the TAPE RECORDER

PRICE 1/6

NOVEMBER 1959

Vol. 1 No. 10

IN THIS NUMBER

● Nature recording in the Highlands ● Notes and news from the tape clubs ● Field trial of the Grundig Cub battery portable ● Readers' problems answered ● Using a microphone mixer ● Tape Recorder Workbench ● Equipment reviewed ● Beginners' recorder to build in easy stages

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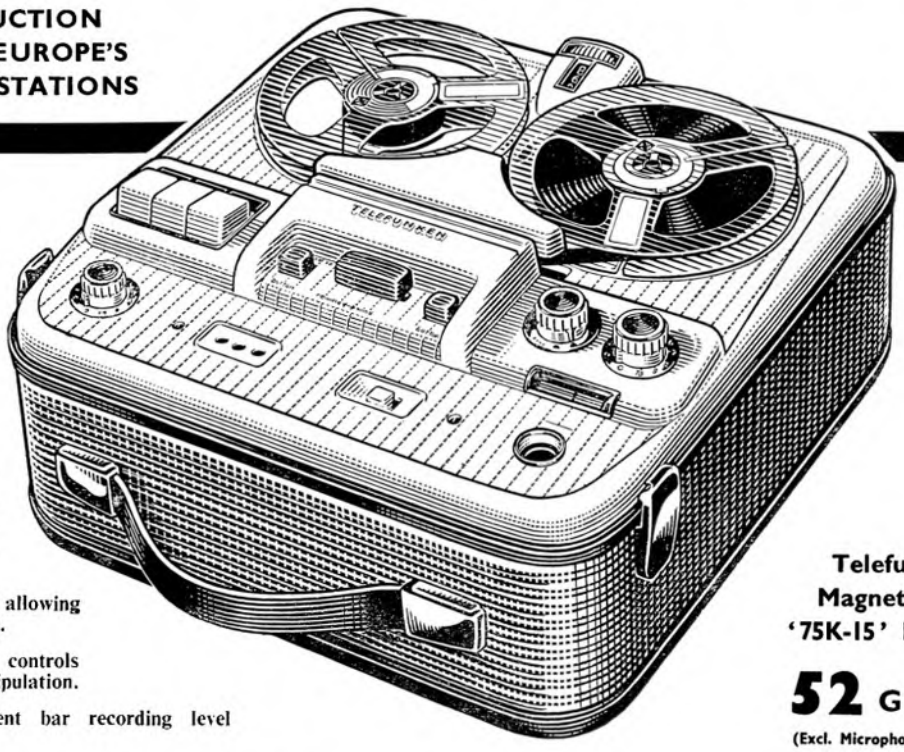

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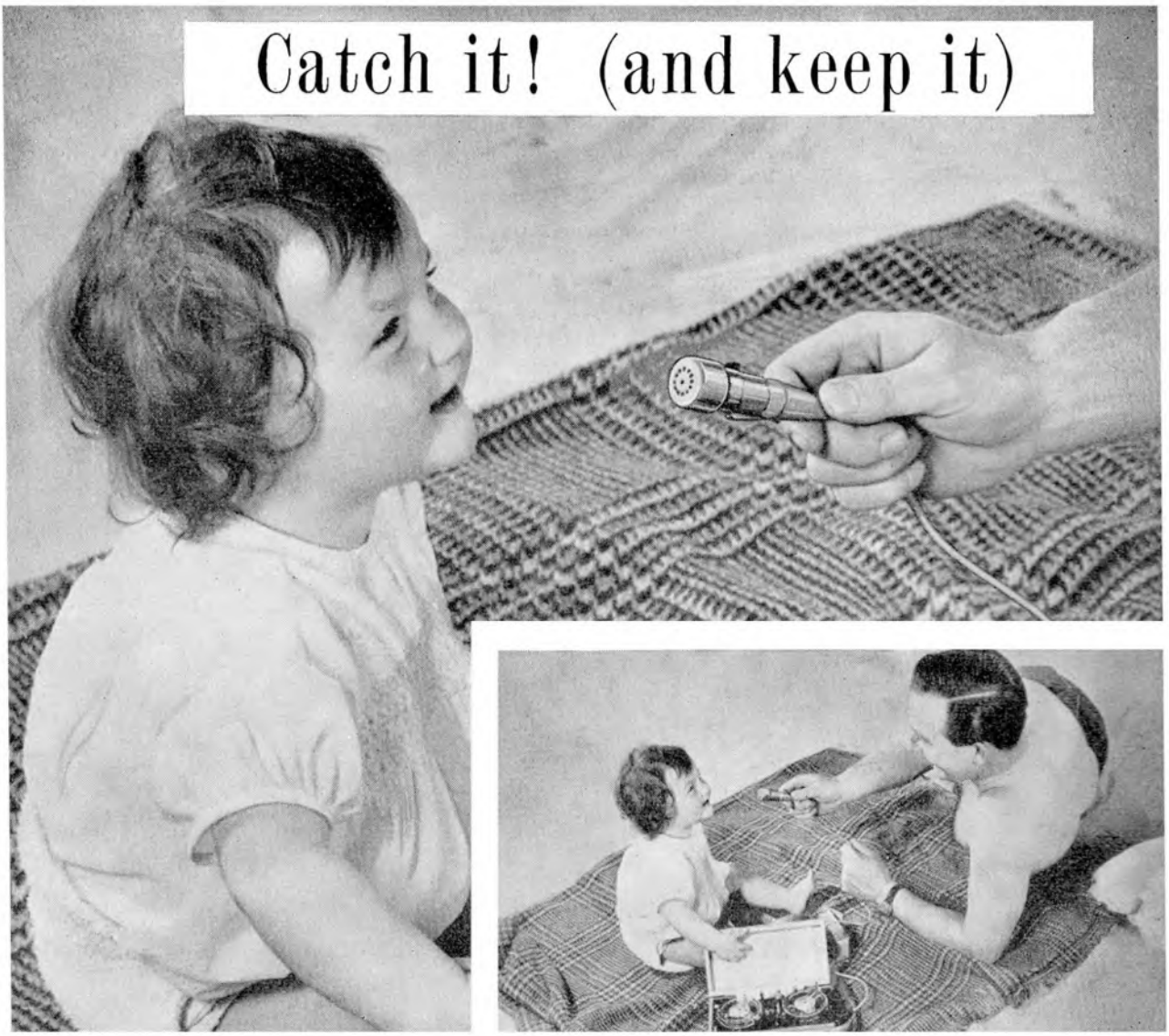

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BUT PLEASE WHISPER IT

IF your announcement is eagerly awaited, there is no need to shout the odds in letters ten feet tall, nor to roll the drums and fanfare the trumpets. Good news travels far fast and the launching of the new Wyndsor portable, the " Victor ", really is something to shout about. But a whisper seems to have been enough to set the tape-recording world by the ears and when even the elder brethren in the electronic trade join in the excitement there must be a mighty good reason. And there is: the shapely Wyndsor " Victor ", is a quality-all-the-way portable, so beautifully designed and executed as to bring professional-sounding recordings within the reach of the most non-technically-minded amongst us.

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  7½ i.p.s.—50 to 15,000 c.p.s. better than ± 3 dB.
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If history is anything to go by, widely publicising the " Victor " would overwhelm the Wyndsor factory. Wyndsor policy is never to sacrifice quality for quantity and the fact is that there have never been enough of the " Victor's " sister model, the " Viscount ", to satisfy the demand. So now is the time for all good enthusiasts to enquire at Wyndsor dealers or to send post-cards (clean variety still preferred) to the modestly proud makers for the names of nearest stockists. There is nothing more annoying than hearing a Wyndsor just after buying an ordinary tape recorder.

the *new* Wyndsor " VICTOR " complete with crystal microphone, 1,200 feet of tape, and spare jackplug, is only 45 guineas.

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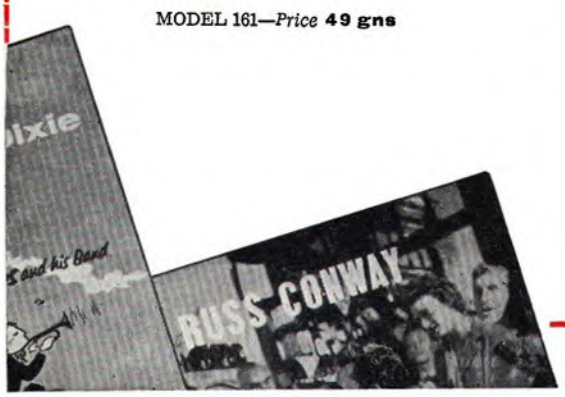

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R.G.D. Fidelity	,,	30 9 0	3 1 0
Minivox (Battery)	,,	35 14 0	3 14 0
Truvox Melody	,,	36 0 0	3 12 0
Elizabethan Princess ...	,,	40 19 0	4 2 0
Truvox Harmony	,,	44 0 0	4 8 0
Sound 444	,,	47 5 0	4 14 6
Verdik	,,	47 5 0	4 14 6
Bromley 59	,,	48 6 0	4 18 0
Wyndsor Viscount	,,	51 9 0	5 3 0
Spectone 161	,,	51 9 0	5 3 0
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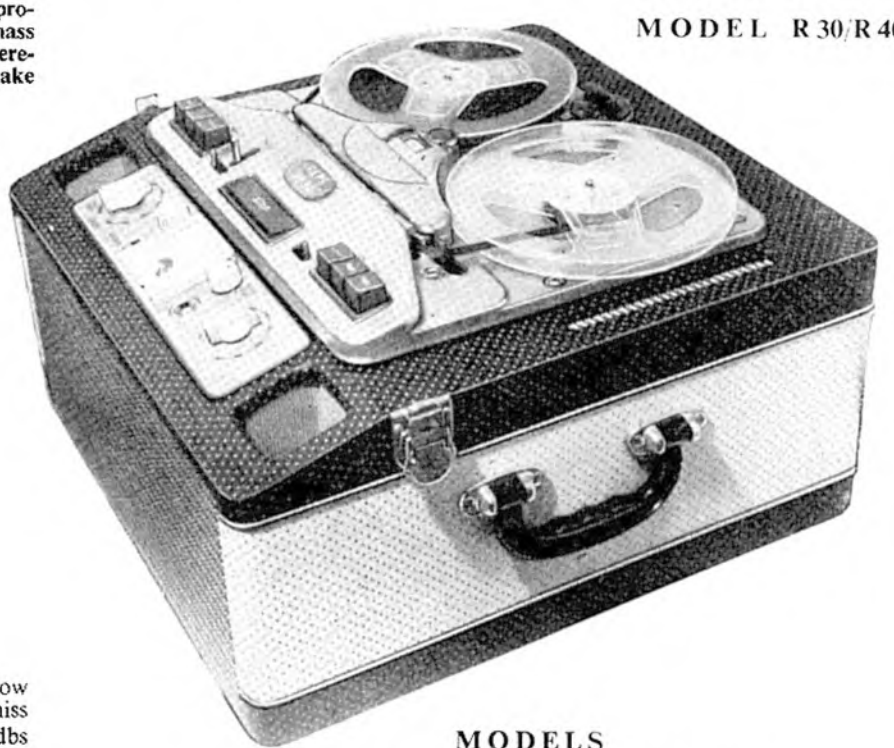
This is no idle statement, it virtually sums up the REPS recorders, for high quality products such as these cannot possibly be mass produced. Our production capacity is therefore strictly limited and for this we make no apology; rather we pride ourselves that all models manufactured comply with this published technical specification.

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.

MODEL R30/R40



TECHNICAL SPECIFICATION

The R40
3¾ ips 60—8,000 ± 3dbs
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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 7½in. per second at 7,500c/s a distance of 0.0001 in. between tape and Playback Head results in a loss of 6dbs 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 7½in. per sec. and then at 15in. per sec. to compare the difference.

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

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.....

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the TAPE RECORDER

Editor - - - - - - - - - - - - - - - **MILES HENSLOW**

Technical Editor - - - - - - - - - - - - - **John Borwick**

Assistant Editor - - - - - - - - - - - - **Julian Berrisford**

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

Telephone - - - - - - - - - - - - - **MUSeum 3967 to 3969**

★

EDITORIAL

HOW many different types of electrical plugs and sockets are there today? Do not try to answer this nightmare that could so easily have been avoided. Do not ask a record dealer what he has endured as a result of disc sizes and speeds. Instead, remember the chaos and seek to avoid more of it. Today, there is without any doubt a big existing potential market for tape records, and there is little doubt that this market would be far more widely exploited than it is already, but for one barrier—and a big one. Lack of standardisation. Many of the tape-recorders now in use will not accept 7-in. spools. Many more of them will not play at 7½ i/s.

So far as tape users are concerned, there is even less idea of the desired standards for the reproduction of music. At the extreme end there is the still widely held belief that nothing under a speed of 15 i/s is good enough: at the other extreme, as a result of over-optimistic advertising, there is an equally held view that 1⅞ i/s is adequate.

In the manufacturing trade itself, very few people have any fixed ideas about the standards that may or may not be desirable for stereo. In America (and even in this country) we know of stereo tape-recorders using the "in-line" system of head arrangement, which avoids the slight complication of stacked heads, and which means that the recorded material for one channel is followed a fraction of a second later, on the second track, by the corresponding signal for the other channel. From America we have seen the R.C.A. cassette, designed to play at a speed of 3¾ i/s, and with two stereo tracks in each direction.

Leaving the subject of tape for the moment, let us refer back to stereo on disc. The best stereo discs (and they are the products of our leading British factories) are magnificent. That they have not yet enjoyed the success that they fully deserve, must be blamed almost entirely upon the fact that there was little or no preliminary co-operation between the disc makers and the equipment manufacturers. They were launched on the market, against the clock, before there was really suitable equipment available for playing them; and the result is that lamentably few dealers were able to put stereo across to the buying public. Only now, after nearly eighteen months, are people beginning to realise that stereo is really worthwhile, and that the discs will do all that was promised of them.

There is a lot to be said for a tape cassette giving four-track stereo at a speed of 3¾ i/s for popular music. There is a lot more to be said for a standard (non-cassette) reel-to-reel tape catalogue of high quality material, using a speed of 7½ i/s and 2 or 4 tracks for stereo. Both these systems could be adopted as international standards. It is to be hoped that the companies who could eventually be most concerned will get together, and then brief the many recorder manufacturers with their decisions. Then, as and when tape records take their place beside discs, there will be a big and ready and non-confused market for the products.

NOVEMBER - - - - - - - - - - 1959

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COVER PICTURE

FIRST night of a Tape Club. All over the country, groups of people are getting together with the idea of forming new Tape Clubs. Already there are scores. Very often—as in this case—two or three people with recorders find that they have a lot in common, and a lot to learn; so they begin to pool their ideas. In this way the first meetings of a new club have often taken place long before the idea of the club is suggested. One of the members of this small group is a keen photographer; and after the meeting had ended he decided that the photograph, as taken, would make a good picture; so he sent it to us! While we realise that there may only be a few such pictures that are suitable for Cover Pictures, we take this opportunity of reminding our readers that we are always on the lookout for good pictures of interesting tape events . . .of news items . . . of unusual uses, etc. So, if you think you know of a good idea, why not let us know. If you are not a photographer, remember that we have our own photographic department.

NEXT MONTH

A FURTHER series of interesting experiments appears next month in A. Tutchings' learn-while-you-build feature for beginners, and Eric Simms takes us on another Nature History recording adventure. There will be a complete coverage of tape news from *Here, There and Everywhere*, together with stories of club activities. A special item to look for will be our announcement of the prize-winners in our **£300 "New Music" Competition.** For readers who want to know more about the "innards", there begins next month a new series entitled "*How Your Recorder Works*", in which technicalities are simply explained. In addition, there are all the regular features, including *Equipment Reviews*, *Readers' Problems* and *Letters*, and *Details of New Products*.

