

the TAPE RECORDER

PRICE 1/6

December 1960

Vol. 2 No. 11

INCORPORATING "SOUND AND CINE"



IN THIS NUMBER

- Taping a Soundtrackr Colour Slides
- Build this Really Portable Recorder — First in a Series Describing a Do-it-Yourself Clockwork-driven Machine
- 20 Tape Gift Ideas
- Readers' Problems Answered
- News and Pictures from the World of Tape
- Equip,emt Reviewed
- Tape Recorder Workbench
- Sound and Ciné — Beginning a Regular Monthly Feature



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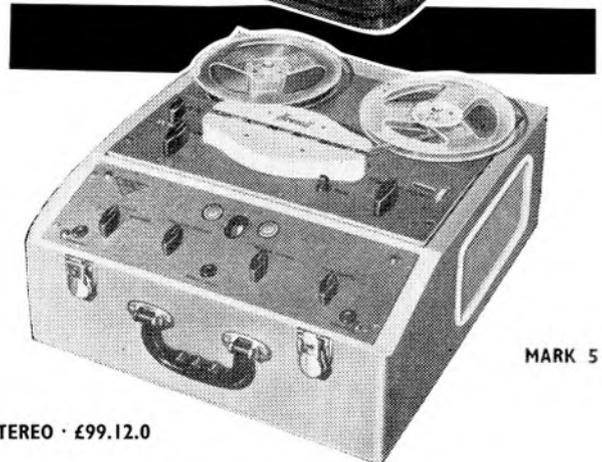
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Frequent model changes to stimulate sales have never formed part of the Ferrograph policy. Indeed, it is very significant that in its external appearance today's instrument still bears a very strong resemblance to the original Ferrograph of 1949. The fact that even after eleven years it has not been found necessary to make any substantial changes is obvious proof of the soundness of the Ferrograph basic principles of design.

Today, when keen competition among manufacturers of Tape Recorders is stimulating interest in 4-track heads, slower tape speeds, cassettes and the like, it is appropriate that we should once more re-state the Ferrograph policy.

Because *Recording* is our business, the unceasing efforts of our engineers will continue to be directed towards perfection in the *recording* function of the Ferrograph rather than attempting to foster its adoption as a competitor to the gramophone.

Those who have bought the Ferrograph in the past have deliberately chosen it for its incomparably high standards of performance and for no other reason. Among them we number many of the leading personalities in the world of music and drama, radio and television broadcasting organisations, Government departments, record manufacturers and in fact all who demand the highest attainable standards of quality and dependability.

Based upon our intimate knowledge of the work being carried out on the Ferrograph we believe that any widespread introduction at the present time of narrow tracks and slower speeds could lead to a general, and regrettable, deterioration in the standards of tape recording.

We affirm, therefore, our determination to make no compromise with quality. The reputation enjoyed by the Ferrograph will not be hazarded, either now or in the future, by the premature introduction of any features that have not been proved fundamentally sound and in the best interests of the user.

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	900	5	2 × 45
	1200	$5\frac{1}{2}$	2 × 60
	1800	7	2 × 90
Agfa PE 41 Double play tape	300	3	2 × 15
	1800	$5\frac{1}{2}$	2 × 90
	2400	7	2 × 120

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At $1\frac{1}{2}$ ins./sec. (4.75 cm/sec.) recording speed the playing time is doubled. All tapes are supplied on reels with leader and contact strips and in specially designed hinged storage containers.

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 If you cut a top note off in the mike, you can't
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 If there's distortion at the start, there'll be
 a din in the end. Give your recorder a fair chance.
 Give it a balanced, wide-frequency input. Give it
 a good microphone. Give it an Acos microphone.

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 Booth 65



MIC 39

A crystal hand microphone of exceptionally attractive appearance. Extended frequency response; noise-free cable and die-cast liner to minimise hum and ensure excellent signal-to-noise ratio. Available with table-stands and floor stand adaptor. U.K. Retail price 3 gns. Other Acos microphones include the famous fold-away MIC 40 (35/-) the MIC 28 Lapel Microphone (50/-) and a superb new stereo microphone (£6.0.0)

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Inside Story



OF THE TELEFUNKEN TAPE RECORDER WITH YOUR DEALER

He knows the features that put the TELEFUNKEN Magnetophon Range in a class apart for Quality, Fidelity and Reliability



THE EXCITING POSSIBILITIES OF TELEFUNKEN 4-TRACK RECORDING

Four-Track recording means you get four tracks on one tape. The perfection of the in-line twin-stacked recording head made this possible by actually allowing a quarter of the tape width to be scanned by each head. Briefly it is possible to record track 1 then rewind and record track 3 in perfect synchronisation. Playing back both tracks together gives an amazing super imposition effect. A *unique Telefunken transistorised preamplifier* actually allows the first track to be monitored by earphones while the second track is being recorded. This opens up a tremendous field of activity for the tape enthusiast. Voice can be dubbed onto music. The Soloist can record himself in a duet! Effects can be added to lectures speeches, and monologues etc.

The Telefunken Stereo model uses Four-track recording and incorporates two separate amplifiers. Using the D77 microphone, two forms of live stereo recording are possible and many other exciting effects can be produced. Send for full details.



TELEFUNKEN 'Magnetophon 76K'
Tape speeds $3\frac{1}{2}$ i.p.s. and $1\frac{1}{2}$ i.p.s. with frequency response of 60-16000 c.p.s. and 60-9000 c.p.s. Playing time of 6 hrs. 20 mins. on $5\frac{1}{2}$ " DP tape. Tone control. Extension speaker socket. **52 GNS**



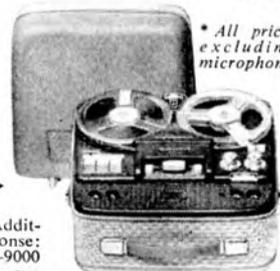
The amazing 4-Track TELEFUNKEN 'Magnetophon 76K'
Over 12 hrs. playing time from one $5\frac{1}{2}$ " DP Tape. Two speeds $3\frac{1}{2}$ i.p.s. and $1\frac{1}{2}$ i.p.s. with frequency response of 30-16000 and 30-9000 c.p.s. **62GNS**

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Gives full stereo and Four-track monaural superimposition effects. Two speeds $6\frac{1}{2}$ and $3\frac{1}{2}$ i.p.s. $1\frac{1}{2}$ i.p.s. gives 6 hrs. 20 min. stereo recording. Push button track selection. Additional speaker in lid. Frequency response: 40-16000 c.p.s. at $3\frac{1}{2}$ i.p.s. and 40-9000 c.p.s. at $1\frac{1}{2}$ i.p.s. **85 GNS**



TELEFUNKEN 'Magnetophon 85KL'
Tape speeds of $7\frac{1}{2}$ i.p.s. and $3\frac{1}{2}$ i.p.s. with frequency response of 30-20000 c.p.s. ± 3 dB and 30-15000 c.p.s. 6 watt push/pull power stage. Separate Bass and Treble controls. D.C. heated pre-amplifier valves. **79 GNS**



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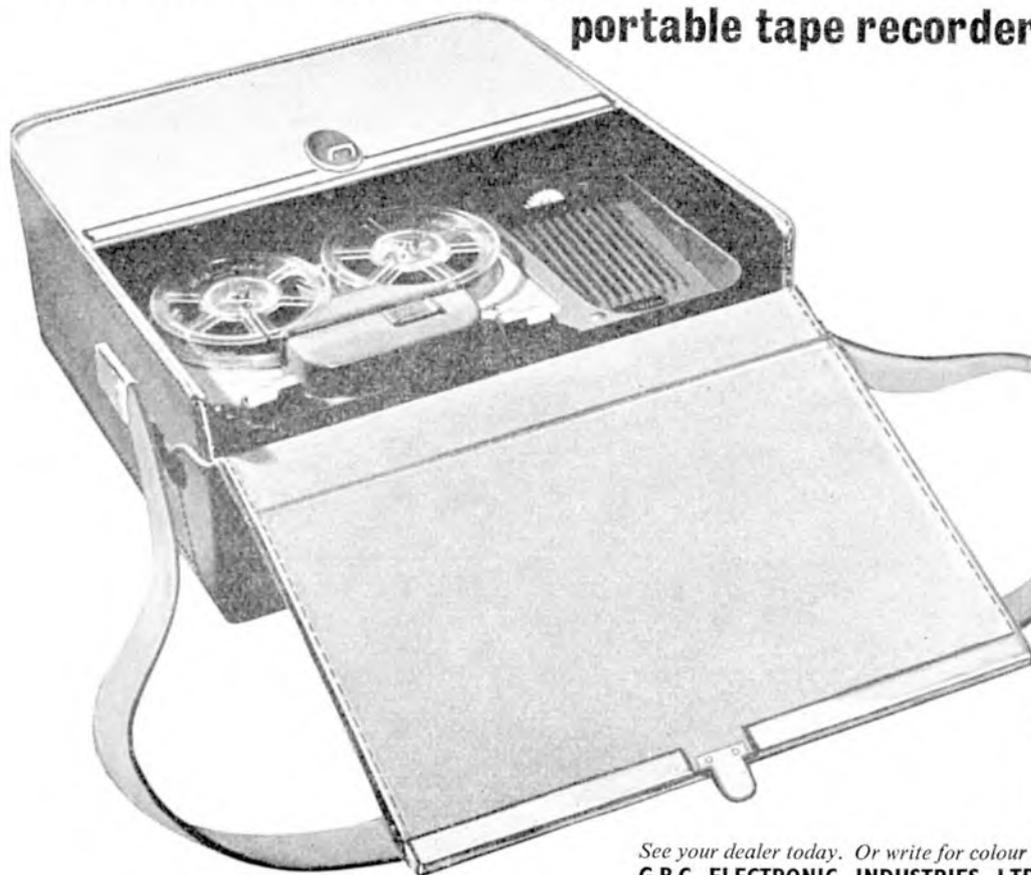
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Yes, all these "professional" features, plus superb quality of sound, plus absolute reliability. Only H.M.V. could offer you such stupendous value for money. Hurry along to your dealer's and ask him to demonstrate this amazing tape recorder.

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** Complete with 1,200' Emitape, spare spool and crystal microphone.*

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1. $1\frac{7}{8}$ " ips can be fitted for an extra 3 gns.
2. Superimposing fitted as standard.
3. Mixing facilities.
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$1\frac{7}{8}$ ips 70—4,500 \pm 3db.

$3\frac{3}{4}$ ips 60—9,000 \pm 3db.

$7\frac{1}{2}$ ips 50—15,000 \pm 3db.

15 ips 40—20,000 \pm 3db.

(signal noise ratio at $7\frac{1}{2}$ ips—47db.)

Separate record amplifier.

Push-pull bias erase oscillator for low tape hiss.

Separate bass and treble controls \pm 15 db at 14 kc/s—15db at 40 c/s.

Supplied complete with Acos 39/1 microphone, Radio Record lead and 1,200' P.V.C. Tape.

MODELS

R10 56 GNS.—2 track

66 GNS.—4 track

R20 62 GNS. with magic eye record indicator

R30 66 GNS. with meter record level indicator

R40 70 GNS. as R30 but with push/pull sound output

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$7\frac{1}{8}$ ips 30—18,000 cycles \pm 3 dBs
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} at optimum bias setting

Collaro Studio Deck. Microphone and Radio/Gram inputs each with separate gain controls for mixing. Separate bass and treble controls.

\pm 12 dBs at 50 cycles and 12 k/cs. Adjustable monitor volume control independent of record level. Peak signal level meter $2\frac{1}{4}$ 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: 1 EF86. 2 ECF80. 2 ECC83. 1 ECC82. 2 EL84. Metal rectifier, contact cooled.

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 Technical Editor - - - - - John Borwick
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 AUDIT BUREAU
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EDITORIAL

A VERY Happy Christmas to you—and may your seasonal parcels include at least one spool of your favourite brand of tape! Doubtless the 1960 Christmas mail sacks will carry a large variety of recorded messages, tapes, anyway, and particularly between clubs and club members the world over.

Talking of clubs, there is an interesting suggestion on another page of the magazine concerning the expansion of activities to take in amateur ciné. There will be many who will turn this down flat: on the other hand there are many more who will see in it the possibilities that we do.

Ciné enthusiasm may be divided into two distinct categories—the first and largest being the 8 mm (and of course 9.5 mm!) groups, and the second being the 16 mm groups, whose work is in the main of a semi-professional nature, and generally linked with sound facilities of a like standard. The 8 mm ciné enthusiast can now enjoy the same magnetic stripe facilities as his more elaborately equipped 16 mm counterpart, but he is generally more dependant upon a tape recorder for his sound reproduction, and therefore what more natural fusing of interests could there be than those of the amateur ciné and amateur tape enthusiasts?

During the last twelve months too, there has been an almost phenomenal increase of interest for “sound” on the part of the slide enthusiast, and there is already a move on the part of manufacturers to produce “coupled projectors” to cater for this new development. We cover the subject, initially, in an article on page 558, and we propose to devote considerably more space to it in the near future.

The preparation of sound tracks for ciné films is a new and exciting venture for tape recorder enthusiasts in search of more ambitious territory to explore. Many of the amateur 8 mm films that we have seen have fallen down very badly as a result of their sound; and we have often thought that much mutual benefit could result from co-operation between the two fields of interest which are—or should be—so closely allied.

It is an interesting fact that many *hi-fi* enthusiasts are also keen photographers, though there is no obvious connection between the two hobbies. When it comes to ciné photography, there is every reason for the ciné enthusiast to take up tape, because silent movies cry out in eloquent silence for “sound”. Though the reciprocal need is not so evident, there is no doubt that some tape enthusiasts would like to add the visual counterpart to their sound venture; and we therefore conclude, as we began, by saying that a merging of some club interests would be a very good idea.

Editorially, in this magazine, we have received enough encouragement to confirm our earlier decision to include ciné interests for the additional benefit of our readers; and so, starting this month, we resume the “sound and ciné” series that we introduced a few months ago.

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COVER PICTURE

THIS month's cover photograph does not portray an over-enthusiastic recordist on a railway footplate, though you might be excused for thinking this. (See also cartoon on page 547). It is the engine-driver's end of a modern inter-communication system installed by A.E.I. at Maltby Colliery (Worksop). This is referred to as “Clearcall” carrier-frequency communication. The locomotive carries a transmitter/receiver and loop aerial giving continuous two-way linking with the despatcher. The microphone—unlike those used by tape enthusiasts—has to be flame-proof, and acts also as the loudspeaker. (photo by courtesy of the National Coal Board).

