluttergrams" for three of the four speeds provided by this recorder. It will be seen that the main speed variation is at capstan rotational frequency: 10 c/s at $7\frac{1}{2}$ i/s, falling to 5, $2\frac{1}{2}$ and $1\frac{1}{2}$ c/s at $3\frac{1}{2}$, $1\frac{1}{2}$ and $\frac{1}{8}$ i/s. Although audible on a sustained pure tone the speed fluctuations were never objectionable on music recordings. The average rms combined wow and flutter reading was 0.1% at $7\frac{1}{2}$ i/s with high and low limits of 0.07% and 0.13% due to cancelling and adding of the recorded and playback frequency fluctuations. At the lower speeds, sustained cancellation did not seem to occur, and the average rms readings were 0.15% at $3\frac{1}{2}$ and $1\frac{1}{2}$ i/s, and 0.2% at $\frac{1}{8}$ i/s.

Due to intermodulation between the 3 Kc/s test tone and tape noise, it proved impossible to obtain a meaningful fluttergram for the lowest tape speed of $\frac{1}{8}$ i/s. With the wavelength of the test tone comparable with the head gap width perhaps this is not so very surprising!

Play Only Tests

Test tapes with known surface induction characteristics were played at all speeds and the resultant responses showed that



playback equalisation was matched to N.A.R.T.B. time constants of 50, 100, 200 and 400 microseconds at tape speeds of $7\frac{1}{2}$, $3\frac{3}{4}$, $1\frac{7}{8}$ and $\frac{3}{8}$ i/s respectively.

System noise, with no tape running, was 44 dB below test tape level, or, assuming that full peak recording level of 12 dB above test tape level could be recorded, 56 dB below peak recording level. This underlines the very low hiss and hum level obtainable with modern low noise transistors.

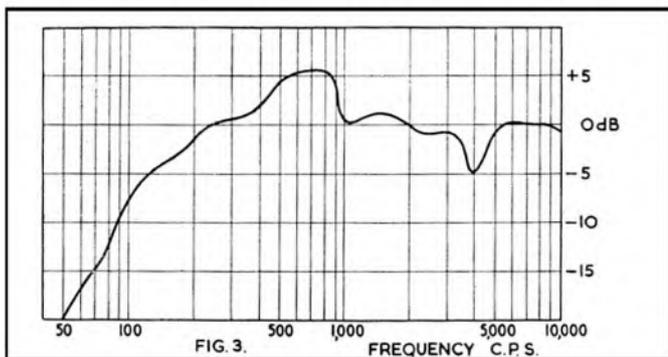
Recording Tests

A 500 c/s tone was recorded at various readings on the meter type record level indicator and it was found that test tape level was recorded at a little less than $\frac{1}{4}$ scale, and that peak recording level (12 dB above test tape level) was recorded with the needle just entering the red sector of the scale. Waveform distortion was negligible at this level and full scale meter deflection gave a level 14 dB above test tape with just perceptible distortion (approx. 5%). Tape erased and biased on the machine showed a noise level 42 dB below test tape level and 54 dB below peak recording level.

Frequency runs were recorded at 6 dB below test tape level to give the responses shown in fig. 2. Top and bottom tracks were compared at $3\frac{3}{4}$ i/s. Dotted curve is for bottom track.

Practical recording tests showed that it was very easy to over record by allowing the meter to kick around mid scale as suggested in the instruction book. The resulting distortion and intermodulation was not objectionable and might well go unnoticed on casual listening on the recorder's internal speaker. I only spotted it when I fed the recording to a wide range external speaker and later confirmed it by C.R.O. comparison with a known properly recorded tape.

Recordings made with the meter kicking over the lower half of the scale, with only the very loudest signals reaching the



red sector, sounded appreciably cleaner even on the internal loudspeaker.

Voice recordings sounded slightly heavy on the built-in speaker, indicating a peak in the mid low frequency response. This was later confirmed by the standard acoustic tests.

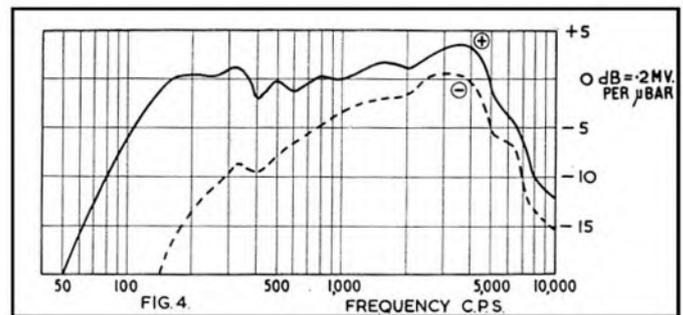
Acoustic Tests

As the playback response was matched to the N.A.B. equalisation it was not possible to use a standard white noise test tape which is recorded to the C.C.I.R. characteristic. Instead twenty $\frac{1}{3}$ octave bands of filtered white noise were recorded on the machine and the sound output on the axis of the internal loudspeaker measured on playback. The resultant overall recorder-loudspeaker response is shown in fig. 3. The "bump" at 600 to 700 c/s explains the slight speech coloration mentioned above.

Microphone Tests

The EL3782/03 microphone supplied with this recorder is a moving coil cardioid microphone, and this particular model showed a fairly consistent back to front ratio of about 10 dB with little change in polar response with frequency.

A switched marked + and - is fitted on the back of this microphone. Tests showed that it operated an electrical bass



cut filter, which presumably was to be used on close speech to cancel the bass rise which occurs when a cardioid microphone is used in a spherical wave front. Practical tests showed this to be so, and free air tests using the white noise measurement technique produced the responses shown in fig. 4.

Circuit Notes

From time to time, whenever a circuit is supplied with review equipment, I propose to devote a short paragraph to interesting circuit tricks or details. The novel feature of this recorder is the three transistor power amplifier. An orthodox amplifier stage feeds an emitter follower driver which feeds the base of the large power transistor from a 47 ohm emitter load. The internal speaker is fed from a primary tap on the output transformer, and a separate secondary feeds the external speaker socket and also provides negative feedback voltage to the base of the input transistor.

Comment

An excellent recorder in every way. It handles well. All the controls are in the right position and operate smoothly and sweetly. The light weight and rather large cabinet combine the advantages of portability with a reasonable speaker enclosure providing better than usual bass response.

The meter type record level indicator must be used carefully (see Recording Tests) to avoid over recording. The electronic mixing circuits together with the facility of playing two separately recorded tracks simultaneously make this one of the most flexible recorders I have handled and I recommend it to the absolute beginner and advanced amateur alike. **A. Tutchings.**

Manufacturer's comment. Your reviewer has stated under the heading Recording Tests, "Practical recording tests showed that it was very easy to over record by allowing the meter to kick around mid-scale as suggested in the instruction book". Page nine of the operating instructions states: "The level should be so adjusted that at the loudest passages the pointer of the indicator does not quite reach the red segment". This we feel lines up with the findings outlined in the next paragraph.

★
**LOEWE-OPTA
 MODEL 414
 TWO-TRACK
 MAINS/
 BATTERY
 RECORDER**
 ★



Manufacturer's Specification. Power supply: A.C. 40-60 c/s 110-220 v, 6 v car battery, 12 v using series resistance LR412, 5 U2 torch cells, 5 DEAC rechargeable cells type RS3.5. **Recording procedure:** double track international standard. **Tape speed:** $3\frac{3}{4}$ i/s. **Frequency response at radio output:** 50-10,000 c/s. **Dynamic range:** 46 dB or better. **Maximum reel diameter:** $4\frac{1}{2}$ in.