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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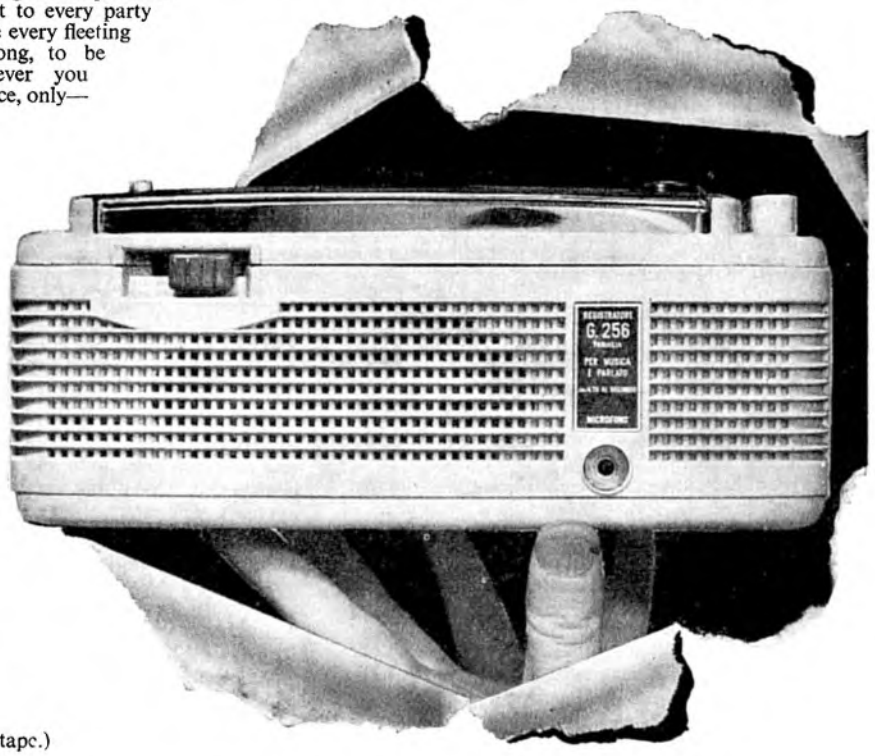

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- High-quality reproduction at 1⅞" per second from extra high flux elliptical speaker.
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LP. 133

By Eric Simms

NATURE'S LIBRARY OF SOUND

PART 6 —— ADVENTURE IN THE HIGHLANDS

IN the British Isles the nearest approach to alpine conditions that can be found is in the Central Highlands of Scotland. The summits of the Cairngorm Mountains are an artic relic, and at their foot lie the ancient pine forests of Rothiemurchus and Glenmore—the remnants of the old Caledonian Forest. This is a country of magnificent scenery which also offers sanctuary to some of our rarest plants and animals. For the recorder of natural sounds it is a paradise, and in the years from 1953-59 I have made four visits with recording apparatus in search of bird and mammal sounds.

The last of these visits was made in July of this year. Here in the forest of Rothiemurchus I was able to make the first British recording of the roe-buck as well as the full and rarely heard song of the Scottish crossbill. Seven nights I spent from dusk to dawn among the great pines, waiting for these sounds to reveal themselves until at last success came.

Dark acres of pine

The first visit was made with Bob Wade in the summer of 1953. Our base was a small hotel that looked out over the dark acres of pine towards the snow-capped summits of Cairngorm and Braeriach, which stood like massive forts along a mighty natural rampart. For the first few days we made ourselves familiar with the country-side and with the distribution of the birds that we were specially seeking. June is perhaps the most exciting and rewarding month of the Highland year. From sunset to dawn a delicate light persists and the wooded glens are full of bird-song. The ground is fresh with blaeberry, trientalis and wood-anemone; the corries of the mountains are soft with azaleas, saxifrage and lady's mantle and the forest bogs and clearings are bright with fragrant orchis and bog asphodel.

We decided to leave the hotel in order to be nearer the hills and the more secluded parts of the forest. One lovely afternoon we set out with our vehicle over a rough track across the heather when suddenly we ground to an abrupt halt. The recording car was firmly resting on its back axle and the hub-caps were out of sight. Bob tried to reverse the vehicle without success while I pushed bundles of heather under the back wheels. At last we were forced to unload some four and half hundredweight of gear, luggage and camping equipment on to the heather. Then clouds began to roll up and soon torrential rain was falling. The whole area became a running mass of mud and water, and Bob and I stripped down as we tried to sink granite boulders into the black morass.

It was not until many hours later that I was able to enlist help from a passing jeep, which finally towed us out the wrong side of the hole. We camped in the rain and then devoted two whole days to the reconstruction of the track so that we might drive out of our predicament. From then on we camped in a disused boathouse to which access was always assured. Bob Wade brought his gifts of improvisation to bear and soon we had a comfortable and dry base of operations.

In our new home we were surrounded by crested tits, bullfinches, meadow pipits, willow warblers and greenshank. A pair of chaffinches soon adopted us and came every morning into the boathouse to be fed, perching on the beds and calling for food. From this charming spot we sallied forth on our recording expeditions. We spent several days recording peregrine falcons whose eyrie was on a buttress some six hundred feet above a track through a wooded glen. We parked the vehicle on the track and then hauled twelve hundred feet of plastic cable up the cliff-face. This was a strenuous operation for the weight of cable grew with each uncertain step upwards. Then I fixed the eighteen-inch parabolic reflector at the top end of the cable and below the eyrie.

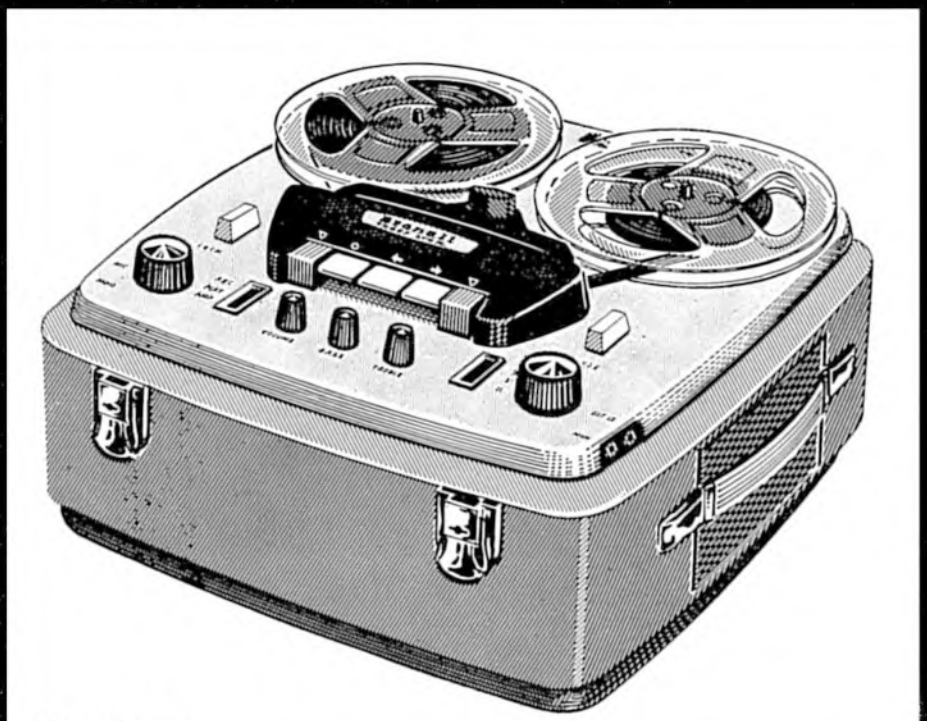
Several days were spent recording various waders on the loch-side —snipe, ringed plover, common sandpipers, oystercatchers and greenshank, but with an improvement in the weather I was anxious to begin our assault on the hill-tops for some of the rare mountain birds of the Highlands. One day at over 3,000 feet I obtained recordings of dunlin and golden plover, but the climax of the whole expedition was the quest for the dotterel—a wading bird of great rarity, for certainly less than one hundred pairs nest every year in Britain. These few pairs seek the highest mountain tops above three thousand feet.

Not an easy bird to see

On the bare summits the dotterel is not an easy bird to see but it is most attractively coloured with a creamy eye-stripe, an upper breast of slaty brown separated by a white band from a chestnut lower breast, and a black patch on the abdomen. On several days recording gear was carried up to the tops. One day we set off in glorious weather, climbing through the heather for several hours before we reached the high alpine meadow on which a cock dotterel was shepherding four chicks. The male, incidentally, is responsible for the incubation of the eggs and for the care of the young. Within ten minutes of our arrival the wind freshened and clouds began to grow above the mountains. Then a clap of thunder burst above the summit. The tape recorder was switched on as the storm gathered momentum for the violence of the thunder made the dotterel family anxious and the male bird called the young to him. Twenty minutes later the rain came, falling like solid rods of ice. We waited for the storm to clear but it was not to be. Wet and desperately cold we began our descent down a mountainside over which the rain-water bubbled and cascaded.

For several days the rain fell, and another attempt on the tops

(*Continued on page 423*)



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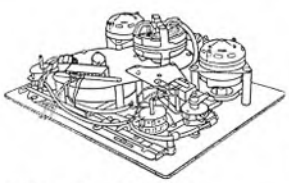

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BRENELL 3 STAR (large illustration)

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was out of the question. Then as June passed and July came, it brought with it a day of perfect tranquility and calm. Once more I returned to the high tops with recording gear. I began the long ascent with a frame on my back to which were strapped a portable tape recorder, a hundred yards of microphone cable, two microphones, a transformer, six reels of tape, an eighteen inch parabolic reflector, food, drink, and extra clothing. But that long and arduous climb was rewarded by the sight, at 3,200 feet, of a dotterel settled on a single egg.

I placed the reflector about twelve feet from the nest. The male on the nest was soon joined by the larger and more brightly marked hen; both birds were so tame that I was able to sit with the recorder only twenty yards away. The two birds continually kept changing positions on the nest. About half an hour after I had settled myself, the hen dotterel, who had been panting in the now intense heat, left the cock on the nest and walked over towards the reflector. She looked closely at it and then realised that this round object was the only thing to cast any shade on the whole of the mountain tops. She moved close in to the reflector and settled on the ground in the shade. So after lugging this piece of equipment to the tops of the Grampians I found that a dotterel was prepared to use it as a sunshade!

The Eyrie of the Golden Eagle

At 4.30 in the afternoon I began the descent down to the plain below with many minutes' recordings of these fine and very rare birds. The day was not over, however, for I still had to visit an eyrie of the golden eagle where two large eaglets were in residence. After a long drive, we stood at the foot of the cliff in a remote part of the Highlands where the nest had been constructed. Twelve hundred feet of cable were hauled bodily up the face and I fixed the reflector at the end looking up at the great platform of pine branches and heather built on a deep ledge in the rock. We just did not have enough cable to reach the eyrie itself.

Two almost fully-grown eaglets stood on the back of the nest and hissed quietly away at me. There was no sign of the adults that evening and it seemed likely that they might be denying food to the eaglets so that the youngsters would approach their first hunting lesson with an edge on their appetites. That night was spent snatching a few hours' sleep on the wooden floor of a bothy not far away. At half past three the next morning we were up for our watch. As the sun rose, the songs of ring ouzels and of twites came up to greet us. At 10.12 a.m. the first adult golden eagle appeared and flew along the cliff top opposite the eyrie. After soaring for ten minutes or so, it made off down the valley. In fact, not once during our watch that day did the adults visit the eyrie. This time the golden eagle's voice had eluded us but this merely strengthened our determination to return to the Highlands and its magnificent world of sky, loch and mountain.

So in October, 1953, Bob Wade and I came back to record the rutting of the red deer stags, and then in May, 1957, we returned to the Grampians for another summer. Here in the forest of Rothiemurchus we were able to add to our list of recorded birds such species as the goldcrest, the Scottish crossbill, the grey wagtail, and the goosander. But in the middle of the month Bob and I went back to our golden eagle's eyrie for the local keeper, who was our contact, reported that there was a single eaglet in the nest about three weeks old.

Hauling up the equipment

The bothy where we had slept four years before became our base, and here we unpacked our stores and equipment for our stay. The base of the eagle cliff was 1,600 feet above sea level and the eyrie 1,100 feet up the face. This time we had come prepared to get cable all the way up the cliff and late on the first morning of our stay we hauled 1,800 feet up the face. I pulled the cable higher and higher and finally with the reflector in my hands I clambered with great difficulty up a rock face on to the eyrie. Here the nest decorated with several plucked and browning grouse and a couple of mountain hares, smelled like a gameshop in summer. Six feet from the centre of the nest was a crack in the rock which was big enough to allow me to fix the reflector with rope to stones which I jammed into the crevice. The reflector was pointed down to look into the middle of eyrie and also to prevent water running or driving into the microphone.

After my descent Bob and I were able to listen in our recording vehicle to the cheep of the eaglet. We made a short recording—the first ever of this bird, but soon a high wind rose and rain began to lash through the pass in grey and forbidding manner. On the next morning the rain stopped but the wind was high. The eaglet called for food for long periods but was not visited by an adult. In the afternoon the rain came again and recording was quite out of the question. The next day was much better and a wide range of recordings was made of the full and varied vocabulary of the eaglet. Twice—in the early morning and in the evening—the hen bird came down to feed the youngster in the nest. Her technique was to fly high above the pass on a reconnaissance; in fact, from below she was a tiny speck in the sky. If she thought the pass was clear, she closed her wings and dropped like a plummet for two thousand feet before spreading her mighty pinions some fifteen hundred feet above her eyrie. For a few seconds she floated while she took a closer look; then, once more the wings were folded and she dropped again to rocket straight on to the nest with a great rush of wings. This performance was one of the most wonderful avian flying shows that I have ever seen—it was quite breath-taking.

I managed to obtain recordings of the adult's wings in this rush and also the eaglet's ecstatic welcome. While the adult fed the young bird with strips of grouse or hare, a most interesting conversation always took place between the mother and her offspring. The chick would use varying forms of its typical cheeping note—TCHEE-oo, TCHEE, TC-TC-TCHUK and so on, while the parent used a quiet, tooting bark which seemed out of keeping with the size and grandeur of the bird. When the adult had finished feeding the chick, the eaglet would use a quite different note of satisfaction—a musical twittering more like the note of a small passerine, such as the linnet or serin, than a young eagle.

At this height in the mountains the weather was always uncertain but in the end we had the first recordings of the golden eagle—recordings of two kinds of adult calls and six different calls of the eaglet. For me a life's ambition had been fulfilled at last and it was with a sober satisfaction that I scaled the cliff face for the last time to bring down the reflector and hundreds of feet of cable.

As I stood that last time on the eyrie, with a panorama of moors and hills spread out before me, my eyes began to focus on another mountain—the haunt of the ptarmigan. Here five days later began my quest for the voices of the higher tops and soon the ptarmigan's croaking rattle had also been added to the season's catch. For the recorder of Nature's sounds the road stretches always onwards; they may be pauses and temporary halts but the road has no end.

HERE, THERE . . . . . and EVERYWHERE

● *Schools and Institutions everywhere are using tape recorders in hundreds of different ways. From Germany comes this picture of a Telefunken "Magnetophon" which is in daily use for providing rhythmical music for classes in gymnastics. One of the chief advantages here, of course, is that the same musical pattern can be repeated, ad lib, and broken, held and restarted as required. We welcome news from schools (with pictures when possible) describing other educational uses.*

Audiotapes for the U.K.

MESSRS. LEE PRODUCTS (GT. BRITAIN) LTD. have been appointed as sole concessionaires for the United Kingdom and Eire to market the full range of **Audiotapes** (manufactured by Audio Devices Inc. of Madison Avenue, New York), this means supplies will shortly be available from practically every dealer in the country.

Scientifically developed over a number of years, these tapes enjoy the highest standing in the States, and Lee Products Ltd. claim that their introduction to this country will provide enthusiasts with a recording medium of exceptionally high quality at prices which will compare favourably with prices for existing tapes already marketed by other companies.

They will be marketing almost immediately a full range of these tapes in all reel diameters—in standard, long-play and double play. There is also a "Master" quality on standard play which is manufactured to the highest professional standards, and super thin Audio on tempered "Mylar". This tempered "Mylar" has twice the strength of the standard ½ mil type, thus providing double recording time without tape weakness problems. Available too, are coloured base tapes in green and blue, permitting easy identification.

Two Thousand Weddings Taped!

THE month's most unusual tape story has just reached us, through the kindness of "Minnesota", in the form of a reprint from the *Fort Worth Tribune*. It concerns "The Little Brown Church in The Vale", in Iowa, U.S.A., where the Reverend Glenn L. Utterback marries more than 2,000 young couples each year.

Tape recorders play a big part in the routine of these services, for not only is one used to provide background Mood Music, but the Pastor records each marriage on tape; and the couples are "delighted to add the recording to their wedding mementos".

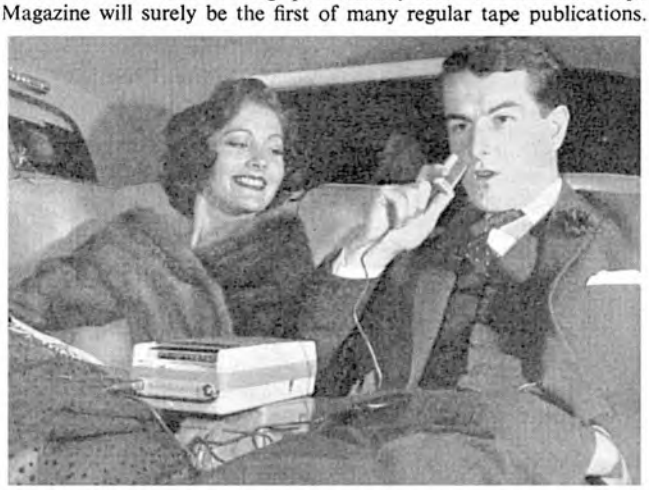
The church was organised during the Civil War days of 1855, and the Rev. Utterback is its twenty-seventh Pastor. It has also become famous as the birthplace of the song, "*Church in the Wildwood*". Paul Mickelson, for seven years organist with the Billy Graham Crusade, has recorded the song on the Church reed organ, and has given permission for its daily use as background music.

