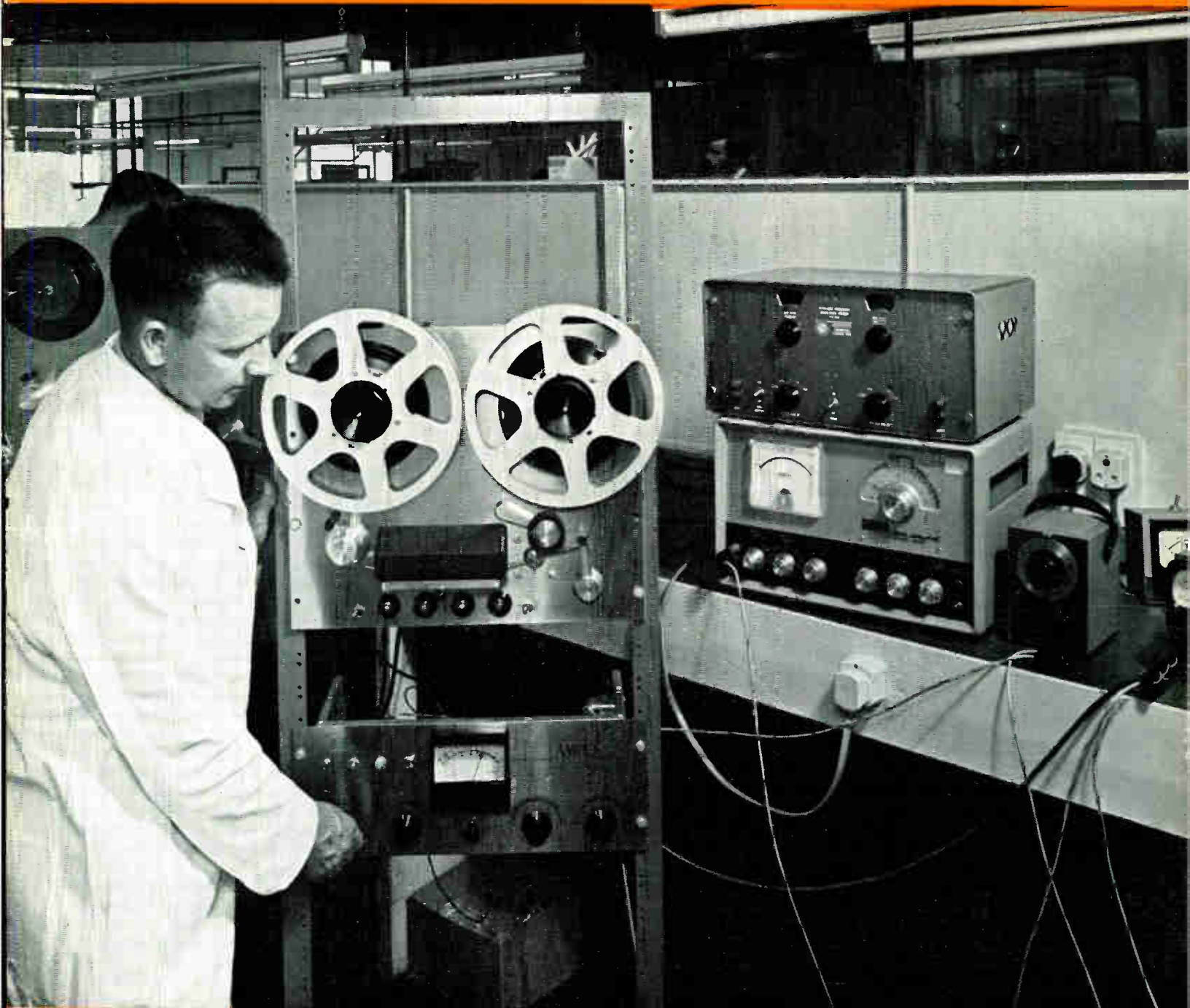


the TAPE RECORDER

PRICE 1/6

NOVEMBER 1960
Vol. 2 No. 10

INCORPORATING "SOUND AND CINE"



IN THIS NUMBER

- A Custom-Built Stereo Recorder—Part 3
- Teaching Tape—a Special Series for Beginners
- Tape Recorder Workbench
- How Drama Students Use Tape
- An Experimental Gram Motor/Tape Deck
- Equipment Reviews
- Readers' Problems
- News and Pictures from Here, There and Everywhere

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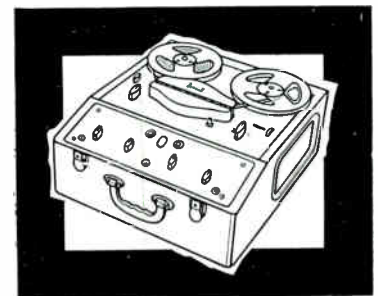
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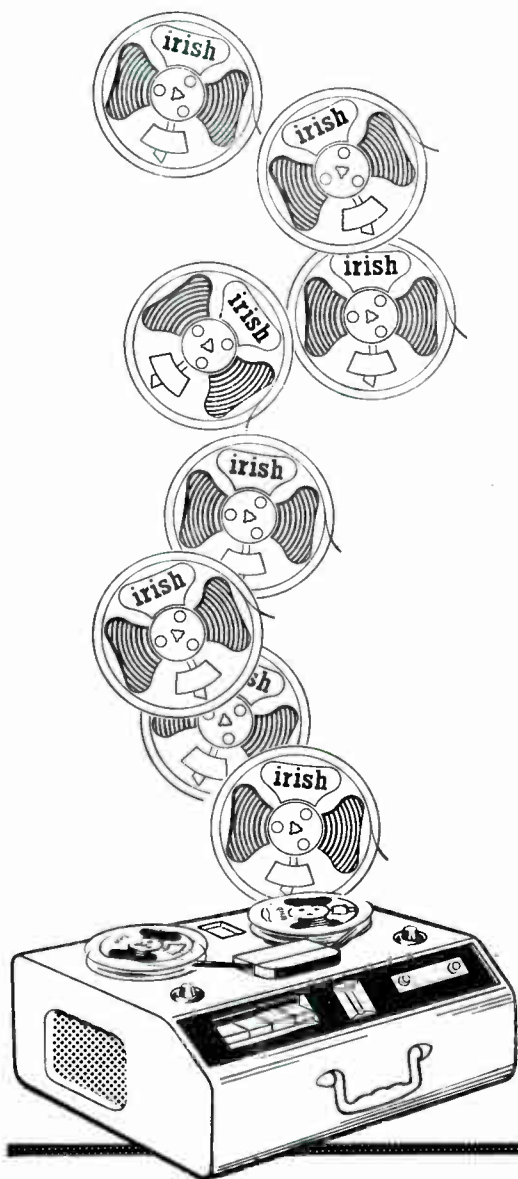
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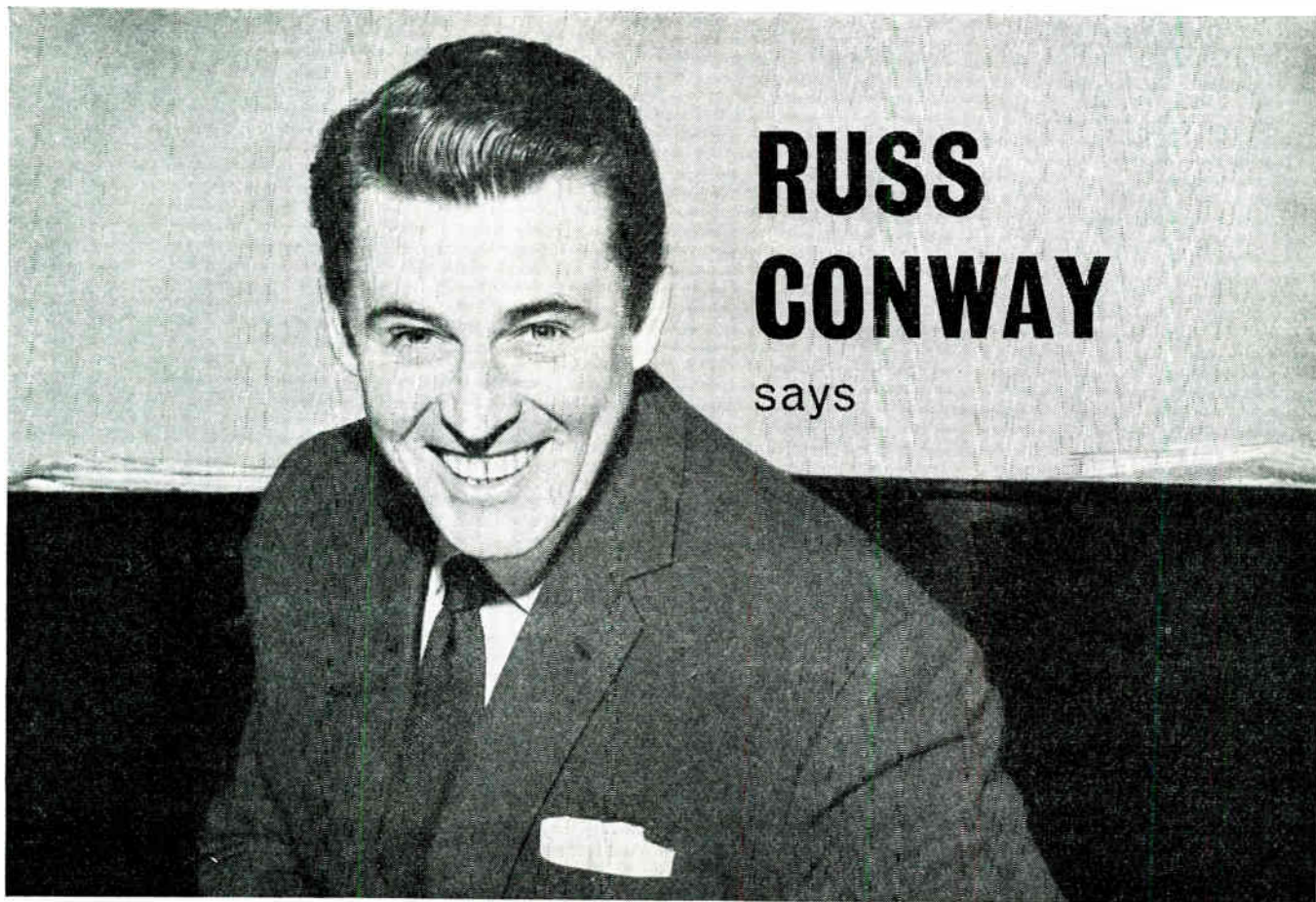
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says

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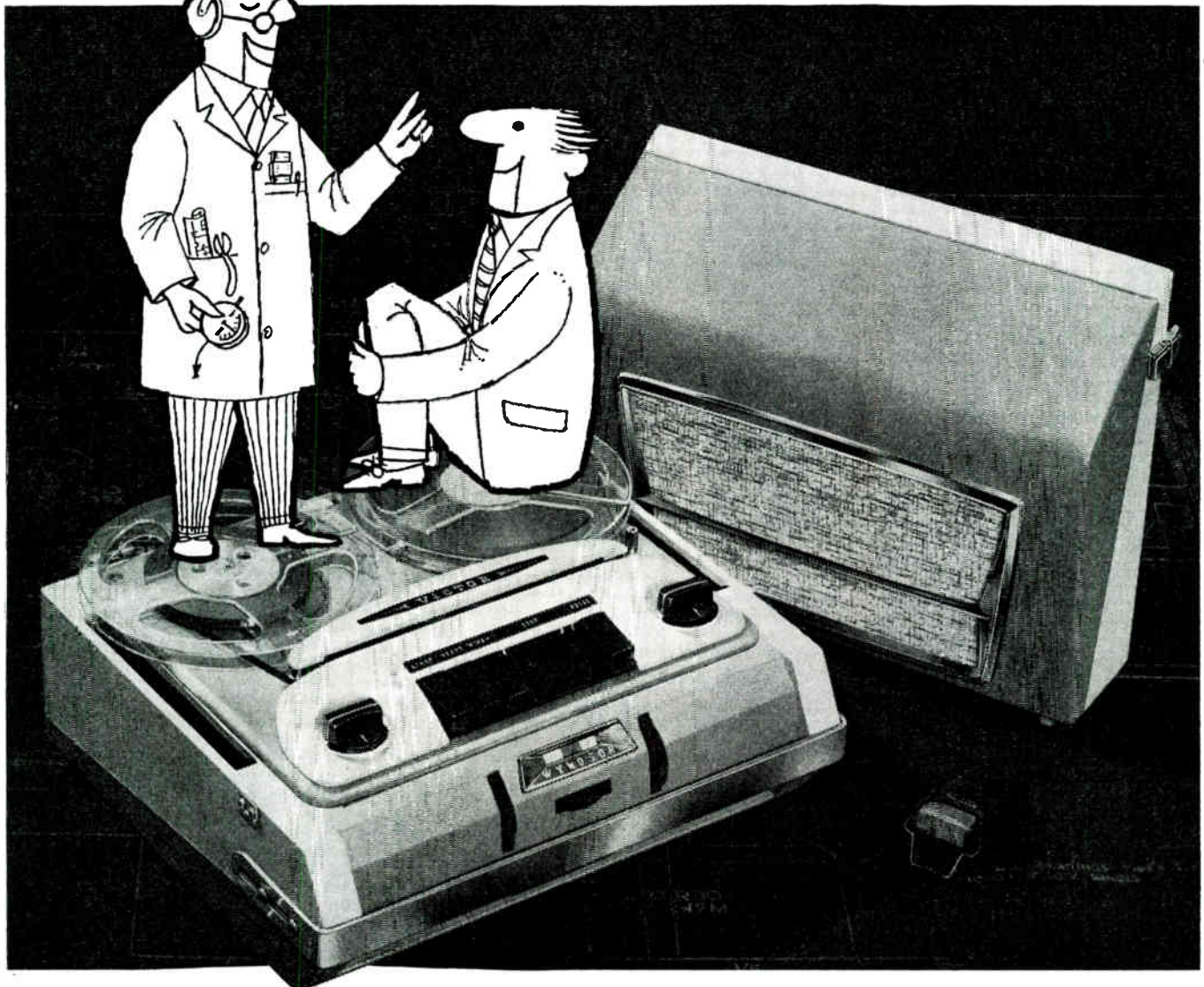
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EDITORIAL

THERE are two subjects for brief discussion in this column this month. The first concerns dealers who help and dealers who do not. Over the past 18 months we have had numerous letters from readers mentioning the good and bad treatment they have received at the hands of dealers from whom they have brought their recorders. In the main these letters have contained complaints, because it is far more natural to complain of bad service than to express gratitude for kindness and attention. With this thought in mind we were interested to see that a contemporary magazine in the cine world has given editorial emphasis to practically the same thing in terms of photographic dealers, and so we take a leaf from their monthly book and suggest that our own readers can do much to help others by letting us know when they have particular reason to be pleased with, or dissatisfied with, their dealers associations. Dotted around this country there must be dozens of tape dealers whose knowledge and enthusiasm are at the disposal of the genuinely interested customer with a tape recorder in mind. There are also those who regard the sale of a tape recorder as "just another item in the day's cash receipts". The former is the man who can be counted upon to give good after-sales service and advice; and particularly in view of the large numbers of lesser known brands of recorders which come and go, the dealer who takes an active interest in his customers is obviously the man to deal with. We receive scores of letters asking us for advice and recommendations, and if we are able to compile a list of good dealers in this office we shall be able to pass on recommendations to the quarters which are most likely to result in permanent satisfaction to our readers.

The second subject concerns tape records. In view of our repeated pleas for supplies of recorded tapes which will give owners of tape recorders an additional interest in their machines, we were glad to hear only a few weeks ago that initial supplies of UST 4-track stereo tapes, recorded at 7½ i/s, have reached this country, and after somewhat difficult and protracted negotiations which were necessary in order to clear musical copyright, etc., a selection of these is likely to be released for sale in the very near future. We hope that readers with 4-track machines will be quick to try out these tapes and to let us know (a) what they think of them and (b) what suggestions they have to make. After so many rumours and promises, and after such a long and disappointing period of waiting, it is good to know that something is at last moving. We also draw the attention of our readers to the recently introduced Bi-tapes, both in mono and stereo versions at 7½ and 3½ i/s. This has begun as a small venture, and the quality of much of what we have heard is good. It is the initial support of such ventures which will ensure their progress.

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COVER PICTURE

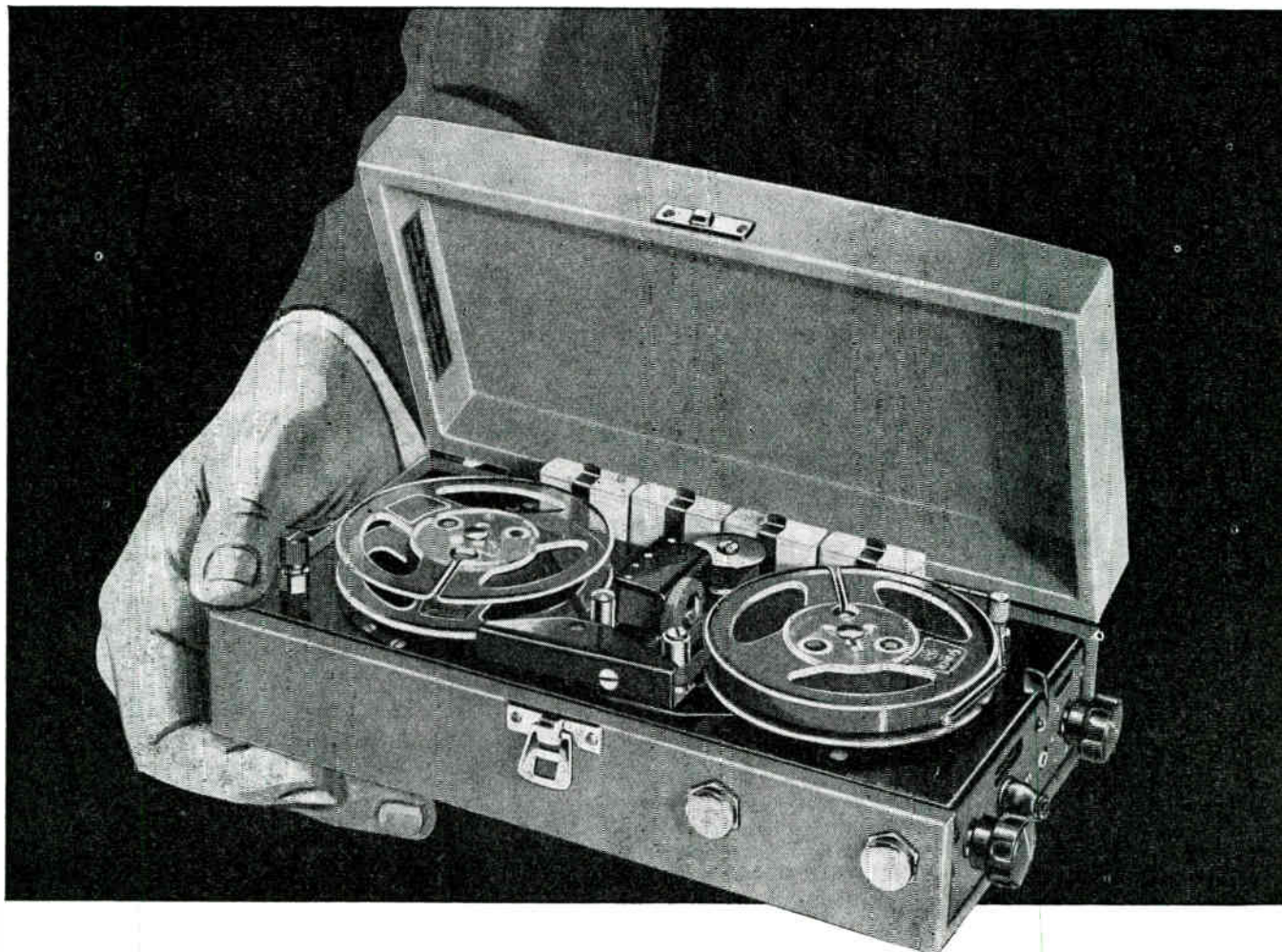
ON a recent visit to the Ampex factory in Reading, we were particularly impressed by the battery of specialised test gear used to check each individual recorder. In fact, the same care which is given to the inspection of £5,000 computer recorders running 8-tracks at 150 inches per second is lavished on the domestic recorders and the professional model 351 shown in the photograph.