Two Years Guarantee

NOT MASS PRODUCED BUT VIRTUALLY HAND-MADE FOR RELIABILITY AND CONSISTENTLY HIGH STANDARD OF PERFORMANCE

R10 SPECIFICATION: 2 or 4 track version. 10 watts push/pull output.

Record Replay Responses—

7½ ips. 40-16,000 C.P.S. } ±3 dBs.
3 ips. 40-10,000 C.P.S. } At optimum
1½ ips. 50- 6,000 C.P.S. } bias setting.

Signal/Noise ratio—

half track 50 dBs at 2¾ ips.
quarter track 45 dBs at 3¾ ips.

Modified Collaro Studio Deck. Microphone and Radio/Gram inputs each with separate gain controls for mixing. Separate bass and treble controls. ± 12 dBs at 50 cycles and 12 k/cs. Adjustable monitor volume control independent of record level. Peak signal level meter 2¼ in. square. Bogen heads. Record safety device. 600 ohms Cathode follower output. Two per cent total harmonic distortion on peaks. 200/250 volts 50 cycles or 100/120 volts 60 cycles. Valve line up: 3 EF86, 2 ECC83, 1 ECC82, 2 ECL86. Metal rectifier, contact cooled.

Prices: 2 Track 7" spools 59 gns.
4 Track 7" spools 69 gns.



Fully illustrated literature available on request to—
REPS (TAPE RECORDERS) LTD.
118 Park Road North, South Acton,
London, W3 Phone: Acorn 4141

THE RECORDER CO.

for best machines on advantageous terms

	Deposit £ s. d.	12 Monthly Payments £ s. d.	Cash Price Gns.
4-TRACK STEREO/MONAUROAL			
Akai M6	13 13 0	10 4 9	130
Sony 521	13 2 0	9 15 2	124
Grundig TK46	10 12 0	7 15 7	99
Telefunken 97	10 0 0	7 9 7	95
Sony 464 CS	10 0 0	7 7 10	94
Philips EL3534	9 16 0	7 4 8	92

	Deposit £ s. d.	12 Monthly Payments £ s. d.	Cash Price Gns.
2-TRACK STEREO/MONAUROAL			
Telefunken 98	10 0 0	7 9 7	95

	Deposit £ s. d.	12 Monthly Payments £ s. d.	Cash Price Gns.
MAINS TWIN-TRACK			
Simon SP5	9 16 0	7 6 5	93
Brenell 5 Type "M"	9 5 0	6 18 7	88
Telefunken 85	8 15 0	6 10 8	83
Akai Model 69	8 6 0	6 4 5	79
Grundig TK41	8 0 0	5 17 11	75
Brenell 5/2 (Meter)	7 15 6	5 16 7	74
Brenell 5/2	7 5 0	5 8 8	69
Reps R10	6 4 0	4 12 11	59
Telefunken 95	6 4 0	4 12 11	59
Truvox R82	5 15 6	4 6 8	55
Grundig TK18	4 2 0	3 1 5	39
Truvox R62	4 2 0	3 1 5	39
Grundig TK14	3 13 6	2 15 2	35
Wyndor Trident	3 10 0	2 11 11	33
Elizabethan LZ30	3 7 3	2 10 5	32
Ferguson 3200	2 16 6	2 0 10	26

H.P. also over 18 and 24 months

	Deposit £ s. d.	12 Monthly Payments £ s. d.	Cash Price Gns.
4-TRACK MONAUROAL			
Akai Model 69	8 6 0	6 4 5	79
Grundig TK40	8 0 0	5 17 11	75
Reps R10	7 5 0	5 8 8	69
International	7 5 0	5 8 8	69
Philips EL3549	6 12 0	4 17 6	62
Truvox R84	6 4 0	4 12 11	59
Grundig TK23	4 15 0	3 10 10	45
Truvox R64	4 2 0	3 1 5	39
Elizabethan LZ29	3 15 8	2 16 9	36
Philips EL3541	3 15 8	2 16 9	36
Ferguson 3202	3 10 0	2 11 11	33
Philips "Star Maker"	2 16 9	2 2 7	27

	Deposit £ s. d.	12 Monthly Payments £ s. d.	Cash Price Gns.
BATTERY			
Uher 4000	9 16 0	7 6 5	93
Ficord 202	7 0 0	5 3 10	66
Butoba MTS	7 0 0	5 3 10	66
Stuzzi Magnette	6 4 0	4 12 11	59
Optacord 414 Bat./Mains	4 19 0	3 14 0	47
Stella ST470	2 15 0	1 19 2	25
Philips EL3585	2 10 5	1 17 10	24

	Deposit £ s. d.	12 Monthly Payments £ s. d.	Cash Price Gns.
TRUVOX HI-FI TAPE UNITS			
TWIN-TRACK			
PD.82 Standard	4 4 0	3 3 0	42
PD.87 Stereo	6 6 0	4 14 6	63

	Deposit £ s. d.	12 Monthly Payments £ s. d.	Cash Price Gns.
FOUR-TRACK			
PD.84 Standard	4 12 0	3 9 0	46
PD 86 Stereo	6 6 0	4 14 6	63

A popular newcomer!
Price 69 gns.
BRENELL MK. 5
SERIES 2

or £7-5-0. dep. and
12 monthly pay-
ments of £5-8-8.



This new version of the Mark V has been improved in performance and appearance and incorporates a Hi-Fi Amplifier of advanced design.

4 speeds, 1½, 3¾, 7½ and 15 ips • 3 independent motors • synchronous drive to capstan motor • instant stop pause control • monitoring • superimposing • up to 8¼" reels.

WE WILL BE PLEASED TO DEMONSTRATE THIS REMARKABLE MODEL. SEND FOR FULL DETAILS

THE RECORDER CO.

(Dept. R) 188, WEST END LANE,
WEST HAMPSTEAD, LONDON, N.W.6.
Telephone: SW1 4977

Nearest Station: West Hampstead, Bakerloo Line

Open Saturday until 6.0 p.m. — Friday 6.30 p.m.

If unable to call, write for free brochure or send deposit now for quick delivery.

INTEREST FREE TERMS

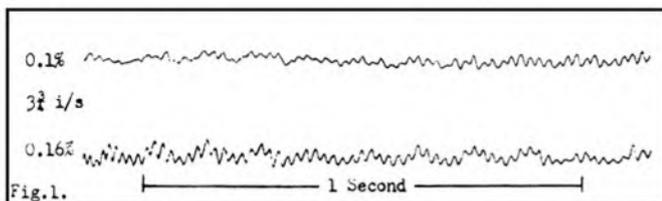
Agents for FERROGRAPH, VORTEXION, REFLECTOGRAPH, SONY, GOODMAN'S, ETC.

FREE DELIVERY · PART EXCHANGE

EQUIPMENT REVIEWED — continued

Maximum playing time: 2 times 60 min., using triple play tape. **Output power:** 1 watt with 7.5 v H.T. **Erase and bias:** H.F. current of 55 Kc/s. **Signal level indicator:** meter. **Tape position indicator:** digital reel revolution counter with resetting knob. **Built-in loudspeaker:** PM dynamic with 3 by 6 in. oval cone. **Output socket:** 5 ohms. 7 transistors 3 diodes 1 selenium rectifier. **Dimensions:** 15½ in. by 9¼ in. by 4½ in. **Weight:** 8.8 lbs. **Price:** £49 7s. **Distributors:** Highgate Acoustics, 71-73 Portland Street, London, W.1.

