

the TAPE RECORDER

PRICE 1/6

MAY 1961
Vol. 3 No. 4

INCORPORATING "SOUND AND CINE"



IN THIS NUMBER

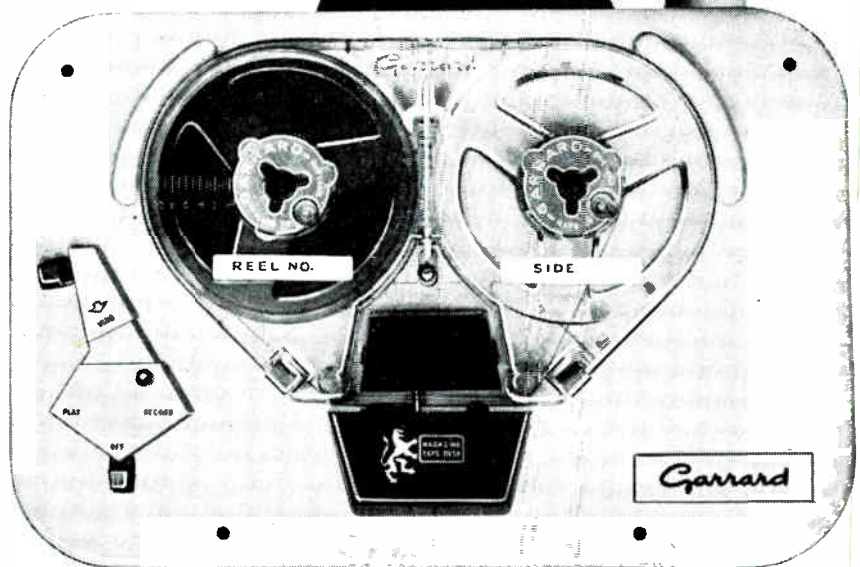
- Tim—Wea—Ask—Ump
- 1961 Audio Festival Reports
- Home Recording—The New Machine
- Building the Portable Recorder
- Sound and Ciné
- New Products
- Here and There and Everywhere—News and Pictures
- Tape Recorder Workbench
- Readers' Letters
- Teaching Tape
- Equipment Reviewed

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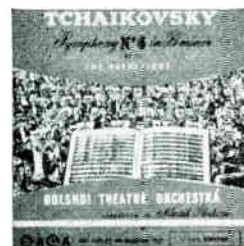
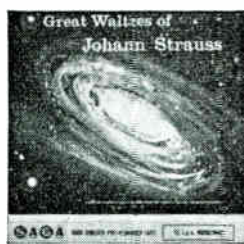


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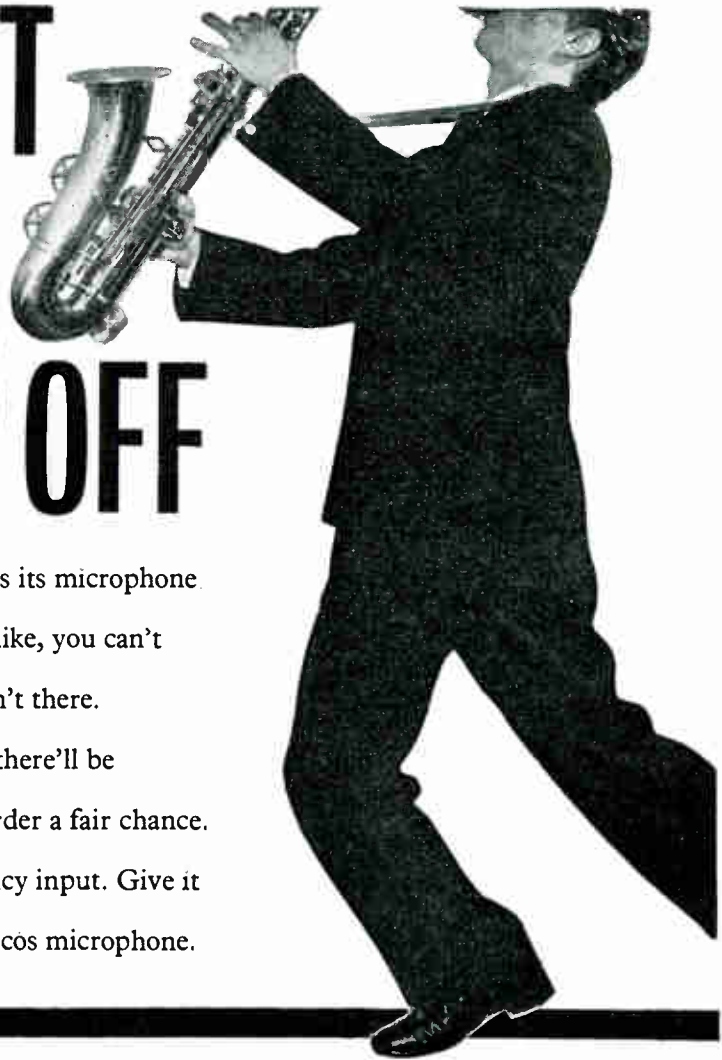
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- A Yes, but there's nothing mysterious about a simple solder connection.
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- A Again, the instruction book tells you . . . and shows you . . . exactly how to use a soldering iron. It's really very simple.
- Q I don't know . . . I've seen the inside of a radio before. It looks awfully complicated.
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YES, YOU!

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- Q Well, it sounds pretty good . . . but what happens if it doesn't work when I've finished?
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(✓) Connect a 22 KΩ resistor (red-red-orange) from socket C1 (NS) to ground lug C9 (NS). See Figure 8.

(✓) Connect a .005 μfd disc capacitor from socket C4 (NS) to IF transformer Q4 (NS).

() Bend socket lug C5 and IF transformer lug Q3 toward each other until they make contact and overlap slightly. Solder the connection securely. (1).

() Install a .005 μfd capacitor from socket C4 (NS) to ground lug C9 (NS). Dress transformer close to chassis, under the capacitor previously installed.

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|-------------------------|-------------------|-------------|-----------------|-----------|
| TYPE M Standard Play | 4" | 300' | 10/6 | M/90 |
| | 5" | 600' | 18/- | M/183 |
| | 5 $\frac{3}{4}$ " | 820' | 23/6 | M/250 |
| | 7" | 1200' | 30/- | M/365 |
| TYPE LR Long Play | 3" | 225' | 7/6 | LR/68 |
| | 4" | 450' | 13/6 | LR/137 |
| | 5" | 900' | 24/- | LR/275 |
| | 5 $\frac{3}{4}$ " | 1150' | 28/6 | LR/350 |
| | 7" | 1800' | 42/- | LR/550 |

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| | 7" | 1800' | 50/- | LRP/550 |
| TYPE DP Double Play Tensitized Polyester | 3" | 300' | 14/- | DP/90 |
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R10 SPECIFICATION:

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

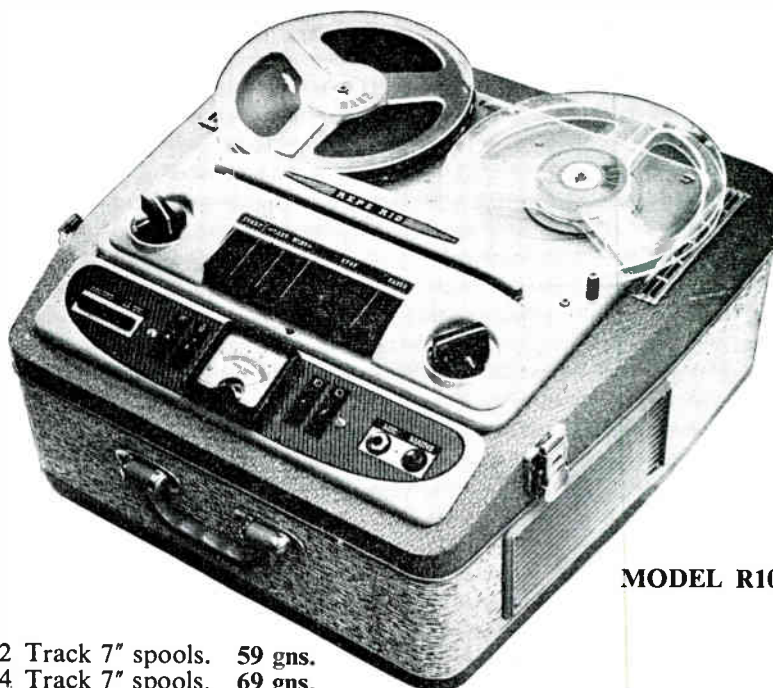
Record Replay Responses—

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

Signal/Noise ratio—

half track 50 dBs at 3¼ ips.
quarter track 45 dBs at 3¼ ips.

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



MODEL R10

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

R40 SPECIFICATION:

3½ ips. 60– 9,000 ± 3 dBs.
7½ ips. 50–15,000 ± 3 dBs.
15 ips. 40–20,000 ± 3 dBs.
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Push/pull bias erase oscillator for low tape hiss.

Separate bass and treble controls ± 15 dBs. at 14 kc/s—
15 dBs at 40 c/s.

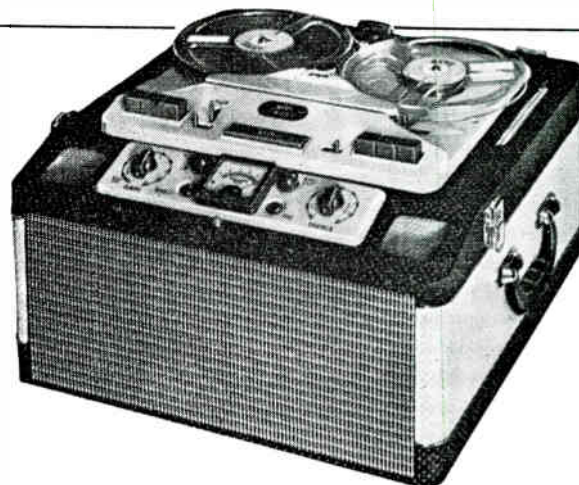
Supplied complete with Acos 39/1 microphone, Radio Record lead and 1,200 ft. P.V.C. Tape.

MODELS

R20 62 GNS. with magic eye record indicator.

R30 66 GNS. with meter record level indicator.

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



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Mr

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the TAPE RECORDER

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 Editorial Offices - - - 99 Mortimer Street, London, W.1
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EDITORIAL

NO good ever came from glossing over bad things, from refusing to face important facts, or from pulling punches to protect an unworthy champion. It was in our mind to write in this vein in our last number, directing this column against a really bad state of irresponsibility and carelessness pervading the tape recorder industry; but our April number coincided with the London Audio Festival, and we considered that such writing at such an important moment might do more harm than good. Now that the show is over we can write even more strongly, and with the added knowledge that the show itself has emphasised the urgency of the points we have to make—for there was so much to see that was really first-class.

During World War II, almost incredible things were done on factory production lines—and particularly in the world of electronics. We entered the era thinking and working in terms of Kc/s, and within a couple of years we were mass-producing apparatus that worked reliably in terms of Megacycles. All this was achieved by the application of strict procedure, intelligent initial training of unskilled labour, and ruthless stage-by-stage inspection. And all this we achieved with Time riding against us as the chief enemy. Now let us look at our tape recorder industry in the light of that achievement, and what do we see? The specifications to which audio engineers have to work are as wide as railway tunnels to a needle, compared with the then seemingly impossible demands of airborne radar; yet, day after day, we receive and hear of complaints of stupid and unnecessary failures in simple circuitry, of machines that have obviously never been subjected to the most elementary tests, and even of downright bad workmanship.

Some tape recorder assemblers who were enjoying the prosperity of an outside boom 12 months ago have been heard to complain bitterly that "things are really bad—that the bottom has fallen out of the market". Our opinion is that they themselves did everything to help bring about this state of affairs. If Mr. X takes his new 30-guinea *Flutterwow* to his tape club, switches it on, and allows a dozen other people to see it expire in a coil of smoke, can those people be blamed for diverting their cash towards the purchase of a car or a washing machine?

We spoke to one keen manufacturer at the show, and asked him about factory inspection. His reply: "Our inspection department is beyond the reach of the managing director. If he is stamping his feet to despatch an urgent order, he must continue to stamp until every individual machine has been stamped 'O.K.' We will not tolerate the risk of customer disappointments."

If one or two more companies had adopted that technique a year ago, they might still be enjoying good business, which can only come through good value. Our reputable manufacturers, know this as well as we do. That is why they are thriving today. But those who bought in quantities of decks, hoped wish-

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fully that they were 100% O.K., and joined them up to quantities more of improperly tested electronics before rushing them into bought-in supplies of "arty" boxes—well, they have lost the day; and they deserved to.

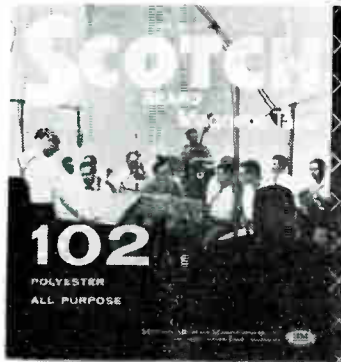
This year's show presented us with evidence that the tape recorder market is as keen as ever, and that the rubbish is being thoroughly weeded out. From now onwards we shall see far better workmanship, and far more selective buying on the part of the public. We have a duty to our readers, to see that they buy tape recorders, and not pups. We have a similar duty to our advertisers with good equipment to sell. We have many times refused the advertising of goods that we ourselves would not like to buy, and we intend to continue with this policy.

COVER PICTURE

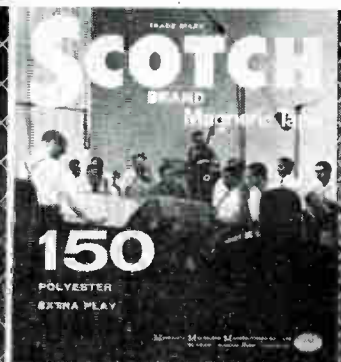
ELECTROPHONIC music, Electronic music, *Musique Concrète*, or call it what you will, is enjoying an important prominence in the world of entertainment; and it is growing in importance with every passing month, for films, television and radio plays. *Tape Recorder* readers who are not already readers of its sister journal, *Hi-Fi News*, may like to note the fact that in the May number (now on sale) there is the introductory article to a new and most interesting constructional series which describes in detail the building of an electronic organ, with two-manual keyboard and pedal keyboard. This is a fully polyphonic instrument for use in the home. Electronic music, produced by tape recorders, is of course a different branch of the family altogether, though simple electronic oscillators can play a big part in it. Its sounds are already so well accepted that they often pass unnoticed. The B.B.C. now regards it as a necessary accessory, its electrophonic workshop has been established for several years (Front cover, B.B.C. photo).

SUBSCRIPTION RATES

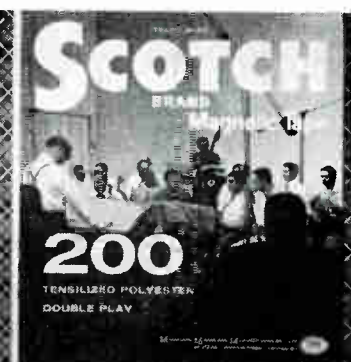
The subscription rate to *The Tape Recorder* is 21/- per annum (U.S.A. \$3.00) from The Tape Recorder, 99 Mortimer Street, London, W.1. Subscription + Index, 24/- (U.S.A. \$3.25).



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* Have you ever dialled any of the above? Of course, it depends upon where you live, but **TIM** is on tap over a wide area. **ASK**, followed by 9211, 9311, or 9411 is for Londoners only. **UMP**, as most cricket fans know, applies, to London, Liverpool, Birmingham, Manchester and Glasgow. **WEA**, followed by four figures, is for London, Essex, Kent and Sussex coasts. These dialling codes form the link between the public and the fascinating H.Q. of the British Post Office Information Services.



WE thought we had picked up the trail of a good "tape story" when we asked to be introduced to **Ump**; but we were wrong. Scarcely a spool of tape is used by the Post Office for these services. Nevertheless, the story is so good that we think our readers will forgive us for going over to disc for this page—magnetic disc, of course. It all began with **Tim**, 25 years ago, but he uses a photo-recorded glass disc. **Tim** was installed at the Holborn exchange in 1936, and at first served London only; but he has since been redesigned, and his services extend over most of the country. In 1960 over 100,000,000 people dialled the service.

Holborn exchange is also the H.Q. of all the other information services provided by the Post Office, several of which are routed out to other areas as the services expand. The whole system—outwardly very simple—is wonderfully thought out and compact. The mechanical side of it is housed in one quite small room, a corner of which is shown below. But this outward simplicity hides an extremely complex network of switched circuitry, and a nightmare of clever planning and organisation.

Let us start where we started our visit—in the room shown below. There, with an occasional maintenance visitor, are 15



modified *Emidicta* dictating machines working automatically and ceaselessly. All are inter-connected by a maze of automatic switchery. Flip down the monitor key of one, and you hear a summary of London's current events in German. That is **ASK 9411** in the London area, and the service is prepared by the British Travel and Holidays Association, introduced in May 1958, and used by 82,000 German visitors last year. **ASK 9311** gave 75,000 French visitors the same information in 1960, and **ASK 9211** was used by 224,000 English-speaking enquirers in the same period.

Flip down another key, and you hear the weather forecast, **WEA 2211** for London, and so on. In the cricket season, on average, 120 new recordings are made per day as play proceeds, and **UMP** dealt with 1,875,000 calls for the last 1956 Oval Test Match alone.

To see how it happens, take **WEA**. There are two small recording studios adjoining. An operator on the main exchange switchboard takes the forecast from the Meteorological Office, writes it down on a memo form, checks it back, and takes it with her to the studio. In front of her (see photo above) is a control panel with two selector switches, a double row of buttons and some switches—and a mike. In the room we have just left, one of the *Emidicta*'s is playing over the current forecast, and all the incoming calls are switched into circuit with it—maybe up to a maximum of 700 at a time. As each message is completed, the record/replay arm returns automatically to the starting groove. The machine is, for example, number 7.

