

the TAPE RECORDER

PRICE 1/6

SEPTEMBER 1960
Vol. 2 No. 8

INCORPORATING "SOUND AND CINE"



IN THIS NUMBER

- Stand-by-Stand Preview of Tape Recorders at the Radio Show
- The Garrard Deck
- Equipment Reviews
- Make Your Tape Easy on the Eye—A Do-it-Yourself Photo Feature
- Readers' Problems Answered
- Details of New Products
- Teaching Tape—for Beginners
- Pictures and News from the World of Tape

here



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- ★ Three digit counter.
- ★ Three motors.
- ★ Very low “Wow”—less than 15% at $7\frac{1}{2}$ i.p.s.
- ★ Pause control.

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AT THE
Radio
Show
STAND 38**

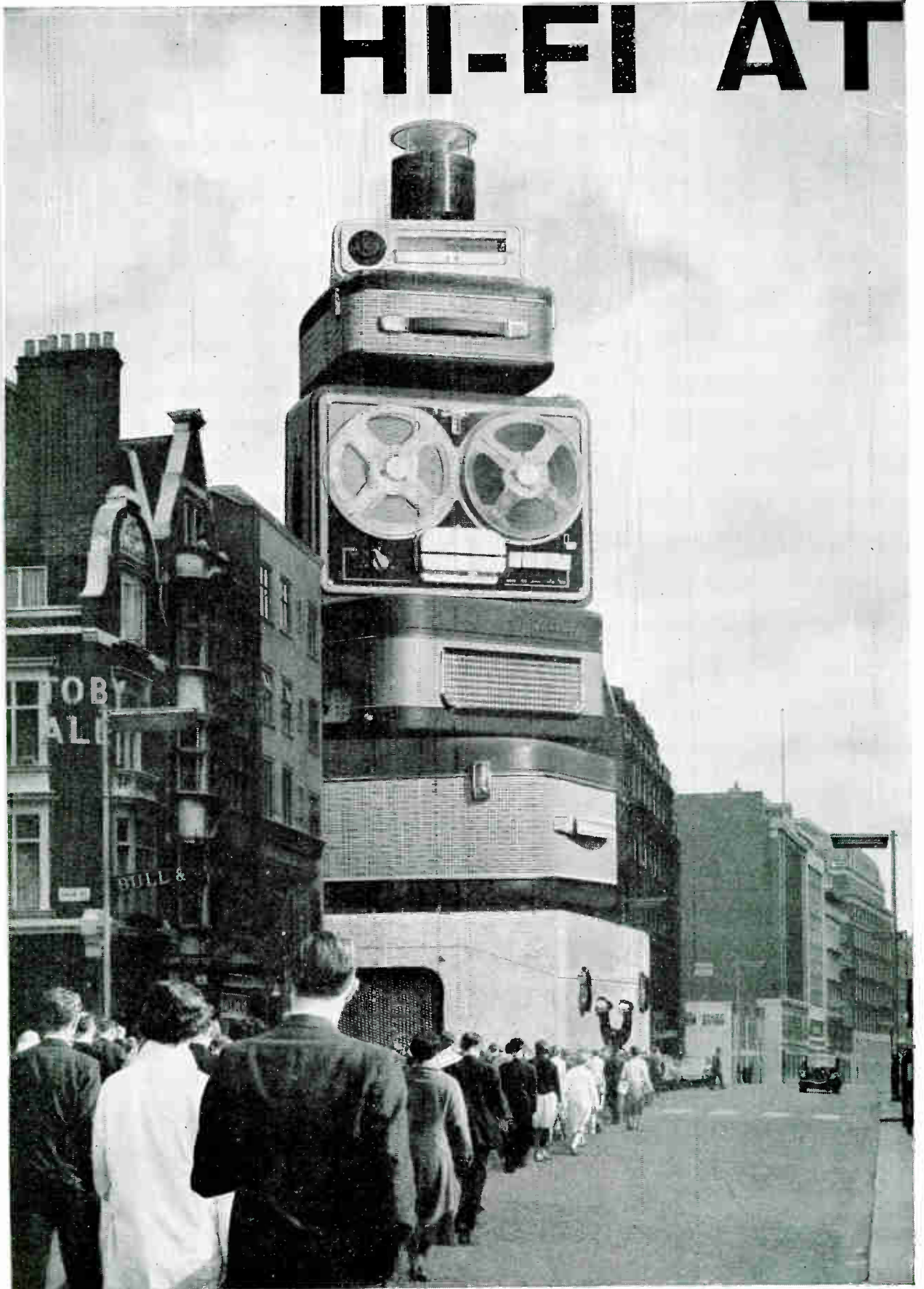
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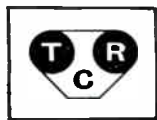
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ADDRESS _____

BLOCK LETTERS PLEASE

Fings ain't what they used t'be

Flick through the magazines these days and you could be excused for imagining that everyone is manufacturing a tape recorder. Fings ain't what they used to be. They're certainly not what they were when Grundig had to spend the greater part of its advertising just explaining what a tape recorder was!

Of course, most people know what a tape recorder is now—although they rarely call it a tape recorder. More generally it's "a Grundig" or, often as not, "my Grundig". And this

really means something in a country in which there are more tape recorder owners per head of population than in any other country in the world.

It makes you realise how strongly established the Grundig reputation must be—and how well deserved.

So although some things aren't what they used to be, one thing still is—Grundig remains the wisest choice for everyone who wants quality, reliability and genuinely rated performance in a tape recorder.

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NEVER BEFORE SUCH VALUE...SUCH FEATURES!

This Autumn, Elizabethan switch to 4-track. Fabulous 4-track. Double the playing time. Double the number of features. Double the *potential*—for Elizabethan 4-track opens up new recording vistas never practicable until today. Yet you get all this at *twin-track* prices—the sort of value that enthusiasts everywhere have come to expect from Britain's greatest tape recorder manufacturer.

Two outstanding new models incorporate Elizabethan 4-track. Specially designed micro-gap recording heads and up-to-the-minute electronic techniques set each machine at the top of its class. Both machines can (with simple add-on units) be easily converted to stereo. Both set record-breaking standards in performance and value for money—even for Elizabethan.

This Autumn, everyone's going Elizabethan 4-track. As an enthusiast in this newest of sciences, you mustn't miss out on a development like this. Get your dealer to demonstrate Elizabethan 4-track for you right away.

Note for the man with an existing tape library

Not only can you play your present twin-track tapes on an Elizabethan 4-track machine—you can actually *add two more tracks!* Thus you can literally double your own collection of recordings without buying a single foot of new tape!

4-TRACK AT ITS ECONOMICAL BEST!

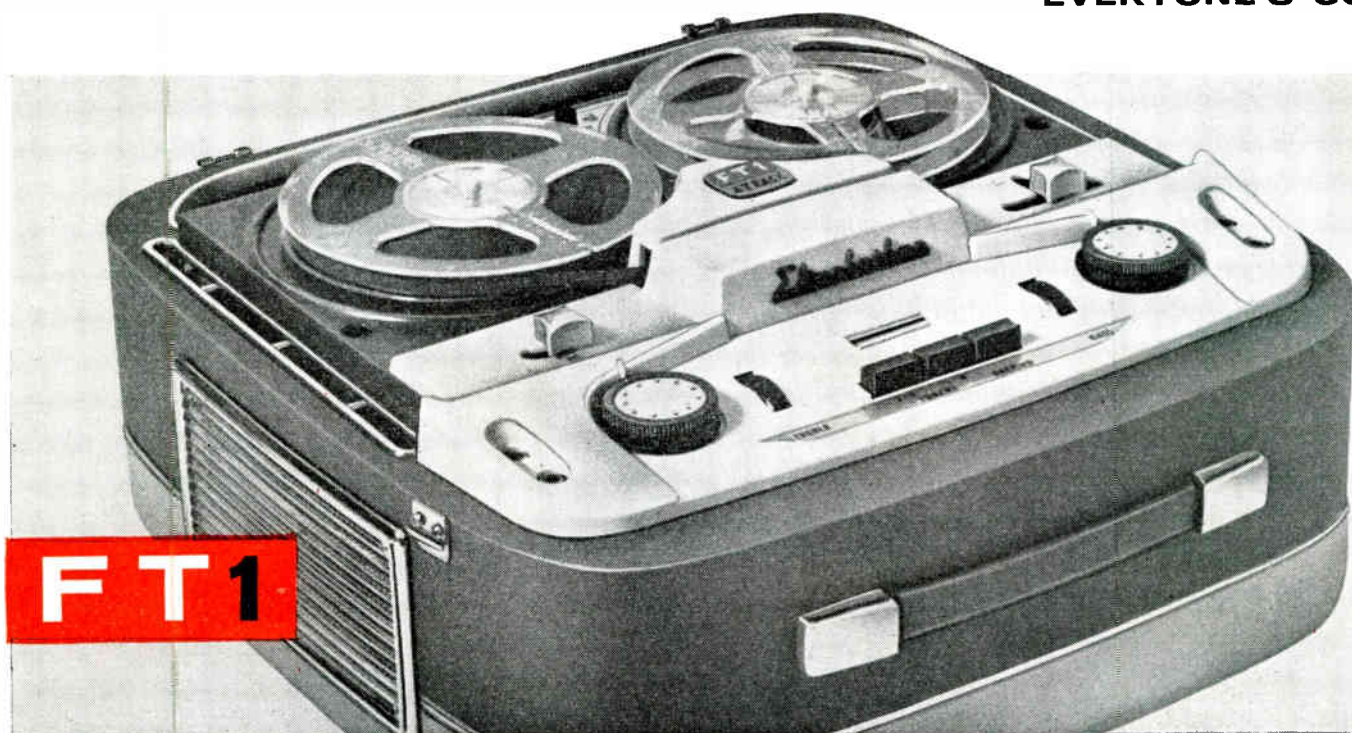
The Elizabethan FT1 offers 4-track at an irresistible price. Yet although well within the popular budget, it carries a real thoroughbred high-performance specification, packed with "extras". Over six hours can be recorded onto one tape, while frequency response is from 50 to 12,000 cps. Luxuriously housed in a contemporary camber-style cabinet with two-tone finish and brass trim, the FT1—even by Elizabethan standards—represents unbeatable value.

LOOK AT THESE TOP-FLIGHT FEATURES!

- 4-track (over six hours' recording time on 5½" Double-Play tape at 3½ ips)
- Simple press-button track selection
- Frequency response better than 50-12,000 cps at 3½ ips
- Separate controls for accurate mixing of inputs
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- Monitoring through speaker whilst recording
- Magic eye recording level indicator
- Safety interlock prevents accidental erasure
- Stereo playback facilities (with additional equipment)
- Provision for microphone and tape storage

ONLY **39** GNS
including microphone,
tape, etc.

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NEVER BEFORE SUCH A SPECIFICATION!

- 4-track (up to 17 hours' recording time at 1½ ips)
- Simple press-button track selection
- Frequency response 50-16,000 cps at 7½ ips
- Three speeds, 1½, 3½ and 7½ ips
- Independent input controls for full mixing
- Separate bass and treble controls
- Monitoring through speaker whilst recording
- Programme indicator and magic eye recording level
- Safety interlock prevents accidental erasure
- Can be used as an independent hi-fi amplifier
- Handsome two-tone portable cabinet with facilities for microphone and tape storage
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ONLY 55 GNS

complete with high-gain microphone. 1,200 of tape, etc.

MAKE TRACKS FOR STAND No. 26

Be sure to visit Elizabethan Stand No. 26 at the Radio Show. See for yourself—hear for yourself—the models that are going to steal the show and continue to lead the TR field. Take our word for it—this year it's really something special!