THIS is a new and improved version of the machine reviewed a little over a year ago (May '62). At first sight the appearance is identical, but closer examination shows that a meter type record level indicator has been fitted instead of the magic eye and internally a more complex motor control circuit is used to give improved speed stability and even lower motor noise. I must admit that after a surfeit of multi track, multi speed, multi output recorders it was a pleasant treat to get back to a simple little single speed, single output, single track (at a time) machine!



Admittedly there seems to be a wide choice of power sources, but this ultimately boils down to mains or battery. Stowage for the mains lead is provided within the recorder case, and changeover to battery operation is obtained by plugging the two pin mains plug into an internal socket inside the recorder. For this reason an adaptor should be used if mains sockets are not suitable for this plug, otherwise it may prove difficult to change to battery operation if the plug is changed.

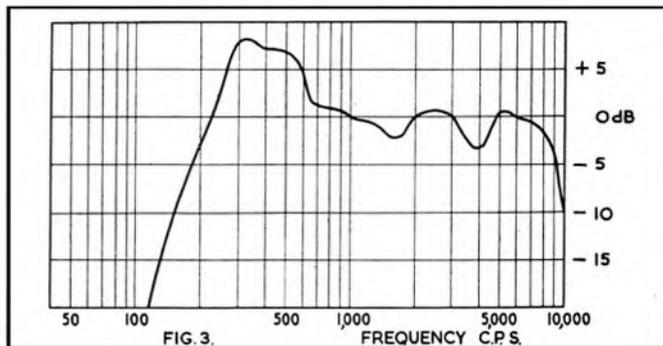
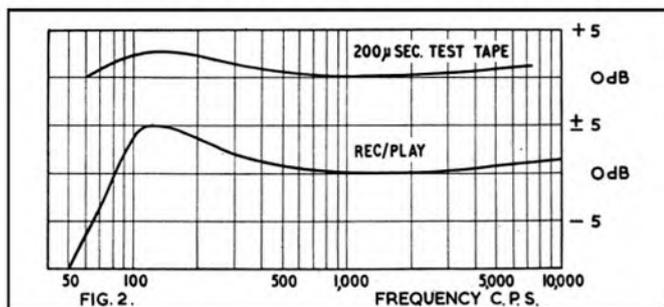
Speed Wow and Flutter

The mean tape speed was carefully measured on both mains and battery and found to be within 1% of the nominal speed of 3½ i/s. Short term speed variations are shown in the fluttergrams of fig. 1. There is a very slight trace of 10 c/s capstan wow and a low level 50 c/s ripple from the 3,000 rpm motor. With maximum and minimum rms readings of 0.1% and 0.16% the tape transport can be said to be eminently satisfactory, particularly for a portable machine of this size and weight.

Speed changes due to normal handling are completely negligible and the machine has to be shaken quite roughly to produce any audible speed change. It is also completely insensitive to attitude; it can be used flat, upright or upside down with not the slightest change of tape speed.

Playback Tests

The top curve of fig. 2 shows the response at the line output of a C.C.I.R. 200 microsecond test tape. System noise with no tape running was 33 dB below test tape level on battery and



26 dB below test tape level on mains operation. Most of the latter reading was due to mains hum which was completely inaudible due to the low note cut off in the internal speaker.

Recording Tests

A 500 c/s tone was recorded at various record level meter readings and it was found that test tape level was obtained at about ¼ scale reading. Bringing the needle up to the start of the red sector recorded a level 8 dB above test tape, and full scale deflection recorded at 12 dB above test tape level. Waveform distortion was just perceptible at full deflection. Recordings with the meter kicking about half scale gave satisfactory recording level by C.R.O. comparison with tapes known to be properly recorded.

The record-play frequency response was obtained by feeding oscillator test tones to the radio input lead and measuring the radio line output voltage at each frequency with a valve voltmeter; this response is shown by the lower curve of fig. 2.

Acoustic Responses

One third octave bands of filtered white noise were recorded and the sound level of each band measured on replay on the axis of the built-in loudspeaker. The overall response of fig. 3 shows that there is a bass cut due to the very small speaker enclosure with a mid bass rise between 300 and 500 c/s. The high note response is sensibly flat to 8 Kc/s.

The frequency response of the LDM12 moving coil microphone supplied with this recorder was measured in a white noise sound field and is shown by fig. 4. It is reasonably level from 250 c/s to 10 Kc/s. Polar response is non-directional at low and middle frequencies with some focusing of high frequencies on the axis. It will be seen from fig. 4 that the measured impedance of this microphone was 10 K which is high for use with a transistor recorder.

Microphone Tests

I gather from the instruction book that a microphone is not included in the quoted price of the recorder, but that a fairly wide choice of Loewe-Opta microphones are available for use with this recorder. My advice is to try them all if possible and choose the one best suited to your needs. This one is certainly not the best choice for this recorder. Acoustically radiated noise from the motor picks up on this microphone even when it is placed well away from the recorder to the full extent of the lead. Even close talking to the microphone does not lose it, and the speech quality has a peculiar hollow quality which is not explained by any of the acoustic tests shown above. It seems to be a transient effect due to undamped resonances in the microphone, speaker, or both. Fig. 4 is the open circuit response and so I repeated the tests with a 2K loading resistance to simulate the loading effect of the transistor input impedance but the frequency response was not significantly different.

Radio quality was excellent, and a number of other high quality microphones were tried with excellent quality and practically no motor noise.

hi-fi books

CINE YEAR BOOK . . .

The only comprehensive survey in one complete volume of the cine market for the cine user. The reference book for the professional, the enthusiast, and the photo dealer. This valuable book follows the unique pattern set and maintained by the "Hi-Fi Year Book"—separate and detailed directories for every product group. **Price 11s 6d post paid.**

HI-FI FOR BEGINNERS . . .

The ideal book for everyone who has just started, or is about to start the hobby. The various chapters deal with Loudspeakers, Amplifiers, Pickups, Turntables, Radio Tuners, Stereo and Installing Hi-Fi. Readers whose particular interests lie with tape will find that Chapter 7 alone will make the book worthwhile. **Price 8s 3d post paid.**

EXPERIMENTAL RECORDING . . .

This book presents in convenient form the series of articles by A. Tutchings on "Twenty Practical Experiments in Magnetic Recording" and full introductions for "Building a Fully Portable Recorder", using a clockwork motor and transistor amplifier. **Price 5s 9d post paid.**

SOUND & CINE FOR BEGINNERS . . .

An up-to-date guide for the beginner by Richard Golding with an introduction to some advanced methods including the latest means of producing experimental soundtracks. Contents include making up separate tape tracks; sound stripe; optical sound-on-film; special recording apparatus; recording sessions; with photographs and line illustrations. **Price 8s 3d post paid.**

CABINET MAKING . . .

This book gives you all the necessary information for building your own Hi-Fi cabinet. Subjects covered include designing, timber, marking out, tools, materials, joints and finishes. The many photographs and diagrams help to make this book indispensable not only for Hi-Fi applications but also for general cabinet work. **Price 8s 3d post paid.**

AVAILABLE SHORTLY

STEREO FOR BEGINNERS . . .

For those who are confused or not wholly converted by Stereo reproduction this book gives all the answers. The author, B. J. Webb, explains in clear language what Stereo is, and how best to obtain it, whether from disc, tape or radio. Advice and guidance on the purchase, installation and maintenance of suitable equipment; a six page glossary, many illustrations and special drawings are included. **Price 8s 3d post paid.**

MILES HENSLow PUBLICATIONS LTD.
99 MORTIMER ST., LONDON, W.1



SUPER SOUND

American Hi-Fi Recording Tapes
(made by C.B.S.)