The operator is about to revise the recorded message, but the current forecast must not be interrupted for a second. A printed list in the centre of the panel shows her the number of the service (Weather might be Service 3, and Ask might be Service 5). She turns the selector switch on the right to 3, and presses one of the white buttons. *This lights up the numbers of all the spare machines available on that service.* One of these is machine number 12, so she turns the selector switch on her left to 12, and the machine selected is hers; and if someone else in the next studio is also looking for machines, number 12 will *not* light up—nor can it be accidentally selected, for it is now "locked" into our operator's control board.

She next presses one of the keys, and this automatically erases whatever message is on the machine she has selected (No. 12). Then, after a brief pause to allow the machine to re-set itself, she presses another key and reads out the message—"clouds, snow, fog, drizzle, etc." Another brief pause, and she presses the next key, and her newly-recorded message is played back to

EVERYWHERE

Stereo Tapes Library

SINCE stereo tape recorders first appeared on the market in this country people who wanted to buy them, or who have bought them, have been confronted with the problem of obtaining stereo music. The opportunity for recording two-channel programmes occurs when the BBC broadcast via radio and television sound channels on Saturday mornings. Pre-recorded tapes have been available for some time, but they are still very expensive. Many readers have asked us for information. How many of them have tried the Stereo Tape Library? Those who have not, should write to Mr. Linden, St. John's Road, Brecon, S. Wales, who has a large range of the EMI stereo tapes, amongst others.

Readers Can Hear It First

Reader F. C. Gazeley of 12, Bromley Road, Beckenham, Kent, writes to us enthusiastically about the stereo results he is obtaining from his TWA/1515 amplifier. For the benefit of other readers who may be constructing this really high-quality tape record/replay amplifier (which is also a hi-fi amplifier in its own right), Mr. Gazeley asks us to publish his telephone number (BEckenham 0653), so that they can make an appointment to examine and hear it.

Currys "Make A Tape" Winners

FOR the last three months Currys Ltd., have been asking people to send in two-and-a-half minute tape recordings in a nationwide talent competition on Radio Luxembourg. Mr. Brian Dencer of Currys expected round about fifty tapes a week but in fact received four times that number. The national finals of the show were held last Friday, March 17th, in Butlin's most luxurious theatre at Bognor Regis. Two thousand people saw the panel of judges—a T.V. producer, a theatrical agent, a tape-recording expert, a film director and a record talent spotter—award first prize to the Baronets, a close harmony group from Edinburgh. Currys have decided to drop their intended future programme on Luxembourg to make way for a second edition of Make-a-Tape which will run during April, May and June.



Tape Recorder Specialists Open Glasgow Showroom

THE growth in popularity of tape recorders has been tremendous over the past few years, and the demand for specialist advice and service has been growing steadily. One of the problems of the tape recorder enthusiast has been that it was difficult to obtain an efficient after-sales service. With the increase of foreign makes on the market the problems of servicing and obtaining accessories are doubled. Now, however, this problem will be a thing of the past for enthusiasts in the Glasgow area. A showroom has been opened by Recording Machines Ltd., at 60 St. Vincent Street—a firm specialising solely in tape recorders and dictating machines—and backed by a first class after-sales service. The firm stock tape recorders to suit every budget and every taste—from the small "pocket notebook" recorder to the giant-sized stereophonic machine. And trained technicians are on hand at all times, to service and deal with faults in any machine.

The official opening ceremony was carried out by Scots singing star and T.V. personality, Kenneth McKellar, who is pictured here as he presents a tape recorder on behalf of the firm to Mrs. Margaret Forrest, Hon. Sec. of the Association of the Parents and Friends of Spastics.

Stuzzi Winners Sing for 35 million

LESS than six months ago Bob and John Allison were two completely unknown youngsters. Recently they've issued their first disc and the forecasters reckon on at least a ¼ million sales. They've won the British leg of the Eurovision Song Contest and on March 18th at Cannes they sang for Britain before an audience of 35 million. The song was their own composition, 'Are you Sure?' And it's all due to the Stuzzi talent competition which was run in conjunction with the musical paper, *Disc*, at last year's Boys and Girls Exhibition. First prize was a Stuzzi Magnette tape recorder, a long weekend in Vienna, a recording test and a T.V. appearance. Bob and John walked away with first prize. The result of their first T.V. appearance was that they were immediately asked to make another. The result of their recording was not only a contract from Fontana but also being chosen for the Eurovision Song Contest. And now the boys have won the British leg of this international competition. They have been so busy since last September when they won the Stuzzi competition that they've only just got round to the long weekend in Vienna—where they were the guests of the Stuzzi Company and made guest appearances on Radio and T.V.

NEWS AND PICTURES FROM



ALTHOUGH the club was only formed on January 1st of this year, the **Seaforth and District Tape Recording Society** have already enrolled 11 members. The photograph on this page shows the Secretary obtaining a recording of Cliff Richards for a boy in Liverpool Alder Hey Hospital. Anyone in the Liverpool area interested in joining the new club should contact *Mr. K. A. Wilson, 21 Elm Road, Seaforth, Liverpool 21.*

MR. C. HOOKER, one of the founder members of the **Friern Barnet and District Tape Recording Club** has left to take a position in Kenya and members presented him with an Irish Splicer as a token of their appreciation. Recently the club visited The Wyndor Recording Co., the local manufacturers and had the opportunity of inspecting the factory and talking to Mr. R. Russell the Managing Director. Many questions were asked including some on the review in the magazine *Which?*, and the club appreciated the frank way in which Mr. Russell answered them. It was felt that the Wyndor Company had every reason to be proud of their product. Arrangements have been made to visit the Eastbourne club on May 7th and members look forward to a discussion on matters of mutual interest. Details of future meetings can be obtained from *Mr. A. Andrews, 13 Hartland Road, Friern Barnet, London, N.11.*

THE second tape club to be formed in Liverpool has been named **The Liverpool Central Tape Recording Society** and will cater for all types of enthusiast, from the rock and roll fan to the serious engineer. The Society was formed on January 11th. and the first meeting was, of course, a business meeting, but at the second meeting members brought along their favourite tapes for replaying to the rest of the members. The Society tried to organise a lecture for the third meeting, but unfortunately it was impossible to arrange due to the short notice. However, the secretary gave a last minute illustrated talk on Extension Loudspeakers, showing the members how a good loudspeaker and enclosure could vastly improve the quality of reproduction of the tape recorder. A representative of a local retailer, Mr. Dennis Smith, visited the club on 17th February to give members a demonstration of the Grundig TK 1 battery portable recorder and it is hoped that Mr. Smith will visit the Society again in the future. Nothing was arranged for the next meeting, but a new member demonstrated how to re-align tape heads. This member brought his Capitol stereo equipment to the next meeting, and demonstrated how to get high fidelity from a cheap tape recorder, by replaying the tape through a hi-fi amplifier and loudspeaker system. Future activities of the Society include a visit to several local musical

societies including Banjo Mandolin and Guitar Clubs, visits to other Societies, recording local church and cathedral bells and Carillon. The production of a tape on some local institution or event. Visits from manufacturers and local retailers to talk to the members on some aspect of tape recording. Details can be obtained from the secretary *Mr. A. Evans, 13 Clapham Road, Amfield, Liverpool, 4.*

CHANGE of premises has necessitated alteration of weekly meetings to Wednesday evening, and in future the **Walsall and District Tape Recording Club** will meet at Blue Coat Schools, Springhill Road, Walsall. Further meetings are to include play acting, and recording a talk on microphones, demonstration of recording with the Stuzzi and a forthcoming visit to a local Audio Studio. New members will be made very welcome and are invited to contact *Mrs. J. Walford, 41 Mill Road, Pelsall, Walsall.*

THE first hospital service tape to be made by the **Cotswold Tape Recording Society** was played at St. Paul's, Cheltenham, by John Yeates and Clifford Benn. The tape was edited and introduced by Peter Duddridge and Peter Turner, and consisted of recordings made in the county, a Cotswold comedian, and interviews with local people about their hobbies and activities. After playing the tape, John Yeates went into the wards with a battery recorder, and took down the enthusiastic comments of patients. At the meeting of the Club on March 6th, members divided into three parties and went off into Cheltenham with battery recorders to interview passers-by. Recorders used were a Fi-Cord, a Stuzzi and a Phonotrix. One party penetrated a local pub and had great success with the patrons; another kept to the streets; the third tried members of the Theatre and Arts Club. The sections then returned to base, and listened to a playback of their efforts. Further interesting meetings have been arranged and details are available from *Peter D. Turner, Cave Cottage, Oakridge Lynch, Stroud, Glos.*

A PRESENTATION of the tape, containing a recording of a Thanksgiving Service at Holy Trinity Church, Woolwich, was made by members of the **Woolwich and District Tape Recording Club**. The Rev. Stacey accepted the gift and stated that the recording would be of historical value to the Church. The Secretary assures any reader interested in joining this club that many interesting programmes have been arranged. Club nights are held every fortnight at the "Armstrong Gun" Vincent Road, Woolwich, London, S.E.18, and times can be obtained from *Mr. C. Hurst, 12 Wellrose Crescent, Abbey Wood, London, S.E.2.*



THE CLUBS

The photograph shows members of Irish Tape Pals at the home of Mr. E. O'Neill of 12 Mayorstone Park, Limerick, looking at the review of the Philips Stereo 4 track tape recorder in the Tape Recorder and at the same time studying the performance of the recorder itself. Those in the picture are (left to right) Gerard Shannon, Eddie O'Neill, Fergus Tickner and Gerard Finn. Irish Tape Pals would like to hear from tape enthusiasts everywhere but especially from the Irish people living in England.



IT was a "full house" on March 9th at the West Middlesex Tape Recording Club's Hampton meeting, where it had been arranged to record a play. The secretary envisaged difficulty in casting, but these fears were quite without foundation. A trial recording was made to ensure the correct position of microphones and with eleven tape recorders fully loaded with tape, recording commenced and the play was finished that night. Sound effects were to be added later. A prize is to be awarded for the best tape produced. Meetings are held fortnightly and further details can be obtained from Mr. H. E. Saunders, 20 Nightingale Road, Hampton, Middlesex.

A MEMBER of the Bristol Tape Recording Club has contacted us and told us of the story of the "trials and tribulations" of the Bristol Club which has been running for nearly three years. It appears that twelve months ago, a circular letter was sent to members suggesting that the Club should close because of the poor support. Four staunch members said that in a city the size of Bristol (500,000 approx.), there was a need for a club of this type. After much deliberation it was decided to give it another try and Mr. M. E. Hollier was elected secretary. Due to him and Mr. M. MacDonald (chairman), new life was instilled into the Club, and membership increased. Already a Fi-Cord and Gramplan microphone have been purchased and two programmes, "The History of Christmas Steps" and "The Church Bells of Bristol" have been made. Two more are planned entitled "The Social Life" and "The Emergency Services". Under the guidance of Mr. Hollier twelve members are building their own mixer units and these will be complete in the next few weeks. Membership has risen from four to twenty in ten months, and their secret of success is "elect a good secretary and keep to the programme come what may!"

This shows what can be done when someone puts their mind to a thing. Mr. Hollier, a radio and television engineer, has succeeded where others have failed. The next year should see the Bristol Club enrolling more members and attempting bigger tasks. Any reader interested in supporting this club should write to Mr. M. Hollier, 27 Dean Lane, Southville, Bristol 3.

AT the Heath Park Hotel, Hemel Hempstead, members of the West Herts. Tape Recording Society divided into two groups for an editing exercise. In the usual friendly, competitive spirit the team set about editing an identical tape which was in the form of a members request programme, which chairman John Grainger had prepared. Many unwanted sounds had been added which marred the presentation of the tape, and with a splicer to each team, they set about removing clicks and false starts, etc. The rules were that each member of the team was allowed to make only one cut and splice before passing on to the next member. In this way each person was able to have practical use

in handling the splicing equipment. Two other splicers were available for joining the unwanted portions of tape which had to be properly stored. The two teams finished about the same time, but on playback it was decided that the team comprising J. Hill, D. Hill, Bob Scarborough and P. Holloway, contained the least faults. At the meeting at The Cookery Nook, Watford, on February 8th, members had a more leisurely evening as a demonstration was given by Mr. Wilson of B.A.S.F. Chemicals, Ltd. Following his talk about the history and manufacture of magnetic recording tape, members saw the colour film "The Magic Tape", which in turn was followed by slides which were automatically changed by a signal applied to the taped commentary. Members left the meeting having learned a little more about the material which is so widely used in the recording of sound. Details of club meetings are available from Mr. P. Holloway, 29, Fishery Road, Boxmoor, Hemel Hempstead, Herts.

THE inaugural meeting of the Exeter and District Tape Recording Club was held at Fildews (Engineers), Ltd., 99, Fore Street, Exeter, on Friday, January 27th, 1961. Further details may be obtained from the Secretary, Mr. C. D. Selwood, Bath House, Espinade, Sidmouth, Devon.

TAPE TIPS — by Guy

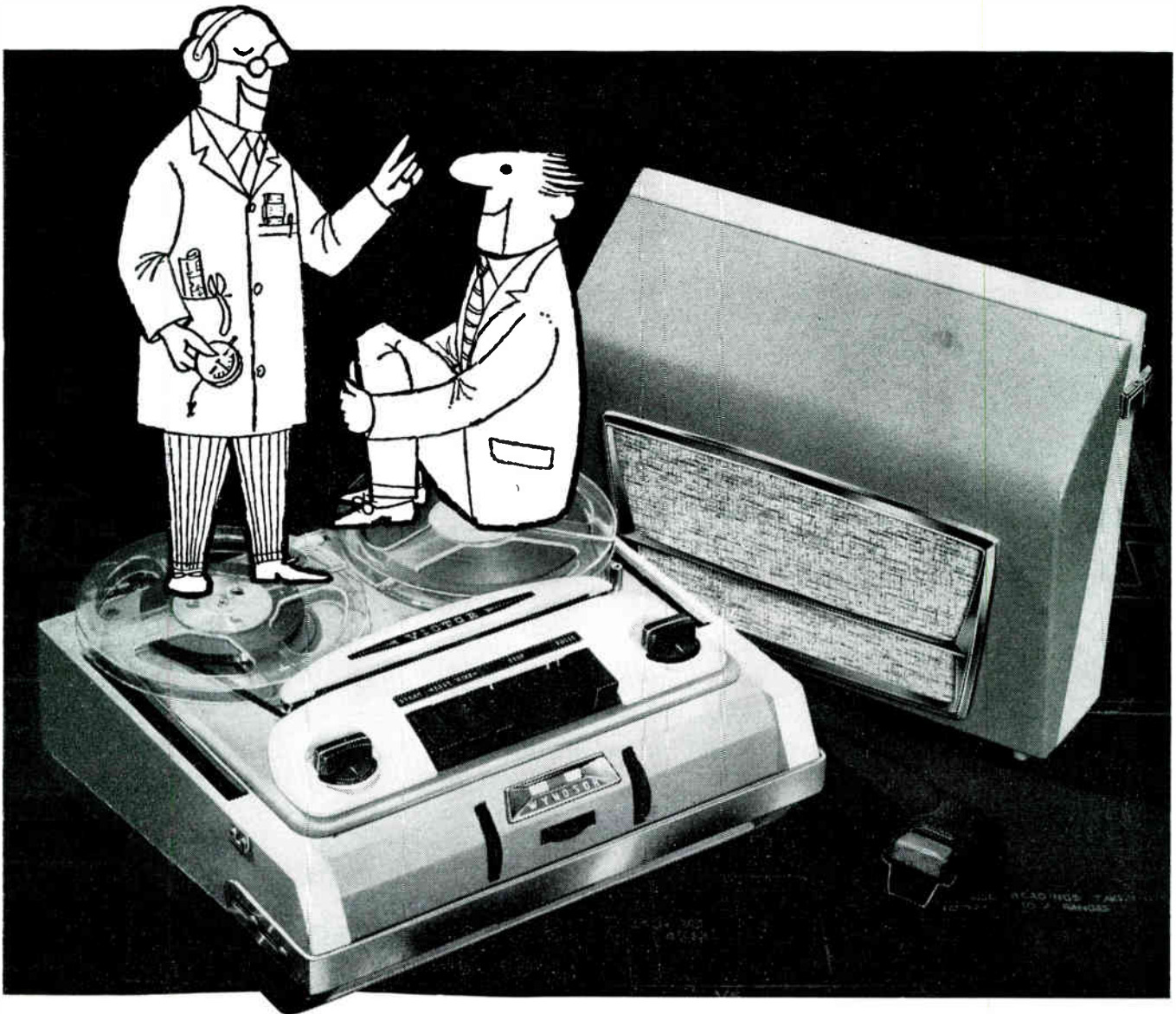
— No. 6 —

Keep the microphone
well away
from the recorder



THE really silent recorder has yet to be invented so don't place the microphone too near to the recorder or it is bound to pick up the motor noise. It is better to use a ribbon or moving coil microphone because the leads from a crystal microphone must be kept short because of the high impedance of such an instrument. If a ribbon or cardioid microphone is used the recorder should be placed on the "dead" side of the microphone. Don't forget that mains hum will be picked up if the microphone head is placed too near to a mains lead.