During the past 13 years, more than 35,000 couples have been married there; and the record number of 20 couples turned up on November 29th, 1958.

* * *

First Magazine to Appear on Tape

The first issue of a magazine distributed on magnetic tape has just been published in West Berlin. Its subject matter is suitable for doctors, surgeons and anyone studying medical practice. Advantages claimed for this new method of presentation are that audible symptoms can be recorded as well as the lecturer's comments and diagnosis conversations. In the first number, for example, heartbeats and breathing sounds are used to illustrate talks on cardiac and consumptive diseases. Duplication of the tapes is a Telefunken project, and 20 Magnetophon domestic recorders are employed. The process is repeated until sufficient copies are made for subscribers. This new idea has exciting possibilities, and the Medical Tape Magazine will surely be the first of many regular tape publications.



● *Though the 1959 Motor Show is already well behind us, and though many of the cars on show will have clocked up a sizeable mileage by now, this picture, from Grundig deserves a place. It was taken in the new Bentley S2 Saloon on the Harold Radford Stand; and the battery operated "Memorette" dictating machine is the latest "Countryman" adaption available on this car. Trying it out is top model John Fenton, watched by Britain's most sought after fashion model, Bronwyn Pugh.*

Following their recent success with monaural and stereo discs of "Alice", Argo Records have turned to Kenneth Grahame's delightful "The Wind in the Willows". We were able to take the above photograph, during recording, of Argo's Managing Director, Harley Usill (centre), and Tony Robertson who adapted the story and directed the production. At the stereo controls is the balance engineer. (Note: the records will not be issued until early 1960)

Hon. Secs. Please Note!

We have been taken to task by the Warwick and Leamington Amateur Tape Recording Society and the Sheffield Tape Recording Society for giving uneven coverage to the activities of tape clubs. When preparing this section of the magazine, our yardstick is, necessarily, "Will it interest readers?". Therefore it is up to you. If your club engages in unusual activities, let us have full details and we will do the rest. The total amount of space we devote to clubs is dependent upon the interesting bulletins received.

* * *

TAPE-RESPONDENTS INTERNATIONAL have recently published their first British News Sheet. They intend to publish three or four times a year and hope that news will be contributed by members. The interests of T.R.I. members seem very varied judging by the requests the British Representative, Robert Ellis, has received for tape exchanges. They range over such subjects as cacti plants, folk music and sounds from space rockets! (We have heard that a clique of tape recorder enthusiasts are frequently seen in action in the Cape Canaveral area, so this isn't so outlandish as it seems). From Canada and the U.S.A. come requests from school teachers requiring teacher and class contacts in this country. Tape-Respondents International are hoping to increase their membership this winter; those interested should write (or send a tape) to **Robert Ellis, Schoolhouse, Whitsom, By Duns, Berwickshire, Scotland.**

* * *

At the last meeting of the **Grantham and District** Tape Recording Club, results of the "*Bells of St. Mary's*" tape competition were played. The competition was based on a form of *Musique Concréte* where ingenuity was called for in producing bell-like sounds. As well as listening to the tapes, members had a pictorial record in photographs of the "musical instruments" and their inventors taken by a reporter from the *Grantham Journal*. The pictures were subsequently published in the October 16th edition. Mr. L. G. Gilbey, the Secretary of the club was the successful competitor, his musical instrument consisting of a narrow sheet of aluminium, a horseshoe magnet and an elastic band—the elastic being twanged at different tensions to produce the required notes. Amongst other entries, the Chairman, Mr. R. Huddlestone, submitted a recording made by partially filling wine glasses with water until the correct notes were found, and Mr. Brown, a committee member, used lengths of steel tubing cut to different sizes, hung up and struck with another piece of metal.

A start has been made on the "Grantham Tape" and a few items have been recorded—the first being a visit to the Fire Brigade H.Q. Station, where a complete sound picture was obtained of the fire service in action. Proposed visits include a church, to record organ music and the church bells, Grantham Railway Station and the Salvation Army Citadel on a band practice night.

For the benefit of members who bring their own recorders to club meetings, a mains plug board consisting of a number of 5-amp. 3-pin sockets has been acquired. The next meeting is to be held on Monday, November 23rd at the George Theatre, Grantham. The club is in urgent need of its own premises and anyone who knows of a suitable building, in a central position, is asked to contact the Secretary, Mr. L. G. Gilbey, 67 Denton Avenue, Grantham.

* * *

The **Crawley and Sussex** Tape Recorder Club must be a lively organisation to draw members from a radius of 40 miles! The Secretary, Mr. R. C. Watson, thinks this covers one of the largest areas of any club. They recently had a visit from Mr. Wilson of B.A.S.F. tapes, who gave a lecture on the origin and development of tape; and this was made more interesting by the playback of a copy of the first tape made. This recording, made in 1936 at 30 i/s, was of Sir Thomas Beecham conducting the London Philharmonia Orchestra.

Another welcome guest was Mr. Robinson of Simon Sound Service who treated club members to an exciting stereo demonstration. The

NOTES AND NEWS FROM CLUBS

what others are doing

A tape recorder is extremely useful as an aid to music-teaching, particularly in the case of children's singing lessons. In the photograph, the teacher is recording on a Telefunken "Magnetophon" machine, and the children will be able to listen to a playback of their voices and so correct mistakes etc. The microphone can just be seen on the table to the right of the recorder.

club's A.G.M. is to be held on December 7th at Crawley, where new members are invited—with or without equipment. Anyone interested should contact **Mr. R. C. Watson, 32 Southgate Drive, Southgate, Crawley, Sussex.** A lecture and demonstration on cine-tape is being arranged for the near future.

* * *

The **Reading Cine and Tape** Recording Society has made a stereo programme of local sounds for blind people in the area. The programme is linked by a commentary and includes sounds of church bells, the railway station and an organ recital. This club, too, will deal with linking tape to film in future meetings.

* * *

The inauguration of a Tape Recording Group is to take place on the 16th November at a meeting of the **Southall Community Association.** Among the activities envisaged, the Group intends to give various forms of assistance and entertainment to old and blind people. They plan to hold technical discussions and to set up a tape correspondents' circle, and the formation of a tape library is also being considered.

* * *

The Hospital Service Group of the **Birmingham** Tape Recording Club put on their first programme at Heath Lane Chest Clinic last month. Barry Stephens was the director and another programme is being compiled to go out in the very near future. Members of this club took advantage of an offer made by Associated British Cinemas to visit the Bristol Road Cinema, Birmingham, for the second time. Not surprisingly, the most intriguing part of the building was the projection room which was fitted with up-to-date stereo equipment and from here they were given a brief run of the film "*Lucky Me*" to demonstrate the effect of the speaker system.

The club has received a very interesting tape from one of its members in Germany—Mr. Charles Davison—who has been touring the Aachen area gathering first hand information (and demonstrations) of the Grundig range of recorders. Material for the three inch tape was recorded on no fewer than seven recorders or microphones, the final tape being recorded on the "*Grundig* 1000". A point to be noted was that all recorders in Germany are fitted with a universal tone control, so that once the level has been determined, the tape can be continued on any other machine at the same setting. This explained how Mr. Davison's tape had a constant tone throughout.

How to read a book with background music to suit the story was recently demonstrated by Mr. Bennet—accuracy of timing and editing being the main factors. His book was "*Dragons in Amber*", by Willey Ley, and his choice of music an excerpt from the Mars movement of the Planet Suite by Gustav Holtz.

* * *

The Coventry Tape Recording Club announce their Annual General Meeting to be held on 10th December at Rotherhams Social Club.

* * *

The **Rugby** Amateur Tape Recording Society is to sponsor a course of tape recorder instruction—called The Star Course of Tape Recording—in the early part of 1960. This course will be organised by Mike Brown (Secretary) and Mrs. V. Tilcock. It starts on Thursday, 7th January, and subsequent sessions will be held on six consecutive Thursdays at 7.45 p.m. at the Red Lion, Sheep Street, Rugby; the cost of enrolling is 5s. (excluding members). Candidates will be assumed to have no technical knowledge whatever and instructors and lecturers have been chosen to cover all aspects of tape recording from maintenance of the machine to programme construction. All enquiries should be addressed to **Mr. Mike Brown, 219 Clifton Road, Rugby.** Unfortunately, people under the age of 18 will be unable to join due to the licensing laws.

* * *

The A.G.M. of the **Blackpool & Fylde** Tape Recording Club was held on October 14th; Mr. L. Heys was elected as President and Mr. E. W. Wallis is Secretary. Although the club is only four months old, it already has a membership of 20. Tape competitions, recordings of interviews with holidaymakers on the promenade, a mystery hunt, and demonstrations by Mr. Parrington of Walter Instruments are just a few of the items enjoyed by members during these four months. New members are invited to write to **Mr. Eric W. Wallis, Hon. Sec., 23 Kipling Drive, Marton, Blackpool.**

* * *

As we go to press we hear from the **Bournemouth & Poole** Amateur Tape Recording Club that they have found new premises for their headquarters, and their address is at The Civil Defence Centre, Holdenhurst Road, Bournemouth. Club members continue to enjoy an active programme and are now engaged in preparing for the next National Tape Recording Contest; several members have prepared 5 minute tapes in various ways and the first batch was played during their last meeting. Outstanding among these was made by the only lady member, Mrs. J. Lawson who took a recorder behind the bar of a hotel.

A recently introduced American portable recorder, the Steelman, aroused much interest at the Northern Audio Fair. Examining it in the photograph are (left to right) M. L. Berry, R. Kalb, (of the Steelman Co.) V. G. P. Weake and T. R. B. Threlfall.

with recorders and tape

Recorders and Spiritualism

WE recently heard that tape recorders are widely used by Spiritualists, and have been put in touch with several such users, to whom we have written, hoping to find out more about this (to us) unexpected aspect of recording. The replies to our letters have proved most interesting, and we are pleased to publish one below:

" Dear Sir:—Re your letter of the 20th, I would be happy to help you with your enquiry but unless your readers are Spiritualists I do not feel they would be interested in the subject; but I can explain how we came to buy and use the *Grundig*. We had been holding a weekly circle in our small sanctuary to develop the healing and mediumistic qualities that my husband is lucky enough to possess.

At first, when he was entranced, all we got was in Chinese or Kaffir, these being the two original controls; but in time they gave way to others of different nationalities, including English, one being a late clergyman who started to give very beautiful prayers and addresses.

It was then we thought of getting the recorder: it seemed such a waste of good material that could be used in our church, should we be without a medium one Sunday. So we invested in the *Grundig* and would not be without it now.

It has given us hours of pleasure, not to mention all the personal messages that we have been able to record and transmit to those not sitting with us. One is unable to remember the essential details that mean so much to a person who has just lost a dear one. Now they can hear the actual guides giving the messages, and I am able to type them out for the recipients to keep. This, I must add, is quite usual among Spiritualists, recorders being used at most circles.

Hoping this will be of some use to you, I remain, yours sincerely."
Gladys Simmons, The Oaks, Shripney, Bognor Regis.

* * *

Talking Clocks

COLOUR photography is rapidly losing its "magic and mystery", as more and more people load up their cameras with colour negative material (as distinct from reversal material for transparencies) and proudly paste up their colour prints into the family albums. There is, however, a lot that happens behind the scenes, in colour processing laboratories, that calls for equipment and techniques that are unknown with the more familiar "black-and-white" photography. For instance, in order to obtain colour matching and balance to standards that many people demand, the temperatures of chemical solutions and even washing water have to be controlled to within half a degree, and special lights must be employed for colour assessing. All colour processing is done in total darkness in the initial stages, and since the timing of certain processes must be as relatively accurate as the temperatures, even clocks have their disadvantages on occasion.

So it was that a London firm, which specialises in high quality colour prints, decided to use talking clocks instead of (and in conjunction with) the normal ticking type! Hence the tape recorder (a Brenell) in this picture. For some routine jobs an endless loop is used, but it is often found more convenient to record a tape for use on a standard recorder, as shown here. As the process to be timed is begun, the operator turns the knob, and the recorded voice then calls out the times as they fall due. A soft musical background can also be recorded on the tapes, which does much to remove some of the inevitable boredom.

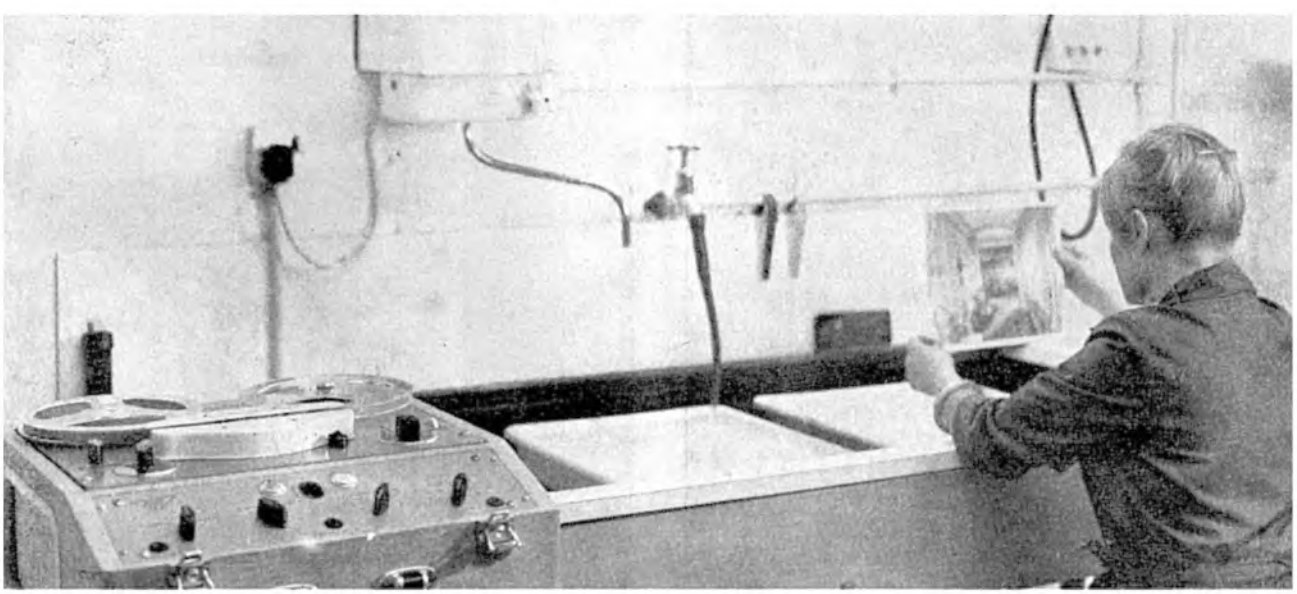
One of the great advantages of talking clocks is that several processes can be timed from the intermittent commentary on a single tape. The picture was taken to show one of the processing rooms at Colour Printers Limited, of 29 George Street, London, W.1, where this idea originated. We think this use for a tape recorder is one of the most unusual we have yet come across, though it seems a very logical one. In our next number we hope to describe another very unexpected job for a standard tape recorder. If you know of an interesting "*unusual use*", and particularly one that could make a good picture, please let us know. **The Editor, The Tape Recorder, 99 Mortimer Street, London, W.1,** we will be glad to receive details and pictures of any such interesting stories which, if used, will be paid for at our usual rates.

* * *

Go To Sleep!

TO quote from an interesting leaflet which recently reached this editorial office, "In these fast-moving days of tension, stress, strain, irritations and annoying trivialities, the art of relaxation is difficult to to acquire . . . . but a remarkable helping hand can be given by the use of the Talon *Somno-Tape*." Well, it is obvious that a review copy

● *Colour processing is carried out in complete darkness, and the use of a recorder as a talking clock greatly simplifies work, as the photo on the right may or may not show.*



● *Photographer Tina Tranter, of Colour Printers Ltd., examines a print which has been timed by means of the "talking clock" recorder.*

MORE NEWS

has not yet arrived, otherwise we might be far too drowsy to be sitting here at 9.00 p.m. on this October night, typing out this paragraph. On the other hand, of course, if visitors find us all walking about with our eyes propped open by matchsticks, they will know what has happened.

But we must apologise to the distributors of Somno-Tapes for the above levity, for the intentions of their leaflet are serious. In a nutshell (or so the claim goes), you play the tape regularly on your recorder each night before you go to sleep, and you learn to relax. Somno-Tapes are recorded in England, using the well-established techniques of Dr. Volney G. Mathison, Ph.D., F.I.A., of Los Angeles, U.S.A. The standard tape costs £2 2s.