New, Boxed & Guaranteed	
5 ins.	600 ft. Std. 13/-
5 ins.	900 ft. L.P. 17/6
5 ins.	1200 ft. D.P. 30/-
5½ ins.	900 ft. Std. 16/-
5½ ins.	1200 ft. L.P. 19/6
5½ ins.	1800 ft. D.P. 35/-
7 ins.	1200 ft. Std. 21/-
7 ins.	1800 ft. L.P. 28/-
7 ins.	2400 ft. D.P. 45/-

With leader and Stop Foil

Suitable for ½ & ¾ Track Recorders

CASH WITH ALL ORDERS : BY RETURN : ALL POST FREE : ALL CALLERS WELCOMED

K. & K. ELECTRONICS LTD.

DEPT. T.R., 25/39 ROMAN ROAD, LONDON, E.2 Tel.: ADVance 1936



SPECIAL

1 PRICE
2 OFFER

ONLY
3 GNS.

**NEW GRUNDIG GCM 3
CONDENSER MICROPHONES**

Suitable for all makes of TAPE
RECORDERS and AMPLIFIERS



A BETTER RECORDING

Starts with a better microphone

Most popular models available from stock post free.

Grampian, Reslo, Film Industries, A.K.G.,
Cadenza, Lustraphone, Foster, Grundig, etc.

Send 1s. (refundable) for full list of recording accessories.

416 MOSELEY ROAD, BIRMINGHAM 12
Telephone Calthorpe 2554

The 'NUMIX 2' is a two-channel unit (Mic. and other source) low- or high-impedance feeds. The 'NUMIX 2' can be used with ANY TAPE RECORDER WHICH WILL ACCEPT A HIGH-Z MICROPHONE. Near professional results are guaranteed.



Price: £6.10.0 complete.

Write for leaflet on 'NUMIX 1', 'NUMIX 2' and 'MONITOR' UNITS.

The 'NUMIX Mk. 3' (fully transistorised) 2-channel Microphone
Mixer is now available.

NUSOUND RECORDING Co.

35 CRAVEN STREET, W.C.2.

TELEPHONE TRA 2080

“you've never heard it so good”

● LEAK . QUAD . GARRARD . THORENS . Lenco (New G88 Turntable £17.14.0) . SHURE M33.5 . DECCA Mk. II . HACKER Players and Radios . B & O BEOLIT 609 deluxe Transistor AM/FM—£33.8.2 Superb! (Review Feb., "The Gramophone")

● DERAM STEREO CARTRIDGE—£4.14.6 with ROGERS CADET Mk. II Stereo Amp.—£26.15.0 and our BOOKSHELF SPEAKERS—£10.10.0 each, plus turntable, arm and cabinet, gives you a complete stereo system for less than £70.

● B & O MAGNETIC STEREO CARTRIDGE now further improved is a real bargain at £6.3.5 used with PYE MOZART STEREO AMP—£35 and you have a stereo system with the advantages of a magnetic pickup from £80.

● ARMSTRONG A20/PCU25—12 watts pp per channel, filters, full specification—only £44.12.6. With B & O CARTRIDGE, etc., etc. TOTAL from £95.

STUDIO 99

TAPE RECORDERS—Just a few

REVOX F36 stereo (new model)	£117.10.0
TANDBERG 6 stereo	£115.10.0
TANDBERG 7 stereo (new model)	£97.13.0
STELLA ST459 (new model)	£65. 2.0
* PLANET U1 Deck 3 heads	£39.10.0

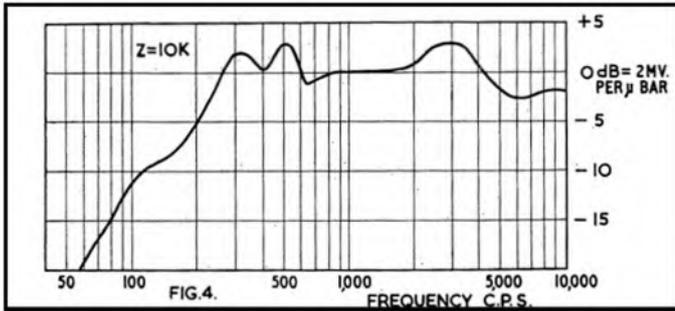
10 a.m. to 9 p.m. incl. Saturday
Closed Sunday and Thursday

57 FAIRFAX ROAD SWISS COTTAGE NW6 MAI 8855

EQUIPMENT REVIEWED — continued

Circuit Notes

Electrical motor noise is often produced if the motor governor contacts are allowed to make and break part of the motor circuit directly. It has been standard practice in most German portable



recorders to use a transistor to control the motor speed, with the governor intermittently breaking the very much smaller base current of the control transistor. The motor control circuit in this recorder uses a second transistor as a high frequency oscillator with a diode rectifier to provide a D.C. bias for the control transistor. The governor contacts short out part of the oscillator winding so that both the frequency and the strength of the oscillator is varied; this in turn alters the D.C. bias on the control transistor which alters the motor speed. There is no actual make and break of the motor current and therefore no radiated electrical noise.

The motor speed control is also smoother and more accurate.

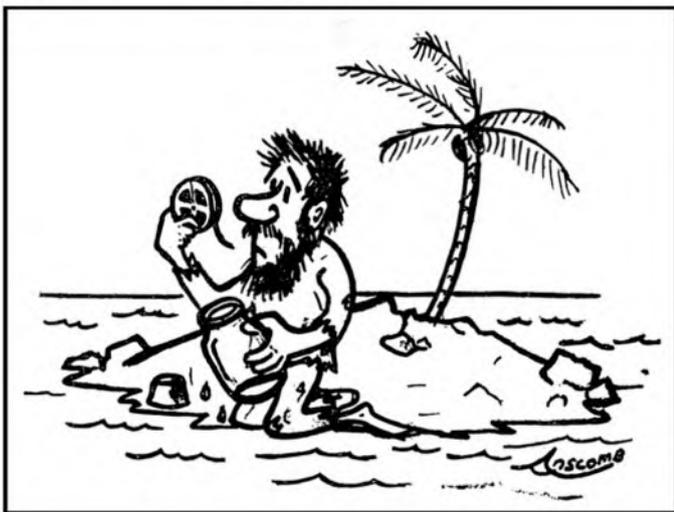
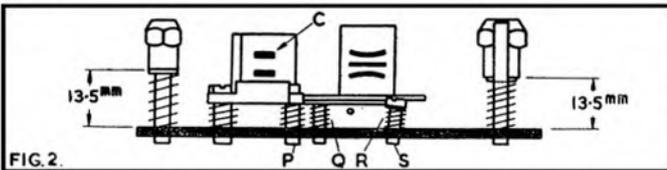
Comment

A lovely little recorder with no vices of its own, but it must be mated with a suitable microphone to show its full capabilities.

A. Tutchings

* * *

The drawing shown below should have appeared on page 157 of the May issue. It shows the tape guide layout of the Stella ST 456 recorder. We apologise to readers for any inconvenience caused.