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



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- 45 gns. (2 track)** with mic, 1200 feet of tape and jackplug
- 49 gns. (4 track)** with mic, 1800 feet of tape and jackplug

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By John Borwick

HOME RECORDING

PART I _____ The New Machine

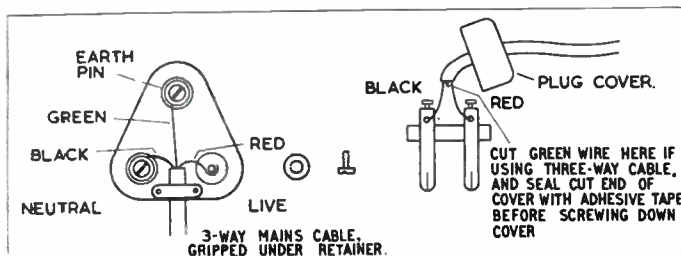


THIS series is designed to cater exclusively for that much-neglected individual, the solitary enthusiast, who wants to get as much fun or usefulness out of his newly-acquired tape recorder as he possibly can—without outside help or interference and without swallowing a technical dictionary in the process. Assuming, then, that you have just bought a machine—or are about to get one—and you plan to get as much out of it as you can, guided by its instruction booklet alone, let's map out a plan of action. After this preliminary article we'll progress month by month through outdoor recording, music and telephone recording, making endless loops and other tape tricks, corresponding by tape, collecting sound effects, taping a play, script-writing and editing, and building a magazine tape.

Before we go any further, I should like you to regard this as a reader-participation series. So I hope you will try out all the various recordings, tricks and experiments I shall be describing as the weeks go by. Who knows you may hit on a useful short-cut or extension of the conventional methods, and so you can write to me and we'll let the others into the secret.

Getting Started

To begin at the very beginning, we'll take it that you've just arrived home with your shining new recorder and unpacked it from its wrappings. There will be an Instruction Leaflet (let's hope for your sake it's written in English), a mains lead, a microphone, perhaps an extra radio lead, a full reel of tape and an empty spool. There is no need to caution you on the advisability of first reading the Instructions. This is very much a matter of temperament. If you belong to that happy band of people who never read notices, fighting your way manfully



through "Open At Other End" boxes, up "This Side Down" staircases, and always test "Wet Paint" signs, then you're not going to be put off by a few words from me. All the same, these instructions are meant to be read. And the sooner the better.

With a mains recorder, the first job will be to fit a suitable plug to the mains lead. If the cable supplied is 3-core, I hope you can arrange to take this to a 3-pin socket because the third *Earth* connection gives greater safety and minimises (usually) that droning sound we call "mains hum". The correct way to wire a 3-pin plug is illustrated in fig. 1, and the chief thing to look out for after you've double-checked the colour coding is that no loose strands of wire can come into contact with the wrong pins. When a 3-core cable must be used with a 2-pin plug, cut the green *Earth* wire short or tape it back out of harm's way.

2-core Mains leads

Some tape recorders use only a 2-core mains lead. In this case the wiring is even easier, but be prepared to reverse the wire/pin connections to discover which way round gives the least noisy recordings. Owners of battery-operated recorders will have to familiarise themselves with the correct drill for fitting the batteries.

Now that the power supplies have been sorted out, we can get the tape laced up and ready to go—having plugged into the mains and/or switched on so that the recorder's amplifier will be warming up in the meantime. The full reel of tape goes on to the left-hand spindle with the tape coming off in a clockwise direction. Pull out the necessary 8 to 12 inches of tape, drop it down the slot in front of the heads and lace on to the take-up spool. You may find the operation of pushing the end of the tape through the little slot in the spool hub easier if you fold a piece of Sellotape over the end.

Now try out the *Playback*, *Off*, *Wind On*, *Off*, *Wind Back* and *Off* controls, in that order, to get the feel of their respective speeds. If you accidentally wind back too far until the tape whips off the take-up spool completely, switch off immediately to avoid undue damage to the loose end of the tape; but don't worry about it—it won't be the last time this happens.

First Recordings

As with all operations which you learn by yourself, your rate of progress and the degree of expertise ultimately reached depend very much on your analysing—consciously or unconsciously—the results you get at each stage in the game. I mean it's no use dodging the fact that making good tape recordings calls for a little more know-how and manual dexterity than, for example, putting on a gramophone record or tuning in the radio. Come to think of it, some people manage to botch even those operations. That's why I suggested earlier that you whizz the tape back and forth on the *Fast Wind* and *Playback* controls, so that you start by getting the feel of the controls and the tape itself. Once the mechanics of the recorder have been mastered, you can concentrate on the artistry.

In the same way, your first recordings—or anyway the first serious recordings after you've survived the inevitable family "Have a Go" session which greeted the machine's first appear-

There are two kinds of people who'll want this new



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... Two quite different kinds of people will want the new TK 24 — the inexperienced and the experienced. The inexperienced because they don't know any better and the experienced because they don't know any better either: because there isn't any better than this brilliant new four track Grundig model. The new TK 24 makes no compromises. It doesn't ask you to choose whether you want high fidelity or long play — it gives you both! All the time! Six hours record/playback.

It doesn't ask you to scrap all your existing conventional twin track $3\frac{1}{2}$ i.p.s. tapes — it lets you play them back as well (and how good they sound!).

It doesn't expect you to have to make complicated arrangements to produce special trick effects — *it allows two tracks to be recorded separately and then played back together.* (Normally, of course, you would play them back separately to get the doubled playing time that four track gives you).

In fact it's the most accommodating tape recorder ever made — even by Grundig!

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See and hear Grundig quality for yourself; the simplicity, the compactness, the styling, the really first rate performance of a new model that will stay 'new' for years.

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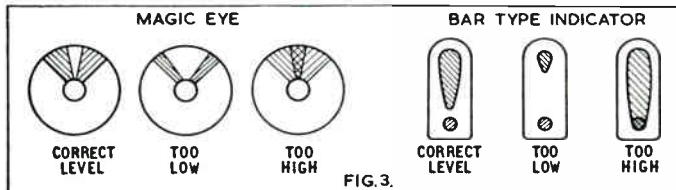
Address

Nearest Town

ance—should aim at mastering the techniques as quickly and as thoroughly as possible. My own procedure when trying out a new machine is to hold the microphone 12 inches from my mouth and record a series of running commentaries while I vary *one thing at a time*.

Getting the Volume Right

Taking the *Volume Control* first, I set this at its half-way mark and record something like the following:—"I'm speaking twelve inches from the microphone in an ordinary conversational voice and the volume control is set at half; that is it's pointing straight up towards 12 o'clock. The magic eye is giving very healthy readings, in fact it's overlapping a little when it closes so this recording is probably over-modulating a bit and distorting. So we'll start to reduce the volume control setting in easy stages. Now the control is at about 11 o'clock and I'm still using the same amount of voice as before. The magic eye has quietened down a bit, but it's still just about closing, so the level should be all right. Any distortion that was present before should have disappeared, or at least dropped to a reasonable amount. I've now turned the volume down to 10 o'clock and the magic eye just closes if I speak peaky consonants. This is probably the best setting, but we'll keep reducing volume to see the effect of under-recording . . ."



Well, that's enough of that, but you will appreciate that replaying this recording—and experimenting, too, with the playback volume setting—we can learn a great deal about getting the right level of sound on to the tape. We have sprinkled enough clues throughout the commentary to establish once and for all the best volume control position and the associated magic eye indications for that kind of speaking voice at that microphone distance. Quite a lot when you think of it.

Over and Under Recording

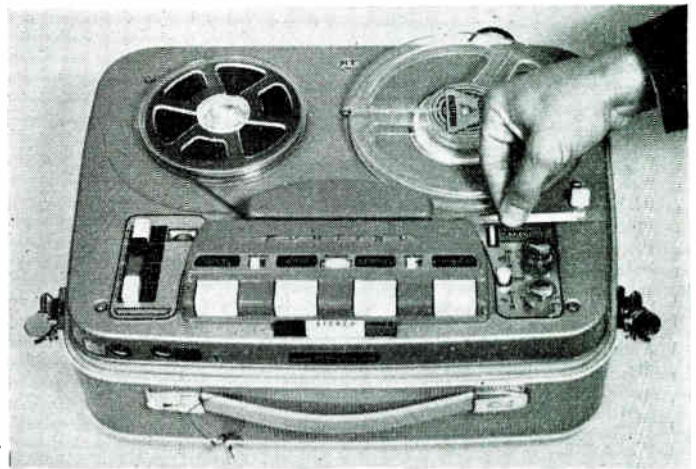
And by the process of deduction, we can anticipate the effect of changing any one of the three things linked in this experiment. A higher volume setting, a louder voice, or a closer speaking distance, will give over-fierce magic eye readings and overload the recorder. This shows up as distorted, edgy quality particularly on peaks in sound, and may even give you trouble in erasing. That means that the over-modulated recording is still heard as a faint ghost of itself when you next try to record on that piece of tape. Incidentally, if you ever get this ghost effect you will find that running the tape through a couple of times in the *Record* condition, but with the volume turned right down, should wipe all traces of it away.

Knowing what to expect, we can *anticipate* over-modulation and prevent it's happening. We know too that a lower volume setting than our carefully-established optimum, a quieter voice, or a more distant microphone position, will mean feeble magic eye readings and under-recording. This is equally undesirable, for it makes us raise the volume setting on playback—to retain the required listening level—so that any inherent noise in the system becomes unduly prominent.

The Other Controls

Next, I like to turn my attention to each of the other controls on the recorder, again altering only one thing at a time. It isn't necessary for me to outline the whole procedure for you here, but each feature will probably suggest to you the correct line of approach. Ideally you are trying to find out as positively as possible just *what each control does*. We can safely leave the engineering types to figure out *how* it does it!

You should examine in turn the tone control(s)—they will usually be operative on playback only, not on record—the tape position indicator, the other recording inputs for radio, etc., the



Above photograph shows sellotape fitted over leader tape enabling easier threading.

pause button, the superimposing and/or mixing controls if fitted, and of course you ought to try and discover whether any noticeable difference in recorded quality is obtained on the high and low running speeds of your machine. As you will know, the faster tape speeds have the advantage of potentially better quality. That is to say they should give you a better response to high-pitched sounds, and show less tendency to wobble on long sustained notes of music than the slower speeds.

But these are things you should check for yourself. If your particular machine seems just as good at 3½ or 1½ inches per second as it does at 7½ i/s, then there is absolutely no reason under the sun why you shouldn't use these speeds and double up on the playing time available on each reel of tape. All the same, if you do detect a difference, you will have to weigh the conflicting claims of quality and economy of tape. But the great thing is that you will be deciding from knowledge, and not by guess-work.

More Varied Recordings

During this first spell of activity, it is a very good idea for you to make as many different kinds of recording as you can, listening critically to the results. You will no doubt think of lots of things to record, but here are a few suggestions to be going on with:—

(1) Wait until it's stopped raining and put the microphone out of the window. The sounds you pick up may not be good enough for the BBC Library of Sound Effects, but there is a good chance that you will be surprised by the "atmospheric" quality obtained in such a simple manner. And it isn't necessary to live in an aviary either. Country-dwellers may have the edge on *Nature* recordings, but town atmospheres have their own special ring—even if it's only a solitary 1,000cc motor-cycle, with silencer thoughtfully removed, roaring through the echoing deserted streets at 2 o'clock in the morning.

Microphone Positioning

(2) Switch on the radio, and move the microphone all round it and round the room, to establish whether the radio and/or the microphone is directional or sounds better in one position rather than another. Now I know that the best way to record radio programmes is via a special input lead, and *not* through the microphone! This is just an experiment to find out a little more about the fascinating field of tape recording, and incidentally to give us as much practise as possible in critical listening.

(3) Make a continuous recording of some domestic activity. This should be as noisy and as different from straight talk as possible. It should involve lots of moving about too, and discourage everyone from working *to the microphone*, on this occasion, because it's the effects of sounds coming from all random distances that we want to listen for. Possible subjects are bath-time, a model railway session, home music-making, etc.

● **Next Month:** the main topic will be **Outdoor Recording**. This will involve us in lengthening the microphone cable and making a windshield.

TAPE AT



R. Russell of Wyndor demonstrated the Victor to many interested visitors.

THE 1961 International Audio Festival and Fair at the Russell Hotel, April 6—9th was well up to the standard of the five previous shows from the point of view of high quality sound. But where tape is concerned, it can really be regarded as something of a landmark. Very few cheap domestic recorders were in evidence. Instead we found that a healthy number of manufacturers had decided to go for quality, hang the expense, and break into the semi-professional class of machine. The resulting decks and recorders, while useful to the pure tape enthusiast since they give him better reliability, may then take their place in the quality home music system alongside the best disc reproducing equipment available.

Of course this attitude to tape is not new to firms such as *Ferrograph*, *Vortexion* and *Reflectograph*, who have produced machines to a demanding technical specification for many years.



The Beverley Sisters open the 1961 Audio Festival.

The equipment from these manufactures follows their earlier pattern, except that the advent of stereo has had to be taken into account, and even 4-track operation. The new Model C *Reflectograph* gives 4-track recording and playback and a series 808/4 *Ferrograph* is promised later in the year to give normal 1/2-track operation plus the ability to replay 1/4-track record tapes.

Something really new always adds spice to an Exhibition, and we have *HMV* to thank this year. Their new deck, the result of many months design and development, made its first appearance, and came near to stealing the show. It is a 3 motor, 7 1/4 i/s machine, with three 1/4-track heads, separate record and playback amplifiers, clock position indicator, meter level indicator, and—most surprising of all—it converts to a gramophone record player using an EMI disc kit costing about £3 3s. This new deck which is very easy to operate was shown on two new *HMV* recorders, the "Voicemaster 50" and the "Voicemaster 65". These machines are to cost £57 15s, and £76 13s, respectively, and seem to include every facility that tape enthusiasts usually ask for. This deck is in the medium price bracket and is to be used by other manufacturers. In fact, *Wyndor* and *Sound* both plan to build machines around it.

Veritone and *Chitnis* who have also got designs on the semi-professional market demonstrated new British decks to be used on interesting new recorders. The *Veritone* "Sixteen" and a Console Stereo version sounded very good indeed. The Japanese invasion is upon us, and *Sony* tape recorders, imported by *Tellur Ltd.*, could rival our own domestic and semi-professional machines.

In all, 22 firms were exhibiting tape machines. They were as follows: *Ampex*, *Brenell*, *Butoba*, *Chitnis*, *EMI*, *Ferrograph*, *Ficord*, *Grundig*, *HMV*, *Minivox*, *Magnavox*, *Philips*, *Reflectograph*, *Robuk*, *Simon*, *Sony*, *Sound*, *Telefunken*, *Trav-ler*, *Veritone*, *Vortexion* and *Wyndor*.



The first of the Japanese invaders!—Sony of Japan.

THE AUDIO FESTIVAL

A fair number of the recorders at the show were transistor portables. Old friends which have been the subject of our Field Trials were the *Butoba* MT 5, the *Fi-Cord* 1A, the *Grundig* TK1, the *Minivox*, and the *Aerialite* Trav-ler. The EMI RE 321 professional model was on show and also a clockwork driven Sony portable.

Microphones

Grampian have now produced a shorter version of their famous DP 4 microphone, known as the DP 5. The earlier microphone was fitted to a Grampian parabolic reflector and put out on the verandah so that visitors could try its directional properties. An interesting bird song recording was also demonstrated and proved the reflector's usefulness. Other microphones at the show included the full range of *STC* professional microphones to which have now been added two new cardioids, the 4106 moving coil and the 4108 condenser. *Acos* featured a live versus recorded piano demonstration, using their Mic 44 stereo microphone, and *Lustraphone* had many tape recordings also. Mr. Pontzen of *Lustraphone* was kind enough to give us a preview of a new electro-magnetic microphone insert which they have developed. This measures only $1\frac{1}{2} \times \frac{1}{2}$ in. and is intended for use with battery portable machines. The *AKG* microphones include domestic and professional types. The former are well known as recorder accessories and the latter are found in most broadcasting and professional recording studios. A newcomer is the *AKG* C 60. This weighs only two ounces, and may be used as a neck halter microphone or used on a fishing-rod type boom.

More Tape Brands

All the well-known brands of tape were represented at the Festival. *Gevaert* of Belgium featured Mr. Leslie Guest's well-known colour slide and music programme with which he is at present touring the country. This, of course, demonstrates their photographic film at the same time as their recording tape. *Zonal* is another firm famous for its photographic and striped film which has now entered the recording tape field. The 1961 International Audio Festival and Fair has certainly established tape as a very strong rival to disc for reproducing all kinds of music, mono and stereo, through the best amplifiers and loudspeakers now available.



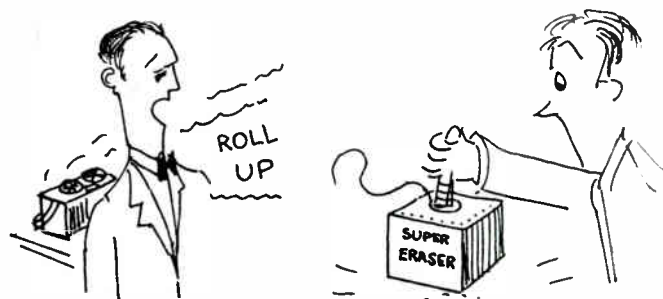
P. J. N. Collaro points out some of the advantages of a revolutionary new motor whose manufacturing rights he has just acquired.



IN FESTIVAL

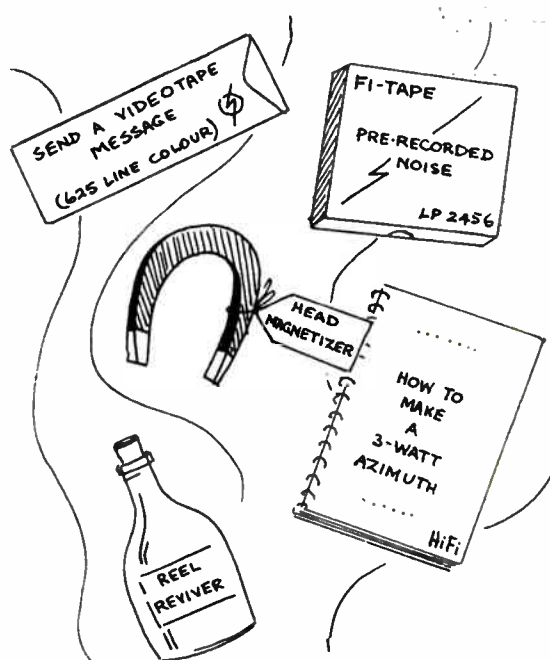
MOOD AND WITH CLINICAL DETACHMENT...