NEXT MONTH

THE advancing Season is reflected in two of our features next month. Firstly, there will be a special article on the topical subject of preparing a tape sound track to accompany the showing of colour slides—now a regular event at family get-togethers. Secondly we shall be drawing up a few suggestions under various price brackets for Xmas Gifts for tape enthusiasts. Readers who followed the series of articles by A. Tutchings on "Learn as you build" *Experimental Recording* will look forward to his next project, beginning next month, which is a portable recorder based on simple transistor circuitry, and a clockwork gramophone motor—just the thing for outdoor sound collecting. The first of a regular series of ciné articles is scheduled too, plus all our usual features, so order your copy now.

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).



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TEACHING TAPE

A SPECIAL SERIES FOR BEGINNERS

By I. W. JARMAN

PART 6—USING A MIXER

IN the previous article I dealt with the placing of the microphone for the recording of speech, solo piano and a vocalist with instrumental accompaniment. Continuing with the problems of balance, let us now consider the recording of a number of performers at the same time, e.g. an unaccompanied choir.

When using the bi-directional type of microphone, the choir may be grouped on the two sides, the distance from the microphone being determined by the strength of the voices and the number of people in the choir. If an omni-directional type is used, the singers should be grouped around, with the microphone suspended face downwards, just above the level of their heads.

The problem of balance becomes more acute when a large number of performers is involved, e.g. in the choir or when some form of accompaniment is necessary. Although it is possible to obtain quite a good recording using only one microphone, you will almost certainly find that much better results can be achieved by using two or more.

The mixer unit

When two or more input sources, e.g. microphones, are used, these must, be mixed in some way to form a single input. This is achieved by using a mixer unit, which in some cases may form part of the recorder itself. By far the most simple method of mixing two input sources is to connect their output leads in parallel, the common output then being connected to the input of the recorder. This system suffers from the disadvantage that both input sources would be in circuit at the same time. This could be overcome by connecting a switch in the output leads of each, but here again you find a big disadvantage, this being that the only control you have of the volume is the main volume control on the recorder. It will be obvious that any adjustment of this control will affect both inputs equally.

To make it possible to adjust the volume of the individual sources independently, each must have its own volume control. In fact the simplest mixer units available consist of a number of input sockets (usually three) each being followed by just such a control. The outputs from these controls are then connected together to form a single output from the mixer unit, this being connected by a screened lead to the input socket of the recorder.

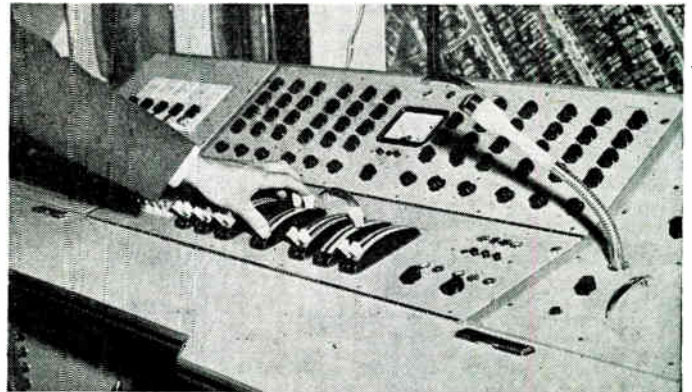
This unit is known as a low level mixer, since no pre-amplification of the input signals takes place prior to the volume controls. Since it is a resistance network, you can expect some slight loss of volume when using it, and the setting of the volume control on the recorder will need to be somewhat higher if the microphone were plugged directly into it. This type of mixer has the disadvantage that any noise from the volume controls, or faders as they are known, being at about the same level as the input signals, will, when amplified, badly mar the recorded sound.

The other type available, known as the high level mixer is, of course, much more expensive than the low level type since amplifying stages are incorporated. With this mixer any fader noise becomes much less noticeable since the amplified inputs will be at a much higher level.

Impedance matching

In connecting the mixer to the recorder, care should be taken to ensure the matching of the respective impedances—since most mixer units are high impedance, direct connection to the high impedance input of the recorder can be made. In the case of the low level mixer, this connection will be made to the microphone input socket. With a high level type, the connection should be to the attenuated radio or gramophone input.

It is important to mention here that since the faders used on the mixer units available to the amateur are non-constant impedance types, the effective resistance of the unit will vary



The simplest mixer units consist of 2 or 3 volume controls in parallel, with ordinary circular knobs. This E.M.I. professional desk uses quadrant sliding controls, which make it easier to fade channels simultaneously.

according to the settings of the individual controls. This will, of course, mean some variation in the level of the sounds to be recorded—in some cases the variation could be large, in others small. But whichever it may be, this variation can be compensated for by some readjustment of the volume control of the recorder. Here again experimentation is necessary—make sure that each fader has a scale around it, and keep a note of the settings of the controls and the amount of compensation necessary.

Uses of the mixer

In broadcasting organisations, each studio, except in a few special cases, will be equipped with a mixer panel capable of controlling a number of inputs. These may consist of microphones, pickups, tape reproducing equipment and lines from other studios etc. In the case of a music studio employing a multi-microphone technique (on a dance band broadcast for example) each section of the band may use at least one microphone, and there will be others for vocal groups and the announcer, possibly as many as fifteen to twenty in all. In such a case, the microphone faders may well be used in groups of four, the output of each group being controlled further by a group fader. The mixer controls are further used for the fading into and out of programmes, and for keeping the volume of the sound within the required limits.

Earlier in this article, I mentioned that certain makes of recorder provide built-in mixer facilities similar to the type I have described. Another form of mixing which all recorders seem to provide is that of superimposition, and I shall be describing this in the next article in this series.



NEWS AND PICTURES FROM THE



Tape trains salesmen

THE latest technique for teaching salesmen how to sell is to use a tape recorder. The new training courses were developed by the Sales Manager of a well-known paper processing company. Based on the principles of reinforced learning and sub-conscious affirmation, the courses enable the student to listen, repeat and learn, and then score his own results. Home learning is encouraged and stethophone headsets are provided to allow private study. The course is so devised that, once the student has completed the course twice without making a mistake, he has in fact assimilated all the facts including a typical interview. He is then ready to go out and sell. The new system trains salesmen in less than half the time, and at one fifth of the normal cost, of setting up lecturing facilities.

P.a.R. name change

P.a.R. Electronics will be known as "Allegro" Sound Equipment from the 1st October 1960. They will continue to manufacture the "Allegro" tape recorder, and will introduce a

twin channel integrated Stereo Amplifier. This will have 6 watts per channel, and be known as the "Allegro 66" Stereo. Mr. P. A. Rispoli, the founder of P.a.R. Electronics will be Managing Director of this new venture, and will continue to operate from 7 Avery Row, Mayfair, London, W.1.

Magnavox enters the British market

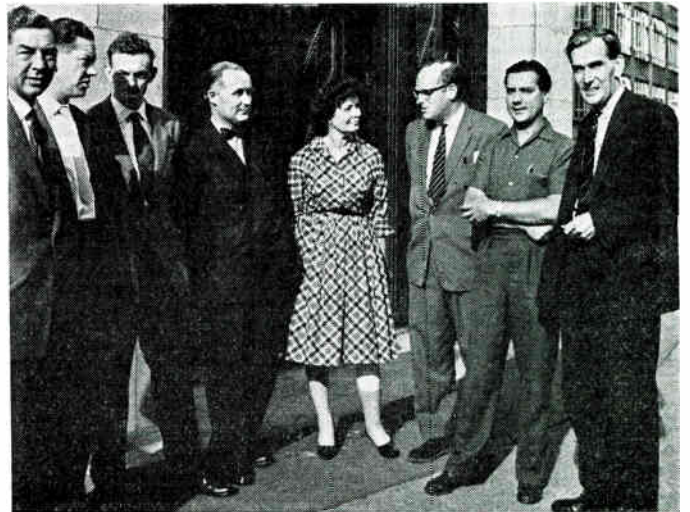
MAGNAVOX is one of the best known names in the American High Fidelity field, and were first mentioned in these columns in connection with their taking over control of the Collaro Company. They have now announced a large-scale scheme for the distribution in the U.K. of radiograms, tape recorders, record players, transistor radios and television sets. The two young directors of the British company, Don Fisher and Denis Fitzgerald, outlined some of the "new look" features of their marketing and distributing plans to the technical press at the "Wig and Pen Club". There were five main points, as follows:—direct distribution through a selected limited number of dealers, three month guarantees of free servicing, rebate guarantee to dealers that no models will come on the market at lower than the retail price, incentive programme for dealers, and very widespread advertising. The first products to be on sale in Britain will include stereo disc players, and tape recorders are promised in the very near future.

BBC issues language discs

FOR the first time under BBC auspices, two double-sided 33½ r.p.m. discs have been issued to help with Italian and Russian pronunciation. They will be useful to anyone learning Italian or Russian, whether by radio from the BBC's Network Three Broadcasts, or in classes, and both discs will be supplemented by a leaflet with useful notes. The discs cost 3s. 6d., plus 9d. for inland postage and packing, from BBC Publications, 35 Marylebone High Street, London, W.1.

Damaged diamond styli

AS distributors of a high fidelity stereo pickup employing a diamond-tipped stylus, Aveley Electric Ltd. have expressed to us grave concern at the number of complaints from users that the diamond points disappear from the styli for no apparent reason. They have carried out investigations and it now seems clear that a common factor in these complaints has been the



The B.B.C. programme "Sound" on Network Three is already well under way with its 1960/61 series. The photograph (left) shows Eric Robinson, well-known television conductor, speaking to Norman Paul about his prize-winning tape "The Rest is Silence". The second photograph (right) shows the contributors to the first programme in this series, (left to right) Ken Blake (listener to "Sound"), Roy Maynard (Assistant to Mrs. Cutforth), Len Thompson (Recording Engineer), R. D. Brown ("Tape Recording Fortnightly"), Marguerite Cutforth (Producer "Sound"), Donald Aldous (Gramophone Record Review"), John Borwick (Assistant Editor "Hi-Fi News" and "The Tape Recorder"), John Kirby (Compere, "Sound").

WORLD OF TAPE

use of special cleaning fluids and anti-static fluids applied to the discs, which result in the disintegration of the cement used to secure the diamond point. They naturally advise special care in the use of cleaning fluids and are taking action with the interested manufacturers in order to eliminate such expensive and annoying occurrences in the future.

Brian Rix to open 1960 Radio Hobbies Exhibition

G2DQU, as he is known on the short waves since he obtained his amateur radio licence in 1938, will officially open the 1960 Radio Hobbies Exhibition on the 23rd November 1960. There can be few of the millions who know Brian Rix only through the record-breaking farces at the Whitehall Theatre and on Television who will recognise him from this call sign, but in fact he has used it to converse in speech and morse code to the international Amateur Radio fraternity for many years. The Exhibition runs from the 23rd to 26th November—unlike some of Mr. Rix's other performances which have reached the four figure mark—and is held, as in previous years, at the Royal Horticultural Society's Old Hall, Westminster. (Coming out of the Whitehall Theatre you should turn right towards Big Ben, and it is second on the right.)

Brenell fit new motor

A HIGH quality capstan motor has been introduced as a standard feature on all their tape recorders by Brenell Engineering Co. It is an Hysteresis Synchronous motor, which has a balanced outer rotor and is used with a heavy, statically and dynamically balanced flywheel. This double flywheel operation results in improved wow and flutter figures at all speeds. Figures are said to be within 0.05%, 0.1%, 0.15% and 0.25% at 15, 7½, 3½, and 1½ i/s respectively. The new motors are to be fitted as standard without any increase in price. Details from Brenell Engineering Co. Ltd., 1a Doughty Street, London, W.C.1.

New outlet for L.P.R.L.

THE Long Playing Record Library Ltd., who are known throughout the world through their postal distribution of discs, have become associated with High Fidelity Developments Ltd., 8 Deansgate, Manchester 3. This shop, known under the title *Lancashire Hi-Fi*, has now opened a section of the Library which will be of great benefit to customers purchasing hi-fi equipment since they will be able to borrow from a large repertoire of records.



Jessie Mathews uses a Clarion recorder to tape her congratulations to 83-year old Mrs. W. Sutherland of Shetland who had won £100 for a hand-woven shawl in the "Do It Yourself" National Handicraft contest.



The new Tape Recorder Centre branch at 82 High Holborn is already attracting the attention of recording and hi-fi enthusiasts.

J. D. Barrington leaves Philips

J D. (DICK) BARRINGTON has been personal assistant to the managing director of Philips Electrical Ltd. for the past eleven years, and indeed his service with Philips dates back to 1927. The many friends he has made throughout the radio industry and in dealer circles will be sorry to hear of his retirement at his own request for reasons of ill health. A farewell luncheon was held in his honour.

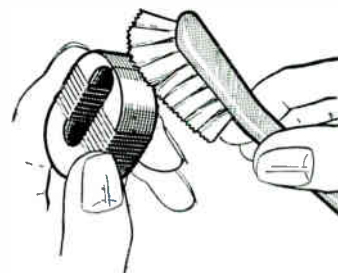
Hi-Fi cycling

WE have several times referred to the ubiquitous nature of the tag "Hi-Fi", and we have had another interesting case brought to our notice by a reader in Birmingham, who describes himself as "a keen cyclist as well as a Hi-Fi addict". In the issue of *Cycling* dated August 10th, 1960, from which he sent us a cutting, we quote this final paragraph:—"Every model throughout the B.S.A. range will carry a new transfer—the Hi-Fi cycling transfer. Hi-Fidelity cycling is described as 'as true a reproduction of the riders' energy in wheel speed as it is possible to get'."

TAPE TIPS — by Guy

— No. 2 —

Keep the
Recording Head
Clean!



A RECORDING head coated with powdered iron oxide from the tape will not record high frequencies (treble notes) at correct amplitude, because the high frequency magnetising flux is shorted by the oxide powder. The increased separation between the tape and head due to the presence of the powdered coating also tends to reduce the high frequency response. Another effect is to increase the background noise—and this background noise is actually recorded along with the signal so that each reproduction is noisy. When a "dirty" head is used for reproduction the effect is again to increase noise and to diminish the treble response.

These tips are abstracted by permission from "How to get the Best out of your Tape Recorder" by Percival J. Guy. Norman Price (Publishers) Ltd. 1958. 8s. 6d. net.



HERE AND

● At Christmas, perhaps more than at any other time of the year, we like to communicate with absent friends. Cards, telegrams and presents have been the standard practice for hundreds of years, but now recordings of the family are sent in the place of cards. The photograph, sent to us by Mr. Brons of Southsea, and reproduced by kind permission of the Portsmouth Evening News shows Mrs. V. Donohoe and her children Stephen, Sharon and Mandy with their grandmother Mrs. G. Donohoe, listening to a tape recording they have just made for Shipwright John Donohoe, of H.M.S. *Battleaxe*. Third Officer L. G. Francis, also in the photograph, prepared the interviews and the recordings were made by two officers from H.M.S. *Collinwood Fareham*.

Audio Fidelity's Adventure in Sound

ON Wednesday, 19th October at 7.30 p.m., John Ridley, General Manager of Audio Fidelity (England) Ltd., is presenting a programme of sound to a public audience in the Birmingham Town Hall. "Adventure in Sound" is the title of the show, which will present a history in sound of Audio Fidelity itself, and at the same time will demonstrate vividly in a non-technical manner just how much fun and excitement there is in stereophonic high fidelity.

The programme will last some two hours and will include—inevitably—Audio Fidelity's infamous "Railroad" record, *Sounds of a Vanishing Era*. Ridley will play excerpts from many of the newsworthy "first" of the Audio catalogue, such as the *Story of Bridey Murphy* recording, the Orson Welles' *War of the Worlds* (the pay which panicked America) and *The Investigator*, the recording of which helped to unseat the fabulous Senator McCarthy. Such historical records will show the development of the company, while the current releases of Audio Fidelity—the new Louis Armstrong *Satchmo Plays King Oliver*, the Hampton *Big Band*, the latest *Dukes of Dixieland* and a strong selection of Audio Fidelity folk music section (*Port Said*, *Fiesta in Mexico*, etc.) will show the results achieved to date by modern recording techniques.

The yet-to-be-issued First Component Series *Symphony Fantastique* will conclude what promises to be an out-of-the-ordinary evening. Co-operating with Audio Fidelity in this promotion are Derek Wareham of H. R. Taylor & Co., Audio Fidelity's Birmingham distributor, and Mr. Chave, Managing Director of Lowther Ltd., who are supplying the equipment to be used. This will comprise four Lowther TP.1 speakers, two Lowther 15SF amplifiers, stereo control unit, and Thorens TD124 turntable.

Tape recordings of Bulgarian Bird-Song

AN unusually tough assignment for magnetic recording tape was the recent expedition to Bulgaria of the British Ornithologists' Union. One of the expedition's main objects was the recording of native bird-song. Among the special equipment was the parabolic sound reflector designed by E. D. H. Johnson, and described in "The Tape Recorder", March—July, 1960. This is fitted with a gunsight, and may be aimed at a distant bird to pick up its cry and no other sound.

The party, under the leadership of Mr. Guy Mountfort, Hon. Secretary of the B.O.U., used thousands of feet of Emitape for recording bird-song and Bulgarian folk music. Excellent recordings of a wide range of sounds were made, often in extremely difficult conditions of rain and mud. In Mr. Mountfort's own

words: "You can't arrange a rehearsal with bird-song. Everything has to work perfectly, then and there, when the moment occurs. A tape which is prone to break, or which might contain certain flaws, would have been useless. We often recorded under appalling conditions, but the Emitape always gave us superb results and without a trace of background noise". The quality of the recordings of Bulgarian folk music makes them a unique and valuable addition to the world's library of recorded folk music.

In addition to sound recordings, made under the supervision of Mr. E. D. H. Johnson, more than 4,000 photographs were taken by Mr. Eric Hosking, the well-known bird photographer. Incidentally, this B.O.U. expedition was the first of its kind ever to be permitted to penetrate the Iron Curtain.

Note: We are hoping to persuade Mr. Johnson to describe his part in the expedition for the benefit of readers. (Ed.)

Apologies to WyndSOR

DUE to a most unfortunate editorial aberration, we mistakenly headed the review of the WyndSOR "Victor" Tape Recorder last month with the name WyndSOR "Viscount". We can only plead that the "Viscount"—reviewed by us in August 1959, and now out of production—had earned itself such a high reputation that the typewriter keys ran away with us. We apologise to WyndSOR and our readers for any inconvenience this slip may have caused.

Tandberg Series 6 deck, available soon

THERE is interesting news of a new and versatile Tandberg Deck which will shortly be available in this country. In the meantime, readers who would like to receive more details of the deck's facilities and its technical specification should write to the newly appointed Tandberg distributors:—**Elstone Electronics Limited, Edward Street, Templar Street, Leeds, 2.**

The Tandberg Series 6 deck promises to be an instrument of really high quality, and we look forward to reviewing it in *The Tape Recorder* very shortly. Features include a four-track system, employing three heads for monitoring and double recording—three tape speeds (7½, 3½, 1½)—four amplifiers (two record and two replay)—mixing for up to four signals on mono—stereo and mono record/replay. The price is 110 guineas.

We learn from Elstone Electronics Limited, the new distributors, that supplies for the British market will be very limited owing to the heavy demand, and that probably not more than fifty decks will be available this year. Our advice to interested readers is therefore to write as soon as possible.