— YOUR TAPE DEALER —

Specialists in Hi-Fi Equipment and Tape Recorders

CHELSEA RECORD CENTRE

203 KINGS ROAD, S.W.3 FLA 2596

Open till 8 p.m. (except Thursdays)

Disc and Tape Reproducing Equipment and Tape Recorders

by Leading Manufacturers

CUSTOM BUILT INSTALLATIONS

All High Fidelity Requirements and Services Available

Estimates Free

Personal Service

Custom High Fidelity

371 Green Lanes, Palmers Green, London, N.13

Tel. PALmers Green 5228

hifi

FOR ALL LEADING
AUDIO EQUIPMENT

call, write, or telephone

hampstead **HIGH-FIDELITY**

91a Heath Street, Hampstead, London N.W.3 Telephone HAMpstead 6377

ENGLAND'S BIGGEST SPECIALISTS:

HOWARD

218 HIGH STREET, BROMLEY RAV 4000

LASKY'S RADIO

ALL LEADING MAKES IN STOCK

Cash or Easy Terms

LONDON'S FINEST SERVICE

207 EDGWARE ROAD, W.2

PAD 3271/2

33 TOTTENHAM COURT ROAD, W.1 MUS 2605

★ PART EXCHANGES WELCOMED ★

- * ALL MAKES Hi-Fi & Tape Recorders supplied
- * PART-EXCHANGES. Terms 12, 18 or 24 months
- * SONY SPECIALISTS. Full Range Stocked
- * GUARANTEED Recorder Repair Service

MAG'S CAMERA SHOPS LIMITED

250-252 KING STREET, HAMMERSMITH, LONDON W.6
RIV 8581-2 Hrs 9-6 Thurs 9-1

SHEEN TAPE RECORDER CENTRE

SPECIALISTS IN TAPE RECORDERS, ACCESSORIES, HI-FI EQUIPMENT
YOUR CENTRE FOR FRIENDLY HELP—SALES AND SERVICE

8 STATION PARADE
SHEEN LANE, SHEEN
LONDON, S.W.14

Showrooms Open until 7 p.m.
PROSPECT 0985
(Opposite Mortlake Station S.R.)

CROYDON'S TAPE RECORDER CENTRE

All leading makes in stock, Hi-Fi equipment, cabinets etc.
Service agents for AKAI Tape Recorders

SPALDING ELECTRICAL LTD.,
352/354 Lower Addiscombe Road,
CROYDON.

ADDIscombe
1231/2040

TAPE RECORDER COVERS



Smart waterproof cover to give complete protection to your tape recorder. Made from rubberised canvas in navy, wine, tan, grey and bottle green with white contrasting pipings, reinforced base, handy zip microphone pocket and name panel.

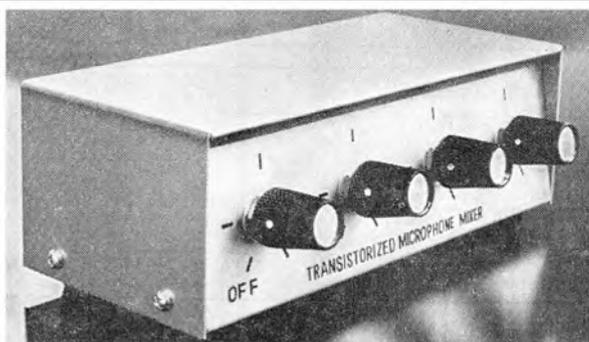
Philips EL3536	...	70/-
" EL3515	...	57/6
" EL3541/15	...	57/6
" Starmaker	...	66/-
Cossor 1602	...	57/6
" 1601	...	63/-
" 1605	...	84/-
Stella ST455	...	63/-
" ST454	...	57/6
" ST459	...	84/-
Saja MK.5	...	57/6
Stuzzi Tricorder	...	58/-
Saba	...	63/-
Wyndor Victor	...	60/-*
Elizabethan Princess	...	60/-
" Escort	...	57/6*
" Major	...	63/-
" FT.1	...	66/-
" FT.3	...	75/-
" LZ29	...	75/-
Fi-Cord 1A	...	52/6
Harting Stereo	...	66/-
Fidelity Argyle	...	55/-*
Simon SP4	...	63/-*
Clarion (with strap)	...	52/6
Brenell Mk.5	...	77/-
" 3 star	...	69/-
Minivox C	...	61/-
Robuk RK.3	...	67/6
Ferroglyph	...	80/-
Sony 521	...	90/-

Grundig TK.1	...	49/6
" TK.5	...	55/-
" TK.8	...	63/-
" TK.14 & 18 & 23	...	59/6
" TK.20	...	52/-
" TK.24	...	55/-
" TK.25	...	55/-
" TK.30	...	60/-
" TK.35	...	63/-
" TK.40 & 41	...	66/-
" TK.46	...	82/-
" TK.55	...	63/-*
" TK 60	...	75/-*
" TK.830/3D	...	63/-
" Cub	...	35/-*
Telefunken 85	...	65/-
" 75/15 & 76K	...	55/-
" 95	...	69/6
Philips 8108	...	57/6
" 8109	...	63/-
" 3534	...	87/-
" 3459	...	79/6
" EL3538	...	63/-
" EL3542	...	63/-

A. BROWN & SONS LTD.
24-28, GEORGE STREET, HULL TEL: 25413, 25412

Lee Electronics

TAPE RECORDER & HI-FI AUDIO SPECIALISTS



AT LAST A 4-CHANNEL TRANSISTORISED MICROPHONE MIXER AT A REASONABLE PRICE

Four high impedance inputs, e.g. four mics or two mics, one gram and one radio. Output gain approximately 6dB. Inputs, standard jack sockets. Battery PP3.

Price complete with PP3 circuit diagram, instructions etc

£3 - 19 - 6
TRADE SUPPLIED

Details of this, and other offers, available on request.

400 Edgware Road, Paddington PAD 5521

USE YOUR TAPE RECORDER FROM ANY D.C. SUPPLY

You can operate your recorder from a car, caravan or boat battery, or from any D.C. mains supply with a VALRADIO D.C. CONVERTER. These D.C. converters enable you to operate T/RECORDERS, etc., for play-back music, telephone conversations and reports whilst on long journeys, in addition to making outside recordings.

Electronic types of converters are also available for 200/250 D.C. with outputs up to 200 watts 50 c/s. from ships' supply or D.C. mains.

Available for practically all makes of recorders, record players, radiograms, amplifiers, etc., with prices ranging from £7.3.0., VALRADIO D.C. CONVERTERS add versatility to your equipment.

For further details just post coupon below to:

Valradio

LIMITED,
Browells Lane,
Feltham, Middlesex.
Tel. Feltham 4242 & 4837

Valradio and Stereosonoscope are the registered trade marks of Valradio Ltd.

Please send me fully descriptive leaflet, ref: TRC on D.C. CONVERTERS for tape recorders and other equipment.

NAME
ADDRESS
Make and type of equipment:.....
D.C. volts in:..... A.C. watts out:.....

THE Ferrograph CENTRE



New Series 5 now on demonstration also Models 422-424.

Accessories; Mixers, Tuners, Microphones, Stands, by leading manufacturers.

It pays to deal with a specialist

our readers write . . .

. . . about good average quality

From:—K. W. Hart, 2 The Greenway, Rickmansworth, Herts.

Dear Sir:—I could not agree more with your Editorial (May, 1963) that with $\frac{1}{2}$ -track recording at $7\frac{1}{2}$ i/s "everything is set for really good average quality", but I would query that word "average" in the light of personal experience.

I have one of the new Swiss Revox F36 stereo machines and use this permanently hooked up to my stereo hi-fi system and I can say most definitely that this new recorder will not give just "average" quality but quality as high as I can feed to it. My hi-fi system permits immediate comparison between original and taped signals—"monitoring"—and it is impossible to tell the difference between them at $7\frac{1}{2}$ i/s. I have had the response of the recorder measured and it is flat between 40 c/s and 15 Kc/s, within 1 dB—and this on both channels. At $3\frac{1}{2}$ i/s the response is smooth up to 12 Kc/s and is the best I've heard on any machine at this speed.