ELIZABETHAN (TAPE RECORDERS) LTD.,
Romford, Essex. Romford 62366/7



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To Elizabethan (Tape Recorders) Ltd,
Bridge Close, Romford, Essex
Please send me your full-colour brochure with details
of the new 4-track recorders and accessories

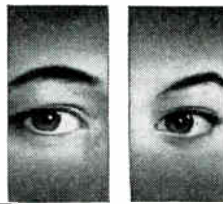
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TRRS

FT3

All eyes on the



Garrard

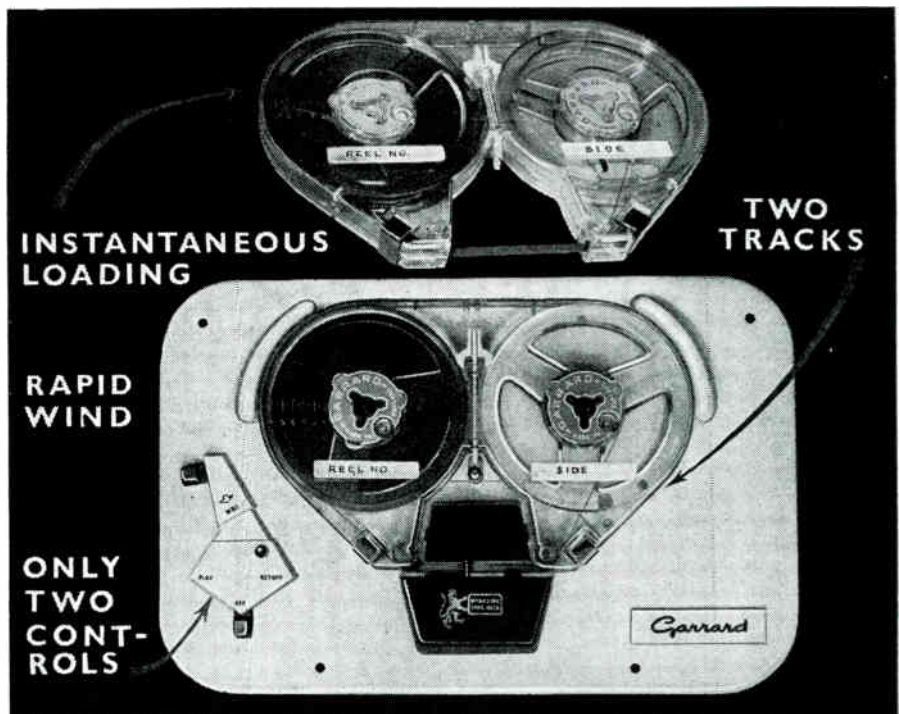
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Popular (Acetate)

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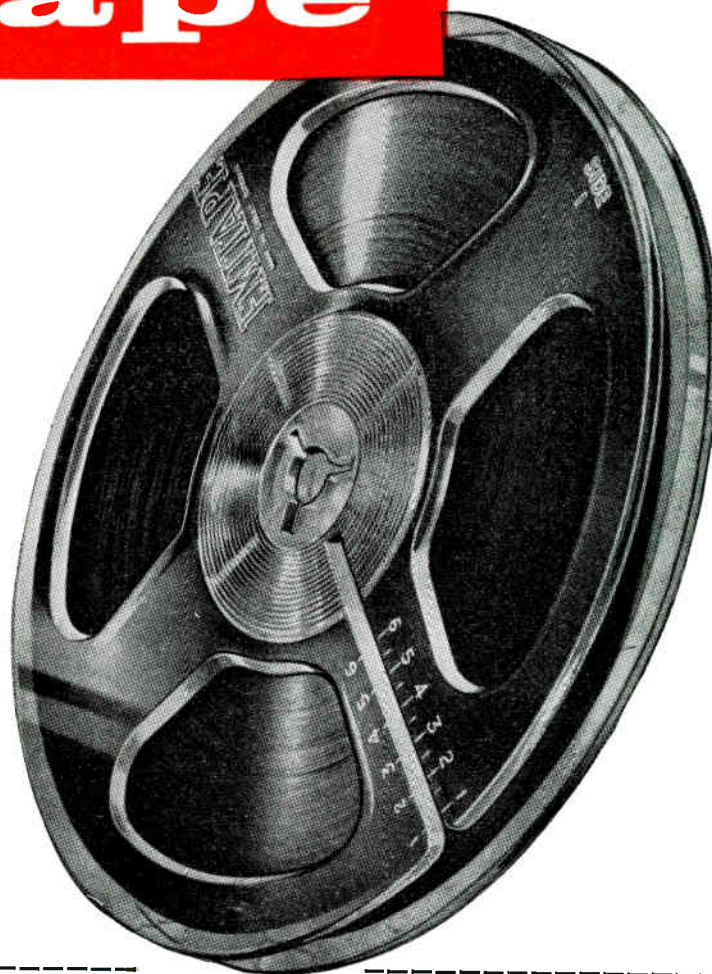
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3. Mixing facilities.
4. Provision is made for the addition of a STEREO HEAD.



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The R.40.

$1\frac{1}{8}$ ips 70—4,500 \pm 3dbs.

$3\frac{3}{4}$ ips 60—9,000 \pm 3dbs.

$7\frac{1}{2}$ ips 50—15,000 \pm 3dbs.

15 ips 40—20,000 \pm 3dbs.

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

Separate record amplifier.

Push-pull bias erase oscillator for low tape hiss.

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

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

MODELS

R20 62 GNS. with magic eye record indicator
 R30 66 GNS. with meter record level indicator
 R40 70 GNS. as R30 but with push/pull sound output

1960 NATIONAL RADIO EXHIBITION

See the Fabulous R.10 Tape Recorder on Stand 305 in the Audio Hall

The R.10 is without doubt one of the most advanced machines of its type available and is the result of eighteen months continuous development.

SPECIFICATION

2 or 4 track version.

10 watts push/pull output. (2 EL84 valves).

$7\frac{1}{2}$ ips 30—18,000 cycles \pm 3 dBS. }
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200/250 volts 50 cycles or 100/120 volts 60 cycles.

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Metal Rectifier, contact cooled.

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

Mr

the TAPE RECORDER

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MEMBER OF THE
 AUDIT BUREAU
 OF CIRCULATIONS

EDITORIAL

WHAT do we want from our Audio Shows? This is a more topical question than the average man-in-the-hi-fi-seat may realise, because recent months have seen a considerable amount of behind-the-scenes activity, on the part of the Audio Fairs' organisers and others; and various reports suggest that important changes may be on the way. These changes—if they take place—could occur without any apparent alteration to the scenery that we know, but they could well result in a complete reshuffle of stage-management, directors and producers. And because we feel that the Audience is quite an important part of the issue, we ask our opening question. There has never yet been a change of management, or a take-over bid, that has not brought about changes which affect the man who really matters, so let us see precisely what we want, and thus perhaps add a beneficial puff to the wind of change.

First, however, let us say a word of praise where it is due. In the early days of 1956, a small group of interested manufacturers got together and proposed an Audio Show. But for their initiative it is possible that we might never have seen the kind of "Audio Fair" that we have enjoyed each year since. Indeed, recalling what we have seen and heard at the Radio Show, it is more than likely that "Hi-Fi" so-called, might have been "nurtured" in a side-show of that mammoth annual display of chrome-plated goggleboxery.

Next, however, we must recall that we have never subscribed to the apparently vague policy of the organisers of the annual Audio Fairs; because on the one hand it has always seemed to us that High Fidelity has been used as a rather rich Cinderella in reverse—as a very useful gimmick, around which the ramparts of "half-fi" could prosper. And, on the other hand, it has seemed illogical that quite a number of potential exhibitors should be excluded from the show each year, for one reason or another, and be compelled to make their own arrangements in neighbouring buildings—where, but for their own publicity efforts and the friendly recommendations of others, they could languish in the shadows.

We are well aware that the title of the show is "Audio Fair" and not "Hi-Fi Show", and that under such an umbrella the management can let in, or keep out, what they please; but the undeniable fact is that the majority of its visitors come to the

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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show to see and hear what they believe to be a comprehensive and representative showing of *Sound at its Best*. With this fact in mind, the organisers of such an exhibition should first and foremost ensure that the doors are fairly and fully open to all manufacturers who are genuinely endeavouring to make and sell good quality equipment for sound reproduction. Secondly, remembering what the visitors are in search of, they should do their utmost to see that there are not too many obvious toadstools among the mushrooms.

How can these two very important aims be achieved? The first, we think, by an Audio Fair promoted by a truly comprehensive group of manufacturers—a body representing *all* interested makers of good quality equipment. The second, we think, through the intelligent and zealous watchdog attitude of the members of that body, who would consider the trust of their public, and who would themselves benefit very considerably from such consideration. A "hi-fi show" in the strictest sense would not pay off. The borderline is too wavy, and we cannot all afford a 500 guinea outlay, *ab initio*. Let there be highest fi, poor man's hi-fi, domestic tape recorders—the lot—as it is the lot, genuine in its aims, *genuinely* classified.

NEXT MONTH

THE cover this month defies description. Next month's cover, shown here in miniature may tax the imagination—till next month, when it will form part of a discussion on the use of tape. Constructor Readers can look forward to part two of A. G. Watling's *Stereo Recorder*, and also to a neat home-built mixer unit employing six transistors. In this number, also, will be a report of the tape exhibits at the Earls Court Radio Show, and a feature on 4-track tapes—plus all the usual features, including Workbench, Readers' Problems, Postbag, New Products, Equipment Reviews, etc.



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TEACHING TAPE

A SPECIAL SERIES FOR BEGINNERS

By I. W. JARMAN

PART FOUR—USING THE MICROPHONE

PREVIOUSLY in this series, we have considered the requirements of a tape recorder and the layout and use of the various controls. Having mastered these controls we can now turn to the problems encountered when making a recording. In the last article, I dealt with the control of the level of the sound to be recorded and the use of the usual indications of this level—i.e. magic eye or level meter. This article deals with the making of a recording using a microphone.

Before we can record a person speaking, an orchestra playing or any other live performance, it is necessary to convert the sounds into electrical energy. This we do by using a microphone of which there are several types, the earliest being the carbon microphone, similar to that used in the mouthpiece of a telephone. When a sound is originated, pressure waves are set up, and the variations in these waves cause a movement of the diaphragm of the microphone. In the case of the carbon type this movement causes variations in the resistance of the carbon granules, which in turn varies the current flowing in it. This microphone, which needs a battery supply, gives fair speech quality but is unsuitable for anything else due to the fact that, among other things, it tends to be noisy.

Nowadays, the microphones used are crystal, moving coil, ribbon and condenser. These, of course, give much better quality than the carbon type and the choice of type is largely governed by your requirements and by the price.

Crystal Microphone

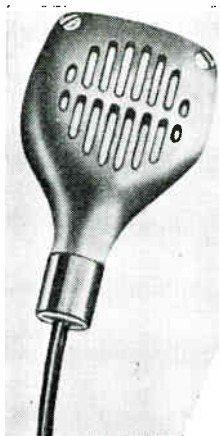
With this type of microphone, movement of the diaphragm causes bending of the crystal wafer, causing voltages to be set up across the two faces of the crystal. It is the type of microphone normally supplied with the cheaper recorders—it is inexpensive and being of a high impedance type can be plugged direct into the microphone socket of the recorder, this usually being a high impedance input. The output voltage of the crystal is, generally speaking, much greater than that of other types. A disadvantage is the limited length of the microphone cable (approximately three yards) after which the sensitivity drops off considerably.

Moving Coil Microphone (Dynamic)

This type of microphone is usually supplied with medium or high price range recorders. With it the movement of the diaphragm causes the coil attached to it to move in a magnetic field, so causing voltages to be set up. It is more robust than the crystal, but being of a low impedance requires a matching transformer. This is often built into the microphone or its stand, although on occasions you will find recorders fitted with an input



Telefunken D19B moving coil



Collaro Crystal Microphone

socket marked "Low Impedance". In such a case, the matching transformer has been incorporated in the socket itself. The leads of a moving coil microphone can be extended quite considerably before the sensitivity is affected. As with other microphones, the screen around the leads should be properly earthed to avoid picking up hum.