THERE AND EVERYWHERE

CQ "Conquest" 4-track tape recorder

CQ AUDIO, LIMITED, have been advised by Collaro Limited that the name "Conquest" is their registered trade mark, and they have been asked to withdraw its use in connection with their new four-track tape recorder. They therefore express their apologies to Collaro Limited for any inconvenience that this error may have caused, and wish to announce that the name of this tape recorder has been changed to the "SCEPTRE".

Club News

The **Doncaster and District Tape Recording Club** has commenced its winter programme after a very busy summer season recording sound effects. One member won first prize in the National Tape Recording Contest and another has produced a tape of bird songs which has been donated to the local Ornithological Society. Meetings are held on alternate Thursdays and Saturdays so that the majority of members can attend at least twice a month. The club are assisting with an exhibition that is to be held on October 29th by the **Wakefield and District Tape Recording Club**. Any person interested in attending should contact the Secretary, Mr. C. K. Young, 28 Chelmsford Drive, Doncaster who will supply full details.

The proposed tape recording course sponsored by the **Rugby Amateur Tape Recording Society** of which, details were given in the September issue of *The Tape Recorder* has had to be postponed until the New Year due to the indisposition of the Secretary. Further details will be supplied at a later date. Details of Club meetings can be obtained from the Secretary, Mr. M. Brown, 219 Clifton Road, Rugby.

The meeting of the **Rugby Amateur Tape Recording Society** held on October 8th consisted of a demonstration by Mr. T. Davis, of the latest B.T.H. Hi-Fi, Monaural and Stereophonic sound equipment. A Grundig mains recorder and a Stuzzi Magnette portable were used to demonstrate the quality obtainable from mains and battery recorders when linked to hi-fi equipment. Mr. R. Goodman produced two humorous items on tape entitled 'A Female having Driving Instruction' and

Stuzzi prize-winners

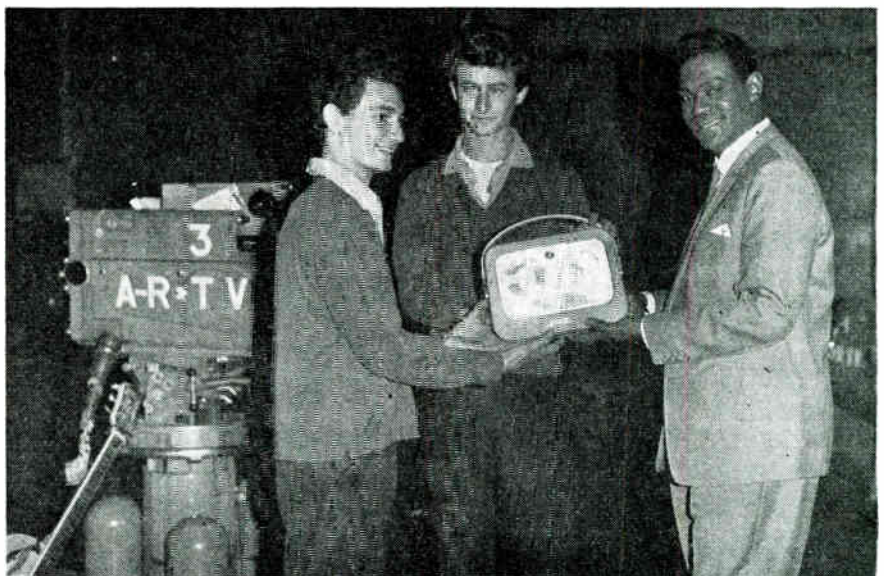
At the **Stuzzi Tape Recorder Nation wide talent competition** recently held at the **Boys and Girls exhibition at Olympia** the brothers **Bob and John Alison of Parson's Green, London**, won the first prize after competing against 550 other entrants. After making the recording at the **Stuzzi Studio**, the two boys received a tremendous welcome from the audience. The judges also agreed that the record was a success and voted that the brothers had reached the finals. These were held at the **Wembley T.V. Studios** and once again a panel of **Tito Burns, Gerald Marks and Jimmy Lloyd** heard the six best entries live. Unanimously they selected **Bob and John Alison** as outright winners. The prizes included a recording test, a long week-end in Vienna as the guests of the **Stuzzi Company** and a **Stuzzi Magnette**.

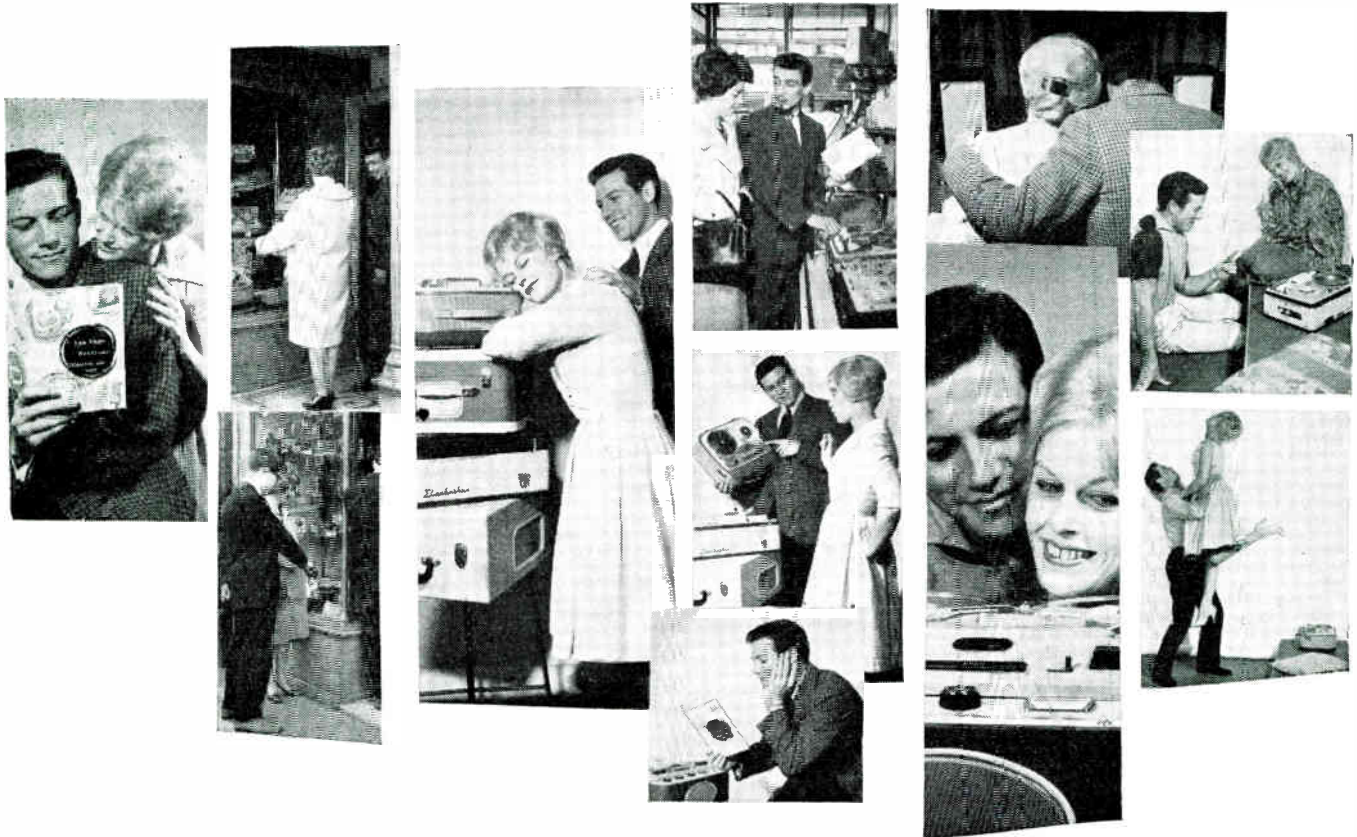


Charlie Chester records messages for the troops in Cyprus, prior to going out there. The recorder is the new "Robuk." (see page 513)

the 'Atomic Submarine'. At a later meeting, a party of 15 visited the BBC Sound Studios at Birmingham and spent the evening examining the equipment used. Tape recording, disc cutting, splicing and editing was demonstrated.

The members of the **Acton and West London Recording Club** held an open house for two evenings recently to demonstrate the uses of the tape recorder to the general public. Approximately 140 people attended the first evening with Mr. D. Wiseman and Mr. J. Hewitt giving a demonstration of mains, battery, mono and stereo recorders. On the second evening, reporters and photographers from the local papers attended together with a crowd of people who had come the previous night. Keen interest was shown in all the activities of the





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MORE NEWS FROM THE CLUBS

Club, and several new members enrolled. At the meeting held a fortnight later a demonstration of the "Reps" range of tape recorders was given by Mr. Gale of Galham Electrical Co. Ltd., 34/36 High Street, Southall, Middlesex. It appears that Mr. Gale would be willing to attend any local tape club, and secretaries who are interested should contact the above address. Further meetings will be held on the 4th and 18th November at the Ballroom of the King's Head, Acton High Street, London, W.3. Details of times can be obtained from the Secretary, Mr. D. Wiseman, 8 Woodhurst Road, Acton, London, W.3.

Mr. H. Frost, chairman of the Crawley Council of Social Service and lecturer at the London School of Economics, has agreed to become President of the **Crawley & Sussex Tape Recording Club**. Mr. Frost has already visited the club and shown keen interest in the activities, which have recently included a talent competition and a stand at the local Festival of Arts. Members are compiling a tape entitled "A Brief Anthology of Sound" which will trace the history of sound transmission, reproduction and recording from 1880 up to the present day. Any reader with historic recordings or information, willing to assist this club, should contact the Secretary, Mr. R. C. Watson, 32, Southgate Drive, Crawley, Sussex, who guarantees to return any literature or tapes that may be sent.

Ten members attended the inaugural meeting of the **Maidstone and District Tape Recording Society**, and decided that club nights should be held every fortnight commencing on October 13th at the Corn Exchange, Maidstone. Anyone interested in joining this local Society should contact the Secretary, Mr. J. E. Perian, "Treetops", Boxley Road, Penenden Heath, Maidstone, Kent.

Mr. P. Ager, chairman of the **Ilford & District Tape Recording Society** since its inception, has moved to another district, and as this will prevent him from attending meetings he has resigned his position. Any local club in Mr. Ager's new district will soon find an ardent tape recording enthusiast. The R.S.G.B. will take the meeting on October 25th at the R.A.F. Association rooms, Cranbrook Road, Ilford, when it is hoped that the Society will go "on the air" for the first time. Further information can be obtained from the Secretary, Mr. D. Bolton, 13, Gloucester Road, Manor Park, London, E.12.

Members of the **West Herts Tape Recording Society** recorded the opening of the Rickmansworth Grammar School Fete. Mr. Stanley Unwin of B.B.C. fame allowed Mr. J. Grainger to interview him during the afternoon and although it was impossible to understand any of the conversation that took place, it certainly provided some entertainment when the tape was played back at a later club meeting.

Programmes for the local Blind Clubs continue to be produced by three members on the Watford side of the district, the latest contains a commentary of the opening of the Subscriber Trunk Dial system at the Watford telephone exchange. Recordings have now been obtained from Scotland and the West of England dealing with G.P.O. procedure and the engineers in charge have provided the commentary.

Secretary: P. Holloway, 29 Fishery Road, Boxmoor, Hemel Hempstead, Herts.

Mr. M. J. Bonner of 28 Rushie Avenue, Pendower, Newcastle-on-Tyne, is anxious to see a tape recording club formed in that area. Any person interested in assisting Mr. Bonner should either call or write to the above address.

The third meeting of the **Hull & District Tape Recording Club** was held on September 13th, and the most notable fact was that founder members were outnumbered more than two to one by new members. Thirty-four members have joined since

the club was formed, proving that advertising through local dealers does pay off. A committee of seven was elected, and the meeting ended with a demonstration of a home constructed tape recorder and a discussion on matching microphones. At a committee meeting held the following week, three sections were formed—Technical, Production, and Outside recordings—to enable a variety of activities to be carried on simultaneously, and to foster a spirit of friendly rivalry and competition. The technical section has already commenced converting one room into a studio and control room, and a course of instruction will begin for non-technical members. The Hull club appear to have got away to a tremendous start, and the committee must be congratulated for gaining so many members in so short a time. Further details from the secretary, K. Fulstow, 17 Lowfield Road, Anlaby, Hull, E. Yorks.

The Brains Trust held at St. George's Hall, Southall, club room of the **West Middlesex Tape Recording Club**, on Thursday 22nd September, proved so popular that many questions had to be left until a later date. Generally, the questions asked were technical and a discussion on the meaning of guarantees, and the obligations of manufacturers to honour them, raised some interesting views. This was followed by Stanley Mace's tape entitled *The Bird Watcher's Dilemma*, which portrays the troubles that besets any recordist attempting to record bird songs. It appears that Mr. Mace got the bird in more ways than one, dogs, trains, cars and aeroplanes appeared from nowhere, but the recordist finally obtained a fine sound effect of a person falling in a stream. It appears that his tape recorder was undamaged. A demonstration by a manufacturer has been arranged for October 27th at St. George's Hall, Southall. Visitors will be welcome, and further information can be obtained from the secretary, H. E. Saunders, 20 Nightingale Road, Hampton, Middlesex.

Mr. R. Powell, 108 Manor Hall Road, Southwick, Sussex, would like to hear from any person interested in forming a tape recording club in the **Southwick and Shoreham** district. Further details will be supplied on request to prospective members who should write to the above address giving name, address and age.

We have heard from Mr. E. H. Foreman, 117 Westgate Road, Dartford, Kent, that he is interested in meeting anyone who would be prepared to assist in forming a Tape Recorder Club in Dartford, Kent. Will any Dartford enthusiasts please write to him at the address given.



Hi-Fi News

NOVEMBER NUMBER

★

Contents include:

- Setting up and Testing the TWA/1515D Stereo Tape Amplifier
- Manufacturing the 'Miniflux' Tapeheads
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AN EXPERIMENTAL TAPE DECK

USING A 78 R.P.M. GRAM MOTOR

WHEN Mr. Tutchings' articles on Tape Recording for the Beginner first appeared in print, I was involved to the extent of a partially completed Mullard Type A Amplifier. This had been commenced with the hope that a deck would materialise in the same way as Cinderella's coach came from the Pumpkin.

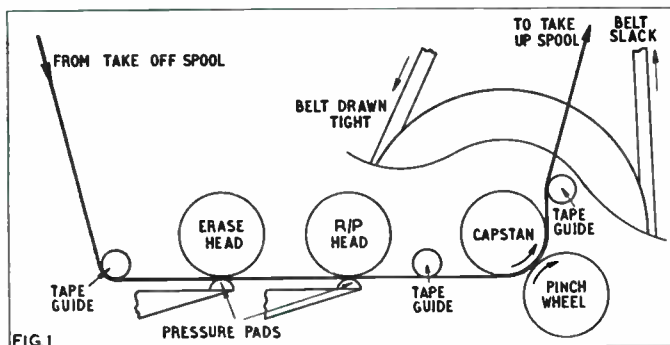
However, somewhat inspired by rubber heels and having a spare 78 r.p.m. motor, I decided to complete the amplifier and have a go at making a deck. With the facilities and equipment available, it was obvious that a high precision machine was out of the question and I, therefore, decided that I would aim at a tape speed of $3\frac{1}{2}$ i/s and be satisfied if I could reproduce the response curve of the amplifier at this speed.

Fitting the capstan

The motor, a large Collaro single phase induction type with a shaded pole frame, was first unbolted from its mounting plate and the turntable driving spindle removed. Since this spindle was governed to revolve at 78 r.p.m. the capstan diameter to give $3\frac{1}{2}$ i/s is obtained from the simple formula:— $d = 3.75 \times 60/75 \pi$; viz. $d = 0.918$ in.

The first Capstan consisted of a 1 in. diameter bar, counterbored to take the turntable spindle. This was mounted on top of a separate plywood pulley of about 3 in. diameter to provide the drive, via a rubber belt, for the take up spool. The capstan assembly was then refitted to the motor, and an attempt made to reduce the lack of concentricity by means of a file whilst the motor revolved!

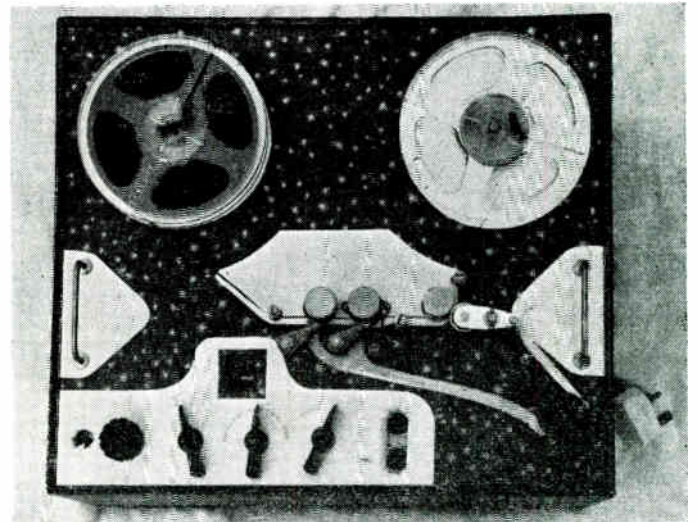
The motor was then fixed to a piece of $\frac{1}{2}$ in. plywood with the fields orientated as far away from the chosen position of the Record-Playback head as possible. The heads were purchased



Showing the improved tape route with anti-clockwise capstan.

from Messrs. Collaro Ltd., and were installed and aligned to the instructions in *The Tape Recorder* of November 1959.

A straightforward tape run was laid out and controlled using tape guides made from distance pieces and washers mounted on 2BA bolts. A spring-loaded pinch wheel was made by the simple expedient of pressing a short length of brass tube over the circumference of a small ball race and sticking on a rubber "tyre."



The author's completed recorder presents a neat, functional appearance. The electronics are based on a Mullard design.

A pressure pad was provided for each head, these being easily bent up from scraps of 18 s.w.g. brass. (Since coupled to "Off/On" switch).

A friend kindly recorded a selection of noises and music on a 3 in. message spool, and with a certain amount of trepidation this was loaded and the machine switched on. Somewhat mesmerised by the different speeds of the two spools, my ears gradually registered that sound was coming from the speaker. Faintly, but quite certainly, our local train came chuffing up the incline! I looked out of the window, but there was no train there—it worked!

Obviously there were snags, periodically the tape moved down the capstan and could only be re-positioned by increasing the drag of the take-off spool, which in turn lowered the overall tape speed. In addition, the capstan was visibly running out of true, causing "wow" to such an extent that piano music sounded quite out of this world.

The general weakness of the sounds was traced to a faulty contact on one of the wafers of the Record/Playback switch, so I would stress the importance of following the instructional diagrams very closely when incorporating a fairly complex switch of this type in an amplifier. Once right, the switch is unlikely to give further trouble; so that a little time expended on what is, after all, the most important switch in the amplifier will be repaid.

In order to reduce the "wow," it was decided to machine the capstan and drive pulley integrally, using the turntable spindle as a mandrel in the hope that better concentricity would ensue. The diameter of the drive pulley could well be increased so as to improve the flywheel effect, provided that the belt could follow a clear path to the take up spool pulley.

Reversing the drive

It was apparent that the tape could be brought into more intimate contact with the capstan if it were made to wrap round its circumference, instead of depending on the line contact provided by the pinch wheel. However, this would cause the tape to follow a devious route with a resultant increase in drag. But if the capstan were made to revolve in an anticlockwise direction, the wrap round effect could easily be obtained and as the capstan would now revolve in the same direction as the take up spool, the driving belt need no longer follow a "figure of 8" path. (fig. 1).

It was quite a simple matter to reverse the direction of the motor rotation. The shaded pole frame was inverted and the leads brought out the other end. A ball thrust was incorporated at the other end of the motor spindle.