WE OBSERVED THE PROGRESS OF TAPE IN ALL DEPTS...

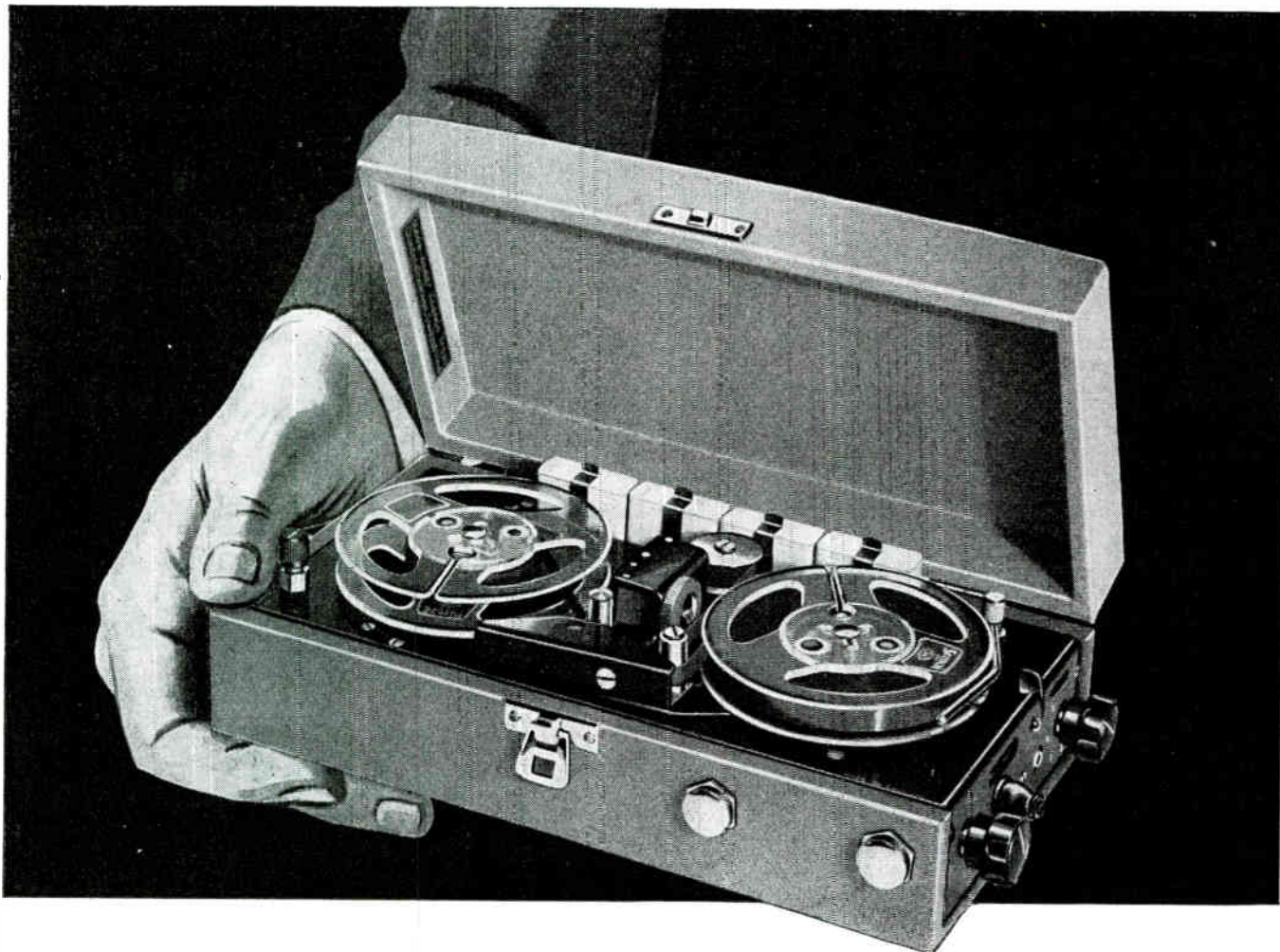


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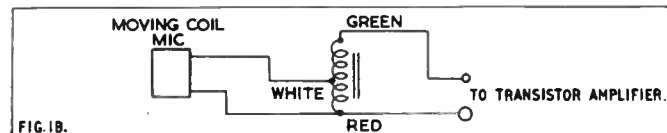
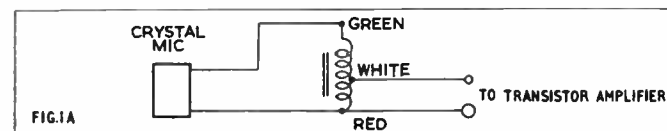
or with Grampian DP4/M
Microphone **66** GNS

BUILDING THE PORTABLE RECORDER

THIS is the last article in the present series on the portable recorder, and it provides an opportunity to present a number of ideas and suggestions which have come in from readers and constructors during the past six months. Many constructors seem to have adopted the idea of making up a small diameter brass turntable for the take up reel, with sufficient mass and moment of inertia to smooth out the gear and governor flutter of the spring motor, but small enough to fit conveniently into a small carrying case.

A Reader's Version

Mr. C. Wilson, of Leeds, sent me down his version of this idea for examination and test; and, as both the tape transport and the electronics assembly showed novel features, I had it photographed. The turntable reel is supported on a heavy brass disc which is made a taper fit on to the motor spindle. The reel is secured by three vertical pins which fit the radial slots in the reel centre. Although not shown in the photograph, the supply reel is also secured to a smaller platform on a rotating spindle which is fitted with an adjustable friction clutch to provide



slight tape tension and to prevent over-running of the reel in portable applications.

The transistor electronics are built on a hardboard panel with cutouts to take the transistor sockets and input and output connectors. The layout is a mirror image of my breadboard arrangement, but it is still easy to trace the circuit for modifications, additions, or fault finding. Mr. Wilson had some mysterious faults in the bias oscillator coil which refused to oscillate even after two rewindings. I found that the wound coil had been enveloped in sticky tape before being placed in the pot cores. Removing the tape and rewinding the coil cured all the trouble and my guess is that the adhesive used in sticky tape may attack and soften the enamel of certain types of enamelled wire. If any other constructors have experienced this trouble I would be very interested to hear about it. Anyway, the safe thing seems to be to avoid this material near the wire!

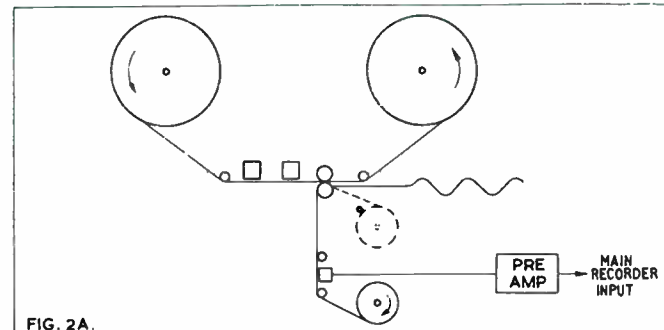
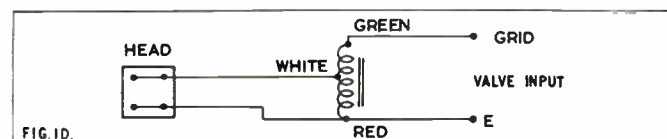
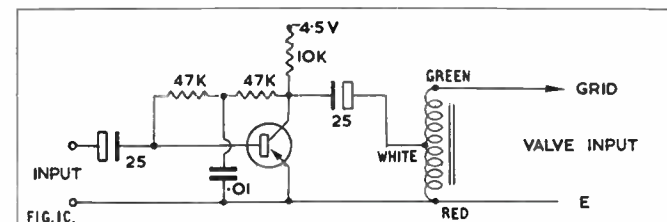


FIG. 2A.

In the kits which my Company now sells, C6 in the bias oscillator circuit has been increased from 150pfs to 250pfs; this makes the oscillator more efficient at lower HT voltage and an HT voltage of 12 volts is adequate and 14 volts should not be exceeded. If the bias oscillator is not working for any reason, such as the faulty coil mentioned above, 18 volts HT can cause thermal runaway and destroy the transistor. With the oscillator running properly I have used up to 22 volts HT for certain applications with no signs of trouble, but this is not to be encouraged unless it is known that the transistor has a high voltage rating. Three 4.5 volt flat torch batteries are very convenient. When brand new the combined voltage is 13.5 volts, but this rapidly falls to about 12 volts, and with intermittent

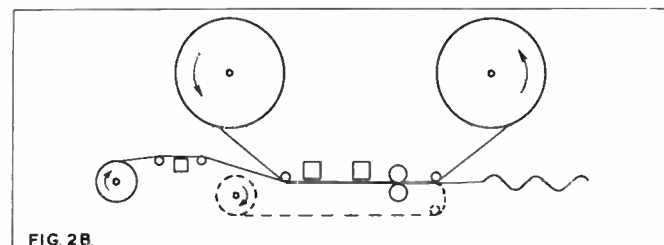


FIG. 2B.

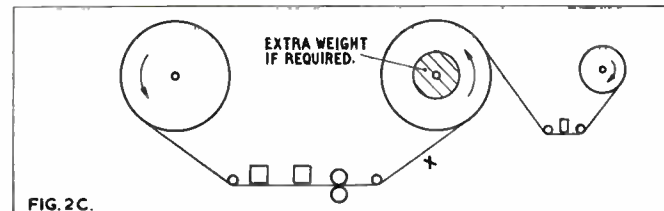


FIG. 2C.

use the voltage remains constant for many months. The batteries should be examined from time to time to make sure that they are not leaking or sulphated, for such leakage is acid and it can completely ruin the delicate electronic components.

In Part 4 I promised to try and find a source of microphone to transistor matching transformers. These are not available commercially to my exact specification so I have had some

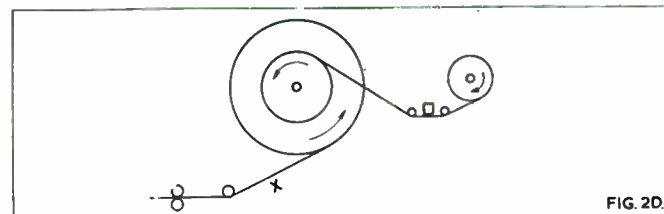


FIG. 2D.

By A. TUTCHINGS PART 6—CONCLUSION

made up and am now including them in my advertised list of kit components. I find that it is advisable to use an input transformer with a high input impedance when using this transformer with a crystal microphone. Edison Swan XB103, Mullard OC75, B.T.H. GT33 or G.E.C. GET113 or 102 are suitable (fig. 1a). The transformer can also be reversed to match a low impedance moving coil microphone to transistor input with a very useful increase of gain when the above transistors are used (fig. 1b). This transformer proves to have many more uses. It can be used to step up the voltage from a transistor pre-amplifier to the grid of a valve, and thus solve the problem where just a bit more gain is required without the complication of adding another transistor amplifier stage. The transformer should be placed as near as possible to the valve amplifier input as the added capacity of any length of screened cable may seriously limit the available high note response (fig. 1c).

Top and Bass Compensations

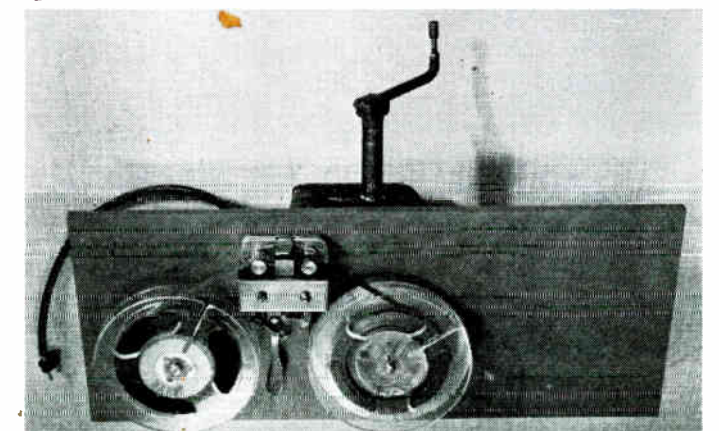
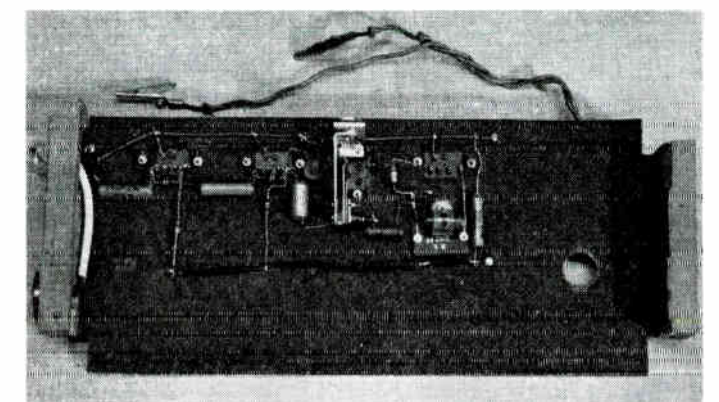
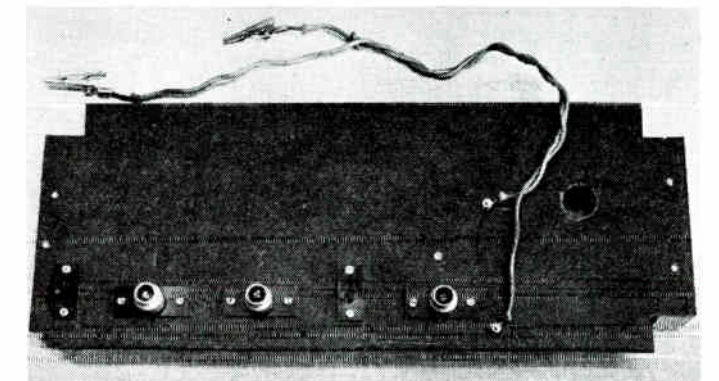
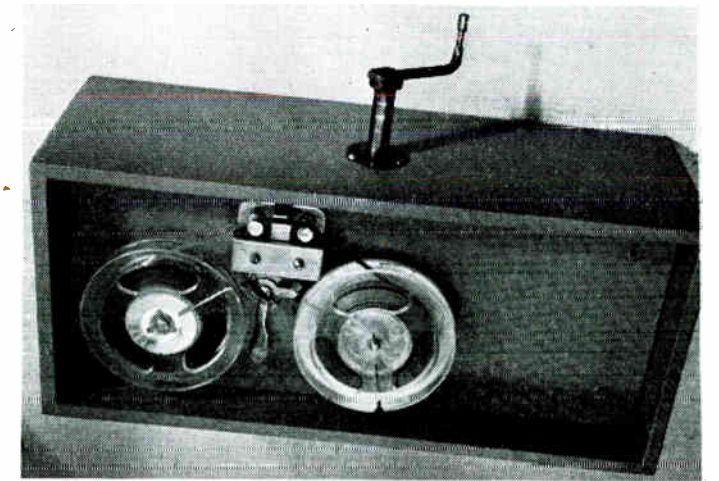
In the same way the transformer may be used to couple the playback head to a valve input. The same limitations as to lead length apply, but the effect of secondary capacity, tuning with the reflected head inductance, is to introduce a high note peak followed by a sharp cut. An 0.2 mfd condenser between the playback head and the transformer primary gives a useful bass rise by series resonance with the transformer primary inductance. This bass rise combined with a top lift obtained by judicious selection of a suitable secondary tuning capacity can give partial compensation of the tape-head response more or less "free of charge" (fig. 1d).

A recent article by Mr. J. D. Hone in the February issue described a method of dubbing or copying a tape, using only one recorder. I would like to show how many of the components and circuits already described may be used for this purpose. Many recorders may be used for dubbing by using the system shown in fig. 2a. The supply reel spindle and bracket, the head, tape guides, pressure pad, etc., are identical to those used in the portable recorder, and could in fact be the recorder itself. The master tape is transported back to back with the blank tape by the capstan and pressure roller of the main recorder.

Take up and Re-Spooling

After leaving the capstan it may be allowed to fall into a shallow box and, unless the length is excessive, there is little risk of tangling and it may be respooled on to the supply reel without mishap. If the tape to be copied is a long one, then some system of take-up is required, and it may be spooled on the portable recorder turntable by placing a felt washer under the turntable plate to let it slip and give a gentle take-up. Alternatively, a separate turntable may be used, or the take-up reel of the main recorder may be used, as suggested by Mr. Hone.

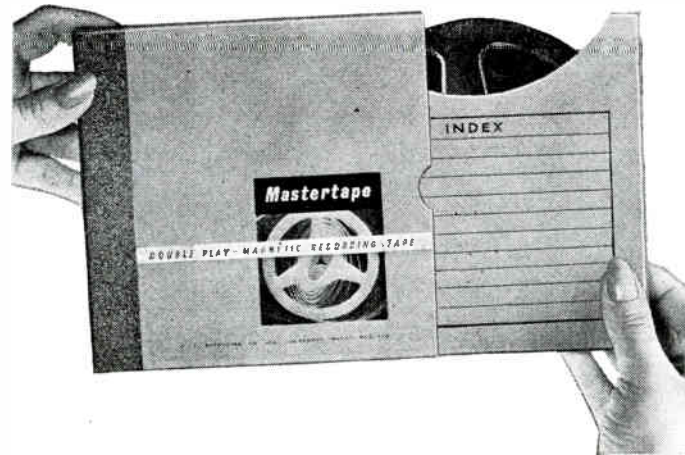
In some recorders it is difficult to obtain access to the capstan except through the normal recording channel. If the two tapes are fed together over the erase and record heads, and thence to the capstan (fig. 2b), the tape transport will be satisfactory; but there is a risk of spoiling the other track of the tape being copied by impressing a weak and backwards recording on it, due to its passing near the erase and record heads. The track being copied is OK as, due to the tape being reversed, it becomes the bottom track. Fig. 2c shows a silly idea of mine which nevertheless seems to work every time! The master tape is interleaved back to back with the copy tape on the take-up reel;



The above four photographs show (top to bottom) the complete recorder, the outside and inside view of the transistor amplifier. The complete deck before fitting into case.