NEXT MONTH

IN the second instalment of his new “learn as you build” series of articles A. Tutchings will make a start on the constructional details of his new Clockwork-driven Portable Recorder. Also, to follow up this month's *Tape with Slides* feature, we shall present a *Survey of Still Projectors*, and that popular extension of tape recording—*Sound and Ciné*—will again be spotlighted in a general article for beginners, by Richard Golding. These are in addition to all our regular features, *Readers' Problems*, *Tape Recorder Workbench*, *Club News*, *Details of New Products*, and *Teaching Tape*. A number of interesting tape recorders are in course of review, and these reports—which are constantly in demand by readers—will appear regularly in the *Equipment Reviewed* section from now on. By far the best way to make sure of getting your copy is to take out a year's subscriptions from this office.

SUBSCRIPTION RATES

The subscription rate to *The Tape Recorder* is 21/- per annum (U.S.A. \$3.00) from The Tape Recorder, 99 Mortimer Street, London, W.1. Subscription+Index, 24/- (U.S.A. \$3.25).



Programmes on Tape for Hospital Patients

THOSE who have been unfortunate enough to spend months in hospitals will know the need for entertainment, and although a great majority of the Hospital wards are now wired for radio programmes, there are still quite a few without this modern asset which is a boon to those who spend day after day and month after month confined to bed by some long illness or disablement.

These hospitals with no radio have over the last five years come to welcome and appreciate the small group of tape recording enthusiasts, who of their own free will, and at their own expense, provided hospitals with recorded programmes.

This service was formed in Bristol in 1953, by Mr. A. Lovell who realised the need for this type of programme after visiting a hospital and talking to patients. He produced programmes of interest especially for hospitals, and distributed them throughout the country to people interested in reproducing these tapes. After a year of recording, he found that he could not produce enough programmes to cope with the increasing demands.

Through an advertisement, contact was made with Mr. J. Hunter of Essex, who first became interested in tape recording as an addition to his first hobby, radio transmitting and receiving. Shortly after the war Mr. Hunter constructed his own recorder but later the purchase and use of a Ferrograph made him realise that more interesting things could be achieved than recording the voices of the family. This advertisement was a challenge, but an obvious problem arose, where could artistes gather together to produce a recording?

With the assistance of Mr. S. Keen, they were and still are, able to use the Poplar Civic Theatre by kind permission of the Mayor and Borough Council. Due to another notice in the local newspaper, numerous other artistes volunteered their services, together with two more radio amateurs who supplied and operated their own equipment. Many fine programmes were produced and artistes including Stanley Unwin and Gate Eastley, all gave their services free of charge. Now over 100 Hospitals are receiving these programmes and more are joining every month.

The equipment used as shown in the photograph includes two Ferrograph recorders, two mixers, six or seven microphones

HERE AND THERE AND EVERYWHERE

and echo facilities. Programmes are produced by Mr. J. Hunter and recordings are made by Mr. J. Lepper and Mr. N. Ta'bois. Over the five years, the programmes produced have reached a standard equal to any professional recordings. Rehearsals take up to three hours and the final "take" is generally made with very few mistakes.

About the same time as Mr. Hunter joined the organisation another enthusiast volunteered. He was Mr. R. Mayor, who suggested the idea of producing religious programmes. This was done and tapes were made for children and adults. Although Mr. Mayor started alone, he has since been allowed the facilities of using Vortexions and studio equipment. The work that has been done over the past five years has proved that religious programmes are needed in Hospitals. Mostly hymn singing, the programmes are Inter-denominational, and are suitable for all age groups.

During the last few months Mr. N. Paul, winner of the British Amateur Tape Recording Contest, has joined the organisation producing news items and interviews with stars of stage, screen and radio.

Sponsorship and distribution has been arranged with several large organisations in this country and due to this co-operation, the Hospital Broadcasting Service have been able to enlarge their service and cater for more Hospitals requesting programmes.

Patients have now come to recognise the members of the group through their voices on tape, and over the last five years over 200 programmes of various types have been distributed. The members of the committee wishes to thank all Hospitals for their assistance in this work, and look forward to supplying "taped" programmes for at least another five years.

* * *



Wilmex Ltd., Demonstrate Irish Tapes

A film describing in detail the manufacture of Irish magnetic recording tape by ORRadio of Opelika, U.S.A. was shown at a Press reception and trade preview by Wilmex Ltd, the Irish Tape concessionaires at the Abraham Lincoln Rooms, Savoy Hotel, London. This was followed by a demonstration of the new Irish 196 long play economy tape. Guests included many of the dealers, tape recorder manufacturers and representatives of the press.

The Directors, Mr. A. J. Williams and Mr. P. H. C. Merrick announced the incorporation of their subsidiary company Wilmex

HERE AND THERE AND EVERYWHERE *continued*

(Distributors) Ltd, which will control all sales promotion and distribution to the trade of the complete range of products previously handled by Wilmex Ltd. The parent company will continue to supply its products to manufacturers and will retain the rights as sole concessionaires.

Daughter Church of St. Andrew Bells on Tape

EQUIPMENT for high-fidelity sound, or "Hi-Fi" as it is commonly termed, has been freely available for the home in the form of hi-fi installations for some little time past, but there is now an increasing demand for equipment of this quality in "the public field". One such case was the installing by B.T.H. Sound Equipment Ltd. of hi-fi equipment in the Church of St. Andrew, Cheadle Hulme, Cheshire. A most interesting and unusual feature of this installation is that the equipment is used for reproducing the sound of the bells, previously recorded on tape, of the Parish Church of St. Mary, Cheadle, Cheshire. This method has proved, for many reasons, most convenient, and the success of installation has been acclaimed by the ecclesiastical authority concerned.

When the new church of St. Andrew was under construction, the St. Mary's Parochial Church Council approached B.T.H. Sound Equipment Ltd. to supply apparatus for the reproduction of the sound of bells over a radius of half a mile. The Church Council also specified that the reproduction must be of the bells of the Parish Church of St. Mary and consist of a fifteen-minute peal of the eight bells, followed by a five-minute tolling of the minute bell. It was decided to make a special recording on tape, the reproducer equipment consisting of a tape deck feeding into a B.T.H. Hi-Fi Control Unit and Amplifier and four high velocity projector-type loudspeakers. The tape deck and amplifier were, therefore, housed in a special oak cabinet placed at the rear of the church, and the loudspeakers fixed in the top of the Renaissance-style bell turret.

A good recording of the bells of St. Mary's presented several problems, for not only is the church situated in a main thoroughfare at the junction of three busy main roads carrying a heavy load of traffic both day and night through Cheadle, but there are traffic lights and a bus stop which also increase the engine noise in the immediate vicinity.

Several tests were made to find the most suitable position for the microphones in order that traffic noise would be at a minimum, and also to ensure a balanced recording of the eight bells. Every assistance was given by the team of eight campanologists and four complete recordings were made on one night between 8 o'clock

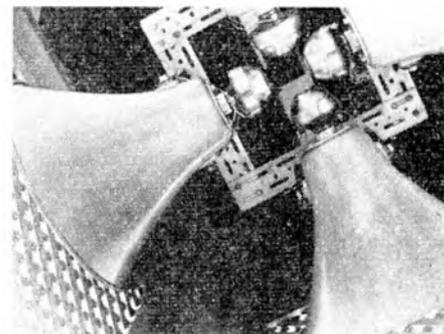
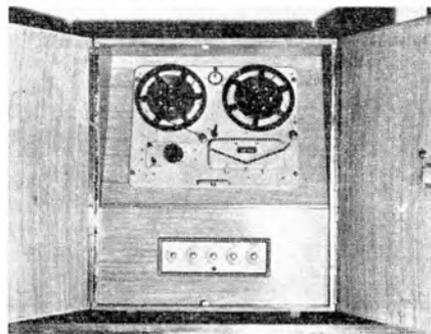
and 10 o'clock. These were then played back and listened to by the bellringers before the final selection was made.

The Church of St. Andrew, Cheadle Hulme, Cheshire, was consecrated by the Lord Bishop of Chester on 9th May. Since then, the reproduction of the bells of St. Mary's, from the new church, has been clearly heard throughout the neighbourhood. The bells have been recognised and many people have commented upon the high quality of reproduction. The curate-in-charge, the Rev. R. H. Sargent, states that members of the Church Council recently toured the district listening to the bells and that the range, quality, and realism of the reproduction has exceeded all expectations.



Cubs Assist Appointments Director

I.S.I.S. Appointments Register, an offshoot of Industrial and Scientific Information Service, offers a unique service for trained technical men seeking first class jobs in industry. Its success is undoubtedly due to the efforts of its Director of Appointments, Mrs. Joan Jones. Her one aim is to place the technologist in the employment to which he is best suited, and to ensure that the employer gets the right man for the vacancy. Applicants registering with the I.S.I.S. Appointments Register must complete a detailed questionnaire, but it was soon found that most of them preferred to read through the form at home and were quite often faced with some query that required her advice. To make this task easier and obviate the time lag, she installed a row of Grundig Cub tape recorders each in its own compartment. Now after running through the form with her or her assistant, the applicant simply dictates his answers to the questions into the recorder. This method ensures no waiting for the applicant, and enables Mrs. Jones and her assistant to deal with several applicants at the same time.



The Church of St. Andrew, Cheadle Hulme, Cheshire (left) houses an up-to-date use of magnetic tape (see story above). The sound of the bells of a neighbouring church are replayed from tape using a Ferrograph recorder and A.E.I. amplifying equipment. (centre). The third photograph shows the loudspeakers in the Bell Tower.

NEWS AND PICTURES FROM THE WORLD OF TAPE



Taking time off during a Palladium rehearsal we see American comedienne, Jean Carrol, taping Britain's No. 1 Pop singer, Cliff Richard—another hit for her Stuzzi Magnette battery recorder.

Sound Film Lecture

AN illustrated talk entitled "Magnetic Recording and the Home Cinema" will be given by Desmond Roe, B.Sc., to the British Sound Recording Association on Friday, December 16th at 7.15 p.m. at the Royal Society of Arts, John Adam Street, London, W.C.2. Particular attention will be paid to the problems of making and projecting 8 mm. films with sound. Enquiries for admission should be addressed to the Hon. Secretary British Sound Recording Association, 40, Fairfield Way, Ewell, Surrey.

New Leaflet from Grundig

THE relative merits of 2-track and 4-track tape recorders are currently the subject of much lively discussion. In order to give guidance to the layman contemplating the purchase of a tape recorder, Grundig (Great Britain) Ltd., have produced a four-page leaflet analysing the two systems, and setting out in simple form the advantages of each. Copies of the leaflet may be obtained from the Publicity Dept., Grundig (Great Britain) Ltd., 39-41, New Oxford Street, London, W.C.1.

Aerialite to Handle the Casian Trav-ler

AERIALITE Ltd., have announced that they have acquired the manufacturing and distributing rights of the Casian Trav-ler tape recorder. All future orders, requests for sales literature and displays, or any correspondence relating to this transistorised battery and mains portable recorder should be sent to Aerialite Ltd., Hargreaves Works, Congleton, Cheshire.

Scotch Tape on Radio Luxembourg

DEVELOPING their sales promotion effort, the makes of Scotch Brand Recording Tapes are currently running a series of programmes on Radio Luxembourg. Every Wednesday and Saturday until after Christmas, the "Six o'clock Record Show" (Radio Luxembourg 6.00 to 6.30 p.m.) will be presented by Minnesota Mining & Manufacturing Co. Ltd., Minnesota House, 3, Wigmore Street, London, W.1.

"Moodmaster" Background Music

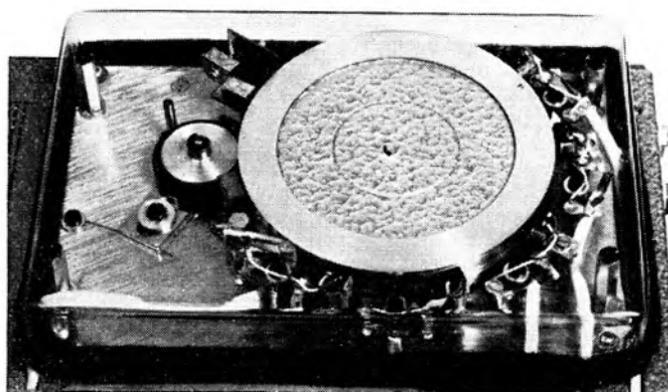
CONSIDERABLE interest in the use of continuous background music in shops, offices, hotels and factories in this country has resulted in the signing of an agreement between the Conley Electronics Corporation of Chicago and G.B.C. Electronic Industries, Ltd., the British company which markets the Clarion tape recorder in the U.K. A new company, Moodmaster (Great Britain), Ltd., in which G.B.C. and Elizabethan (Tape Recorders), Ltd., hold the controlling interest, has been set up to handle marketing of Conley Corporation's Moodmaster equipment in this country. The directors of the British company feel that its unique features of operation and installation, together with its simplicity, will open up an entirely new field for the use of background music in this country.

R.G.D. Price Reduction

RADIO Gramophone Development Co. Ltd., manufacturers of R.G.D. recording equipment announce that their Mark 104, single speed tape recorder, has been reduced from 25 gns to 21 gns. Details from: R.G.D. Co. Ltd., Eastern Avenue West, Romford, Essex.

Two "Victor" Recorders Stolen

WYNDSOR "Victor" tape recorders, Serial No. 20865 and 23107, have been lost in transit, *en route* for Birmingham and Coventry respectively. Any information regarding these machines should be sent to—The General Manager, Mr. Russell, WyndSOR Recording Co., Ltd., 2 Bellevue Road, Friern Barnet, London, N.11.



New Portable Echo Machine

RECORDING studios are designed and built "acoustically dead" to minimise the rebounding of sound from walls, ceilings and tables. Imagine the frustrated designer after removing all trace of echo to hear singers and guitarists demanding echo, and nowadays records without echo can be counted on the fingers of one hand. Just announced in this country is the Binson Echorec Baby, a portable echo machine which should prove very popular with the amateur and professional musician. It consists of a magnetic recorder, using a rotating metal disc instead of tape. Recording and erase heads are fitted, together with replay heads which are fitted at varying distances around the disc. The signals are fed into the recording head, checked by means of a magic eye recording level indicator, and by selecting different replay heads varying degrees of echo can be obtained. One, two, three, or four echoes can be selected, with an additional feature of "swell" which feeds the output back into the recording head

NEWS AND PICTURES FROM THE WORLD OF TAPE *cont.*

to provide reverberation. The output of the Echorec has to be fed into an external amplifier or public address system. The instrument can be operated by a foot control, allowing guitarists to operate the machine whilst playing. Manufactured in Switzerland and distributed in this country by **Modern Electrics Ltd., 164, Charing Cross Road, London, W.C.2.** The Echorec Baby retails for 85 gns.

Has Your Club Tried Ciné?

