

the TAPE

PRICE 1/6

SEPTEMBER 1959

Vol. 1 No. 8

RECORDER



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- Build a Simple Recorder-Part One of a Beginners' Constructional Series
- Recording Sound Effects
- Tape and Home Movies
- Designing an Electronic Mixer
- Tape at the Radio Show
- Club News
- Readers' Problems
- Equipment Reviews

STEREO without STYLUS

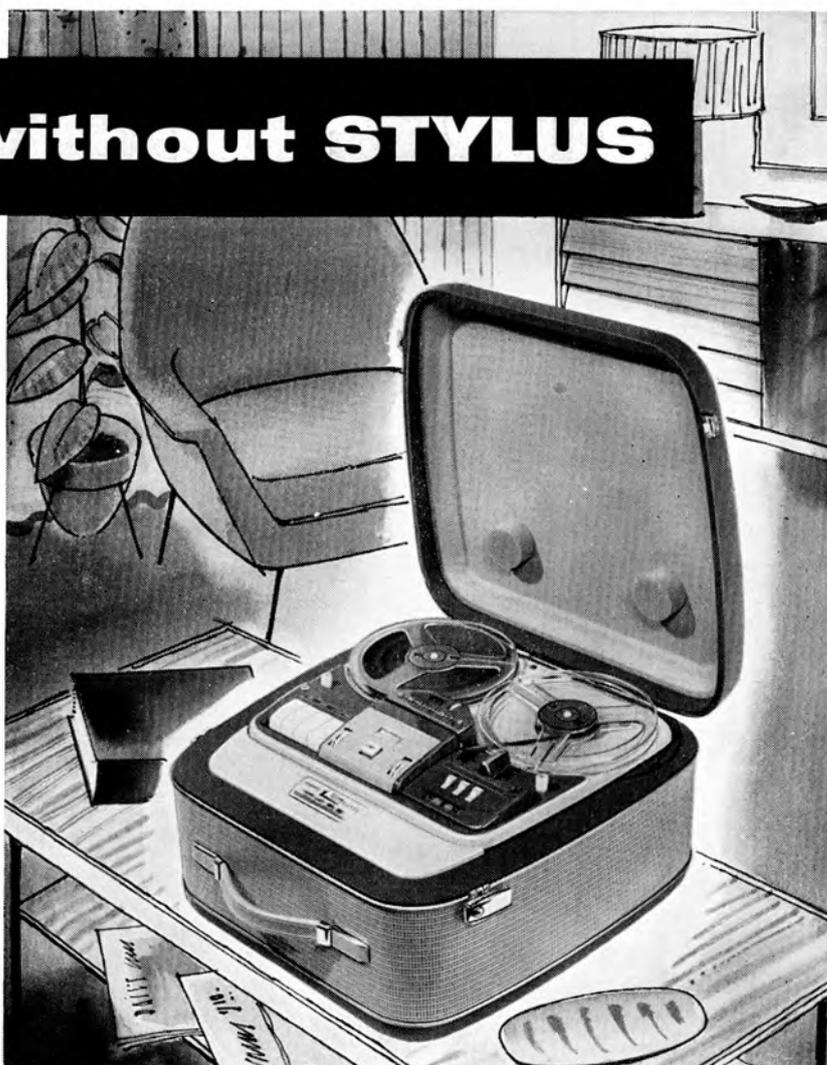
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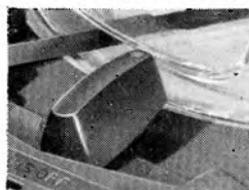
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TECHNICAL SPECIFICATIONS

Mains Voltage: AC only 200-250v. Consumption: 70w. Tape Speeds: 3½ and 7½ ips. Frequency Response: 40 c/s-14kc/s at 7½ ips. Inputs to Record/Playback Amplifier: Microphone socket - 2mV; Radio socket 300mV. Speakers: Large elliptical speaker and 4" tweeter. Power Output: 4w. Signal/Noise Ratio: Better than -40d B. Dimensions: 16½" x 12½" x 8". Weight: 23 lbs.

MODEL 505 57 gns.

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The whole mechanism is mounted on rubber which together with careful selection of motors reduces mechanical noise to a minimum.

Provision is made for the addition of a stereo head with both channels available either to an external stereo amplifier, or one channel through the internal amplifier and the other externally.

TECHNICAL SPECIFICATION

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3½ ips 60—8,000 ± 3db

7½ ips 50—15,000 ± 3db

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(signal-noise ratio at 7½ ips—47db)

Separate record amplifier

2 per cent total harmonic distortion at peak recording level 1 kc/s.

†Push-pull bias erase oscillator for low tape hiss

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

Supplied complete with Acos 39/1 mic. stand. and 1,200' E.M.I. tape

MODEL R 30/R 40



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.

HOW MANY CYCLES?

From the correspondence we receive it appears that a great deal of importance is attached to the frequency response in its relation to reproduction, generally to the exclusion of the other inter-relating factors—i.e., background noise, harmonic distortion, transient response, etc.

In tape recording a balance must be sought between these factors in order to approach as near as possible to the original sound. The designer must decide at any given speed whether wide frequency response, low distortion or negligible background noise should be given precedence for one can be improved at the expense of the other.

It is generally known that to obtain the best results the bias is adjusted individually on each machine to an optimum level. This implies that a series of recordings are made at some middle frequency, generally 1,000 c/s and the bias current adjusted until maximum output is obtained on playback. The bias is then increased until the output drops by approximately 10 per cent. This is the optimum point at which distortion and background noise† from the tape is at minimum. However, the high frequency output from the Playback Head is attenuated as the bias increases towards optimum; the higher this frequency the greater this effect. It is not known for certain the reason for this attenuation; one theory suggests the bias causes partial erasure, which is accentuated as the bias current increases.

A more plausible answer takes into account that at 7½ in. per second at 7,500c/s a distance of 0.0001 in. between tape and Playback Head results

in a loss of 6db or half the output; this loss is nearly proportional to frequency. Now below optimum bias the surface of the oxide coating on the recording tape is the most sensitive part and no distance loss can occur, subject to the tape making intimate contact with the Head. However, at optimum bias the point of maximum sensitivity or remanence is below the surface of the oxide giving a distance loss. This is borne out by the fact that a thinner oxide coating improves the treble response but with reduced overall sensitivity.

You are by now probably asking what all this boils down to—briefly then, a Playback Head with a very fine gap will not by itself improve the treble range unless:—

1. It is under-biased, which means higher background noise and greater harmonic distortion.
2. Receives large amount of treble boost during record which leads to increased distortion in the treble region, and excessive ringing on the transients.

Finally to see if you really need all those practically inaudible cycles try recording on a really good machine* at 7½ in. per sec. and then at 15 in. per sec. to compare the difference.

Fully illustrated literature available on request

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118 Park Road North, South Acton, London, W.3

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Please send me without obligation full details of your range of Tape Recorders. I am particularly interested in Model R.....

Mr.....

the TAPE RECORDER

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★
EDITORIAL

A GROUP of ostriches were gossiping idly, the way ostriches do, on a sandy patch of the African Veldt. A jet aircraft thundered across the sky, and the group of ostriches stood still, with their heads traditionally buried in the sand. A short while afterwards another ostrich ambled up. "That's funny", he said, "Where's everyone gone."

And if that seems rather a lighthearted way of opening a leading editorial column, let us explain that we always think of ostriches when we discuss "tape" with certain sections of the recording and entertainment world. Or perhaps we should now, and at long last, put that sentence in the past tense, for things seem to be moving.

It is about 12 years since "tape" first appeared on the British market as a novelty for the home; and though it is true to say that it has gained in popularity, steadily and without a recession, from that time onwards, it is equally true to say that it has never (until very recently) been accepted by Big Business as Entertainment Potentiality Number One. From the very first it was obvious to many clear-thinking people that home recording must eventually replace the gramophone as the domestic "Magic Box". Some even went so far as to give it thirty years; and today, a third of that sand lies in the bottom of the hour glass.

There is no longer any doubt whatsoever that the major recording companies have got to face a very big problem, as presented by "tape". Tape recorders are finding their way into the homes of the multitudes at the rate of thousands per week; and as there is a limit to the amount of money that can be spent by the public per week on entertainment, the cash cannot go in two directions at once. Further, a tape recorder in the home offers the immediate cash saving possibility of recording from the air, rather than buying the same music from the shop.

We are back on the thorny subject of Copyright. Let us dwell on it only as briefly as necessary. People will not buy "pops" numbers unless they can hear them; and if they hear them over the air, they will not buy them if they can record them. It seems only sensible, therefore, to think that the recording companies will soon kill this form of pirating by supplying tapes for broadcasts, and by ensuring that the broadcast tapes will embody an inaudible signal which will make illegal recordings useless. That, however, is for the suppliers to sort out. What is more important for the user is that a lot of hard work should be devoted to the production of recorded tapes, so that they can take their place in the shops, alongside of their disc counterparts, as soon as possible. The answer seems to be a four-track tape at 3 3/4 i/s, in an easily handled cassette, and in a generally agreed form—in other words, an internationally acceptable standard. At the moment, the tape recorder enthusiast is out on a limb. He is not catered for, in terms of programme material: he is told, in unspoken words, to help himself from the air at his own risk.

But the heads are coming out of the sand. The next twelve months will probably see more progress than has taken place in the past twelve years. And, with the recorder accepted by Big Business as the device of the future—and with the stimulus that this will give to production and sales—we can then begin to think seriously of home-recorded pictures and many other exciting adventures that lie within the unexplored territories of tape as a whole.

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COVER PICTURE

IN the Recording Room at Studio 22, Ebury Street, V. C. Clinton-Baddeley, Artistic Director, and Edgar A. Vetter, Technical Director, of Jupiter Recordings Limited, are editing tapes for one of the Jupiter poetry series. In order to perfect the cadence or meaning of each passage, the version issued on the final Jupiter recording is a carefully edited assembly of the best "takes" from a large number of readings of each work. For this intricate work only the best tape recording equipment and microphones are good enough to produce top quality long play records. The machine shown is a Philips Studio Recorder which combines portability with facility in editing.

NEXT MONTH

ERIC SIMMS returns next month with another of his colourful accounts of recording bird song in remote places. Do-it-yourself enthusiasts are catered for again at two levels. More advanced constructors will be looking forward to J. W. Berridge's concluding notes on *Designing Your Own Mixer*; while beginners will want to tackle the second stage in *Building a Simple Recorder* by A. Tutchings. News of the world of tape including club activities will be presented in pictures as well as words. In addition, look for the regular features—*Equipment Reviews*, *Readers' Problems and Questions*, *Tape and Home Movies*, and *Tape Recorder Workbench*. Our August issue sold out in a couple of days. Make sure of your copy next month by placing a firm order with your supplier, or by taking out a subscription.

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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Angus McKenzie in TAPE RECORDING & HI-FI MAGAZINE

⦿ Sometimes, all too rarely, a product received for review has a quite outstanding performance and is reliable and robust. Such a product is the Simon SP4 . . . It has a superb performance in every way, with not one snag in the way of it . . . Staggering Performance . . . Any owner of an SP4 can be very proud of it. *I feel sure that this machine will go far to establishing a new standard of quality by which other machines will be judged.*

Percy Wilson M.A. in THE GRAMOPHONE

⦿ First-class marks for its comprehensive design, for its cleanness and thoroughness of construction, and for its excellent performance . . . *This is a tape recorder that is outstanding by any standards the world over.*

J. Moir in THE TAPE RECORDER

⦿ The novel features incorporated in the SP4 are generally of great value to the user, and are not gimmicks . . . The Simon machine is not cheap but it has exceptional facilities, a good performance, is undoubtedly good value for money.

J. C. G. Gilbert F.R.S.A., Assoc. I.E.E., M.Brit. I.R.E., F.T.S. in MUSIC TRADES REVIEW

⦿ At last with the Simon SP4, I have found a machine that is not only simple to use, but is capable of producing professional results . . . Has facilities only found in truly professional machines costing £350 and upwards . . . This machine, both in performance and appearance, is unlikely to be superseded for many years.

- * SIMON AUTOMATIC DECK fully 'push-button-controlled'
- AUTOMATIC TAPE REVERSAL without touching controls
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- 'PIN-POINT' MODULATION with cathode ray magic eye

simon SP. 4

Two accessories to do justice to the SP4

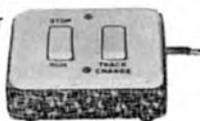
THE CADENZA RIBBON MICROPHONE

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our readers write

★ We award a prize of one 7-inch spool of Tape each month for the best letter printed either on this page or amongst "Readers' Problems." This month the prize goes to Sgt. W. P. Woodrow. Letters not intended for publication should be clearly marked NOT FOR PUBLICATION.

. . . copyright and tape clubs

From:—H. L. Walter, General Manager, The Performing Right Society Ltd., London, W.1.

Dear Sir:—I entirely agree with Mr. Peter Ford that whether a performance at a tape club meeting is public will depend on the circumstances. I would not, however, agree with his statement that normally it would be fairly safe to assume that it would be private.

This matter was very carefully examined by the Court of Appeal in March 1956, in *Jennings v. Stephens*. In his Judgment, The Master of the Rolls said that the presence or absence of visitors is not a decisive factor, nor does it matter whether the performance is paid or gratuitous, nor is it conclusive that admission is free or for payment, nor is the number of the audience decisive. The true criterion seemed to him to be the character of the audience. When referring to the much earlier case of *Duck v. Bates* (where it was ruled that a performance in a hospital to members of the staff was not a performance in public), the Master of the Rolls commented that in the opinion of Lord Justice Brett this was a borderline and extreme case. He commented that in *Jennings v. Stephens* there was nothing like the fact of the hospital as the common home which gave a quasi-domestic complexion to the performance in *Duck v. Bates*. Again, he said, referring to the *Women's Institute in Jennings v. Stephens*, "The quality of domesticity or quasi-domesticity seems to me to be absent".

It seems to me, therefore, that every performance is a performance in public which has not a strong element of domesticity or quasi-domesticity. I would not suggest that a tape club consisting of a few friends meeting in the home of one of them would be a public performance, but if the invitation to the public to become members is wider than mere friendship, e.g., if the club were open to anyone in the locality who had an interest in tape recording, I would say that performances of music at the club would be performances in public.