However, as the leaflet continues, " Personalised tapes can also be made especially for you if desired, to help you overcome the tobacco habit, over-eating, to achieve self-reliance and self-confidence, to overcome forgetfulness and to develop a positive outlook." Such tapes cost £3 3s.

* * *

Tape Cassette Sells Discs!

OUR existing ideas on shopping for gramophone records—pops or classical—are due for a shock, when " Informatron " starts to appear in the record shops. This new phase in sales automation lets you hear immediately on headphones—or loudspeaker if the shop allows—tape copies of any one of 20 recordings. The record sleeves are displayed above the machine, and you select the one you want to hear by dialling its code number on an ordinary telephone dial. This avoids the wear and tear of handling and playing the actual discs themselves, and is bound to save the shops expense and worry.

Choosing 20 classical records to load such a machine could be quite a headache, but pop records present no problem whatsoever. It has been arranged that the " Top Twenty " will be recorded and distributed to Informatron users each week. Inevitably the question of copyright had to be gone into pretty thoroughly, and the agreement reached is that 45 seconds only of each number is allowed, and the dubbings are made in the International Broadcasting Company's studios under the personal supervision of Allen Stagg.

The affinity with " Juke Boxes" will be obvious, and the manufacturers of the new Informatron, Automatic Distributors Ltd., are amongst the country's largest distributors of the automatic disc players used in cafés etc. Besides its use for disc selling, the Informatron is available built into a transportable walnut and glass case (see Right hand photograph below) in which goods of all kinds can be displayed. Up to 20 questions are indicated on a showcard, and the public can dial to find the answer. Once again, the pre-recorded answers may be reproduced through a loudspeaker or a telephone handset. The different uses of this machine in shops, exhibitions, travel agencies, etc., are unlimited.

The heart of the Informatron is a plastic cassette containing an extra wide magnetic tape on which 20 separate tracks may be recorded. The maximum duration of each recording is 3 minutes but a continuous play switch will give one hour's uninterrupted playing, if preferred. Selecting the required track is performed electronically by a simple telephone dial. Special facilities and studios exist for making purchasers' own recordings on request, and the cassettes themselves may be inserted or interchanged in a matter of seconds.

Simultaneously with the Informatron, the makers have launched Publiphone, which is basically the same idea, but the tape reproducer and amplifier are separate from the telephone. Answers to up to 20 questions are given, as before, and may be coupled with a Public Address system, to relieve pressure at busy enquiry desks at airports, stations, hotels museums, etc.

* * *

More News from Rochester

IN our last number we published the story of a first attempt at a Tape Documentary, by boys of a school in Rochester, Kent. Great effort went into the project . . . but the boys were the first to admit that the results were not the masterpiece that their enthusiasm should have made it. Immediately, they went to work on a second project. The master who introduced the new hobby—J. Graham Jones—sends us this further news:

The subject they chose next was " *Careers* ", which seemed a good choice because each of the boys was vitally interested. We have a very active Careers Library in the school, but the boys decided that they would find it more intriguing to go out and meet some people actually in the job concerned. The whole form took part in this work

Inserting the tape cassette into Publiphone and Informatron machines takes a matter of seconds, so that the recording may be changed easily.

Recorded information may be listened to as above, or on the loudspeaker. The push button on the right dispenses leaflets on demand.

and produced reports on the jobs they were investigating. The list finally covered far too wide a range of jobs to include in one programme, so it was decided that only certain jobs—notably the Services—should be mentioned. The reports were duly edited, interviews with recruitment officers were recorded and their text written into the programme script. They decided that an argument between a "drifter" and an employment officer would be a good thread to the script and that, by careful illustration from the pre-recorded interviews, he should be won over to choosing a career with a real future. This programme was more successful. It was shorter, it had more punch and its points were clearly, sometimes amusingly, made.

Boys' Eye View

Next, a Fourth Year "E" Stream form asked to prepare a programme about the school which they called "Boys' Eye View". In this case, to allow for the somewhat lower attainment standard of the form (two boys had the greatest difficulty in reading the simplest words) the thread of the programme was mapped out and each piece of the script was made into a class effort. It was written only when each boy had made his attempt at writing it. The best wording was chosen, with reasons given, and the writer of each speech eventually read it at the microphone.

Each finished section was written into small books called "script books" which the boys treasured and carried everywhere.

We found it important to do such work in short "takes" of a page, or even a speech, at a time. It ensures that the standard of the work is kept up and that at each stage the programme can be criticised as it develops. There is a danger that this method may take too much time out of the syllabus, so strict rationing is essential. I've found the boys quite happy to do a little at a time each week.

Improvised Equipment

All our programmes could have been recorded quite well with just a machine, a microphone and an editing block. However, in order to give scope to the more practical in the classes, it was decided to build more flexible equipment, using two classrooms, one as studio and the other as control cubicle. However, no sooner had we set up the mic in the studio than we realised that some system of listening in the control was necessary, so the gramophone input of the school wireless was connected to the monitor output of the machine.

Next, we needed to communicate with the studio from control. A crystal mic, connected with the mic input of the school gramophone, in turn connected to a speaker in the studio, provided talk-back. A simple switching device cut out the monitor circuit and brought in the talk-back when the producer needed to speak to the studio and restored monitoring when his homily was over. The studio output was fed into a very simple carbon fader coupled to two others controlling the output from two gramophone pickups and so we were able to mix voice and music or recorded effects.

A bell-push "borrowed" from the science department brought up a green light in the studio to tell the actors when to go ahead for recording. This equipment was simple, even crude; but as it was built around apparatus already in school, it was simple to piece together, cheap, and gave the boys a sense of radio which machine and mic alone could not have done.

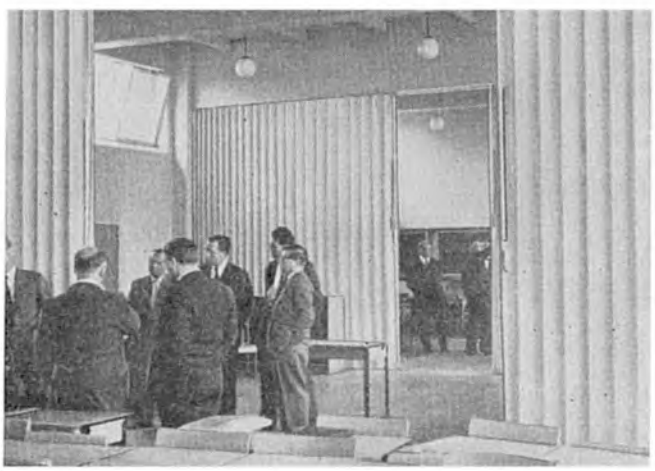
A Valuable Project

The Programme Project seems valuable in many ways. Thoughts have to be organised, words well chosen to convey the most meaning with the least verbiage. Repetition is avoided, discussion is provoked, the boys gain an awareness of the world around them and bring a new critical approach to their work. Speech is always carefully examined—the hardest case of h-dropping was given the task of watching for it in others, and had to say each word himself before the others accepted his criticism. Those with technical bent, operated the equipment and placed microphones, listening to acoustics and trying to get rid of the liveliness of the classroom—and soon found ingenious ways of doing this by using empty crisp boxes and raising the desk tops! At the end of it all, the boys were able to listen to the programme and say to themselves, "This is our programme, right from start to finish".

I've found the boys brimming with ideas for future work. They are developing the ability to write down and speak their thoughts in a form clearly understood and acceptable by others. Much experiment needs to be done, but the use of a tape recorder in the ways I have discussed, appears to be well justified.

Graham Jones

In the TV show "Take Your Pick" on Friday 16th October, Michael Miles presented Mrs. Hazel Reeve with a handsome prize. It is a Veritone Venus Console recorder, finished in sapele mahogany.



Visitors examining the new "Soundmaster" expanding walls and doors during a series of noise level tests recently made at a large Midland school. The doors will shortly be produced by Home Fittings (Great Britain) Ltd., one of the Brockhouse Companies.

R. G. C. Baker of the 3M Company Tapes Division is seen, with a spool of 3M Scotch Brand tape under his arm, discussing its use with an ATV engineer. A feature article on the tape recording of TV programmes appears in "Hi-Fi News" for November.

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.

Microphone leads—the long and the short of it

Dear Sir: The microphone which came with my tape recorder is a crystal type, and on a very short lead. So much so that nearly all my recordings have the noise of the spools turning in the background. Is there any objection to my extending this lead to, say, 30 feet, so that I can make recordings further away from the machine, perhaps out-of-doors?

I have heard of microphone preamplifiers to be used with, I think, low impedance types, but I am not sure if this is what I require, or whether the preamplifier should be at the microphone or the recorder end of the cable. Can you advise.

Yours faithfully, **T. N. O., Kenley, Surrey.**

* * *

Your letter raises a number of points, but let us examine first the important question of long and short microphone leads. For many purposes, it is unfortunate that microphones are often "chained" to the recorder by a lead no more than 6 feet in length. Yet this is what

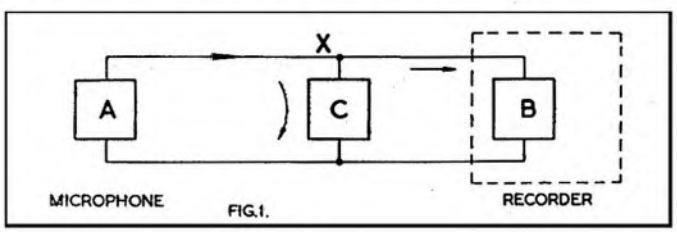


FIG.1.

happens with the average crystal microphone supplied as a standard accessory on inexpensive domestic machines. Of course the dictates of economy must be listened to, and a crystal microphone is cheap to manufacture. Also, it produces such a healthy output voltage for a given volume of sound input that a whole valve stage can sometimes be left off the recording amplifier inside the tape machine—important factors if you are trying to bring out a recorder at under £50, £40 or 30 guineas!

Why it is that crystal microphones in particular must be used with a short lead is tied up with the question of impedance and a few words on this may be in order. The first thing to note is that a length of cable does not present an infinitely easy path to electric currents, any more than a water pipe does to the flow of water. In the twin wire (or a single wire surrounded by braiding) used with microphones, the current arriving at the tape recorder is diminished through two quite separate causes. Together these make up what is called the impedance of the cable, the first being the actual resistance to flow of the wires themselves, and the second the tendency for current to be lost by flowing through the inter-wire capacitance of the cable so as to by-pass the recorder altogether.

In a well-designed and connected cable, the resistance is small enough to be neglected, but the capacitance path cannot be ignored and gets worse with every foot length of cable added.

To see why this is more serious with crystal microphones than others, let us examine **fig. 1.** *The current flowing at the point* **X** *has a choice of paths, either to flow (usefully) through* **B** *the input impedance of the recorder, or (wastefully) through* **C** *the inter-wire capacitance. Now, for a given value of* **C** *(i.e., a given length of cable) there will be a greater wastage if* **B** *is of high impedance.*

And this is the crux of the whole matter, because crystal microphones require **B** *to be very large—of the order of 5 Megohms. A long lead causes a serious loss in volume, but not in frequency response. If the recorder impedance is low there is a loss of low frequencies.*

Moving coil and ribbon microphones are low impedance devices, and are virtually unaffected by the capacity losses discussed above. Accordingly, cables of 100 ft. or even longer are often used quite successfully. Excessively long runs introduce a certain loss of high frequencies.

On the question of pre-amplifiers, a certain amount of confusion seems to exist. With high impedance microphones, such as crystals and condensers, the addition of a small amplifier can effectively overcome the difficulties of long leads. The place for this amplifier is at the microphone end of the cable (if possible), and it should transform the signal down to a low impedance to suit the line.

The condenser microphones used in professional recording studios have an amplifier built into the microphone itself, and our sister publication, "Hi-Fi News" carried a description of a home-built unit by Reginald Williamson (See "Hi-Fi News", August, 1959).

If it is decided to add a pre-amplifier for use with low impedance microphones, for example in a recorder which only possesses a high impedance (and low sensitivity) input circuit, the best position is at the recorder end of the cable. The transformer too, is usually best at this end of the line.

* * *

One Amplifier or Two?

Dear Sir: I am considering the purchase of a tape recorder, but I would like your advice on a small matter.

Some recorders, like the Reflectograph 500, have separate record and replay amplifiers and I was wondering if this feature is necessary for good quality recording from a radio or television receiver. Recorders possessing this feature are usually expensive, and I would like to know if it is worth paying more for a recorder of this sort.

Yours faithfully, **J. C., Hailsham.**

For recording broadcasts, it is not much of an advantage to have separate amplifiers. You will usually be monitoring the programme on the radio or TV set, and after a bit of practice you will have established the best volume settings to make good recordings.

A separate playback amplifier and playback head really come into their own when live recordings through one or more microphones are being carried out. In this case, it is very important to be able to monitor while recording, and, in fact, professional recording engineers make it a rule to monitor everything in this way. The playback head follows a few inches after the recording head, and gives an absolute guarantee that the recording is technically up to standard. A changeover switch is usually provided, to give instantaneous comparison between the incoming and the recorded signals.

* * *

Learning Dutch

Dear Sir: I have endeavoured to obtain *tape* lessons in the Dutch language from a number of firms including Linguaphone and Assimil, but without success; Tutor Tapes do not teach Dutch.

Could you inform me of anyone who does do these lessons on tape? I can get them on gramophone records, but have no gramophone.

Yours faithfully, **Kenneth Clark, 17 Greenfields, South Marston, Swindon, Wilts.**

* * *

Editorial Note

We regret that in describing the Philips Continuous Tape Cassette on page 351, the speed was given incorrectly. It is, in fact, 1⅞ i/s and we hope no confusion was caused.

By John Borwick

THE GRUNDIG CUB

Field trial of a light-weight recorder

Photo by A. E. Mason

● The demand for " mains free " tape recorders, which can be taken anywhere—up mountains or down escalators—has always been high, and was met until recently by one or two types only. Now, a succession of inexpensive battery-operated portables have appeared, and we begin this month a series of field trials to give readers a general picture of their performance.

We feel that the strictly technical review is out of place here, with its emphasis on frequency range, signal-to-noise ratio, wow and flutter, etc. These machines do not claim the high fidelity performance of larger (and more expensive) *semi*-portable recorders, and the kind of questions we shall be trying to answer are " Can I *really* take it anywhere? ", " Can *anyone* learn to operate it easily? " and "Are its tapes interchangeable with other machines? ".

A very few technical points will require mentioning of course, such as the battery complement, type of microphone, etc., but these will normally take second place to descriptions of the success or otherwise of actual recordings made under typical conditions. We shall literally " try it on the dog " or, as the above photograph shows, the younger members of the family.

THE styling of the Grundig " Cub " would be hard to beat. Of course, it can be said of all battery portables that you can " take them anywhere ", but Grundig have interpretated this phrase more widely than most firms. The Cub looks so attractive that you can " feel proud to take it anywhere ".

Two tones of grey are used throughout, a mushroom grey for the plastic outer case, the deck top, and the flexible carrying handle, and a darker shade for the lid. The lid is detachable, which is a slight nuisance in that you have got to park it somewhere while operating the machine. Also, why is there never room in these portable recorders to house the microphone? Unravelling the lead from your coat pocket never looks very professional, and if it happens to be the same pocket where you keep your pipe . . .

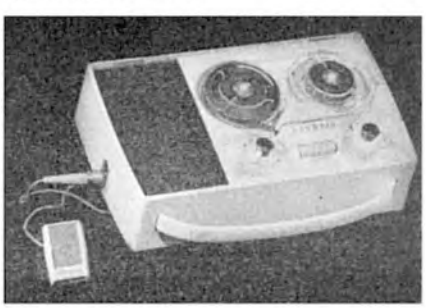
Will operate at any angle

However, a compensating good feature is that two tiny wire brackets prevent the spools from falling off their spindles, so that the recorder will operate satisfactorily when held at any angle. The controls are as easy to use as any we have seen. A single switch gives Playback, Record, Rewind, or Off, and the volume control acts both on recording and playback. The only other control is a Stop bar, which is invaluable for pausing the tape during breaks in recording, or holding ready to play in on a cue.

The emancipation from the tyranny of mains supplies was the first thing that I decided to test—on my evening journey home; but I am bound to say that my first recording was a failure. It was meant to be a running commentary of myself travelling down on the Oxford Circus Underground escalator. When I came to play it back, I found that the din of the moving staircases and the people chattering completely drowned the commentary. I have since found that I should have been speaking closer to the microphone, and slightly across it.