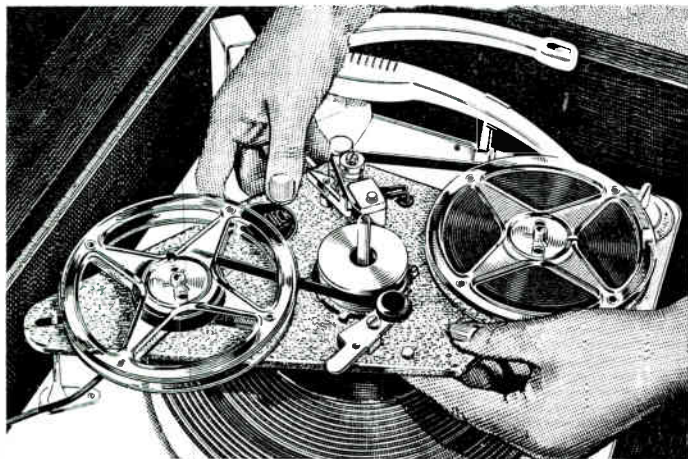
The tape now followed the capstan for about a quarter of its total periphery and the pinch wheel was arranged to bear in the middle of the "wrapped" portion. "Wind-on" and "Rewind" facilities were obtained by removing the tape from its normal path and allowing it to spool directly from the take off spool. This

(continued overleaf)

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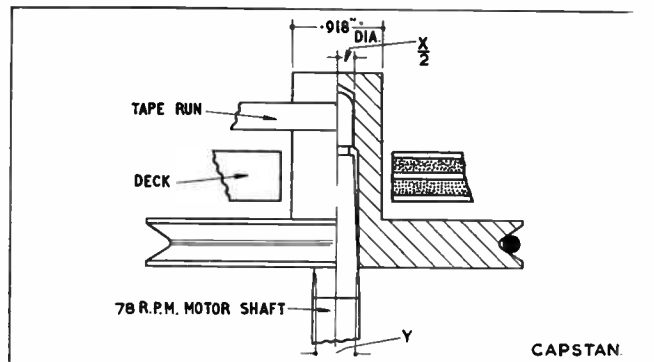
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GRAMDECK TURNS A TURNTABLE INTO A TAPE-RECORDER

EXPERIMENTAL TAPE DECK—(continued)

functioned adequately as long as spools of normal hub size were
used, taking about 3 minutes to wind on 500 feet. To wind back,
the take up and take off spools were merely exchanged.

Results were gratifying, the machine would now "Playback"
with reasonable accuracy, though a certain amount of "wow"
could be detected on sustained sounds. This was tracked down to
excessive wear of the bearings in the motor casing which carried



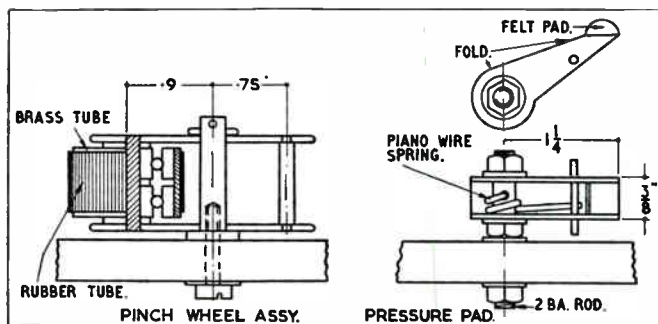
Dimensions X and Y should give a push fit.

the turntable spindle, so that, if the experiment were to be repeated,
it might be worth while replacing these bearings with close toler-
ance ball races at the outset.

Some difficulty was experienced in obtaining an adequate erase
with the oscillator coil wound to the Mullard instructions, but as
this was done on a hand-drill, it is possible that I did not obtain a
very high "Q." However when the requisite coil for the Collaro
Erase head was purchased and slight modifications made to the
amplifier circuit, a powerful erase resulted. This can be "potted"
up or down as shown in the instructions given with the coil.

I have not gone into details of the ratio of the drive between
the take up spool and the capstan as this is a matter of personal
choice bounded by the length of belt and the amount of space
available. The only design criticisms are that:—(1) The take up
spool must always be potentially faster than the capstan; (2) The
rewind should not be protracted.

Within these limits I have found that a 3 in. diameter drive
pulley coupled to a 1 in. diameter driven pulley by means of a



belt which can slip is quite satisfactory. On the other hand, the
amount of slip is rather more critical. If the belt is too tight, the
tape will be over-stretched and probably break: if it is too loose,
rewind will be protracted, or may not work at all. It is best to
locate the take up spool on the shaft and confine the "slip" to the
co-efficient of friction between belt and pulley. The belt naturally
tends to adhere to the longer (driving) pulley and slips on the
smaller (driven) pulley. The driving pulley could be knurled to
enhance this effect, if desired.

This machine is not intended in any way as a substitute for a
commercial recorder, but will provide a very useful test bed for
those readers who wish to experiment in Mono or Stereo. The
layout will accommodate larger or smaller capstans, if it is desired
to run the tape at higher or lower speeds. The performance is
limited solely by the accuracy and constancy of the tape transport
and the frequency response of the amplifier at the chosen speed.

By David Kinglake

Drama Students Take up Tape

JUST as tape recorders are rapidly appearing in family homesteads and suburban domiciles, so are they creeping into the flats, rooms and attics of that strange assortment of individuals collectively known as Drama Students.

I, for my sins, am a member of this band of hope, and like many of my Thesbian colleagues, possess a tape recorder, which comes in for much and varied use—the strange noises to which our microphones are subjected being quite out of this world! What sort of things, then, do we record which saner people wouldn't? Well, firstly, there is the serious aspect of our work. For instance, voice training. . . .

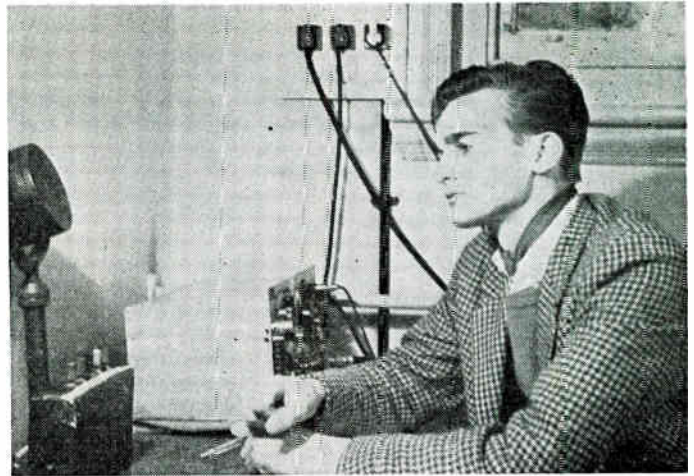
Checking progress

Now voice training doesn't just mean that we do one or two classes a week saying "How Now Brown Cow?" and leave it at that. It means that every evening and/or morning our immediate neighbours, or our nearest and dearest, are entertained with vocal utterances after the style of: "Pahtahkah . . . Pawtawkaw . . . Pootookoo, Pawtawkaw . . . Pahtahkah . . . Paytaykay, Peeteekie . . . Paytaykay . . . Pahtahkah," and other such pieces of interesting information!

This, if you don't get it, being an exercise for vowels and plosive consonants. Now if one records this, vocal faults will stand out very clearly—such as bad vowels, slurry t's and over-exploded p's. These can then be practised and re-recorded, and improvements noted.

As a matter of routine at my own drama school, the tape recorder is used to check how well we students have (or have not) progressed. The school possesses two Ferrographs located in a soundproofed studio. In our first term we record a short reading passage, with equal lengths of blank tape left after each. Some eight or nine months later a second recording is made next to the first. The voice tutor can then play both over to us, pointing out our original faults and showing us where we have improved and where not.

At home, of course, we don't just do voice exercises, but a lot of practice poetry and reading, for Verse Speaking is part of the syllabus. Being a drama student, one obviously concentrates on drama, and hence a necessity to work on parts and



One of the author's fellow-students just ready to give the "go ahead" cue to the sound-proofed studio. Note the ex-BBC/Marconi microphone used for talk-back. (Photo by courtesy of the Central School of Speech and Drama.)

lines. Here the recorder can be particularly useful. I try all my lines on tape, experimenting on various inflexions and pointing of lines. Often one finds that, in rehearsal, the point you are trying to make with a line just isn't coming over. Trying it on tape at home can often solve little problems like that, finding out where one is going wrong, and what can be done.

One word of warning. We have found to our cost that it is very unwise to learn lines from tape. It will produce a tendency to learn the original inflexion, and speak it that way—and this is very definitely not acting, it's reciting!

Notes and phonetics

I tried the experiment also of learning my period costume notes from tape. It means recording the important facts about the costumes, and then playing it over whilst studying diagrams and pictures, so making a mental association. From the exam results it seems to have worked reasonably well.

Phonetics, too, is a subject that lends itself to tape. There are a number of strange sounds used in the subject known as Cardinal Vowels which must be learned. Now these vowels are not standard English vowels, and so I have found that a recording has helped me to memorise them.

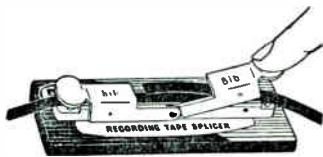
Further uses of tape

What other uses have we found for a tape recorder? How about the study of dialect? We are issued (that means we buy) a small book containing a phonetic transcription of 24 dialects found in the British Isles. Trying these again and again on the recorder can improve mastery of dialect. Several of us got together a week or so ago and made up a tape of British Dialect for some American friends. This was done interview-style, with myself speaking beautiful (?) Standard English, and my three friends being variously characters from London, Birmingham, Lincolnshire, Yorkshire, Liverpool and Dublin. We also added a rendering (!) of "Ilkla' Moor", accompanied by a supposed representation of Ye Typicale English Pubbe Piano-playinge. This tape is now on it's way to the States (although we don't hold much hope for Anglo-American Re'lationships when it gets there!).

There is, of course, the other most important function for our machines, which is recording the college jazz band. We have a very good band, and we hold some good parties, but sometime during the evening the band wish to retire to the bar—naturally! And so canned music takes over—at least until the return of the band canned.

Next Month: Shakespeare and tape, and sound effects.

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18/6 each (subject)

Everyone who uses a tape recorder will need this little tool. It is indispensable. P. Wilson. "The Gramophone."
Send a stamped addressed envelope for a helpful leaflet on tape editing.

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A CUSTOM-BUILT STEREO RECORDER

DESCRIBING THE CONSTRUCTION OF A HANDSOME MACHINE OF UNIQUE DESIGN

Part Three — Testing and Lining up

FOR anyone who believes all the adverts all the time, and does not notice what they omit, the testing and lining-up of a tape recorder can be a chastening experience. After a few long evenings struggling with equalisers, azimuths, wave-forms and decibels, the probability of getting professional results "on the cheap" seems remote. Add to this the complications of stereo balance, and the need for two pairs of hands, and you will be ready to ring up Sloopah Recorders and tell them they cannot do it for the money!

Test gear

The minimum equipment for doing the job properly can be seen in the photograph. Additionally, a commercially produced test-tape is strongly recommended. This will have fixed frequencies covering the audio range (to C.C.I.R. standard) on one track, and a high frequency (8 or 10 kc/s) on the other.

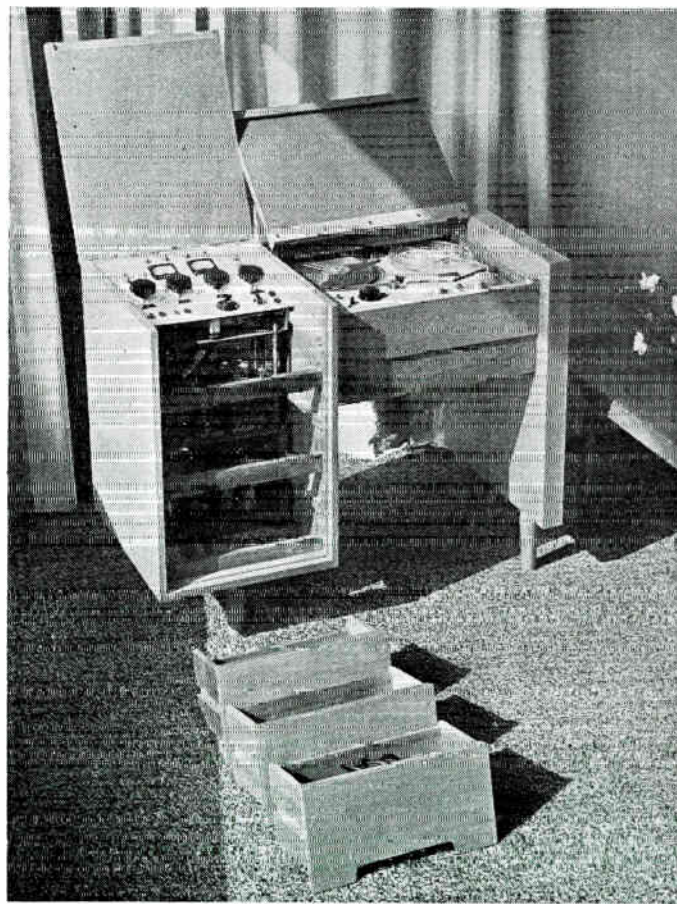


Fig. 2. All parts of the complete recorder are easily accessible, even when mounted in their working positions. For example, this permitted changes to be made to the Record amplifiers on test.

The latter is for aligning the playback head to ensure that the gap is truly at 90° to the tape.

The first tests were necessarily those to check that construction had been correctly done. Using the block diagram again, HT was checked to all distribution points with the deck switched to "Playback" and "Record". In the latter position, the oscillator output was monitored on the oscilloscope, and a quick check made on the erase and bias voltages on "Stereo" and "Mono". A check was made on the total HT current at the fuse and also through the deck solenoid.

Playback

The heads were first demagnetised—checks made during assembly can often lead to occasional stray currents through the windings. The test tape was then loaded to play the high frequency track for azimuth adjustment. While this was being done, the passage of the tape across the heads was observed to spot any misalignment or "wander". The output was monitored through the playback amplifier for that channel, and the head "rocked" for maximum amplitude. The tape was then turned round and the procedure repeated for the other head—luckily a sine wave looks the same backwards as it does forwards!

The test tape was then played back on its audio track, and the output of the playback amplifiers measured, using the oscilloscope as a valve voltmeter. The high frequency response was well maintained at 10 Kc/s (the limit of the test tape), needing only a few dB assistance from the equaliser. It is worthwhile drawing a conversion chart from volts to decibels, using a convenient output voltage as "zero", so that results can be graphed immediately without tiresome calculations. A typical chart is shown for a "zero" of 1.5 volts. This can be conveniently used for outputs of pre-amplifiers "or main amplifiers," as 1.5 volts is an attainable figure in most cases.

The bottom end

The low-frequency end needed a bit more care, and measurements at 50 c/s were avoided to keep clear of "beats." With the aid of series capacitors in the equaliser feedback path, the 40 c/s response was made quite respectable. Minor adjustments to reduce residual hum were made at this point—orientation of head transformers, check of screened leads for earth loops, etc. Hum should not be noticeably increased when the motors are switched on. The screening "wing" on the head pressure pad usually deals with this effectively.

The second channel was dealt with in the same way, and any variations matched with the first. Smooth stereo on good loudspeakers demands equality more than women do!

Mixer

The mixer must be matched for gain and frequency response on each channel, and the noise level checked in a similar manner to the playback amplifiers. Since the circuit is a feedback design, these requirements are easily met and maintained. The printed circuit construction, while facilitating the control panel layout, proved susceptible to hum and bias "pickup." Careful screening of supply and signal leads was necessary, watching the result on the oscilloscope which had by now

become invaluable. Familiarity gained with oscilloscope wave-forms enabled the source of faults to be diagnosed remarkably well; in particular the ratio of signal to noise was usefully recognised at the various points in the circuit.

Oscillator

Most of the checking work had been done on this circuit during design, but it remained to set the correct bias levels on the heads and ensure that adequate erase volts were available on load. If an oscilloscope is used for measuring, it must be remembered that the full peak-to-peak voltage is shown and must be multiplied by 0.3535 to obtain the more usual R.M.S. voltage.

The correct dying-away of the bias waveform will be seen on the oscilloscope when the deck is switched from the "Record" position. The value of the capacitor holding the charge had to be made 32 microfarads, as the high current taken by the double oscillator acts quickly on the available voltage.

Metering Circuits

Whatever circuit is used, some form of zeroing or backing circuit is usually employed, so this must be set first. The input potentiometers are then adjusted to give a predetermined reading on each dial (about 2/3 deflection) for 18 volts R.M.S. on the recording output valve anode, using a 1Kc/s test signal.

Recording gain

The gain of each recording amplifier was then preset to give this 2/3 deflection with an input on each microphone channel of 1 millivolt—the mixer control for that input being at maximum and the master gain control just over halfway.

Bias filter setting

The series filter between the recording output and the head transformer had been roughly tuned to the bias frequency during construction. These were now finally trimmed, with the oscillator on load, for a minimum reading at the output valve anode (the metering point).

Recording equalisation

Trials of different pre-emphasis circuits proved the superiority of some form of treble-lift inductor circuit. With RC feedback networks, any attempt to equalise above 10 Kc/s raised bumps in the response around 6-7 Kc/s, and a 2dB bump is enough to colour the reproduction of strings or swing a stereo image "out of focus." With an inductor treble-lift circuit tuned to 15Kc/s, several recording runs were made over the whole range 40 c/s to 15 Kc/s, with an audio generator at low level. (The playback chain having been previously equalised, all adjustments

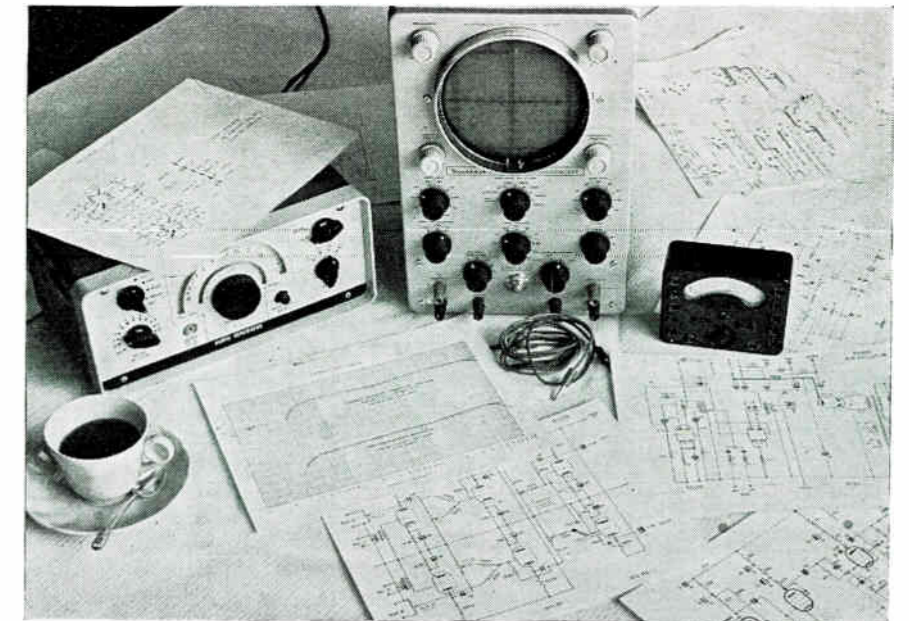


Fig. 1. The author supplied this photograph (right) to illustrate what he calls "the bare essentials for a satisfactory line-up. A close inspection reveals the Jason Audio Generator, Heathkit Oscillator (also used as a peak-to-peak valve voltmeter), and Avo Minor multi-meter. The profusion of drawings shows the thoroughness with which this "spare evenings" project was carried out.

had now to be made on the recording equalisation to obtain a level response).