AN article appeared in the July 1960 edition of *The Tape Recorder* entitled "You can start a Tape Club". Since that article was printed, another 14 to 16 clubs have been formed, and we are sure that by the time this article appears another couple of clubs will be simply bursting with ideas. However, as much as we support clubs of this nature and publish details of club news and events, it is felt that members of many of these clubs really have nothing to interest them. Week after week, demonstrations of members' equipment prove to them that their machines are (a) good (b) bad. This will either make them very jealous or complacent, and can lead to very argumentative club nights.

What really should happen is that the club should be divided into at least three of four sections containing a technical, non-technical, and beginners section, each with their own committee, enabling new recording enthusiasts to start off in the shallow end and not dive into the deep end. Of course, when a member wishes to move from one group to another, possibly after a period of six months depending upon their achievements, this should be put to the committee of that section and dealt with.

A person with no technical knowledge will not stay at a club which spends all its time arguing about impedances and outputs. This now brings us to the jackpot question "What will interest members at club nights?" Several clubs appear to have the answer—Cine.

To produce a sound track for a film of slides is really a challenge. Sound effects have to be made, tapes have to be edited and spliced to within a fraction of a second, and finally the finished product must synchronise with the projector. To make a tape of this nature for a film of 20 minutes duration could take up to one hundred man-hours, but there is a sense of achievement when it is finished. Whether a member has a Grundig Cub or a E.M.I. TR. 52, he can play his part in obtaining recordings suitable for the film. *Reading Cine and Tape Recording Society* "saw the light" over a year ago, and must now be one of the most successful clubs in the country. In this month's issue we commence a series of articles on Tape and Cine. This may be the answer to your problems. Why not try and see how entertaining the result is, and then let us know the response from members; all interesting letters will be published.

P.S. A letter has gone out this week to all Club Secretaries setting out details of the kind of story we like to publish in "*Club Roundabout*". If any club is thinking of taking up Cine as a new venture, we shall be glad to act as a "sorting house" to obtain for them Cine Manufacturers' literature on request.

The **Wakefield and District Tape Recording Club** sponsored a tape recording exhibition on October 29th at the Youth House, Wakefield. The main hall was given to manufacturers to demonstrate their equipment whilst a smaller hall was used by the club to demonstrate tape and slides synchronisation, stereo reproduction and a film show by the manufacturers of Irish and B.A.S.F. Tapes. Altogether over 1,000 people attended the exhibition which again proves the interest of the public in this new and interesting hobby.



Nusound Recording Company have added to their Thornton Heath branch a very smart London Showroom. This is at 35 Craven Street, Trafalgar Square. We recently called in on Mr. G. V. Smith (seen in our photograph), and were impressed by the wide range of Tape and Hi-Fi equipment on show. In addition to being an appointed Ferrograph dealer, he was able to demonstrate to us the famous Ampex recorders.

CLUB ROUNDABOUT

The Fi-Cord range of tape recorders and accessories was demonstrated at the **Bournemouth and Poole Tape Recording Club** by Mr. Rendell and Mr. Lovegrove representing the manufacturers. The **Bournemouth and New Forest Cine Club** were the guests of the evening as the demonstration showed how the Fi-Cord could be used to record sound for film. The 101 was also featured, showing how the modern business man uses midget recorders for keeping correspondence matters up to date when travelling throughout the country. An open meeting has been arranged for November 29th, at 7.30 p.m., at the Civil Defence Centre, Holdenhurst Road, Bournemouth. Any reader interested in tape recording who would like to know more is cordially invited. *Secretary: H. R. Jones, 442, Poole Road, Branksome, Poole.*

Allegro Sound Equipment announce that they will be pleased to visit any tape recording club and demonstrate their equipment. Any secretaries interested in this offer should contact Mr. Rispoli at **Allegro Sound Equipment, 7, Avery Row, Mayfair, London, W.1.**

It has been announced that the **World Tape Pals Police Round Robin Tape Group** is no longer in existence. Previous members have re-formed under the name **International Police Tape Recording Club**, and it is open to serving police officers who are prepared to produce a tape every eight weeks giving details of their jobs. Already this organisation has members in the Commonwealth and the United States of America and further particulars can be obtained from the United Kingdom secretary, G. F. Q. Brooks, Police Station, Bradfield, Reading.

The idea of linking tape with colour slides has met with enthusiasm by members of the **Reading Cine and Tape Recording**

The Robuk **rk3** makes tape recorder history!

'Never-before-offered' features in a quality recorder in the medium price range



THE ROBUK R K 3

Its features include a featherlight 'Piano-Key' operation, 3 speeds and separate gain controls for input mixing.

The introduction of the Robuk R K 3 is still the most exciting news in the tape recorder field! The full specification contains 36 features which are normally found only on expensive models —yet the three speed R K 3 costs only 36 gns., complete with microphone and long playing tape! Never before has a tape recorder in this price range, offered so many outstanding features!

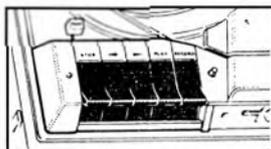
Three speeds 'n that!

How's this for a list of tape recorder qualities?

- 1 Three speeds—amplifier compensated at all speeds.
- 2 Simplified 'Piano-Key' operation.
- 3 Input for gram. and mic. have separate gain controls.
- 4 Monitoring through speaker, with separate monitor gain control.
- 5 Superimposition facilities with switch on tape deck.
- 6 Separate on/off switch, and tone and volume controls.
- 7 Full size 7" reels can be accommodated with lid closed.

Many other features

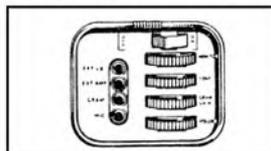
Incorporated in the tape deck are additional features such as pause control, position indicator, recording level indicator, accidental erasure prevention and automatic interlock to avoid tape spillage—fast forward and rapid rewind speeds. Sockets are also provided for extension speaker and external amplifier.



Simplified 'Piano-Key' Operation! Three keys complete the operating sequence! RECORD . . . REWIND . . . REPLAY!

Free 'Tape Fun Book'

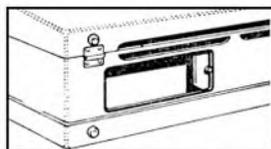
Offered as part of a drive to introduce all classes of families to the pleasure and fun of tape recording, this unique booklet lists new ideas for serious collectors as well as exciting party games that open up a new field of home entertainment.



Rim Controls for fingertip operation! Neatly grouped . . . easily identified! Simple enough for a child to operate!

Slim design for portability

Packed for carrying, including the microphone, 7" reel of tape, the R K 3 weighs only 23 lbs.! The attractively styled, two-tone case in scratchproof, washable plastic, measures only 16" x 11½" x 7" deep—a feature/quality machine!



Sliding door storage compartment for microphone and spare leads!

Where to send for information

Dealers throughout the country will be stocking the R K 3 at the time you are reading this announcement. Send the coupon below for further information and you will also receive a free copy of the 'Tape Fun Book'.

Please send further information on the Robuk R K 3 and a copy of the free 'Tape Fun Book'

NAME

ADDRESS

DHB. F/2

THREE SPEED

The Robuk **rk3** 36 GNS.

TWIN TRACK

Today's greatest tape recorder value!

ROBUK ELECTRICAL INDUSTRIES LTD. · 559-561 HOLLOWAY ROAD · LONDON · N.19

TAPE CLUBS

Notes and News — continued

Society, and several successful evenings have been spent in this particular field experimenting with synchronising equipment. A tape recording was made by one member, for the Royal Berkshire Hospital, of a United Nations Day Service in a local church, and it is hoped that more of this type of thing will be done by members in the future. Another I.A.C. award has been won by a member in the "Abstract and Experimental" section of the recent I.A.C. Amateur Film Competition. Various equipment—projectors, accessories and screens—has been used for talks on producing slide shows, together with the latest Japanese cameras and other cine equipment. The Hon. Secretary gave members a talk on "The Experiences of a Beginner" in cine filming and showed some of his early shots. Details of future meetings can be obtained from the *Secretary*: D. Noyes, 4, Froxfield Avenue, Reading.

The fifth edition of the bi-monthly record programme "Tapeorama" has just been released. The programmes are recorded on single track at $3\frac{1}{2}$ i/s and interesting items are always welcomed. Further details can be obtained from **Mr. M. Renshaw, 6, St. Vincent's Close, Girton, Cambridge**. A stamped addressed envelope should be enclosed.

A very poor response to the proposed **Cambridge Tape Recording Club** has been received by M. Renshaw (address given above), but efforts will still be made to form a club in this area. It is hoped to hold an inaugural meeting early in December and readers interested should contact the organiser.

We have received a letter from a reader who has just purchased a tape recorder and would like to exchange tapes with a teenager abroad. His machine is fitted with three speeds $1\frac{7}{8}$, $3\frac{1}{2}$ and $7\frac{1}{2}$ i/s. Please contact **John Fogerty, 78, Purfleet Road, Averly, Nr. Grays, Essex**.

During the last month, members of the **Nottingham Co-operative Amateur Tape Recording Society** have visited the main station of Redifusion Ltd., and a telephone exchange in Nottingham. Mr. Parrington has also visited the club and demonstrated the range of tape recorders manufactured by Walter Instruments Ltd. Many interesting meetings have been arranged for the New year: January 5th Talk by K. Fricker; January 12th E.M.I. talk and demonstration; January 26th A talk by Mr. J. Palmer on plans for a Hospital Service.

THE value of portable tape recorders was demonstrated at a meeting of the **Leicester Tape Recording and Hi-Fi Club**, when Mr. D. Darbyshire replayed recordings made on a visit to the offices of the Leicester Mercury. The general noise of the editorial office and the presses running, served to put the finishing touches to an interesting lecture. At a later meeting, Mr. J. Buckler gave a talk on the correct way to record weddings, and there was a demonstration of splicing by the Secretary for new members of the club. Visitors will be welcome at any of the Club nights and information can be obtained from Mr. P. Starrie, 56, Minehead Street, Leicester.

The September meeting of the **Johannesburg Hi-Fi Society** was attended by twenty members and six tape recorders at the Catholic Centre, Johannesburg. The Chairman's talk at the beginning of the meeting developed into a lecture giving details of the club policy proposed by committee members. This was followed by a talk by Mr. P. van Wyk on adjustments for four track crosstalk, which proved to be of great value to members having four track

machines. A competition was arranged, but only two entries were submitted. As a result it was decided not to award prizes, although the tapes were played to members. The mono entry was a recording of a zither made by Mr. G. Lawrence, a blind member, and the stereo tape featured a recording by Mr. A. Peach of the Pipe Band at the Unessa Searchlight Tattoo. We know that clubs in this country like to hear how clubs are organised abroad. Details of overseas clubs' activities should be sent to The Editor, The Tape Recorder, 99, Mortimer Street, London, W.1.

At the meeting of the **West Middlesex Tape Recording Club**, held at St. George's Hall, Southall, on Thursday 27th October, members had the privilege of hearing three tapes which won prizes in the recent National Tape Recording Contest. After hearing the tape "Ban the Phon" made by a group of young people, members decided to concentrate their efforts and produce an entry for the next competition. A visitor to the club for the first time was Mr. L. Francis of the Sheen Tape Recording Centre who presented a copy of the *Hi-Fi Year Book* to the library. Plans for a Hospital Service are well advanced, and members are looking forward to some interesting work which will bring pleasure to patients. The next meeting has been arranged for Thursday, December 8th, at Hampton with a sale of members' surplus equipment. Further details can be obtained from H. E. Saunders, 20, Nightingale Road, Hampton, Middlesex.

Mr. D. F. G. Spinks of 82, Rider Haggard Road, Heartsease, Norwich, would like to see a tape recording club formed in the **Norwich** area. Any person interested in this new venture should write to the above address, enclosing a stamped addressed envelope.

Members of the **Harrow Tape Recording Club** are hoping to enlarge their membership with a drive to attract more tape recording enthusiasts in that area. Already they have nearly twenty members and with the interesting club nights arranged for the next few months it is hoped to double that number. At their last meeting held on Thursday 27th October the much-travelled Mr. Parrington of Walter Instrument Company gave a most interesting talk and demonstration of the Walter range of recorders. This meeting was well attended, proving that Mr. Parrington certainly "draws the crowds". Having seen how popular this type of meeting is the committee have decided to contact other manufacturers and already Specto Ltd., have offered their services. Details of club nights can be obtained from Mrs. T. Fisher, 5 Gloucester Road, North Harrow, Middlesex.



"Only single track sir, but it has a siding . . ."

“sagacious santas”



insist on

TRADE MARK

SCOTCH

BRAND

recording tape



WORLD'S LARGEST SALES OF MAGNETIC TAPE

IDEAS FOR TAPE GIFTS

Up to 10s. 0d. ★ It's a safe bet that your tape recording friends can never have too much recording tape, and tape would make an acceptable present in any price range. Up to 10s. you can choose small spools from any of the popular brands of tape—3-in. message spools cost from 4s. 6d., and 3½-in. spools around 6s. 9d. Accessory tapes are useful too—Agfa Joining Tape at 5s. 6d., Scotch Branch leader tape at 4s. in various colours, or E.M.I. tinfoil automatic stop tape, 5s. 6d. A handy way of identifying parts of the tape is to use self-adhesive coloured labels, and the set of Metro-tabs (3s. 6d.) are particularly suitable. Easy-to-follow instructions are a feature of the booklet "How to Splice Tape" available, price 2s. 6d. post paid, from "The Tape Recorder".

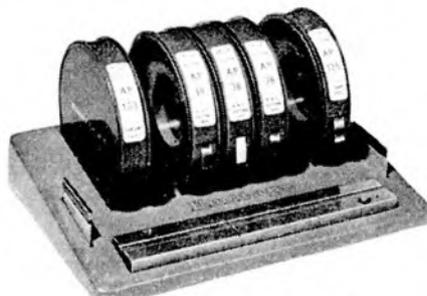
10s. 0d. to £1 ★ Keeping tapes tidy and easily accessible is made easier by using "Tape Books," the special containers made by the M.S.S. Recording Company, and costing 7s. 6d. each. Up to £1 we have a fair choice of tape spools—5-in. at 18s. (Standard), or 3½-in. at 17s. (Double Play). The "Bib" Tape Splicer, costing 18s. 6d., makes an excellent gift, and for a friend who is interested in equipment and specifications, how about the 1960 Edition of the "Hi-Fi Year Book", price 11s. 6d. post paid, from this office?



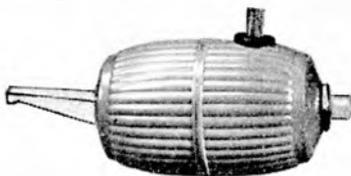
Scotch Accessory Kit 29s.



Grampian Reflector £5 5s.



E.M.I. Editing Kit 37s. 6d.



Cinesmith Depolariser 35s.