Ribbon Microphone

This works on the same principle as the moving coil but instead of a coil, a very thin aluminium ribbon is used. As with the moving coil, being of a low impedance, a matching transformer is necessary. Unlike the other types, which are omnidirectional (sensitive all round), the ribbon is bi-directional. In other words, it is sensitive back and front with relatively "dead" spots at the sides, the pattern being similar to a figure of eight. It is the type of microphone which is used a great deal in the recording of music. When using this type, you should avoid working too close to it (less than nine inches or so) since it tends to accentuate the bass frequencies.

Condenser Microphone

This is not as well known as the other types. As the name suggests, it is in fact a condenser whose capacitance is varied by variations of pressure on the diaphragm. It has its own supply unit providing the polarising voltage and is normally supplied with a pre-amplifier. All of which, of course, makes it a very expensive piece of equipment—in fact, its use is almost completely confined to professional concerns.

Earlier, I said that the choice of microphone is governed largely by your requirements and how much you are prepared to pay for it. However, when choosing your microphone make sure that you get one which has a flat frequency response, particularly if you intend to record "live music". If you are recording speech only, the main concern is intelligibility, and a restricted frequency range will give satisfactory results. But if you intend to record music, then the frequency range must be as wide as possible.

It is important to remember that when a sound is produced in an enclosed space, the sound waves reaching the microphone will do so by travelling different paths. Those we are really interested in, since they produce a more realistic sound, are those which travel the shortest distance, in other words, the direct sound. But also reaching the microphone will be indirect sound reflected from the walls, ceiling and floor of the room.

The problem of balancing the microphone is, to a great extent, that of adjusting the ratio of direct to indirect sound. For example, if the microphone is placed too far away from the source of the sound then the result can be a meaningless jumble due to the reflected sound more or less swamping the direct. And, of course, the reflected sounds may well be distorted, certain frequencies having been absorbed by room furnishings, etc. You will find that high frequencies are affected by soft porous materials such as curtain and soft furnishings. In studio design, these high frequencies are treated by using a material such as glass wool, protected by perforated or slotted hardboard.

One major problem that the amateur faces, when attempting to record in the average sized living room, is that of room resonances, which tend to cause certain notes to be exaggerated compared with others. These can be reduced to a certain extent by avoiding rooms with regular surfaces, plain plastered walls for example. (The heavily ornamented ceiling is a good example of a broken irregular surface.) This gives some indication of how the reflected sound, the indirect sound, reaching the microphone can be quite dissimilar to the original. It follows, therefore, that generally speaking, the microphone should be reasonably near to the sound to be recorded and as far as possible from anything which will cause reflection of it. For example, if you are sitting at a table recording from a script, avoid talking at the surface of the table.

HERE AND THERE AND

A blind journalist reports from Britain

GRAEME EDWARDS, an Australian journalist who has been blind since infancy, determined some time ago to visit Great Britain alone for an indefinite period. He arrived in London in February, and since then has been sending home tape recorded items and feature articles for broadcasting and newspaper publication in Melbourne. Graeme Edwards has been reporting for the *Melbourne Herald* for ten years. In London he has been exploring—sometimes unaccompanied—places of tourist interest, taking down impressions in Braille shorthand and on a tape recorder. Back at his hotel he edits the recorded material, and dubs it on to another tape recorder for despatch to Melbourne in the form of a complete magazine. In a recent BBC talk, listeners heard his attitude to the special difficulties and successes—the busy life of a sightless journalist.

Useful prize for Holiday Camp “storyteller”



DURING his 45 years as a coalminer, Mr. A. Johnson of Seaham became a great favourite among his fellow workers because of his apparently limitless fund of humorous stories. He recently proved his talent whilst on holiday at Butlin's Filey Bay Holiday Camp, where he won the 'Voice of the Week' contest sponsored by Grundig (Great Britain) Ltd. His prize was—a Grundig Tape Recorder.

Acos investigate “home” recording problems

A NEW Tape Recording Studio was opened recently at the Cosmocord Works at Waltham Cross. Due to increased popularity of record-it-yourself programmes, Cosmocord installed this recording studio to study recording techniques in a 'home' environment. Studio equipment includes, besides the official Acos recording installation, the kind of equipment an amateur is likely to have in his own home; and the studio is to be used to explore the kind of recording techniques available to the amateur in informal recording sessions.

Johnny Carson (see photograph) with his group, the Carsonaires, made a number of experimental recordings, using



Acos monophonic and stereophonic microphones. The result—some fine mono and stereo tapes and useful, first-hand experience for Acos development.

Two more “Irish” booklets

WE have just been browsing through two new booklets issued by the manufacturers of Irish Recording Tape. The first of these, called *'Tape it off the air'*, contains instructions on how to set about recording from the radio, and is written in every-day language which the absolute beginner can understand. The second booklet is entitled *'How to make better tape recordings'* describes the correct use of microphones and gives advice on tape storage. Recording levels, feed back, tape and splicing are all dealt with in this excellent leaflet and copies may be obtained from Wilmex Ltd., St. Stephens House, Westminster, London, S.W.1.

Grundig's sporting challenge

GRUNDIG (GREAT BRITAIN) LTD. announce that a series of programmes have been booked on *Radio Luxembourg* from September 23rd to December 16th. Called *'Grundig's Sporting Challenge'*, the programmes will be broadcast at 8 p.m. for thirteen consecutive Friday evenings! Ex-England soccer captain Billy Wright will put questions to 'Memory Man' Leslie Welch covering the whole field of sport. Listeners and members of the audience will be able to ask questions either by post or in person, and any who succeed in stumping the Memory Man will receive £5 in Premium Bonds.

If you live in any of the places listed below and would like to attend a show, tickets can be obtained from **Radio Luxembourg, 38 Hertford Street, London, W.1.** Shows will be held at: Wolverhampton, Derby, Sheffield, Liverpool, Manchester and Newcastle. An added attraction will be the mobile exhibition of the full range of Grundig tape recorders which is being staged in each hall.

EVERYWHERE

Stuzzi announce big price reductions

THE 'Outer Seven' trade agreement which became effective on July 1st substantially reduced the tariff duty on Stuzzi Tape Recorders. These are manufactured in Austria, and new prices for both the Magnette and Tricorder are announced. As from August 1st the Tricorder will retail at 63 gns. and the Magnette at 59 gns. Both include microphone and tape.

Blind Mayor Backs News on Tape

THE Mayor of Uxbridge, Alderman Tom Parker, who has been blind since he was a boy, was heard being interviewed by Walter Gillings, producer-editor of *What Goes On Here*, Ilford's talking newspaper for the blind, when the eleventh edition was presented to the local Blind Club at the Thompson Rooms.

A Tape recording enthusiast himself, he told how this helped him in his public work and said he thought more could be done to provide a news service for the blind on tape, as was being done in Denmark. The interview with Alderman Parker will be included in the first edition of *Blind Bulletin*, which will be produced by Walter Gillings Sound Features and made available to blind groups throughout the country. Note the address, Walter Gillings, 115 Wanstead Park Road, Ilford, Essex.

New Organisation of Tape Correspondents

DETAILS have been announced of a new Tape Recording venture, to be known as the **English Speaking Tape Respondents' Association**, which has been founded by Tape enthusiasts for Tape enthusiasts. "E.S.T.R.A." is a completely non-profitmaking concern and none of the officers receive any



A recording enthusiast talks to the pilot of the City of Winchester before embarking for a holiday at Le Touquet. (Grundig Photo)



The well-known local Eistedfodd's Harpist Elfyn Jones plays his harp on a hillside to Gordon Millar Thomson, sound recorder of Bill Hartley Productions Ltd.

payment for their services. The subscription is to clear outlays on postage, stationery, membership cards and directories.

The aim is to give members a well printed directory in September of each year with supplements in December and April. The Directory and Supplements will list members' names and addresses, their occupation, details of recording equipment and their interests and hobbies. Apart from the annual subscription all that is demanded is that members will reply to all letters and tapes received. If there must be a delay, tapespondents should be informed by letter. Any person interested in joining this Association should contact the *Secretary*, Robert Ellis, Schoolhouse, Whitsome, by Duns, Berwickshire.

THOUGH we make no claims to be an agency, we are frequently asked for help, in this office, and try to lend a hand where practicable. An unusual request was received in the other day from a Mr. Nunn, of Dunmow, Essex, asking if we could put him in touch with any fellow classical music enthusiasts, who "have wearied of inadequate car radio" during frequent and long car journeys, and are using their tape recorders to play tape records, using a converter. Any other readers with experience of this, please write in to this office, marking unprintable experiences "Not for Publication!"

Shure tape heads now available in U.K.

TAPE Heads made by Shure Brothers Incorporated, Evanston, Illinois, U.S.A. are now available to manufacturers in the U.K. The range includes the new 4-track Stereo Tape Head Model TR54A (as illustrated) and Stereo Erase Head Model TE28A.

Full details and specifications can be obtained from the sole U.K. representative of Shure Brothers—**Mr. J. W. Maunder**—at 95 Hayes Lane, Beckenham, Kent. (Tel.: BEC 7413).

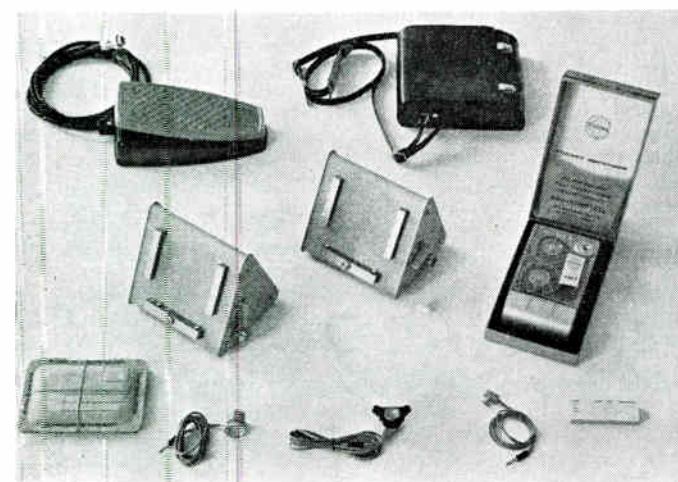
NEWS FROM THE WORLD OF TAPE



The built-in microphone permits the operator to continue working yet leaves both hands free.



The Fi-Cord "at work" in the office. The foot control and stethophone headset assist the secretary to transcribe letters simply and efficiently.



The complete range of accessories comprising foot control; carrying case; amplifier; transcriber; microphone; headset; telephone attachment and spool packing case.

AS reported in last month's edition, *Fi-Cord* have announced a fully transistorised dictating machine. Battery powered and measuring $6\frac{1}{2} \times 3\frac{1}{2} \times 1\frac{1}{2}$ in. it weighs only 27 ounces. It can be carried in the pocket, brief case or shoulder bag, and on the desk it occupies less space than a phone.

With its built-in microphone and quiet built-in play-back, the machine can be used at any time. An accurate counter numbered from 00 to 99 makes it possible to select any particular section of the recording immediately. A battery warning light fades when the batteries near extinction. Volume control is automatic. A single button gives fast forward and backward rewind and recording time is 30 minutes, 15 minutes on each side of the spool. An important feature is the standard $1\frac{1}{2}$ i/s speed which allows tapes to be played back on any normal tape recorder fitted with this speed.

A small lapel microphone allows the operator to continue working with both hands whilst recording and for office use a transcriber is available which automatically provides the power for the recorder, no plugging in is necessary as studs make automatic contact. For the typist there is an electronic foot pedal which controls the stop-start mechanism and the light-weight stethophone earphones have a built in volume control. To cater for multiple listening, a transcriber with amplifier and loudspeaker incorporated can be used as a stand. The *Fi-Cord* 101 uses two small standard mercury or dry batteries giving up to 20 hours operating time.