. . . are unqualified success

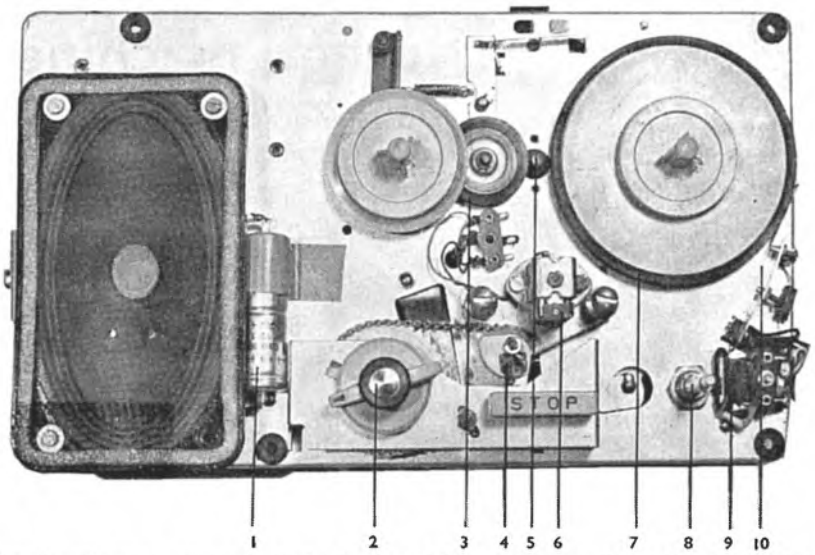
But the next recording in the train was an unqualified success. The family now have a much fuller idea of the different merits of my nightly commuter friends, and found it great fun trying to fit the recorded voices to the various nicknames, " Pipe ", " Stock Exchange ", " Boots", etc. The whole of one track of the tape was used up on this recording—about 15 minutes—and there were quite a number of useful incidental sounds on the tape, such as trains passing at speed, porters shouting, and going through a tunnel.



Although the largest spools which can be accommodated are 3 in., the special tape supplied gives 15 minutes per track.

THE GRUNDIG CUB

We hear a lot about transistors nowadays—these tiny semi-conductors which can do the job of large radio valves without expensive and heavy power supplies. Inevitably they have entered the field of portable tape recorders and this article is the first of a regular series in which we shall put each of these new portables through their paces. Next month we test the GBC " Clarion ".



Top view with cover removed, showing **1.** *electrolytic smoothing condenser,* **2.** *selector switch,* **3.** *idler wheel,* **4.** *permanent magnet erase head,* **5.** *drive capstan,* **6.** *record/playback head,* **7.** *rubber rim on tape-up spool to take drive and brakes,* **8.** *recording level/volume control (knob removed),* **9.** *motor control transistor, etc.* **10.** *Brake arm for take-up spool.*

Playback Through Other Equipment

The quality of reproduction through the Cub's built-in loudspeaker is naturally somewhat limited, though there is plenty of volume. A separate lead is provided which allows the output to be taken to the Pickup input on a radio, or another amplifier, and this was found to be an excellent method of listening. Incidentally, the rewind time for a full spool is approximately 5 minutes. Replaying Cub tapes on other tape machines, and vice versa, is not allowed for, as was soon discovered.

A recording made on the Cub was put on to a large semi-professional machine, the speed of 3¾ i/s selected, and the tape played back. In general, the quality was all one could wish—limited only by the microphone, which is as good as those usually supplied with inexpensive recorders, but no better. But the running speed, as revealed in the pitch of voices and music, and the timing was found to be inconsistent.

The explanation is that the Cub possesses no separate drive capstan, but pulls the tape past the recording head by means of the take-up spool alone. Hence, the recording speed is slow to begin with, and rises progressively as more and more tape is accumulated, and the radius of the " drive " increases. This factor—which is met on some magnetic dictating machines too—is unimportant if tapes are always reproduced on the same type of machine, but it clearly makes it difficult to exchange recordings or to edit.

Checking the speed

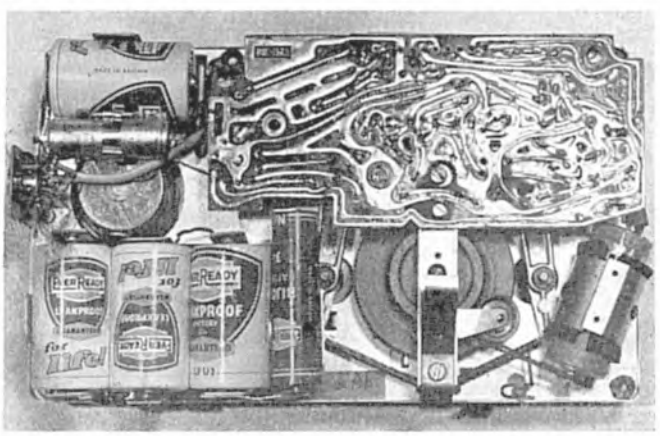
To find out the quantitative effect of this gradual speed change, steady tone was recorded at the beginning, middle, and end of the tape. When this was played back on a standard machine at 3¾ i/s the speeds were found to be ± 25 per cent. at the two ends, and correct towards the centre. This checks correctly with the (hub + tape) radius change from 0·9 in through 1·2 in. to 1·5 in.

A final feature which was tested was the ease with which a complete newcomer could operate the machine, guided by the Instruction Book alone. For this, the Cub was handed over the garden fence to a neighbour. Although it had been re-packed in its original carton, and the batteries even removed, the machine was ready and working in less than 10 minutes, and several splendid recordings were made at a family party. Some of these might have had difficulty in passing the Censor, but technically they were very good! A useful comment supplied by the neighbour was that some foolproof re-shaping of the batteries or terminals should be designed since it is so vitally important to insert the batteries the right way round in transistorised equipment. As an alternative to the internal batteries, a socket is provided to operate the machine from a 6 volt external battery, e.g., in a car. Also, a special mains unit has just been announced by Grundig which fits underneath the recorder in place of the batteries. In both these cases too, the polarity is obviously very important.

Technical Specification

Battery complement: 4 × 1·5 volt Monocells Leakproof or equivalent, 1 × 3 volt. **Operating Life per set of batteries:** 10–15 hours. **Transistors:** 2 × OC 71, 2 × OC 72. **Playing Time:** 15 minutes each track using the TDP6 tape as supplied. **Spool size:** 3 in. **Recording Sense:** top track left to right. **Mean Tape Speed:** 3¾ i/s. **Frequency Response:** 150–5,000 c/s approx. **Signal to Noise Ratio:** 40 dB approx. **Output Power:** 100 mW approx. **Loudspeaker:** 3·5 ohms elliptical. Input for microphone or radio, etc. Output for external amplifier. **Dimensions:** 11 × 6¾ × 3½ in. **Weight:** 5½ lb. with batteries. **Price:** £27 6s. including reel of tape, empty spool, microphone, and extra connecting cable.

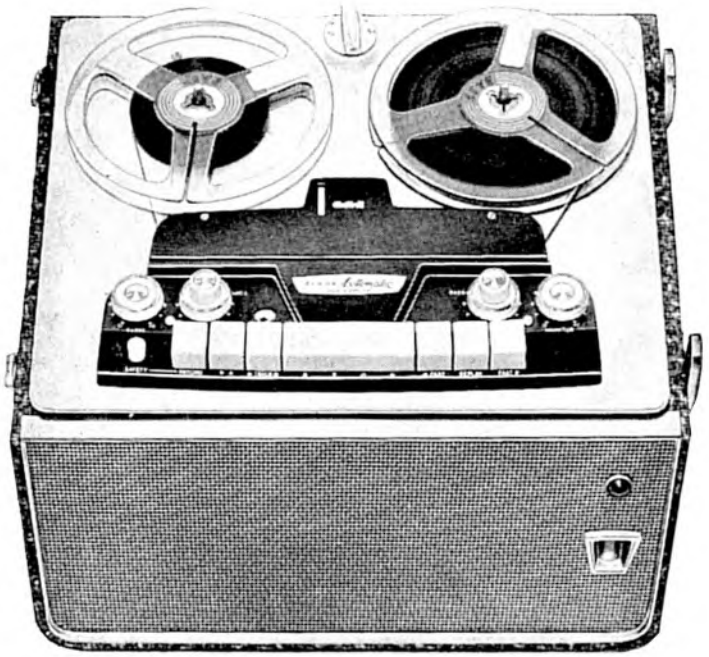
Manufactured by **Grundig (Gt. Britain) Ltd., 39/41 New Oxford Street, London, W.C.1.**



This underneath view shows the positioning of the batteries, the printed circuit board, the flywheel (right of centre), and the motor (extreme right). Every user, however non-technical, will need to change the batteries at some time or another, and should study their correct layout before doing so.

'A new standard of quality, by which other machines will be judged'

Angus McKenzie in TAPE RECORDING AND HI-FI MAGAZINE



This is the enthusiastic opinion of an expert, an independent reviewer, after thoroughly testing the Simon SP4. Throughout the Hi-Fi world, this superb new tape recorder, with its combination of high performance and range of exclusive features, is sparking off similar praise from those who have seen and heard it. Look at this list of star features—then come and see it for yourself at your nearest dealer—try it, test it and you too will join the crowds of Simon enthusiasts.

SIMON AUTOMATIC DECK fully 'push-button controlled .

AUTOMATIC TAPE REVERSAL without touching controls.

3-WAY MIXING FACILITIES on both record and playback.

BASS AND TREBLE LIFT AND CUT with independent controls.

REMOTE CONTROL FACILITIES on both record and playback.

HIGH QUALITY MONITORING Paired bass and treble loudspeaker units.

10 WATTS OUTPUT from ultra-linear push-pull amplifier.

PUSH-PULL OSCILLATOR for noise and hum suppression.

ACCIDENTAL ERASURE PREVENTION by special record 'safety button'.

ACCURATE TAPE POSITION INDICATOR based on linear tape scale.

PIN-POINT' MODULATION with cathode ray magic eye.

* Automatic, in the simon sense, is meant to be taken literally; it means continuous replay—the machine stops, reverses and changes to the other track with only a two-second pause, and *with no necessity to touch any control.* Similarly, up to three hours continuous recording can be made without attention the machine automatically stopping at the end of the second track.

simon SP.4

incorporating the new Simon fully automatic tape deck

and you can replay stereo, too

with the **SIMON STEREO ADAPTOR**

You can convert the SP4 for stereo at any time—and enjoy the brilliant realism in reproduction which only SP4 performance plus stereo can give. The Simon Stereo Adaptor replays pre-recorded tapes to CCIR specification and has full tone control as in SP4. Complete with amplifier and bass and treble speakers matching those in the SP4, price 49 gns.

Your Simon Dealer would be pleased to arrange H.P. terms **95** *GNS*

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Write for leaflet (N11) to:

SIMON SOUND SERVICE LTD.

46-50 George Street, Portman Square, London W.1

By A. Tutchings

EXPERIMENTAL RECORDER

LEARNING AS YOU BUILD — PART THREE—SIMPLE RECORDING

★ At this point in your experiments you should be able to play a loop of recorded tape at 7·5 i/s with reasonable balance and speech quality, either on the headphone or on the loudspeaker, via the radio set or amplifier. Do not proceed with the next experiment until you are quite sure that you are obtaining the best possible results, and that the experimental set up is stable and is giving a consistent performance which can be repeated at will. A little time spent in cleaning up the "lash up" at this stage will prevent a lot of frustration in later experiments.

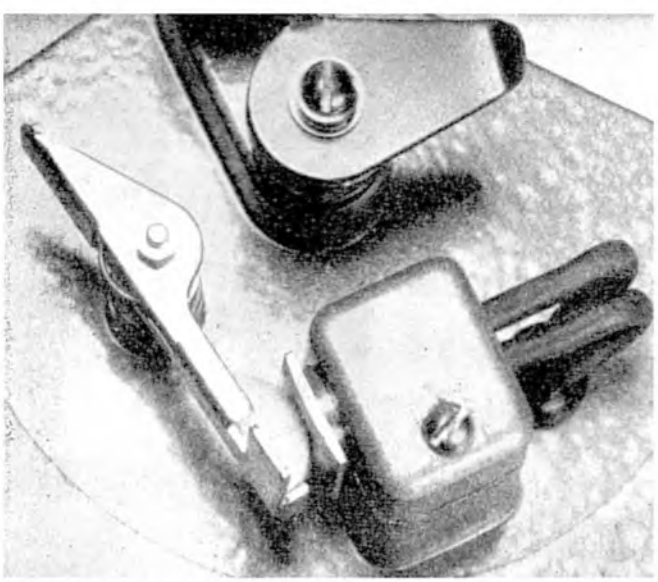
* * *

Experiment 8. Erasing the Tape

LAST month I suggested that you try and find a small horseshoe magnet, but in fact the size and shape of the magnet is not very important, and anything from a Magneto magnet down to the tiniest bar magnet will do. Most toy shops sell a little red horseshoe magnet, but you should first look through your junk box for a defunct gramophone pickup, loudspeaker unit, or headphone unit, and remove the energising magnet.

If you can borrow a small pocket compass you should place it near your magnet so as to find the direction of the magnetisation, and mark the N and S poles as indicated by the compass needle. If no compass is available a few iron filings from an iron nail, placed on a piece of paper, and held over the magnet, will again indicate the position of the poles. You should mark one of the poles N, and the other S, it does not matter whether your guess is right or wrong so long as it is possible to see when the magnet is reversed.

Next, the loop recording should be played so that it can be heard on the headphone or loudspeaker, and after the loop has made a few revolutions the magnet should be brought near to the tape, a few inches from the playback head, so that a given portion of the tape first passes from N to S across the magnet, and then a fraction of a second later passes the gap of the playback head.



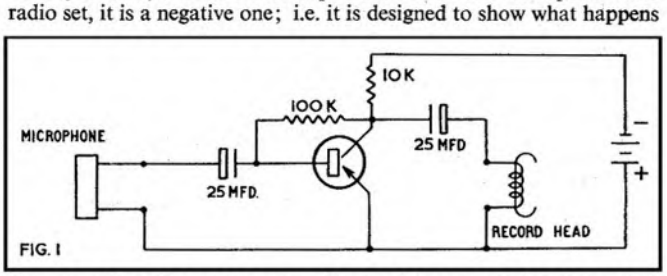
Permanent magnet erase heads are still used in some recorders. The photograph shows one (top) on the author's Gramdeck.

It will be found that unless the magnet is very powerful the reproduction will not be affected until the magnet is placed within about half an inch of the tape, when the playback level will drop. If the magnet is made to contact the oxide side of the tape the recording will be wiped off, or erased entirely.

If you experiment with a fresh loop of recorded tape you will find that the direction of the erasing field is not important, and erasure will take place whether the tape passes from N to S, or vice versa. In this condition the tape is said to be "*saturated*" and all the miniature magnets or domains in the magnetic oxide are fully orientated to a N/S position along the length of the tape, and any magnetic pattern which existed on the recorded tape is obliterated.

Experiment 8. Recording

We are now ready for our first recording experiment: and I should warn you that, like our first experiment with the microphone and radio set, it is a negative one; i.e. it is designed to show what happens



if we do things the wrong way. The head is connected to the output of the transistor preamplifier with the microphone feeding the input. **Fig. 1.** The tape should first be erased by placing the magnet against the tape with the N pole nearest the record head, and as the loop join comes round for the second time the magnet should be removed. Next speak into the microphone at a fairly high level, timing the speech to last for a further revolution of the tape loop. I suggest you count, or recite the days of the week, stopping when the join comes round again.

Now Reconnect the head

Now reconnect the head to the input of the amplifier, and listen to the test recording on the headphone or via the loudspeaker. You will find that it is very distorted and is barely intelligible. You should now reverse the polarity of the erase magnet and try again. The results should be exactly the same—low level with very marked distortion.

Before proceeding with the next experiment let us try and explain, without graphs or mathematics, exactly what is happening. We have seen that when the tape is erased by the permanent magnet it is fully saturated along its length, either N S or S N, depending on the polarity of the erasing magnet. If we try and record with an electromagnet, which is another name for the "*record head*," the half cycles of current of one polarity cannot magnetise the tape any further in the direction corresponding to that of the erase magnet, as the tape is already saturated and cannot accept any further magnetisation in this direction. The other half cycles, however, *can* be recorded, as they can reduce the magnetisation by cancelling the saturation

(*Continued on page* 437)

A Tape Recorder

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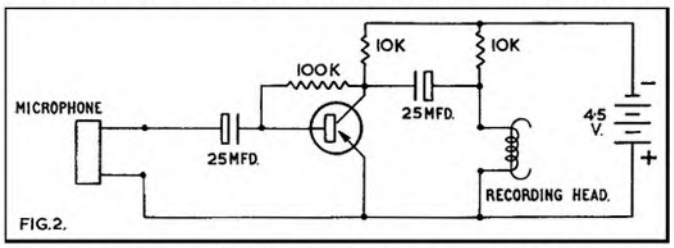
field. The resultant recorded signal is therefore very one sided, with either the positive or negative half cycles almost completely suppressed, due to the saturated condition of the tape.

Experiment 9. Recording with DC Bias

It would seem logical to try and set the condition of the tape so that it is not saturated, and one way of doing this is to pass a little direct current through the head, in addition to the alternating current we



are trying to record. It will be seen that the direction of this current through the head is important, as it *must* produce a field across the recording head gap which cancels the saturating field, and allows both the positive and negative going half cycles of the signal to produce equal changes in the magnetisation of the tape oxide.