I have no commercial axe to grind for Revox as I have no connection with them other than that of a customer, but I do like to grind the axe of quality in tape recording. My Revox—need I say?—is the two-track version and I should like to mention that I have been fortunate enough over the last few months to have had practical first-hand use of the best and latest stereo recorders, four-track and two-track versions. Though I realise the Editor has closed the controversy about two- and four-track recording, may I make a comment based solely on first-hand experience? It is that having lived with the best two- and four-track machines—all those costing over £100 each—I have found that I prefer to listen to two-track reproduction. All the machines of the top grade, whether two- or four-track, will produce a good facsimile of an original signal, but the two-track machines do it with what I can only call "less mechanical intrusion". They are kinder to tape—and to one's ears. Feeding in white noise to these machines proves the point. On the two-track machines, the Revox most notably, it comes out smooth, but on the four-track machines it comes out with a lumpy, rougher quality. But the final and conclusive point is simple: lengthy comparative listening tests prove it's easier and more satisfying to listen to two-track reproduction—it remains genuinely in the category of 'hi-fi'.

Yours sincerely,

. . . about a telephone effect

From:—I. A. Easton, 40 Buchanan Drive, Rutherglen, Lanarkshire.

Dear Sir:—With reference to the Reader's Problem entitled "Telephone Effects" by J.H., of London, which appeared on page 161 of the May issue, I should like to point out that Telefunken make a microphone with the addition of a Telephone Effect switch. This switch is fitted to the D14 model and controls the frequencies picked up.

Yours faithfully,

BRAND NEW TOP QUALITY 100% TESTED RECORDING TAPE

(As supplied to the Far East Broadcasting Corp.)

	Size	Length	Price
STANDARD	3"	160'	2/6
	5"	600'	9/-
	5½"	900'	11/6
	7"	1,200'	16/-
LONG PLAY	3"	220'	3/-
	5"	900'	11/6
	5½"	1,200'	16/-
	7"	1,800'	23/-
DOUBLE PLAY	5"	1,200'	23/6
	5½"	1,800'	28/6
	7"	2,400'	41/-

Postage 1/- per spool 4 or more P.F. Refund Guarantee (never ever requested)
Recorder repairs at reasonable prices. (Collected and delivered in London Area)

N. WALKER, 28 Linkscroft Avenue, Ashford, Middlesex
Telephone: ASHFORD 53020

YOUR TAPE DEALER

Country and Provincial

BOURNEMOUTH

NATIONAL RADIO SUPPLIES

66 Holdenhurst Road
Bournemouth

Tape, Hi-Fi & components

Tel. 25232

H. D. KIRK

Stereolectrics

Specialists in High Fidelity
150 HIGHER BRIDGE STREET

Phone: 23093

BOLTON

R.E.S. (COVENTRY) LTD.

SPECIALISTS IN HIGH FIDELITY

and all makes of Tape Recorders

All leading makes of High Fidelity Equipment stocked and demonstrated under ideal conditions. ★ The Best Selection—Terms and After Sales Service in the MIDLANDS.

R.E.S. (Coventry) Ltd. 128 Far Gosford St. Coventry 28781/2

FARNHAM, SURREY

- ★ Stockists of all the leading makes of High-Fidelity Equipment
- ★ Comparative Demonstrations
- ★ Cabinet Manufacture, s and Designers
- ★ Personal service and satisfaction guaranteed
- ★ Specialists in custom-built Hi-Fi Equipment

LLOYD & KEYWORTH LTD, The Record Shop

26/7 Downing Street, Farnham, Surrey. Telephone: Farnham 5534
SURREY AND HAMPSHIRE'S HI-FI DEALERS

TAPE RECORDER CENTRE (HALIFAX)

Stock all the best Tape Recorders; Hi-Fi Equipment;
Tape; L-P Records, etc.

DEMONSTRATIONS DAILY BY EXPERT STAFF
2 years FREE SERVICE ON NEW RECORDERS over £35

30 King Cross Street, Halifax. 'phone 66832

LEICESTER

ALL YOUR HI FI REQUIREMENTS

Speakers by:	H.M.V. QUAD LEAD ROGERS	TANNOY MORDAUNT LOWTHER	W.B.
	WHARFDALE GOODMANS.		
Tape:	FERROGRAPH REFLECTOGRAPH	GRUNDIG	
	SIMON BRENELL		
Record Department:	ALL LABELS-PARASTAT SERVICE.		

LEICESTER CO-OPERATIVE SOCIETY LIMITED, High Street, Leicester. Tel: 20431

STOCKPORT

FAIRBOTHAM & CO. LTD.

47 LOWER HILLGATE STO 4872
FERROGRAPH, REVOX, TANDBERG, BRENELL,
SIMON, TRUVOX, SONY, PHILIPS, MAGNAVOX
All models on comparison demonstration
Evening demonstrations by appointment

— YOUR TAPE DEALER —

**MANCHESTER
LANCASHIRE HI-FI Limited**

and now incorporating
The Tape Recorder Specialists
DIXONS ELECTRONIC (Sales and Service)
8 DEANS GATE - - - next to Grosvenor Hotel

The Largest Electrical store in the North

TAPE RECORDERS and HI-FI



Fenham Radio
158, NEW BRIDGE STREET,
NEWCASTLE UPON TYNE 1
Telephone: 29866

WESTWOOD'S of **OXFORD**

46 GEORGE STREET
PHONE: 47783

PETERBOROUGH, NORTHANTS Tel: 5643/5644

CAMPKINS RECORD SHOP
RECORD TAPE AND HI-FI EQUIPMENT SPECIALISTS

NEW ADDRESS: **15 LONG CAUSEWAY** LARGE STOCKS
(IN CITY CENTRE)

HAMILTON ELECTRONICS
HIGH FIDELITY TAPE RECORDERS
35 LONDON ROAD
SOUTHAMPTON
TEL. 28622

18 QUEEN STREET **SALISBURY**
J. F. SUTTON
RECORDS — RECORDERS — HI-FI
421 SHIRLEY ROAD
111 EAST STREET **SOUTHAMPTON**

Audio Electronics (Midlands) Ltd.
Specialists in Dictation Mcs., Tape Recorders, Inter-Com., Tapes and Accessories
Full After Sales Service on all Equipment
PHILIPS, GRUNDIG, TRUVOX, UHER, ETC.

203 STAFFORD STREET WALSALL Tel.: 21086

WORTHING, SUSSEX

We stock Hi-Fi Equipment by Leak, Quad, Goodsell, RCA, Acos, Garrard, Collaro, Tannoy, Wharfedale and Goodman and give fully comparative Demonstrations

BOWER & WILKINS LTD.
1 Becket Bldgs., Littlehampton Road Worthington 5142

CLASSIFIED ADVERTISEMENTS

Advertisements for this section must be pre-paid and accompanied by a postal order, money order, or cheque. The rate is 6d. per word with a minimum charge of 7/6d. Box numbers may be used for an extra charge of 1/6d. The trade rate is 9d. per word, plus 2s. for a box number, conditions on application. Send replies to box numbers, c/o "The Tape Recorder", 99 Mortimer Street, London, W.1.

No responsibility will be accepted by the editor, the publishers, or the printers of The Tape Recorder for the quality of any goods offered, bought or exchanged through the medium of these columns, or for any failure in payment, etc., though the greatest care will be taken to ensure that only bona fide advertisements are accepted.

All advertisements for the July issue must arrive not later than June 4th.

LEGAL

£90 Reward. Stolen 11th/12th April from East Ham. Quantity of tape recorders including Simon SP5 Serial No. 00248. Subject to usual conditions. Apply: Turnpenney & Co., 141 Fenchurch Street, London, E.C.3.