Yours faithfully

Mr. Ford replies:—

Mr. Walter's familiarity with *Jennings' case* appears to have allowed him to pass a slip in the date (1936) and also in his quotation from Lord Wright's remarks. Dealing with the popular belief that "members only" makes a meeting private for copyright purposes, the Master of the Rolls said that the presence or absence of visitors is not the decisive factor. Mr. Walter refers to my guarded opinion as a statement. I would agree with his very reasonable conclusion as to the state of the law but suggest that there must be a great many tape clubs sufficiently informal and restricted in membership to enable them to claim with justification that they do not give public performances. Once they start advertising and federating with other clubs, of course, the situation may change.

P.F.

. . . about an inexpensive microphone

From:—W. Tomlinson, 62 Beacontree Avenue, London, E.17.

Dear Sir:—Further to my letter in the July issue regarding the earpiece I mentioned as an auxiliary speech microphone, the response from readers was at first a little overwhelming. I feel now that so many people may be seeking to find these units in their own locality that I had better give the full details of markings for positive identification.

These are: Headset/chest Mic outfit No. AP.13221 or AP.12500. The m/c inner unit is manufactured by T.M.C. All these marks will be found on the correct unit. I regret that I cannot undertake to supply any other reader with the unit since my local "surplus" has at the moment had his stocks exhausted!

From the very many letters I received I gathered that the readership of this magazine has a large proportion of the "Do-it-Yourself" school of thought.

Sincerely



. . . about "Scooterlogues"

From:—Sgt. W. P. Woodrow, No. 2 Sgts. Mess, R.A.F., Cherhill, Wilts.

Dear Sir:—Enclosed please find a photograph of myself during recording one of my "Scooterlogues" a travelogue series I have been doing for "Tapes for the Blind" circle run by Eric Sheres of Birmingham and Charles Standen of London. So far I have gone around London and Bath and have tapes in preparation of the Wiltshire places of interest. I have been using a Stuzzi Magnette, but have now converted to a Fi-cord and have swapped the scooter for a motorcycle combination outfit as the Magnette gave flutter due to engine vibration, whereas the Fi-cord stands up to all the vibration punishment without a murmur of protest. For another thing it is safer to handle when driving.

Yours truly

* * *

. . . recording the Pygmies

From:—Colin N. Turnbull, The American Museum of Natural History (African Section), New York 24, N.Y.

Dear Sir:—It may interest your readers to know a little more about the photograph of me which you used on the cover of your July issue.

The picture was taken during my second visit to the Belgian Congo, in 1954, when I was making a documentary film on the life of the Pygmies of the Ituri Forest. During the course of this work a sort of African Music Festival was staged, the various tribes from miles around all coming along with their best musicians to perform in front of the "magic box". It was a magnificent festival, and from the resultant recordings *Ethnic Folkways of New York* have published two 12 in. LP records—"Music of the Ituri Forest" and "Music of the BaMbuti Pygmies".

To get recordings of the music of the negro tribes was easy enough—comparatively. All their villages are strung along or near the long road that cuts through the middle of the forest, connecting Stanleyville with Bunia, so transport of the equipment presented no problem. To record the music of the pygmies was a different matter, however. These little forest nomads are easily seen by tourists, strung along the roadside in the hopes of making a few francs by posing for a photograph and such tourists are usually satisfied that they have "seen the pygmies". But to really see them and know them one has

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Make a date—with the new Elizabethan AVON. It's the most sensational tape recorder of the day: life-like reproduction; versatile facilities including mixing and super-imposing of two programmes; simple in use, and only two handy deck controls. It's the most attractive recorder you've ever seen, with the latest look and in a choice of the latest two-tone colour schemes. And the price is quite remarkable. *Make a date with the Avon—at your local dealer's. Now.*



25 GNS

ready to use complete with microphone, tape, etc.

EAP

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BLOCK LETTERS PLEASE

Elizabethan

OUR READERS WRITE—(continued)

to live with them for months or years on end in the heart of the forest. A great part of their music is considered by the pygmies to be sacred to the forest, and is never sung while they are down near the roadside, in the negro villages.

To record their music, then, I had to get pygmies to carry the equipment out to one of their forest hunting camps, and set up a "studio" there in a hut made by making a framework of interlaced saplings covered with large phrynias leaves, hung like tiles. A quarter of a mile of cable led to my portable gasoline generator which I buried five feet in the ground and roofed over with leaves, fitting up a reverse switch so that I could start it when needed from my "studio". This "luxury" was a better move than anticipated—the pit housing the generator soon became a favourite haunt for the local population of vipers.

The pygmies took to the notion of having their music recorded much more intelligently than did their negro neighbours, who to the very end regarded the whole operation as White Man's Magic. The pygmies were startled out of their wits when they first heard their voices played back; the second time they were just fascinated, and the third time they accepted it as "one of those things". But at all times they loved singing to it, and would listen eagerly and critically to the playback. They were entirely unselfconscious in front of the microphones, but their mobile concerts presented a lot of technical difficulties. One was never quite sure whether the singers would remain seated, or start dancing round the camp, or whether they would just each drift off to his own hut and sit by the fire outside, passing the song around the clearing from one hut to the next. In the end I found that one centrally fixed non-directional microphone, with the lead slung high overhead, was the best answer.

Some of the things one has to contend with in making recordings in this area are impossible to deal with. No amount of silica-gel will combat for long an average humidity of 95 per cent., particularly damaging when combined with a temperature that never drops below 70°. But even worse, perhaps, are the insects that buzz loudly around the fascinating shining microphone during the middle of the most beautiful quiet lullaby, or that make their nests in the recording equipment so successfully that on one occasion they even caused a short circuit. And perhaps worst of all the ants that seem to regard electric cable as the greatest delicacy in the forest. Trying to trace a short over a quarter of a mile of cable stretched through ant and snake filled forest is no fun.

On this occasion, and on my last trip from which I have just returned, however, I have been helped considerably by magnificent equipment, and I cannot praise too highly Vortexion, who, for my last trip supplied a machine which they had successfully rendered distasteful even to termites, and which survived eighteen months of being tossed around in a hot humid climate, without showing the slightest loss in performance except towards the end, a deterioration in one of the potentiometers, for which I carried a spare. I operated their standard mains (220 v.) model in conjunction with their electronic four-way mixer through a Vortexion Vibrator converter from four car batteries. Personally, I have always preferred a rotary converter, in spite of the danger of voltage fluctuation, but could find nothing to complain about on this last trip using only the vibrator. The batteries, heavy duty, took less kindly than the rest of the equipment to the hard usage they received, and one exploded in my face which fortunately did no great damage, but caused a lot of hilarity among the pygmies.

I found that by constantly having the equipment in the open, and pretending to be making recordings whether in fact I was or not, it soon became accepted as part of the extraordinary impedimenta that all white men carry about with them, and caused no great interest in itself. Having all the time in the world at my disposal, I was content to record whenever it looked likely that something interesting was going to happen, and just washing it out if it was a failure. After several months, without asking for any special performances, I had some remarkably fine recordings for which I would gladly have sacrificed twice as much time and undergone twice as many hardships—if there are that many.

On both occasions I have used Audio Devices Mylar base tape, both 001 mil and 002 mil. With all the Vortexion equipment I have used this tape out in the scorching arid Sahara as well as in the dripping forest, and no matter what extreme of climate, it has refused to curl or stretch to any degree noticeable to the human eye or ear. I kept

THAT COMPETITION



"— will be taken down, edited and used as an interval signal . . ."

some test reels which I have subjected to the most rigorous tests, and even these played back during the tests and at the end of my travels, with perfect fidelity. This tape, also is unpalatable to termites. Other tapes I have tried have proved in some cases quite useless, and in others variable in reaction to heat and humidity. The tendency to curl in strong sunlight (and there are occasions when it is impossible to find or make the necessary shade) is as great an evil as the tendency to stretch in hot humid conditions. The mylar tape, even of the thinnest gauge, has consistently refused to curl or stretch, or even to collect mould.

I have no doubt that there are other makes of recording equipment and tape that are also able to withstand the rigours of field-recording in Africa, but having had two arduous periods of work with Vortexion and Audio-Tape, I intend to stick to old trusted and proven friends. I would, however, like to find some enterprising manufacturer who will make me a few miles of ant-repellent cable, and someone who can design a microphone that is less attractive to sportive bumble-bees.

Yours faithfully

Underwater Recording

From:—G. T. Meaker, P.O. Box 748, Kitwe, N. Rhodesia.

Dear Sir:—I have read with great interest your monthly publication *The Tape Recorder* since the first edition. I wonder if you could help me, or any of your readers, in a method of recording *sounds* underwater—not speech. Is there perhaps a microphone commercially available that I can purchase? If not, how could I go about constructing one for use with an EMI model L2B, battery operated portable recorder.

Besides recording etc., I am interested in underwater diving and during the latter part of October and through November I will be going on an expedition to sea off East Africa. I hope to capture many sound effects and "talks" for our film we're making on this expedition. There isn't much time left before October, but I could always use the information and get to work before other expeditions.

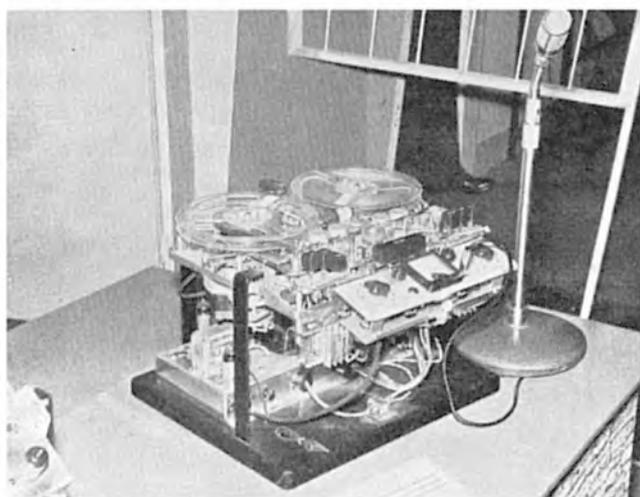
Yours faithfully

THE MONTH OF TAPE

Four Pages of News, Pictures and Notes

Tape at the Radio Show

THERE may be those who believe, with your correspondent, that our hobby of tape recording is a little out of place at the Radio Show, having a mind to the excellence, in this respect, of the London Audio Fair. A comparison between this event, and the "Audio Hall", a section of the Radio Show, is natural. Many will feel that the latter suffers in this comparison. Nevertheless, if concentration can be maintained in spite of TV, Radio, and even a full-sized jet aircraft, the visitor may be rewarded with details of some important new developments.



A REPS recorder mounted to show the layout of the parts.



Mr. Reps explains—with diagrams!—what modifications he makes to the Collaro deck before fitting it in his recorders.



The Simon display ranged from professional rack-mounted equipment to a new crystal version of the popular "Cadenza" microphone.

The BSR "Monardeck" has been described in a previous issue, and forms the heart of inexpensive models from several makers, at prices from 25 to 32 gns. The writer's recollection is that Trix were the first in the field, showing their model at the Audio Fair. We have now examined the Elizabethan "Avon" at 25 gns. which offers a frequency range of 60-10,000 c/s with a power output of 2½ watts. Three colour schemes are available. At 28 gns., the "Bantam" is available from E.A.R. A two tone case is designed to match the colour scheme of the deck and LP tape is supplied as standard. From Tape Recorders (Electronics) Ltd. the Sound "Prince" is offered, price 32 gns., complete with the usual accessories. The case of the "Prince" is in line with contemporary Continental styling, and houses a larger speaker to handle the 4½ watt output. The frequency response is quoted as 60-8,000 c/s with a signal-to-noise ratio of 50 dB.

The big news, however, is undoubtedly the appearance of not one, but two, new tape decks. Since hearing a whisper over a year ago, the writer has been awaiting Garrard's first venture in this field, mindful of their reputation as manufacturers of turntables. They have produced a magazine loaded deck, 3½ i/s only, that is extremely simple to load and operate. Normal spools can be used, but these are limited to 4 in. diameter and are in fact referred to in the leaflet as "old fashioned". Trix were seen to be offering a recorder using this deck, priced at 35 gns. with a quoted response of 30-10,000 c/s and a playing time of 35 mins. per track. Does this give them another "First"?

The Collaro "Studio" Transcriptor

The ubiquitous Mark IV Collaro, still going strong, now has a younger brother. More conventional in design, it offers the tape speeds of 1½, 3½ and 7½ i/s, and is extremely attractive in styling. This deck is obviously going to be very popular, though, as yet, it will only be available to manufacturers. Two of the features of the Collaro deck, that will undoubtedly commend themselves, are the adoption of a three motor drive and provision for the mounting, if required, of a



McDonald Hobley of TV fame draws out the name of a lucky winner of a Sound Tape Recorder.

third head. Two makes of tape recorder, incorporating this deck, were seen and make interesting comparison. Trix have produced the "Everest" at 49 gns. with a frequency response at $7\frac{1}{2}$ i/s of 40-12,000 c/s, using the Collaro heads. Their published specification claims a signal/noise ratio of 60 dB (some five or ten times more than usual!) this was not noticed until later, and in consequence it is not known whether this might be a printing error. If a true figure, apologies and congratulations are indeed due. The "Major" is priced provisionally at 59 gns. and is manufactured by Elizabethan. In this instance the signal/noise ratio is at the more usual figure of 43 dB, but the frequency response is considerably better. It is understood that this is due to the fitting of a special record/replay head having a gap width of 3 microns. 50-20,000 c/s at the tape speed of $7\frac{1}{2}$ i/s must prove to be a serious challenge to the Continental manufacturers.

Mixing Facilities Becoming Popular

It was noticed that a great number of tape recorders are now available with built-in mixing facilities, and a superimposition control.

Truvox tape decks are not, perhaps, seen in such great numbers but their reliability cannot, surely, be challenged. The Mark VI was first seen last April and it is understood that it will shortly be available for home constructors. Using a standard Truvox type K amplifier this deck was most impressive in its performance at $3\frac{1}{2}$ i/s, the lower of two speeds. A leaflet gives the approximate prices of 25 gns. monaural and 39 gns. fitted with the Truvox stacked stereo head. A new, complete, tape recorder is on the way, the exhibition dummy showed a clean and attractive design.

Mention must be made of the Sound "Belle". The overall size of this complete recorder is only $10 \times 8 \times 5$ in., the weight is 11 lbs., and the price is 26 gns. This machine is unorthodox in that it does not use the normal capstan and pressure roller but has a uniform drive to the take-up spool. This system, while resulting in simplicity, and presumably, reliability in operation, does mean that the tapes cannot be replayed on a more conventional machine.

Comparing the impressions gained at this show with those from previous years, one has the feeling that, while the number of manufacturers in the tape recording business remains much the same, new names are replacing those that have disappeared. Certain names are most definitely still with us, and the quality of their products provides a reason and a moral.

A.B.S.