Final adjustments

The playback gains were now set by playing back a 1 Kc/s signal recorded at maximum level on each channel in turn, and adjusting the outputs by preset potentiometers to give identical levels with the "balance" control central.

A subjective test was made with a high quality programme signal (live orchestra from Maida Vale via Wrotham) recorded

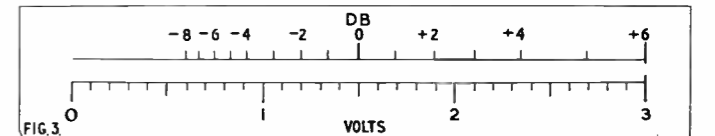


Fig. 3. A great deal of tedious and repetitive conversion of voltage ratios to decibels was avoided by preparing this quick check volts/decibels scale. This is an idea that many readers may wish to copy.

simultaneously on both channels. The playback over two channels appeared dead centre between the two loudspeakers with no audible "wandering" of the programme or background noise. Slight adjustment was made on a recording of "white noise" to equalise an apparent difference between channels. This proved on measurement to be about 1/2 dB at 8 Kc/s, so was probably an attack of Hi-Fi Ear.

Conclusion

The final frequency response met the specification (± 2 dB) up to 13 Kc/s, and was in fact ± 1 dB between 50 c/s and 12 Kc/s. Background has not been accurately measured, but is inaudible at normal playback level. Erased tape is no noisier than virgin tape and with some makes is perceptibly quieter. The mysteries of live stereo recording are still being pursued—perhaps I shall be able to pass on useful information after more experience.

Note: The author has mentioned his unusual modification to the makers of the Stag dressing table, and although they were quite impressed, they have no plans for including stereo recorders as an optional extra, either now or in the future. (Ed.)

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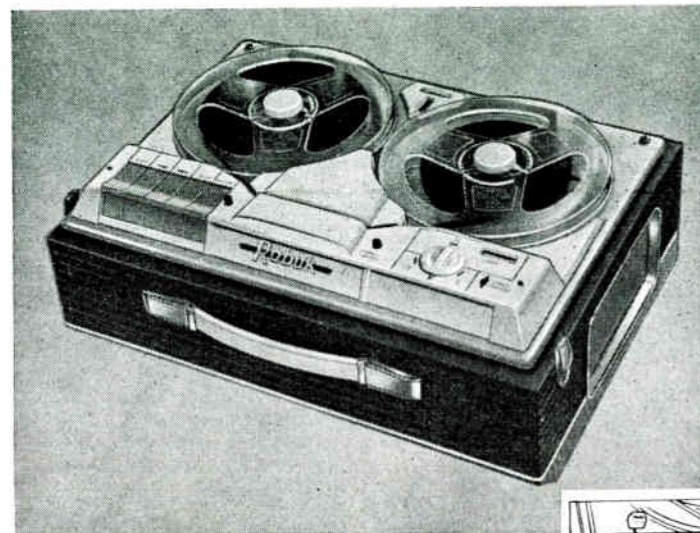
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The Robuk **rk3** makes tape recorder history!

'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 Radio Show produced few surprises for tape recorder enthusiasts, but adequate compensation is provided this week by the news of the feature packed Robuk R K 3. The list of design developments contains all the items normally expected in high priced recorders, yet this new model is priced at only 36 gns.! 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.

Free 'Tape Fun Book'

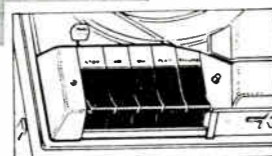
Offered as part of a drive to introduce all classes of families to the pleasure and fun of tape recording, this unique booklet lists new ideas for serious collectors as well as exciting party games that open up a new field of home entertainment.

Slim design for portability

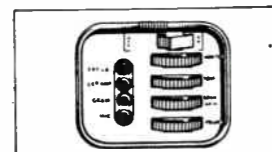
Packed for carrying, including the microphone 7" reel of tape, the R K 3 weighs only 23 lbs.! The attractively styled, two-tone case in scratchproof, washable plastic, measures only 16" x 11½" x 7" deep—a feature/quality machine!

Where to send for information

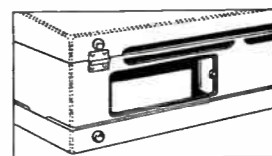
Dealers all over the country will be stocking the R K 3 at the time you are reading this announcement. For further information, however, you can write to 'Recorder Enquiry Division' Robuk Electrical Industries Ltd., 559-561 Holloway Road, London, N.19. A card to this address will also bring a copy of the exclusive 'Tape Fun Book' by return of post.



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... tape recorder workbench

Practical suggestions for the tape handyman by A. Bartlett Still

No. 17 — WHY WE EQUALISE

IN my notes for the September issue I described two forms of pre-amplifier suitable for connecting a tape head to a main amplifier for playback purposes. Both these units were linear devices, and I stressed that equalisation had to be incorporated in the main amplifier. To cater for the main amplifier not so provided, equalisation must be provided in the pre-amplifier. Before attempting to describe such a pre-amplifier I feel it would be helpful to gain some idea of exactly what is meant by "equalisation" in this context, and why it should be required.

The accepted method of recording on magnetic tape utilises a constant current technique in the recording head. The idea is that the same field strength shall be available at the record head poles whatever the frequency. This will mean that, whatever the frequency, signals of similar amplitude will be represented on the tape by similar numbers of lines of force, frequency difference lying in the variation of wavelength along the tape.

When we come to consider playback, the signal is produced in the head by the action of cutting the lines of force as the tape goes past. It is a basic rule of electromagnetics that the voltage induced is directly dependent upon the number of lines of force cut per unit time. Obviously, the stronger the signal the more lines of force on the tape and the bigger the voltage, but, not quite so obvious, with the higher frequencies and consequently shorter wavelengths, more lines of force will be cut in a given time although the signal level is the same. If the frequency is doubled the wavelength is halved, and so twice the number of lines of force will be cut in the same time. This will produce twice the voltage output from the head, and leads to the basic law that *playback voltage increases with frequency at the rate of 6dB per octave*. This is shown in my figure by the top line.

The bass frequencies

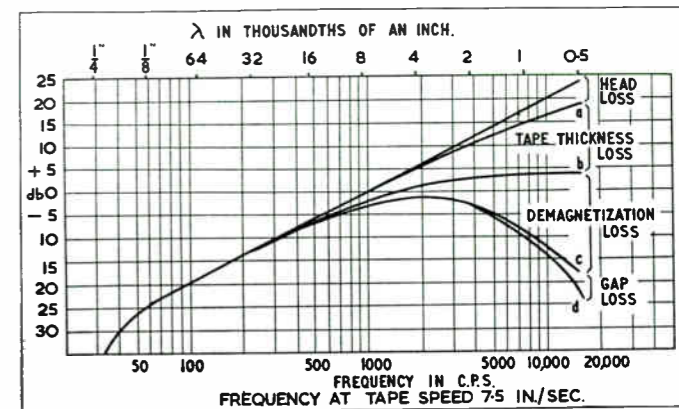
Unfortunately, things do not stop there, and so we have to look at all the other factors that are liable to affect the ultimate response. As we go down in frequency, the wavelength increases to an extent whereby the head pole pieces are too short to "collect" all the lines of force. The point at which this will occur depends on the physical construction of the playback head, and the curve I have given shows the effect produced by a typical head @ 7½ i/s tape speed. With a change in speed, the turnover point will move up or down the frequency scale accordingly. If a conventional "ring" type head is used the curve will ultimately continue @ 18 dB/octave, but it is never, in fact, used below the cut-off frequency. This will explain why, when we are continually being offered higher and higher frequencies, most, if not all machines cut their bass response at 40-50 c/s.

So much, then, for the basic response and the variation of it at the lower end of the spectrum. A glance at the curves will indicate that there is a whole family of influences at work on the upper end, and it is largely these that make or mar the whole effort. It should be said that the four items shown are not the only ones. Others exist whose effect is, however, minute. Let me consider these four effects, and I will deal with them in order of magnitude.

High frequency losses

Head loss: The reactance of the playback head increases with frequency, and in consequence so does the source impedance of the signal voltage. The head has its own self-capacity which produces a shunting impedance tending to reduce the output. You no longer have available a true open circuit voltage.

Gap loss: More generally understood. If the gap of the playback head equals the wavelength on the tape, equal magnetic polarity exists at each pole of the head, so zero signal results.



● Showing the various factors introducing HF losses.

As will be seen from the curve, this effect arises only at the extreme end, and then increases in magnitude rapidly. It must be made clear that "gap" in this context means the *effective* gap, always larger than the figure quoted, and sometimes made to seem even larger by poor alignment. (Which, incidentally, was the subject of *Tape Recorder Workbench No. 1*.)

Tape thickness loss: The name cannot quite explain the fact that the shorter wavelengths prevent the penetration of the magnetising force. It is rather as if a bar magnet and its lines of force could have only a certain aspect ratio, the result being that only a part of the tape oxide can be used. At lower frequencies, or longer wavelengths, the tape can be magnetised to its full depth, in fact until saturation and consequent distortion commence.

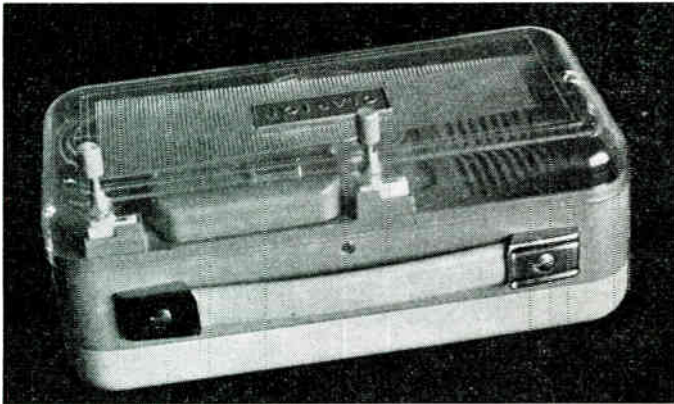
Demagnetisation loss: Added to this lack of acceptance by the tape of short wavelength signals is added the fact that short magnets have a habit of committing suicide in a minor sort of way. This happens during a short period of time after recording, and can even be observed to a certain extent by comparison of immediate playback from a third head and subsequent playback several days later. As can perhaps be imagined, this loss is not an exact constant. Temperature, humidity, speed of spooling, and other similar conditions all have their effect on the magnitude of this loss.

The playback curve

The net result of all these influences is a playback response off the tape that follows the lowest curve in the graph. It will readily be understood that to produce a flat response, a "mirror image" must be produced as the sum of the record and replay amplifiers. A common way of doing this, in the cheaper commercial recorders, is to apply half the correction in the amplifier and use it twice—during recording and replaying. There are many disadvantages in this arrangement, and better machines follow professional practice, the C.C.I.R. recommendations put forward in 1953 by an international committee. Put simply, they said that all machines should replay identically, and should record to suit any variations of tape, etc. that may exist. At a tape speed of 7½ i/s, the playback amplifier response should fall at 6 dB/octave to 2.5 kc/s, when it levels out *assuming an ideal head*. Since no head is perfect, head loss and gap loss are compensated for as individual to that machine and not to the tape. The recording of a CCIR tape is carried out by the constant current technique mentioned earlier, with pre-emphasis to allow for the two losses that are the concern of the tape and not the playback machines. Using this system, tape records can be replayed anywhere in the world to the standard expected of the broadcasting services who were responsible for it.

OUTDOORS WITH A PORTABLE

OUR CONTRIBUTOR DESCRIBES A HANDY MODIFICATION TO THE "CLARION"



Plungers fitted to the lid enable this transistor tape recorder to be operated without risking damage by dust, sand or rain.

THE development of the transistor has opened up a vast field of sound recording that lies beyond the reach of the recording studio or the nearest power plug. Cine amateurs who want background noises of the sea, of birds, or of a train; journalists who want to interview important people coming off a plane, perhaps at night; business men and authors who want to dictate notes while they are travelling; all these people, and more, are turning to battery-driven transistor tape recorders.

There is a wide range of such recorders available, from the miniature, plastic-encased models, for speech only, to the professional models used in the field by broadcast engineers. Some of these are designed with all the essential controls on the outside, so that the recorders can be used with their lids closed. Others, particularly among the more "popular" types, have a plastic lid covering the deck, and the lid must be removed to operate the controls.

The need for protection

On a sandy beach, when the wind is blowing, or anywhere outside during rainy weather, it is asking for trouble to walk round with a recorder's deck exposed to the elements. There is a strong temptation to wire in an external switch to the battery, so that the controls may be set ready for recording, the lid closed and the recorder switched on and off "on location" by means of the external switch. It is, however, highly inadvisable to try to modify the wiring of a modern, compact transistor tape recorder. Transistors are easily damaged by incorrect connections, and it is far safer to operate a recorder only by the controls provided by the designer.

A solution that avoids any tampering with circuitry is to build in a simple mechanical means of operating the push-buttons on the deck without removing the lid. The modifications described in this article apply specifically to the Clarion transistor tape recorder; but, with a little ingenuity, owners of other makes of recorders could easily adapt the principle.

All that is needed is to make provision to operate the two push-buttons (one for forward running and the other for stopping). The volume control, which is also covered by the lid, must, in any case, be set at an average level for the

recording job to be done, as, in the interests of economy of current, there is no record level indicator; and the microphone socket and record/playback switch are both situated on the outside of the case.

How it's done

It is quite simple to make two plungers to work the push-buttons. First, the clear plastic lid should be placed on the recorder, and a mark should be made on it immediately above each push-button on the deck. The push-buttons are provided with stepped guides so that, when they are operated with the finger a little to the left or a little to the right, the buttons can be fully depressed or merely returned to the neutral position. In each case, the marks on the lid should be a little to the left of the centre of each push-button so that the left-hand button can be fully depressed by the plunger for forward running, and the right-hand button can be depressed only to the neutral "off" position. (It is not necessary to provide for rewinding with the lid on.)

It will be found that the marks fall just where the lid begins to curve towards the front edge. Simple wooden or metal plungers working through holes drilled at these points would

(Continued on page 507)



BRITISH-MADE MICROPHONES

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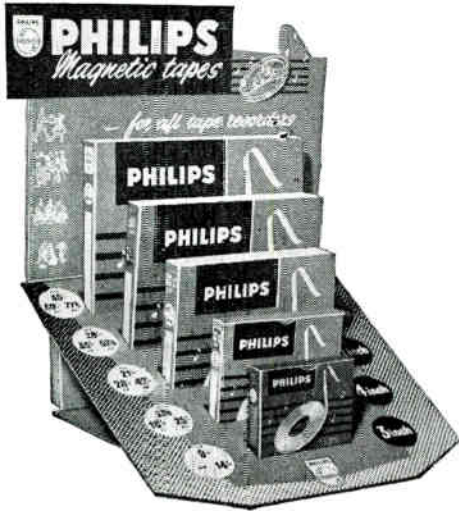
MODELS FOR TAPE RECORDERS,
STUDIO USE AND SPECIALISED
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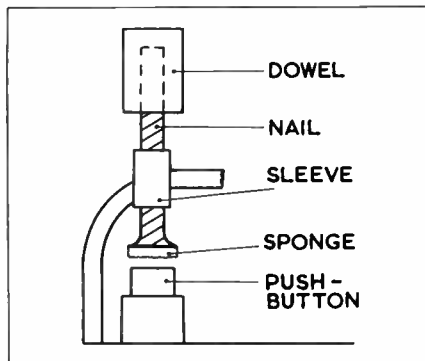
OUTDOORS WITH A PORTABLE—(continued)

not be satisfactory, since the curve of the lid would tend to throw them off the vertical, and, just at the moment when it was necessary to work the controls, it might be found that the plungers had slipped off the push-buttons. To keep the plungers vertical, therefore, it is advisable to fit a short length of metal sleeving into each hole, projecting only above the lid.

The sleeves

The experimenter's "junk box" will usually yield something suitable. The writer used two pieces of metal sleeving of $\frac{1}{4}$ in. outside diameter and $\frac{5}{32}$ in. inside diameter by $\frac{1}{8}$ in. long. A $\frac{7}{32}$ in. drill was used to make the holes in the lid, and they were gently opened out with a round file until the sleeves fitted closely. When the rest of the work was ready for assembling,

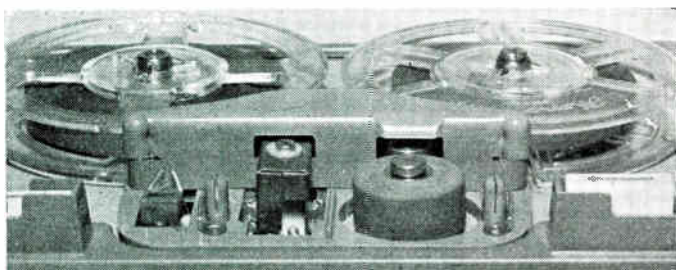
The diagram illustrates the component parts of this simple modification. Very little variation would be necessary to provide external controls on other machines of similar shape.



the sleeves were glued into position, flush with the inside of the lid, using a strong glue suitable for a metal-to-plastic bond. Care had to be taken to ensure that the sleeves were vertical.

The plungers

Two 3-inch nails were used as plungers, cut down respectively to lengths of $1\text{-}\frac{3}{16}$ inch and $1\text{-}\frac{1}{16}$ inch from the heads. The notches below the heads were filed smooth to prevent interference with the free movement of the plungers. The longer nail was used for the left-hand plunger, as it has further to travel. The head of the nail was left at its full diameter of $\frac{5}{16}$ inch. The head of the shorter nail, for use as the right-hand plunger, had to be reduced a little, for the right-hand push-button rises very close to the lid in the "on" position. The head of this nail was filed to reduce its thickness, and



Close up of the Clarion head assembly, capstan and pressure roller, with the cover removed prior to modification.

to reduce its diameter to about $\frac{1}{4}$ inch in order to avoid fouling the curved portion of the lid. Small pieces of thin plastic sponge were glued on to the heads of both nails, to prevent them from scratching the push-buttons.

The dowels

When the sleeves had been glued into position—at least 24 hours being allowed for the glue to harden—the plungers

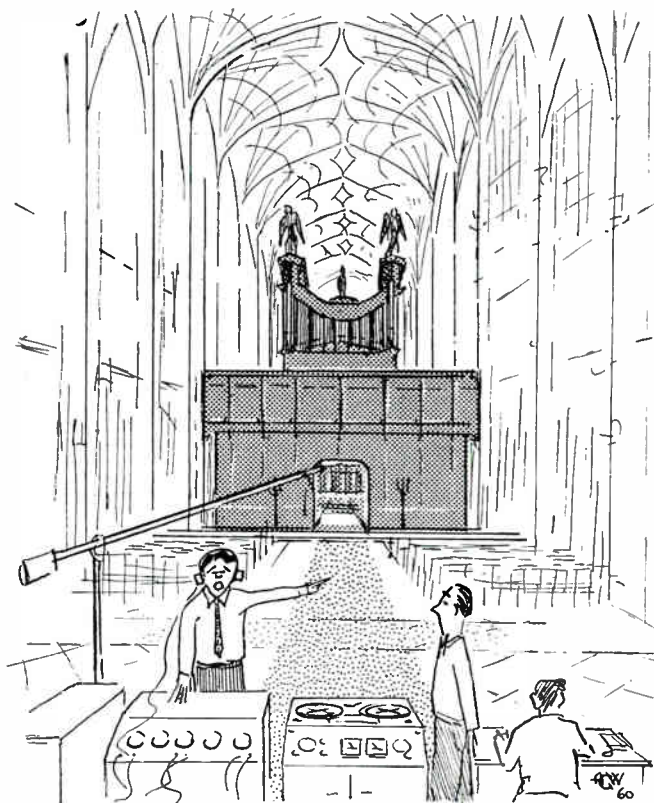
were inserted with the heads below the lid. Two pieces of $\frac{1}{4}$ -inch wooden dowel were cut, each $\frac{1}{8}$ inch long, and were drilled down the centre to a depth of $\frac{1}{8}$ inch to fit fairly tightly over the ends of the plungers. A spot of glue on the ends of the plungers before inserting them into the dowels was all that was necessary to secure them.