FOR SALE

Find that review you want—get a copy of the index for "Tape Recorder", volumes 1, 2, 3 and 4. Price 2s. each volume, plus 6d. postage, from 99 Mortimer Street, London, W.1.

Easysplice Tape Splicer makes accurate splicing easy—guaranteed 5s. 6d. Scotch Boy splicing tape 3s., P. & P. 6d. Easysplice, 30 Lawrence, Ealing.

Tape Recorder, Vol. 1. Mint condition, semi-bound with index, £2 inc. post pack.—Box No. (London) 310.

Grundig 4-channel Electronic Mixer Unit (type GMU 3). Unused. Cost 16 guineas. Any offers.—Box No. (London) 311.

Truvox 4-track Stereo Tape Deck PD 86 for sale. Surplus to requirements. Brand new, unopened, purchased 1963, £35. S.P., York House, Huddersfield.

Ferroglyph Series Four, fitted FR7 monitoring head. Mint condition, still under guarantee. Cost over £90. Including Mullard four-channel mixer, cost £10. Accept £70 the two. Owner going stereo.—G. F. Goshawk, 11a Lark Crescent, Hartford, Huntingdon.

Grundig TK12 track reversal, excellent condition, any test, £20.—62 Beacontree Avenue, E.17. Larkwood 3792.

Tape Recorder, Vols. 1, 2 and 3, unbound with index 30s. per vol. Collect or pay carriage.—George, 205 Avon Road, Chelmsford.

E.M.I. TR50A professional tape recorder, 15/7½ i/s overhauled and modified by E.M.I. for dual-track operation. Two sets full-track tape heads included. £90 o.n.o. Revox C36 (Mono) recently serviced by Concessionaires, £80 o.n.o. Two STC type 4021 microphones, £12 each. All subject, unsold.—White, 56 Manor Wood Road, Purley, Surrey. UPLands 4093.

Revox 2-track Stereo £87 under guarantee. Shure M7D £5; B20 Stereodyne £4 10s. Pamphonic 1002 amp plus preamp 25W £20. Pamphonic 1004 10W amp/preamp £11. Pamphonic Senior Victor L/S 19 owner going abroad. Box No. (London) 312.

Vortexion WVA Tape Recorder, Ribbon microphone, very little used £60. Box No. (London) 313.

Wearite series 5 A/N deck, as new, only 2 months old £30 cost £44. McLachlan, 16 High Street, Albrighton, Nr. Wolverhampton.

Uher 4000 transistor portable four speeds, cardioid microphone, leather case. Nine months old, scarcely used. Cost £107, accept 75 gns. Graigen, 9 Kings Avenue, Carshalton Beeches, Surrey, Wallington 1487.

Reps Model R10 Twin track model, perfect working order. Accept £41. Phone Ealing 9818 11 a.m.—6 p.m. Any Tuesday or Thursday.

TRADE

A Service for the Connoisseur. Ferrotape available by post, all sizes in stock. Also Hublok empty spools. Send for price list.—J. Turner, 51 East Street, Horncastle, Lincs.

Ferroglyph 5A/N, 422 and 424, Revox F36, etc., always in stock.—City and Essex Tape Recorder Centres (see page 219).

Tape and gram equipment repairs/mods.—Harding Electronics, 120A Mora Road, Cricklewood, N.W.2.



**For sound recording
at its best - it is
well worth waiting for**

The Incomparable
Ferrograph

Post this coupon today for full details

NAME _____

ADDRESS _____

To:—THE FERROGRAPH COMPANY LTD.
84 BLACKFRIARS ROAD · LONDON S.E.1. Tel: WATerloo 1981



**ONLY A PILLAR
BOX AWAY . . .**

Wherever you live, you are only the nearest pillar box from the biggest Tape Recorder dealers in the British Isles — HOWARD OF BROMLEY.

Thinking of buying a Tape Recorder, Hi-Fi Equipment, or a Camera? Willing to risk 3d. to see if we really do offer you better terms than anyone else? Then contact us for full details of all our offers (which include INTEREST FREE H.P. on most makes) and free brochures, etc.

If we do not convince you, you will only have lost 3d.—and you can still go elsewhere (but we bet you won't!).

Write, phone, call in or send carrier pigeon:

**218 HIGH ST.,
BROMLEY,
KENT**

**RAVensbourne
4000 & 4477**

**H O W A R D
T A P E R E C O R D E R S**

CLASSIFIED ADVERTISEMENTS — continued

£10,000 worth of Hi-Fi equipment and Tape Recorder accessories. Due to purchase of wholesaler's entire stock we can offer hundreds of bargains in pickups, cartridges, styli, motors, etc., at greatly reduced prices. Send 3d. stamp for comprehensive lists. Lee Electronics Ltd., 400 Edgware Road, London, W.2.

Diemos Ltd., announce an outstanding new type of amplifier. This is the most versatile unit ever offered to the tape enthusiast, mono or stereo, magic eye or meter up to 7 mono channels etc. Specifically suitable for the Planet Decks. Send for full details to 8 Corwell Lane, Hillingdon, Middx.

Recorder need Repairing? Then let City and Essex Tape Recorder Centres do it for you expertly and economically (see page 219).

Cinesmith Depolariser demagnetizes your record/playback heads in situ. Use occasionally for better recordings without hiss and with background silent as the grave no matter how often played. From your dealer or Cinesmith Products, Regent Street, Barnsley. £2 5s. Write for leaflet.

L. Bishop Limited, Tape Recorder Services, 1708 Bristol Road South, Rednal, Birmingham. Tel.: Rubery 2709. Grundig specialists.

Pre-recorded tapes. Unique complete catalogue listing all makes, mono, stereo. 7½ and 3½ i/s including World Record Club tapes. Call for free copy or send 1s. mailing fee. Dept. T.R.3 Teletape Ltd., 33 Edgware Road, W.2. PAD 1942.

Use up those odd lengths of tape, splice them together professionally after reading "How to Splice Tape", price 2s. 6d. posted, from The Tape Recorder, 99 Mortimer Street, London, W.1.

All makes of tape recorders repaired or modified. Miniflux heads supplied. "Audiomaster" equipment serviced. Audio installations built to your specification by John C. Latham, Deimos Ltd., 8 Corwell Lane, Hillingdon, Middlesex.

Full building instructions for the remarkable "Tricolumn" loud-speaker are available in reprint form from Hi-Fi News, 99 Mortimer Street, London, W.1. Price 2s. 6d. post free.

Sound Bookshelf. Books on audio, hi-fi, records, tape, music. S.a.e. for catalogue. World Audio Publicity, 34d Great Windmill Street, London, W.1.

WANTED

Good Cash prices for tape recorders.—Tel.: Maryland 5879 (see page 219).

Wire Miniphone or other cheap small instrument required. Evenings, KIL 0288.

Grundig Distributor Speaker for TK 830-3D recorder required. Must be in first-class condition.—Box No. (Somerset) 309.

EDUCATIONAL

Frenchman teaches French by tape recorder. Captivatingly vivid 1963 style lessons. Takes half the time to learn at home by post. (Also Spanish.) To enrol, write—R. de Breville, 22 University Street, Belfast, 7.

Sleep Learning. Of fascination to all TR enthusiasts. Send 6s. 6d. for book. Refund guarantee.—York House, Huddersfield.

TAPE TO DISC

Tape to Disc Recordings. Finest professional quality, 10 in. L.P. 35s. (32 min.); 12 in. L.P. 40s. (45 min.); 7 in. E.P. 17s. 6d. 48-hour Postal Service. S.a.e. for leaflet to: Deroy Sound Service, 52 Hest Bank Lane, Hest Bank, Lancaster.