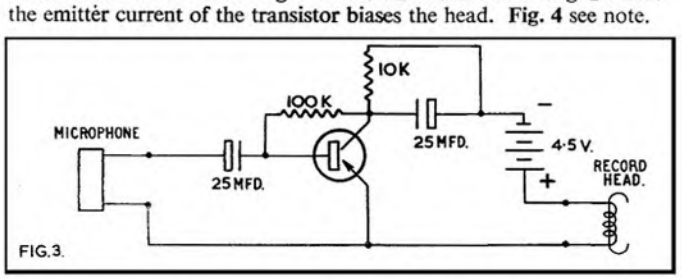
Fig. 2 shows how a 10K resistor should be connected to pass a small direct current through the head. The battery voltage should be 4·5 volts for this experiment. Two tests should now be made on tape which has been erased by the permanent magnet, with the connections to the record head reversed for the second test. Alternatively you may do the second test on another loop which has been erased with the erasing magnet reversed.

Testing for polarity

If all is well, you will find on playback that one recording is very much like the unbiased test, i.e. very thin and distorted, but the other should be of much greater volume and reasonable quality. The latter recording is of course the one where the bias and erase fields tend to cancel. You should carefully note the polarity of the erase magnet and head connections which give the best recording.

You may find that with DC bias you get quite good results with either connection of the head or position of the erase magnet; this usually indicates that the saturation erasing field is not acting longitudinally along the length of the tape, and you should again check the position of the erase magnet poles by iron filings or compass needle, and place the magnet so that a line joining the two poles lies along the length of the tape with both poles contacting the tape oxide.

Alternatively, you may find that both recordings are distorted. You should first try recording at a slightly lower level, and then experiment with different values of bias feed resistor. If the head windings are connected in parallel, a resistor in the range 5K to 15K should do; and if the windings are in series, then a resistor of between 15K and 20K should be tried. **Fig. 3** shows an alternative to **Fig. 2** where the emitter current of the transistor biases the head. **Fig. 4** see note.



Experiment 10. The Secret of Bias

The brief explanation of the action of DC bias given above is rather simplified, and a further experiment will show that there is another factor which must be taken into account. Let us first saturate the tape with the erase magnet, and then pass it over the record head with the proper amount of bias to cancel the erase field, as found in the last experiment, but with no input signal; i.e. with the microphone short circuited, or disconnected. Now do a test recording with the bias resistor disconnected.

Something is wrong! The recording is again weak and distorted, even though the tape is no longer saturated, and is in fact in exactly the same condition which previously gave a satisfactory recording. What is the explanation? The tape has been erased and biased properly—but a recording made a few minutes or seconds later is unsatisfactory. In the same way, if you erase a tape loop and then let it do one circuit over the biased record head without speaking into the microphone, but speak on the second traverse of the same head, you will find that the recording is not up to the standard of a recording made on the first pass of the tape. Time seems to be the all important element, and the big secret is that the state of the magnetic domains of the magnetic oxide must be *changing* at the instant when the recorded signal is impressed on the tape. In other words, *only when the magnetic oxide is changing from the saturated to the biased condition, and the molecules are in a state of fairly violent agitation can a true recording be made.*

DC bias coming back into favour

DC bias was first used by Poulson in 1895 in his steel wire Telegraphone recorder, and later in Germany during the last war in early models of the Magnetophon tape recorder. For nearly twenty years it was superseded by High Frequency bias which gave a lower distortion and background noise, with a resultant improvement in dynamic range. (We shall be using AC bias in later experiments.) Recently however, with steady improvements in the grain and magnetic characteristics of the magnetic oxide it has come back into favour for very portable battery operated tape recorders and dictation units, where a small amount of background noise and a slightly higher distortion can be tolerated.

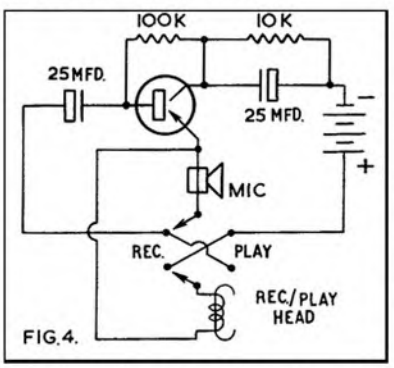


Fig. 4. *Shows a method of using a double-pole, double-throw switch to change over the transducer and the Record/Replay head for recording or playing back. This diagram is included for experimenters who are able to assemble more complicated arrangements helped by the circuit above.*

Next Month:—We shall continue with DC bias recording, but this time from the ext LS terminals of the radio set so that you will have a wider choice of programme material, and then begin to think of getting away from the loop and doing slightly more ambitious recordings on a small reel of tape.

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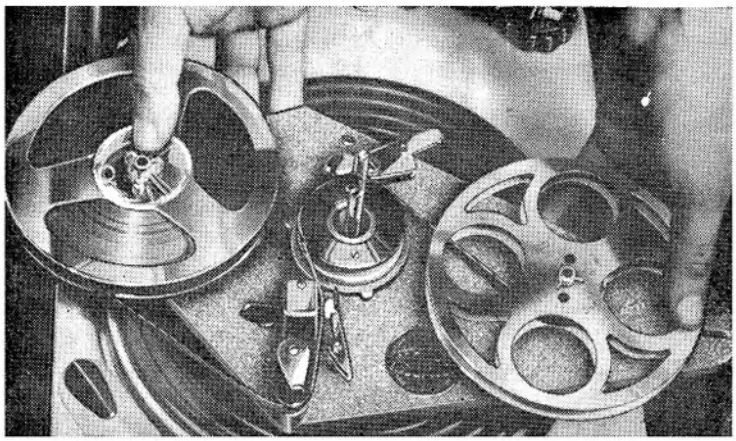

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● *We remind our readers that notices of equipment listed and illustrated in this monthly feature are in no sense reviews. When figures, specifications and diagrams are published, these data are extractions from manufacturers' lists. When samples of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

★

Wyndsor

Victor

Transportable

★

AS an addition to the Wyndsor Viscount, reviewed in the August issue, Wyndsor are producing a new transportable machine using the Collaro "Studio" deck and named the "Victor".

Most of the outstanding features of the Viscount are retained, such as the 10 × 6 inch speaker mounted in the lid, monitoring of the incoming signal through the speaker, output socket to CCIR spec. and "Straight through" amplifier facilities. New features include, mixing on both inputs, finger-tip edge control grouped at the front for ease of operation, built-in spare spool pockets, and full frequency equalisation at all speeds. A frequency response is claimed at 7½ i/s of 50-15,000 c/s ± 3dB, 50-9,000 c/s ± 3dB at 3¾ i/s and 50-5,000 c/s at 1⅞ and a signal to noise ratio of better than −40dB. The deck uses three 4-pole motors and 1,200 foot of tape can be rewound in 63 secs. 7-inch spools are fitted. As the photograph shows, the cabinet is designed on very pleasing lines. It is constructed from wood and is covered in two-tone grey leathercloth with gilt fittings. The size is 14¼ × 12½ × 9 ins., and the weight is 29 lbs. The price £47 5s. includes 1,200 ft. of Emitape, a spare 7-inch spool, jack plug and lead for direct recordings, and a crystal microphone.

Full details can be obtained from **Wyndsor Recording Company Limited, Wyndsor Works, 2, Bellevue Road, Friern Barnet, London, N.11.**

* * *

The Transistorised E.M.I. L2

THE Model L2/TA is a transistorised version of the L2. The same case is used, but the deck has a number of improvements and by the use of completely transistorised electronics it has been possible to include a complete replay system, there are no erase facilities. The recorder operates at a tape speed of 7½ i/s and is fitted with full track, fine gap record and replay heads. Power is supplied by eight U2 torch batteries. The recording amplifier has a microphone input, bass cut, gain control and a simple modulation meter which can also be used to check the HF bias current and battery voltage. The separate replay amplifier has no gain control and it feeds zero programme either to line or to headphones from a tape recorded with levels normally used with E.M.I. 77 tape. The loudspeaker amplifier is fed with a programme only when replaying a tape and cannot be used when there is a plug in the Phones/Line out jack.

The record, replay and loudspeaker amplifiers and bias oscillator are constructed on separate printed circuit cards and can easily be removed for servicing. A test "modulation button" is fitted so that the level of the incoming signal can be checked without wasting the batteries or tape.

Technical data: Signal to noise ratio, better than 44 dB unweighted. **Frequency response:** 50–10,000 c/s ± 3dB. C.C.I.R. recording characteristic. **Oscillator frequency:** Approx. 50 Kc/s. Battery motor governed from 12 V–8½V. **Wow and flutter:** Not greater than 0·25%. **Bass Cut:** Approx. 10 dB at 100 c/s switchable. **Input:** microphone 30–50Ω. **Sensitivity:** 75μv for peak level. **Outputs:** Phones/line, 600 floating, max. + 8dBm. The size remains at 8 in. high, 14¼ in. wide, and 6¾ in. deep, but the weight is increased from 14¼ lb. to 17½ lb. **Price:** £124, microphone extra. (A photograph was published last month).

For further details write to, **E.M.I. Sales & Service Ltd., Hayes, Middlesex.**

* * *

★

Lustraphone general purpose moving coil microphone The LD/66

★

THE performance obtainable from many domestic portable recorders can be very greatly improved by the use of a better class of microphone. The crystal microphones supplied with many machines are useful for general purpose recording, but when you require a recording from your recorder of the best possible quality then the purchase of a better microphone is money well spent.

Lustraphone introduced at the Northern Audio Fair a new general purpose moving coil (dynamic) microphone at a reasonable price. This unit, the model **LD/66** is available in four different impedances, suitable for Low, Line, High or condenser inputs. The casing is constructed from cream polystyrene, and has a stirrup to support it when used on a table or with the stirrup folded flat it conveniently fits into the hand. A special model is available with a swivel screw socket for stand mounting. The frequency is claimed to be substantially flat from 70 to 12,000 c/s. The weight is only 8 ozs. and the size 3⅛ × 2¼ × 1¼ ins. It is supplied complete with 6 feet of cable. The price for the low impedance model is £4 2s. 6d., the high impedance model is £4 12s. 6d., the special stirrup for stand mounting is 7s. extra.

Full details of this unit and stand plus accessories for use with it, can be obtained from the manufacturers **Lustraphone Ltd., St. George's Works, Regents Park Road, London, N.W.1.**

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Elizabethan

Mains Unit for the Cub

GRUNDIG (Great Britain) Limited, have introduced a Mains Unit for use with their portable Cub tape recorder as an alternative to the batteries. This unit allows mains operation of the Cub wherever normal AC supply is available.

The Unit, which clips neatly on to the bottom of the machine after the batteries have been removed, is finished in the light grey Cub case. Adding only 2½ lbs. to the weight, it in no way impedes the portability of the machine. The price is £7 7s. 0d.

Further details of these models are available from: **Messrs. Grundig (Great Britain) Ltd., 39/41 New Oxford Street, London, W.C.1.**

Grundig TK60 Stereo Recorder

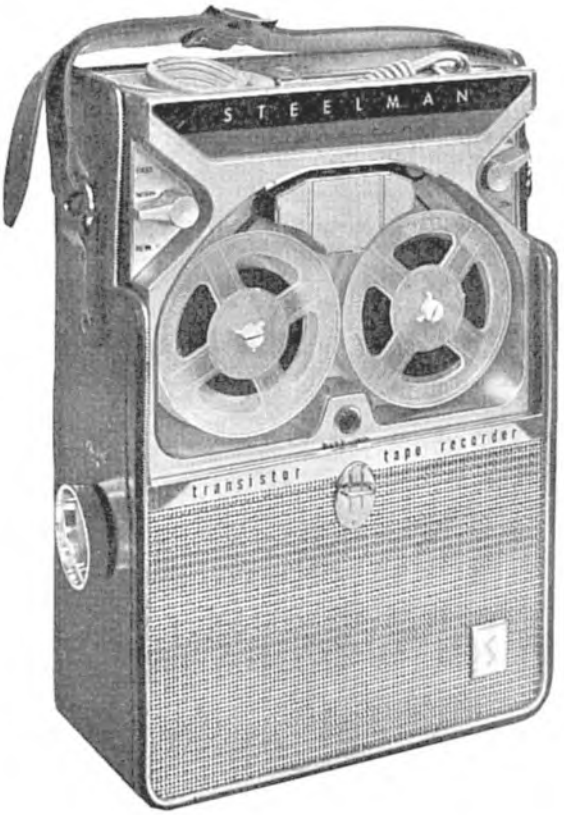
GRUNDIG is the first company to submit a complete stereo recorder to this magazine for review. It is the new **TK.60.** This is a two-speed machine operating at 7½ and 3¾ i/s, equally suitable for monophonic or stereo recordings and conforms to International Recording Standards, i.e. top track left to right for Mono and twin track "in-line" heads for Stereo. The maximum spool size is 7 in. carrying 1,800 ft. of Grundig L.P. tape. It contains two high quality 4½ watt Power Amplifiers which feed two high flux permanent magnet extended range elliptical loudspeakers of 10 × 6¾ in. The loudspeakers are housed in separate enclosures and can be detached from the main body of the recorder for stereophonic reproduction. Remote control facilities are provided for stop/start. There are input sockets for two Microphones, Extension Loudspeaker or Gramophone Pickup, Diode Input from Grundig Radio Receiver, or other external

input source. Output connections are available for two stereophonic channels or monophonic signal and for Extension Loudspeakers. There are facilities for superimposition and a Temporary Stop Control is fitted. Control is by push-button. The TK.60 is remarkably compact, and is contained in the now well-known Grundig blue-grey case. The price is £134 8s.

Stereo tape deck

THE TM60, the tape deck of the TK60, has also been released by Grundig. The deck itself is identical with that of the TK60 and contains the whole electronic equipment of the TK60 other than power amplifiers and speakers. A separate box attached to the main unit by a connecting lead contains three sockets for microphone inputs. The TM60 can be used with any good amplifier or stereo amplifier, radio or radiogram.

The price, including 1,800 ft. of Long Play Tape, is £94 10s.



STEELMAN Phonograph and Radio Company claim to be America's largest manufacturer of gramophone equipment, and as a result of an agreement reached recently between their Company and British companies, some of the Steelman products are to be produced in this country.

One of the first items is a battery portable tape recorder, "**The Transitape**". This recorder is very professional in appearance, the styling is as American as the Cadillac, but the thick leather case contains a machine with an interesting specification and, at least on the other side of the Atlantic, a good reputation. It will be of interest to see if the British assembled models live up to this reputation. Many parts are being imported, but as production is increased it is hoped to incorporate nearly all British components.

There are two speeds, 1⅞ and 3¾ i/s, frequency response at this speed is 150-7,500 c/s, 3 inch spools are fitted. The single D.C. motor is rubber mounted, an integral electro-mechanical governor maintains constant speed from 7 to 9.4 volts, fast forward and rewind voltages, maximum 18.9 volts. The bearings, jewelled and oilite type, are used at all critical points and no lubrication is required. Wow is said to be 0.5 per cent. at 3¾ i/s. This recorder will operate at any angle with or without the cover being closed.

Power is supplied by dry batteries, 6-Mallory RM-12R for the amplifier (about 300 hours life), and seven of the same for the motor life (about 50 hours). In an emergency standard penlight batteries can be used, these have about 6 hours life. There is a neon level indicator for battery life. It can also be operated from a 12 volt car battery. A separate neon is used to indicate over-modulation when recording.

A 4-inch speaker is fitted, there is also an output socket for an external speaker (3 ohms). When used the internal speaker is cut-out. The case is available in black and cowhide with silver-grey and chrome trim, or brown with beige and gold trim. A shoulder strap is provided. The measurements are 3 × 6½ × 9½, and the weight is under 6½ lbs. without the batteries. A crystal lapel microphone is supplied which can be operated with the microphone in its compartment on the top of the recorder. A Transitape has been promised, for review.