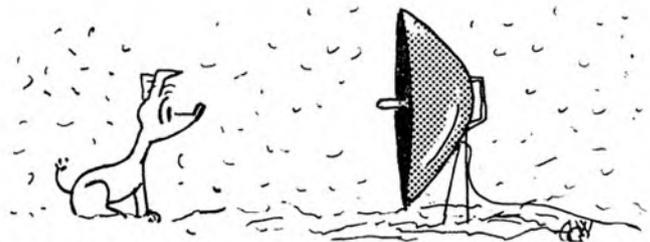
Truvox Radio Jack 68s. 4d.



M.S.S. Tape Calculator 2s. 6d.



T.S.L. Universal Mixer 42s.



£1 to £2 10s. 0d. ★ The dangers of putting noise on tapes, due to the heads becoming accidentally magnetised, are well known to tape enthusiasts, and an efficient defluxer such as the Cinesmith Depolariser, price 35s., is invaluable. Another useful accessory is a telephone attachment, which allows both ends of conversation to be recorded or "Broadcast." These are made by most recorder manufacturers. The T.S.L. Universal Mixer, price 42s., is just right for the more ambitious enthusiast, as are the various tape editing outfits, e.g., the E.M.I. Accessory Kit, price 37s. 6d. Finally, may we suggest a year's subscription to "The Tape Recorder", price 21s. per annum, 24s. with index, post paid.

£2 10s. 0d. to £5 ★ A radio jack extends the usefulness of any tape recorder, and a good example is the Truvox Radio Jack, price 68s. 4d. For monitoring purposes good quality headphones are always in demand, such as those from S. G. Brown, and the Grundig Stethoscope, Type STET 3, price 63s. The Irish tape splicer automatically cuts and trims the edges of the tape and makes an excellent gift. It costs 67s. 6d. To allow extra long leads, or to match low impedance microphones, to the ordinary recorder, Grampian manufacture a special microphone matching unit. This costs 65s., and steps up 15-30 ohms to high impedance. As a last suggestion, we feel sure that every tape recordist would welcome an extra microphone and since most likely they now have a crystal, a moving coil unit such as the Lustraphone LD66 at 92s. 6d. is recommended.



Give **PHILIPS TAPES** *this Christmas*

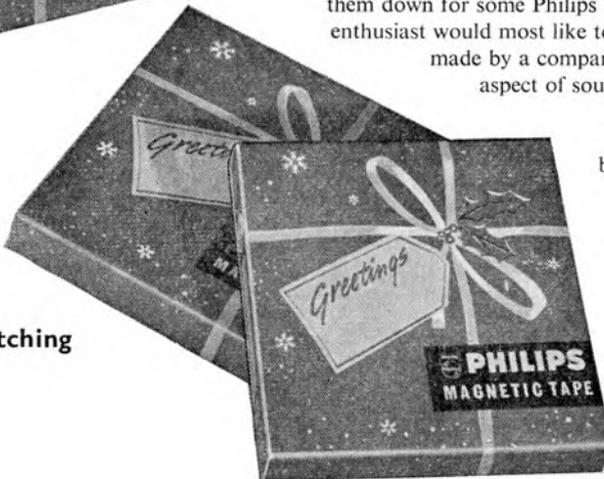
—the perfect gift for recording enthusiasts, in a special Christmas wrapping!

Any tape recorder owners on your Christmas gift list? Then mark them down for some Philips Tapes — the gift every recording enthusiast would most like to receive. For Philips Tapes are made by a company with vast experience in every aspect of sound recording and reproduction,

plus world-wide resources and research facilities. So you can be certain you're giving the best when you give Philips Tapes.

And to make your gift complete, Philips Tapes in the 5", 5½" and 7" reel sizes, have been specially wrapped for Christmas — you have only to add the lucky recipient's name. Make someone really happy this Christmas — give them gift-wrapped Philips Tapes.

- High sensitivity
- Wide frequency response
- Resistant to stretching
- Moisture proof
- Extra long life



PHILIPS ELECTRICAL LIMITED, CENTURY HOUSE, SHAFTESBURY AVENUE, LONDON, W.C.2.
(PR3668A)

*One of the first Companies to manufacture tape recorders
in this country proudly announce their new model for 1961*

THE MAGNAFON ZODIAC

which includes all the latest features for the tape recorder enthusiast

There are two models:

THE ZODIAC MARK 1 2 TRACK 39 gns.

THE ZODIAC MARK 2 4 TRACK 45 gns.

Each model has a collaro studio deck—3 speeds—mixing facilities—superimposing—tone control—pause control—tape position indicator—output socket for hi-fi—7" × 4" speaker—inputs for microphone and radio/F.M. Tuner.

*Fuller details will be in the next edition of this magazine,
or go now to your local dealer and see the 1961 tape recorders on show*

MANUFACTURERS—MAGNAFON & CO., 3 BAGGELLY STREET, E.3

SOLE DISTRIBUTORS—R. MARKING & CO. LTD., 197 STREATHAM ROAD, MITCHAM

Tel: MITCHAM 7116

SHAKESPEARE'S SOUND EFFECTS ARE O.K. FOR TAPE

"**STRIKE, I say!**" So orders Richard III in Act Four of Shakespeare's play, and what a nice little problem for the sound effects boys. Especially as it is preceded by the instruction "Enter King Richard and his train, marching."

I quote these lines and instructions to illustrate the idea that Shakespeare's plays, although admittedly more difficult than the usual run of "Tape Drama," are eminently suitable for portrayal in sound. There will come a time in the progress of those clubs who have a strong dramatic section when they will tire of doing plays written only for the sake of sound effects, and will aspire to greater things, and a good sound script is not so easy to find. Of course there are plenty of plays about, but once resolved, these usually turn out to require some special visual effects, the only necessary sounds being tinkling tea-cups and telephones, and there is little in either the instructions or the dialogue to suggest more.

Apart from the fact that Shakespeare's plays are not of the "drawing-room" variety, we must also remember that they were written to be performed on a stage quite devoid of scenery of any kind; and yet the scenes were set in many places under many different conditions. And it is this fact that helps us, for we can find all the necessary description in the dialogue itself, and with the use of imagination and technical experience can reproduce in sound many of those conditions, as I shall attempt to illustrate later.

Except for those clubs operating in conjunction with a dramatic society, a complete play would probably be out of the question, but one or two carefully chosen scenes could well bring about some interesting, instructive and entertaining results. Perhaps a short analysis would illustrate better what I mean; let us take a very well-known scene, Act One Scene 4 of "Hamlet," and try to resolve it into its sonic possibilities.

Firstly; where is it set? Most copies say "The Platform," this being on the castle walls. We know that the sea is close by—references are made to it in this scene—and this gives us our first background effect—distant sea. Then the first two lines:—

"*Hamlet:* The air bites shrewdly, it is very cold.

"*Horatio:* It is a nipping and an eager air."

tell us the weather conditions. We apply a little imagination, and knowing the mood of the scene, finally decide on a whining, thin, almost unearthly whistling wind, mixed with the sea noise. Already we have shown position, atmosphere and mood. The next lines:—

"*Hamlet:* What hour now?

"*Horatio:* I think it lacks of twelve.

"*Marcellus:* No, it is struck."

suggest our opening effect—church bells, from a distance, heard firstly below, and then above, our eerie opening music. This could fade at about bell No. 10, leaving the two remaining bells to strike above the sea and wind noise and a slight pause for effect, after which we have the clatter of boots on stone, and the arrival of the characters. Two lines further on are the instructions "A flourish of trumpets, and ordnance is shot off." Further on still is the arrival of the ghost. How about building the wind



The author (left) directs a student's production while the sound mixer controls a slow fade. The actors are in an adjoining sound-proof room. (Photo by courtesy of the Central School of Speech and Drama).

noise here, with more music, or slow drums? This is followed by Hamlet's struggle with the other two, and his retreating footsteps following the ghost. In the next scene, of course, the ghost speaks.

I feel sure I must have made my point by now, for if sea, wind, bells, footsteps, trumpets, cannon, struggles, drums and ghostly voices all within two short scenes aren't enough for the enthusiasts . . . well!

If your actors are uneasy about Shakespeare, but your technical boys are interested, why not try a joint effort with a keen dramatic society, who might be only too willing to play?

There are plenty more scenes which are possible. Try "Julius Caesar" Act Five, Scenes 2, 3, 4 and 5, which is the battle—horses, fights, shouts, alarms, excursions etc. Or the first scene of "The Tempest" which, although short, needs some carefully controlled sea, wind, storm, and boat noises, creaking rigging, flapping sails—all apart from the shouting in the script! There is also quite a lot in "Macbeth," and the "Henry" plays, and many others.

With careful reading, judicious cutting, and the application of thought, a producer/technician could make an interesting and quite exciting tape, let alone the fact that the experience gained in the process would be large. And it's great fun doing it, anyway.

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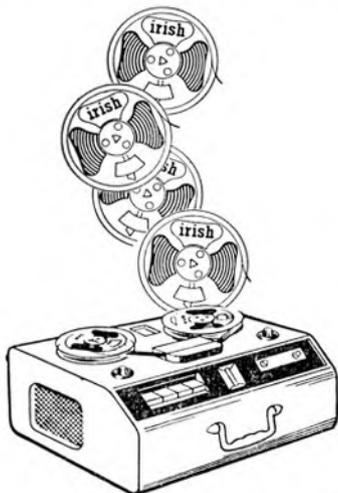
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... tape recorder workbench

Practical suggestions for the tape handyman _____ by A. Bartlett Still

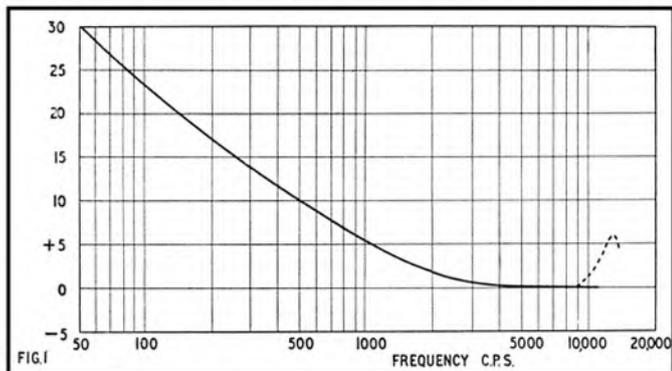
No. 18 — AN EQUALISED PLAYBACK AMPLIFIER

LAST month I tried to give some idea of the reasons behind this business of equalisation as applied to a tape recorder. I concluded by explaining how an international committee had issued their recommendations as to the manner in which equalisation should be applied. At first sight the dealings of an international body set up to assist radio organisations can be of little interest or importance to the owner of a domestic tape recorder. Nevertheless, if you are to achieve satisfactory playback of any of the numerous tape records now on the market, your machine should replay to the "C.C.I.R. characteristic".

C.C.I.R. characteristic defined

This characteristic, defined as a response according to the law of a resistance/capacity combination having a time constant of 100 microseconds (for $7\frac{1}{2}$ i/s tape speed), is shown by the full line in fig. 1. At the time (1953) 10 Kc/s was considered to be the top limit of frequency at this tape speed, but the line may be extended if it is considered desirable. A "C.C.I.R. Test Tape" is one on which a number of single frequency notes are recorded in such a manner that the replay will be level if the response is correct.

It may be remembered that the definition was qualified by the phrase "assuming an ideal head". In view of the effects



of gap loss and head loss (far from ideal) the playback response will be modified as in the dotted line, and this variation will be individual to the particular machine, or, rather, the playback head.

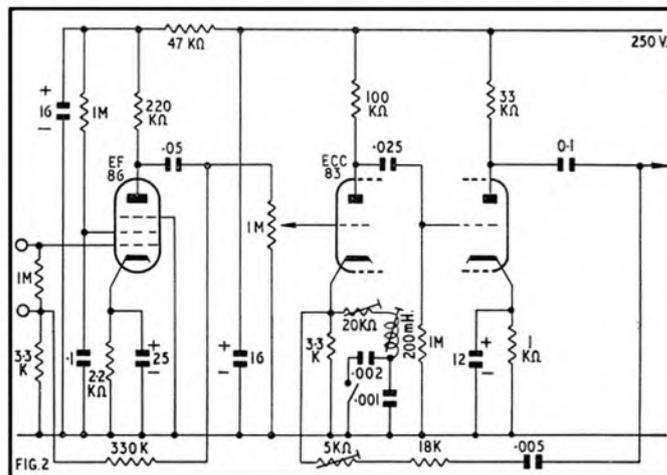
A circuit that I have used successfully as an equalised playback amplifier is given in fig. 2. This was built on a chassis measuring $4\frac{1}{2} \times 2\frac{1}{2} \times 1\frac{1}{2}$ in. deep, and this was mounted (using a three-head deck) upside down immediately under the deck to keep the leads from the head as short as possible.

The circuit

Examination of the circuit will show that the first stage is similar to the circuit I gave, some three months ago, of a single valve pre-amplifier. Its function here is to amplify the head signal to a level where it can be frequency corrected at a reasonable signal-to-noise ratio. As before, the input is shown suitable for an input with both leads from the head isolated from earth, and separately screened. In the case of a single screened lead from the playback head, the inner should be connected to the upper grid lead, and the screen earthed.

The second valve, a double triode, is designed to provide further amplification and to produce the frequency response of fig. 1. The basic 6 dB/octave slope is provided by the resistance/capacity network in the feed back line. By definition, this should have a

time constant of 100 microseconds, but I have allowed for it to be adjustable over a small range. On the completed unit, this control will allow the frequency response to be adjusted on test over the part of the spectrum below 1 kc/s. The peak in response



towards the upper end is provided by the coil and capacity network connected to the cathode of the first triode. A coil, designed for just this purpose, is available from Teletron for a few shillings, and is well worth buying. It is provided with an adjustable dust iron core so that the circuit can be tuned to peak at the correct frequency, which will itself be determined by the effective gap width of the head, and must be found by trial and error. The preset resistor sets the magnitude of the effect produced by this circuit, i.e. the height of the hump on the curve, and so virtually any playback head can be accommodated. If a tape speed of $3\frac{1}{2}$ i/s is used, the frequency at which the gap effect is noticeable is reduced. To cater for this, an additional capacitor should be switched in as shown.

This amplifier is capable of producing the volts required to drive a simple single-ended output stage. If the signal is to be fed to a good quality power amplifier, a simple resistive attenuator unit should be used to adjust the level.

In later articles I hope to extend this subject and consider the recording process, but I shall first devote some space to other queries that readers have raised, the first of these being the inclusion of equipment in a tape recorder to measure bias current. In the meantime, may I conclude by wishing, to all my readers, a very sincere good wish for the Christmas season.