Manufactured by **Fi-Cord Ltd., 14a Dover Street, London W.1.**

BIRMINGHAM Electronic Products Ltd., have just announced a further price reduction on their Norfield Tape Recorder. The new retail price is £50 8s. plus £2 2s. extra for the legs. This recorder gets away from the usual four-square external appearance, and has a curved lid, base, and front. Although fitted with a strong carrying handle, and eminently portable, the Norfield's detachable legs can turn it into a free-standing machine in a matter of seconds. For further information write to **Birmingham Electronic Products Ltd., 1 Lodge Road, Birmingham 18.**

TWO WONDERFUL TAPE RECORDS

Operatic Recital by Victoria de los Angeles (sop.) with the Orchestra of the Opera House, Rome, conducted by Giuseppe Morelli. H.M.V. HTA 19. $7\frac{1}{2}$ i/s. 84s. (Mono).

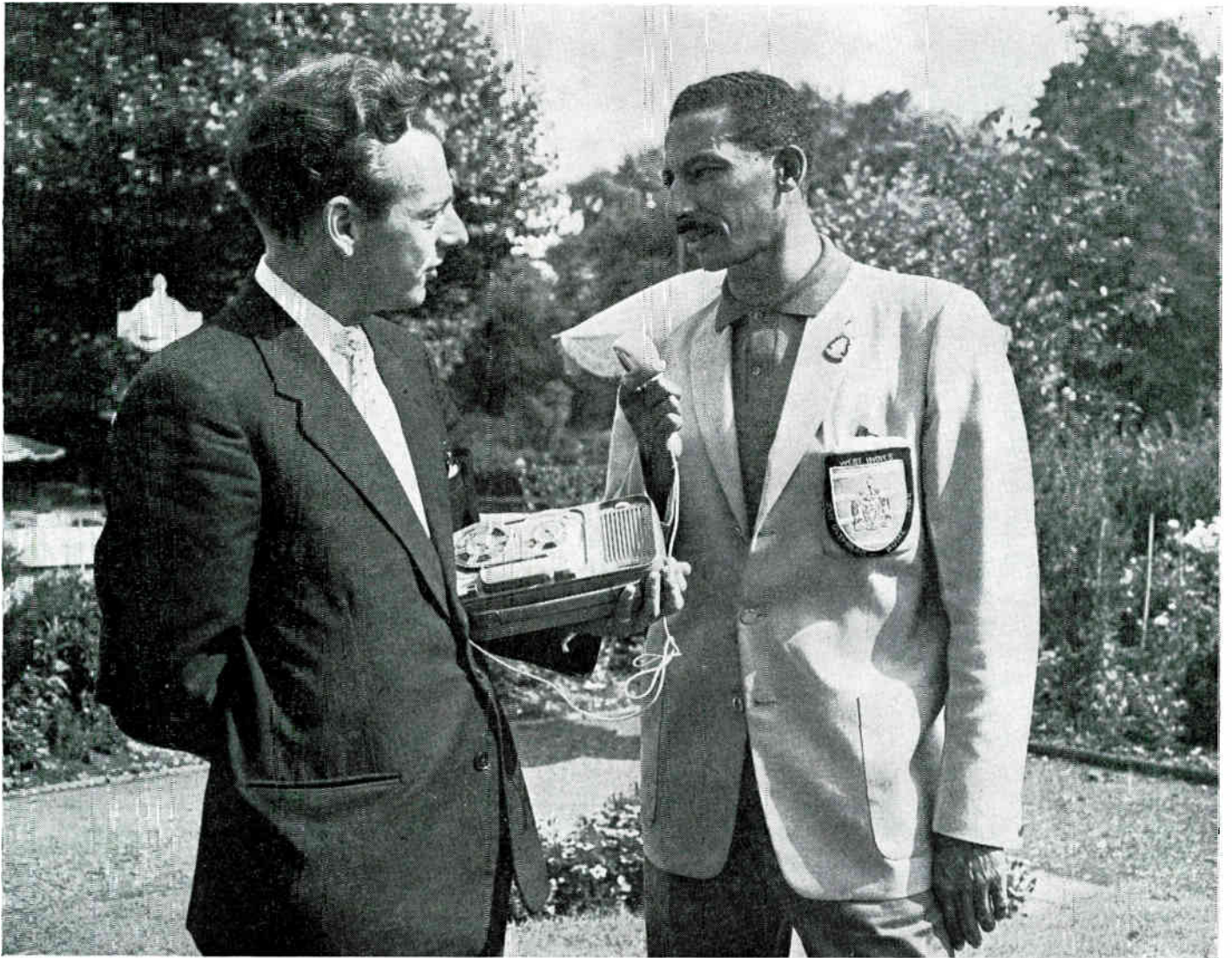
Complete operas are reasonably well served, recitals less so in the tape catalogues at present; speculation as to the reason for this might well be a thorny affair on the evidence of de los Angeles here. The selection (Verdi-Puccini-Boito-Rossini-Mascagni-Catalani, and on ALP 1284) is a happy one on the whole, with the possible exception of the prison aria from *Mefistofele*. But the voice, surely one of the most hauntingly beautiful the world has even known, almost deprives one of words. The Willow Song and Prayer from *Otello*, for instance, which is a tear-jerker at the best of times, takes on an even more catastrophic significance. Wonderful singing, backed by a good if somewhat distant recording, by more modern standards.

★**Sibelius. Pelléas and Mélisande**, Incidental Music, Op. 46. *At the Castle Gate; Mélisande; The Three Blind Sisters; Pastorale; Mélisande at the Spinning Wheel; Entr'acte; the Death of Mélisande.* The Royal Philharmonic Orchestra, conducted by Sir Thomas Beecham, Bart. H.M.V. SBT 1255. 47s. 6d. 27½ mins.

Analysing the Beecham magic has long been something of a national or international pastime; not being much use with a hockey stick, I remain quite happy on the touch-line. Without recourse to adulation, this performance is as near to sheer inspiration in its root meaning that mortals can hope to achieve. The phrasing alone is enough to make one adjust all previous standards of musicianship.

The recording is good, if on the mellow side; not a bad thing in this case.

Thomas Bedwell



The West Indies Olympic Team flew into London recently en route to Rome. Our representative visited them at their headquarters, the Windsor and Dominion Hotel, Lancaster Gate, and recorded interviews on the Clarion Tape Recorder. The photograph shows Herb McKinley, Manager and Coach of the present record-holding Relay Team, taping his expectations of the Team's chances in the 1960 Olympics.

At a meeting of the **Ilford and District Tape Recording Society** members J. Hunter and D. Bolton played a series of unusual recordings including some made over thirty years ago. Chairman P. Ager coupled two of his hobbies together, namely photography and tape recording, and with the aid of his projector gave an interesting demonstration of how a recorded commentary, with music, can give life to slide viewing.

Club nights are held every fortnight (16th and 30th August) at the Royal Air Force Association, Cranbrook Road, Ilford.

Secretary. J. Langley, 4 Clifton Road, Ilford, Essex.

Fourteen members of the **Bournemouth & Poole Tape Recording Club** visited their nearest colleagues, the Weymouth Tape Recording Club recently. Several prize-winning tapes were demonstrated by both clubs. It was decided to keep in closer contact through the medium of tape and so maintain joint interest. Weymouth hope to visit the Bournemouth club in the near future.

Secretary. H. R. Jones, 442 Poole Road, Branksome, Dorset.

Mr. Angus McKenzie gave an excellent demonstration to the **West Middlesex Tape Recording Club** at their clubroom, the Red Lion Hotel, Hampton. The material used was mostly stereo with Mr. McKenzie supplying lively comments. Micro-

phones were also shown including the S.T.C. 4021 and the Telefunken Condenser Microphone, and members were impressed by the quality of recordings obtained. Finally the lecturer gave a brief talk on his "portable" mixer. This includes five Stereo channels, peak programme meters, V.U. meters, valve consumption meters and 90 valves.

Secretary. H. E. Saunders, 20 Nightingale Road, Hampton, Middlesex.

Mr. B. Wilson of B.A.S.F. visited the **Leicester Tape Recording and Hi-Fi Club** and gave a lecture on how tape was manufactured. One of the recordings demonstrated was a dubbing of a recording made on the first plastic based tape in 1935. The evening's events were concluded with the showing of the prize winning documentary "The Magic Tape", and a discussion on tape storage and print-through. A future get-together will be the Club "on show" to the public on the 8th, 9th and 10th September at the Stocking Farm Community Centre, Leicester.

Secretary. P. Starrie, 56 Minehead Street, Leicester.

The **Grantham and District Tape Recording Club** welcomed the visit of Mr. Saunders of the E.M.I. organisation who gave an interesting lecture on the uses of tape. Two members who attended the Federation of Tape Recording Clubs first Congress

PHOTO NEWS



These gay covers, just brought on to the market by BI Tapes Ltd., show their range of popular music on pre-recorded tapes. Selections include Jazz, Latin American music, etc.

in London last month reported on the meeting. Great interest was shown and members pledged their support to the Federation for the work they are doing for non-affiliated Clubs.

Secretary. R. S. Pearson, 45 Swinegate, Grantham.

A demonstration entitled "Tape, Hi-Fi & How" was presented by Mr. F. R. Selbourne of the Welmecc Corporation, manufacturers of the Telefunken tape recorders, at a recent meeting of the Coventry Tape Recording Club. The equipment on show included three tape recorders, a Quad amplifier and a 15 in. Tannoy column speaker. It was explained that Hi-Fi meant different things to different people and that there was no standard answer to the question "What is Hi-Fi?"

Mr. Selbourne proceeded to demonstrate the Telefunken's musical reproduction at the speed of $1\frac{1}{2}$ i/s, and how it was possible to record on one track and at the same time replay on another with the four track machine, enabling the operator to achieve a variety of effects. Finally several microphones were used to show members how to select the most suitable for speech and music.

At a later meeting Mr. J. F. Parrington of Walter Instruments Ltd. presented a demonstration of the new mains/battery portable, and the "404" tape recorder. A great feature of Mr. Parrington's lectures is the way in which he will dismantle any of his equipment to let the audience see the essential parts, which must inspire confidence in his firm's products.

Secretary. R. Reynolds, 1 Thurlstone Road, Radford, Coventry.

Mr. F. C. Gazeley of 12 Bromley Road, Beckenham, Kent, the organiser of the Blind Service of the Voicespondence Club,

and Mr. C. Standon are anxious to form a British Tape Service for the Blind. The aim will be to provide any blind person in the British Isles with reading material on tape which they are unable to obtain from other sources. Any person interested in this work should contact Mr. Gazeley at the above address.

A team of members of the Rugby Amateur Tape Recording Society under the leadership of Mr. Dawson has spent over 130 hours providing the effects for the Girl Guides Pageant "Jubilee Airlift". It was estimated that over 800 people attended. The membership target for the year ending June 1961 is 75. Already 29 members have enrolled and with the 2nd Star Course on Tape Recording in the Autumn the club has great hopes of reaching the target early in the new year.

Secretary. M. Brown, 219 Clifton Road, Rugby.

The West Middlesex Tape Recording Club are scouting around again for an alternative "Headquarters" for their meetings. Their new "home" will be announced as soon as possible.

The Secretary has brought to our attention the Southall Sound Club. This club is run as a service to the aged and infirm for whom they play and tape messages to and from distant relatives and friends.

The Annual General Meeting of the West Wales Tape Recording Club was held recently, and the principal office holders were re-elected for a further term. The main item discussed was the continuation of the Hospital Tape Service, and it was agreed that further tape should



18 year old Rosanne Jennings, who corresponds by tape with her boy friend in Germany every week, is seen using her Elizabethan tape recorder in her dressing room at the London Palladium.

RAPID RECORDING SERVICE

78s & LPs from your own tapes

Master discs and pressings

Recording Studio equipped with Bechstein Grand Mobile Recording Van — "Off the Air" Service

Practising studios with or without accompanist
21 Bishops Close Church Lane, E.17 COP 3889

AND NEWS FROM THE CLUBS

be purchased right away. These programmes are of local flavour and mostly in the Welsh language. Since there is a turnover of patients, they find that tapes can be kept and replayed after a short period. The Club now possesses a collection of ten hours of programme material. The meeting times are the first and third Thursday of every month at The Club Room, New Street, Aberystwyth. We gather that the West Wales Tape Recording Club is the first to have been formed in that country and was constituted on the 1st of January, 1959.