Tape to Disc service, editing, and dubbing, all speeds. Studio available for musical groups. Outside recordings our speciality. Ilford Sound Recording Service, 63 Aintree Crescent, Barkingside, Ilford, Essex. Telephone: CRE 8947 and GRA 5107.

Rapid Recording Service, 78s and L.Ps from your own tapes. (48-hour service) Master Discs and pressings. Recording studio. Mobile recording van. Manufacturers of the Sleep-o-matic Unit. Foreign language courses available for sleep-learning. Brochures and price lists on request from Dept. T.R. 21 Bishops Close, London, E.17.

Index to Volume 4 of THE TAPE RECORDER
Available now - - - - Price 2s. 6d.

— **TAPE TO DISC SERVICES** —

The following are members of the Association of Professional Recording Studios who can be relied on to give satisfaction

MJB RECORDING & TRANSCRIPTION SERVICE
specialise in the production of microgroove records from Professional and Amateur recordings (Acetate copies; Processing Masters and Pressings at 16⅔; 33⅓ & 45 r.p.m.) Extended playing times achieved by controlled cutting. Mobile, Studio, Editing, Label printing and "Off the Air" Services.
7 HIGH STREET, MAIDENHEAD Tel: 25630

TAPE RECORDERS · AUDIO EQUIPMENT · DISC CUTTING STD & LP FROM TAPE · STUDIO FACILITIES · HIRE SERVICE · SALES · EXCHANGES

MAGNEGRAPH

1 Hanway Place, London, W.1 Tel.: LAN 2156

AUTOMATED SLEEP-SUGGESTION

- **WHAT IS SLEEP-SUGGESTION?**
- **HOW DOES IT WORK?**
- **HOW CAN IT BENEFIT YOU?**

SEND NOW for **FREE BROCHURE** for up-to-the-minute information on this vital subject.

EDUCATIONAL RECORDINGS LTD.
Dept. 13, 21 Bishops Close, Church Lane, London E.17

ADVERTISERS' INDEX

	Page
A. Brown & Sons Ltd.	214
A. C. Farnell Ltd.—Irish Tape	198
Chateau Productions Ltd.—Microkit	187
City & Essex Tape Recorder Centres	219
Denham & Morley Ltd.	204
De Villiers (Electronic World) Ltd.	219
Educational Recordings Ltd.	218
Elstone Electronics Ltd.	206
E.M.I. Tape Ltd.	190
Ferroglyph Company Ltd.	217
Francis of Streatham	188
Heathkit	189
Highgate Acoustics	188
Howard Tape Recorders	217
Geo. Jeffrey Ltd.	205
K & K Electronics Ltd.	212
Lee Electronics	214
Nusound Recording Co.	212, 214
Recorder Co.	210
Reeves Sound Service Ltd.	212
Reps Tape Recorders Ltd.	210
Revox (U.K. Concessionaires) Ltd.	194
R. E. W. Earlsfield Ltd.	206
Stella Radio & T.V. Co. Ltd.	200
Studio 99	212
Tape Recorder Centre	186
Valradio Ltd.	214
N. Walker... ..	215
Wharfedale Wireless Works Ltd.	204



SPECIALISTS IN

FERROGRAPH
VORTEXION
TANDBERG
BRENELL
AMPEX
REPS
SONY
REVOX
PHILIPS
GRUNDIG
LOEWE OPTA
TELEFUNKEN
ETC.

FANTASTIC!!

FANTASTIC!! An understatement indeed, for so vast is the range of selection of new and secondhand recorders to be seen in our showrooms that no other word can describe it. Call into any of our branches and see the largest and finest selection of recorders on display in Great Britain. Every recorder can be seen, heard and compared and each member of our experienced and expert staff will be happy to offer you honest, unbiased advice in order to assist you in the selection of a recorder to suit your individual requirements.

- ★ HIGHEST PART EXCHANGE ALLOWANCES
- ★ OVER 250 NEW & S/H RECORDERS ON DISPLAY
- ★ H.P. TERMS OVER 9-24 MONTHS
- ★ FREE HOME DEMONSTRATIONS
- ★ TAPE RECORDER REPAIR SPECIALISTS
- ★ FREE DELIVERY. FREE TECHNICAL ADVICE

NOTE.—OUR CITY SHOP OPEN MON.-FRI. 9-6. CLOSED SAT. OPEN SUN. 9-2 p.m.

CITY & ESSEX T A P E RECORDER CENTRES

228 Bishopsgate, E.C.2. Opp. Liverpool St. Station. Bis 2609
 2 Maryland Station, Stratford, E.15. (Adj. Station) Mar 5879
 205 High St. Nth. (Opp. East Ham Station), E.6. Gra 6543

ELECTRONIC WORLD

is by far the cheapest
HIGH QUALITY TAPE
on the market

- * **Acclaimed by experts**
Reprints of reviews available
- * **Backed by our Guarantee**
If you are not completely satisfied with any purchase, we undertake to refund the full price plus your return postage

POST COUPON NOW!

DE VILLIERS (Electronic World) LTD.

16d Strutton Ground, London, S.W.1

STANDARD PLAY (Acetate base)

3 in. spool 175 ft. 4 spools for 18/-
or 48/- dozen

4 in. spool 300 ft. 4 spools for 26/-

5 in. spool 600 ft. 2 spools for 26/-

5½ in. spool 850 ft. 16/- per spool

7 in. spool 1,200 ft. 19/- per spool

ARCHIVE GRADE (S.P. Polyester)

7 in. spool 1,200 ft. 22/6 per spool

LONG PLAY (Acetate Base)

7 in. spool 1,800 ft. 28/-

LONG PLAY (Polyester Base)

3 in. spool 225 ft. 4 spools for 22/-
or 60/- dozen

4 in. spool 450 ft. 2 spools for 21/-

5 in. spool 900 ft. 2 spools for 35/-

5½ in. spool 1,200 ft. 24/- per spool

7 in. spool 1,800 ft. 31/- per spool

DOUBLE PLAY (Special Polyester base)

3 in. spool 375 ft. 4 for 40/-
or 108/- per dozen

4 in. spool 600 ft. 2 for 30/-

5 in. spool 1,150 ft. 27/- per spool

5½ in. spool 1,750 ft. 35/- per spool

7 in. spool 2,400 ft. 45/- per spool

I enclose remittance for £ s. d.

Post Free

Name

Address

BLOCK LETTERS PLEASE

Cash with order



THE HI-FI SCENE—1963



first published in 1956 the Hi-Fi Year Book has steadily grown in size. This year for the first time it tops the 300 page mark and yet still costs the same price — 10/6. All the entries have been revised and brought up to date and there are new articles by leading authorities, on Pickups, Tuners, Amplifiers, Speakers, Tape Recording, Microphones together with an Audio Diary. The 16 Directory Sections cover all High Fidelity products currently available in the U.K. giving a brief specification, price, also manufacturers' names and addresses.

TAPE RECORDERS

HI-FI YEAR BOOK

AMPLIFIERS

MOTORS

COMPLETELY REVISED

TUNERS

TAPE AMPLIFIERS & MIXERS

MICROPHONES

SPEAKERS

Price

TAPES

CONSTRUCTIONAL KITS

10/6

TAPE ACCESSORIES

PICKUPS

(11/9 post paid)

HI-FI DEALERS

MILES HENSLOW PUBLICATIONS LTD. 99 MORTIMER ST., LONDON, W.1