The price is £57 15s. Further details are obtainable from the U.K. agents, **Teletronics Limited, 46/47 Frith Street, London, W.1.**

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Electron	47½	6 17 6	3 12 2
Wyndsor Viscount	49	6 19 0	3 14 2
Spectone 161 ex Tape	49	6 19 0	3 14 2
H.M.V.	50	7 0 0	3 15 10
Telefunken 75 KB with mike ...	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
Fi-Cord	59	7 19 0	4 10 0
Elizabethan Major	59	7 19 0	4 10 0
Grundig TK25*	62	8 2 0	4 15 0
Telefunken Deck with Pre-amp* ...	63	8 3 0	4 16 8
Philips 8108	62	8 2 0	4 15 0
Veritone Venus*	66	8 9 0	5 2 6
Kurting	68	8 8 0	5 5 0
Brenell Mk V with mic.	69	8 11 0	5 5 6
Grundig TK30*	72	9 12 0	5 10 0
Telefunken 85 3w.*	75	9 15 0	5 15 0
Telefunken 85 6w.*	79	9 19 0	6 1 8
Grundig TK35*	82	10 12 0	6 5 8
Harting HM 8	86	12 6 0	6 10 0
Sabafon Automatic*	89	13 19 0	6 13 4
Simon SP4*	95	14 15 0	7 1 8
Tandberg 4TR*	124	20 4 0	9 3 4

*All machines are complete with tape and microphone, except those marked * which are without microphone.*

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. . . . tape recorder workbench

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

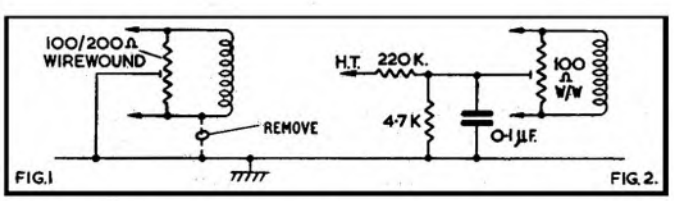
No. 6 . . . . . PLAYBACK HUM

IT is probably true to say that the biggest criticism that can be levelled against the average tape recorder—justified criticism that is—by those who favour discs, is that the dynamic range is poor by comparison. By " Dynamic Range " is meant the difference, usually expressed in decibels (dB) between the loudest undistorted signal and the inherent noise signal that remains when there should be silence. In speaking of the " average " tape recorder it should be pointed out that the " average " record player is far from blameless, but because of the system is better by the few dB that make all the difference. It is those few dB that we will look for on our tape recorder this month.

What is the problem? A reasonable figure for the signal/noise ratio of a preamplifier handling an input signal of 3-5 millivolts is 80 dB. According to the C.C.I.R. curve, about 30 dB of boost is needed at 50 c/s—the fundamental frequency of the mains—which leaves 50 dB. Such figures are normally taken to be unweighted, i.e. open circuit input, and it would usually be expected that the input circuitry would improve matters. In the case of a tape head, however, the input circuitry consists of an iron-cored inductance, a prolific source of hum pick-up! In the case quoted, if the hum signal picked up by the head were half a micro-volt, the signal/noise ratio ends up at 44 dB, a borderline figure.

Any improvement is worthwhile

It follows then that any improvement we can make, either to the original 80 dB or to the effective signal picked up by the head, will be worthwhile. Our aim is, for practical purposes, to achieve a level of hum that is barely discernible at the loudspeaker when the playback volume is set for average room level. Incidentally, we are not talking about servicing a machine that has *developed* a high hum level. I'll try to deal with that another month.

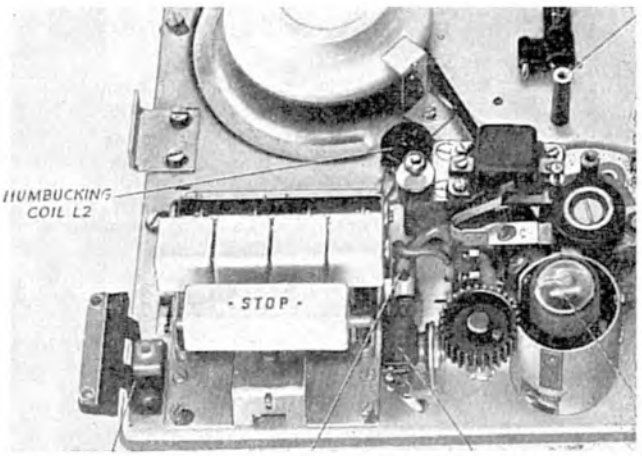


Figs. 1 and 2. *Circuits illustrating the use of a humdinger potentiometer. The values of components may vary from those shown.*

Broadly speaking, I think there are two distinct steps to take. First, we should try and improve the amplifier; and then minimise the hum produced by the head. It will be noticed that I am considering hum to be the main source of noise, due to the 30 dB of bass boost. With modern components higher frequency noise should be a lesser problem although we can hear it at a lower level. Bearing in mind that my remarks must be general to all makes, it is suggested that you obtain, and study, a circuit diagram of your machine. You may find some of my dodges already in use.

Humdinger potentiometers

Valve heater circuits are invariably earthed, preferably by a centre-tap in the transformer winding, but it is often found helpful to use a " humdinger " potentiometer. This enables the earth to be moved from one side to the other, and will often give one position that is optimum. A further improvement can sometimes be obtained by earthing through a capacitor, while maintaining



A humbucking coil is featured in a number of tape recorders. The photograph shows the early Grundig 500L/700L *series machine.*

the whole heater supply at a DC level above all the valve cathodes. Due to a slight rectifier effect, biassing the heater/cathode insulation in this way tends to increase the leakage resistance leaving only the capacity effect to be dealt with by humdinger. The circuits are given in **figs 1 & 2.** Values of components can vary about those given. What is important is that the existing earth connection must be removed first. Don't go any further until you have located *that* connection.

Dodge No. 2 is soon dealt with. If the mains transformer is fastened to a chassis made of ferrous metal, pack it away with about ⅛ in. of non-magnetic material, brass, dural, or even hardboard. The transformer must have a magnetic field, but there is no need to let a steel chassis spread its effect.

Be sure there are no earth loops

My next point is not really a dodge, but rather a check to see that established principles have been followed. Due to the mains transformer field, potential differences of up to 5 microvolts per inch can exist across the chassis. For this reason, all earth lines, screening, etc. are normally returned to the chassis at one point only, at least as far as low signal circuits are concerned. This point is usually next to the first valve. It is equally important to see that no earth loops have been formed, perhaps by accident. A common example of this is the earthing of each end of the screen of a wire. But don't let yourself be fooled by the fact that the screening may itself be earthing another part of the circuit. Now it is unlikely that actual mistakes will exist on your machine, but the original design had to be suitable for all those made, and it is possible, not necessarily probable, that careful experiment can improve matters. But never make a move without being confident that you can restore to the original.

Humbucking coils

It may well be helpful to experiment on the amplifier with the head out of circuit and replaced by a resistor of about 2-3 K. The connections to the head must now be examined a little more carefully in order that we can fit a humbucking coil. These very useful little devices are frowned upon by some people, but, used properly they are, in the writer's opinion, quite legitimate. It was explained earlier that the head, because of its construction, was prone to hum pickup. Mumetal shielding, to a greater or lesser degree, minimises this and a humbucking coil can be used to " buck " or cancel out the remainder by injecting an inverse hum voltage into the circuit. It should not however, be used to buck amplifier hum due to possible phase changes, hence the expression " used properly ".

My circuit, **fig. 3** shows the coil connected in the earth return of the head, and here lies a possible source of confusion. On some machines, to simplify switching, one side of the head is earthed when recording and the other side on playback. This helps to keep the two "ends" of the amplifier separate and avoids oscillation. You will have to determine the lead that is earthed on playback (The existence of the humbucking coil in the

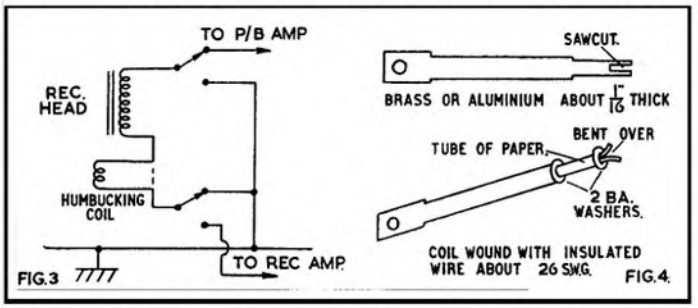


Fig. 3. (*Left*). *Typical head switching circuit, showing the use of a humbucking coil.* **Fig. 4.** (*Right*). *A thin dural mount as shown allows the coil to be tried in different positions for best effect.*

lead which is live for recording will have negligible effect). The number of turns of wire for the coil, and its final position, will have to be determined by experiment. Position will be largely dictated by existing wiring, and may require the coil to be near the head. In this case up to about 50 turns may be needed.

If the coil can be placed near the transformer or a motor only 10 or 20 turns may suffice. The greater number of turns the greater the effect but the more critical will be the correct setting. Remember that turning the plane of the coil through 180° will change its effect from bucking to boosting or vice versa. Using a thin dural mount, as in **fig. 4**, allows you to push the coil about for the best final position.

. . . and a check on progress!

Finally, how do we check whether any improvement is being made? If you can put a voltmeter across the speaker connections and get a reading of the hum signal the job is easy; but quite a bit can be done by ear. It is no good listening to the speaker and trying to decide whether the noise is getting louder or softer. You have to have a reference level. It is best to set the volume control so that the hum is just audible, and mark or make a note of the setting. If, next time you try, the hum is just audible at a higher setting, you are on the right lines. But I must end with a warning. If your machine is still under guarantee, don't touch it. If it isn't, bear in mind that the responsibility is yours, not the makers, nor, I'm afraid, mine!

By J. W. Berridge

MORE ABOUT MIXERS

PART FOUR — IDEAS ON USING A MIXER

ONE of the biggest complaints I hear from the amateur is that none of the professionals ever gets around to letting him, the amateur, in on any of those useful little tricks which make the professional job sound so smooth and slick. At the risk of breaking faith with many who regard these tricks of the business as sacrosanct (without cause, in my opinion) I'd like to pass a few of them on. The most important is the business of the cross-fade, or segue (pronounced S-E-G-W-A-Y if you want to use the word) as it is sometimes called. Half the beauty of the cross-fade is that it can be made at any speed you wish. A sudden one can sound exactly as though the transition has been made with a switch but without the click. A slow one can be almost unnoticeable, especially between similar types of music.

The art of cross-fading

How fast to make the cross-fade is entirely a matter of your own taste, but a few comments might be a help. If you arrange your segue such that music starts at the same moment that the voice finishes, the transition should be as fast as you can make it, provided you're planning to start the music at the beginning. A listener expects a musical phrase to start at full level, and a fade in at the start of music sounds decidedly sloppy. If, however, you plan to bring in the music some way from the start of it, then by all means fade it in, and slowly. A good length of time in which to accomplish a fade of this sort is five seconds. Better still, if you want the fade to be as inconspicuous as possible, start to bring in your music *before* the voice finishes. The music is already there in the ear of the listener when the commentary quits. Just be sure not to drown out the last few words of your commentary. Remember also that a fade-OUT of music should be much slower than a fade-in. If you're at the end of your tape, use a really slow fade-out and try to time it so that the last vestiges of sound are gone simultaneously with the last few inches of tape. By a really slow fade I mean about fifteen or twenty seconds. This may seem a long time when you first do it, but it won't when you listen to the wonderful lingering effect you get. Even with loud and excited music this still holds good.

Watch the tempo

How you cross-fade between sections of music depends on the music itself. Quiet music should be done slowly and gently, noisy music fairly quickly. If you're going from a quiet to a loud excited passage, do it quickly for effect, if from a loud passage to something quieter, do it slowly—let the excitement of the louder passages die down gradually and replace it with the restfulness of the quieter music. Above all, try and make the change at the end of a musical phrase, it doesn't leave the listener with a sense of something left unfinished. Also, never fade out the first piece of music before you've started to bring in the second. This leaves a short period of silence in between. It's much better to let the second item drive out the first, much as a person would elbow his way to the front of a crowd.

What about the obvious question of setting levels with a mixer? Well one obvious comment is to set level on the recorder

The author is seen here at a professional mixer panel in a TV Studio of the Canadian Broadcasting Corporation in Toronto.

then do your mixing on the mixer where it should be done. Turn all controls on the mixer full up then set the volume on the recorder so that the quietest sound gives adequate recording level. This means that any source should then give enough sound to record properly. Setting a balance between the different sources can only be done one way successfully, at least by the home recordist. The professional is able to monitor his recordings continuously in a separate sound-proofed booth. You can always build one of these if you have the money and the inclination of course, but the best method is by trying beforehand. Unlike the professional, the amateur gets the advantage of being able to take his time.

Balancing the channels

Play through your music; speak a few words; record a few seconds from the radio or TV. A few minutes trial and error will enable you to set up each channel so that it gives the right balance. You can then make a mark on the face of the mixer with a chinagraph marking pencil. This is a grease pencil which will rub off quite easily afterwards. Be sure to make *two* marks on each control, one for full and one for background level. In the latter case, note that loud music will have to be turned down farther than will quiet music to achieve the same background level. Another good habit to get into is that of starting again if a mistake is made. Our whole aim is to avoid starting and stopping the recorder and the effect is completely nullified if it is done only once—start again, the practice is always useful and a second effort is invariably better than the first.

Finally a word about the mixer and the rest of your equipment itself. If you plan to do very much recording at all, you'll find it essential to have some sort of permanent set-up. Enthusiasm soon dies if you have to unplug and store away the gear every time you're through with it. Make sure also that your set-up is convenient to operate. Move everything around until you have it in its most convenient position, then refrain from making repeated changes. Do all your mixing right on the mixer and if any of the other equipment has a level control, set it up in such a fashion that the appropriate mixer control is operated full up then use the mixer control.

Avoid too small control knobs

If you're building your own equipment, or at least the mixer, use round knobs for the controls and large ones at that. A round knob can be rolled under the finger-tips, any other has to be turned by a twist of the wrist. In addition, large knobs turn easier than small ones. Human beings have only two hands and often one of these is already occupied. If the two sounds you wish to cross-fade are on adjacent channels, it is possible to achieve this fade with one hand, that is if round knobs are used. It takes practice but it can be done. You just turn the two knobs in opposite directions by rolling them under your fingers. Even if you never have to use this trick, always try and use your finger-tips on control knobs. This is much more sensitive and less fatiguing than twisting the whole wrist and forearm.

Let me close with one irrelevant but important word of warning. If you record music of any sort, be very sure you don't use it for anything other than domestic purposes, etc. Copyright restrictions are still under dispute. It's perfectly all right to record from disc to tape for a public performance *provided* that the music has been cleared for use at that performance. Long-play tape run at low speed is ideal for dancing to and tape is much easier to handle than discs during a play or stage show. Just make sure that you're not breaking any copyright regulations. Good recording.

our readers write . . . . .

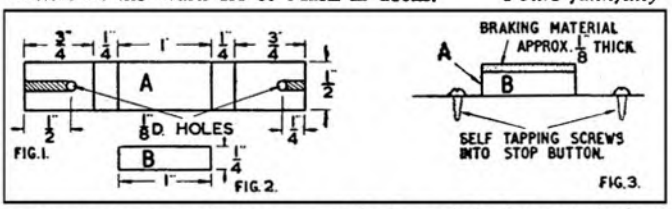
★ We award a prize of one 7-inch spool of Tape each month for the best letter printed either on this page or amongst "Readers' Problems." This month the prize goes to David G. Whiteley. Letters not intended for publication should be clearly marked NOT FOR PUBLICATION.

. . . about a flywheel brake

From:—David G. Whiteley, 63 Clement Street, Birkby, Huddersfield.

Dear Sir:—I have enclosed drawings and instructions which describe how I constructed a simple but effective flywheel brake for my Collaro Mark III tape transcriptor.

The idea occurred to me some time ago while examining the remains of my idler pulleys. I attributed the damage to the constant reversal of the flywheel and I decided to fit the brake in order to reduce the damage to the new ones. I hope you think the idea is worth printing as it may be of some use to owners of the Mark III or Mark II decks. *Yours faithfully*



The brake is made from a small piece of tinplate attached to the underside of the Stop button. Braking action is obtained by friction between the brake material and the ridges on the flywheel.

Materials: Piece of tinplate (top of food can would be suitable) piece of felt, cork or rubber for brake lining.

Instructions: (1.) Cut parts A **(Fig. 1),** B **(Fig. 2)** from thin tinplate. Thick tinplate would withdraw the self tapping screws too far and they would not bite in their holes. (2.) Drill the ¼ in. dia. holes as shown and cut out the slots shown shaded. These slots make it unnecessary to remove the self tapping screws completely. This procedure is advisable since they are situated in a rather awkward position. (3.) Bend plate A into the shape shown in **Fig. 3** and solder plate B centrally into the shape shown (4.) Glue the braking material, which should be about ¼ in. thick in position shown. There are several types of glue on the market which are suitable for attaching the material to the metal. For those who are stuck for ideas, may I suggest Britfix 99, available from most model shops. (5.) Remove the cover from the transcriptor, then remove the transcriptor from its housing. It should then be supported upside down. (6.) Slacken the two self-tapping screws which hold the Stop button to its base plate by about two or three turns. A Phillips screwdriver with the end bent over at 90 degrees is a great help althought not essential. (7.) Slot the brake on to the screws and tighten down. (8.) Turn the transcriptor the right way up and adjust the keenness of the brake by adding a thin layer of braking material if required. It is essential that the braking action should not start until after the stop button has activated the stop mechanism, otherwise the ends of the recordings will be slurred. **D. G. W.**

* * *

. . . about the Fi-Cord review

From: Ralph E. Gough, General Manager, Fi-Cord Limited, London, W.1.