* * *

The **Rugby Amateur Tape Recording Society's** ambitious recording called "Our Town—Rugby," which has previously been mentioned in these columns, was finally assembled on Thursday, March 24th. It is ten minutes in duration and was requested for putting on the Australian Radio Network.

* * *

INFORMATION has just been announced giving details of the second tape recording course organised by the **Rugby Amateur Tape Recording Society**. Dates have been arranged for six consecutive Thursdays from October 6th to November 10th. Meetings will be held at the Red Lion, Sheep Street, Rugby. The names of the tutors and demonstrators taking part will be announced in next month's *Tape Recorder*.

A small enrolment fee will be charged to non-members taking the course but they will receive a rebate should they decide to join the Club for the year.

Further details from **M. Brown, 219 Clifton Road, Rugby.**

* * *

A SPLICER that will splice recording tape and 8 mm. Ciné film has just been produced by **Metrosound Ltd.**, manufacturers of recording accessories. Moulded in high tensile nylon, and fitted with a non-magnetic stainless steel blade in a transparent cutter arm, the *Metro-Splicer* will certainly enable record-

How the other half files



Are your tapes like this? For an attractive way to make them easier to use and easier on the eye, see page 394.



Winner of the *Soho Fair Beauty* competition, 19 year old Joanna Dene, a student from Golders Green. She was presented with a Windsor Victor tape recorder as representative of numerous prizes, including one year's subscription to "Hi-Fi" News, on Friday July 15th at the final night ball at the *Cafe Royal* by "Talk of the Town" star Irene Hilda.

ing enthusiasts to perfect the art of editing. Channels are provided to ensure correct positioning whilst the tape is held firmly by two spring loaded arms, fitted with rubber pegs. The cutting blade can be rotated to give a cut at any angle between 45 and 90 degrees. Splicing tape is then applied, and the excess is removed in the usual way after removing the joint from the splicer. Film is spliced, by removing the tape channels and fitting a sprocketed guide, the emulsion is then removed with a scraper which is provided, together with a spare cutting blade.

To cater for recording engineers editing tape by measurement, the channels are calibrated in inches and millimetres. The *Metro-splicer* drilled to allow easy fixing to a tape deck is priced at 15s. and manufactured by **Metro-Sound Mfg. Co. Ltd., 19a Buckingham Road, London, N.1.**

Southport Audio Fair Cancelled

THE Autumn Audio Fair, as planned by Audio Fairs Limited, and as announced in a previous number of this magazine, has now been cancelled. This is officially confirmed in a statement issued by Audio Fairs Limited, and dated 10th August, 1960. It is probable that this decision is the result of negotiations which have been taking place recently, and which may materialise in the form of new plans for future exhibitions. This is an important issue, and we refer our readers to our Editorial Column on page 379.



The man who knows what's inside says—
You get more out of
TELEFUNKEN



TELEFUNKEN Magnetophon 75K-15

TWO TAPE SPEEDS $3\frac{1}{2}$ ips and $1\frac{1}{2}$ ips
 FREQUENCY RANGE 60-16,000 cps at $3\frac{1}{2}$ ips and 60-9,000 cps at $1\frac{1}{2}$ ips.
 PLAYING TIME 6 hours 20 minutes ($5\frac{1}{2}$ " DP tape at slow speed).
 Press button controls. Extra-sensitive braking and tape tension control system.
 Recording head with ultra-fine gap. Indirect flywheel drive. Fast rewind, quick stop button. Digital counter. Automatic tape-end stop. Connections for earphones, remote stop/start control and extension speaker.
 In attractive lightweight Styron Case.

PRICE: **52 gns**
 (excluding microphone)

TELEFUNKEN Magnetophon 85KL

Six watts push/pull power stage, two matched oval speakers with cut-out switch, volume control, and separate bass and treble tone controls. Monitoring through loudspeakers or earphones while recording. Straight through amplifier facilities. Magic eye level control. External speaker connection. Continuously variable trick control can be fitted. In luxury case.



PRICE: **79 gns**
 (excluding microphone)

TELEFUNKEN Magnetophon 76K

Four track selection gives playing time of 12 hours 40 minutes from one $5\frac{1}{2}$ " DP Tape. Two speeds and frequency response of 30-16,000 cps at $3\frac{1}{2}$ ips and 30-9,000 cps at $1\frac{1}{2}$ ips. Transistorised pre-amplifier stage. DC heating of valves, simultaneous play back on two tracks.

PRICE: **64 gns**
 (excluding microphone)

TELEFUNKEN Magnetophon 77 FULL STEREO

Four Track Stereo Recorder $5\frac{1}{2}$ " spools. Tape speeds $3\frac{1}{2}$ and $1\frac{1}{2}$ ips with frequency response 40-16,000 cps and 40-9,000 cps. Extra speaker in lid for full stereo playback.

A full selection of Telefunken Accessories, Microphones and tapes are available. Ask for free brochure.

TELEFUNKEN
The originators of Tape Recording

SEND COUPON for details of the complete range to

WELMEC CORPORATION LIMITED
 147/148 Strand, London WC2

NAME.....

ADDRESS.....

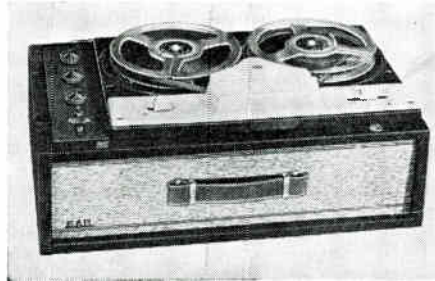
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EARLS COURT—1960

A STAND-BY-STAND PREVIEW OF THE MAIN TAPE EXHIBITS



Murphy TR1



E.A.R. Bantam



Regentone RG20

• Domestic tape recorders are now being manufactured by practically every one of the major Radio and Television firms. It follows that each year's National Radio and Television Show sees an increase in space allocated to magnetic recording. The Exhibition runs from August 23rd to September 3rd, and the brief details given below will help readers who cannot visit, an idea of what is on show. A report will follow next month. In the notes below all Stands bearing a number in the 300 range are situated in the Audio Hall on the first floor. All other Stands are situated on the ground floor with the exception of those in the 400 range, which are situated elsewhere on the first floor.

Alba (Radio & TV) Ltd., Stand No. 16 and 306. Side-by-side with the range of TV and radio sets will be shown the Duchess model R59 tape recorder.

Associated Television Ltd. Stand No. 74. This stand will be high on the visiting list of all those who want to see how the professionals put their programmes together.

Brenell Engineering Co. Ltd. Stand No. 311. Tape recorders in stereo and monaural versions will be shown, as well as tape decks and amplifiers which may be fitted into any existing high fidelity installation.

British Broadcasting Corporation. Stand No. 408, 409, 410. The Engineering and Programme Information Services will be ready as usual to deal with the myriad questions from listeners and viewers. Also the gramophone and other programme equipment will be on show and "on the air" at various times throughout the Exhibition.

British Radio Corporation Ltd. (Marconiphone). Stand No. 47. Just in time for the Show, Marconiphone have introduced two inexpensive tape recorders. They both use the Collaro Studio deck; the MTR/1 costs 42 guineas, and the MTR/2 39 guineas.

Collaro Ltd. Stand No. 38. A new record changer is promised, known as the C60, and—perhaps of more direct interest to readers of *The Tape Recorder*—there is also to be a demonstration of their well-known tape decks.

Cosmocord Ltd. Stand No. 210. Main features of the demonstrations will be the Acos Hi-Light ultra lightweight pickup and the Acos range of microphones.

Cossor Radio & T.V. Ltd. Stand No. 57. The new tape recorders will be given pride of place by this firm, whose test equipment and oscilloscopes have been featured in *Hi-Fi News* Equipment reviews.

Daystrom Ltd. Stand No. 112. A number of Heathkit home construction units are to be given their first showing. These

include a four-waveband transistor portable, stereo and mono tape recorder/replay amplifiers, an RF signal generator, and a Grid Dip meter. Visitors will have an opportunity also to examine the many amplifier, tuner, and loudspeaker kits already established.

Dynatron Radio Ltd. Stand No. 52 and 313. A new tape recorder is announced, to be known as the Cordova, price 39 guineas.

Electric Audio Reproducers Ltd. Stand No. 319. The Bantam portable tape recorder will be featured along with other popular units.

Elizabethan (Tape Recorders) Ltd. Stand No. 26. Many visitors will wish to inspect at first hand the recently introduced Elizabethan Major recorder, which incorporates many professional features, and we have been given advance information of two new four-track recorders, priced at only 39 and 55 guineas, respectively.

Ferguson Radio Corporation Ltd. Stand No. 39 and 324. An inexpensive tape recorder will be shown in addition to the current radio and TV sets.

Fidelity Radio Ltd. Stand No. 48. The Argyll tape recorder, which uses the B.S.R. Monardeck makes its first Radio Show appearance.

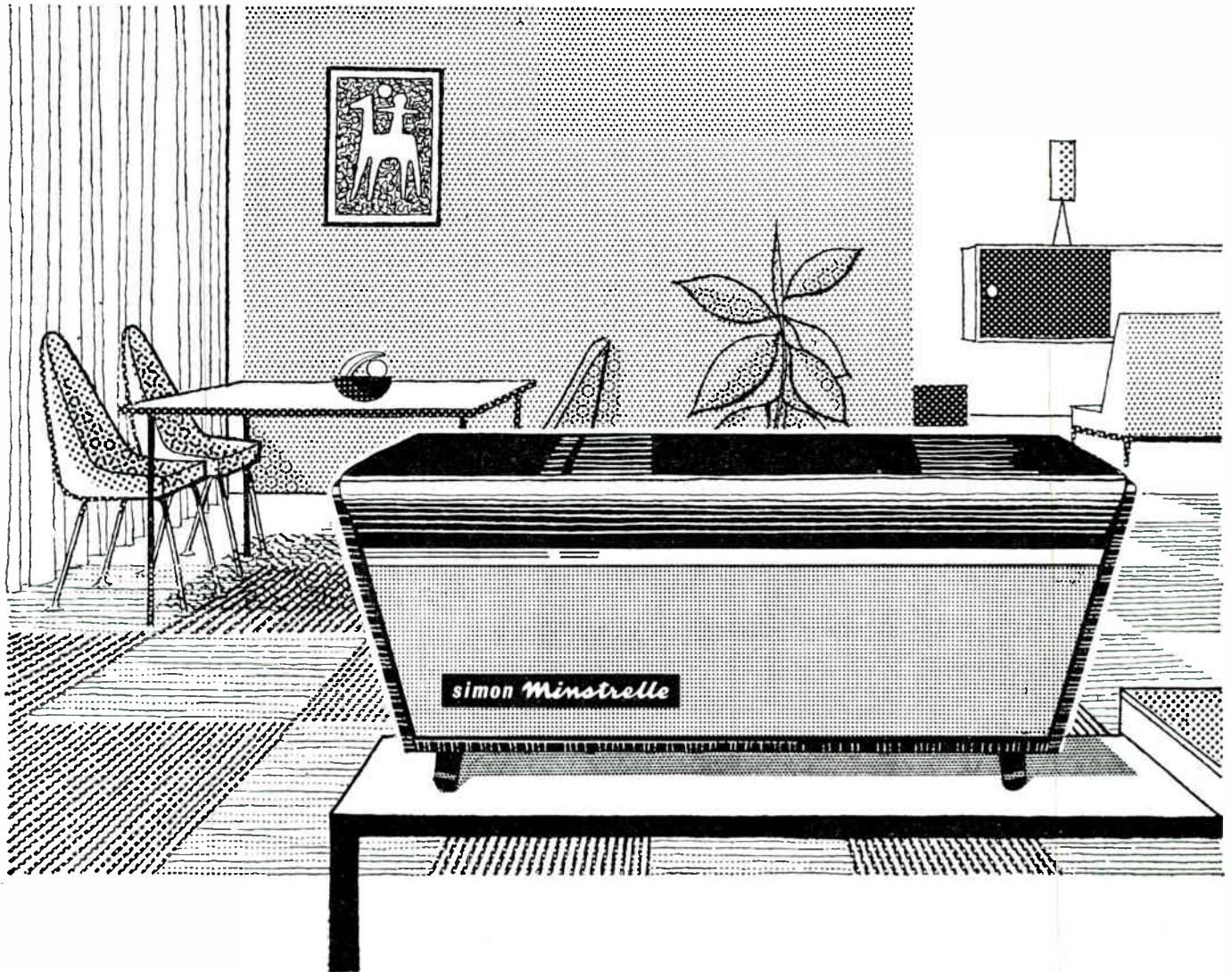
Gainsborough Tape Recorders. Stand No. 301. The well-known Mark I recorder will be joined by two new machines, the Mark II, costing 49 guineas, and using the Collaro Studio deck, and the Mark IV, details of which will not be available until the show.