* * *

The New Grundig "Memorette"

The Grundig "Stenorette" has found its way into thousands of offices in many countries. Their new dictating machine, the "Memorette" is battery operated, and so can be used anywhere at any time when important discussions or detailed instructions are



The first Grundig Memorette in this country was recently used by Mr. B. C. Mathews (left) sales director of Sphere Travel Service Ltd., to take dictation aboard a Super Constellation and record discussions in Air India's Paris Office.

to be recorded. Of course the two types of machine are complementary, and material recorded on the Memorette, for example, may be transcribed by the secretary on her own Stenorette. (See at top of column.)

* * *

Tape Training Courses

A SECOND most successful course in Tape Recording has just been held, August 27th-31st, at the Rose Bruford Training College in Kent—readers may remember our account of the Easter week-end course in the May issue.

Once again, close on 50 people attended the course, which was designed to give practical training in using tape recorders, with special emphasis on their use in schools, training colleges, clubs, and amateur dramatics. The course opened with an introductory talk by B.B.C. producer Jack Singleton — of "Younger Generation" and "Roundabout" fame—on how to record interviews and discussions and how to string them together into a well-shaped programme. He played many examples, including a glorious "How not to do it" interview with a Tonbridge Wells nonagenarian.



Geoffrey Hodson, who organised the Rose Bruford courses, is seen demonstrating the right way to record on a Stuzzi Tricorder.

● Do you know of any tape recorder owner who uses his machine for any unusual job? If so, will you ask him to write and give us the details? Have you had any outstandingly unusual experience with your recorder—humorous?—serious?—strange? If so, why not let us know about it. The experiences of others are of interest to you; and, similarly, your story may well be of special interest to our readers. If you think that your experience, or story will make a good picture, please tell us, too.

★ CLUB DATES:

Readers are invited to send in items of interest to this page

Members of the course were then divided into three groups according to their tape experience and spent the next two days learning the ropes. F. C. Judd copes with the technical side and I. W. Jarman dealt with tape editing. John Borwick supervised the studio training, and had written a couple of short scripts which called for sound effects, incidental music and such "gimmicks" as a distorted telephone voice etc. The acting was almost up to "Old Vic" standards, and the operational techniques of recording were found to require as much skill and application as the purely technical aspects—besides being much more fun!

On Friday evening the course members were the guests of Multimusic (Reflectograph) Ltd., at the Radio Show, and were given

a most convincing demonstration of the Reflectograph 500 and Stereacorder machines in which quick comparisons between live and recorded sounds proved that recordings can nowadays be as real as the real thing.

The week-end was spent on all manner of outdoor recording—followed by hectic editing sessions—to produce two magazine programmes. The first programme was called "Saturday Out" and for this the students took battery recorders to Brands Hatch where Stirling Moss was racing, and the Chislehurst caves—to a late night rock and roll session hundreds of feet below ground.

The other production was entitled "The English Sunday". To add to the many subjects covered by this title, a car-borne transmitter/



Students went far and wide gathering recordings for their programmes. Two schoolteacher members, Miss M. A. Jeffries (left) and Miss J. Hutson (right) are seen interviewing Linda Cook (2½) winner of a "Youngest baby with the largest vocabulary" competition. Linda's mother is looking on (centre).

NEWS:NOTES ★

Readers are invited to send in items of interest to this page

receiver was used to contact a couple of radio amateurs on the "ham" waveband, so that a recorded "QSL" could be included in the programme. Both newcomers to tape recording and "old hands" found the five days added greatly to their tape recording "know how", and several have already booked for a return visit.



I. W. Jarman explains tape splicing to Miss L. J. Mason and Mrs. E. Bent. Readers will remember his illustrated articles on tape splicing in our February, March and April numbers. A booklet entitled "How to Splice Tape" will be ready during October, Price 2s., details from this Editorial Office.

A short course on tape recording has also just been held at East Suffolk's Adult Training College near Ipswich. The College is called Belstead House, and for the final production it was imagined that a similar college was being set up in New Zealand and that a tape was to be sent describing the English version. The students divided into three groups, each producing a five minute recording concentrating on one aspect of the story. Group A gave the historical background to the house. Group B described the impressions of two girl students on their first day, and Group C recorded sound pictures of present day college activities. The whole programme was linked with suitable music.



To record a short programme called "The Woodworker", students used two tape recorders and a 4-channel mixer (all Vortexion), a Collaro record-player, a Film Industries microphone, and hammer, screwdriver, drill, saw, and sand paper (manufacturers unknown).

- **Birmingham.** The Founder of the Club, Dennis Osborne, has resigned, and Terry Nurse is Acting Secretary. Mr. Joe Kerr, who hopes to form a Manchester Club shortly, sent them a tape, together with an offer to help any member with technical problems, or even to build a radio from a kit of parts.
- **Catford.** The Secretary would like to remind prospective members that all are welcome. The members were particularly interested in the disc cutting during their recent visit to the M.S.S. Recording Studios. Mr. Len Watkins went along to the Club to explain the functions of World Tape Pals.
- **London Tape Recording Club.** Roger Aslin recently gave a talk on "The History of Tape Recording". Alan Stableford provided the tape equipment—Vortexion—and assisted with the demonstrations.
- **Warwick and Leamington.** Members visited Birmingham for a "live" Television transmission on September 6th. They have also exchanged tapes recently with The Jersey Tape Club.
- **West Middlesex Tape Recording Club.** Their next meeting will be held on September 24th at The Co-operative Hall, Station Road, Hampton, at 7.30 p.m.
- **The Organ Music Enthusiasts (Tape Organ Club).** The aim is to bring together organ lovers from all over the world. Please write to Carl Williams, 19, Van Derveer Street, Amsterdam, New York, U.S.A., if you are interested in joining this Club.
- **The Walthamstow and District Tape Recording Society.** Much of the Society's efforts go towards helping blind people and hospitals. Can any readers assist either by offering their own time or equipment, or by putting the Society in touch with blind friends? Write to W. J. Tomlinson, 62, Beacontree Avenue, London, E.17.

New Clubs Being Formed

The Bradford Gramophone Society are starting a Tape Recording Society in the near future. For details please write to Miss R. Potter, The Hollies, 10, Walmer Villas, Bradford, 8.

The Family Circle (Tapesponding) is being formed by Mr. & Mrs. Osborne. They have three children themselves, and although at present only families in Great Britain can join they hope to expand the membership later. For full information please write to Mr. D. Osborne, 75, Millmead Road, California, Birmingham, 32.

★ DOES YOUR CLUB SEND US NEWS? ★

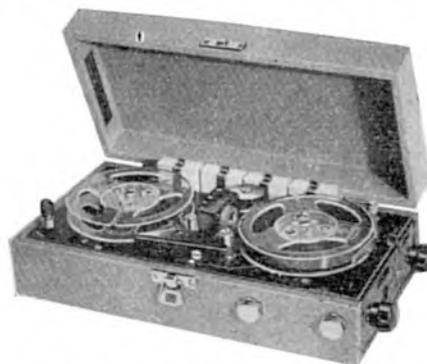
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By Michael Swan

TAPE AND HOME MOVIES

PART FIVE—LATEST TRENDS

THIS was going to be a Photo Fair Report, but thanks to the printers' strike, I was able to dodge my commission for a short time and get on with some film production! On reflection, there was not much of interest to the tape recording enthusiast at the Photo Fair; after all. After giving a 8 mm. stripe projectors a raspberry in one of my previous articles, it is pleasing to be able to report the now excellent quality available from 8 mm. stripe. The Italian Cirse Sound projector, which has been developed over the last few years is now a first-class job, and gives superb results from the narrow stripe. It is a standard 8 mm. projector, well made, and nicely finished, using the new 8 v. 50 watt lamp, and is mounted on an amplifier built-in to the base of the machine. The projector comes in a carrying cabinet which also contains the loudspeaker, and when in use this loudspeaker cabinet gives an excellent bass response. The projector motor is synchronous, and has two fixed speeds of 16 and 24 f.p.s. An auxiliary motor drives a heavy duty flywheel for the capstan drive past the magnetic heads, and this ensures a flutter free performance. The distance between the projector gate and the magnetic sound head is said to be 52 frames, the international standard for 8 mm. sound and, as more machines are now conforming to this standard, films recorded on this machine will play back on another without being out of synchronisation. The amplifier has built-in mixing from two inputs, and the latest type magic eye level meter. One surprising application which the importers were demonstrating were 8 mm. reduction prints from 16 mm., with the sound tracks recorded direct from the 35 mm. originals.

8 mm. Catching On

These 8 mm. sound prints are already in use by one or two go-ahead concerns such as the Bergen Steamship Line, and this development is going to make the 16 mm. industrial film producer look to his laurels. The same machine is available with a carbon arc attachment for projection in large halls, and can throw a 20 ft. picture from a distance of 115 ft. The amplifier specification modestly claims a frequency response of 80 to 6,000 c/s at 24 f.p.s. (equal to a tape speed of 9.6 cm/sec., our 3½ c/s) with a signal to noise ratio better than 53 dB and a maximum 5% distortion at 2½ watts output. The price is £169 10s. (without the carbon arc attachment!).

The 8 mm. Elite magnetic sound projector is a Norwegian machine which we first saw a couple of years ago. This machine claims a 6 watt amplifier and a built-in 6 in. speaker, although it has a socket

for an extension loudspeaker. It has two fixed speeds, 16 and 24 f.p.s., but no mixing facilities. A three-channel mixer is a modest priced extra. One unusual thing about the projector side of the mechanism is that there is no power rewind for the film, only a rather tinny handle to do the job manually. The sound head is at the international standard of 52 frames from the gate. The price is £159 10s.

The Dominus 8 mm. projector is a highly original idea



The Cirse Sound 8mm. Projector

from France. Actually, there are a lot of bright ideas in amateur movie equipment made in France which we never see, as they are not always imported into this country, but the Dominus is being made under licence in London. It is basically a tape recorder with a built-in 8 mm. projector, or an 8 mm. projector with a built-in tape recorder, whichever way you first look at it. The tape drive and the projector drive are on a common shaft, so once a track is recorded it does not go out of sync provided you remember to use start marks on the film and tape.

Dealing with the projector side first, the lacing is unusual, but not unknown, as the twisted loop idea is also used in the popular 8 mm. Zeiss Movikon camera. The projector uses the new 8 v. 50 watt cold light lamp, which dispenses with a mirror reflector (it is built-in to the lamp) and the manufacturers of the machine dispense with a built-in fan. Presumably there is insufficient room inside the cabinet for a fan to cool the lamp, and the lamp does not overheat the rest of the contents of the cabinet.

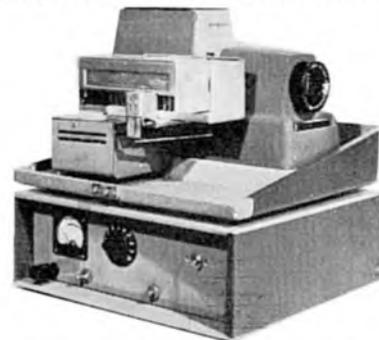
On the other side of the machine is a standard tape deck accommodating 7 in. spools with two speeds, 3½ i/s and 7½ i/s. The tape recorder has an output of 3½ watts. Although no technical figures are available, the machine played one of my best tapes with excellent results. One important point, it is possible to play either the projector separately, or the tape recorder separately, or both in synchronisation. The machine is no more bulky than the average tape recorder, and weighs 33 lb. It is priced at £157 10s.

A most interesting device for operating an automatic slide projector was in use on the Hanimax stand at the Photo Fair. It was called the "Voice Impulse Projector Unit" and we wrote to the manufacturers for further details. They stated that "the V.I.P. electronic unit was designed to obey the human voice as opposed to high frequency signals which in many respects have proved unsatisfactory. It will operate from a sound input provided by a tape recorder, a record player, or a direct commentary by microphone used with amplifying circuit. In its present form it is used to control slide projection without any manual operation or supervision. In operation the sound impulse of, for example, a pre-recorded commentary will continue to project one slide on to a screen until there is a deliberate and calculated pause or interruption of sound, the unit will then "sense" the absence of sound and electronically actuate the slide changing mechanism.

Lock Circuit is Reversible

"The unit is designed to lock the circuit whilst there is either a signal or no signal and also to unlock the circuit when the signal ceases or a signal is received, as the case may be."

This novel unit was coupled to an Argus 300 slide projector which was also fitted with an electrically operated magazine changing mechanism (available as an extra for this particular projector). The V.I.P. unit is priced at £27 19s. 6d. It seems to be more suitable for professional than amateur use; it would be ideal for hard selling with a slide projector where the commentator would normally only pause for breath to change the slide manually anyway. We do not quite see the objection to high frequency signals which have proved so successful on the Telefunken and REPS tape recorders mentioned last month, but it is gratifying to find an original idea appearing in this country.



Voice Impulse Unit Coupled to Argus 300

By B. W. READ

BUILD A LIBRARY OF SOUND EFFECTS

No. 3 AEROPLANES AND ATMOSPHERES

HAVING covered the recording of domestic animals, cars and motorcycles in my two previous articles, this month we'll consider the ways and means of recording aeroplanes and then that most valuable necessity of a sound library the atmosphere recording.

Aeroplane sounds, from the Tiger Moth to the Comet, are exciting thrilling and dramatic in every way, but the capturing of their sound may well prove difficult because of locality and access to a suitable recording position. You cannot, obviously, just wander into an aerodrome, set up recording gear and start making recordings, and amateur recordists would most probably make themselves unpopular if they started worrying aerodrome managers for permission. These worthy folk already have plenty enough on their plate with the running of the aerodrome and the safety of the aircraft to contend with. So how shall we go about it? Now most aerodromes have public roads and highways ringing them and a road, lane or parking space can often be found in near enough direct line with the take off or landing runway.

Remembering that aircraft always take off and land into the wind should help you to position yourself, and being probably a mile or so from the take off point, by the time the plane passes the recording point it will be just that few hundred feet up which will give a nice long approach and departure whilst at the same time this position will help considerably with the control of the levels, especially when the plane is overhead. When finding your aerodrome do take note that many have roads running through them on which parking or stopping

is forbidden, and others have roads bordering them which are closed to all traffic during aircraft movements. If you find anything like this, you may safely take it that these roads are too close to the aerodrome for your purpose any way, and finding a road running close to or parallel with the closed or forbidden one usually presents no great problem, especially if you have a good map of the area.

Bearing in mind all the trials and tribulations of finding first, an aerodrome and then a recording point, probably the best bet of the lot is to find a friend whose home is situated near an aerodrome or airport which would make a good recording point. In the case of big airports such as London, Gatwick, etc., there are thousands of people so situated. I should know. I'm one of them! Just imagine it a warm fine evening, a deck chair in the garden, the recording machine at the ready on one side, your favourite beverage on the other. Just the job!