Dear Sir:—We have read Mr. Moir's review of the Fi-Cord tape recorder in the September issue of *The Tape Recorder*, and there are one or two comments which we should like to make.

You state that the primary purpose of the Fi-Cord is to record speech, which is not so. It was orginally designed as a high quality recorder operating on 7½ i/s for making "on-the-spot" recordings when it was inconvenient or impossible to use a mains operated recorder. Particular emphasis was placed on the recording of background sound for cine film. The 1⅞ speed was added in order to give it a second use —that of a portable notebook. The standard microphone supplied with the Fi-Cord is designed primarily for this second use, when size is important and the incorporation of a motor stop/start switch is is necessary.

The incorporation of a motor stop/start switch inevitably means that a certain amount of motor noise gets onto the tape which, however, is not important in the secondary use of the Fi-Cord. For the primary role of the Fi-Cord, we recommend and sell in quantity the Grampian DP4/M moving coil microphone or the Reslo RBM/T ribbon microphone. The Grampian is, of course, more suitable for use in the open air, whilst the Reslo comes into its own indoors.

Yours truly

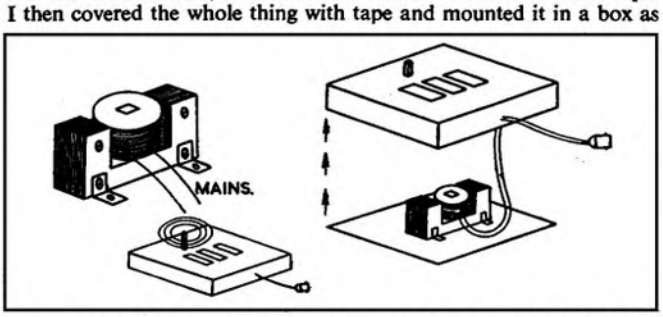
We are grateful to Mr. Gough for this letter and the excellent account of a Fi-Cord's performance during a recent television filming expedition to Africa, which he enclosed. The two-fold usefulness of the Fi-Cord at its two speeds of 1⅞ and 7½ i/s will no doubt recommend it to many of our readers. (*Editor.*)

* * *

. . . about a bulk eraser

From: R. W. Panting, 33 Rupert Street, Reading, Berks.

Dear Sir:—First of all, let me congratulate you on a wonderful magazine! In your very first edition, you quoted that a bulk eraser usually consisted of E laminations with a winding on the centre limb for connecting to 50 c/s mains supply. I experimented in this direction with an old transformer and I succeeded in making a very efficient eraser. To begin with, I removed all laminations and rebuilt only the E's, the I's being discarded. Next I drilled four holes for bolts and also sealed off all wires which were not in use with adhesive tape. I then covered the whole thing with tape and mounted it in a box as



shown. Thin plastic was used for the top of the box, but no doubt Perspex or even Formica would do equally well.

A tape is erased in about 30 seconds with this eraser. The laminations come level with the top and the tape is turned round on the spindle. *Yours faithfully*

* * *

. . . about hub diameters

From:—F. I. Herbert, 23 Linden Road, Bosforth, Newcastle-upon-Tyne.

Dear Sir:—Tape is at a disadvantage when compared to discs in one respect—there is no direct means of identification of the beginning or end of a recording, so that one must rely upon indirect methods of location. That manufacturers are cognisant of this is evident in the increasing numbers of instruments which are being produced with reasonably accurate position indicators and considerable thought has obviously been put into the design of such. My own instrument, recently acquired, is excellent in this respect, allowing me to find a given place to within one revolution, provided that—and here is the crux of the matter—the diameter of the take-up spool hub is constant.

At the present time, different makes of spool vary considerably and thus the care in design of indicators is rendered useless. Standardisation too early in the development of equipment can have a stultifying effect upon progress, but this surely does not apply in this instance.

Can you use the weight of your opinion and that of your readers to persuade the manufacturers that uniformity in this instance cannot be other than advantageous both to themselves and their customers?

Yours sincerely

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EQUIPMENT REVIEWED

★

THE VERITONE VENUS PORTABLE RECORDER

★

Manufacturer's Specification

Mains Voltage: 200–250 Volts A.C. **Tape Speeds:** 7½ and 3¾ i/s. **Frequency Response:** At 7½ i/s, 40–12,000 c/s, ± 3 dB, at 3¾ i/s, 40–8,000 c/s ± 3 dB. **Recording Sense:** Standard. **Signal to Noise Ratio:** 45 dB. **Wow and Flutter:** <0·2%. **Magic Eye Level Indicator.** 3 Heads, separate record and playback amplifiers. Direct monitoring. **Input Sensitivity:** 1 mV, 0·5 Megohms. **Outputs:** Line, and 15 ohms for ext. L/S. **Loudspeaker:** 10 × 6 elliptical unit on sub-baffle. **Size:** 17¼ × 15½ × 7½ in. **Weight:** 35 lb. **Price:** with tape and Acos Mic/39, £60 18s.

Manufactured by **Veritone Ltd., 5 Avenue Parade, Ridge Avenue, London, N.21.**

* * *

THE Veritone Venus is a competitively priced recorder with some unusual and valuable features not normally found on a non-professional machine; and it therefore merits special attention when getting down to your final short list of tape recorders that should be heard before making a final decision.

It is worth listing these special features at this point, though they will be covered more fully in the appropriate section of the review.

1. The loudspeaker is mounted in the bottom of the case pointing downwards but it can easily be removed from this position and clipped into the lid if the best possible results are required. This dual mounting allows a speaker of reasonable size to be used, a worthwhile advantage from several points of view.

2. Separate record and replay amplifiers are used. As three heads are fitted, the programme being recorded can be heard *from the tape* as recording proceeds.

3. Superimposition is possible, thus a commentary can be added to an existing recording.

4. There are separate tone controls for bass and treble response.

5. An output socket provides a signal corrected to the C.C.I.R. response standards, irrespective of the tone control settings.

The case, finished in fawn leathercloth, measures 16 × 16½ × 7½ in., and as the weight is only 35 lbs. it is not inconveniently portable. The removable lid is grilled to carry a speaker, and fitted with two fold-away feet, although the speaker unit is fitted into the bottom of the machine. It may be used in the latter position, for the rubber feet lift the machine about half an inch off the table surface and allow relatively free passage for the sound. Top response naturally suffers, when used in this way, but the performance is still quite acceptable. When the machine is used in a large room, or when the best performance is required, the 10 × 6 in. speaker unit can be easily detached from its mounting in the base and clipped into the lid. A permanent connection between the machine and speaker is provided by a 9 ft. length of plastic lead, which is normally folded away behind the speaker unit in the base of the machine.

Two speeds, 3¾ i/s and 7½ i/s, are provided. Selection is made by a small lever in the centre of the machine, behind the head assembly. This has to be turned through 180 degrees, and on the particular machine tested was rather stiff in action. The four control knobs are grouped in pairs each side of the deck, the "record" volume control and fast wind and rewind control being on the left, with record/replay switch and replay gain control on the right. The mains switch is ganged to the replay gain control.

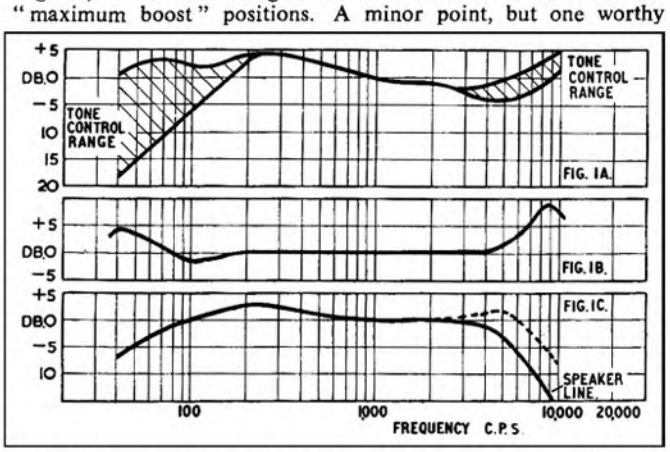
A conventional 3-digit counter (when is somebody going to introduce a 4-digit counter?) and recording level indicator are built into the raised centre portion embodying the heads and tape slot. The tape run is unconventional in that a pressure pad is fitted to the "record" head only, the curved tape path being relied on to hold the tape in contact with the erase and replay head. Use of three heads is a valuable feature, for in conjunction with the separate record and replay amplifiers that are fitted, it allows the signal being recorded on the tape to be monitored while recording is in progress. This is a professional practice that is met in few domestic recorders and is to be highly commended.

Separate bass and top tone controls, and jack sockets for microphone, gram, and external speaker (15 ohm.) connection are carried on a small panel at the rear of the machine. The same panel also carries two small slide switches, one of which allows the internal amplifier to be used for public address work. The other removes the erase signal, when a second signal is being added to an existing recording.

Objective Results

Fig. 1a indicates the response obtained using the EMI TBT1 test tape, the cross hatched portion showing the range of the tone controls. The "top" control has a rather limited range, but it is of value in reducing tape hiss on noisy recordings. The enthusiast is catered for by providing a socket (though this is in a rather inaccessible position under the machine) from which a signal corrected to the C.C.I.R. standard can be taken to drive an external amplifier. Connection is made at a point before the volume control or tone control, and thus the response is independent of tone control settings. On the particular machine sent for test, the response, **Fig. 1b** was not within the C.C.I.R. standard, but it was not too far outside.

The overall record and replay responses obtained at the C.C.I.R. socket, and at the speaker terminals, are shown in **Fig. 1c,** the curves being taken with the tone controls in the "maximum boost" positions. A minor point, but one worthy



of note by any prospective user, is that the maximum bass is obtained with that control at the counter-clockwise end, whereas maximum top is obtained with the "top" control at the clockwise end of its travel. There is a convention, though I am not sure that it has official backing, that the maximum output of whatever is controlled should be obtained with the control at its

(*Continued on page* 451)

SENSATIONAL

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clockwise end. Whether this convention is met or not, it is useful to have both controls to the same standard.

Fig 2 indicates the record and replay response obtained at the lower tape speed of 3¾ i/s, the curve being obtained at the speaker terminals, with both tone controls "maximum".

The signal/noise ratios obtained were very satisfactory for such a small portable machine, the unweighted figure being 44 dB. and the weighted figure 47 dB. There was no very significant difference between the values obtained at either tape speed, though the good results obtained at the lower tape speed may be largely due to the restricted frequency range.

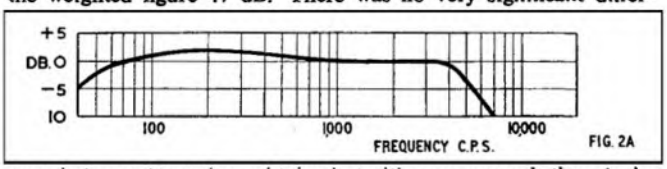

FIG. 2A

The same figure for wow and flutter, 0.18 per cent., was recorded at both tape speeds, an unusual result, but whereas the disturbances at 7½ i/s were mainly "wows", i.e. low speed fluctuations, at 3¾ i/s they were mainly flutter, i.e. high speed variations in mean tape speed.

The rewind time is unusually short, 55 seconds for 1200 ft., but the tape tension during rewind is apparently a little on the low side with the result that the tape rewinds rather loosely.

Subjective Results

There were a few minor criticisms of the machine in use. Switch clicks, produced by operating some of the controls, are rather loud and could be suppressed with advantage. Also, a stronger detent spring on the high speed wind and rewind control would be advantageous in preventing the control over travelling when being moved into the "off" position.

The frequency response of the particular machine tested was hardly within the advertised claims, but wide frequency response is a much over-emphasised advantage. This reminds me that I had a hard time trying to convince an enthusiast that I met at the Radio Show that the difference in sound quality between two recorders, one selling at £40 and the other at £90, was not due to an extension of the frequency range to 20,000 c/s. An extension of frequency range from 15,000 to 20,000 c/s is hardly worth a price difference of 10s. in a machine costing £80.

On the other hand, the use of three heads and separate record and replay amplifiers is worth a great deal, for the facility of hearing the recording while it is being made is invaluable. It is difficult to persuade the vicar and all concerned to repeat the wedding ceremony because you didn't find out until all was over that the microphone plug was making intermittent contact.

The superimposing facility is also of considerable value to the keen enthusiast, for it allows suitable music or spoken commentary to be added after a recording has been made. In the Veritone this can be accomplished by merely running the recording through the machine with the "erase" switch in the off position to prevent erasure of the existing recording. Thus the new material is an addition and not a replacement.

Reliability is something that a reviewer can rarely comment on with any experience, but the Venus ran for a couple of months of normal use without the slightest trouble. Taken all in all, the Veritone Venus is a very satisfactory compromise between performance and price, and its special features are of real value rather than something that merely looks good in the advertising.

J. Moir

Manufacturer's comment: The extra head on this machine makes superimposition very accurate since you can listen to the first recording whilst adding the second.

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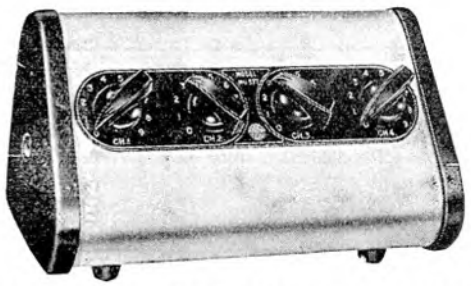

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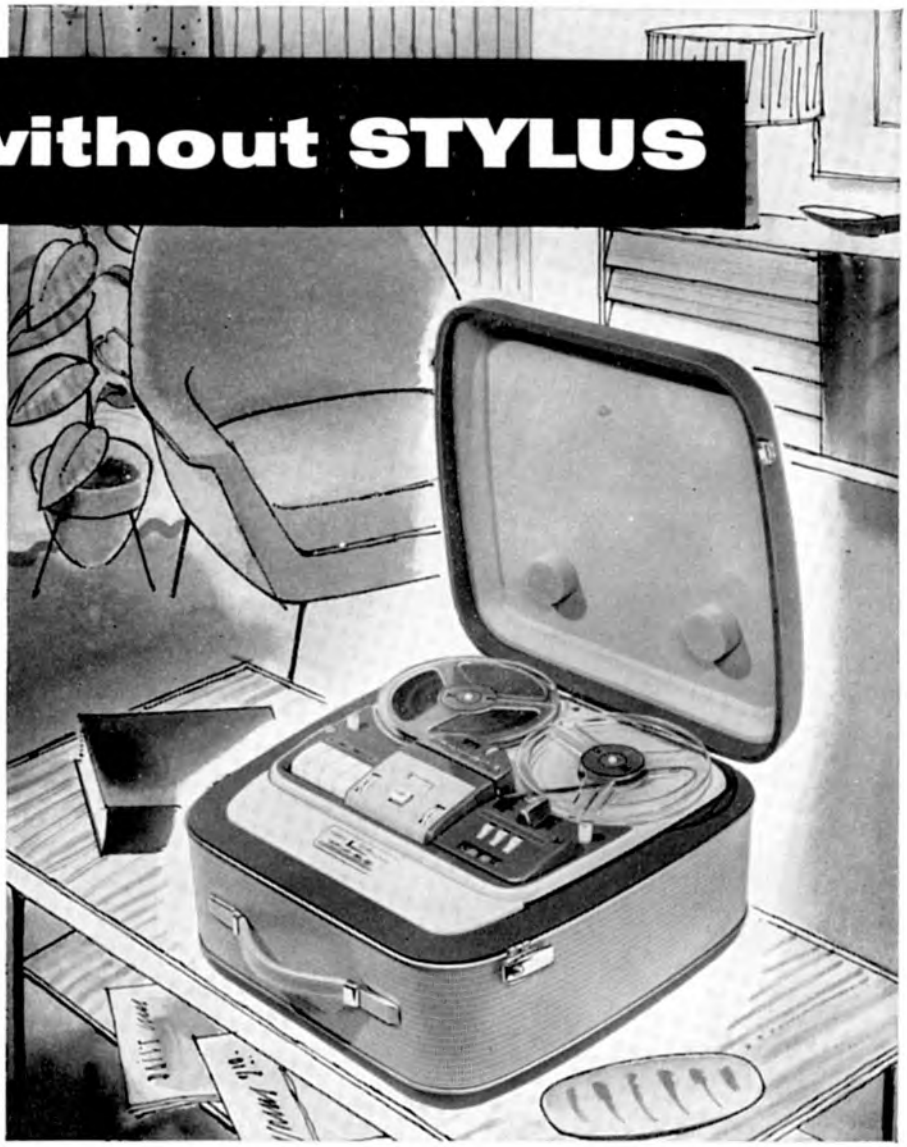

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