The finished job

After this modification, the recorder is now ready for use in the field. With the tape threaded, the loudspeaker switched off, and the volume control a little more than half open (or as experience dictates), the lid can be fitted ready for the outing. The microphone is plugged into the side of the recorder, and the switch is set to record. When it is time to record, the left-hand plunger is depressed to start the recorder. At the end of the "take", the right-hand plunger is depressed to return the push-buttons to the neutral position.

Venture in Windsor

A FULL scale documentary on Windsor called "The Windsor Story" will shortly be undertaken by one of its newest groups —The Windsor Group Drama and Tape Recording Society. The secretary, Mr. W. Smith has announced that this exciting venture will trace the history of the town from 1190 right up to the present day. The society have applied for permission to extract information from the archives in the Guildhall, and the history of the Theatre Royal and Windsor's first policemen will be just two of the subjects contained in the documentary. Interviews with civic dignitaries will be recorded on tape and parts will be dramatised with appropriate linking music. This is quite an ambitious project for a group that was only formed in July from the remnants of the former Windsor Youth Theatre Company, and any person wishing to receive information should contact the secretary, Mr. W. Smith, 73 King's Road, Windsor. Meetings are held every Thursday at the Royal Adelaide Hotel Windsor.



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Readers' Problems

Modifying the Soundmirror

From:—K. E. Roberts, F.F.S. (Eng.), 22 Fairmead Gardens, Redbridge, Ilford, Essex.

Dear Sir:—I own a "Soundmirror" tape recorder, single speed, single track for 7-inch spools. As you are no doubt aware these are no longer made, but I feel that there must be a great number still in use as they are very substantially made machines.

The recorder is an extremely good performer and it occurs to me that probably some of your readers have carried out modifications to give double track and additional speeds. I should be very interested to learn of any possible modifications or the fitting of a different deck if possible. You probably know that the "Soundmirror" was made by Thermionic Products Ltd., who now trade as Thermionic Products (Electronics) Ltd. of Hythe, Southampton.

Any ideas in connection with the foregoing would be greatly appreciated. I would not mind if the modifications were inclined to be costly as things are today, the "Soundmirror" would not have much value as it stands. I realise that there may be some difficulties with the permanent magnet erase when considering double track, but hope that these are not insurmountable.

Your faithfully,

Can any readers help on this? (Ed).

Replaceable Labels

Dear Sir:—Further to a letter in your July 1960 issue, it seems to me essential for the contents of boxes of tapes to be easily identifiable from the exterior of the box. (1) Do you know of any system for labelling the boxes (I have E.M.I. and B.A.S.F.) with their contents with changeable labels, to avoid destroying or damaging the boxes when they are relabelled for new contents? (2) After jointing with splicing tape, how can I prevent successive turns of tape from adhering?

Yours faithfully, J.A.M., Wembley Park.

The new impact adhesive labels can generally be peeled off when required without damaging the box surface. Two types of these which you might care to investigate are "Arrowtabs", which are plain labels made in a variety of colours and sizes, and the new "Bib" tape labels. The latter are designed for sticking on the actual spools, but could equally be fastened on the boxes, and are printed for enscribing Title, Composer, Artist, Reel Number, Speed, Date and Type of Tape used.

A well-made tape splice using one of the proprietary jointing tapes, should not "bleed" gum on to adjacent turns of tape. However, this trouble can be eliminated completely by rubbing ordinary French Chalk—or even Talcum Powder—over the joint prior to spooling.

Tape with Slides

Dear Sir:—I wish to use my tape to accompany the showing of 35 mm slides. Background music and some commentary. Please advise me. I possess a Ferrograph 4AN Leitz Pradovit F projector, with remote Control.

I do not possess, at the moment, a microphone. Which would you suggest for speech and commentary. I record music from VHF mainly from Tape Output on the Quad Amplifier.

Yours faithfully, B.K., Doncaster.

Any good microphone will give perfectly adequate results on speech commentaries, though naturally the more expensive types will reproduce the voice with better fidelity. A ribbon microphone has a slight advantage over moving coil and crystal types in so far as its figure-of-eight directional pattern causes it to pick up less of the room's reverberations when recording, and it can be angled in such a way as to cut down the projector noise should you decide to record commentaries while viewing the slides.

If you purchase a low impedance ribbon microphone (or any other type rated at or around 30 ohms) you will need the Ferrograph microphone matching Transformer Type TV30G.

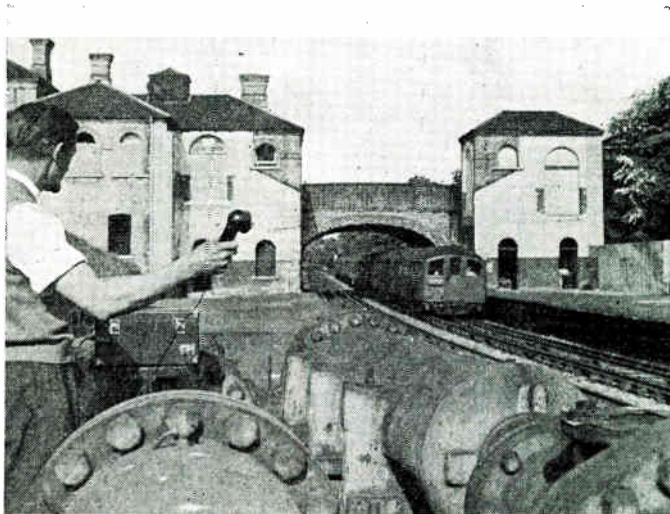
You will find details of the available methods of operating a sound track to accompany slides (manually or automatically) in a special article in our next issue.

Recording Vehicles

Dear Sir:—I would be very grateful if you would be kind enough to answer the following problem. I wish to record car, tube, and locomotive drivers shouting from their cabins whilst on the move. In the case of bus drivers would you suggest that the recordist sits on the top or lower deck? What is the best microphone to use, the best position to hold it, and which direction to hold the microphone? In the case of the tube driver should I sit in the first carriage next to the driver and record through the window. In the case of the locomotive driver I would be pleased to have any suggestions. Finally which is the best way to record sound effects of cars and buses. Should I stand on the kerb and try recording or will I obtain too much noise? How do they record sounds for radio and television plays, as this seems to be the type of recordings I require.

Yours faithfully, O.O., London.

There is no fool-proof way to record speech in moving vehicles, and it will nearly always be necessary to make one or more trial recordings before getting the right balance between voice and engine noise. You can usually reckon on getting enough of the background noise, and the main problems will be to obtain clear speech without overloading the recorder.



Showing B. R. Read recording trains.

Crystal or moving coil microphones are suitable, the latter permitting longer cables, should this be necessary. A speaking distance of 6-12 inches will be about right. It is absolutely vital not to distract the driver in any way which might cause an accident, and I think you can assume that drivers of public vehicles will ask you to obtain prior permission from Head Office.

A number of informative articles have been contributed to "The Tape Recorder" by B. R. Read, who makes the majority of the effects recordings for the BBC Recorded Programmes Library, and he employs kerb-side, footplate and even "inside the boot" tactics depending on which aspect of the sound he particularly wants to emphasise (see in particular "The Tape Recorder" issues April 1959 and February 1960).

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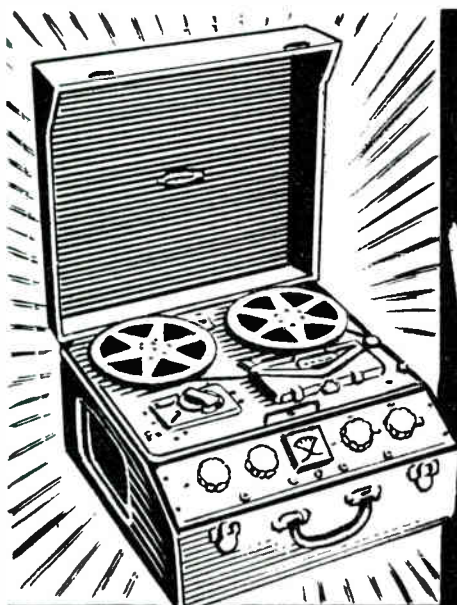


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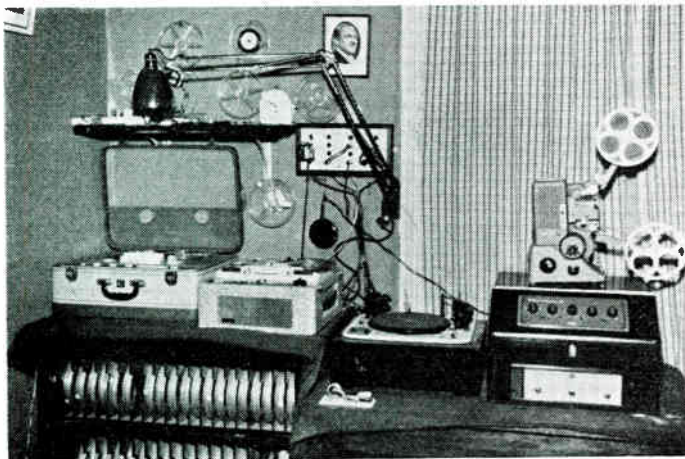
Also at

A NEW ZEALAND LETTER

From:—Travers Home-Morrison, 136 Bank Street, Whangarei, New Zealand.

Dear Sir:—The number of letters published from amateur tape users are most interesting and one can often pick up hints and tips that are well worth having by this medium. In a small country such as New Zealand there are something like 2½ million people and I feel sure that there are many thousands that are tape recorder enthusiasts like myself who would gladly subscribe to such a magazine as yours if they knew it existed.

My own tape recording extends over the past six years and I have used a number of well-known machines. My present set-up



consists of a Telefunken KL35, "Collaro" IV units operating through a "Leak" Amplifier and pre-amp, and a A.W.A. Hi-Fi Tuner.

I have the two recorders for copying from one tape to another and have built up a form of terminal or junction box, worked by means of telephone jacks, with twelve plug holes. This enables me to make any connection combination without the necessity of fumbling around behind the recorders. The "Truvox" Jack connected direct to my 50 ft. Radio whip aerial mounted some 65 ft. from ground level fitted with transformers at the base and set end, enables me to record perfectly from our local broadcasting station (1XN) without using the radio at all. My speaker is a 12-inch "Rola" in Reflex Enclosure.

Splicing

Splicing is in my opinion, one of the most important and most neglected of all tape operating functions, and the dearth, until recently, of a really efficient and easily operated splicer on the English market has caused many a headache among amateur users.

I have, for years, been obliged to make all my splices on a very clumsy and uncertain type of English splicer now, thankfully, discarded for an American "Robbins" known as the "Gibson Girl" splicer which not only holds the two tape ends really firmly but cuts them just right and trims the finished splice in the "Gibson Girl" waist cut which makes any fouling of the tape in the guides almost impossible. My Robbins cost about \$11.50 but it is worth its weight in gold and I cannot imagine anything better. Only the proper splicing tapes should be used and I feel sure that your newly issued book *How to Splice Tape* will prove very valuable to all amateurs who do not need to learn the hard way as I did.

My tape library now consists of 40 reels (1200 ft.) of recorded music which means a total of 96,000 ft. (double track) mostly recorded at 3½ i/s, and in the main classical and musical opera. I have found that my Telefunken recording at this speed gives me a very satisfactory high fidelity, at least to my ear.

To protect my tapes from atmospheric conditions, I keep each reel in a tin can (the ordinary can used for 400 ft. cine reels serves well and they are cheap); each can is labelled on the

outside edge and filed in a partitioned table numerically. The reels are numbered on each side i.e. 1 and 1a and so on, and my catalogue consists of a loose-leaf binder with one page to each reel and having an index at the start divided into sections such as "Beethoven", "Liszt", "Operas", "Vocal" etc. On the page for any particular reel I have ruled two columns on the right side which show the start and finish of every piece, and when a piece is "wiped" it is merely erased on the sheet and another piece added when recorded.

I use a Smith second-minute timer which enables me to ascertain exactly how long any piece takes to play-back, therefore, if erased the section of the reel that holds it can be filled correctly with any other recording without any overlapping.

It is my firm conviction that if a speed of 3½ or 7½ i/s is used on any machine the speed should remain set and definite on the counter, and if re-wound at say, 275 it should return to exactly 275 on the rewind. It should also be possible to put two recorders side by side start them off at a set speed and have both of them show the same figures on stopping. I have not yet found this possible with any two machines. In some cases the difference in final figures was hundreds, which is ridiculous.

I am enclosing a photograph showing my set-up with my Telefunken on the left, the Collaro next to it, the Garrard turntable and on the right the Amplifier and Tuner. My terminal block with telephone "Jacks" can be seen on the wall and my tins of tape under the table.

In conclusion I would like to wish your magazine every success and look forward to future issues with great pleasure (I wish it were a weekly!!!) and please when reviewing new equipment and referring to this, state the maker's name and address together with prices which are most valuable to your overseas readers. There is nothing more annoying than to read of new equipment but to find no reference to its maker's name or its price.

P.S. I would gladly send tapes (3½-inch reels) of New Zealand features such as Maori songs etc to any of your readers who would care to make an exchange in return of items that I would like, or to correspond with readers.

Yours truly.

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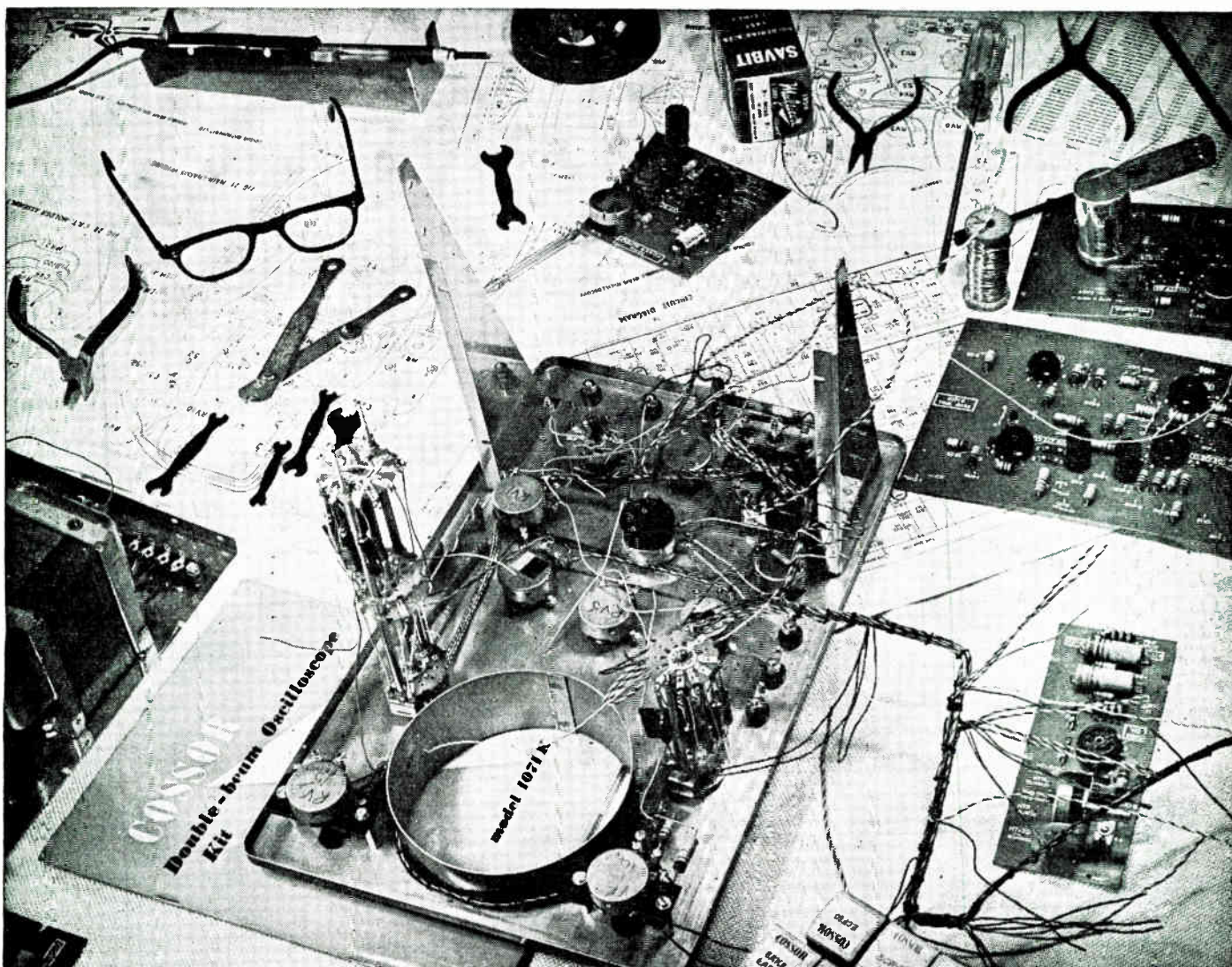
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TAPE, RECORDERS & ACCESSORIES

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.

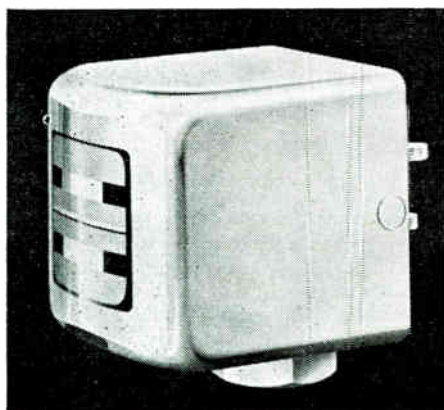
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**THE SIMON
"CYMBAL"
PORTABLE
TAPE
RECORDER**

★



SIMON Equipment Ltd., have announced their latest tape recorder, the Cymbal. The Garrard magazine deck is used as on the Simon Minstrelle, and gives a playing time of seventy minutes, using both tracks. Changing over the cassette takes only about 2 seconds. The frequency response is 70 to 9,000 c/s, with an output of 3 watts fed into a 5 in. x 3 in. speaker mounted in a special acoustic cabinet. Other features include magic eye recording level indicator, crystal microphone, extension speaker sockets and inputs for radio and record player. The Cymbal weighs 22 lbs., and measures 13 in. x 6½ in. x 9½ in. It retails at 24 gns. Further details from Simon Equipment Ltd., 48 George Street, London, W.1.



★

**FIRST OF THE
SHURE RANGE
OF TAPE
HEADS NOW
AVAILABLE
IN U.K.**

★

THE comprehensive range of precision tape heads manufactured by Shure Bros. Incorporated, is now available to manufacturers in this country. Intended for incorporating in semi-professional grade equipment, the series includes the T.R.54A, a four track record/replay head of particular interest with attention currently focused on machines of this type. Full details and specification will be supplied on request from the sole U.K. Representative, Mr. J. W. Maunder, 95 Hayes Lane Beckenham, Kent. (BEC 7413).

New Robuk Recorder (see photo on page 493)

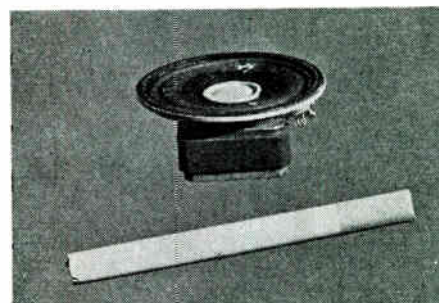
ANNOUNCED this month, the new Robuk three-speed tape recorder is designed and produced by the makers of the Motek tape deck. With press button operation, and separate inputs and gain controls for microphone and radio to facilitate mixing,

the recorder can be used as a straight-through amplifier and there is a superimposition control. The tape speeds are 1½, 3½ and 7½ i/s, and the frequency response is stated to be 60—7,000 c/s±3dB at 3½ i/s. Other features include a magic eye recording level indicator, safety record button, pause control, revolution counter, and external speaker sockets. Capable of taking 7 in. spools the recorder has an output of 2.5 watts which is fed into a 7 x 4 in. speaker, and with tape, spare spool, input leads and microphone the machine is priced at 36 gns. The Manufacturers are Robuk Electrical Industries Ltd. Wedmore Street, London, N.19.