Smaller stuff

Another possibility is that you might well have a flying club in your area, and this could prove a very useful and profitable source to you. These clubs are usually equipped with Tiger Moths, Austers and the like with perhaps one or two Rapides and possibly an Anson or an Oxford. If you could get to know one of the members he might well be able to arrange an introduction for you to make some recordings from within the aerodrome, perhaps from near the club buildings where there would be a mains supply available.

When you are all set up and ready to record, it is almost inevitable that things will not happen, because you want them to, but that you will have to wait on events and take what comes. It is, therefore, of great importance that you should take a careful note of everything you record, so that you can cut all your recordings into the right sequence when you get back to base. It will probably take some time, but you should aim at getting a start up, taxi, take off, pass over, landing taxi and switch off from as many different aircraft as possible. Although this may be possible on or near a small aerodrome with the smaller aircraft, I'm afraid it will prove impossible with the larger aircraft unless, as mentioned earlier, there happens to be an accessible road near the start up point from which you can get both the start up and the taxi away.

A point to remember here is that if you record during daylight, it is inevitable that you will have birds coming through on your recordings, but if you are not fussy on that point, then they can sound quite effective as a contrast. A really easy aircraft to record if the opportunity occurs, is a helicopter. Their approach and departure is so comparatively slow that level adjustment is simple, and the variation in sound due to the altering of the pitch of the rotors during descent and take off makes a recording both interesting and effective.

Flying High

Recording an aeroplane from the interior whilst flying is, of course, a very different proposition and short of hiring a plane at prohibitive cost specially for the job, I can see no way that the amateur can make such recordings. I would, therefore, suggest that in this case, if interior recordings of aircraft are needed, faking is legitimate on this occasion, and shouldn't prove too difficult. I have made a comprehensive and genuine set of recordings of a Tiger Moth, for instance, but I'm sure that many people would be fooled by a similar set of recordings made with the aid of a Ferguson or Fordson Farm Tractor! For bigger piston engined aircraft, a low pitched subdued roaring drone is what is needed. You could try a car recording played at half speed, or try it at normal speed but with a massive top cut plus some bass lift. For prop. jet planes such as the wonderful Viscount, try a recording of your wife's vacuum cleaner, played fairly quietly with some bass cut.





The Britannia and Comet are more difficult because they are so quiet and well behaved, but a medium pitched singing drone played quite quietly might well do the trick, say a mixture of car played slow and vacuum cleaner, with some bass cut and fairly heavy middle register cut. This combination played low-should be fairly near the mark. If you are fortunate enough to have a wife who owns a spin dryer, you could try that out as a variant of the vacuum cleaner, or possibly in addition to it. For Military aircraft, the above will still apply, except that the sound must be on a much vaster and more massive scale, but I can only give these very rough guides for those of you who haven't flown as yet. I wish you luck with your aeroplane recordings. It is, once again, a waiting game and extraneous noises will have to be avoided.

Atmospheres

As it's probably raining, let's go indoors again to make what are possibly the most useful recordings for any library; background sounds that can be used again and again and will give life and depth to any productions. We will deal with crowd sounds first, and here the golden rule is, to make your recordings of general use, no words should be intelligible. Also, this rule, explained to the people concerned, will help when seeking permission to record. Two excellent places to start your collection of atmospheres are your local pub and cafe. Having got permission, set the equipment up early on a day that is going to be busy. Try to find a corner where you will be out of the way but not hidden. People don't like to think they're being made fools of or eavesdropped on and if you are in view it will help allay any suspicions and make explanations as to what you are doing so much easier. The buzz of conversation, rattle of tea cups, plates, glasses, etc., all add up to atmosphere which is really authentic.

Variations of these recordings should be fairly easy to get and other places you might try are your local club house and bar, dinners and functions, Horticultural shows, in fact any place where people meet. Definitely not to be sneered at is the local Mothers Meeting or Women's institutes. These have proved very useful sources of crowd sounds to me and their co-operation has been valuable. You might also bear in mind the possibility of attending some of these meetings and functions when a talk or lecture is being given because on these occasions, by

switching on and off at the right moments, you can get some really good and useful spontaneous applause, laughter and other reactions.

Take care

Now before going on any further I must give you a warning. Whatever sort of equipment you may be using on these jobs, if your set-up involves wires trailing in any way at all, no matter how short, you should in your own interest and that of the people who have given you permission to record, consult with your insurance company and check on liability in case of accident to your hosts and or members of the public who are present. Armed with this information and your position in this respect clarified, permissions will be much more readily given and to have this matter cleared up is, after all, only fair to everyone concerned.

There will also be opportunities to make some very useful recordings in your own home or the home of a friend on such festive occasions as Birthdays and Xmas. The biggest difficulty of recording in the average size house on these occasions will be to get sufficiently far away in order not to have one voice or group of voices predominating, nor to have any particular item distinctive whereby the recording will be recognised as recording of that event instead of just being a background for later use in many contexts. At these gatherings the co-operation of the people concerned can easily be obtained by making a short, record session part of the evening's entertainment.

To get a good burst of laughter, for instance, tell them that on a hand signal they must all take a deep breath and hold it as long as possible. As soon as they have taken this breath, switch on your machine and just stand there, with the microphone in position, quite silent and waiting. It won't be many seconds before they all burst into laughter and this little trick works just as well with children as with adults. Applause is a useful sound to have, and your party group could provide you with small group applause of many kinds from enthusiastic to half-hearted and desultory. And during the intervals between the fun and games, keep the machine ready for the cheerful chatter that usually occurs. Incidentally, you might also check with the insurance company the question of liability in your own home in case of accident. You really can't be too careful.

Next article: Railways and General Sounds.

Tape recording at its greatest and best...

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... tape recorder workbench

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

IT is only comparatively recently that the fitting of facilities for superimposition has been carried out by tape recorder manufacturers in this country. The writer suspects that it has been seized upon as a "gimmick" that adds another line to the specification at relatively little cost. While the ability to effect superimposition of recordings is by no means a necessity, there can be no doubt that it proves a useful feature to those who begin to broaden their outlook on this business of home recording.

Superimposition consists, simply, of a lack of erasure so that the old recording, normally wiped out, will in the main be left when a new recording is made. Two things must, however, be noted. Firstly that the original recording will invariably be reduced in level due to the erasing effect of the recording bias that has to be used. This reduction tends to vary with different types of machine due to variations in the amount of bias employed, and may well have a frequency selection, affecting the higher frequencies to a greater extent, causing the original recording to lose "sparkle". Secondly, due to the fact that the vast majority of domestic tape recorders use one amplifier, either for recording or for replay, it is not possible to monitor the original recording while making the new one. Hence any attempt at true synchronization is out of the question.

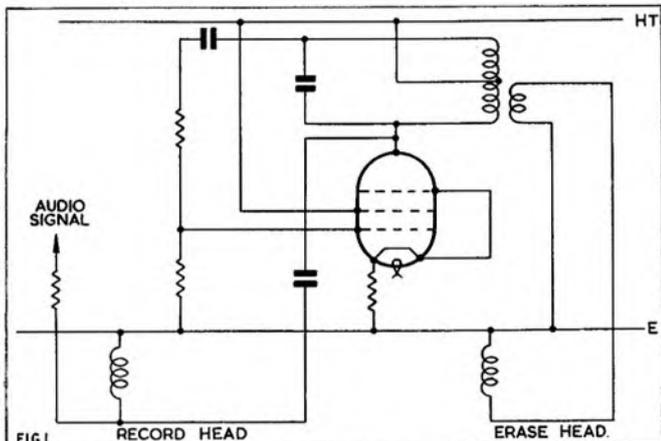


Fig. 1. Circuit of oscillator for low impedance heads.

The first of these two points may well be an advantage. A typical use of the superimposition feature would be the recording, first, of appropriate music for use as a background, followed by a second recording of speech. Loss of sparkle and slight attenuation of the music would, in fact, help to place it in the background where it is wanted. The speech under these circumstances, should be indistinguishable from a normal recording.

The Switch Should be Loaded

It would seem then, that all that is required is a switch in the supply to the erase head. Unfortunately the power supplied to the erase head by the oscillator is very many times greater than that taken by the recording head for bias purposes. Unless some form of stabilised oscillator were used, disconnection of the erase head would result in a considerable voltage rise, and a corresponding increase in recording bias. The solution is to substitute a dummy load in place of the erase head, such that the power drawn from the oscillator remains substantially the same.

Fig. 1 shows a typical bias oscillator circuit, feeding both record and erase heads. In this instance the erase head is of low impedance and hence has its own winding on the oscillator coil. The power consumed by the record head (bias) is probably about 0.1 watt, while the erase head may use 2 watts or more. Fig. 2 shows the actual connections to the erase head with a two way switch incorporated

and the dummy load resistor, which must have a suitable power rating, i.e. 2 watts. It may be carbon or wire-wound. The resistance

The Veritone Venus Recorder is an example of a machine already fitted with facilities for superimposing recordings. It is available in console form, or portable (as shown).



value of the load should be near the impedance of the erase head, itself dependant on the bias frequency used. Some approximate values for common erase heads are given for guidance:—Collaro 270 ohms, Brenell 270 ohms, Truvox 4.7 K ohms, Lane 4.7 K ohms, Grundig 1 K ohm, Wearite 390 ohms.

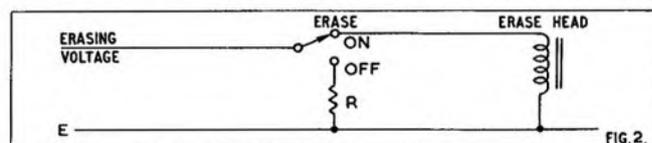


Fig. 2. The Erase head switch, with dummy load R.

A little experiment may be necessary to find the correct value, which should allow you to make a recording, on a previously erased tape, that is indistinguishable from a normal recording. If your machine uses a deck that is not listed above, you will have to consult the makers to find the appropriate resistance value.

Finally, there have been machines produced using D.C. current or a permanent magnet for erasure. In the former case a simple switch should do, while in the latter it will be necessary to move the magnet away from the tape. This will be done anyway on playback, so the same mechanism will serve.

Next month we'll take a further look at the question of maintenance and seek the cause and effects of "Cross-tracking".

RECORDING TAPE — Return of Post Service

DOUBLE PLAY

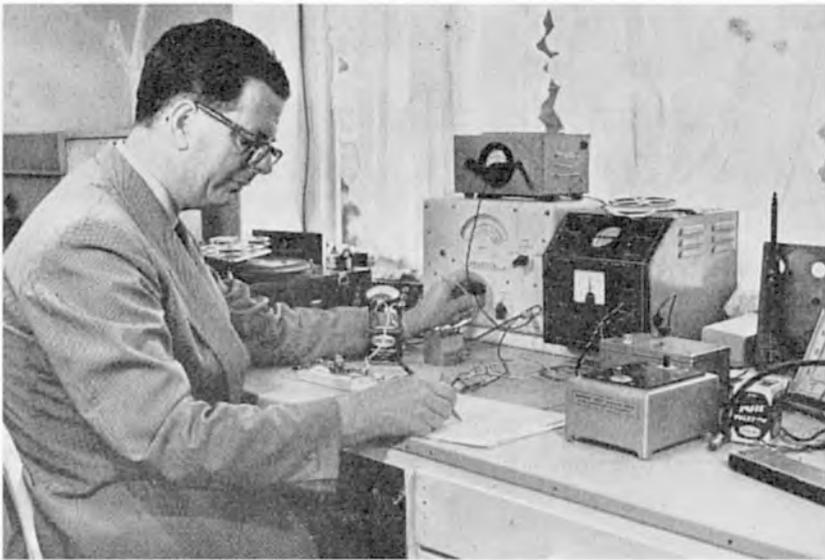
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The Author in his workshop tests the performance of the "breadboard" amplifier.

BUILDING A SIMPLE RECORDER

Starting with this month's article, you can piece together in easy stages an inexpensive tape recorder. The most you need to spend each month is £1, and besides getting lots of fun out of building the recorder, you will learn how it works at the same time.

IN this series of articles I want to try and recapture some of the magic of the crystal set era of the mid 1920's when an earlier generation of experimenters had the supreme thrill of hearing their first broadcast on a conglomeration of bits and pieces which they had lovingly put together on the kitchen table, and which they could proudly claim to have built themselves.

The analogy is quite close as I intend to use the modern version of the crystal, the Transistor, which, to those of us who have been brought up on valves, with their massive power supplies and almost dangerous voltages, has a magic of its own, with its ability to do many of the jobs previously done by valves when powered from a single flashlamp battery. Not only does it do these jobs, but it often does them more efficiently and simply, and, now that transistor prices are lower, more cheaply also.

Use the Recommended Components

In the same way that the early experimenters spent most of their pocket money on a good pair of earphones, and a tried and tested crystal, I am going to suggest that you also invest in a few simple components of known performance and characteristics which will be used as building blocks in our series of magnetic recording experiments. They are:—

- (a) An electromagnetic transducer which can be used either as a microphone or as a headphone. This unit uses a balanced armature system coupled to a light well, damped aluminium diaphragm, and has a response rising 3 dB per octave from

100 c/s to 4,000 c/s to give crisp clean voice reproduction. The output level of this unit on average speech is used as a reference signal level in most of our experiments.

- (b) A general purpose audio transistor, mounted in a suitable three pin plug so that it is mechanically protected, and can be plugged into a number of alternative breadboard circuits with little risk of improper connections or damage through unskilled soldering.

- (c) A magnetic record/playback head having a suitable impedance and output for use in transistor circuits, with a gap width of 0.25 thou and a well screened and efficient magnetic circuit.

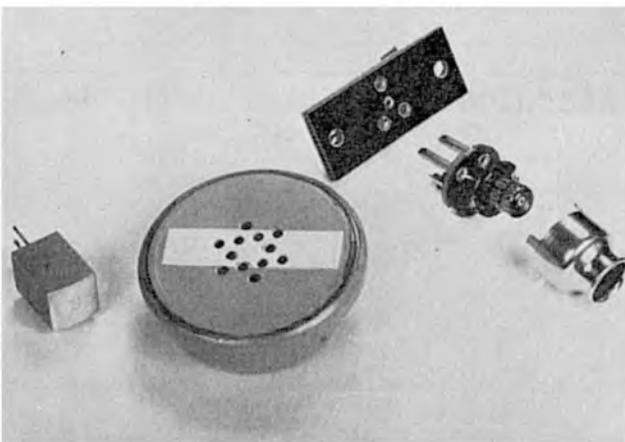
The average price of each of these units will be £1, and they will be advertised in this magazine as we come to need them.