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BUILD THIS REALLY PORTABLE RECORDER

PART ONE—THE SPECIFICATION AND THE CLOCKWORK MOTOR

A LITTLE over a year ago I wrote some articles on simple transistor circuits, and described an elementary tape transport mechanism for a series of experiments which were designed to teach, in a "do it yourself" fashion, the basic principles of magnetic recording. I made available a kit of parts including a microphone/headphone unit, a record/play head, and a plug-in transistor and base, so that all students could use identical parts with known characteristics. I was quite overwhelmed at the interest shown, and soon expanded the transistor kits to include all components down to the last nut and screw. Later still there was a demand for the hardware, such as the head plate with guides and pressure pad, the supply reel spindle and bracket, and the turntable take-up plate. The original experiments used a gramophone motor as the prime mover, and a radio set as the power amplifier and loudspeaker. The output of the transistor preamplifier was fed to the P.U. terminals, and the bias oscillator record unit from the EXT.L.S. terminals of the set. Since then, many letters have come in asking if it would be possible to add a further transistor amplifier and a clockwork gramophone motor so that a truly portable recorder could be made which would be completely independent of the mains supply, and could be used for interviews and the collection of sound effects, etc., in the field.

The specification

During the summer, I made up several such units, and was very intrigued by the results obtained. A photograph is shown of an early prototype which used a converted acoustic gramophone for the motor and case. I came to the conclusion that the biggest demand for such a unit would be from enthusiasts who already owned a mains-operated recorder and microphone of adequate quality, and who would like portable recorder facilities if the cost could be kept low enough. I then drew up the following specification for such a unit:

(1) Cost of all parts excluding case to be well under £10, (2) A spring-wound motor to be used which would allow a 4 to 5 minute recording to be made without winding, and which could be wound whilst recording without introducing speed variations, (3) Tape speed and equalisation need not be standard, and could in fact vary throughout the reel; the slight quality change could be compensated during replay or re-recording. This assumption that all recordings made on the portable gear will be replayed on the same equipment and re-recorded on the home recorder is quite fundamental, and accounts for the vast simplicity and low cost of the unit.

(4) No erasing facilities to be provided, it being assumed that the tape would be bulk erased or erased on the home recorder.

High frequency bias would however be used to keep background noise and distortion down to a very low level, (5) No rewind to be fitted, it again being assumed that any rewinding required could be done by hand or on the home machine, (6) All electronics to be transistorised and battery replacement costs to be kept low, (7) All parts in the earlier kits to be used so that further outlay would be low.

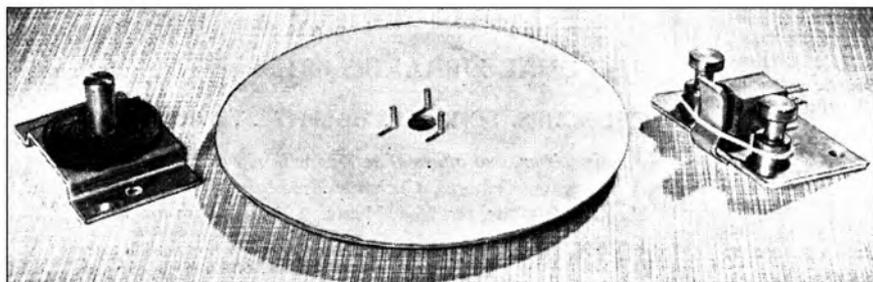
(8) Wow and flutter to be low enough to be completely undetectable on speech or sound effects, and music recording to be satisfactory for casual listening or background effect, (9) Recorded frequency response to be limited only by that of the microphone used. With a professional 600-ohm microphone recordings of BBC quality should be obtained, (10) Background



Layout and construction are clearly shown in this photograph.

noise should be at least 10dB below the lowest ambient acoustic background noise encountered in the field, (11) Mean recording level to be 20dB below peak recording level (instead of the normal 12dB) so that loud sounds will not overload the tape. This is possible due to the extreme quietness of the battery-operated transistor circuits used for record and replay. The very wide dynamic range allows recording without a gain control or volume indicator, (12) Mechanical noise to be low so that recording is possible in a confined space such as a car without acoustic pick-up of recorder motor noise.

I feel that I have now succeeded in meeting this specification but as it is extremely difficult to be sufficiently critical about one's own "brain child", I have recorded a reel of miscellaneous sound effects including music, train, traffic, and speech under a wide variety of conditions and sent it to the Editor for his own unbiased appraisal.* I used an S.T. & C. "ball and biscuit"



*The author's tape was duly received at this office, in the form of a fixed 7½ i/s full-track copy. Replayed on semi-professional equipment, this gave results noticeably better than that obtained on the cheaper domestic recorders, showing that this clockwork portable does justice to the high quality microphone. (Editor). The photograph on the left shows the supply reel spindle, turntable plate, and record/replay head assembly.

A REALLY PORTABLE RECORDER

Continued

The photograph (right) shows the prototype of this new do-it-yourself clockwork recorder. It used a converted acoustic gramophone, and first results were so encouraging that a full-scale specification could be drawn up immediately. Simple transistor circuitry is to be used, and the other principal features are:— no erase facilities, non-constant speed, and loudspeaker playback to be an optional extra, to keep weight to a minimum.



microphone, which gives a wide enough response to show the capabilities of the portable recorder, and the gain of the recording amplifier was fixed.

Now, how is it all done? One of the photographs shows the hardware: (a) A supply reel spindle and bracket complete with felt pad which supports the supply reel and provides a slight back tension by gravity and friction between the reel and the felt disc, (b) A record/play head mounted on a plate with guides and pressure pad, (c) The turntable plate which sits on the turntable like a record and holds the take-up reel in such a way that it runs true and picks up enough torque from the turntable to transport the tape without slippage.

Another photograph shows how these parts are mounted near, and on, the turntable to move the tape. 3½-in. reels and double-play tape are used, and at a turntable speed of 78 r.p.m. a 10 minute recording can be made on each track of the tape, giving 20 minutes in all.

I have found that a cheap plastic- or rexine-covered suitcase is very suitable for housing the recorder, and that it is wise to leave plenty of room for microphone cables, spare tape, etc. The minimum dimensions of the motor board are 11 in. × 14 in., and the overall depth, to clear the motor underneath and the tape reels above, is 4½ in. The turntable acts as a fairly massive flywheel, and the recorder must be relatively static while recording; any sudden movement will tend to move the head around the turntable with resultant wow and obvious speed fluctuations. For those who want a more compact unit which can be slung on a shoulder strap and operated whilst walking or in fairly violent motion, the turntable can be discarded and the take-up plate mounted directly on the motor spindle. The short-term speed variations are increased due to lack of the smoothing provided by the turntable mass and inertia, but the smaller unit is perfectly adequate for recording speech and most sound effects. The complete recorder in this form need be no larger than 5½ in. × 8 in. × 4½ in.

Deck Layouts

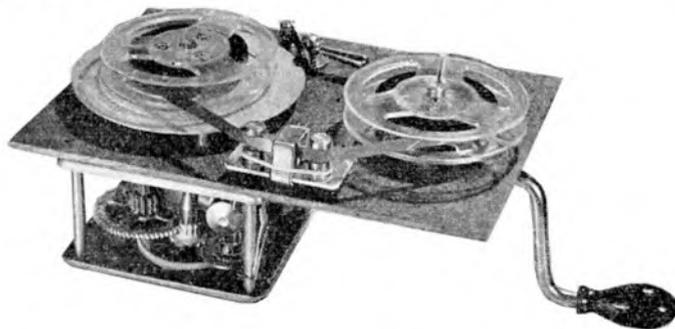
The sample transport units illustrated by the photographs are mounted on hardboard panels, but wood or metal could be used. Layout and construction are self evident, and the only critical point to watch is that the height of the supply reel, tape guide plate, and turntable be adjusted so that the tape runs parallel to the motor board and does not foul the cheeks of the tape reels. The tape should run midway between the reel flanges so that, even if the reels run slightly untrue, the tape winds evenly on the reel centre without touching any other part of the reel or turntable. I used half a cotton reel to support the take-up plate on the smaller unit, but those of you with access to a lathe may prefer to

turn up an aluminium or brass adaptor. A heavy ¼-in. brass disc would be most suitable as it would add inertia smoothing to the take-up and ensure a performance only slightly inferior to the more bulky turntable.

At this point I think it wise to pause and consider our future programme. The transistor electronics, to be described in *Part 2*, will allow recording on the above tape transport mechanism from any microphone with a medium impedance between 200 and 2,000 ohms, 600 ohms being optimum. The mic/headphone unit will be used for earphone monitoring of a recorded tape in the field, and the level and quality will be adequate to judge whether a recording is satisfactory. It is suggested that the same electromagnetic transducer be used as a microphone for the early experiments until recordings are obtained which are obviously limited by the response and sensitivity of this microphone. At this point, details will be given of suitable impedance matching units which will allow better-quality microphones to be used. The mic/headphone unit will not be wasted as it will still be used as an earphone, or as a second speech-quality microphone.

The playback equalisation will be made variable to compensate for the change in tape speed from the beginning to the end of the reel. The starting speed is about 5 i/s and rises to about 15 i/s near the end of the reel. The mean playback level will be in the order of 100 to 200 milli-volts so that it will feed into the radio input of any tape recorder, or the pickup terminals of any radio set or amplifier.

Finally, for those who want loudspeaker playback in the field, a transistor power amplifier will be described which can be built into the portable recorder case, or made up as a separate unit to plug in as required.



Illustrating an alternative version of the recorder, aiming at a minimum top area. The tape must run parallel to the deck.

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Readers' Problems

Extension Loudspeakers

Dear Sir:—I have been a reader of your magazine since I found it was more explanatory than competitive mags., but I am rather surprised that so little about speakers is published, especially as it appears an agreed point that "Domestic" portable tape recorders do not give of their best through the small speakers incorporated in the sets.

I am purely a "Domestic" enthusiast, taping and replaying through a radio set, with an occasional "live" experiment, and know little of the technicalities involved, but understand one must ensure that any extension speakers purchased must match the output of the recorder. I feel it would be in the manufacturers' interests to recommend and/or market a medium priced speaker cabinet suitable for their products.

Personally I would like to purchase a set of three matched speakers with crossover unit and drawings or full details of a suitable cabinet, as, like myself, there must be many handy-men capable of woodwork, but who fight shy of electrical equipment, who could afford a better quality speaker by economising on the cabinet. I have a Telefunken 85KL and have so far been unable to find out what the ohms output at the extension speaker socket is and would be very grateful of any information you could offer.

Yours sincerely, W.T.R., London.

We are inclined to agree with you that tape recorder manufacturers could usefully recommend and/or manufacture add-on external loudspeakers to match their machines. Of course, some of them already do this,—as witness the Grundig external loud-speaker Type.

The Telefunken 85KL extension speaker socket is rated at 15 ohms (from serial No. 827832 onwards) any reputable loud-speaker manufacturer will be able to supply a suitable unit for this and/or drawings of enclosures. As a final note, however, we would warn against buying or building too elaborate a loud-speaker unless you plan at the same time to use a high fidelity amplifier which matches the speaker in performance and power output.

Linear and "Log" Volume Controls

Dear Sir:—Please will you explain the terms "linear" and "logarithmic" as applied to volume controls and tell me what would be the effect of using a "lin" control in place of a "log" one. Also, when recording with either of two crystal mikes I'm getting hum on the tape, whereas using a Simon "Cadenza" ribbon instrument in high impedance condition no hum is present. I've tried the customary idea of reversing the leads and have made sure that there is a good earth between the input socket and the mains connection.

As the recorder, an Elon JC20, is nearly four years old could this be due to valve trouble or perhaps you can make other suggestions.

Yours faithfully, H.C., Harrogate, Yorks.

The terms "linear" and "logarithmic" refer to the rate at which the volume control introduces loss for a given angle of rotation of the control knob. In the case of a linear volume control, the rate is constant, so that at the mid-way position the resistance in circuit is exactly half the nominal value, and any intermediate setting introduces a proportionate fraction of the whole.

Turning up logarithmic volume control takes out resistance at a continually varying rate, gradually at first and then in steeper amounts. This conforms more closely with the ear's estimate of equal changes in loudness, and gives a smoother control of volume over the whole range. A number of "tapers" are in existence, but in this country it is usual to have about 3% resistance at 20% rotation, and 10% at 50% rotation.

Using a linear control instead of a logarithmic one would give less fine control at low volume settings, but would not

constitute a serious nuisance except when fading up or down—as in mixing one programme source with another.

You do not say whether you are using a long lead with the crystal microphones, but it must be admitted that high impedance types are prone to hum pickup unless screening is carefully preserved over the whole length of the "live" lead. It is unlikely that the amplifier valves are to blame.

A Bias/Erase Query

Dear Sir:—When I was reading your reply to the question titled "Simple Erase Cut-out" (September issue) two questions crossed my mind. No doubt I have gone wrong somewhere. But if the erase current at 40 Kc/s is put on to tape by the same principle as the recording, surely this would mean a better head than the actual recording head—but this is not the case. How come? Secondly, if the bias at the same frequency (reduced power) can partially erase a signal already on tape, why not feed it at full power? Surely then an erase head would not be needed.

Yours sincerely, R.A.D., Bristol.

The falling off in high frequency response, which is a feature of the tape recording medium, takes place mainly at the time of replaying, and so the bias component in the combined signal fed in at the time of recording is in fact impressed on the tape though, perhaps, at a much reduced volume.

Of course your second suggestion that the erase signal should be fed through the recording head is impracticable since, at the power needed, the erase signal would swamp the signal to be recorded. Normally if erasure is to accompany recording a separate erase head is required, and this must be situated at some point before the tape passes the recording head.

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TAPING A SOUND TRACK FOR SLIDES

HOW TO COMBINE TAPE RECORDING WITH COLOUR PHOTOGRAPHY

AN enormous number of tape recording enthusiasts are also pretty handy with a camera, and now that Colour Photography has advanced so far in technique a high percentage of these must now be "shooting" in colour. The economics of colour photography is such that most people use Colour Positive films, which produce transparencies or slides. These cost approximately one shilling each, which compares very favourably with the cost of producing a single black-and-white Enprint, whereas colour prints are just about four times as costly.

The usual Home Slide Show is not exactly professional in its approach, with the slides being shown in any old order: sometimes upside down or with the writing around the wrong way! Another difficulty, which taxes the patience of the audience somewhat, is that the spontaneous commentator will very often forget some titbit of information until it is too late and the next slide is already on the screen.

Use tape

If a tape recorder can be got hold of, the whole position is changed. A commentary can be pre-recorded and played in step with the changing of the slides producing an entertainment for the eyes and ears. The tape "remembers" the exact time and place of all the photographs, it knits the whole show together, and, when suitable music and a few family recordings are added, something approaching a full scale show is produced. I would urge anyone reading this article who possesses both a slide projector and a tape recorder to get down to it in the next few weeks so that he can have a slide show *with sound* in time for Christmas. It involves quite a bit of work, of course, but the whole family will enjoy joining in a creative team effort.