Garrard Engineering & Mfg. Co. Ltd. Stand No. 56. High Fidelity pickups and the 301 and 4HF transcription motors will take pride of place. The magazine loading tape deck will also be demonstrated, and visitors will be able to discover for themselves the ease with which these tape cassettes can be handled.

Lee Products (G.B.) Ltd. Stand No. 55. Tape recorders—including the Elpico range—and a wide selection of accessories will be seen, together with the Dulci amplifiers and tuners. The various grades of Audiotape, imported from America, will interest all tape users.

(Continued on page 391)

For the most reliable show report do not miss the October "TAPE RECORDER"



The perfect complement to your home



A high performance tape recorder with nothing stinted—that's the Simon Minstrelle. At last here's a tape recorder that is designed without compromise both as a piece of furniture to grace your home, and a fine instrument to do justice to your music.

So easy to use New features like the drop-on magazine loading (no tape threading or fuss) make its operation simple enough for the youngest member of the family. Recording is simple too, no trailing wires, no 'microphone shyness'—the microphone is built-in.

So attractive too In a handsome cabinet of polished sapele mahogany, the Minstrelle is a piece of fine furniture, and its superb tone matches this elegant appearance.

the simon **MINSTRELLE** tape recorder

- * Magazine Loading * Built-in speech microphone * Straight-through amplification
- * Full tone Control * Triode push-pull Amplifier * Superimposition * Mixing

Table cabinet or Portable optional

39 gns

inc. built-in microphone

At your local dealer or write to **SIMON EQUIPMENT LTD.** 46/50 George Street Portman Square London W1 WELbeck 2371

Tape at Earls Court



Trix Comet.



P.a.R. Allegro.



Cossor CR1601.

Lustraphone Ltd. Stand No. 309. Microphones for both domestic and professional use will be on show, as well as a number of mixers and microphone stands. The latest microphone, not previously exhibited, is a simplified version of the VR/65 "Stereomic" stereo ribbon. This is the VR/65 NS, and measures only 1¼ in. in diameter.

Merryfield Ltd. Stand No. 314. The Gramdeck tape attachment, which allows tapes to be replayed and recorded on any record turntable, will be the main exhibit, together with the transistor-pre-amplifier. Ready to assemble furniture is also to be featured.

Multicore Solders Ltd. Stand No. 71. The new Reflectograph tape deck is certain to draw many enquiries, and will be shown built-in to the model A and model B recorders, the former being a two track machine and the latter a four track instrument capable of playing back any quarter track or half track pre-recorded stereo tapes. A new Multicore accessory to make its first appearance will be the Bib Tape Recording Kit. This incorporates the Bib splicer and a number of other useful items.

Murphy Radio Ltd. Stand No. 23. An inexpensive tape recorder will be shown in addition to the current radio and TV sets.

Perth Radios Ltd. Stand No. 205. The Perth-Saja and Clarissa tape recorders will be demonstrated along with other domestic radio equipment.

Peto Scott Elec. Insts. Ltd. Stand No. 27. A brand new tape recorder.

Philips Elect. Ltd. Stand No. 10 and 320. 4-track tape recorders are added to the existing range of tape equipment, microphones and recording tape.

Regentone Radio & TV Ltd. Stand No. 59. The popular RG20 and RT51 portable tape recorders will be on show.

Reps (Tape Recorders) Ltd. Stand No. 305. Although using standard decks, each of the Reps range of portable tape recorders is virtually hand-made and visitors will be encouraged to inspect "the works" in a special display.

Standard Telephones & Cables Ltd. Stand No. 14. Professional microphones and public address equipment are to be the main exhibits, and will interest all more serious minded recording enthusiasts.

Stella Radio & TV Co. Ltd. Stand No. 6. Two new 4-track tape recorders have just been announced to join the present range of "Stellaphones". These are to be known as the ST455 and the ST454, and will sell at 59 guineas and 37 guineas, respectively.

Tape Recorders (Electronics) Ltd. Stand No. 3. The Sound "Studio" and Sound "Prince" portable recorders are now to be made available in 4-track de-luxe versions, and these will be shown alongside the standard models. A high fidelity tape recording system, to be known as the "Soundmaster", will

also be shown, incorporating separate record and playback amplifiers. The Sound "Officemaster"—just announced—is an entirely new, compact dictating machine with remote control operation of each facility. We are told that prominent personalities will make their appearance and present competition prizes as at previous shows.

Trix Electrical Co. Ltd. Stand No. 37. Tape recorders to be shown include the Everest, Companion, and Comet, and there will be a number of items of professional public address equipment including valve and transistor amplifiers and column loudspeakers.

Truvox Ltd. Stand No. 317. The R6 and R7 tape recorders—priced at 55 and 75 guineas respectively—merit the attention of all tape enthusiasts interested in quality recording. The Mark VI tape deck can be fitted into existing stereo or mono high fidelity installations.

Valradio Ltd. Stand No. 114. Mains equipment of all kinds including radio and TV sets and tape recorders, may be operated from car or other batteries through one of the DC/AC converters exhibited. Versions are available for DC inputs up to 50 volts, and AC outputs up to 400 watts.

Walter Instruments Ltd. Stand No. 72. The popular range of mains tape recorders is joined for the first time by the "Transistor" machine. This is a full sized mains/battery recorder, and adds to the facilities of a mains-only machine the flexibility of battery operation.

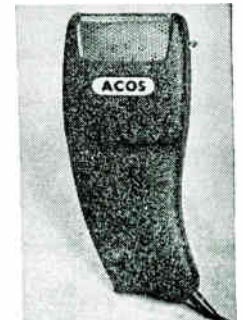
In the 1960 Edition of

HI-FI YEAR BOOK

There are 60 pages on Tape and Mikes



Left: Lustraphone LD 66 Moving Coil Microphone. Below: Acos Mic. 45.



GREAT NEW PERTH CLARISSA MK III



Beautifully styled slim blue and gold case with brilliant gilt fittings and white grille. Speeds— $7\frac{1}{2}$ — $3\frac{3}{4}$ i.p.s. Using $5\frac{3}{4}$ " reels it can take up to three hours recording and play back at $3\frac{3}{4}$ i.p.s. with double play tape. Accidental erasure impossible. Frequency range up to 9 k.c.s. Monitor through magic eye and built-in speaker. Superimposing and automatic muting of built-in speaker. High gain amplifier circuit. Wide range tone control with large elliptical high flux speaker ensures a clear 3 watts output of outstanding fidelity. Size $15\frac{3}{4}$ " \times $12\frac{3}{4}$ " \times $6\frac{1}{4}$ ". Weight 17 lbs.

29 $\frac{1}{2}$ gns

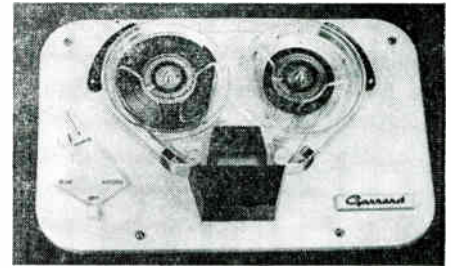
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THE GARRARD DECK AND ITS MAGAZINE



TAPE CASSETTES HAD TO COME — HERE ARE SOME FACTS ABOUT THE FIRST

THE introduction of a magazine tape deck opens up a new concept to recording. The tape reel—now in magazine form—is so easy to handle that everyone, including the partially disabled can use it. Furthermore, the magazine principle overcomes another great disadvantage, in that tape threading time is eliminated. A magazine can be changed so quickly, (the record so far, 2 seconds), that a break in the music or speech however short, is sufficient time to switch off, change the magazine, and switch on again.

New models of tape recorders are appearing so quickly that a review of all the advantages to be gained from magazine loading may not be amiss. The use and speed of changing tracks and tape have been mentioned, but additionally there are: (1) No spillage of tape. (2) Immediate play after switching on. (3) Protection of the tape at all times. (4) Attractive and easy storage in book containers. (5) As the bare portion of the tape, between the tape guides in the magazine is the precise point of contact with the heads, indexing of recording is 100% accurate and easy. (6) The magazine enables the user to apply the most exact position indicator yet devised. (7) Interchangeability of tape spools without the use of tools.

Magazine Details

The Sound magazine is a plastic container which holds a reel of 650 feet double-play tape, as well as the empty take-up spool, the brake assembly and tape guides. The spool is of special design, with a smaller hub diameter than usual, and a pin for tape loop anchorage. Spool diameter is 4 in. nominal, with an unbroken periphery to give maximum braking surface. The plastic container is made from two identical half mouldings and labelled in such a way that when "side one" is uppermost the brake assembly is fixed in the bottom half. When opening the magazine by removing the two spring clips this position should be maintained, i.e. "side one" uppermost.

If by accident the brake mountings should be broken, the brake should be withdrawn by gently pulling upwards and it can be replaced in the top half. This should be remembered for the future. Note, when doing this, the spring must be compressed so that the spring nipple contacts the front of the rear pillar. Before re-assembling the magazine, the tape guides should be cleaned and replaced in the bottom half so that the tape can be drawn round them.

The unique hinge at the back of the magazine should be brought together by holding the top half magazine vertically. Observe the left hand hinge tongue which should come to the inside of its slot whilst the right hand hinge tongue should go to the rear of its slot. The half magazine should then almost drop into position. Make sure the tape is free in the tape guides before replacing the two spring clips at the front.

So versatile is the magazine by its ease of opening that a good buy for shorter recordings is 450 feet of long play tape. It is advisable to use the spool designed for the magazine for the reason indicated above.

Recording

Upon switching on, the capstan revolves, therefore when the control lever is switched to "Play" or "Record", the speed of travel of the tape is instantly correct. Pauses during recording are therefore possible merely by moving the control lever to "off"; pushing it back to "record" at the end of the pause period resumes recording without a delay in take up. A red lock release button

is provided to prevent movement into the record position, and thus obviate the possibility of accidental erasure.

Position Indication

The use of a magazine offers two useful methods for accurate position indication of record material: (1) The bare portion of tape between the two tape guides is the exact spot at which a recording ends and another begins. Therefore coloured stickers or indicators may be applied at that position on the tape. The different colours of these tabs are registered in a folder. (2) The design of the magazine has made it possible to introduce a tape position indicator of accuracy, and with this it is possible to find, with great speed, any required position on the tape. Such a facility, previously only possible on the most expensive machines, is so accurate that a practiced operator can find a word of speech or a note of music.

Each magazine is equipped with 650 feet of double-play tape giving a recording time of 34 minutes per track—a total of 68 minutes per magazine. Few items to be recorded last for more than 30 minutes without a convenient break; and therefore as soon as this time has elapsed, at the first break in music or speech, the control lever should be quickly moved to the "off" position, the magazine lifted off, turned over and replaced. The control lever is immediately moved to "record". As the operator becomes practised this procedure may occupy only three seconds or less. Similarly, as the second side of the magazine becomes full, the procedure is repeated—but this time with a fresh magazine.