A number of miscellaneous small components such as resistances, condensers, terminal blocks, flashlamp batteries, etc. will be required but it is assumed that these can be bought locally, if they are not already available in the experimenter's own junk box.

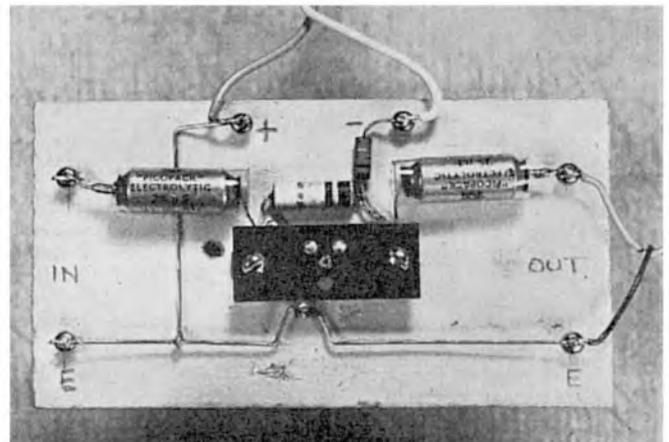
First Experiment with the Microphone

I am going to assume that you have available a radio set with PU and Ext.LS terminals with enough sensitivity to work from a crystal pickup, or alternatively, that you have an amplifier and loudspeaker of equal sensitivity.

For the very first experiment I suggest that you connect the microphone directly to the PU terminals of the set, and with the volume control fully advanced, listen to the loudspeaker output as someone



The basic kit of components includes the head, microphone/earpiece, transistor, plug, socket and cover.



This close-up of the breadboard shows the wiring and will help to identify each component on the circuit diagram.

BUILDING A SIMPLE RECORDER

BEGINNERS

HERE IT IS!

By A. Tutchings

talks into the microphone. You will almost certainly find that the voice is barely audible, and a very loud shout will be required at the microphone to produce even a faint sound from the loudspeaker. This is not surprising when one considers that the average radio set needs a signal of about 100 millivolts at the PU terminals for normal loudspeaker level, and that the output of our microphone on normal speech is less than 1 millivolt.

A Pre-amplifier is Needed

The output of a magnetic playback head is of the same order as our microphone, so that it is obvious that if we want to listen to magnetic recordings on a loudspeaker we require a preamplifier with a voltage gain of about 100. This is just within the capability of a single stage transistor amplifier if two conditions are met; first that the source impedance is low compared with the input impedance of the transistor, and secondly that the impedance into which the transistor amplifier works is high compared with the output impedance of the transistor.

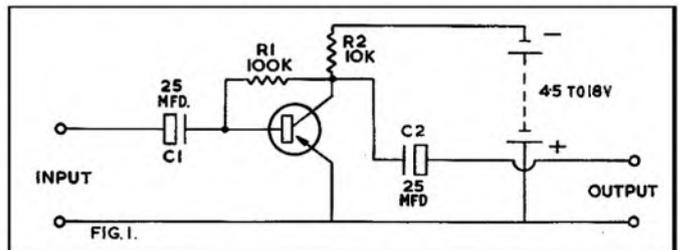
The specified microphone and record/play head both have mid frequency impedances in the region of 300 to 500 ohms, and the input impedance at the PU terminals of the set will not be less than several hundred thousand ohms.

The transistor amplifier circuit most suited to these conditions is the well-known earthed emitter circuit shown in fig. 1. With the component values shown the input impedance is about 3 K, which is sufficiently high compared to the microphone or head impedance to satisfy condition one, and the transistor output impedance is about 2 K, which satisfies condition two.

And now just a few words about component tolerances and values; C1 should have an impedance at low frequencies which is low compared to the input impedance of the transistor. A 25 mfd. condenser is specified as it is an easily obtainable value, but a capacity as low as 4 mfd. can be used with little audible bass loss. The positive

pole of this condenser should be connected to the input terminal, and the negative pole to the transistor base.

R1 biases the base of the transistor so that a current of a few microamps flows into the base. This component is fairly critical and the value should not depart appreciably from the specified 100 K.

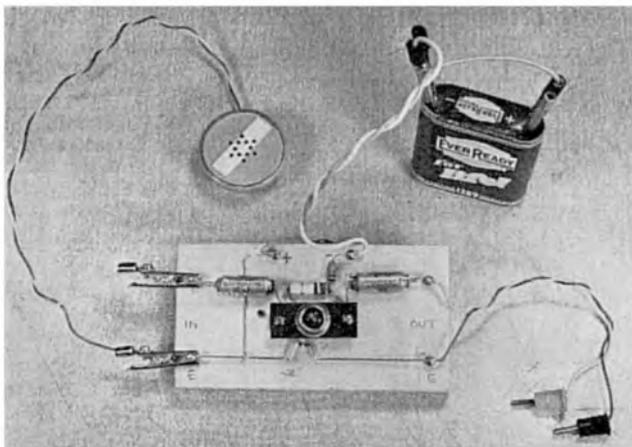


R2 is the collector load resistance. This is not critical within a few thousand ohms, i.e. anything between 7 K and 15 K will do.

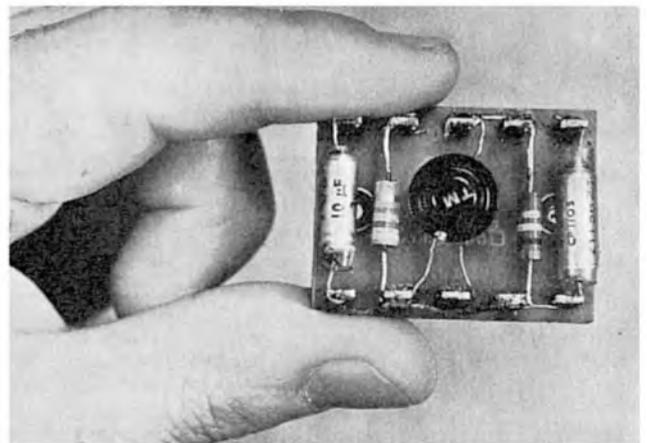
The mean collector current is about 0.5 mA, with a battery voltage of 9 volts, and this current is modulated by small variations in base current produced by the signal from the microphone or head. The current changes develop an alternating voltage across the load resistance R2 which is passed to the valve amplifier through C2 which blocks the DC potential across the transistor.

For the valve amplifier used in this experiment a small condenser of about 0.01 mfd. would be satisfactory, but a 25 mfd. condenser is specified so that the transistor amplifier may feed a headphone or recording head in later experiments. If an electrolytic condenser is used, the negative pole should be connected to the transistor.

The polarity of the battery connections is very important, and this should be carefully checked before the transistor is plugged in, otherwise you may get that nasty sinking feeling which we have all



Showing the amplifier set up for use to boost the microphone signal into radio or loudspeaker.



A miniature version of the amplifier may be built on a Bulgin tag-board, using small-size resistors and capacitors.

Fun for all the family

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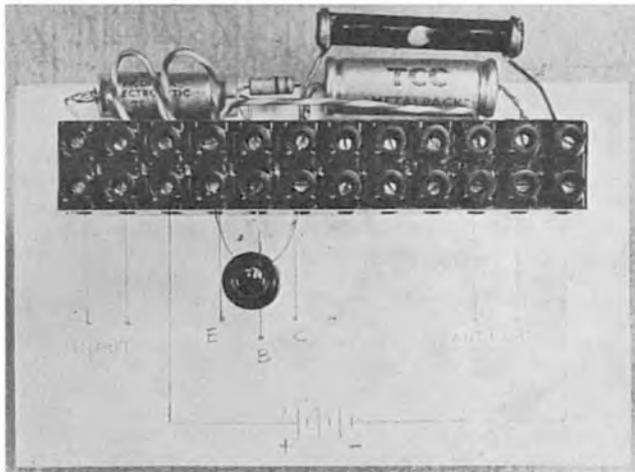
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	FEET	REELS	PRICE	FEET	REELS	PRICE	SIZES	FEET	REELS	PRICE	
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4"	300	16	10 0	450	25	14 6/8	5"	1200	48	£2 5 0	
5"	600	32	£1 0 0	850	45 1/2	£1 8 0	7"	2400	2	8	£4 0 0
5 1/2"	850	45 1/2	£1 7 6	1200	64	£1 15 0	SUPERGRADE				
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had at some time or another when a meter switched to a low current range is accidentally connected across full HT or the mains supply. In the type of 4.5 volt flashlamp battery shown in the photographs, the short connector is the positive one, and this, contrary to usual valve practice, goes to the earth line which is common to one input terminal, one output terminal, and the transistor base.

The photographs show most of the mechanical details of the construction of the amplifier which in the first case should be of the open breadboard type, with plenty of room for subsequent modifica-



An alternative method of constructing the amplifier is to use "chocolate strip" as shown, which makes soldering unnecessary.

tions and additions. If later on you decide to make it up in a more permanent form, one of the photographs shows how compact it can be.

Now Put the Amplifier in Circuit

We are now ready for our second experiment, which is of course to repeat our first experiment with the amplifier in circuit. It should now be found that adequate volume is available from the loudspeaker when speaking about two to three inches from the microphone. If the volume control is turned up too far, or if the microphone is used near the loudspeaker, acoustic feedback may occur due to the sound from the loudspeaker being picked up by the microphone, amplified and fed to the loudspeaker again, so that a continuous howl builds up which changes in pitch as the microphone is moved. This is best cured by extending the microphone leads so that it may be used in another room remote from the loudspeaker.

This will also help in judging the voice quality which should be crisp and clean with, if anything, a slight excess of high note response, which may be reduced if desired by using the tone control of the radio set or amplifier. We shall require this extra top response in later recording experiments.

If the gain is still too low, the battery voltage may be increased to a maximum of 18 volts, by connecting four of the batteries in series, paying due regard to the polarity of each unit so that the voltages add properly, and as usual watching the overall polarity to avoid damaging the transistor.

Next Month

In the next article in the series I hope to describe a simple tape transport system, which with the head, and the amplifier described above, will let us carry out simple playback of tape.

If you already possess a tape recorder, there is of course no problem in transporting the tape or in providing some sample recordings for the next experiment. If not you should beg, borrow or steal an old gramophone turntable which will turn at 78 r.p.m., an old spring-wound acoustic gramophone will do at a pinch, but you may get a bit fed up winding it up for each test. You should also try and scrounge some tape recorded at 7.5 inches per second from one of your tape recording friends.

The other very important piece of experimental equipment is a rubber heel, but don't buy one until I tell you a bit more about it.

. . . about tape speeds

From:—James Moir, Axiom Works, Wembley.

*Dear Sir:—*I read with interest Mr. Short's comment on my review of the Stuzzi Mambo tape recorder and would like to comment on his remarks about the application of tape recorders running at a speed of 3½ in./sec.

He can be assured that I have no professional bias against this speed, for I recognise the economic advantages of the lowest possible tape speed. However, in the present stage of the art, I know of no machine that will satisfy a critical listener's requirements at tape speeds lower than 7½ in./sec. There are many machines with an adequate frequency response available, but there are none to the best of my knowledge, that are sufficiently free from wow and flutter. No doubt this situation will change with the passing of time.

Mr. Short is a good deal nearer the truth in his comment about the usage of commercially recorded tapes. The best EMI tapes are a good deal better than the best LP records and are infinitely cheaper than records on a basis of "life hours per shilling" though dearer in terms of first cost. Tapes should have been sold as the medium for the connoisseur with a recording standard of professional level, and the mass market should have been left to records.

When the design and production problems of producing tape records in cassette form have been solved we will undoubtedly have on the market commercially recorded tapes at 3½ in./sec. By that time the engineering and economic problems of producing tape machines running at this speed and having an adequate performance in respect of wow and flutter will no doubt have been solved. Until that time, I think the critical listener will continue to use tapes running at 7½ in./sec. and be troubled by the relatively restricted choice available.

Yours faithfully

* * *

. . . about registering tapes

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

*Dear Sir:—*When sending a reel of recorded tape through the post, one usually "registers" it. This insures it for £10 (or more if you pay extra). Does this insurance cover the cost of the spool and tape only?

What (if the recorded material was a production costing, say £100 to produce), would happen if the reel was mislaid in transit. Would it be possible to claim £100 or would the insurance only cover the cost of the reel of tape, a mere £2 odd?

Yours faithfully

We regret to say that we don't know the legal answer. Personally, we like to make a reserve copy of valuable tapes in case one gets lost.

* * *

£300 NEW MUSIC COMPETITION

● Closing date extended to November 9th ●

In our June number we announced that, in the event of a printing strike, readers could obtain entry details for our competition direct from us. As it worked out, the strike became a big event, and requests for details are still coming in. In other words, the plans have been so upset that we have decided to extend the closing date by one month. It is now November 9th.

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DESIGNING YOUR OWN MIXER

PART TWO _____ ELECTRONIC MIXING

By J. W. Berridge

IN the first of these articles, we arrived at a number of conclusions concerning practical mixer design. In addition, we were able to see how a practical design could be derived. The circuit I showed at that time was the theoretical one. In fig. 1 I've shown this same basic mixer circuit in practical three-channel form, and in fact there are a number of commercial units now on the market employing just such a circuit as this. The conclusions we arrived at were (i) that any one input is shunted by all other inputs, (ii) that a certain signal loss is inevitable with a purely resistive mixer circuit, (iii) that only the best quality components should be used because of the low signal levels employed, particularly when dealing with microphones. Let me comment briefly on each of these conclusions for a moment.

I have deliberately refrained from being too specific about the first conclusion. More complex mixers, as I intend to show, may bear little physical resemblance to the basic circuit at which we have already arrived. They can become quite complicated valve circuits and are usually no longer merely a collection of resistors. Nevertheless, they still consist of a number of circuits in parallel and a shunting effect still exists. This is one factor which we will always have to contend with, and should be borne in mind at all times when designing mixers.

Let's Add a Pre-amplifier

The limitations expressed by our other conclusions dictate our next step toward a useful piece of equipment. The insertion loss present in the passive mixer frequently prevents us from attaining an adequate recording level from it. The question is how to overcome this loss, and the obvious answer is to increase the gain of the recording set-up. This means adding a pre-amplifier at some stage in the mixer, the most obvious place being directly after the basic mixer network. Thus we arrive at the arrangement of fig. 2 in which the minute voltages obtainable from the mixer are amplified before being fed into the input of the recorder (or whatever equipment is being used). This arrangement is satisfactory and relatively easy to accomplish. The pre-amplifying stage itself may consist of an extra valve added to the circuitry of the recorder itself with power supplied by the recorder; may consist of a valve stage built into the mixer cabinet



Professional mixers may have a dozen or more channels as shown in this photograph of the control console at a Philips recording studio.

along with the mixer circuitry; or may consist of a small pre-amplifier built on its own chassis, either with its own power supply or drawing power from the recorder.