★

**NEW
NEW SUB-
MINIATURE
LOUDSPEAKER
FROM T.S.I.**

★



AS the photograph shows, the LP45F sub-miniature loudspeaker is considerably smaller than a cigarette. Its overall dimensions are 1½ x ½ in., and it has been designed for use in pocket receivers. To achieve sufficient acoustical output from the speaker at low signal levels, a Ferrite magnet has been used instead of the more usual Alnico type. This results in the very high field strength of 9,500 gauss. Leaflets are available for manufacturers and private individuals from Technical Suppliers Ltd, "Hudson House", 63 Goldhawk Road, Shepherds Bush, London, W.12.

★

De-Luxe Recorder from Allegro Sound Equipment

DUE to be released in October is the first tape recorder to be manufactured by Allegro Sound Equipment. Fitted with the Colaro Studio Tape Deck, with speeds of 1½, 3½ and 7½ i/s, the Allegro De-Luxe operates on twin tracks to international standards with a claimed frequency response of 40-12,000 c/s ± 3dB at 7½ i/s. Other features include 3 watts output into a 8 in. x 5 in. speaker, monitoring, revolution counter, magic eye level indicator, and bass and treble controls. Priced at 42 gns it is available from the manufacturers, Allegro Sound Equipment, 7, Avery Row, Mayfair, London, W.1.

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ACOUSTIC MEASUREMENTS**

25 one-third octave bands of filtered white noise recorded to C.C.I.R. characteristics so that the noise power fed to the speaker is constant for each band when played on a recorder equalised to the C.C.I.R. playback response. Voice announcements identify each band. Range 40 cps to 10,000 cps. Speed 7½ ips.

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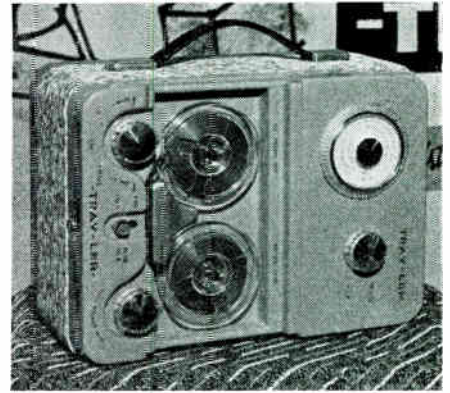
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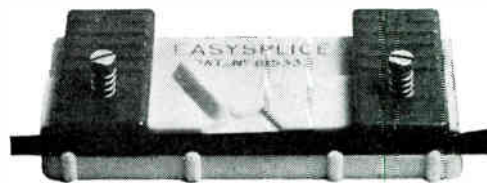
THE TAPE RECORDER,
99, Mortimer Street, London, W.1.

NEW PRODUCTS—(continued)

★
CASIAN TRAV-LER TRANSIS-TORISED PORTABLE NOW AVAIL-ABLE WITH BUILT-IN RADIO
★



OUR field trial of the original Casian Trav-ler appeared in July, 1960, and readers will remember that we felt that this all-British machine was of unusual interest. The above photograph shows a new version demonstrated for the first time at the Radio Show, incorporating a built-in radio. It is expected that this feature will make the Trav-ler a particularly versatile instrument, since it will suit a number of different occasions, either for providing music while you travel, or making recordings in any location. The price, complete is £60 15s. Manufactured by Casian Ltd, 37 Grafton House, Golden Square, London, W.1.



★
EASYSPLICE MARK 2
★

EASYSPLICE announce a new version of their popular editing block. The earlier feature whereby spring loaded bars held the loose ends of tape in position has been retained along with the 45° cutting guide, but the tape channel itself has been improved by the addition of four retaining posts. Priced at 5s. (6d. post and packing), it is available from Easysplice Co., 30 Lawrence Road, Ealing, London.

The "Knight rider"

USING the B.S.R. deck, which operates at 3½ i/s with 5½ in. spools, the Knightrider tape recorder has two inputs, one for microphone and the other for radio. The power output is 2.5 watts through a 7 × 4 in. speaker, with a frequency response of 60—9,000 c/s±6dB. Recording level is checked by means of a neon indicator. Housed in a portable two tone cabinet, the machine is supplied, priced £25 complete with reel of tape and microphone. Manufactured by H. E. Kettle Ltd., Knightrider Street, Maidstone, Kent.

The Kurland "Konsollette Four"

INTRODUCED this month is the Kurland Konsollette Four tape recorder, a 4-track machine using the Collaro Studio Deck and Bogen 4-track heads. With tape speeds of 1½, 3½ and 7½ i/s and capable of taking 7-inch reels, the machine can be adapted for stereo by fitting an extra head. Using printed circuitry, the power output is 3.5 watts with a Wow and Flutter figure stated to be 0.15% at 3½ i/s. Other features include, straight through amplifier pause control, magic eye recording level indicator, push button controls, revolution counter and extension speaker sockets. Price 45 guineas complete with crystal microphone and a 5-inch reel of long play tape. Manufacturers, Kurland Recording Systems Ltd. 9-11 Tilly's Lane, High Street, Staines, Middlesex.

EQUIPMENT REVIEWED

★
**FILM INDUSTRIES TYPE M.8
 RIBBON MICROPHONE**
 ★

Manufacturer's Specification: Frequency Response: 35-13,000 c/s \pm 3dB. Source Impedance: 30 ohms standard, with built-in transformer. Other impedances available up to 57 Kilohms. 12-ft. twin screened cable. Price: £8 15s.

Manufactured by Film Industries, Ltd., 90 Belsize Lane, London, N.W.3.



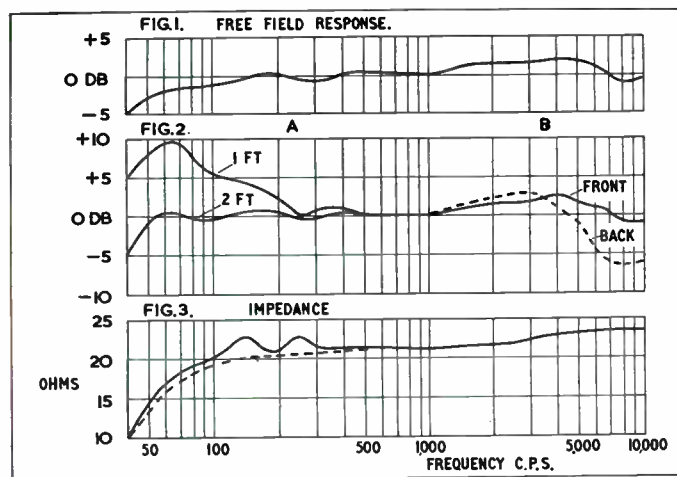
THIS neat and compact ribbon microphone is an excellent example of the modern trend towards reducing the size of such units by using high-efficiency magnetic materials. This leads to a shorter, narrower ribbon than was common a few years ago, with resultant improvements in frequency response, polar response, and general robustness.

The slim design is not cluttered by external plugs, sockets, or swivelling joints. The head plugs directly into a 4-in. length of semi-flexible tubing which allows adjustment to any desired angle, and which can be screwed into a floor stand or the table base shown in the photograph. The microphone is fitted with 12 ft. of screened, two-core cable; extra cable can be obtained from the manufacturers at 1s. 6d. per yard. The secondary of the line transformer is not earthed to the case, so that true balanced line operation is possible for minimum hum pick-up on very long extensions.

Frequency Response

The free field response, with a plane progressive wave approaching the front face of the microphone, is shown in fig. 1. It will be seen that the response is sensibly level from 50 c/s to 10,000 c/s within plus or minus 2 dB.

Fig. 2A shows the effect of bringing the microphone close to a small sound source, as in close talking. This "proximity effect" is caused by the differential sound pressure between the front and



Frequency runs on the Film Industries M.8 Ribbon

back of the ribbon increasing at long wavelengths when the wave front is spherical; a bass cut must always be used with this type of microphone, when it is used at a distance of less than two feet. The high note response is well maintained to at least 10Kc/s—the limit of my white noise calibration gear—but pure tone tests

showed a measurable response at 18 Kc/s. The figure-of-eight polar diagram becomes very one-sided at frequencies above 4Kc/s; the response from the rear of the ribbon is shown in fig. 2B. The natural response of a simple ribbon microphone falls whenever the distance from front to back of the ribbon, around the pole pieces, approaches half a wavelength of the incident sound. Theoretically, when the distance becomes one wavelength, the difference in pressure, which moves the ribbon, becomes zero; but in practice there are so many alternative routes from front to back that some force is always available. Nevertheless, various artifices must be used to compensate for the fall in response above about 5Kc/s; in this case it is a standing wave or resonance effect within the semi-circular magnets which cup the rear of the pole piece assembly. The difference in response on the two sensitive sides of the microphone should be borne in mind when balancing voices or musical instruments.

Impedance

Fig. 3 shows the measured impedance over the frequency range. The two small peaks are caused by harmonics of the main ribbon resonance, and the slight rise at high frequencies by leakage reactance of the line transformer. The fall in impedance at low frequencies is caused by low primary inductance in the transformer; this fall is introduced deliberately to damp the ribbon resonance electromagnetically, by a 'short circuit' effect.

Further damping of the ribbon is achieved by adding acoustic resistance in the form of fine gauze wire and fabric screens, placed around the ribbon and pole piece assembly. By muffling the microphone in heavy cloth, to increase the acoustic damping still further, the contribution of the motional impedance
(continued on page 517)

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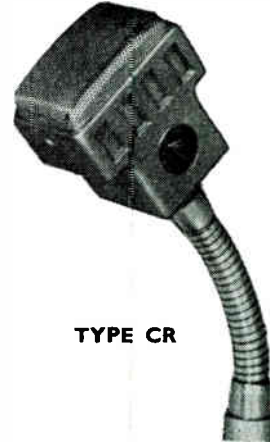


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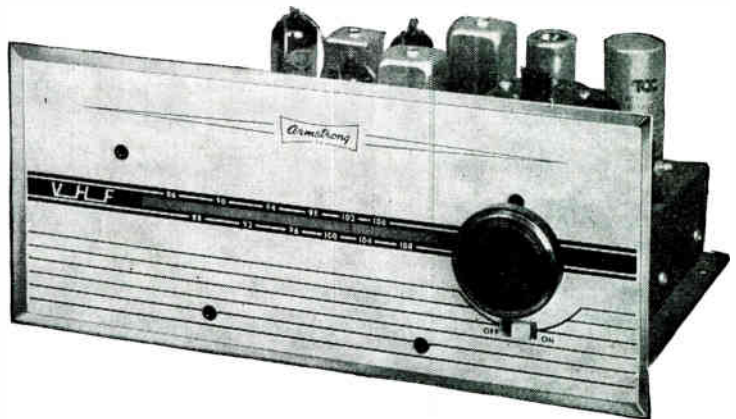
MODEL T4 (Illustrated) 19 GUINEAS

A high fidelity VHF tuner designed for operation with any good performance amplifier or tape recorder. Incorporating many features normally found only in the most expensive tuners it represents outstanding value at its price (which includes purchase tax). The T4 is completely stable with no trace of drift and automatic frequency control provides broad easy tuning. An attractive cabinet in polished wood (price £2 16s. 0d.) is available as an optional extra.

Self powered ● Full VHF band (87-108 m/cs.) ● Automatic frequency control ● Cathode follower output ● Variable output 0-500 mV. ● Multiplex output for stereo radio adaptor ● Separate 75 ohm and 300 ohm aerial inputs.

MODEL ST3 Mk 2 27 GUINEAS

This new AM/FM tuner is the successor to the well tried and successful ST3. Improvements in design and a considerable reduction in size make the new tuner even more attractive than its predecessor. It includes all the features of the T4 Tuner and is similar in styling. The AM section covers the long and medium bands and includes a miniature bright-line indicator for easy tuning.



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of the ribbon was almost eliminated, and the dotted curve obtained. These tests are important, as they indicate that the ribbon resonance is critically damped so that the ribbon approximates to a simple mass-controlled system. Large peaks in the impedance curve caused by ribbon resonance would indicate the strong possibility of low frequency transient distortion.

Sensitivity

The sensitivity was found to be -90dB ref. 1volt/dyne/cm², or 0.03 millivolts open circuit voltage across the 20 ohm source impedance. This means that a matching transformer with a ratio of 50 to 1 will deliver 1.5 millivolts per bar to the grid of a valve, or to the high impedance input jack of a tape recorder. This is about the same level as that obtainable from a high grade crystal microphone of equivalent frequency response, and about half that of one of the cheaper, but more peaky, diaphragm crystal microphones. Care must be taken to keep the capacity low across the secondary of such a transformer, to avoid resonance with the leakage inductance, which could produce a peak in the audio range followed by a sharp cut in response.

The microphone head was fairly sensitive to electromagnetic hum fields, and it should not be used within a few feet of equipment containing mains transformers or motors.

Subjective Tests

Careful listening tests confirmed most of the objective measurements. High note response was smooth and sweet with none of the hardness common to many diaphragm pressure microphones. The thorough damping of the ribbon resonance virtually eliminated low frequency transient distortion. A badly designed ribbon microphone can give a low frequency colouration to any sharp noise, such as a handclap, and is also subject to stand and handling noise. The microphone under review, however, showed none of these faults; indeed the unit could be used as a hand microphone with few concessions to the fact that it was a ribbon microphone.

A-B tests were made against a very wide range miniature condenser microphone, and, although there were subtle differences, it was difficult to state a definite preference for either. There was perhaps a very slight hint of heaviness on male speech at 2 feet distance, but there was no suggestion of boominess. Careful listening showed that some of this effect was due to the slightly different quality of the acoustic ambient background noise, and room colouration; open air tests showed very little difference indeed.

To sum up, this microphone shows evidence of careful design, and the workmanship, technical performance, and styling are excellent. It can be thoroughly recommended for studio or semi-professional use, or for home use where the associated equipment can do justice to its very wide range response.

A. Tutchings

**IRISH
TAPE SPLICER
TYPE S.P.3**

retails at 67s. 6d., and is distributed by Wilmex (Distributors) Limited, St. Stephen's House, Westminster, London, S.W.1.



THIS is, without a doubt, one of the most efficient tape splicers I have ever handled. The built-in blades for cutting and trimming eliminate all the usual fiddling about with a loose razor blade, and, as there are no loose accessories, there is nothing to get lost!

The tape channel is free and uncluttered, and it is only necessary to lay the two tape ends, oxide down, in the channel, overlapping them by about one quarter of an inch, and clamp by bringing down the two side arms. The plastic knob on the centre member carries the blades, and is movable; it is pushed back to the 'cut' position and the splicer closed over the tape. A

gentle pressure cuts the tape diagonally; an unmistakable 'click' indicates that this has been done. The centre arm is opened and the trimmed off end of tape brushed clear. Next the end of a piece of half-inch wide splicing tape is placed over the join, it can be left attached to the main roll which lies forward of the splicer, and the join smoothed with the finger so that the characteristic mottled appearance of the contact adhesive is visible through the backing of the splicing tape.

We now come to the only critical part of the operation—the knob *must* be pulled forward to the 'trim' position before closing. Failure to do this will result in the splicing tape being cut diagonally in line with the tape ends, which leaves the tape unjoined with a bit of splicing tape on each end. One has to do this only once to remember the next time!

If, however, the cutter is moved forward and the centre arm closed, a further 'click' indicates that the job is done, and opening the splicer reveals a perfect join with the edges of the tape slightly waisted over the length of the splicing tape so that no loose corner can catch a tape guide or any part of the tape path. Lifting the tape uncovers the remaining trimmed off end, which is brushed clear ready for the next join.

The blades, and indeed all parts of the splicer, are made of steel, and are therefore capable of being magnetised. However the joins made with the splicer as received were perfectly quiet, and after magnetising it quite thoroughly with a large permanent magnet, and demagnetising it again with a bulk eraser, the joins were still inaudible. I next set out to try and make a noisy join, but nothing I could do with a permanent magnet on the closed splicer would produce the slightest effect—only if the blades themselves were magnetised was there a slight click. It seems likely, therefore, that the steel body tends to screen the blades from accidental magnetisation, even in the presence of very strong fields.

I normally hate splicing tape, but I must admit that I spent the best part of an afternoon playing with this gadget just for the sheer joy of handling a good tool. The verdict therefore is 'strongly recommended'.

A. Tutchings.

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HOW TO SPLICE TAPE

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Grampian DP 4

Retail Price—DP4/L complete with connector and 18 ft. screened lead £7/11/-. (Medium or High Impedance models £1 extra).

A complete range of stands, swivel holders, etc. is available also. A matching unit (Type G7) can be supplied for adapting the microphone for a recorder having a different input impedance, or when a long lead is required. Retail Price £3/5/-. Write or telephone for illustrated literature.

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Minstrelle ...	4	2 0	4	1 11	39
Allegro ...	4	2 0	4	1 11	39
Spectone 171 ...	4	2 0	4	1 11	39
Victor ...	4	15 0	4	14 6	45
Spectone "161" ...	5	2 11	5	2 11	49
4-TRACK					
Argyll 4-T ...	3	5 1	3	5 1	31
Philips EL3541 ...	3	11 5	3	11 5	34
Elizabethan FT1 ...	4	2 0	4	1 11	39
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Clarion ...	2	15 0	2	12 3	25
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our readers write

. . . about automatic slide-changing

From:—Alan R. Hunt, "Winton", Palmers Road, Wootton, Isle-of-Wight.

Dear Sir:—In the July issue of *The Tape Recorder*, you published a letter from Mr. J. Pritchard Jones, Tanycoed, Talysarn, Penygroes, Caernarvonshire, who wanted details of a home-made kit for constructing a unit which would operate a 35 mm slide projector

I have just received this month's issue of "35 mm Photography", and in it I find that Messrs. Grundig are introducing an accessory to do exactly what Mr. Jones wants, and as he is using a Grundig T.830 it would seem as though this unit would be a better idea than a home-built unit. The accessory by Grundig is called the "Sona-Dia", which when placed beside a recorder and linked to it solely by tape (no electrical connections), will control the slide changing mechanism of any automatic 35 mm projector.

While playing the commentary, the operator merely presses a button. This sets up an impulse which releases the changing mechanism at the end of the commentary. I have no details of the price. I thought you might like this information in case any further readers want such an accessory.

Yours faithfully,

. . . about "Studio" deck modifications

From:—G. W. G. Hulme, 14 Coronation Road, Hayes, Middlesex.

Dear Sir:—I own a tape-recorder with the Collaro "Studio" deck. This lacks two features which my other machine has and which I find most useful. These are a record safety lock and automatic stop. Can you tell me if any manufacturer can supply parts so that I can add these to my deck. I should think that at least the safety lock should be available, as I notice that at least one machine using the Studio deck has this incorporated.

I have only recently "discovered" your *Tape Recorder* magazine and I am now trying to obtain a complete set of back issues. I find that quite a few are out-of-print. Might I therefore enquire if any of your readers have spare copies of these issues available which I may purchase from them: Vol. 1, No. 1 (Feb. 59); No. 3 (Apr. 59); No. 6 (July 59); No. 12 (Jan. 60) and Vol. 2, No. 1 (Feb. 60)?