The tape soundtrack has one enormous advantage—that it imposes discipline. It tends to make you select only the best photographs, and it forces you to put them into some sort of logical sequence. Then the commentary tells the story in a reasonable order. In other words, it makes you *plan* the thing.

A useful working procedure which I have used to advantage is as follows:—Select and arrange the slides in a reasonable sequence, putting in duplicates and doubtful slides at the same time, and then have a dummy run at which a number of things

can be decided. Firstly, the less pleasing slides can be voted out, and the best order for the remainder can be fixed. It is a good idea then to number the slides in the top right-hand corner, so that they can easily be loaded in order to appear the right way round. Another decision relates to the duration which each slide seems to merit. It is surprising how the time varies to get an artistic, well balanced show, and you can use a stop watch to judge this, or the second hand of an ordinary watch. A slide full of interesting detail, or about which there is an anecdote, might have to stay on the screen for 30 seconds, or more, while others may flash through in five or ten seconds. In general planning it is quite good to allow an average of about 20 seconds per slide which will call for approximately 40 words of commentary each.

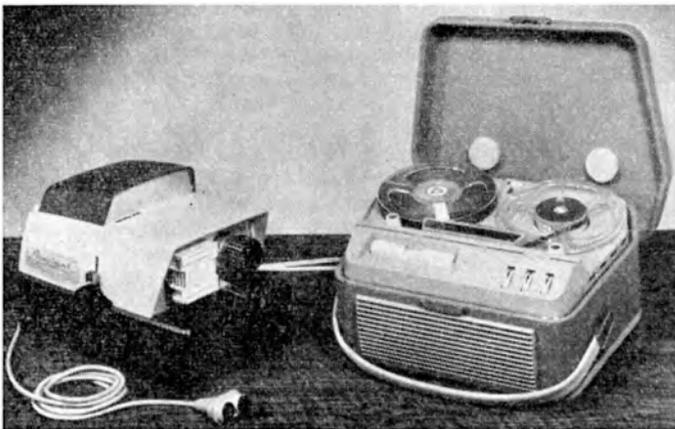
Once all the timings have been decided, you should write the commentary to fit, and read it over aloud to make sure there are no tongue-twisters or sentences that go on for such a long time that you run out of breath. It is a very good idea to introduce a few short sequences of three or four slides—as in strip cartoons, or these "Next Morning in the Manager's Office" type of advertisement. These will help to break up too regular doses of pictorial subjects, and can help the overall shape of the complete show.

The commentary

On the subject of making the commentary, it should be noted that there are a number of ways of recording this. If you are able to produce a fairly reasonable and spontaneous sounding talk while reading, this procedure will be best; but if the speech sounds too stiff, or if part of the commentary is by young children, you might try recording impromptu while the slides are actually being shown. I found this quite easy to arrange. I set up the microphone while my young son chatted about each slide to a number of friends. The resultant tape needed a fair amount of editing, but it did produce a useful amount of natural, descriptive speech. It is true that, using this method, the sound of the projector cooling fan is picked up by the microphone at the same time. Using a ribbon microphone, placed so that its dead angle faced towards the projector reduced the noise considerably. In any case it was realised that this tape would not normally be listened to except when the projector was running, so that the sound of the live projector effectively masked the recorded one.

However the speech is to be recorded, there comes the question of adding music. Assuming that a 2-channel mixer is available, or that the tape recorder itself possesses facilities for mixing 2 inputs (as in the case of the Simon SP4 used by the author), it will be possible to make a highly artistic job of fading in and out the music according to the timings previously arrived at, with the commentary spoken on a visual cue from the mixing operator. Ideally, the person carrying out the mixing could wear headphones, so that the music from disc or tape was heard by him alone, and the speech only would be picked up by the microphone.

If no mixer can be got hold of, a highly satisfactory montage of speech and music can still be obtained by "Broadcasting" the music over a loudspeaker. It is true that the recorded quality of the music may never be so good with this arrangement, and yet, provided a fairly good microphone is used and you carry out a few experiments to find out the best relative positions for



The Stuzzi Tricorder—shown here coupled to a Paximat Electric projector—is an example of a recorder which incorporates metal foil synchronised slide changing.

TAPING A SOUND TRACK FOR SLIDES

cont.

the loudspeaker microphone and commentator, the total effect can be very pleasing. At best, the slightly distant sound of the music due to the room acoustics imparts the kind of spacious effect which is deliberately employed on much background music for films.

Synchronising

When you have finally recorded the sound track, and tidied up the tape where necessary, you must decide how to operate the slide projector so that the required slide is shown on the screen in exact time with the commentary and music. There are at least three systems in current use which automatically guarantee exact synchronisation. Firstly, in the Agfa method, short lengths of self-adhesive metal foil must be attached to the front, shiny side of the tape wherever a slide change is required. The tape then runs past a special guide, which is fastened on to the tape deck by its suction cap, and possesses electric contacts which change the slides automatically. Readers will recognise this metal foil system as being that fitted to a number of tape recorders to give automatic stop and track change at the beginning and end of reels.

Secondly, there is the Zeiss method whereby short bursts of supersonic tone are recorded on the tape—ideally on a separate track—and these trip a relay to operate the slide change mechanism. Finally, a number of projectors, including the Liesegang, incorporate an automatic switch arrangement which can be adjusted to change slides at fixed time intervals from a few seconds up to half a minute. In this case it would be necessary to record the sound track to fit in with this time exactly. Readers may have seen this principle used in a number of Sound/Slide Demonstrations, for example, at this year's London Audio Fair.

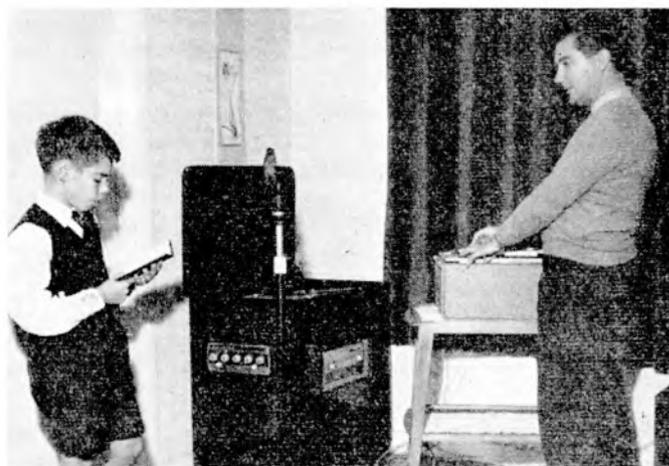
These automatic systems are fairly expensive, and the reader who has not got unlimited resources will be quick to see that they do not improve the quality of the pictures anyway—they simply remove some of the hard work, and the slight risk of the manual operator developing cramp! Changing slides by hand is a fairly easy operation, once you have had a bit of practice. You can take the cue from the sound track in a number of ways. Perhaps, you can trust to memory or refer to a cue sheet. Alternatively, you can arrange that the fading down of the music is the cue for a change of slide. I prefer to have a cue which is more positive than this, and have tried out a number of suggestions, including putting a click on the tape, such as that from a ball-point pen plunger, or even the sound of the front door bell, but finally decided that the sound of the slide lever itself was the most natural cue. This may be recorded on the tape by the commentator himself (without the cooler fan running), and it gives a good clear cue to the operator without being very distracting since it is immediately followed by the live sound of changing slides in any case.

When setting up a slide show it is best to place the loudspeaker as near the screen as possible without, of course, allowing the screen to come between the loudspeaker and the audience. You may be using the loudspeaker built into the tape recorder itself, but this is no handicap since once the tape has been switched on it requires no further attention.

I stumbled across an even better idea, which is to play the sound track through a Hi-Fi Stereo system. Then, with the screen positioned in between the two loudspeakers, the sound seems to come from the centre of the screen itself.



Stage 1: The slides are arranged in sequence (including doubtful ones and spares, which are eliminated during a trial run). In the author's case, using a Paximat 36-slide magazine projector, this was a relatively simple matter.



Stage 2: The commentary is recorded and the music mixed simultaneously, or at a later stage. Using the Simon SP4 recorder it was possible to mix speech, disc, and a number of pre-recorded tape inserts, since the Simon has provision for mixing three inputs.



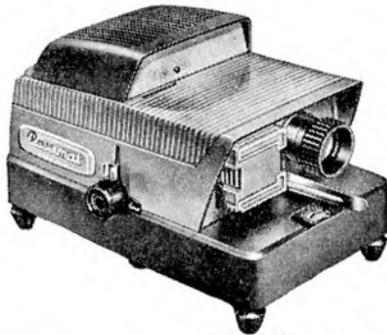
Stage 3: The Slide Show itself is cued entirely from the Sound Track. A pair of loudspeakers are being used to give a central sound, and one of the loudspeakers can just be seen to the left of the screen. This arrangement is preferable to placing the speaker where it may be masked by the screen.

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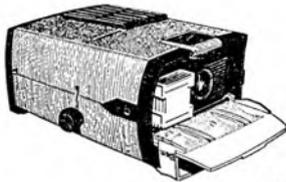
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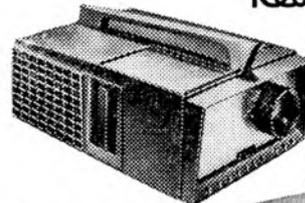
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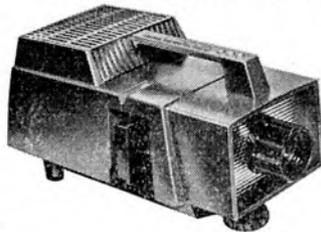
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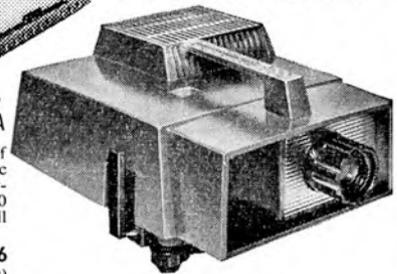
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SOUND AND CINE

● Recognising the increasing interest which tape recording enthusiasts now show in amateur Film Making—either as private individuals, or through clubs—we have been extremely fortunate in persuading Richard Golding to contribute a regular series of articles. He is Production Manager of the Grasshopper Group, which is probably the leading amateur cine club of its kind in the world. He is experienced in every aspect of film making, and has been writing and lecturing on Cine for a number of years. Further articles will appear each month.

THE Cine man normally thinks of sound as an essential complement to films of all types, from the pure holiday travelogue or the simple family record film where background music is often all that is needed, to the more ambitious production with carefully synchronised music, dialogue and effects. He realises that the background of sound can heighten the dramatic effect of the visuals or establish the mood of a scene. An example of this can be found in "Raga to a Red Rose" by Herman Wuyts, the brilliant Belgian amateur film maker. He has set this film to a sound background of Ragas played by Ravi Shankar. Each Raga has its own mood and colour, and corresponds with the seasons and hours of the day or night and is so well cut in to the picture, that every change of atmosphere in the action of the film is subtly underlined by it without ever intruding.

Sound values

The Sound man, on the other hand, has different values, and when entering the world of film making may be a little disconcerted when the *Musique Concrète* track that he has invented comes second to the abstract moving images that he chooses to match with it. I don't mean by this to detract from the importance of sound, on the contrary, the best amateur cartoon I know,

"Short Spell" by Stuart Wynn Jones, gains immeasurably by the force and impact of his clever soundtrack, and would not be the success it is without it. What I do mean, however, is that sound must always add something to the film without ever interrupting or destroying the filmic consistency of illusion.

To carry this argument further, let us consider Television. This medium is often described as "sound radio with pictures". Granting this and agreeing that it has far to go before it becomes an entirely new art form in its own right, the fact remains that it is the visual side which leaves the deepest impression on its viewers and the most successful programmes are those which appeal primarily to the eye and only secondarily to the ear. But, nevertheless, silent Television, as we know when something goes wrong with the set, is awful to behold.

Now, most amateur film makers conceive their first efforts as silent films and, as such, these films, whether of the baby gurgling away on the lawn or of that memorable trip to the Dolomites, stand up on projection to the family circle accompanied only by some casual commentary by the maker. But repeated viewings, shown silent, bring tedium and unless you are prepared to take some extra trouble to add some form of background music appropriate to the theme contained in the film, you may find your immediate circle of friends getting smaller quite quickly. Then sooner or later you will find that a track, whether pre-planned or not, will become an accepted part of all your film making.

The simplest method is, of course, by "wild" tape or disc, which can be controlled to a certain extent by the addition of strobos; but when it comes to the addition of a commentary and the mixing of music and effects some degree of synchronisation is necessary.

Synchronisation means that the soundtrack is adjusted to the picture so that whenever the source of a reproduced sound is



A glance at these stills from the film "Raga to a Red Rose" by Herman Wuyts, will show that amateur films can reach a very high artistic standard. In this particular film the sound track contributes very largely to the success of the film as a whole.

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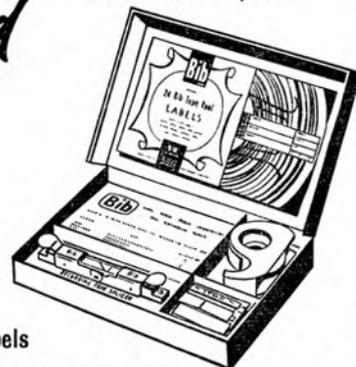
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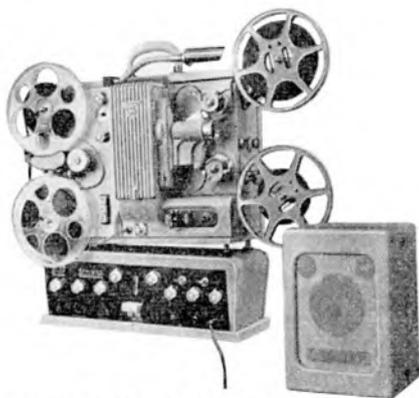
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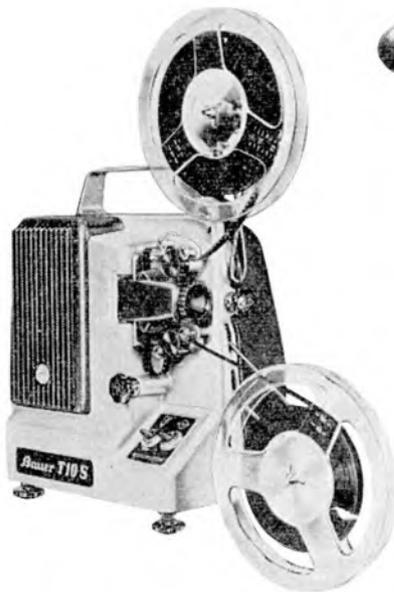
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Guidance in the choice and assembly of Cine/Sound equipment will appear from time to time in these pages. A selection of fairly ambitious units is shown here. (Left to right) the Malax Sonoclub combined tape and cine system, the Bauer T10S 16 mm Projector, which has sound coupling facilities, and the Camex Reflex 8 cine camera.



shown visually on the screen, the time relationship appears normal. There are many ways to achieve synch and they include tape loop couplers, magnetic striped film and optical sound on film.