Separate Pre-amp. is Best

This last is frequently the best arrangement for the amateur recordist since it involves no modifications either to the recorder, or a mixer which may already be operating with reasonable satisfaction. One big advantage to this course of action is that it is not necessary for anyone with little knowledge of electronics to resort to building his own, since there are a number of pre-amps suitable for the purpose on the market. Reference to the *Hi-Fi Year Book* reveals that Cape Electroponics of Southampton manufacture several sub-amplifiers (as they are alternatively referred to), their model A being suitable for high-impedance use. Lowther Manufacturing of Bromley, Kent, produce their transistor "Matching" units for low-impedance inputs, CQ Audio of Enfield, Middlesex, have a stereo economy pre-amp which, if the two halves are coupled together in series, would make a good two-stage unit, and of course Wellington Acoustic Laboratories, Farnham, Surrey, put out the Wal-Gain transistorised pre-amp. Any one of these units inserted between the mixer and the recorder will raise the signal voltage to a point where it will give more than enough recording level.

Designing your own pre-amplifier for insertion in just such a position is a tougher problem. By the time the already small signal voltages have passed through the mixing network, they become microscopically low and it becomes necessary to design the pre-amp with the absolute minimum of internal noise and distortion if good reproduction of the incoming signal is to be achieved. None but the finest components are capable of such a task and the cost of designing and building such a pre-amp is frequently out of all proportion to the disappointing results achieved by the home designer. However, several good designs have appeared in the pages of magazines in the past and an excellent stereo pre-amp was designed by H. Lewis Yorke and described in the March 1959 issue of *Hi-Fi News*. The unit utilised two EF86 valves in two separate pre-amplifier stages. Either of these stages could be used for the purpose described, or they could be coupled in series for greater gain. Alternatively, only one stage could be built if that is all that is needed. Construction is relatively simple and requires few tools; complete data is given in the article. For those readers who wish to construct this pre-amp and who have not got a back copy of the particular issue, a letter to the subscription department of this magazine, together with a remittance to cover the cost of the issue and postage, will produce the required copy.

Watch for Noise Level

Because of the very low signal levels employed in this type of circuit, it is usually called "low-level mixing". Despite the fact that such an arrangement is quite practical, the results are sometimes noisier than is desirable, particularly for some applications. A certain amount of noise is tolerable when recording music, more so when loud passages are predominant, since the level of the music itself tends to mask the noise generated in the mixer circuits. However, if what is being recorded is relatively quiet or, worse still, intermittent (such as someone reading poetry) the noise becomes obvious and very irritating. To improve this state of affairs we have to increase the ratio of signal to noise, and before I go further let me explain that the noise referred to is the noise generated in the valve circuits employed. Noise picked up by a microphone has nothing to do with good mixer design.

There are two ways to increase the signal-to-noise ratio of a circuit. The first is to decrease the noise, obviously the desirable way. However,

DESIGNING YOUR OWN MIXER

Following last month's notes on designing straightforward "Passive" mixers, the author points out the advantages of electronic mixing, and outlines his own design shown here. The power supply has been kept on a separate chassis to minimise the chances of hum developing in the chassis.



if our noise and signal levels are very low to start with it becomes exceedingly difficult to decrease the noise much further. The second way is to increase the signal level and this is by far the more advantageous of the two. Fig. 3 shows how this is done. A pre-amplifier is added to each of the inputs before the actual mixer network. This is obviously more costly than other arrangements since a pre-amp is needed for each input, but the improvement in general performance makes this the best type of mixer circuit in present-day use. Because of the fact that the actual mixing is now done at a point where the signal levels are of a fairly high order, having been considerably amplified, this type of circuit is referred to as "High-level mixing". What actually happens is that the insertion loss is overcome before it occurs and even greater benefits show up in the process.

Improved Signal/Noise Ratio

For one thing, the design of the pre-amp stages is not so critical since signal voltages are initially higher. This means that even if the generated noise is slightly higher, the signal-noise ratio will still be much improved over the previous arrangement. Better still, since the mixer network now follows the pre-amp, it will take its toll not only of the signal but also of the noise. Furthermore, if you refer to fig. 2 again, you will see that as a mixer control is turned down the tendency is for the signal to lose itself in the noise of the pre-amp. With the circuit of fig. 3 this does not happen since the noise decreases with the signal. Again we have a marked improvement in signal-noise ratio.

Further advantages show up when we start employing high-level mixing. We are now able to use the more insensitive inputs to our recorder etc., but in addition we can design the pre-amp stages of our mixer to give us any facility we wish. Two of the stages can have the flat response necessary for microphone inputs while the third may be equalised for records, thus eliminating the need for a record pre-amplifier. Any number of arrangements are possible, limited only by the imagination and budget of the builder. Again, commercially available pre-amps may be used and any of the units

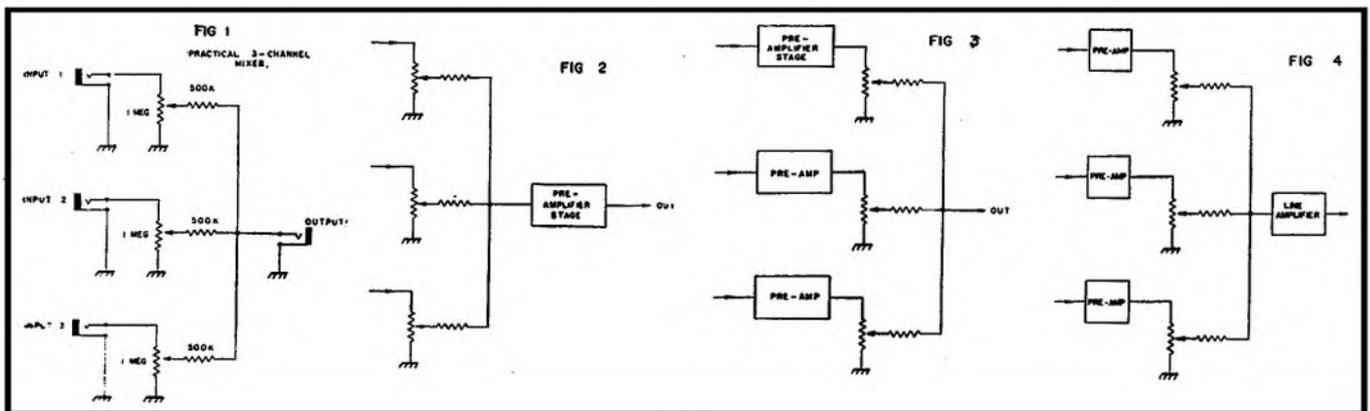
mentioned previously will serve the purpose. Calculation of the mixer values remains the same, the value of the potentiometers being equal to the output impedance of the particular pre-amp employed.

A Line Amplifier is Worthwhile

The last step in making our mixer into a really versatile piece of equipment is to add the pre-amplifier which originally followed our mixer network. This may seem rather pointless after we've gone to some trouble to eliminate this stage, but remember that we are not now dealing with such low voltages. In fact this stage is no longer a "pre" -amplifier but is referred to as a "Line" amplifier. Despite the pre-amplification in our mixer, the voltages we get out of it are not very much higher than those obtainable from a microphone, because of the insertion loss of the network. With recorders which have a high-gain microphone input this is no problem, and if recording is our only goal we have reached it. But present-day recorders can be used for many more things than just recording. A number of recorders can only be used for public address or other amplification purposes by feeding them at some point midway along their circuitry. Also the modern trend is to build separate power and pre-amplifiers, and it is not possible for this mixer to deliver enough output to drive a power amplifier direct, either for P. A. use or for reproduction in the home. The obvious comment that comes to mind is that home hi-fi and public address set-ups have a separate pre-amp anyway, but then why have this pre-amp at all when nine-tenths of its facilities are better supplied by the mixer.

Final Circuit

If our mixer can be made to deliver sufficient output we can dispense with the extra pre-amp altogether and use all the facilities of our equipment to their greatest advantage. Hence the reason for adding a line amplifier stage. A suitably designed one can deliver anything up to 1 volt compared with the 5 millivolts or so from a microphone (up to 100 mV for crystal units). And so our final circuit becomes the arrangement of fig. 4 with the complete circuit diagram shown in



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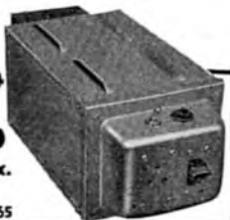


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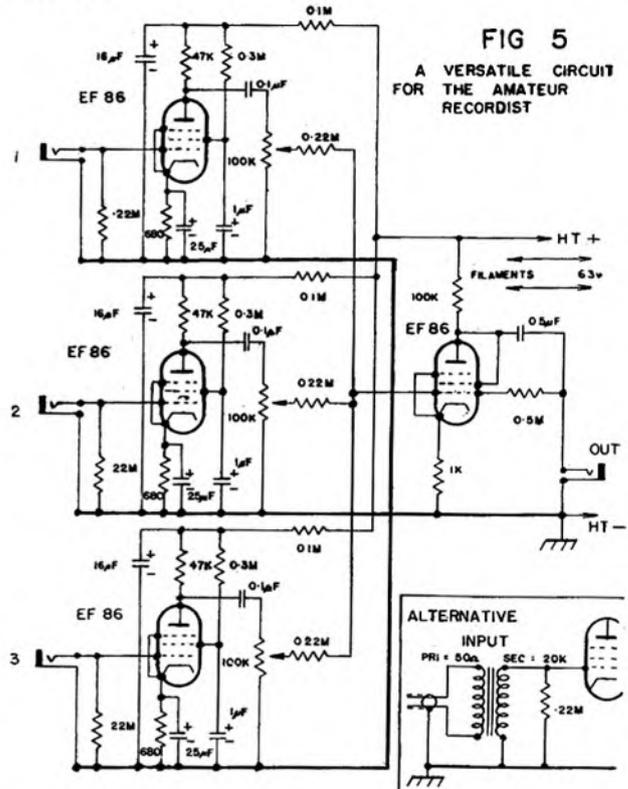


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DESIGNING YOUR OWN MIXER—(continued)

fig 5. The circuit is basically similar to that used in many commercial mixers and presents the minimum difficulty in construction. Layout is not unduly critical except that input leads should be kept fairly short and well separated from the output leads. Component values are not critical either and if the reader finds that he is unable to obtain a certain value he may use the next nearest. He should bear in mind however that should he pick a different value for any of the components in the input stages he should make the same change in all the other input stages. The alternative input for low-impedance sources is also shown, the primary of the transformer being chosen to match the load impedance of the signal source, usually a microphone.



A lot can be done with a mixer to improve the standard of our recordings. The reader's imagination should supply him with enough ideas to work on and attentive listening to radio, TV and records will give a good idea of how sound should be handled to give interesting results.

Next Month: Practical aspects of building a mixer, and putting it to use.

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Readers' Problems

★ Do you have any questions on tape recording—technical or otherwise? If so, send them to our Editorial Office and we will find the answer or invite readers to help. But please limit each letter to a single query to help us in answering.

Radio Programmes by Tape Recorder

Dear Sir:—Recently I have been listening to local amateur radio transmissions—on my tape recorder! They come through quite clearly on my amplifier and I can also record them by setting the m/c to "record".

Can any of your Boffins explain this?

Yours, T. Nurse, Birmingham.

P.S.—I understand that some members of Birmingham T.R.C. get the BBC Light programme!

The radio programmes as transmitted on Medium and Long waves consist of a radio frequency (carrier) signal whose amplitude varies in accordance with the audio frequencies picked up by the microphone, etc. To detect or "demodulate" these signals, it is necessary only to pass them through any material which has less resistance in one direction than the other. This is the principle of the old cat's whiskers and crystal receiver, and of the diode valve, and one has even heard of a piece of coal being used successfully to pick up radio programmes.

The spurious reception to which you refer and on which we have received a number of letters, can usually be traced to intermittent or "dirty" contacts at the input to a high gain piece of equipment. The microphone or other input lead acts as an aerial in which tiny currents are induced from all the dozens of radio waves. Partial discontinuities, such as those in a faulty jack plug, will act as a detector and the small audio signal will be amplified sufficiently to be heard from the loudspeaker or recorded on the tape.

Within the last few days, a member of "The Tape Recorder" staff who was organising a "Record your Own Voice" stall at a Youth Fête found himself radiating the BBC Light Programme at strength 6's. The securing screw on the jack plug was found to be loose, and tightening this silenced the programme—presumably pacifying the Performing Right Society too!

The trouble is obviously more acute in the vicinity of a high-power BBC transmitter, or an over-enthusiastic radio ham.

* * *

Tape Recorder Lubrication

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

Dear Sirs:—I do enjoy reading both *Hi-Fi News* and *The Tape Recorder*, but so far I have not read an article in which the important factor of lubrication of tape-recorders (turntables, motor, flywheel, etc.) is discussed.

Could you oblige me therefore and let me know what type of grease you recommend for lubricating the working parts of a tape recorder? Mainly I wish to lubricate the turntables, the flywheel shaft, the rubber drive wheels (with metal bearing), and the motor of my machine, which is a well-known make of tape recorder.

I asked my dealer to find out from the manufacturers about this question of grease—and he was told *vaseline*, or any grease of about that consistency. I was a little dubious, but used it—and of course it soon melted as my machine was running, and so getting warmed up. I had the job of cleaning this out, and I don't mind admitting I swore wholeheartedly at the "experts"! This was not the first time that I had been given wrong information about my machine. At the Audio Fair, I asked some questions of the attendant on the manufacturer's stand. He then promptly offered me information (about recording methods, modulation level) which was totally wrong! When I asked him if he had read the appropriate Service Manual, he firmly declared he had. But when I told him I had a copy myself, and had read it—and that what he said did *not* tally, he was covered in confusion! He could only say that I should not have had a Service Manual. What a reply! These "experts" who are supposed to represent their companies, and give technical "advice" to the unwary public, are mostly half-wits in my humble opinion. I think some of the products

are good—but I know for sure that some of the people do not know their jobs, do not read the data-sheets their company must surely provide, and do not consequently "inform" the public they deal with efficiently.

However, will you please now advise me of a suitable grease which I can use in my machine, and which will not melt as its temperature is increased.