Indexing

As already mentioned, the magazine offers the greatest ease of indexing. Note the bare portion of the tape. Each time the machine is stopped, the precise point at which the recording finished is at that part of the tape. Suitable coloured tabs can be applied wherever it is desired to index. Subsequently, when any item is required, the appropriate magazine is placed on the deck, the "wind" control pulled forward and released as soon as the colour required, is at the play-back head i.e. when the tab is in the position indicated in the photograph. The control lever is then moved to the "play" position.

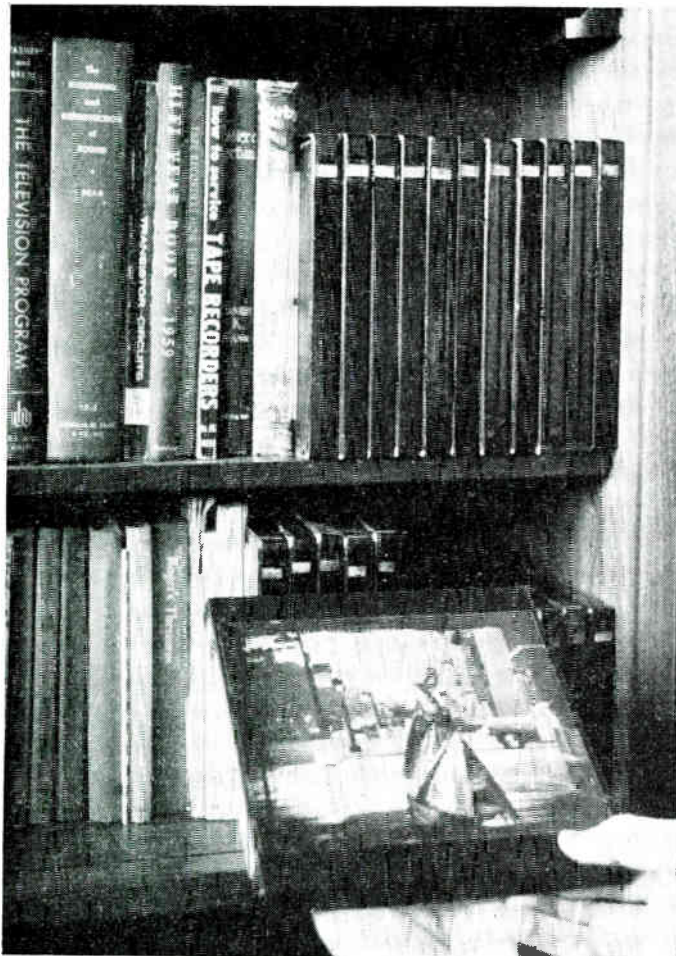
For those who require the ultimate in precision, an ingenious *tape position indicator* has been developed. This device is merely placed on the *right hand* side of the magazine, over the spool carrier spindle which protrudes through the centre of the spool. As soon as the machine is switched to "play", "record", or "wind" a spring loaded plunger slips into the first spool slot. The indicator is therefore functioning the moment a spool has made, *at maximum*, one-third of a revolution. It is necessary, in the interests of accuracy, that all the tape possible be on the left hand spool, i.e. the right hand tape spool completely empty and pulling on the loop. The hands of the clock are set at 12 o'clock by turning the knurled knob on top of the dial. The user should note that accuracy is assured, because the indicator is operated by the spool itself. At all times there is a direct and positive link to the spool and its revolutions, there are no belts which may slip.

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MAKE YOUR TAPES EASY ON THE EYE

STEP BY STEP INSTRUCTIONS FOR
A DECORATIVE TAPE FILING SYSTEM

by John Berridge

on the tape in the first place. In this photo-story is one solution to the problem, a useful wet-night project.

A little explanation for some of the less obvious points. Practically all of the materials are available at any good stationery store. I used rubber cement for my efforts, but any good adhesive will do. The advantage of rubber cement is that you can peel the paper off if you make a mistake, and start again. It also dries quite rapidly and speeds the task immensely. Gummed white paper is very handy for the titling, but ordinary white notepaper is just as good if the adhesive is used sparingly. There's nothing to stop you being really fancy of course and using coloured paper. Cover pictures are easy to obtain—just cut them out of a magazine. If you like a certain picture but it's a lot smaller than the top of the box, use two or even three and tell a story with them.

Label the box and the reel as I've shown here (unless you've already worked out your own filing system). It's a good system, and it can show you what's on the tape without having to play it over. Do your labelling with a typewriter if possible, it's neater, and try and use the same machine each time, for consistency. A coating of clear plastic lacquer might help to protect the finished product, but it looks very messy unless it's applied evenly, a tedious job at best. Also save yourself the trouble of dressing up the smaller boxes, they're not worth it. My library consists entirely of 7 in. and 5 in. reels and I've never found it lacking in versatility. A few evenings' work on your tape boxes can turn your library from a liability into an attractive asset.

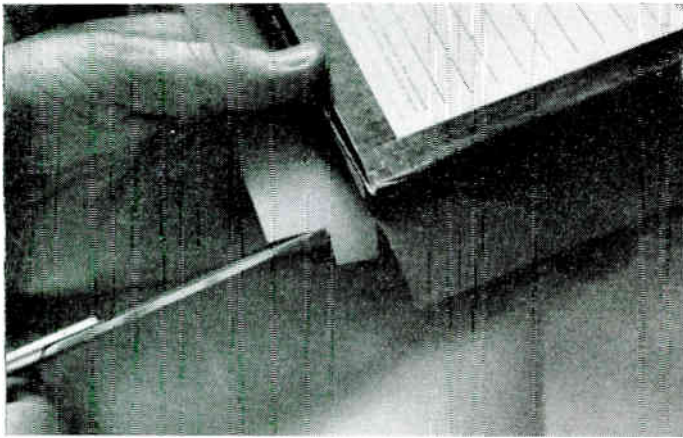
TAPE Recording is a wonderful hobby but once the novelty stage has been passed and the tape fan begins to realise the potentiality of tape, the Law of Averages begins to catch up with him. He collects a fair-sized library of tapes and runs into trouble. The Better Half usually relegates them to some cupboard because of their appearance, and the boxes eventually get badly damaged. Then there's the problem of keeping the right tape in the right box, quite apart from knowing what's



Step 1. Gather together all the materials and tools you'll need before you start. In addition to the tape boxes themselves are a ruler, pencil, scissors, gummed labels or paper, cement, Sellotape, notepaper (for titling), textured paper for covering the boxes, and pictures cut from magazines. The textured paper can be any colour but black is good.



Step 2. From the textured paper cut two squares 9½ in. each way, one for the top and one for the bottom of the box. Lay the top piece down, cover the top of the box with cement, and lay it in the centre of the square. Turn over and smooth out any wrinkles. Trim a strip 1½ in. wide from one side of the bottom piece, and keep this strip, it will be needed later.



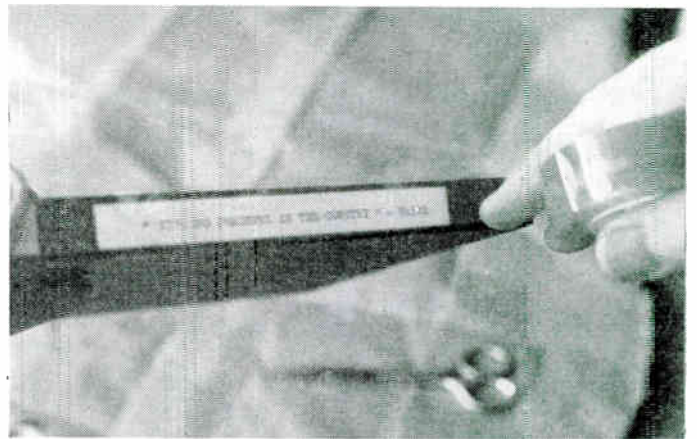
Step 3. Trim the corners of the top square as shown here, making sure that the tab in each case is adjacent to the *side* of the box, not the front or back. Cement the flaps down to the side edges of the box with the tabs around the corners. Cement the remainder of the flap inside the edges of the top, then cement the back flap down over the two side tabs and the hinge. Cement the front flap down over the front edge of the box and when dry, cut the paper from the finger recess.



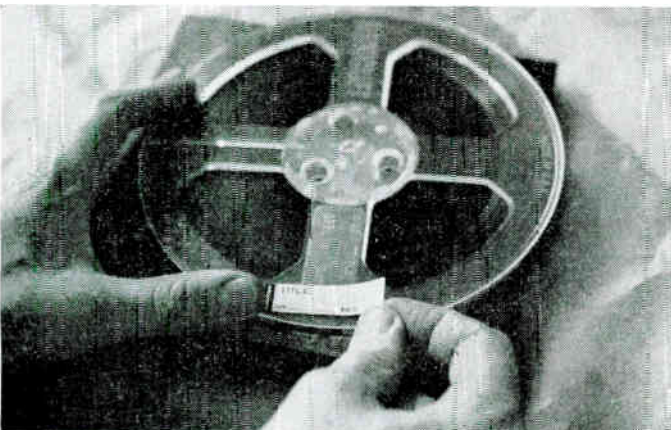
Step 4. Repeat Step 3 using the square of paper from which a strip has been trimmed, and laying one of the longer edges parallel with the hinged edge of the bottom of the box. No tabs will be needed on the corners of the box next to the hinge, only on the two opposite corners. Take the strip previously trimmed off; trim to 7 in. long and use it as shown to reinforce the inside of the hinge. Keep the box open until the cement on this strip is thoroughly dry.



Step 5. Cut a piece of the gummed or white notepaper to a 7 in. square. Type or write full details of the contents of the tape on this square, and try and keep the spacing of the titles, letters and any numbers the same every time, so that all boxes look alike. Cement or gum this on the *inside* of the box lid. This is usually more protected and can cover up a lot of usually unsightly advertising.



Step 6. Cut a number of strips for the titles either from the gummed or the notepaper, together with a small strip for a reference number. Type on any information you may wish (I use the title of the first piece of music, plus the name of the composer, conductor or soloist), then stick them to the spine of the box, over the hinged edge. Locate them so that they're in the same position on every box.



Step 7. Add an adhesive label to the tape reel itself to correspond with the reference number on the box. This should include at least the number of that particular tape. Further data can also be added on white leader attached to the leading end of the tape itself.



Step 8. Finish by cementing an appropriate picture to the outside of the lid of the box, and smooth out any wrinkles with a rag of some sort. More than one picture can be used of course, arranged to suit the taste of the owner, or some sort of artistic design.

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



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Readers' Problems

Flying saucers in reverse

Dear Sir:—I am a member of the Darwin Flying Saucer Research Society and at our meetings I frequently have to play American tape recordings on my recorder (a Wyndor Viscount). I find that by threading the tape through in the usual way the output is very weak and the recording is backward. On twisting the tape, and with the reverse side of the tape (the shiny side) facing the recording heads, I get perfect reproduction. This does not appear logical to me, can you explain?

Yours faithfully, H.E.S., Darwin

It would seem that the tapes have been recorded on one of the machines—now regarded as non-standard—which scan the bottom track instead of the top track (tape moving from left to right). Then, when you play this tape on a standard recorder, the only signal you receive is the faint leakage from the bottom track picked up by your top track head and, travelling backwards. Your remedy of playing the tape wrong side towards the heads will produce a signal, of course, but we suspect that the level is down on what it should be, since the thickness of the tape base separates the coating from the head gap. There is also severe attenuation of high frequencies in this back-to-front arrangement, and you should ask the senders of these tapes to have them copied on to a standard machine in future.

Hum on doubling tape speeds

Dear Sir:—Whilst building a programme using my Repts 30 Tape Recorder fitted with an Acos 39/1 "mic". I require to record a series of notes at $3\frac{1}{2}$ and twice as long as finally required, and then play back at $7\frac{1}{2}$ obtaining a note an octave higher and of the correct length. My snag is that on playback I also have a rushing sound somewhat a cross between a hum and air rushing. This "noise to signal" is most pronounced and very bad if I record at $3\frac{1}{2}$ and then play back at 15. I also have this noise by running the tape on record in a silent room (no signal whatever) and then playing back. Am I showing up hidden frequencies by doubling the speed (or is it a square law)?—by the way, I record in a noiseless room and on brand new tapes.