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BUILDING A PORTABLE RECORDER—(continued)

as the tape is fed to the take-up reel at a constant speed so the master tape is also transported at the same speed. On some recorders, using a gravity clutch for the take-up reel, it may be necessary to place extra weight on the reel to keep taut the section of tape marked "X".

A further and even sillier idea (fig. 2d), allows a difference in speed between the master and copy tape! If two take-up reels are used, and bolted together as in Mr. Hone's system, and if one of them is half filled with tape, so that the diameter is twice that of the centre core of the empty reel—then, if the copy tape is secured to the larger diameter reel, the master tape will be transported by the smaller diameter reel at half the speed. Conversely, if the master tape takes up on the larger diameter reel it will be pulled past the extra head at twice the speed of the copy tape. I agree that if the recording is a long one the speed ratio will change slightly due to the different rate of build up on the two reels, but for such a simple system you can't have everything, can you?

The output of the kit head is of the order of 1 millivolt and this signal may be used in several ways to feed the main recorder. In order of simplicity they are:—(a) Feed head directly into mic socket of the main recorder. (b) Feed head through 10:1 auto transformer mentioned above to mic socket of the main recorder. (c) Feed head via single stage transistor pre-amplifier to radio input of the main recorder. (d) Feed head via single stage amplifier and the equaliser (described in Part 3 of this series) to the mic input of the main recorder. (e) Feed head through two stage transistor amplifier and equaliser (portable recorder or similar circuit) to radio input of the main recorder.

I don't think I have to apologise for spending so much time on this tape copying business. The portable recorder is after all an adjunct to the main static home recorder, and if it can be made to do a further useful job, then so much the better!

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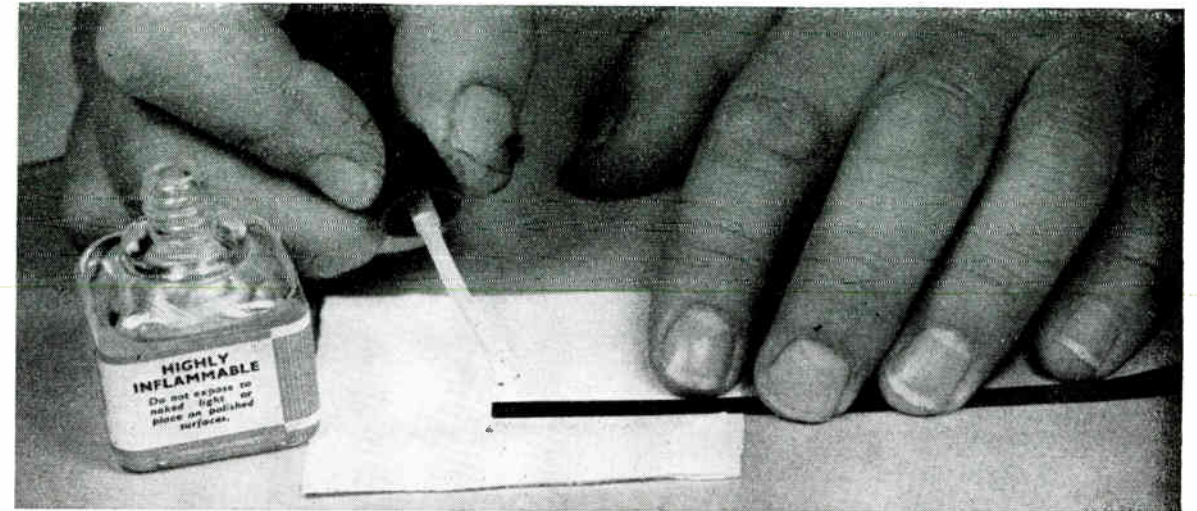
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TEACHING TAPE

A SPECIAL SERIES FOR BEGINNERS

By I. W. JARMAN

PART NINE PERMANENT JOINTING



IN the previous article I dealt with editing and the splicing of tape using a pressure adhesive jointing tape. It was explained that this type of joint is of a temporary nature, since it can if necessary be taken apart and then remade without damage to the recorded material. However, there is another method type which can be used—the permanent joint—so called since once it has been made there is no way of taking it apart without damaging the tape.

Permanent jointing

In making this type of joint, two different methods are in general use: (a) that employing a jointing compound which on application to the tape base will slightly soften its surface—this is known as the solvent welding method. (b) that employing a universal jointing compound which is applied to both ends of the tape to be jointed and also to the patch laid over the joint. N.B. There is another method used by some manufacturers of Polyester base tapes, i.e. heat welding, but this method is not generally available to the public. The first of these methods, which can only be used on tapes with a cellulose acetate or PVC base (a different solvent being required for each type), is described here in some detail.

To make this type of joint, in addition to jointing compound and the accessories needed for temporary jointing, you will require a small brush or dipstick (there is usually one or the other attached to the cap of the bottle) and a supply of absorbent paper. The joint can be made at right angles or at 45° and to describe how to go about making it, let us assume that the recorded material on the tape is no longer required and that all that is needed is the replacement of the temporary joints with those of a more permanent nature.

First, using the editing block, cut each side of the temporary joint. Then remove the tape from the block and place the left hand piece (coated, dull side uppermost) on a pad of absorbent paper. Using the small brush, apply compound to the last quarter of an inch of tape and with another piece of absorbent paper wipe off the coating.

Next apply more compound to the part of the tape from which the coating has been removed and place the right hand piece (coated side uppermost) over it, making sure that there is no gap between the coatings of the left hand and right hand pieces.

Finally using absorbent paper again, apply slight pressure to the joint and allow a few seconds for it to dry out.

One important thing to remember when using this overlap method for editing a tape to improve the recorded material,

is that because of the overlap, a quarter of an inch is lost with each joint made. You will see from this that the editing technique will differ slightly from that described in the previous article. With temporary jointing the cut on the left hand piece of tape is made as close as possible to the required material, but for permanent jointing using the overlap method, the cut should be made a quarter of an inch before the required material. In other words, you mark your cut as before, but the actual cut will be made a quarter of an inch to the right of the mark. Great care should be taken with this jointing compound since being a solvent any spilt can damage not only the tape but the deck as well.

Jointing with universal compound is the method normally used for jointing Polyester base tapes, but it can also be used for cellulose acetate or PVC bases. With both methods, care has to be taken to ensure that excess compound is removed on completion of the joint and that pressure be applied to the joint, which must be allowed a few seconds to dry out before playing. Professionally, the drying-out process is aided by slight heat application. Whenever splicing of the tape is necessary, the joints should be made carefully and accurately since a badly made joint can lead to a number of faults on recording.

1. If the outer edges of the tapes are not lined up correctly, then the traverse of the tape across the heads could be affected resulting in poor quality and variations in volume.

2. If, when using the temporary method, the adhesive jointing tape overhangs the edges, or when using the jointing compounds any excess is left on the tape, you will find a distinct tendency for adjacent turns to stick together. This will cause "snatching" or tape bounce.

3. Any gap left between the coatings when a joint is made will cause a momentary break in continuity on recording. It will be seen from this that the time spent ensuring that the job is done properly is well worthwhile. And this, of course, applies not only to editing but to whatever use you put your recorder.

In the next article, I shall be dealing with some of the more common faults pointing out that in many cases they could be prevented by simple maintenance and checking.

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Readers' Problems

Fade Erase

Dear Sir:—I was most interested in the article "Tape Recorder Workbench—No. 13" on Fade Erase. I am contemplating incorporating this modification in my recorder, using the method depicted in fig. 3 of the article. However, I have a couple of queries which perhaps you can answer for me. They are:—(1) The recorder is a "Baird Soundmaster" (Serial No. 8148) with the de luxe version of the Mk. II. This recorder has been out of production for some years. Can you tell me the impedance of the erase head? (2) Am I correct in assuming that wire wound potentiometers and resistor should be used, or will the carbon type do?

If you are unable to answer query No. 1, perhaps you can suggest to whom I should write. I am not sure of the present address of the Baird Co.

Yours faithfully, F. P. M., Weymouth, Dorset.

I must confess that I have been unable to find out exactly the impedance of the erase head on your machine, but I understand that a figure of 380 ohms would be a reasonable approximation.

You should certainly use wire-wound potentiometers, and I think it would be preferable for the resistor, though a 2 watt carbon type could be used. I hope you have success with the modification.

Hum on Playback

Dear Sir:—I have a Telefunken 4-track 76K Tape Recorder, and as you will already know it has facilities for listening to one track, whilst recording on another, but the one drawback to this is the fact that the outgoing signal is too weak to hear properly. I do not think that this is an isolated fault of my own particular recorder, as it has just had a 100% overhaul. I have tried amplifying the signal through an amplifier, but I get a terrific hum which renders the signal inaudible. The noise resembles open circuit hum. Could you please help in the matter? Is there any inexpensive type of small amplifier, say, 2 watts which might serve my purpose?

Yours faithfully, E. T. W., Balham, S.W.12.

I suspect that your trouble is caused by earth currents in the lead connecting the 76K to your amplifier. Assuming that the amplifier is not an AC/DC device, it should be quite possible to amplify satisfactorily. However, with continental machines it is often necessary to make an earth connection directly, and not through a signal lead via other equipment. You may well find that experiment along these lines will help, but if you are still in difficulties I suggest you contact the makers' representatives in this country, who are:— Welmec Corp. Ltd., 147 The Strand, London, W.C.2.

Poor Bass Response

Dear Sir:—My equipment consists of a Collaro Mk. IV tape-deck, a Linear LT.45 amplifier, plus an Armstrong Stereo-Twelve radiogram chassis which I am using for playback purposes (in conjunction with the low-power output from the LT.45, of course).

My particular problem is a poor bass response. This, I believe to be due to a recording deficiency, as—when playing tapes recorded on a friend's instrument—there is a fully satisfactory low frequency response as well as an adequate "top". Furthermore, easing the tension on the pressure pads when replaying provides evidence that there is ample bass response on playback (with, of course, great loss of treble).

I shall be glad if you can advise me on how to obtain an increased low frequency emphasis when recording, and—for your guidance—I enclose a copy of the circuit diagram and list of component values.

Yours faithfully, N. B., Halifax.

I have been through the circuit you enclosed, most carefully, and cannot find any cause therein for a loss of bass response

during recording. I have, of course, to assume that there is no fault in the equipment and, in the light of your comment about the playback of tape recorded elsewhere, this brings me to one possibility only. I suspect the trouble to lie in the amount of recording bias being fed to the head. If the bias level were too low for the tape you are using, the level of treble would be greatly increased, giving the same effect as too little bass. Such an incorrect level could be due to an incorrect adjustment, an ageing valve, or very easily, use of a different brand of tape.

It must not, of course, be forgotten that were the other machine to record less treble, that would also have the effect of making the bass more prominent. If you are in a position to play a tape record for comparison purposes, this would give a datum line to which other information can be related.

Tape Connections

Dear Sir:—My equipment consists of (a) An Avantic SPA.II Stereo Amplifier and Control Unit; (b) A Truvox Tape Deck and type "C" Amplifier; (c) A Garrard 4HF Unit with GCS.10/1 Pickup. The various outputs and inputs are: (a) Amplifier. Inputs, Pickup: 600 mV into 1.2 ohm; Tape: 100 mV into 100 K ohm. Output, Tape. 70 mV from 30 K ohm impedance source. (b) Tape Amplifier. Output and Input: 0.5V at $\frac{1}{2}$ megohm. (c) Pickup. Output: Not known.

My queries are: (1) Can I connect the Tape Amplifier Output to the Amplifier "Tape" Input? If not, what must I do?

(2) Can I connect the Amplifier "Tape" output to the Tape Amplifier input? If not, what must I do?

(3) In many books there is much written about "impedance matching", but little said about what to do to achieve it. Could you recommend a book giving details of what one should do if the "ins" and "outs" are different?

(4) Is the earth of a 3-point mains plug suitable for earthing the amplifier, also for earthing an FM tuner?

Yours faithfully, W. W. B., Carlisle.

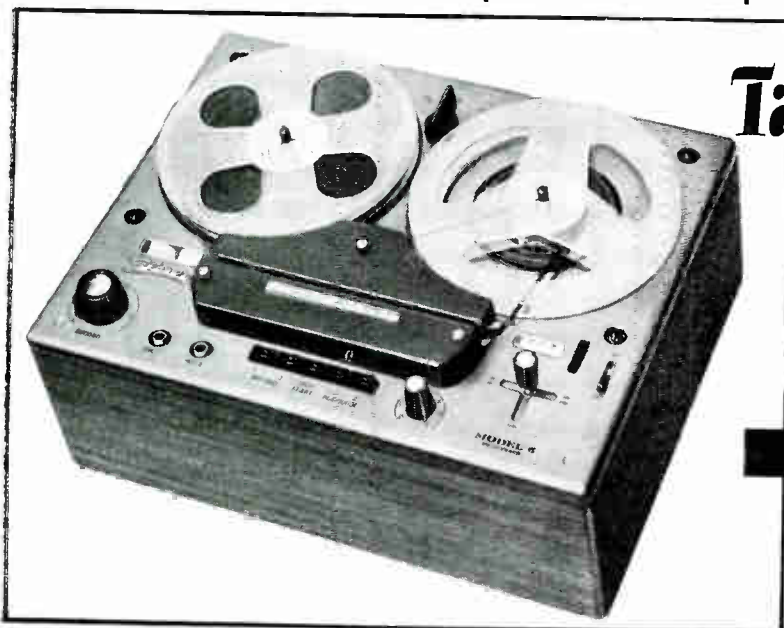
1. *You cannot connect the tape amplifier output to the amplifier tape input, adjusting the input by means of the tape amp. v.c. I should expect results to be entirely satisfactory; if not, I suggest connecting 100 K $\frac{1}{2}$ -watt resistor across tape amplifier output leads.*

2. *You can connect the amplifier tape output to the tape amp. input, but you will probably not get anything like enough signal to load the amplifier and modulate the tape fully, in which case you will be obliged to work from the amplifier 1.5 terminals, which is less satisfactory as this is a low impedance source, and would involve modification of the tape amplifier input, or taking a special tapping from another point in the amplifier circuit. Your dealer will advise you on this point, if you take the appropriate circuit diagrams with you. Alternatively, you could try a Wal Gain transistor input, but in this case you would need to pad down the amp. tape output to about 1 mV as the Wal Gain has a gain of 100 to 1.*

3. *The principles of impedance matching have been covered in two recent articles in Hi-Fi News, with particular reference to pickups, where problems most frequently arise. The principles of matching are the same in other cases, but instructions for the application of these principles vary according to the circuitry employed. In 2 above, the problem is not primarily one of impedance matching, but of inadequate sensitivity of the tape amplifier for the tape amplifier output, which is a much more difficult matter to deal with.*

4. *The amplifier and tuner should be earthed at one point only, and the connection from this point to earth is best made directly to an external earth, such as a copper rod in moist earth. The third pin of a mains plug usually travels a long way before reaching the ground, but will do well enough if an extension earth is difficult to install.*

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Sound and Cine

"GENRE" · ANIMATION PUPPETRY

by R. GOLDING

Dorothy Rogers manipulates her paper sculpture puppets before shooting off another single frame. The set was made in her living room and measured 6 x 4 ft.



LAST month in my review of Scenario type films popular with the amateur, I concluded with a reference to *avant-garde* live-action filming. Most competitions include *avant-garde* in the Genre section owing to the experimental nature of both treatment and technique involved. "Genre", of course, has unlimited possibilities, and one of its fascinations is that there are no rules that have to be followed, even with animation. You just go on breaking new ground all the time, inventing new techniques to keep up with your imagination.

The Theme

One of the most imaginative *avant-garde* film makers in Europe is Harry Kumel of Belgium and his latest film—*Anna La Bonne*—is based on a Cocteau poem. It is a simple but effective story told by an unseen narrator of the housemaid of a wealthy and popular demi-mondaine. Anna, the maid, murders her mistress because she is jealous of her beauty and her sex-appeal, but she slowly becomes affected by the crime, realising that she will ever remain "Anna la Bonne" until she commits suicide, and even afterwards. On this framework Kumel has created a series of moods dominated by colour. The text is divided into six verses, each one forming a separate flashback in the tortured mind of Anna.

The first verse is a sort of recall of the beauty of the mistress—Annabelle Lee. Although dead she is still beautiful. Her spirit begins to haunt Anna in a setting dominated by an overall green colour-cast with Annabelle Lee in a red dress to express her voluptuousness. The second phase has a rich yellow cast and sets the mood for introducing the gay and wealthy crowd who used to flock to pay homage to the mistress. All Anna's daily occupations are set in green but when the sound track speaks of her guilt—"one does not kill—it is one's hand!", the hand comes into picture in slow motion and lit in red.

Watching The Colour Balance

All the colour changes in the film are smooth owing to Kumel's care to cut or to pan from an introductory colour before placing the appropriate filter over the lens. An example—a scene is dominated by red and green, the text speaks of flowers; we pan to discover a bouquet of yellow tulips before cutting to the following scene which is completely in a yellow tone. This scene is all yellow, the narration brings in something which happened suddenly—the murder—and we get a quick cut to a double impression of a macro-photographed eye that is all red; thus the next scene is prepared for a shot of Annabelle Lee, lying in a red dress, dead on a golden bed. It is a startling film, even for Harry Kumel, and the technique he used won him the Cannes Grand Prix although the film lasts only five minutes.