Cordially yours
P.S. My machine HAS needed greasing, by the way, since the turntables have started to squeak. I am not greasing it merely out of a desire to "fiddle" with it!

Probably the real reason why the subject of lubrication is rarely mentioned in respect of tape recorders is that it should be unnecessary. The practice is to use Oilite brushes, possibly with a felt reservoir, that have been impregnated in manufacture with a suitable oil. This arrangement should be good for many years of really heavy service. In certain instances an oil hole is provided, through which a few drops only of a sewing machine type of oil should be applied to the felt pad. Other manufacturers recommend the replacement of the brushes at a few coppers each, plus fitting charges.

In the few instances where a grease is required, a "non-creep" variety is used. One such, "Molylistate", is normally supplied in bulk, but, I understand, should be available in small tubes to retailers from at least one of the radio and television wholesalers. I am also advised by the makers that "Molyspeed Grease", normally available from Halfords and similar shops as a car chassis lubricant, has suitable properties, but I can't help thinking that a 1 lb. tin would go a long way on a tape recorder!

Finally, I must make the tentative suggestion that the squeak does not indicate the need for lubrication, but rather points to an incorrect adjustment in the mechanism.

* * *

Artificial Echoes and Erase Cut-out

Dear Sir:—Having read two letters in the Readers' Problems section of your July issue, we would like to draw the attention of your correspondents to our product, the Veritone Venus.

Firstly the letter written by REA4 R.G. Tate enquires about "Artificial echo" and since we fit twin amplifiers and three heads this facility is available on our recorder at 58 guineas.

Secondly, in respect of "Erase Cut-out" Mr. P. A. Trewartha should be advised that by using this method or shielding the head, then considerable loss to the first recording is likely to be experienced. The Veritone Venus achieves little or no audible loss to the first recording since automatic alteration of the Bias is made when superimposing. Furthermore, with our Instant Audio Check system the operator can hear the first recording whilst superimposing a second one. Yours faithfully, L. Wright, Veritone Ltd., 16 Station Close, Potters Bar.

Readers will find that the "Tape Recorder Workbench" feature this month is devoted to Simple Superimposition. (See page 341).

* * *

Glenn Miller Fans

From:—J. W. Grinyer, 19 Portnall Road, London, W.9.

Dear Sir:—I am wondering if it would be possible to ask any tape enthusiasts who are interested in Glenn Miller and his Orchestra and would like to tapespond, etc., with me to drop a line to the above address.
Yours faithfully

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Verdik S1	45	6 5 0	3 8 4
Elektron	47½	6 17 6	3 12 2
Wyndson Viscount	49	6 19 0	3 14 2
Spectone 161 (Ex. Tape)	49	6 19 0	3 14 2
Grundig TK20	52	7 0 0	3 19 4
Dulci Harting Deck* with pre-amp	55	7 5 0	4 3 4
Elpico	55	7 5 0	4 3 4
Telefunken 75 KB with microphone	56	7 6 0	4 5 10
Brenell 3 Star	58	7 10 0	4 9 0
Veritone Portable	58	7 10 0	4 9 0
Saja Export	59	7 19 0	4 10 0
Truvox R2	59	7 19 0	4 10 0
Grundig TK25	62	8 2 0	4 15 0
Telefunken Deck*	63	8 3 0	4 16 8
Philips 8108	63	8 3 0	4 16 8
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Stuzzi Magnette	69	8 11 0	5 5 6
Grundig TK30*	72	9 12 0	5 10 0
Telefunken 85*	75	9 15 0	5 15 0
Harting HM5*	82	10 12 0	6 5 8
Grundig TK35*	82	10 12 0	6 5 8
Sabafon Automatic*	89	13 9 0	6 13 4
Simon*	95	14 15 0	7 1 8
Tandberg Stereo 4 Track*	124	20 4 0	9 3 4

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TAPE, RECORDERS & ACCESSORIES

FIRST DETAILS OF NEW PRODUCTS

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



★
**Inexpensive
 Japanese
 Tape Recorder
 from
 Lasky's Radio**

LASKY'S RADIO, 42, Tottenham Court Road, London, W.1, are selling what must be the cheapest tape recorder available in this country, "The Nippon Light". It is Japanese made, and priced at £19 19s., crystal microphone 19s 6d. extra, and a radio jack is also available for £1 10s. It is a two-speed machine operating at $7\frac{1}{2}$ and $3\frac{3}{4}$ i/s, the spools are 5-inch. One knob controls Rewind, Stop, Play, Record, and Radio (amplifier only). A neon recording indicator is employed. While recording the internal loudspeaker can be kept in circuit enabling the incoming signal to be monitored. The recorder is compact, measuring $12\frac{1}{2} \times 9\frac{1}{2} \times 7\frac{1}{2}$, and it weighs only 15 lb.

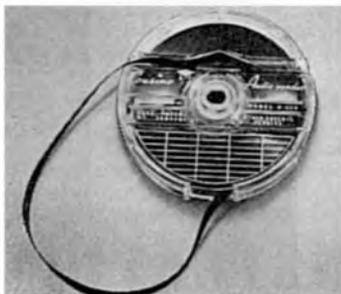
* * *

Simon Stereo Adaptor

THE Simon Stereo replay adaptor, which was demonstrated for the first time at this year's London Audio Fair, is now in production and is being released for sale on September 1st.

It is designed for use with the standard SP/4 Recorder which requires no modification of any kind. The adaptor unit is simply attached to the side of the Recorder, the stereo replay pre-amplifier being a self-powered gang unit giving full tone control for both channels. Signal balancing is achieved through the radio input gain control on the standard recorder, and the other channel is handled through the second Amplifier/Speaker Unit, which incorporates an identical amplifier to that in the recorder itself. The price is £51 9s. Further details will be available from Simon Sound Services Ltd., 46-50 George Street, London, W.1.

★
**Philips
 Continuous
 Tape Cassette**



★

PHILIPS ELECTRICAL LTD., Century House, Shaftesbury Avenue, London, W.C.2, are now marketing a Continuous Tape Cassette, type EL3963/00, which is intended for use primarily with their AG8108G Tape Recorder and with certain other models which

have a left to right tape sense and facilities for locking the tape turntable in a stationary position during recording/playback.

Of clear plastic, the cassette has a diameter of $3\frac{1}{2}$ in. and contains low friction magnetic tape coated on both sides. Playing time is 20 mins. at 17 i.p.s., 10 mins. at $3\frac{3}{4}$ i.p.s. and 5 mins. at $7\frac{1}{2}$ i.p.s. These times may be doubled by the formation of a "mobius loop" as described in the operating instructions.

The EL3963/00, which sells at £5 0s. 0d., is suitable for application in all situations requiring a continuous operation of directions, messages or signals.

* * *

Cinesmith Depolariser

CINESMITH Products have produced a new low priced depolariser. The body is made of plastic and the pole piece is specially designed to eliminate the need to dismantle the pressure pads. It is claimed that the slender pole piece will easily pass between the pressure pads and the record/playback head of any recorder. The price is 34s. It is available from dealers, or direct from the manufacturers, Cinesmith Products, Regents Street, Barnsley, Yorks.

★
**Grampian
 Microphone
 Matching
 Unit**



★

A new matching unit has just been released by Grampian for use with Tape Recorders, Home Cine sound equipment, Amplifiers, etc., in cases where it is desired to use a low impedance microphone with an amplifier with a high impedance input which might lead to instability and treble loss.

Consisting of a double wound transformer housed in a Mu-metal case, it is provided with a jack socket on the primary side for input and a short screened lead on the output for connecting to the input of the amplifier. Length $3\frac{3}{8} \times 1\frac{1}{2}$ in. dia. Weight $5\frac{1}{2}$ oz. Input to match 15-30 ohms, output to work into high impedance. List price £3 5s.

Manufacturers: Grampian Reproducers Limited, The Hanworth Trading Estate, Feltham, Middlesex.

* * *

The Dulci "Shaftesbury"

ADVANCE details have been received of the Dulci Company's "Shaftesbury" portable recorder using the Monardeck, which will shortly be available. The price is £30 9s. It is also their intention to make the amplifier available as a separate unit, with features devised to produce the very best results obtainable from this deck. The Dulci Co. Ltd., Villiers Road, Willesden, London, N.W.2.

* * *

Editorial Note

Referring to the new Collaro "Studio" Tape Deck last month, we unfortunately described it as a single track machine. This should have read "twin track".

Also, in our July issue, the photograph of a Wearite Deck was wrongly captioned—a stacked stereo replay head was used in place of the usual dummy head.

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EQUIPMENT REVIEWED



★
THE FI-CORD
MK 1A BATTERY
OPERATED
RECORDER
★

★ **Manufacturer's Specification:** Power supplies: Four 2-volt accumulator batteries, weighing 5 oz., rechargeable with special Fi-Cord charger from A.C. Mains 110-240 volts. **Battery life:** Recording time 1½ to 2 hours at 7½ i/s, 3 to 3½ hours at 1½ i/s. **Motor:** 3 volt D.C. **Transistors:** 7 General Electric types GET 3 and ET4G. **Magic Eye Indicator.** **Tape speeds:** 7½ i/s and 1½ i/s. **Frequency response:** At 7½ i/s 50-12,000 c/s ± 3 dB. **Recording sense:** Top track, left to right. **Signal to Noise ratio:** Better than 35 dB. **Wow and flutter:** 0.4%. **Remote Control:** Motor switch on microphone. **Loudspeaker:** Built in. **Input:** 400-1,000 ohms, 0.4 mV. **Output:** Socket from playback head. **Size:** 9½ × 5 × 2½ in. **Weight:** 4½ lb. **Price:** With tape, batteries and microphone, £61 19s.

Manufactured by Fi-Cord Ltd., 40a, Dover Street, London, W.1.

★ * * *
THE Fi-Cord machine must surely rank as the world's smallest commercially available tape recorder, being only 9½ in. x 5 in. x 2½ in. and weighing 4½ lbs. It is thus small enough to be tucked into a lady's handbag or the pocket of an overcoat; and it can be operated in this position for after setting up the gain control, all the recording can be controlled from the press switch on the side of the microphone.

Miniaturization has been effected by the substitution of transistors for valves, and by good but simple mechanical design; but the facilities have not been unduly skimmed for a small monitor speaker, provision for a stethoscope headset, a remote control switch and a neon bar type of volume indicator have all been included. Power is supplied by four small rechargeable cells which slip easily into clips along the back edge of the deck.

Three-inch Diameter Spools

Three-inch spools are the maximum size that can be accommodated, but with double play tape this allows a playing time of about fifty minutes per track, or one hour and a half per spool, at the lower tape speed of 1½ i/s. At the higher speed of 7½ i/s about twelve minutes recording may be stored on each track. The recording of speech will undoubtedly be the main purpose of the machine, and the lower tape speed is quite adequate for this purpose. A not over-critical user might even find the performance at the higher tape speed good enough for recording music, and in fact there are many occasions when a Fi-Cord would make it possible to obtain a recording which would be quite unobtainable with a larger machine requiring a mains power supply.

The shape of the machine, and the mounting of all the controls on the end of the case, make it possible to operate the machine when it is slung over the shoulder in the special carrying case; and in this way it may be used in a train, bus or aeroplane if the user has the courage to dictate his letters in

public. For desk use, the end mounted volume indicator is too low to view comfortably unless the machine is up-ended. Apart from this minor criticism, operation of the machine is simplicity itself. The microphone is provided with a "press-to-talk" switch, which controls the tape motion and thus saves both tape and batteries. A miniature filament lamp serves to indicate when the motor is running.

Batteries May Be Re-charged

All the power is provided by four small lead-acid type of accumulators that last for about 3½ hours at the lower tape speed. These cells are completely sealed in polythene cases and may easily be recharged by clipping them into the special Fi-Cord—recharger a very convenient unit having dimensions slightly smaller than the recorder. Charging is indicated by four small neon lamps, and the completion of charge by four miniature filament lamps. Rechargeable cells of this type are undoubtedly a cheaper and more convenient form of power supply than dry batteries, and it seems probable that they will appear in other types of equipment. Recharging takes 8-10 hours, and as a spare set only cost 24s. it is well worth having a spare set on hand.

Objective Tests: When studying these objective tests it should be remembered that the results have been obtained on a machine weighing about one tenth of the average recorder reviewed in these columns. The frequency response, when recording and replaying at a tape speed of 7½ i/s is shown in fig. 1. Though hardly high-fidelity in the strict sense (if there is any strict interpretation of the words!) it is completely adequate for recording speech—the primary purpose of the Fi-Cord. The response is quite as good as that obtained from some mains driven machines of the cheaper variety, and is a good deal better than that of the vast majority of AM radio receivers. At the lower speed (1½ i/s) the response deteriorates, but it is still more than adequate for speech recording.

The absence of any mains supply, and the narrow frequency response, result in a signal noise ratio of 30 dB unweighted, and about 36 dB weighted, comparable with many full size mains driven recorders.

Miniaturization obviously requires that the mechanical drive system and the flywheel size be reduced to the absolute minimum. As a result, the wow and flutter is about 0.35% at the higher tape

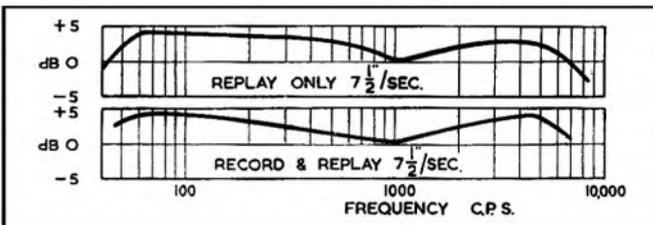


Fig. 1. Frequency response at the higher speed of 7½ i/s.

speed. For such a small machine this figure is remarkably good. Music is a bit rough but speech is hardly affected. Higher values were obtained at the lower tape speed, but speech is still perfectly adequate. Higher values of wow and flutter have been

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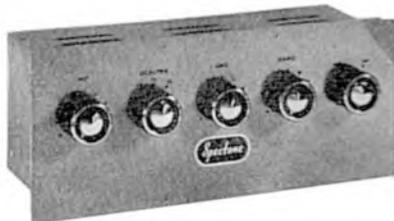
Between St. Leonard's Church and Streatham Station

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EQUIPMENT REVIEWED—(continued)

recorded on several gramophone record players selling in the £50-60 region.

General Comment: The Fi-Cord is an extremely compact little machine that is ideal for speech recording, or even for music recording in situations where a mains supply is not available. Speed irregularities (wow and flutter), and the restricted frequency range, limit its use to speech, where the performance is absolutely adequate—or to music recording, where its extremely small size and built-in power supply make a battery powered recorder essential. The microphone supplied is small and effective, but the performance of the Fi-Cord justifies a better microphone when space is not such a serious restriction. At a price of 59 gns. including the battery charger it is good value for money.