Loop Couplers are the most popular with 8 mm enthusiasts, and are designed to operate in conjunction with a particular projector. They can be clamped to the side of the tape recorder, and they work by controlling the projector speed to keep the film in synch with the constant speed of the tape. The electrical supply to the projector motor is controlled by the amount of resistance in the circuit, and this resistance is varied by the state of synchronisation.

How couplers work

The Coupler is a self-correcting device, and its principle is quite straightforward. The tape path is extended round several rollers and a capstan which is driven by the projector. One of the rollers is mounted on a moveable arm, thus forming a tape loop which varies in size according to the projector speed. The arm is attached to the slider of a variable resistance in circuit with the projector motor, and so controls the speed automatically. There are many units on the market and all of them give quite good synch throughout the length of the film, but the snag is that there obtains a serious lack of standardisation, and if a film is to be shown elsewhere, or entered into a competition, then it should ideally be run through on the same apparatus on which it was originally recorded and synched.

Magnetic stripe

An advance on coupling is *Magnetic Striped Film*. The stripe is available for all three gauges, 8 mm, 9.5 mm, and 16 mm, and after the film has been shot, processed and edited, can be applied for the cost of about 1½d. per foot. It has the advantage of keeping both sound and picture on one roll of film, and therefore needs no adjustment of projector controls throughout the run. The stripe is coated to the side of the film that will face the normal light source position on projection (16 mm sound projectors), bonds equally well to base or emulsion side, but tends to wear on originals that bear a number of splices. The disadvantage with 8 mm stripe is that, at 16 frames per second, the linear speed of the film is low and in consequence the music quality is poor. It can be improved by running the projector at 24 fps, but the film must have passed through the camera at the same speed. Although separate tape is by far superior from the reproduction point of view, stripe does give constant lip synch

whereas the tape loop coupler has only to vary a couple of frames to lose synch, and remember that you have forty frames to every 16 mm foot of film and twice as many for 8 mm.

One of the most successful 8 mm films in the last few years, "Flick Knife" by Hugh Raggett, was striped and then post synched on a Peterson machine. This is essentially a dialogue film containing 240 separate speeches and running for some twenty minutes, and involved the use of two extra tape recorders. This film was made some four years ago when 8 mm stripe was in its infancy and, needless to say, although the synch is perfect the quality of reproduction is by no means good. Since then, however, considerable improvements have been made and there are at least two machines on the market that provide good reproduction and facility for mixing commentary, music and sound effects simultaneously or the three one on top of the other.

These machines are expensive; the Bolex Sonorizer unit costs £90, but when it comes to 16 mm magnetic stripe, prices really soar. A good optical/mag stripe 16 mm projector will cost in the region of £350, but there are many clubs and lone workers who possess such machines. Of course, when you venture into 16 mm or gather expensive equipment around you, you are aiming at higher things than home movies, and are generally set on competition prize-winning and wider distribution of your films.

The standard today is high, competition-wise, especially on the technical side; and I have seen at least four documentary films in various competitions in the last two months which come up to professional standards in both sound and photography. Equipment is forever being improved upon, and with the aid of reflex cameras, zoom lenses, and sound projectors like the Sonoclub which carries ¼ in. tape at the rear of the machine while the forward sprockets take the usual film spools; the tape being driven by the same motor and always in synch, perfection is within our grasp.

Therein lies the danger, however; for in our haste to achieve this perfection we may lose sight of the fact that, artistically, our values are not keeping up with our technical know-how.

Next month: A review of the different methods of organising sound recording sessions for the beginner and the more experienced amateur film maker, including suggestions on how to keep down the cost, and the importance of optical tracks.



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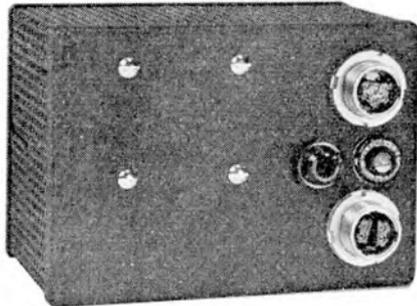
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FIRST DETAILS OF NEW PRODUCTS

● We remind our readers that notices of equipment listed and illustrated in this monthly feature are in no sense reviews. When figures, specifications and diagrams are published, these data are extractions from manufacturers' lists. When samples of this equipment are submitted for test, they are passed to our technical contributors, whose reports are published in a separate section.

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★ * *
New Recorder from Italy

THE Incis tape recorder, manufactured in Italy, is now to be distributed in this country. This machine is supplied complete with a carrying case which contains a second loudspeaker. Two speeds of $3\frac{1}{2}$ and $1\frac{1}{2}$ i/s allow one hour and two hours recording respectively with a four inch reel of tape. Recording level is checked on a magic eye level indicator, and the power output is rated at 2.5 watts. Claimed frequency response is 70-10,000 c/s at $3\frac{1}{2}$ i/s and 100-6,000 c/s at $1\frac{1}{2}$ i/s. Weighing 20 lb., the Incis measures only 10 x 9 x 5 in. and is available in this country from **Denham & Morley Ltd., Denmore House, 173-175, Cleveland Street, London, W.1.**

● We gave details last month of the new Robuk 3-speed tape recorder, designed and produced by the makers of the Motek tape deck. Write to **Robuk Electrical Industries Ltd., Wedmore Street, London, N.13,** for more information.



★ * *
"Victor" 4-track version

THE Wyndor Recording Co. Ltd., announce a four track version of their well-known portable tape recorder, the Wyndor "Victor." This tape recorder gives quality playback of its own recordings through a 10 x 6 in. elliptical speaker in a detachable lid. The four track version is only being released now that it has been developed to a standard of all round performance equal to the two-track. All the existing facilities of the two track Victor, such as mixing of inputs, controlled monitoring, three speeds and the same size speaker have been retained, and the appearance is identical apart from the track change switch. The four track machine has been developed to meet the current demand, but the company have no intention of dropping the two track version. The new machine retails for 49 gns complete with crystal microphone, 1,200 ft. tape and radio jack plug. Manufactured by **Wyndor Recording Co. Ltd., 2, Bellevue Road, Friern Barnet, London, N.11.**

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EQUIPMENT REVIEWED

★

LUSTRAPHONE VR/65NS "STEREOLUS" STEREO RIBBON VELOCITY PENCIL MICROPHONE

★

Manufacturer's Specification.

Frequency response: substantially flat between 50 and 13,000 c/s. **Output Impedance:** 20 ohms each unit. **Sensitivity:** 90 dB below 1 volt/dyne/cm². **Dimensions:** length 7½ in., maximum diameter 1½ in. **Weight:** 15 oz. **Connection:** 20 feet 4-core screened and overall sheathed cable. **Finish:** fine silver hammer. **Termination:** standard ½ in. 26 TPI internal thread. **Price:** £15 15s.

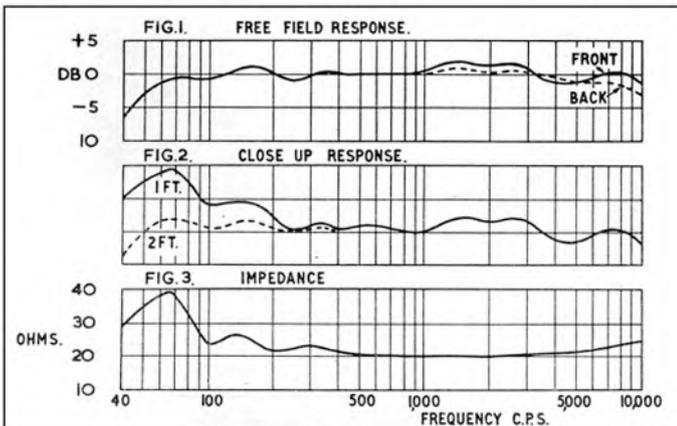
Manufactured by Lustraphone Ltd., St. George's Works, Regents Park Road, London, N.W.1.



THIS unit consists of two identical ribbon microphones mounted vertically in line one above the other. The top half of the unit can be continuously rotated through an angle of approximately 100° from the "in line" position so that optimum stereo pick up may be obtained. Alternatively the instrument may be used for monaural work by connecting the outputs in series, and the polar response modified by altering the position of the ribbon elements. As a further variation the elements may be set at 90° and the outputs connected to separate mixer channels so that the figure of 8 polar diagram may be swung through 90° by manipulation of the fader controls. If the outputs are connected in phase opposition, the microphone becomes a close talking microphone with virtually no sensitivity to distant sounds.

Frequency response

The solid curve of fig. 1 shows the free field response of one of the units. The dotted curve is the response from the other side of the ribbon; the small difference in response indicates that the polar diagram remains symmetrical up to the highest



● Free field, close speaking, and impedance/frequency graphs.

frequencies. The response of the other unit was so nearly identical as not to be worth plotting separately.

Fig. 2 shows the effect of using the microphone near to a small sound source. This is the well-known "proximity" effect common to all velocity or pressure gradient microphones, and it

indicates the need for a bass cut in the pre-amplifier if the microphone is to be used at distances closer than about 3 feet.

Impedance

The impedance was measured over the frequency range and is plotted in fig. 3. This reveals the ribbon resonance at 70 c/s, and the even order harmonics at 140 c/s and 280 c/s are clearly seen. Reference to fig. 1 will show that, although the resonances can be detected in the acoustic response, they are well damped by the acoustic resistance of the screens which surround the ribbon and pole piece assembly. The mid-range impedance is 20 ohms, which agrees exactly with the specification. If the very low frequency free field response is to be maintained, the primary impedance of the line-to-grid transformer should be high compared to 40 ohms at low frequencies. Alternatively, a falling impedance at the transformer primary would provide some measure of bass cut with the advantage of electromagnetic damping of the ribbon at low frequencies.

Sensitivity

The sensitivity was measured as 94 dB below 1 volt/dyne/cm², or 0.02 millivolts per bar across the source impedance of 20 ohms. A 50 to 1 line-to-grid transformer would thus provide 1 millivolt at the grid of a valve for a sound level of one bar. Declamatory speech at 3 feet will produce a sound level of about 0.2 to 0.4 bars, so that the grid voltage available for each channel will be in the order of 0.2 to 0.4 millivolts. The sound levels, and therefore the outputs, will be much higher for music, but

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(continued on page 569)

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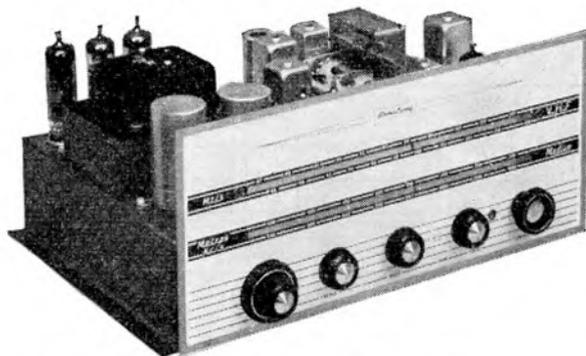
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care will have to be taken in the selection of valves and input circuit components if adequate signal noise ratio is to be achieved.

Comment

This microphone is described by the manufacturer as “for the wider group of amateur stereo recording enthusiasts”, and for this purpose it gets full marks. With good associated equipment it should provide excellent stereo recordings.

It may be instructive to consider what compromises have had to be made in the design of a microphone in this class. A professional stereo microphone may cost anything between £150 and £300, so what has had to be sacrificed to produce this unit at £15? The axial frequency response is comparable to the best available. The polar response is fairly symmetrical, and the small variations that do exist are not likely to colour the reverberant sound quality. The sensitivity is about 10 dB lower than the BBC ribbon microphone, but a signal to noise ratio of 45 to 50 dB can still be obtained by using modern low noise-low hum valves and well screened and balanced input transformers. The bumps in the impedance curve show that the main ribbon resonance is not critically damped, and low frequency transient response is thus slightly suspect. A lighter thinner ribbon, which would match the air load more exactly, together with a heavier magnet system to provide more electromagnetic damping, would eliminate any possibility of trouble from this source, and would at the same time provide a welcome increase in sensitivity—but we can't have everything, and the manufacturers are to be congratulated on striking a nice balance between size, weight, response, sensitivity, and, of course, price!

A. Tutchings.

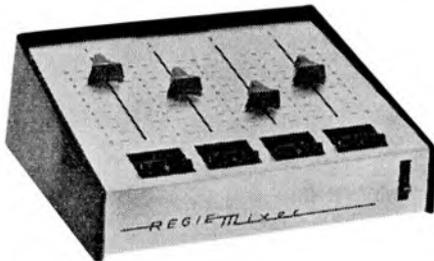
Manufacturer's Comment: this review was sent to the manufacturer prior to publication, and the following comment received: “As stated by Mr. Tutchings, use of thinner ribbon material could give a further improvement in performance although it would result in a substantial increase in cost.

“The opinion of musicians listening to the demonstrations at the 1960 Radio Show, of recordings made with this microphone, was that music reproduction was entirely life-like, which indicates excellent transient response.

“Concerning a heavier magnet system, an increase in physical dimensions would materially affect the symmetry of back and front pickup respectively, quite apart from considerations of economy.”

* * *

**SABA
REGIE-MIXER
100**



Manufacturer's Specification

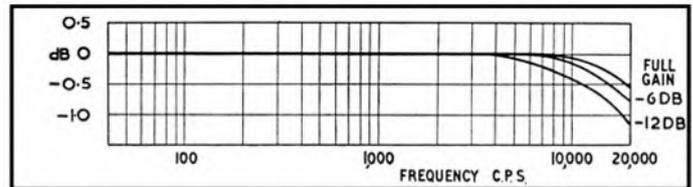
Battery: 22½ volt 2.5mA. **Transistors:** 3 × TF65. **Inputs:** 3 × 0.05 mV at 1 kilohm, 1 × 350 mV at 500 Kilohms. **Output:** 60 mV (for 1% distortion) at 15 Kilohms. **Frequency Response:** 20 — 20,000 c/s. **Signal/Noise Ratio:** at least 65 dB. **Interaction:** 1 dB. **Crosstalk Ratio:** at least 65 dB. **Dimensions:** 8½ × 6½ × 3½ in. **Weight:** 3 lbs. **Price:** £18 18s. **Manufacturer, Henri Selmer & Co. Ltd.**

* * *

IT must be confessed that the Specification outlined above, which has been taken from the instruction booklet, was at first looked upon with some suspicion by the writer. Too often one has seen the phrase “Frequency response 20 — 20,000 c/s”

only to find that the range quoted is not the range over which response is flat within certain limits. In one instance it was found to be the range over which response could be detected. Again, “Signal/Noise ratio at least 65 dB”—below what? Without a reference level this figure really means nothing.