Painted Sound Track

For Stuart Wynn Jones, on the other hand, five minutes is a long time. *Short Spell*, his most successful film, is just a 100 ft. in length and was made without camera or recording equipment but by drawing directly on to 35mm clear film stock. The film follows a simple formula; an alphabet where each word is turned immediately into its picture and providing 26 amusing variations on a single theme. The visuals are explosive but it is the narrow hand-painted soundtrack that really commands attention. It is a series of dots and wiggles, nothing more, but amazingly affective and a result of his long study and endless experiments in expressing rhythms visually.

Since this film he has made two orthodox cartoons, painting on celluloid, based on pure geometrical and oscilloscope patterns with *musique-concrete* sound tracks compiled from extended sessions of recording with tape loops and varying capstans.

The orthodox method of cartooning is quite involved but there are many amateurs who derive great pleasure and satisfaction from it, achieving forms of plastic design unknown in terms of natural life. Firstly a treatment must be written and broken down into a number of sketches onto a storyboard. The scenes on the storyboard are then timed and charted together with the proposed music and affects. The chosen music, speech and sound effects are recorded first, before any actual painting is attempted, because in animation it is simpler to match the visuals to the track rather than the reverse.

Track Reading

Reading the track consists of running the film through a sound head, or the tape round a magnetic head, slowly so that only a series of groans and grunts is reproduced, and marking synchronisation points on the film frame or the tape with a wax pencil. These details are then transferred to camera instruction charts known as "dope sheets", marked off in numbers of frames and completed camera instructions such as "pan south 20 frames" etc.

For conventional movement it is necessary to use celluloid sheets against which the background can be visible. The sheets of "cels" must be numbered and have a pair of registration holes along one edge. These holes fit over corresponding pegs on the animation board or rostrum. When the drawings are set up we have, from bottom to top, (a) the background (b) the parts of the drawing which do not move (c) the cels (d) a pressure plate glass to prevent the cels cockling under the heat of the lamps. Animation is obtained by changing the top cels in order and exposing a single, double or treble frame for each one.

(continued overleaf)

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Sound and Cine — continued

This is the technique favoured for most T.V. Commercials and was chosen by the Grasshopper Group for the now famous *Battle of Wangapore*. This film took John Daborn and his team two years, working by post, to make, for over a thousand drawings on cœl alone had to be painted.

Bob Godfrey, who has since graduated to making Commercials and is the producer of the *Do it Yourself T.V. Cartoon Kit*, a brilliant skit, chose a less complicated method for his first film *Watch the Birdie* by using coloured cutouts. This film is a six minute animated guide to the habits of the Ungle-Wungle bird, particular tribute being paid to its courage, adaptability and courting technique. The film took him six weekends to make and is perhaps the most successful amateur cartoon in existence. Although not such a technical *tour de force* as *Wangapore*, it has a sharper wit and the style of draughtsmanship is highly original, owing nothing to Disney. It cost £60 to produce, of which over half went on the music copyright. Nowadays, under his commercial set-up, he tells me, it would cost in the region of £3,000 to produce a similar film.

Puppets

Although it helps, artistic ability is not all essential in making animated films, while imagination certainly is. For instance, the small plastic toy models selling for 2d. or 3d. each can easily be converted to pliable puppets by some skilful work with 30-amp fuse wire, and a costume-epic mounted on a table top. Toy soldier animation can be quite rewarding especially if human and animal movement has been studied in any degree. Different human movements take place at different speeds and can be observed and timed with a stop watch. The best way to study complicated movement is to run a live-action film through an animated viewer and watch the changes, frame by frame, making sketches as you go.

This was the method used by Dorothy Rogers for her paper sculpture puppet film *Spring in the air*, a love story set to a Mozart flute quartet track. Her final storyboard consisted of 115 water-colour sketches each with a detailed breakdown on movement and timing.

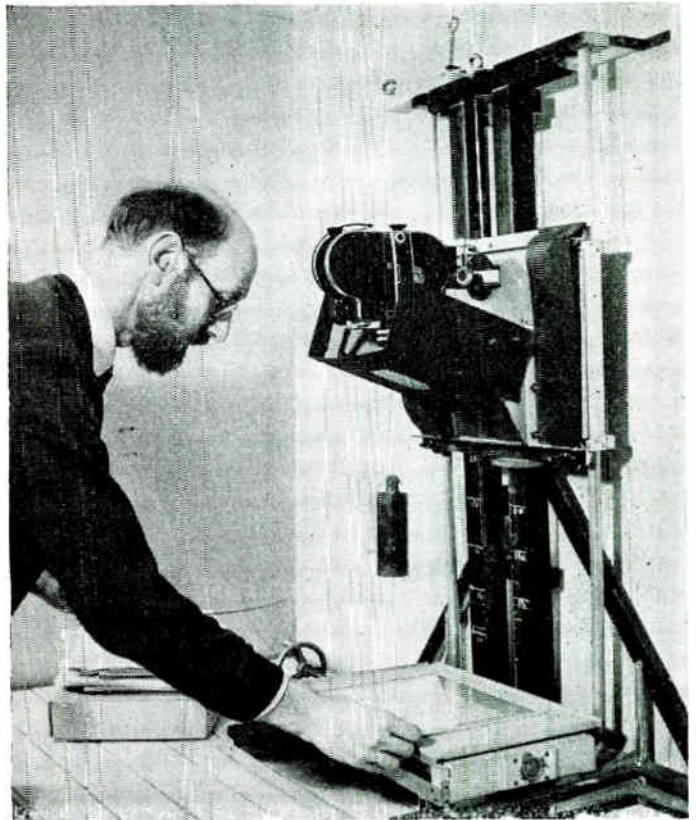
Puppetry is hard work and involves hours of careful effort for a minimum number of frames in the can. On the other hand—Pixilation—can achieve a similar effect, by using live actors, in a much shorter space of time. It is also more fun. The technique is to shoot at 8 fps for fast motion and intercut with stop motion. With stop motion you use the single frame as fast as you can while the actors go through their movement naturally. This gives an effect of jerky animation and the actors behave as puppets with magical properties.

Giving life to Still Pictures

The "Stillie" technique is finding new popularity. Once it was confined to the exploration of church windows, telling the story by an exploring camera which used a variety of tricks to give movement and life to the still subject. Now, still pictures are being used in all sorts of contexts; to tell the history of the U.S.A., to sell Lyrol on T.V., to make a most entertaining amateur film on the roaring twenties with a glorious traditional jazz backing. This film, *Two Studies of Jazz*, uses a variety of zooms and mixes to make its impact, and because the technique is simple and does not involve lots of painstaking effort I expect to see it repeated in a number of forms before too long.

Generally the animated film and the whole art of single frame shooting is experiencing a major revolution, and a multiplication of styles and techniques is causing it to extend its range as a creative medium in its own right.

Strongly influenced by posters, exhibitions and the styling of commercial products contemporary animators, amateurs and professional, are moving away from Disney's brand of fairytale realism and are trying to discover a sort of graphic symbolism. Saul Bass is the man to watch in this respect. His method is to extract the graphic root of the film's theme and exploit it in his titles; the tears, for instance, in *Bonjours Tristesse*, the



Stuart Wynn Jones, well known to our readers, adjusts the pressure plate at his rostrum.

bullet holes on the Goya engravings for *The Pride and the Passion*, the old presscuttings in *Cowboy*.

The emphasis, for our contemporary animated film maker, must be on legibility and the direct impact. The new photographic techniques enabling the direct use of the artist's original drawings, the use of electronics to control camerawork and even picture quality, the outlets nowadays in Television; all these can raise animation to a new and glorious level.

Even if your first attempts at animations are confined to titles alone for your documentary or scenario film, you can achieve this impact if you plan them as an essential part of the picture, intended to add to or establish the mood in those difficult moments at the beginning of the film.

A last word on animation—Peter Pearse of Southend is one of this year's Ten Best winners with his cartoon film—*The Happy Prince*. The cartoon is based on an Oscar Wilde poem and uses still drawings all the way through. Working entirely alone through the winter he painted all the visuals and photographed them himself. The only assistance from outside was with the narration and music mixing for the final optical sound track.



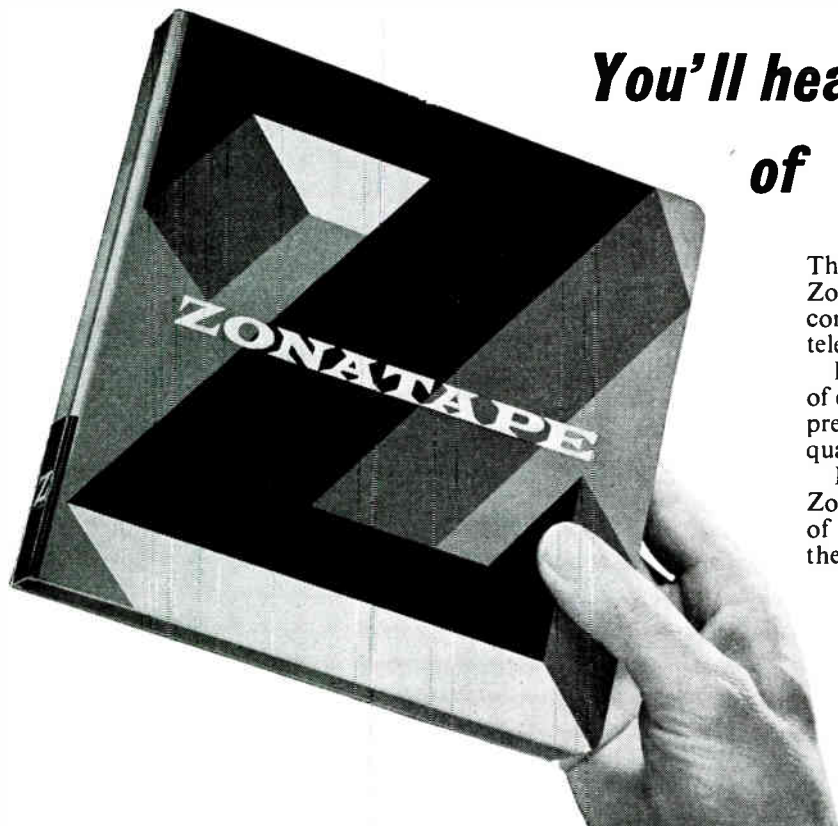
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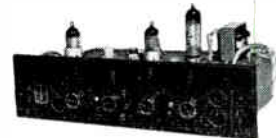


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... tape recorder workbench

No. 22 AC/DC CONNECTIONS

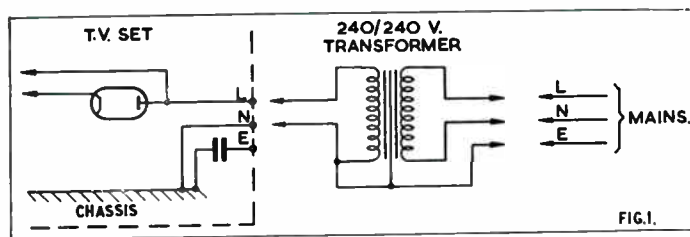
by A. Bartlett Still

It is a very pleasant thought that there are new readers of our magazine every month, and I am sure that I will be forgiven for hoping that a number of them will be new readers of this column! The letters that come in very often show that new readers do not always bring new problems; there are a number that keep cropping up, problems that have perhaps already been dealt with in these pages.

Normally, it would not be fair to the "Old Faithfuls" to keep repeating information previously given, but I feel sure they will overlook an occasional repetition if the subject is of sufficiently wide interest, or is of great importance. On these latter grounds I make no apologies for further notes on a subject that first appeared in "Tape Recorder Workbench" No. 8 in January 1960. This concerns the connection of a tape recorder to a radio or T.V. set. These days, most recorder instruction booklets tell you how to record from radio or t.v. by connecting to the "Ext L.S." sockets, or give details of what has come to be known as a "Diode" connection—a modification to the circuit that can easily be fitted, either by yourself or the local dealer.

Play Safe!

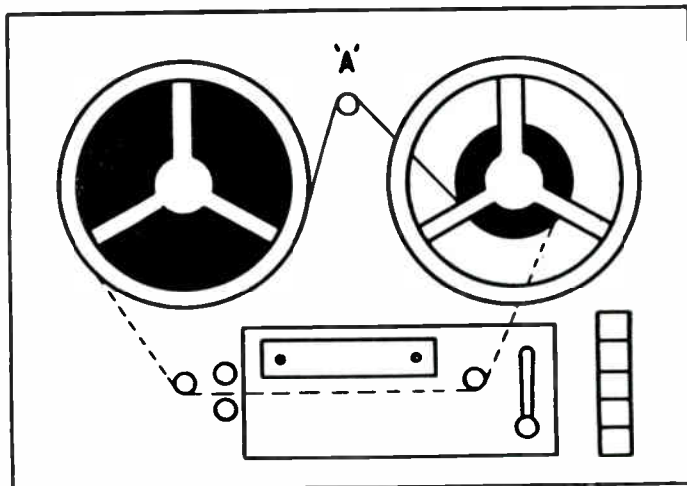
The important thing is this: a number of Radios and nearly all T.V. sets are of what is referred to as the "AC/DC" variety, and they do not have a mains transformer. With such sets, and this cannot be too strongly stressed, a **direct connection to a tape recorder could be dangerous, even lethal.** Incidentally, it is not often that you get good recording from them because of a high level of mains hum. In an AC/DC set the chassis is connected to one side of the mains supply, but this is safe enough because the set is so constructed that no metal parts can be touched in normal operation. A tape recorder is *not* so constructed. Its chassis is protected from the mains and so is safe to touch. But when the two are joined together the unprotected T.R. chassis is connected to the mains through the T.V. set; hence the danger.



A 1:1 isolating transformer should be used on AC/DC equipment.

The safe way to overcome this problem is to provide the missing transformer. An isolating transformer should be used to feed the mains to the receiver, whose chassis may then be earthed with complete safety. I am repeating a diagram which I gave before, and which shows the correct form of connection. A good dealer or competent electrician will be able to give further advice if required.

A tape deck that I have had for a number of years now, and which, incidentally, has given me great cause for satisfaction, is the *Truvox* Mk. III. Its particular failing (and I have never yet found a tape deck without one failing) lies in the looseness of the spooling during *Fast Forward* and *Rewind*. A cry for help from a reader that appeared in "Readers Problems" last February showed that he had similar trouble (though not



Position A shows new tape guide for modification to *Truvox*. Dotted line—old lace up. Continuous line new take up.

necessarily a similar deck). From a fellow *Truvox* owner in Oxford comes a suggestion that I believe will provide the cure.

He had added the extra pillar, marked 'A' in the diagram, as close to the spools as possible. For fast winding, the tape is taken round this pillar as shown. The modification does, apparently, tighten the wind though it will not necessarily tidy it. The pillar is made of a spacer and two washers, the spacer being—and this is important—a few thousandths of an inch over the nominal quarter inch. If the spacer is exactly a quarter of an inch the tape will tend to bind and chafe at the edges, but the addition of a piece of paper between the spacer and on the washers does the trick—the clearance required is no more than that.

A Truvox Braking Tip

Following on from this very useful tip, the same reader queries whether the braking on the *Truvox* deck might be too fierce for double play tape, particularly with the modification added. The form of electric braking adopted is very efficient, but should be smooth enough in operation; damage would normally be caused by "snatching". However it is fairly easy to decrease the braking force, as follows:

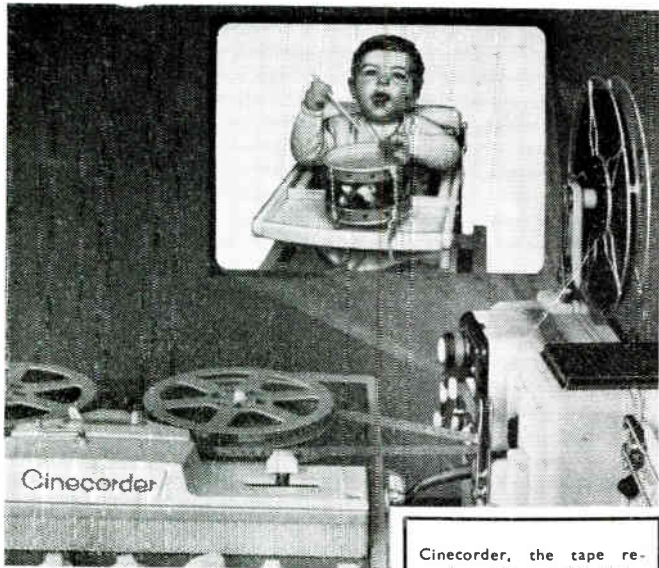
The amplifier H.T., being D.C., is applied to the trailing motor through a resistor to limit the current. The value of this resistor normally recommended by the makers is 1 kOhm, but this must obviously only be correct for a certain H.T. voltage. If it is suspected that braking is too fierce, there would be no harm in locating this resistor and increasing its value to about 1.5 kOhm, or whatever value is found to be suitable. This can be done by replacement or by adding a second resistor in series with the first. It should be noted that quite a high wattage rating is needed here, it would probably be advisable to use a wire-wound component.

Finally, a word or two about *Static*. On some tape decks, particularly those of continental origin which tend to use a lot of plastic in their construction, all manner of sparks and fire-works can be seen when fast winding. This will be most apparent if the machine is normally kept in a warm dry place. Nowadays static will not normally harm a recording because most tape oxide is sufficiently conducting to discharge any static voltage that may tend to build up on the tape itself, but the sparks from spool to deck can be quite frightening. The remedy is to clean and polish the spools and deck regularly with one of the silicone furniture creams. Quite apart from helping to keep your machine looking spick and span, the conductive film will defeat any voltage build-up.