Yours faithfully,



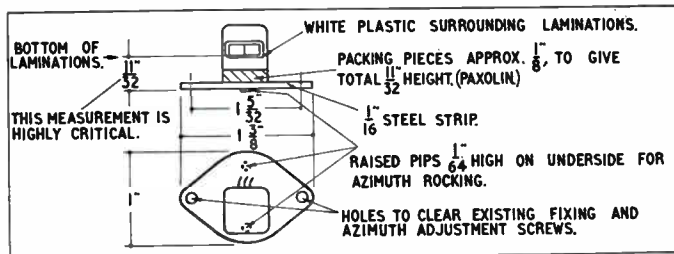
Reader Jack McClelland, 329 Antrim Road, Belfast 15, has kindly sent us this cheerful photograph of Barry and Sheila McMullen recording Christmas carols for replaying (frequently!) during the coming Festive Season

. . . about changing heads

From:—W. W. Glick, 73 Barry Road, East Dulwich, London, S.E.22.

Dear Sir:—May I reply to part of Mr. R. W. Griffin's letter in the August 1960 edition?

I, too, wrote to Collaro on the subject of using fine-gap heads on their Mark IV deck, and got the same negative reply. However, I have succeeded in fitting a Telefunken head. Since this head has no provision for mechanical fitting it has to be done with a good resin adhesive such as "Araldite." It is necessary to make a base from steel strip in order to form



the fixing holes and for Azimuth adjustment. The attached sketch shows the idea. Of course, great care is required to ensure that the laminations of the head are at exactly the right height to avoid cross-tracking.

The results I have obtained more than justify the effort involved. I can now get excellent results at $3\frac{1}{2}$ i/s on all but piano music, which is a little distorted at times. When using the Telefunken head type F402A, it is necessary to alter the equalisation curve since its high frequency response is much better than the conventional head. I have obtained good results merely by using the $7\frac{1}{2}$ i/s equalisation position on the Mullard Type 3 watt tape amplifier. Some adjustment of bias current may be necessary, but this will also depend on the type of tape being used.

Incidentally, I have been using an American tape (Audiotape) which appears to beat most British and German tapes into a cocked hat (at least double-play anyway). Please don't be modest about critical reviews of various manufacturers' tapes. We are all in the dark at the moment, and have to rely on the advice of the tape recorder manufacturer (with his nice little arrangements with certain tape makers!). In any case my recorder is all my own work, so I have nobody to tell me which tape I should use!

I sincerely hope your excellent magazine will continue along its own, independent, useful way.

More power to your pen.

Yours faithfully,

. . . about knowing what to buy

From:—S. I., Manchester 23.

Dear Sir:—I wonder if any of your other readers have come up against the question of repairs as my experience below.

I recently took my recorder in to a Manchester "Service" Depot for several adjustments to be made. These included slight wow, and other small speed checks, etc., and a general look over for the winter. As soon as the engineers saw this instrument it was greeted with a chorus of condemnation and I was asked why I had ever purchased such a machine. I was informed that if it had not been for the fact that I had bought this machine from them, they would have nothing at all to do with it. However, they accepted it, but later advised me that the recorder would have to be sent back to the makers, for repair. This, as far as I know, has been done. (I might mention here that the people in question are service agents for another well-known make of recorder.) Now the question which arises is: just what has one

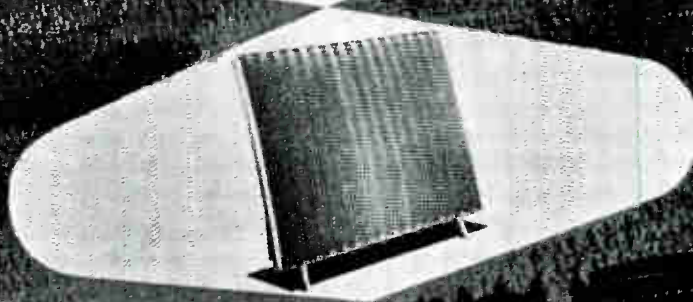
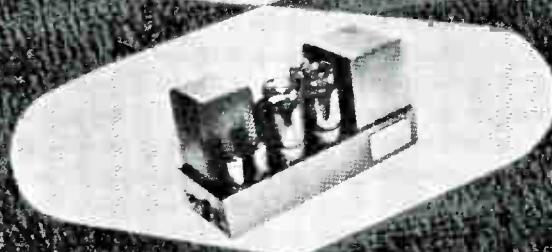
(continued on page 521)

1960

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READERS' LETTERS—(continued)

got to buy? It is true that some makes of any product are better than others, but I do not consider that it is right, or good business, that any article should be condemned by any party on what is a matter of opinion.

Has one to purchase machine "A" because the vendor may be making a larger profit than if he sold machine "B", or must the purchaser take machine "B" or "C" because it suits his purpose or pocket better? If the latter, then it places the purchaser in a very nasty position when the time comes for repairs and replacements if service agents are going to refuse to do the work because they just happen not to like the instrument in question.

It might be of further interest to know that in addition to the instrument in question, we also possess another one of different make and about the same price which also has not been well received by the Depot in question. I should be interested to hear the views of your goodself, your readers, and in particular, the makers in general.

Yours faithfully,

... about tape cassettes

From:—John Munro, Library House, Lossiemouth, Morayshire.

Dear Sir:—As a regular reader of *The Tape Recorder* I feel that I must comment on the review of the Garrard magazine-loading tape deck by Mr. A. Tutchings, as I think that the public are being misled, and I hope that the following may be worthy of publication:—In his review of the Garrard magazine-loading tape deck, Mr. A. Tutchings states that "spare magazines can be obtained at a price comparable to a 12 inch L.P. record, but that this fact is not sufficiently advertised by the deck manufacturers or record makers who use it".

The simple truth is, that not one single word has ever been mentioned of such spares either in Garrard's advertising literature or by any other user of the deck. No wonder, if the cost is about £1 15s. of which 10s. represents the cost of the cassette! Who wants to pay an extra 10s. each to avoid threading other tapes? I wonder if purchasers of such recorders had this fact pointed out to them when informed of its ease of operation!—which only holds good for the tape supplied to them with the machine. Thanking you.

Yours tapefully.

... about swapping tapes

From:—E. R. Statton, 19 Front Street, High Spenn, Rowlands Gill, Co. Durham.

Dear Sir:—I would like to make contact with a tape friend for a young lady of sixty. A tape pal of mine in Germany has made this request to me. The lady in question, was at one time a professional pianist, speaks excellent English and is modern in her approach. Amongst her hobbies, are swimming and yachting.

Interested persons should drop me a card in the first instance, and I will then send them to my tape pal in Germany who will pass them on to the lady in question.

Yours faithfully,

... about playing times of tape records

From:—W. Carter, 46 Hampton Road, Erdington, Birmingham 23.

Dear Sir:—I recently purchased a pre-recorded tape, retail price 35s., described to me in a previous telephone conversation as a 5 in. tape containing selections from *South Pacific* and *Oklahoma*, and on the face of it I realised that I was getting terrific value for money, so much so, that I queried if I was being undercharged. But no! The price was correct.

On unpacking the carton I found the 5 in. spool to be half empty and the playing time proved, on my machine, to be 15 minutes only at 3¼ i/s, and whilst the selections advertised were in fact contained, there remained a feeling that I had been caught. To most tape enthusiasts a 5 in. tape means the minimum length of tape required to fill a 5 in. spool, and to mislead the public into thinking that they are actually getting this minimum

must inevitably result in disappointment and subsequent complaint to the retailers who are really not to blame.

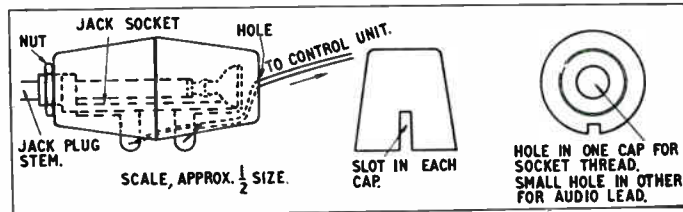
Perhaps through the good offices of your organisation the makers of pre-recorded tapes might be persuaded to label their products clearly with the duration of play and/or the actual length of tape in feet.

Yours faithfully,

... about a home-made plug adaptor

From:—Mr. John Hone, 10 Aldbourne Road, London, W.12.

Dear Sir:—The majority of audio equipment has the output lead terminated with a Jack plug, where the connection has to be made direct into the tape recorder. When it is required to use



a piece of this equipment with an amplifier control unit, an adaptor must be used, because these units have special plugs peculiar to the particular make of apparatus.

An excellent adaptor can be made quite cheaply. This is how I made mine:—

Take two polythene bottles caps (Goddards Drybright Polish), a Jack socket (Bugin), and a short length of screened audio lead. Make a hole in one cap for the Jack socket, pushing thread through and screw on nut, then a small hole in top of the other cap and one slot in each cap at the side, to let the two terminal tags through. Fix the two caps together with Durofix, having left a loop of lead poking through the slide slot. After soldering the connections, pull the lead through the hole to make a nice flush

(continued overleaf)

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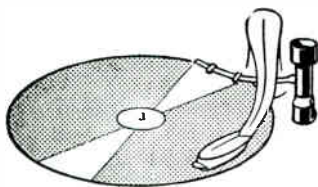
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READERS' LETTERS—(continued)

fit. The only thing left to do now is to connect a plug to suit the control unit on the other end of the lead. The adaptor is ready for use by removing a microphone (for instance) from direct connection into the tape recorder, via the adaptor, straight into your control unit.

Yours sincerely,

... about servicing

From:—D. J. Smith, 36 Trinity Road, Wood Green, N.22.

Dear Sir:—Three and a half years ago I purchased a Tape Recorder, the name of which is—(deleted, Ed.) Up until recently, all went well, and I'm glad to say I only had to replace one small part.

Trouble started, however, when I came to swap tapes with my friend who has a Ferrograph. My tapes played slow on his machine and his played fast on mine. One of us was not "7½"! Simple tests soon removed any doubt that it was mine. It ran at about 8½ i/s. By playing through some of my early tapes of piano music and comparing their key on the piano it showed that the change had taken place gradually over a period of about 8-18 months after purchase.

I accordingly wrote to the makers, after examining the "works" and finding no apparent fault. Their reply was nothing short of staggering. "Your fault is probably due to a worn drive pulley," they said, but advised me to take my machine back to the retailer. In fact, in a further communication, they insisted that I took it there, as they could do nothing themselves. Well, a few moments consideration by a mechanically minded person, would convince him that a worn drive pulley would produce a slower speed, not a faster one. So I didn't take it to the shop. Instead I took the drive pulley out, mounted it in the chuck of my electric drill, and turned it down with a half-round file till I had the correct speed (What could I lose?). In fact, it works perfectly, with no wow apparent. I didn't alter the slow speed, as I only use it for speech.

I can only conclude, after various enquiries that the fault was due to a worn motor bearing. So if I'd taken it for servicing, I would probably have had the price of a new motor to pay. Very nice. And I wonder how long that one would have lasted! I would be pleased to see any comments you may have.

Yours faithfully,

... about tape recoil

From:—Raymond E. Cooke, Wharfedale Wireless Works, Idle, Bradford.

Dear Sir:—Your article on Tape Recoil by Stanley Unwin gave me both pleasure and food for mutilation.

As an ovoid usurper of tape myself I have frequently been trebled by wrinkle on my azimold. Thanks to Mr. Unwin, my expanse now restricts to over 4 kilocycles with impaired dirty fairground noise. Unfortunately insipid rum and bumble predermitate. Is this due to exceed negated foodpack causing too low infernal output imprudence, or should I revise to fibre needles?

Yours faithfully,

... about tape widths

From:—D. Pattle, Alderholt, Fordingbridge, Hants.

Dear Sir:—Mr. W. Pearson of Crayford (letter in September issue of *The Tape Recorder*) has come across a common fault with British tape used on Continental Tape Recorders. The explanation is that Continental tape is cut 6 mm wide, plus or minus a few micron, with a maximum width equal to ¼ inch. British tape however is ¼ inch wide, plus or minus a few thou., and any tape on the plus side of ¼ inch will, on a Continental machine (a) rub on the tape spool due to slight mis-alignment, (b) stretch at the edges shortening the life of the tape, or (c) jam in the tape guides usually ending in a ruined tape.

One remedy is to have the tape guides widened a few thou. or use the tape made by, or recommended by, the manufacturer of the machine.

Yours faithfully,

READERS' LETTERS—(continued)

... about dubbing fees

From:—T. J. Masters, 37 Woodville Road, London, N.W.11.

Dear Sir:—I have been a tape recordist for nearly a year, and I am now convinced that we are all "Dye in the Wood" criminals! 99.9 per cent. of anything recorded from any record, broadcast, or live performance is illegal—this is irrespective of your purpose for recording—unless you pay "Dubbing fees", and how many of us do? We soon tire of recording our own voices and other weird noises, our relatives' efforts to be entertaining, and baby's first syllable. Relatively few of our number have the facilities or inclination to strike off into the country to collect front yard noises or the mating call of various wild birds!

I am particularly interested in sound tracks for Family Films, and all the record libraries with suitable material tell the same story, "If you dub you have to pay Dubbing fees". The era of "Tape Recording for all" has only just begun, it is to be confined to just taping for educational purposes, or should we record and damn the consequences?

I do not necessarily agree with a licence for tape recorders, but obviously something has to be done to assure the future of this excellent, and useful instrument and pastime.

Yours faithfully.

* * *

... about tape teenagers

From:—Terry Nurse, 161 Stuarts Road, Birmingham, 33.

Dear Sir:—Glad to read in the September *Tape Recorder* that correspondent A. Sulman enjoyed reading my special article for your journal, "You Can Start a Club", and like him I want to see that the teenage generation is well represented in our clubs. 12 per 90 (13.3%) is not bad you know. There are some 50½ million people here in this "elderly" outpost of Europe of whom 7½ million are teenagers (M.I.L. Youth Marketing Survey, 1959). If you work that out (still remember your school maths?) it gives us all but 14%. So on the figures quoted, tape clubs represent a pretty fair cross-section of the community!

And I don't agree entirely that tape recording isn't a cheap hobby. Perfectly reliable recorders are on the market for 23 gns.: quite a dozen retail at under 30 gns. Surely that compares well with such "expensive" hobbies as home movies, when you realise that such a recorder (with mic and tape included) is all a beatnik needs to tape "Pick of the Pops" each Saturday night, and have on tap(e) all the latest hits. (Bet the BBC would be surprised if they knew how many copies of last week's POTP there are in existence right at this moment!)—incidentally does a beatnik tape Pick of the Pops? I wouldn't know about these things, being a clean-shaven-type-old-codger-of-19.

So we come to Mr. Sulman's last point, and one which I quite understand and sympathise with. It is quite natural that Mr. Sulman should, as a teenager, shudder at the thought of seeking advice from those with more knowledge than himself, considerably more experience, and—tut, tut—a birth certificate 35 years old! There is nothing unusual in this. All teenagers know better than their elders (till they eventually become "the elders" themselves). All teenagers feel that anyone on the "wrong" side of 30 has one foot in the grave (and the other poised forth ready to give a whack at the bucket). So I say to Mr. Sulman, "Please don't get self-conscious about it. Let nature take its course. Enjoy life and your tape recording, and rejoice in the good news of the world tomorrow when Elvis will rock forth from 16-track 15/64's i.p.s. quadrupled-play tape, in an Ultrasonic-Hi-Fi Juke Box; which for good measure will also deliver a free choc ice when you put your dime in the slot (or will it be a rouble; and the Radio Moscow symphony orchestra you get?). Who knows, I might even live long enough to know . . ."

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The rate is 6d. per word, with a minimum charge of 7s. 6d. Box numbers may be used for an extra charge of 1s. 6d. The trade rate is 9d. per word, plus 2s. for a box number, conditions on application. Send replies to Box Numbers c/o "The Tape Recorder", 99 Mortimer Street, London, W.1.

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

All advertisements for the December issue must arrive not later than November 7th.

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For Sale (continued)

Valradio 12v D.C. 240v A.C. vibrator suitable Ferrograph Vortexion, £11. Three Reslo RBL/T, one Lustraphone LEV/59, £4 each, four mics, £14. Smith, 89 Esmond Road, London, W.4.

Scotch Brand Recording Tape. Approximately 18-7 in. reels of double play tape almost new offered at £2 per reel. S.M.E., Ltd., Steyning, Sussex.

Grundig TK 35. Leads, GDM mike, two large spools, etc. Excellent condition. Little used. Details £75 o.n.o. Box No. (Sussex) 255.

As new, Butoba battery tape recorder. Two speeds, music at 1 1/2. (See August Tape Recorder test) cost with extras £87. Wanted Tannoy L/S units, mains recorder, sell £60. 43 Sandy Point Road, Eastoke, Hayling Island.

Calling all tape recording enthusiasts. Whether you "Tape" your time or time your tape here's a bargain for you. Brand new stop watches at only £3 15s. each carriage paid. These are Waltham 1/5th second, side action, 9 jewel movement watches, and are guaranteed by a money back refund, if you are not fully satisfied. Send your order now to avoid disappointment. Welsby, 219 Hood Lane, Sankey, Warrington, Lancs.

Grundig TK25, excellent condition with mike, cost £71 8s., will accept £50. Bradley, 6 Beadon Avenue, Waterloo, Huddersfield.

Grundig Cub complete, hardly used, £18 o.n.o. P. Knce, One Ash, Curtisden Green, Goudhurst, Kent.

Easysplice Tape Splicer makes tape splicing simple, easy and accurate. Guaranteed, 5/-. Easysplice Co., 30 Lawrence Road, Ealing.

A few music books and one or two copies of "Hi-Fi News" and "The Tape Recorder" and other magazines (mostly 1958 onwards). A few record catalogues also for sale, and a short list of discarded L.P.s from private collection at near give away prices. Write for list. Box No. (Leics) 257.

Wanted

TK20 or similar good Grundig wanted. F. Riddle, 113, Church Road, Northolt, Middx. Viking 4734.

Miscellaneous

Tape to Disc—all speeds s.a.c. for leaflet, Omega Recording Company, 112 Sunnybank Road, Potters Bar, Middx. Tel.: 6428 (evenings only).

Tape Recorder need repairing? Let London's largest tape recorder specialists do it for you, expertly and economically. Essex Tape Recorder Centres, 2, Maryland Station, Stratford, E.15. MAR 5879.

Tape to Disc—Comprehensive 78-45-33 service available from Rendezvous Records, 19 Blackfriars Street, Manchester 3.

Tapes? Transfer? Consult Sound News for better rates. See above.

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

Sound Services, for high standard, low cost Tape Recorder repairs by professional sound engineers. Telephone Billericay 1391, where your East London or Essex address will be automatically recorded.

ESTRA—The Tape-spondence Club run by Tape Enthusiasts for Tape Enthusiasts. Details from the Secretary, Robert Ellis, Schoolhouse, Whitsome, Duns., Berwickshire.

Tape recordings transferred to modern DISCS. Phillips, 38 Kensington, Liverpool, 7.

All tape recorder repairs. Official Walter service. Swift Teleservice, Quarry Bank Mill, Styal, Wilmslow, Cheshire. Tel.: Wilmslow 6231.

Personal

Will Mr. E. M. Davies, 108 Market Street, who wrote ordering back numbers of "The Tape Recorder" last July please advise Circulation Manager of his current address as goods have been returned by post office marked insufficient address.

WAL GAIN TRANSISTORISED PRE-AMPLIFIERS. Many applications, extra gain for Mics, Tape Heads, P-Us, etc., etc. Supplied complete with phono plugs, battery, screened lead, etc. Mono £5, Stereo £7.10.0d.

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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 75K-15'

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 $5\frac{1}{4}$ DP tape. Tone control. Extension speaker socket. **52 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 valves. **79 GNS**



The amazing 4-Track TELEFUNKEN 'Magnetophon 76K'

Offers over 12 hours playing time from one DP Tape. **62 GNS**

TELEFUNKEN 'MAGNETOPHON 77K' 4-TRACK STEREO

Gives full stereo and Four-track monaural superimposition effects. 2 speeds $1\frac{1}{2}$ 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. Full monitoring facilities. Separate 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**



* All prices excluding microphone.

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