My fears were, I'm very glad to say, dispelled as soon as the mixer was put on test. If the blanks are filled in by making the response read “± 3 dB with respect to 1 kc/s,” and the S/N ration “below 60mV,” then the unit passes out first class. There is one respect in which the figures given are misleading, however. One might be forgiven for assuming that the output of 60mV—the only figure quoted—can be obtained with an input of 0.05 mV. In fact it needs 1.4 mV to produce this output, an unrealistic figure



for an input impedance of 1 Kilohm. But, looked at another way, 0.05 mV produced, with full gain, 2 mV of output, sufficient to load the mic socket of the average tape recorder. Such a signal represents a reasonable level from a low impedance microphone.

The frequency response at three attenuation levels are plotted, and will be seen to be very good, well worth specifying more precisely! The signal/noise ratio could not be measured directly (65 dB below 60 mV means a noise signal of only 34 microvolts!) so it was calculated from indirect measurements, giving a figure of 70-75 dB. Most of this noise was transistor hiss, and it would be entirely lost in tape hiss on the average tape recorder.

Measured Results

Output 60 mV	Inputs 1, 2, 3	1.4 mV
	Input 4	6 V
	Distortion	0.8 %
	S/N Ratio	70 dB
Output 2 mV	Inputs 1, 2, 3	0.05 mV
	Input 4	200 mV
Attenuation Law		
Scale	10 9 8 7 6 5 4 3 2 1 0	
Reading	0 1 3½ 6 9 12 15½ 22 28 44 60	
dB		

Longitudinal Fader controls, backed by level pre-setting variables, are used on this mixer, and they deserve the highest commendation. On the sample tested they were smooth to operate, electrically and mechanically noiseless, and followed a very reasonable law. The channel switches are as noiseless as they are claimed to be, and the whole unit is very easy to use. With the chosen presentation of the controls it is possible to see the state of the various channels from the other side of the room.

It was found that switching the unit on while recording resulted in a gentle “fade-in,” but there was a tendency to “squegg” on switching off, a burst of audible oscillation lasting about half a second. At worst this means that the tape recorder should be switched off first.

The instruction booklet (which occasionally betrays the fact that it was translated in Germany) is extremely comprehensive and should prove helpful to the new owner. Altogether the Saba Regie-Mixer 100 represents, in the writer's opinion, the outcome of much serious thought in the design stage and exceptionally good value for money.

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our readers write

. . . about a film society

From:—Group Fourteen Amateur Film Society, 36 Trinity Road, London, N.22.

Dear Sir: Tape recording is an integral part of amateur film production and Group Fourteen Amateur Film Society wish to extend a welcome to all tape recording enthusiasts. The Society meets weekly in Woodside House, Wood Green, London, N.22. Anyone interested should get in touch with the secretary Mr. P. Hunt, 46 Harlech Road, London, N.14. Tel: PALmers Green 3738.

Yours faithfully,

* * *

. . . about tape magazines

From:—G. E. Spark, Garrard Engineering and Manufacturing Co. Ltd., Swindon.

Dear Sir:—May we relieve the concern expressed by Mr. John Munro in your issue for November.

Presumably as a regular reader he has already scrutinised the article which appeared in your September issue, in which was related the advantages to be obtained from magazine loading. In his letter he mentions merely one advantage, and this is always misleading unless the full picture is revealed.

Actually, the replacement magazine has been available for a considerable period of time at a retail price of 37s. 6d., whilst there is also available a reel of tape at 27s. 9d., an empty magazine with one empty spool at 8s. 3d., and an empty spool at 3s. 6d. This makes it possible for the users to please themselves entirely whether they buy a completely loaded magazine, or empty magazines and reel on their own particular brand of tape. Whatever system is used, it is obvious that the magazine will cost some money, and the user has himself to decide whether the advantages of magazine loading warrant the outlay necessary.

Mr. Tutchings, in his review, was quite right in his comparison, your correspondent should know that in playing time the magazine contains enough tape to give an equivalent playing time of 35 minutes each track. In many cases this is equivalent to two long playing records, but in any case is of longer duration than most long playing records.

It is the magazine principle combined with the controls on the Deck which make the Garrard system so child-like in its simplicity. We hope we have helped Mr. Munro, but should be only too pleased to supply him with any further information he may require.

Yours faithfully,

* * *

. . . about sub-standard recorders

From:—Arthur S. Robins, 38 Tanfield Avenue, London, N.W.2.

Dear Sir:—Having just read your editorial in the November issue of *The Tape Recorder*, and having just brought a recorder myself I thought I would write to you.

My recorder—a battery model—I purchased from a well-known London dealer. I had trouble with it when it was first delivered, and wrote to them. They asked for it to be returned, and I took in. I think it was the manager who served me, and after trying three models, of the same make, we found one that was far superior in quality—tonal—to the others. The others had manufacturing errors, also.

I had heard a demonstration of their type of recorder at the manufacturer's showrooms some time ago, and I was in a position to know what these machines could sound like. Had I not known this I might have accepted the first one—some had mechanical faults as well—what I'm really inferring is that although I had excellent, courteous service from the dealer, if I hadn't known what it should sound like I could have been given a substandard model—in tonal qualities, and been told—I've heard this before too—"Oh, well, you must expect this with a small speaker".

I have written to the manufacturers about all this. Also on the instruction leaflet it said, quote:—"Put the plug in the centre socket"—unquote. There were 4 sockets! I think the leaflet was for the original single speed model.

The reason I went to this particular dealer was because they advertised a "repairs in the home" service for their recorders. When I asked about it, they told me that they had to cancel it as the two firms they had asked to cover the country for them were no good. They had so many complaints, it was ruining their reputation. Isn't this a shocking state of affairs? Radio and Television are just the same it seems. I hope my letter has been of interest to you.

Yours faithfully,

* * *

. . . about attractive boxes

From:—Graham B. Giles, 34 Hillersdon Avenue, Barnes, S.W.13.

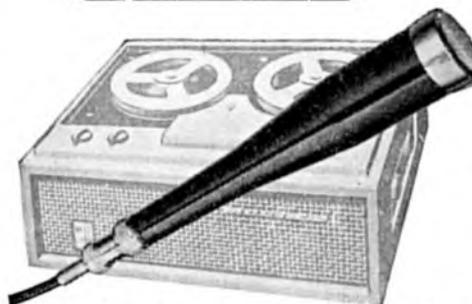
Dear Sir:—Re—"Make your tapes easy on the eye" in the September issue.

This permanent problem has faced many of us while trying to make our equipment blend with the decor of modern living; to this end we are not helped by the tape manufacturers who, even now, are producing poor quality boxes of unattractive appearance.

Mr. Berridge's ideas are very good and well presented. His method unfortunately has the disadvantage of being painstaking and unnecessarily complicated. After a few years of use I am sure that the paper covering would wear, become dirty, and possibly torn. To avoid this I prefer to use a self-adhesive plastic material (such as Fablon, Stixon, Contact). This is durable, washable and clean to use. There are many colours and patterns available from which to make your choice. If you do not wish to have uniformity in design it is possible to buy remnants at reduced prices which will give you a different cover to each box.

My own method is:—(1) Cut one piece of material large
(continued overleaf)

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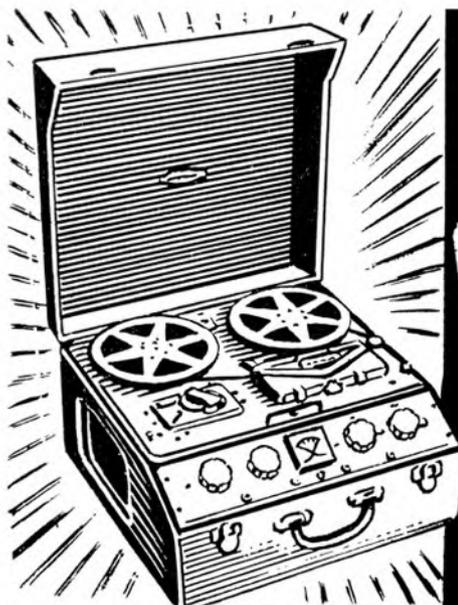


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READERS' LETTERS—(continued)

enough to cover each box completely. For a 7 in. box this should be 18 in. by 9 in. (Four such pieces may be cut from one yard of 18 in. width costing 3/9.) The procedure is similar to that adopted when covering a book with paper. The two larger surfaces are covered first then the edges out to fold inside the box. Care should be taken to remove only a little of the backing paper at the time to avoid making it awkward to handle. Once fixed, mistakes are hard to rectify.

(2) On the outside edge of the case fix two Arrowtab labels (No. 66 2½ by ¼ in. available from photographers 200 for 1/9d.) On these are summarised the contents of each tape in one or two words. A mapping pen and Indian ink will produce much neater results than a typewriter on such labels.

(3) Inside the box stick a sheet of 7 in. by 7 in. plain paper on which are typed the complete details of the tape. Should this extend to two sides of paper the second sheet may be fixed in the other half of the box. It is an advantage to have two different coloured leaders by which the sides can be identified in these index sheets.

For absolute safety it is possible to write on the leader tape, but the practice of marking the reels themselves is, as always, completely unnecessary. There is then none of the complication of rewinding. *Yours faithfully,*

... about metal boxes

From:—J. Hamilton, 9 Sidbury, Worcester.

Dear Sir:—In your November issue, you published a letter and details of a home-made plug adaptor by Mr. John Hone, and whilst this idea appears at first sight to be satisfactory, we can imagine what the hum pickup may be if, as Mr. Hone suggests, a microphone be plugged in. I think a much better solution to this plug and socket problem is to obtain a discarded 35 mm film spool can from the many that seem to be available from chemists and photographic dealers, and mount a jack socket in the screw-on lid. A flexible screened lead may then be brought through the body of the can and the lid replaced.

Being made of aluminium, the unit is screened via the braid of the cable normally terminating at the "earthy end" of the apparatus in use. Plastics certainly have their uses, but not for housing unscreened jack sockets if a high impedance source is in use. These spool cans have many uses in the "audio field" ranging from nut and bolt containers to crystal set cases. The writer usually makes use of these to contain small microphone matching transformers, and they look not only "professional" but obviate any difficulties related to hum pickup. *Yours faithfully,*

... whose face is red

From:—P. E. Wetherill, Sales Manager, Emitape Division.

Dear Sir:—With reference to the letter on page 522 of the November issue, we think that the correspondent is a little bit out of date. The facts are as follows:— British Specification for ¼ inch material is .246±.002, the Continental Din Standard is 6.25 mm±.05 mm. You will see from these figures that the width tolerances are identical. *Yours faithfully,*

EXPERIMENTAL TAPE DECK

—Described by S. H. Boutle—

MANY enthusiasts will have followed the recent series in this magazine, that dealt with transistor amplifiers, low impedance heads, and simple tape transport mechanisms, having, I have no doubt, had some trouble with the latter. Simple tape drives have their uses experimentally, but if the object is to construct an instrument that will have some practical use, then more effort will have to be expended on this most important component.

Having surrounded oneself (as I did) with pre-amps., bias oscillators, and rubber heels, and incidentally enjoying every minute of it, it becomes apparent that if a reliable tape drive were added to the collection, a most versatile, and useful instrument would be the result. The first requirement is a suitable top plate that forms the basis of any tape deck, this was

(continued on page 575)

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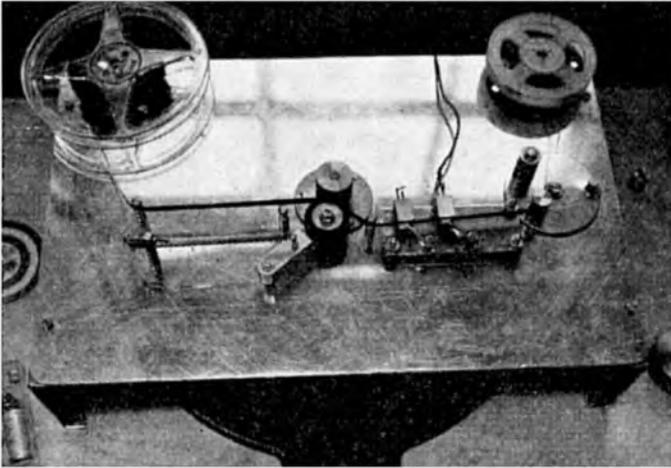
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EXPERIMENTAL DECK—(continued)

met by an aluminium sheet 15 × 10 × $\frac{1}{4}$ in. It was decided that the motor drive should be one of the old type centre drive, variable speed units. These can be obtained very easily, and cheaply at the present time. As can be seen in the photograph, the motor and turntable are mounted on a board in the usual manner. Two side pieces then support the top plate above the turntable.

The next item, the capstan bearing, is the most important component of the whole assembly. Various ideas, and suggestions were tried without much hope of success. Ball races were thought of and rejected as, usually, they give rise to intolerable rumble. This is indicated, by the fact that professional tape decks are invariably fitted with plain bearings. Accordingly, this was tried with immediate success. The bearing fitted to the model described, consist of a $\frac{1}{4}$ in. silver steel shaft, with a bush of



phosphor bronze. These are machined so as to be a very snug fit. In fact, if when finished the shaft is inserted in the bush and one or two drops of light oil applied to the shaft, the joint should be airtight. Needless to say, the whole bearing should be concentric.

For many experimenters this type of work would be out of the question, having neither the tools, nor experience to use them. However, a friend or neighbour may be persuaded to come to the rescue. Failing all else, many light engineering firms are willing to do this kind of work. Having assembled top plate, bearing and side piece, reel carriers are fitted, the left hand one having a pulley fitted for take up drive. The other has a flat plate with bush, for fixing on to the bottom of the shaft. A piece of felt is stuck on the underside of the plate. When the deck is in use, the felt rubbing on the mounting board, places a restraint on the feed spool. This prevents over run and jerking of the tape during operation.

The lower end of the capstan shaft is fitted with a similar plate of larger diameter. The underside of this plate is also covered with felt. Thus when the motor is switched on plate, shaft, and capstan will turn as one. A pulley, identical to the one fitted to the take up drive shaft, is fitted to the capstan shaft. A position midway between the end of the bearing, and the top of the plate bush, should be suitable. A belt must now be provided. $\frac{1}{4}$ in. diameter solid rubber belting, cut to side and joined with Evostick, has proved most reliable. The belt should not be too tight, or else, slip, which must occur when the relative r.p.m. of the capstan shaft, and the take up spool shaft vary due to the changing diameter of the tape on the take up reel, will be prevented.

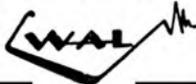
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