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CHITNIS Electronics announce the introduction of two further Tape Recorders to their Audiograph range. The first is the KMS/66 a 4 track High Fidelity stereo model running at $3\frac{1}{2}$ ips. Basically this model has been developed out of the very successful 9/S4K. The KMS/66 has a second loudspeaker in the lid, which enables the user to enjoy full stereo reproduction without the need for extra speakers. This recorder has Bogen heads which assure an unusually wide frequency range and excellent transients. This latest Audiograph stereo recorder is presented in a newly styled cabinet with all the usual facilities associated with high class recorders for domestic use. Retail price 66 gns which includes a reel of tape. The model AF/42 has been introduced by Chitnis Electronics as a challenge to recorders in the lower price range. Features include 4 track operation (mono); 2 speeds $7\frac{1}{2}$ and $3\frac{1}{2}$ ips and 7 in. reels. Here again the usual facilities for monitoring multi-channel inputs etc., are offered together with microphone and reel of tape at the retail price of 39 gns complete. A smart

presentation case finished in blue and grey is used to house the instrument, which incorporates an amplifier designed to hi-fi standards.

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Continental Plugs and Sockets



A WIDE range of Continental plugs and sockets have just been announced by T. S. L. full details of the range, and prices are available from Technical Suppliers Ltd., 63 Goldhawk Road, London, W.12.

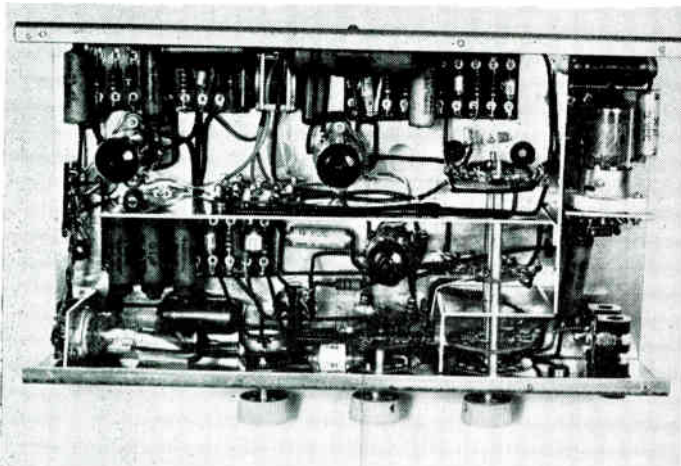
New Japanese Recorders

THE Sony range of recorders from Japan were demonstrated for the first time in April, they are the 101 (£51 9s.) 111 (£35 14s.) 262 (£64 1s.) and the 521, a two or four track Stereo machine at £130 4s. All the machines are available from the U.K. distributors Tellux Ltd., 44 Brunel Road, Acton, London, W.3.

EQUIPMENT REVIEWED

The Stern Type C Tape Amplifier

STERN'S RADIO have steadily been building up a lively business in "Do-It-Yourself" kits, specialising in products based upon Mullard designs. They invited us to select any item from their range for construction and review, and we chose the Type C tape record/replay amplifier. The components were good, and the metal exceptionally robust. It was a pleasure to find holes so accurately drilled and positioned that screws really dropped into place. The instruction manual was also very good and easy to follow. Successive pages showed point to point wiring stages—and ignored what was already covered, making checking very simple. The unit was completed and sent to our reviewer, Mr. Tutchings, for testing, and his report appears below:—



I AM glad to report that the Editor's homework left me with the simple task of interconnecting the preamplifier and power pack, and that it worked perfectly from the word go! I think my testing sequence might be of interest to those constructors who want to do a bit more than simply connect the unit to a deck and see if it makes a pleasant noise, and I will endeavour to report my tests in chronological order. Two heads were used. A *Miniflux* of very high inductance, and a *Collaro*.

Playback Responses: The *Miniflux* head of the tape deck was connected to the coaxial input lead of the Stern preamplifier, and a check made that the deck and amplifier were efficiently earthed to avoid hum troubles. The other coaxial output lead was connected to my valve voltmeter and to an audio amplifier for aural monitoring. The deck was next loaded with a $7\frac{1}{2}$ i/s C.C.I.R. test tape and the head aligned for azimuth on the appropriate high frequency tone. The output on the 1 Kc/s tone was 280 millivolts, or approximately 0.3 volts rms; more than enough for most power amplifiers. The other tones were plotted to give the middle response of Fig. 1. It will be seen that the response is level from 40 c/s to 10,000 c/s plus or minus 1.5 dB!

The equalisation was tested at the other two speeds by using suitable standard test tapes. The $3\frac{3}{4}$ i/s response was very close

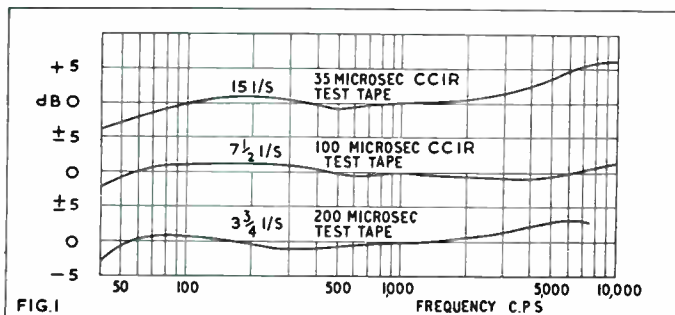


FIG. 1

to the 200 micro second playback response generally accepted as standard for this speed.

The 15 i/s equalisation would seem to be nearer 50 microseconds than the standard 35 microseconds, but it must be remembered that the amplifier is designed for use with a variety of heads, and that the responses we are measuring are a combination of head and amplifier responses. The first head used for these tests had a high inductance, and a self-resonance with its own screened lead at 15 Kc/s. The added capacity of the extra connecting lead, together with the valve input capacity, would bring the resonance down towards 10 Kc/s, and this may account for some of the top rise shown in these responses.

Signal/Noise Ratio: The noise and hum from the preamplifier was 3.5 millivolts, or 38 dB below test tape playback level; the recorded noise due to bias together with the tape noise did not appreciably alter this reading. Recording tests showed that peak recording level, which is 12 dB above test tape level, could be recorded with negligible distortion with proper bias. The unweighted peak signal to noise ratio is thus almost exactly 50 dB. One of the reasons for this excellent signal/noise ratio is the high output of the head used in these tests. The results from the second test head, the *Collaro*, gave 3 to 4 dB less signal, but even so the performance of the preamplifier is very good.

Recording Tests. At this point the first signs of trouble appeared, when using the *Miniflux* very high inductance head. A quick aural check showed that recordings on the tape were erased cleanly and efficiently. Recordings, however, sounded thin and slightly distorted and the recording level, as indicated by the magic eye, had to be reduced a long way below peak recording level to get passable quality. If this sounds faintly familiar to you it is because I have had to say it so often before in my reviews—Yes—it is our old bogey under biasing, but in this case it was not the fault of either the head or preamplifier design, but a combination of circumstances which makes them non-compatible.

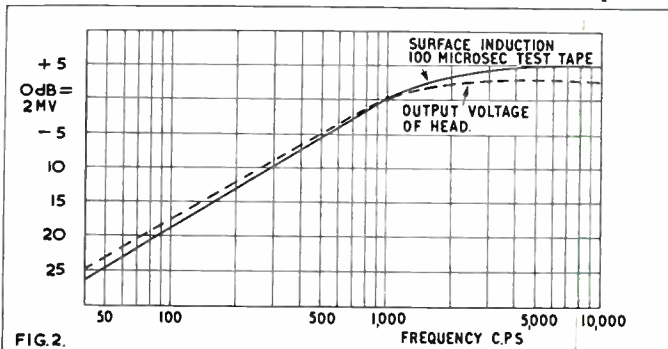


FIG. 2.

Optimum bias for this head is 130 volts at 60 Kc/s, but, with the erase head connected, the preamplifier only delivers 40 volts. I then used my favourite trick of disconnecting the erase head as a temporary expedient for obtaining more bias, and with the erase disconnected the bias voltage rose to 100 volts. Performance immediately improved, and whereas distortion had been visible on the C.R.T. even at test tape level with the low bias, the recorded signal could now be raised 12 dB with no visible distortion at all, and listening tests immediately showed a vast improvement. Fig. 2 shows the record-replay responses, and these are sufficiently near to the test tape replay-only responses, to need no further adjustment.

Bias Tests: The erase head was reconnected and efforts made to raise the bias by altering C29 in the bias feed circuit. A 250 pf was connected across the 100 pf condenser fitted, and this raised the bias to 80 volts, but a test at $7\frac{1}{2}$ i/s showed a peak in the recorded response at 5 Kc/s (dotted curve). This was obviously due to the head being tuned to this frequency by the larger bias feed condenser. Every possible combination of coil tap and feed condenser was tried with not further increase of bias. As a check that the

design of the preamplifier was blameless, the Collaro head was substituted for the high inductance Miniflux and the 40 volts provided proved to be satisfactory for distortion-free peak-level recording. The inductance of the Collaro head is 500 milliHenries, and the self-resonance 30 Kc/s.

Summary: A fine pre-amplifier, and ideal for use with heads of orthodox construction and inductance—for which purpose it was designed. As will be seen, however, if it is desired to take advantage of the extended frequency response which is now possible with heads of very short gap length and high inductance, such as the *Miniflux*, some modification of the oscillator and equalisation circuitry of tape pre-amplifiers will be necessary.

A. Tutchings.



★
THE STUZZI TRICORDER

578W

★
Manufacturer's Specification: Tape speeds, $3\frac{3}{4}$ i/s, $1\frac{7}{8}$ i/s, and $15/16$ i/s. Tracking system, half track to international standards. Mains supply, AC mains 50 c/s. 110, 130, 150, 220 and

240 volt ranges. Consumption, 50VA approx. Fuse 0.8A. Frequency range, $3\frac{3}{4}$ i/s, 40-16,000 c/s, $1\frac{7}{8}$ i/s, 40-8,000 c/s, $15/16$ i/s, 40-4,000 c/s. Signal to noise ratio, better than 45 dB. Speed stability, better than 0.3%. Output power, 2.5 watts. Reel size, $5\frac{1}{2}$ in. reels.

Price: £66 3s. Distributed by Recording Devices, 44, Southern Row, London, W.10.

Electronic Mixing

Controls: The control system of this recorder is unusual. The centre button is first fully depressed and the required function, i.e., record, play, rewind, etc., set up on the other buttons which are marked with the Continental style symbols. A very light touch on the centre button sets the tape into motion, and a further touch will stop it instantaneously. Operation is by relay

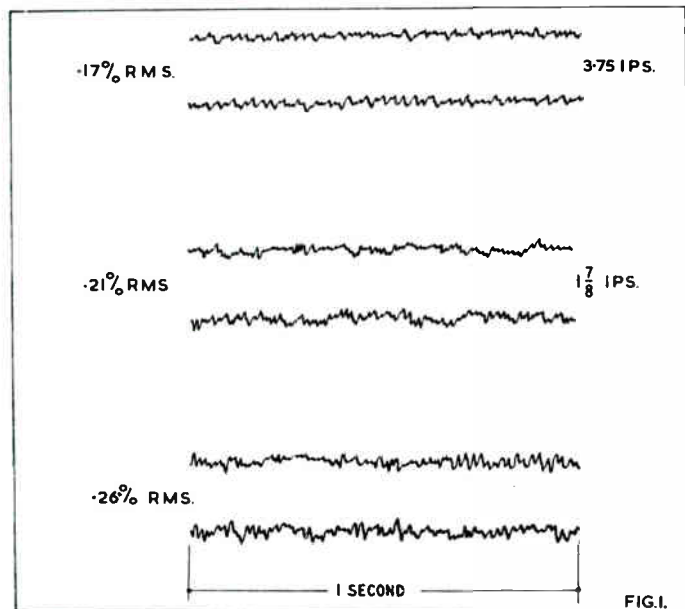


FIG.1.

so that remote control by foot pedal or slide projector is possible. Gain controls for two inputs allow electronic mixing, and these controls and the tone control are edge operated but—unlike many British recorders with edge controls—the rims are clearly numbered and one is never in any doubt about which way to turn a control, or where to set it for reproducible results.

Wow and flutter: Fig. 1 shows the fluttergrams for the three speeds when recording and replaying a 3Kc/s test signal. At the highest speed of $3\frac{3}{4}$ i/s the total wow and flutter did not exceed 0.17% rms. Most of this was low level flutter and wow was almost completely absent. At $1\frac{7}{8}$ i/s the total reading reached 0.21% rms with no very obvious periodic component due to rotating parts. At the lowest speed of $15/16$ i/s the combined reading was only .26% rms, mainly tape rub and longitudinal oscillation, with a just perceptible capstan wow at two cycles per second when listening critically to a sustained pure tone recording. This is a remarkable performance, and, like the Tandberg recorder recently reviewed, it owes a lot to the very smooth drive provided by the Papst external rotor motor.

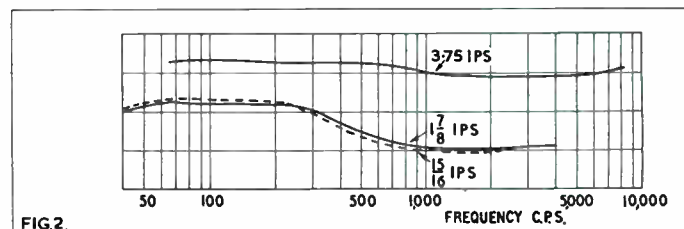


FIG.2.

Playback response: The top curve of fig. 2 shows that a 200 microsecond C.C.I.R. test tape plays with a level response. This means that British or American pre-recorded tapes will play back with a wide and level frequency response. The same test tape was played at half and quarter speed to give the equivalent of 400 and 800 microsecond recording characteristics. This was

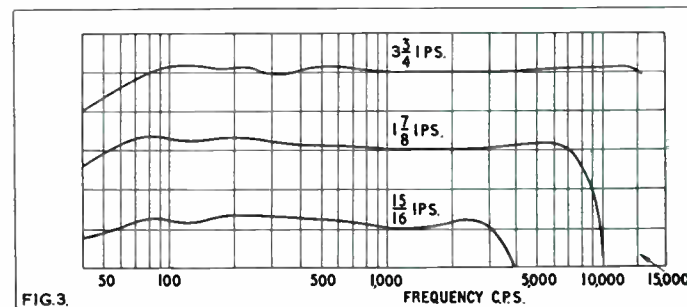


FIG.3.

not done with any idea of interchanging tapes, but simply as a bit of detective work to try and decide what actual recording characteristics were used at the very low speeds on this machine. A little mental agility indicates that the surface induction of a test tape recorded at $1\frac{7}{8}$ i/s, with a constant input to the recording amplifier, corresponds to a time constant of 200 microseconds, and that at the lowest speed to a time constant of 400 microseconds. This implies that very considerable pre-emphasis is used in the recording process—see next paragraph.

Record play response: Observation of the magic eye record level indicator during pure tone recording tests showed that pre-emphasis at the two lower speeds was of the order of 20 dB, and for this reason all test recordings were done at 20 dB below peak recording level so that the higher frequencies did not overload. On normal recording, of course, the well-known spectral distribution of energy in speech or music allows a higher level to be used. The record/play responses of fig. 3 meet the manufacturer's specification exactly and, as frequency responses, can not be faulted. It only remained to see if the level response was obtained at the expense of distortion and intermodulation by the common expedient of under biasing. I am glad to be able to report that this was not the case. A level 11 dB above test tape level could be placed on the tape with less than 3% distortion, and the recording level indicator beams just touched at this level.

Returning for a moment to the vigorous pre-emphasis and the spectral distribution of voice and music, I did find that sibilent

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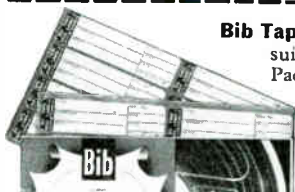


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STUZZI TRICORDER REVIEW—(continued)

blasting could occur with the microphone provided with the recorder, particularly when used face on at the lowest speed. This was due to a 7 to 10 dB peak in the axial response of the microphone at 4 to 5 Kc/s; there was no sign of overload with a level response microphone, or from radio recordings. Generally speaking it would be wise to under record very slightly at the low speeds.

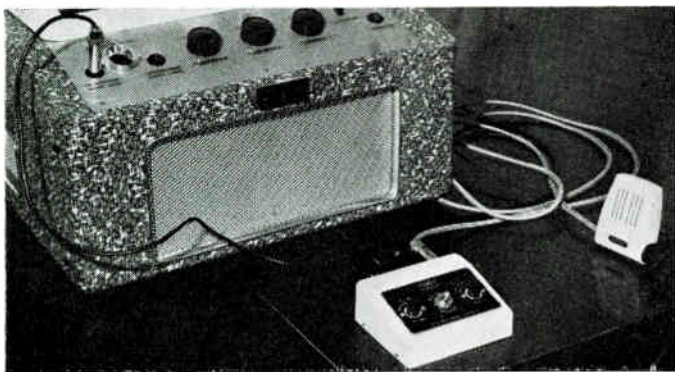
Signal noise ratio and hum: The only disappointing feature of this particular recorder was a rather high hum level: 38 dB below peak recording level at $3\frac{3}{4}$ i/s, 34 dB at $1\frac{7}{8}$ i/s, and 25 dB at the lowest speed. As all other points in the specification were fully met I think I am fairly safe in assuming that the hum was due to a slight fault, or a noisy valve, in this case—but I must report these things! Recorded hiss was extremely low; I measured this by playing the tape on a professional recorder with a very low hum level and with a weighting network to favour the hiss and eliminate the last vestige of hum. The bias and erase noise was only 2 dB above bulk erased tape noise which is excellent.

Power output: The electrical undistorted power output into a 3 ohm load was 2 watts. The instruction booklet mentioned extension speaker impedances in the range from 2 to 6 ohms, so a further check was made with loads of these values. The undistorted power output was still in the order of 2 watts.