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★
**THE
SPECTONE
ELECTRONIC
MIXER 142**
Manufactured by
Specto Ltd., Vale
Road, Windsor,
Berks.
★

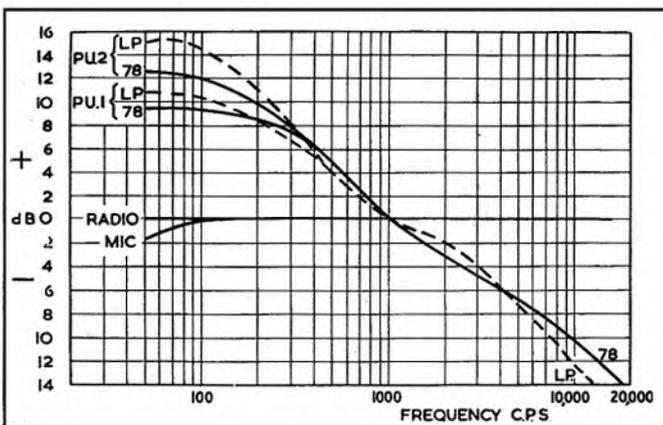
Review of Spectone Electronic Mixer Model 142A

Manufacturer's Specification: Sensitivities: (for 500 mV output) Mic 1.5 mV, PU1. (F.R.) 1.5 mV (Corrected) 6 mV, PU2. (F.R.) 10 mV (Corrected) 50 mV, Radio 100 mV. **Hum and Noise:** (relative to above, unweighted) Mic -50 dB, Disc (Corrected) -53 dB, Disc (F.R.) -50 dB, Radio -60 dB. **Frequency Response:** Mic 25 c/s -20 Kc/s. ±0.5 dB, Disc (F.R.) 25 c/s -15 Kc/s. ±0.5 dB, Disc (Corrected) according to graph (see note below), Radio 20 c/s -20 Kc/s ±0.5 dB, all relative to 1 Kc/s. **Valve Line-up:** 3xE.F.86, 2xECC83. **Power required:** 210-250 volts A.C., 50-60 c/s, 17.5 watts. **Price** £22 1s.

Note:—The graph showing correction curves for 78 and LP was found by the writer to be very close to the coarse and fine groove curves in B.S. 1928: 1955.

THE unit was found to be well packed, with the inclusion of a mains lead and coaxial plugs. While the simplicity of operation does not warrant any specific instructions, it is felt that the inclusion of a copy of the descriptive sales leaflet would assist the non-technical user.

The Mixer, which is well constructed, is designed to fit into a panel opening 11½ in. × 4½ in., displaying a gold hammer escutcheon 12½ in. × 5½ in. The manufacturers are to be complimented on the neat, yet workmanlike appearance of the internal component assembly and wiring. Provision of alternative sensitivities for the disc channel



is considered to be a distinct advantage, particularly in view of the fact that in the "Flat Response" condition adequate gain is available for the use of a second microphone.

Unfortunately, the Mixer supplied was found to have two slight faults, which did not, however, prevent its performance being adequately assessed.

Firstly, the noise level from the microphone channel was found to be some 16 dB higher than specified, and it was unaffected by "weighting" of the input socket or replacement of the EF86 valve. A listening test led the writer to suspect a "noisy" resistor. Secondly, movement of the Disc channel gain control, over one part of its track, produced a disturbing crackling noise, such as would spoil a quiet fade. In view of the types of components used in this unit, such faults must be uncommon, particularly as it is presumed that they were not apparent during testing.

Measured Performance

The following performance figures were obtained on the unit supplied:—

Sensitivity: 500 mV at 1 Kc/s. output. Mic 2.2 mV PU1 F.R. 2.1 mV, 78 6.0 mV, LP 6.6 mV. PU2 F.R. 12 mV, 78 50 mV, LP 56 mV. Radio 120 mV.

With an overload of 20 dB on the Mic channel the measured Third Harmonic Distortion at 1 Kc/s was 0.5%.

Hum and Noise relative to 500 mV output. Mic ±34 dB (see text). PU 1 and 2 F.R. -46 dB, corrected -54 dB. Radio -62 dB.

With all controls at minimum the noise level was found to be -65 dB.

In conclusion, this mixer appears to the writer to be well constructed, attractively designed and reasonably priced, it should prove a valuable asset to the home recordist who wishes to attempt more serious work.

A.B.S.

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★
**THE
SPECTONE
161
PORTABLE
RECORDER**
★



Manufacturer's Specification: Mains Voltage: 210-250 volts, A.C. **Consumption:** 85 watts. **Valves:** ECC 83, ECL 82, EL 84, EM 84. **Tape Speeds:** 15, 7½ and 3¾ i/s. **Frequency Response:** 50-16,000 c/s at 15 i/s, 50-12,000 c/s at 7½ i/s, 50-8,000 c/s at 3¾ i/s. **Recording Sense:** Top track left to right and bottom track right to left. **Signal to Noise Ratio:** Better than 56 dB referred to peak output. **Wow and Flutter:** 0.15%. **Fast Rewind Time:** 3 minutes (approx). **Position Indicator:** Magic Eye. **Mixing and Superimposing.** **Loudspeaker:** 7 × 4 in. elliptical, 15 ohms. **Inputs:** Microphone 3 mV, high impedance; Radio 120 mV, 250 K. **Outputs:** 2 watts or from pre-amplifier stage. **Size:** 15½ × 15¾ × 8½ in. **Weight:** 36 lb. **Price with Acos 3921 microphone:** £51 9s.

Manufactured by Specto Ltd., Vale Road, Windsor, Berks.

THE Spectone Model 161 recorder is a machine priced for the domestic market but having a performance that is a good deal better than the average in its price class. It employs a standard Collaro Mk. IV deck capable of operating at any of the three standard speeds, 15, 7½ or 3¾ i/s and of playing and recording tape running in either direction of travel. This latter facility is one that is not adequately appreciated until a machine has been used for a couple of weeks by the less mechanically minded (but more decorative) side of the family.

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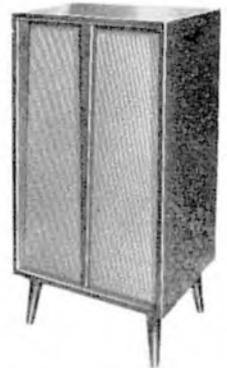
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EQUIPMENT REVIEWED—(continued)

Tape recorders employing the Collaro deck have tended to settle down to a fairly uniform standard but there are a few ideas in the "161" that are worthy of special note. Storage space for three spools (unboxed) is provided inside the lid, the spools being protected from dust and damage by a hinged cover. Provision for two input signals is not unusual but in this machine the mike and radio/gram signals can be mixed in any desired ratio. The recording enthusiast is further catered for by the inclusion of facilities for superimposing a commentary on top of an existing recording. Owners more interested in replaying commercial tapes are provided with a jack socket from which a signal can be taken (impedance 10 kΩ) for an external amplifier. This is taken from the output of the penultimate valve so avoiding the distortion inherent in the small output transformer incorporated in all portable machines.

The case is neatly finished in red and fawn imitation leather cloth and measures 15½ in. × 15½ in. × 8 in. At a total weight of 36 lb. it is "portable" if the car park and destination are not too far apart. Three controls, a combined tone control/mains switch, microphone/replay volume and radio/gram volume control, an EM 84 bar type signal indicator and the microphone jack socket are mounted as a narrow panel in front of the deck mechanism.

On a recessed panel at the rear of the machine are four more jack sockets, radio/gram input, external speaker, external amplifier, and erase. A particularly long mains lead (8 ft.) and a three pin 13 amp socket can be stored in a small cubby also in the rear. The instructions provided are worthy of note because they are unusually comprehensive (11 pages) without giving the impression that they have been prepared for a Service radar system. They include instructions for demagnetising the replay head if and when it gets magnetised after long use. With these general remarks the results of the usual measurements can be surveyed.

Objective Results

To those confirmed supporters of commercially recorded tapes as a source of home music, the response curves of fig. 1 indicate the performance obtained on replay. The test tape carries frequencies

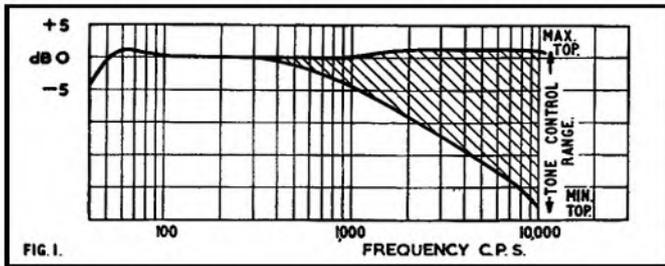


FIG. 1.

Fig. 1. Frequency response on replay, showing tone control range.

up to 10 Kc/s only but the figures obtained suggest that the response is substantially flat well beyond this frequency. It is worth noting that the response measured with the tone control in the "max top" position does not exhibit any symptoms of the sharp peak in the 8-10 Kc/s region that characterises most domestic tape recorders. These results were taken with the tape running from left to right (top track) but a check on the performance obtained from the bottom track indicated that it did not differ from the top track by more than 2 dB at any frequency.

When replaying a programme of your own recordings it is the combined record and replay response that is of importance. The response curves obtained at each of the three speeds are shown in fig. 2. These are all particularly good for the respective tape speeds while that taken at 7½ i/s confirm the suggestion made above that the replay response extends beyond 10 Kc/s for the combined response is only 1 dB down at 14 Kc/s. All the response curves are free from irregularities within the frequency band, again an unusual point of advantage.

The signal/noise ratio, the ratio of a 1 Kc/s signal recorded at maximum level as indicated by the volume indicator, to the noise remaining when the signal is erased on the machine, is shown for all three speeds in Table 1. There is a fairly large difference between the weighted and unweighted values an indication that mains frequency



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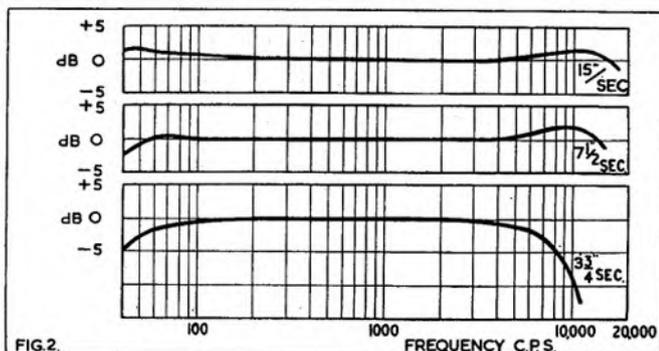
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The advertisement features a dark background with several images of audio equipment. At the top, the text reads "Hi-Fi YEAR BOOK SPECIAL TAPE EDITION" with "1959" in a small circle. Below this, the word "QUAD" is written in a stylized font. To the right, the text says "for the closest approach to the original sound". There are six small images of different audio components: a turntable, a radio tuner, a tape deck, a mixer unit, a speaker, and a pickup. At the bottom, the text reads "ACOUSTICAL MANUFACTURING CO. LTD. HUNTINGDON, HUNTS." and "PICKUPS · AMPLIFIERS · SPEAKERS · MOTORS · TUNERS · TAPE RECORDERS" with "10s" in a small circle.



noises predominate in the total noise a result that was obvious during the preliminary listening test.

The value of wow and flutter shown for all three tape speeds is better than average, a point that was obvious before the values were measured. The performance at $7\frac{1}{2}$ and $15\frac{1}{2}$ i/s as subjectively judged was better than would be inferred from the figures. $3\frac{3}{4}$ i/s is not yet an acceptable speed for the connoisseur of good sound quality, though perfectly adequate for speech recording.

Subjective Results

To prevent being biased by the results of the subsequent measurements of the performance it is my standard practice to play over a few well-known tapes and grade the performance. If the performance is thought to be below the average of the particular price class into which the machine falls, it is loaned out to a less critical (and, therefore, more average) friend for his comments. This procedure is followed for practically all machines costing below about £50, but in this instance the Spectone was taken round with the comment "Listen to this, a relatively cheap tape recorder that is good."

No small machine can include a loudspeaker of adequate size and that included in the "161" does much less than justice to the performance of the remainder of the machine. It is perfectly satisfactory for monitoring purposes but a good external speaker is a worthwhile investment if the commercially recorded tapes are to be enjoyed.

Table 1—Signal/Noise Ratios

Tape Speed 15 i/s	Weighted	42 dB
	Unweighted	33 dB
Tape Speed $7\frac{1}{2}$ i/s	Weighted	44 dB
	Unweighted	34 dB
Tape Speed $3\frac{3}{4}$ i/s	Weighted	47 dB
	Unweighted	30 dB

Table 2—Wow and Flutter

Tape Speed 15 i/s	0.13%
$7\frac{1}{2}$ i/s	0.18%
$3\frac{3}{4}$ i/s	0.24%

This particular Collaro deck was a little above average in performance either by good luck or by careful inspection by Spectone, though the rather long re-wind time and the feel of the push buttons are two points that require further attention by the designer of the deck. In almost all other respects, noise, braking system, smoothness, and I believe, reliability, the performance of current production decks is well above that of the earlier models.

Taken all round the performance of the Spectone is above that expected from a machine in its price class. Some attention to the level of mains hum, and the use of a better internal speaker would make the machine outstanding in value.

J. Moir

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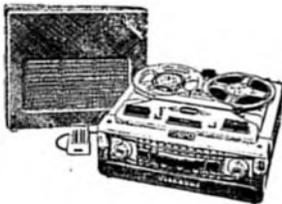
The experienced WyndSOR design team consider it not going far enough to develop a prototype, measure frequency response, signal-to-noise ratio and so on, and publish the answer as a production standard. To expect every one off the line to make the grade, however well made, is naive stuff.

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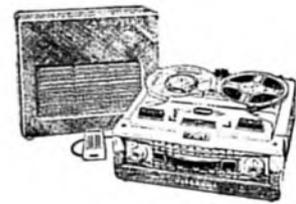
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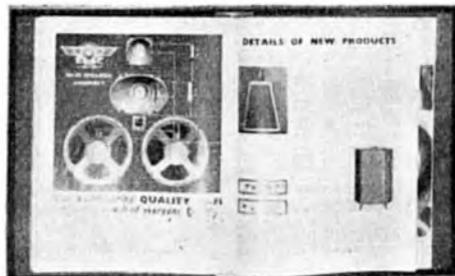
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