Comment: I like this little machine very much. It does show what can be done with the new micro-gap heads. As I have said before, with such a head there is no difficulty in reproducing very short wavelengths, or very high frequencies, from the tape; the big problem is to get the very high frequencies on to the tape without distortion and intermodulation. In this recorder, bias is near optimum, and the high frequencies are recorded by carefully tailored pre-emphasis of the top response during recording. The pre-emphasis and bias are critically matched to the tape, and it is more than ever important to use only the recommended tape for consistent results with this unit.

A. Tutchings.

The Tape Mixing Ade, Mk. 1



Manufacturer's Specification

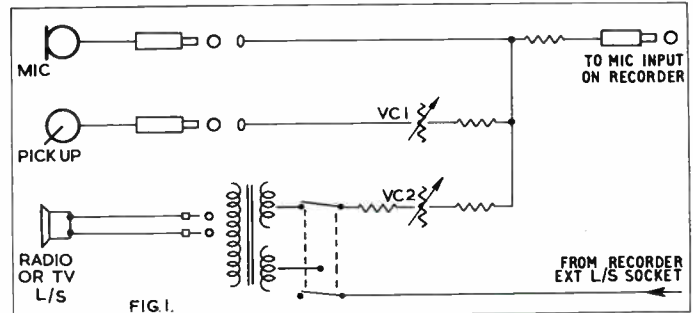
Inputs: Microphone (high impedance, 50,000 to 250,000 ohms) via jack socket; pickup (high impedance, 5,000 to 100,000 ohms) via jack socket; radio (low impedance External loudspeaker socket) via twin cable; tape recorder (external loudspeaker sockets) via twin terminals. **Output:** high impedance (via coaxial cable and jackplug). **Record/Playback Switch:** allows playback through radio loudspeaker without changing connections. **Isolating Transformer:** gives protection from electrical shocks. **Dimensions:** $4 \times 3\frac{1}{2} \times 1\frac{1}{2}$ in. **Price:** £5 5s.

Manufactured by Electronic Ades (London) Ltd., 6 Alpha Road, Teddington, Middlesex.

THIS little gadget is not a *mixer* in the ordinary sense of the term—though it may be used to mix the levels of two separate programme sources relative to a third. It is designed specifically for the tape recorder enthusiast who has fairly modest

microphone/radio/gramophone recording requirements and wants to be able to record from the chosen source without all the usual rigmarole of changing over plugs, cables and volume settings.

The tape mixing Ade's first function, then, is to accept inputs from all the required sources, and this aspect was tested before going on to more ambitious experiments. I hope the manufacturers will not mind my reproducing a simplified sketch of the



circuit (fig. 1) but it will help to explain the mixer's operation in more detail. You will see that the *microphone* is permanently wired through to the tape recorder, so long as it is plugged into the Tape Mixing Ade, and the only control of its volume is that in the recorder itself.

Pickup Permanently in Circuit

The *pickup* is also permanently in circuit, via the volume control VC1. Thus the pickup may be independently adjusted in volume, or faded out completely if not required. The third input, labelled *Radio*, is taken from the External Loudspeaker sockets of a radio, radiogram, or television set, and forms part of the mixing circuit, via VC2, only when the two-way switch is set to record. Once the equipment was set up according to my diagram, i.e., with the switch in the down (record) position, the first step was to set the tape recorder volume for correct level on speech. Then, without touching the recorder volume any more, I tried out the pickup and radio channels in turn to establish the best settings of VC1 and VC2 for recording. Once this had been done (and the settings memorised or marked on the dial with Chinagraph pencil) *no more adjustments were necessary.*

The Professional Touch

After a few trial runs with the above set-up, making recordings from one source at a time, it was decided to try a little mixing. If you want simply to record speech *over* music, say from a gramophone record, you just use the microphone in the ordinary way and set VC1 to a little below the position normally used for recording from discs at full volume. A little trial and error soon produced recordings with quite a professional touch. It was then verified that a second microphone will indeed operate satisfactorily through the pickup circuit and VC1, making microphone mixing a possibility of the speech + effects, narrator + dialogue, or band + solos variety.

Playing Back

If you look again at fig. 1, you'll see that switching up to playback connects the tape recorder's External Loudspeaker socket (if fitted) to that of the radio or TV set. This is designed to give improved quality playback of your recordings, and is based on the assumption—true more often than not—that your radio's loudspeaker is capable of better reproduction than the lightweight one in your portable tape recorder. Don't expect too much from the TV loudspeaker, however, unless your set has a better than average loudspeaker.

Summary

To sum up, I would say that this new accessory does exactly what it sets out to do, namely eliminate some of the fiddling operations in home recording. However, the initial setting up does call for a bit of care, and I can think of quite a few cases where an extra switch would be necessary, e.g., to silence the radio or TV while playing back your recordings—preferable to tuning off-station—so that complete newcomers to electronics should see a reliable dealer before connecting up. **John Borwick**

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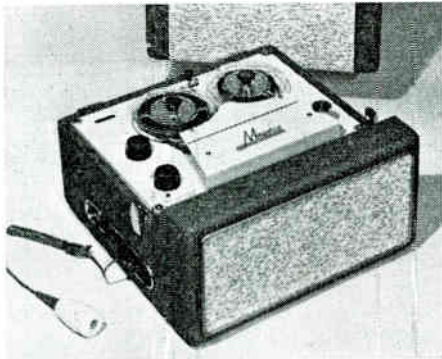
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★
THE
CHALLENGE
"MINIVOX"
MODEL C
★

AN earlier model of this all British portable tape recorder was the subject of one of John Borwick's *Field Trials*, and was fully described, from the operational point of view, in the January 1960 issue of this magazine. The later model, presently under review, has had the tape speed of $3\frac{1}{2}$ inches/sec. added to the existing $1\frac{1}{2}$, but would seem to be otherwise very similar. The present writer is glad to be able to endorse earlier remarks about the ease of operation of the controls of the machine and its versatility. When assessing its performance, however, it seems to be easy to fall between two stools. Should one pose the question "What do I expect from a tape recorder?" or "What do I expect from a portable tape recorder of this size?" Since the first question obviously requires qualifications to some degree, the second was adopted, to be answered more than satisfactorily by the "Minivox".

Hum—Non Existent

This is not to say that there are not minor criticisms, but let due note be taken of the word "minor". The jack plugs and sockets used are of the miniature variety, in keeping with the overall size of the machine, but, largely because of this, they are not always as positive in their contact as might be desired. Due to battery operation, mains hum is, of course, non-existent, but it is felt that the level of noise remaining, particularly tape hiss, could be disturbing. This is not so much a function of the noise power as the frequency band in which it is concentrated. Lacking a circuit diagram no details are known of the bias arrangements, the effect is of D.C. recording bias, leaving the head magnetised to a degree and introducing tape hiss even during playback. These effects are only serious if the tapes are replayed with a standard machine.

Wow and Flutter not Noticeable

The frequency response figures obtained, cannot be described as superlative, but they are adequate. At first sight the lack of bass would be a handicap, but it does result in some very clean recordings under conditions that might otherwise introduce colouration, an important point with a portable. Wow and flutter are not noticeable and distortion is at a very low level. The fact that a 1 Kc/s signal could be recorded at full level and replayed at full volume producing nearly 300 mW in the loudspeaker @ 5% distortion, speaks well for the output stage as well as the record amplifier.

To sum up, if it is appreciated that a portable, battery operated, machine must yield in some respects to its bigger brothers, this little *Minivox* performs well and, it must be remembered, can perform anywhere **A.B.S.**

Price £31 10s. Manufactured by Challen Instrument Co., 4, Stratford Place, London, W.1.

This review has been submitted to the manufacturers who are preparing a comment for publication in an early issue.—Editor.

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our readers write

Note: This letter was published in the April edition of *Hi-Fi News*. We reprint it here in view of other correspondence on this subject which is reaching this office. (Editor).

. . . about the 89% rejects

From: University Recording Company, 16 & 17 Burleigh Place, Cambridge.

Dear Sir:—We can fully endorse the statements made by Peter N. Frost in his letter to *Hi-Fi News* (January) regarding the exceptionally poor quality of the equipment turned out over the last fifteen years by practically every maker (British and foreign) in the recording and hi-fi field. We are specialist engineer distributors and consultants with wide wholesale and retail connections; designers/manufacturers of complete installations and professional recording engineers to boot, so we have profound experience of all aspects.

We have always found it necessary to thoroughly examine and test every single item received from any maker, distributor or importer, prior to releasing it for sale to the public via the trade or using it in our own manufactures. It is very rare indeed to find a piece of apparatus of any sort which has either not suffered damage in handling or transit or does not contain a fault or incipient fault of some description, which will cause some trouble in the hands of the user if not rectified by very highly skilled and qualified engineers before the equipment goes into service.

Beyond the broadest classification it is impractical here to enumerate the faults found. Starting with almost 100% rejects on first acceptance tests, the final breakdown is as follows: 89% of the items tested are rejected, and not stocked at all due to lethal or faulty design or fraudulent misrepresentation as to specification (obviously nobody can make these goods or sell them with integrity).

The remaining 11% are our standard lines which are usually basically sound and we deal with these as follows:

(1) 58% approx. are returned to the suppliers with major faults in workmanship or materials) which are either not economically correctable or beyond local action. *We do not take them back* and we suspect they later appear at other places or on the cut-price market.

(2) 16% are returned for repair, retested and accepted.

(3) 24% (and 2 above) require repair, touching up, adjustment, lubricating or cleaning in our works prior to re-testing and acceptance for sale.

(4) 2% approx. could have safely gone out for sale in the original unopened packings with a reasonable guarantee of satisfaction provided there is no valve, component or control failure during the first few hours of operation.

(5) We now grade 2, 3, and 4 and try so far as possible to see that they are applied to compatible projects within their scope.

We get no avoidable complaints from our customers. When we complain to our suppliers the stock reply is "yours is the only complaint received, etc., etc.". From this we assume practically nobody else tests the stuff before they sell it. Quite obviously the remedy for shoddy goods lies entirely in the hands of the consumer who should insist upon seeing the goods tested to his or his consultant's satisfaction prior to purchase; return all early and avoidable failures to the supplier and demand back the money and keep the makers advised of complaints. Quite clearly the present manufacturing, distributing and advertising systems for highly technical consumer goods of all kinds is rotten to the core and will so remain until the "consumer" takes the trouble to change it. *Yours faithfully*

* * *

. . . about faulty goods

From:—David R. Wiseman, 8, Woodhurst Road, Acton, London, W.3.

Dear Sir:—We have just read your April issue with great interest, and it is our considered opinion that the writer of the

letter from the University Recording Company ("89% rejects") should be given a medal!

We can still hardly believe that this was indeed written by a member of the wholesale and distribution trade. Now we're starting to get somewhere near the truth, at last. If only retailers and distributors, and the manufacturers were as conscientious as this company, the sales of high-fidelity equipment would be considerably higher. I, personally, have been playing around with tape recorders for nearly thirteen years now, and it is only with the greatest reluctance that I buy British. I don't say that the foreign gear is faultless, but the standard of finish is considerably higher.

Let me give you an instance—my wife bought a British stereo-recorder. When it arrived, there was a label on the handle, marked "Passed Final Inspection . . . O.K." We plugged in and switched on, and the transformer immediately blew! Out of curiosity, I decided to probe around it, and found that it could never have made a stereo-recording, because the heads were wired incorrectly. Three letters to the maker didn't even get the courtesy of a reply.

My wife then bought a *Telefunken*, and after a week something shorted. My wife phoned Welmecc Ltd., who were most concerned about it, and apologised profusely. They requested that she refrained from any worry, and promptly sent an engineer to the house. The machine has run perfectly since, without any other fuss. If only British makers showed the same concern! My only item of equipment, shortly, will be my *Wharfedale* speakers—Wharfedale being one of the rare "interested" types. It is to be noticed that the preference for foreign equipment is steadily growing in this country, and British makers have only themselves to blame. I have a perfect example right in our club. First, a preponderance of British types, but the German machines are steadily increasing.

Take the average retailer—in far too many cases, he can't even demonstrate a lot of the machines on his shelves, and that's a fact. I have reports of this every week. There are exceptions, we know, but they're too rare. If one goes direct to the maker, you merely get utter indifference. Make no mistake, we would dearly like to have an entirely British outfit, covering tape, disc, and radio, but it's far too big a risk. The reliability isn't simply nil—it's minus! Messrs. University simply bear this out. Now, how many of the makers are going to be this honest, too? Not a single one, for a bet.

You, the public, are partly responsible, you know. You simply don't have the initiative to kick up a fuss about it. You will accept any rubbish sold to you without yelling blue murder. Most of you get only what you deserve. With a few outfits of the University type around, things would alter vastly, in a very short time. We would like to know if they supply anyone in this area. Jolly good luck to them—they deserve to prosper.

Yours faithfully,

* * *

. . . about replies

From:—T. H. Morrison, 136 Bank Street, Whangarei, New Zealand.

Dear Sir:—Your issue of January 1961 has just come to hand and I have, as usual, read it from cover to cover and curb my impatience waiting another whole month for a further number. How I wish it were a weekly magazine (pity the poor Editor!) My letter in the November 1960 issue of your magazine brought me ten airmail replies from various parts and I have now answered them all in a similar manner and suggesting that as I can get all the classical and light opera music here in abundance, there is really nothing that an English tapespondent could send me. One gentleman from Sweden was kind enough to send me a 3½ in. reel of talk about his country and Swedish music which was quite novel to us here and greatly appreciated by us all, I have now taped his reel in reply with native music and talks regarding this part of the world and this will go forward shortly. In every instance I have suggested to writers that if they would like similar

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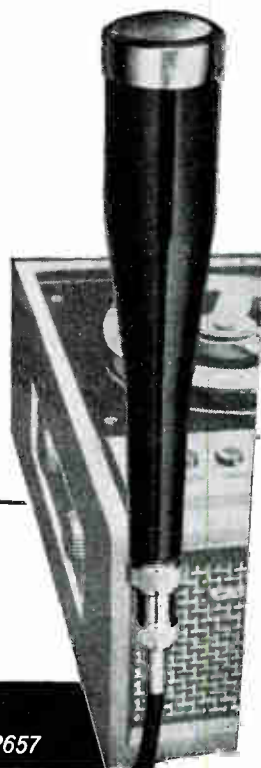
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READERS' LETTERS—(continued)

recordings I will be very pleased to tape them for them if they care to send along (per surface mail) a 3½ in. tape and return them the reel in the same way.

I would always appreciate music and talks from foreign parts but I detest the American "canned" noises, trumpet blares, "pop" singers (?) and Jazz and do not record these. I prefer orchestral and piano music by the masters and do not care for organ or chamber music.

I have compiled a 1200 ft. reel of native music and legends and will use parts of this for recording on any tapes sent to me for this purpose.

It may surprise readers to learn that we have only one T.V. station in the whole of N.Z. although more are promised shortly. The fact that we are some 50 years behind the times has, of course, the advantage in that our equipment is the very latest type (the same would apply if we waited another 50 years!). T.V. is, of course, only for the city people and I am afraid that it will be very many years before the outlying areas will be able to receive it.

I heartily agree with one of your correspondents concerning the length of pre-recorded tapes. I bought two reels (7 in) of "The Merry Widow" in German which is splendid but the reels were only partly filled and I feel that the suppliers of these tapes should be forced to state the respective lengths of tapes.

I am always interested in the articles by Mr. Tutchings and others but the correspondence columns interest me much more as they give the other fellow's views and experiences which often prove most useful and interesting to us here, altogether a fine magazine and you are to be congratulated on its context.

With kind regard to you and all tape users (we have no Tape Clubs in N.Z.).
Yours very truly,

* * *

... for sheep sounds

From:—R. G. Ledieu (IAC) a/c Atlantis (Brazil) Ltd., Caixa Postal 7137, Sao Paulo, Brazil.

Dear Sir:—I wonder if any of your readers would be prepared to help me by recording for me a short length of tape, at 7.5 i/s, of sheep being herded, including if possible some fairly young lambs, and then a similar length of a similar number of sheep at rest—in a field or pens at a market.

I need these effects for dubbing on to an 8 mm film I have made and neither length need be more than about thirty seconds in duration, as I should use them in the form of a loop. The recordings should not contain human voices as far as possible, or at least it should not be recognisable that they are speaking English. The film is set in this country.

I should be most grateful for any assistance. I should naturally be prepared to meet any expenses or, if wished, to reciprocate by making recordings of something from this end.

Yours faithfully,

* * *

... about "splice-free" tapes

From:—H. A. Hart, Station Chambers, Sunningdale, Berks.

Dear Sir:—Mr. A. J. Merrill's complaint of "an audible lapse in sound" is far more likely to be due to a splice in the tape. I have found a splice in the tape of four well-known brands of tape, and on taking the matter up with one manufacturer was told in so many words that if the tape was good enough for the German radio, it was good enough for me—splice or no splice.

I think it is time that all well-known brands of tape were guaranteed splice free, as there is nothing more annoying than to hear this lapse of sound in any recording. I usually cut the splice out, join stop foil and leader tape to the larger portion left, and place on to a smaller spool.

Yours faithfully,

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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.

All advertisements for the June issue must arrive not later than May 7th.

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Kodak Limited have a vacancy for a tape recording enthusiast who would assist in the preparation of tape lectures. A knowledge of tape recording theory is desirable and practical experience essential. Please apply, giving personal particulars, to the Personnel Manager, Kodak, Ltd., Kingsway, W.C.2.

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Emitate for sale, new, unused. "99" L.P. 1,800 ft. 37/6 per reel, double play £3. The Gramophone Shop, 901, Dumbarton Road, Glasgow, W.1.

Clarion Transistor portable, contained in twinset amplifier new, perfect £18. Wood, 90, Grestone Avenue, Birmingham, 20.

Grundig TK35 recorder and accessories. Little used £50. P. Meadway, Peregrines, Tuddington Lane, Littlehampton, Sussex.

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