I should be very obliged if you can offer any suggestions that would enable me to eliminate this.

Yours sincerely, R.H.W., Bristol.

It very often happens, when doubling or halving tape speeds as in the preparation of trick recording or musique concrète, that unwanted tones of noise intrude themselves. In the case you mention, it is almost certainly mains hum at 50 c/s and harmonics that is causing the trouble. When you play back at the same tape speed as you record (as the designers of the recorder imagined you would!) the level of hum is no doubt below audibility, at least as reproduced from the machine's fairly small loudspeaker. But doubling the speed on playback raises the hum components by an octave as well as the required tones, and the combined improvement in the sensitivity of the loudspeaker and your ears makes this higher frequency noise a nuisance.

Even the bias current interferes with this kind of trick recording. How this can happen will be appreciated after a moment's consideration. If the bias frequency is 40 Kc/s, for example, a 15 i/s recording played back at $3\frac{1}{2}$ i/s might have a steady 10 Kc/s tone in the background; and at $1\frac{1}{2}$ i/s we would hear a tone at 5 Kc/s. Unfortunately there is no cure for either of these forms of interference, except to use a high signal level during recording and re-recording, and check that the input leads, etc., are effectively screened and earthed as appropriate.

Simple erase cut-out

Dear Sir:—Your reader, A. E. Jordan, (letters, June issue), appears to have been more successful at superimposing than myself. My friend and I, with an Elon Mark IV and a Brenell, have tried:—1. Removing the "erase link"; 2. Covering the erase head with first card and then brass strip; 3. Re-routing the

tape to by-pass the erase head completely and:—4. every combination of these three!

In each case the result was an almost complete erasure and we are now told that this is caused by the bias applied to the record head. Can you tell us if this is the case and, if so, does this end our hopes of being able to use either machine for superimposing?

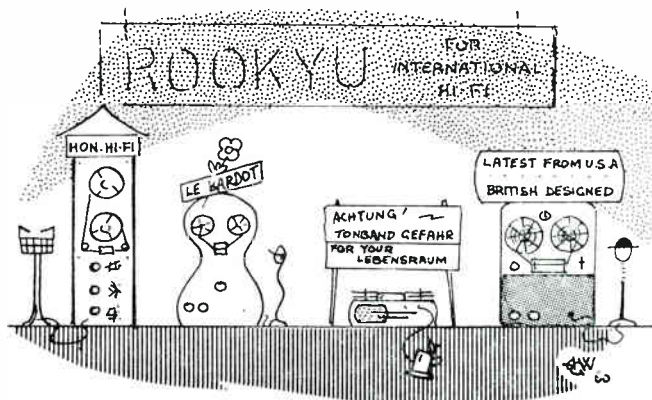
Yours faithfully, A.M., Ipswich.

The bias voltage which is mixed with the recording signal being applied to the head, is at the same frequency as the erase voltage, but at much reduced power. It will always have the effect of partially erasing previous recordings, however, and you will have to make some allowance for this. The procedure normally employed for this simple erase cut-out method of superimposing is to make the first recording at a higher volume setting than the second, and then hold the tape away from the erase head—in one of the ways you mention. The best volume ratio between the first and second recordings has to be found by experiment, and must inevitably be much more "hit or miss" than the controlled and monitored superimposition incorporated on some of the more versatile recorders.

Corresponding via 2-track and 4-track machines

Dear Sir:—I have a Telefunken 76KB 4-track recorder, and my wife who is at present in Bermuda, has a Grundig TK25. We, of course, "tapespor...". However, a problem has arisen! I received a recorded tape from Bermuda and after playing it through, recorded a message on it and sent it back to Bermuda. I played it back before sending it and it was "loud and clear", though there was a very faint "ghost voice" from the old recording made on the TK25. Still, when this tape was received in Bermuda and played on the TK25, it was (I am told) completely unintelligible, as the original recording dominated my own message. So the problem is, how can I, on my 76KB record over a used tape, being sure that the original message is completely erased? The "other way about" works all right as the TK25 will wipe off the 76KB messages cleanly. Incidentally, I am using the the correct track, that is the grey button which records track Nos. 1 and 2, not the red one which would record 3 and 4. We tapespond at $3\frac{1}{2}$ i/s. Yours faithfully, C.G.H.R.R., Twickenham.

The playback head on your wife's TK25 is scanning, and therefore reproducing, the top half of the tape. On your 4-track machine, the erase and record/playback heads act on only half of this upper track at a time. When you record your reply, therefore, you are erasing only half (or slightly less of her previous message, and she will hear both at full volume. Ideally, before recording your message, you should erase the tape using a bulk eraser, or a borrowed half-track recorder. You would get some improvement, however, by playing the tape through completely (in both directions) on your machine with the input volume turned down. This would erase tracks 1 and 2 and, except for the "land" in between, would eliminate the trouble.



FOR THE RECORD

CHOOSING a tape recorder calls for sound judgment (if you'll excuse the pun). We can't all have a fund of electronic and mechanical knowledge to draw on. But if we're wise we shop around with our eyes and ears wide open. We listen to every make within our reach and pocket. What's more we note which models are being demonstrated through their own speakers and which through some non-included-in-the-price external equipment.

That's only one of the many important ways in which the WyndSOR "Victor" scores. The WyndSOR Recording Company is one of the most experienced manufacturers having been specialising in nothing but quality tape recorders now *for ten years*. They know that a good-sized quality speaker is essential for reproduction of music faithfully and the WyndSOR "Victor" has this very feature.

Of course, if the amplifier isn't up to much it wouldn't matter, but WyndSOR have designed a special amplifier which has pre- and post-emphasis networks. They also guarantee that every tape recorder which leave the WyndSOR factory is not only tested and measured to ensure it achieves the published specification, but is also equalised to C.C.I.R. International Standards. Play a professionally pre-recorded tape on any WyndSOR tape recorder and you'll hear what that means.

It also means that with the WyndSOR "Victor" you can make your own professionally-sounding recordings and you can mix and fade music and speech, all with finger-tip control of the most simple-to-operate group of controls on any tape recorder.

Write for a leaflet and the name of your nearest stockist to the modestly proud makers of the best-sounding tape recorders in the middle-price bracket. There is nothing more annoying than hearing a WyndSOR just after buying an ordinary tape recorder.

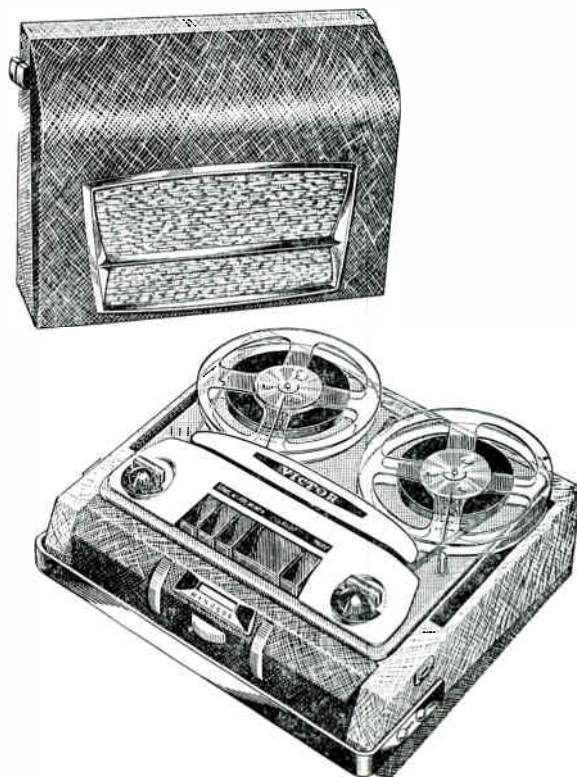
* frequency responses:—

7½ i.p.s.—50 to 15,000 c.p.s. better than ±3 dB.

3½ i.p.s.—50 to 9,000 c.p.s. better than ±3 dB.

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- * full frequency equalisation *at all speeds*
- * 10" × 6" elliptical speaker in detachable lid
- * up to 8 hours playing time on one D.P. tape
- * monitoring through its own speaker with independent control
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- * facility for use as an amplifier
- * three independent 4-pole motors
- * unique styling in two-tone grey with gilt fittings
- * twin tracks * pause control * tone control
- * guarantee: 12 months (valves 90 days) and the name of WyndSOR.



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

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Telegrams: Wyndreco, London

... tape recorder workbench

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

No. 15 – TAPE AND PRE-AMPLIFIERS

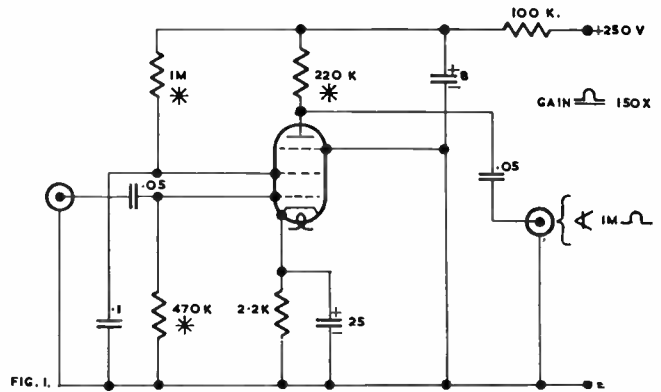
QUITE a number of the amplifier units available these days incorporate, together with the correction necessary for 78 and LP discs etc., an *equalised* input for the replay of tapes. Where there is also sufficient sensitivity, all that is necessary for the replay of tape records is a tape deck and a suitable screened connection from the replay head to the amplifier input. However it does appear, from Readers Letters, that not all amplifiers have sufficient sensitivity, and that some degree of pre-amplification is needed of the signal obtained from the tape deck.

Once a suitable pre-amplifier has been provided there is a distinct advantage in this system, due to the fact that the connection between tape deck and amplifier is carrying a much larger signal. This means that the Signal/Noise Ratio will not be affected to anything like the same extent by hum pick-up in the connecting cable. From this it will be obvious that if any pre-amplifier is to be used it should be situated as close to the replay head as possible. Incidentally, even if the main amplifier does not have a corrected tape input, quite good replay results can be obtained using one of the disc correction circuits available. It must be stressed that an uncorrected tape input requires the use of a pre-amplifier that incorporates equalisation circuitry, possibly this could form the subject of a future article.

This month, however, I shall describe two forms of a basic one valve pre-amplifier designed to derive its power from the main amplifier, that is capable of all the gain that might be required. I have found both circuits successful in use, in fact, **fig. 1** forms the first stage of the playback amplifier on my present "Living-Room" equipment.

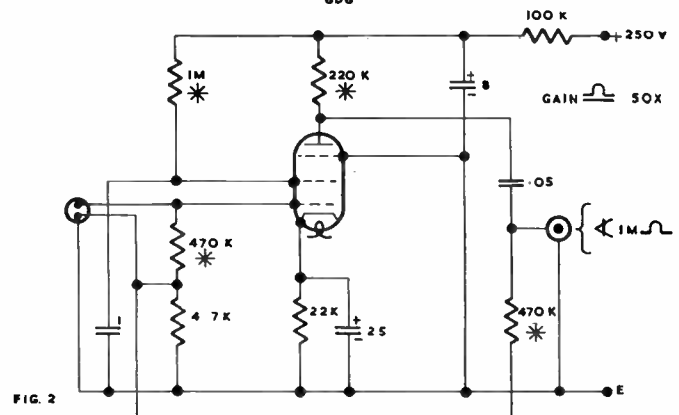
Whichever circuit is to be built, a small, totally enclosed, chassis is preferable and you could do a lot worse than adopt a form of "chassis" that I have often used, to wit, a 2 ounce tobacco tin! If the valve base and connecting co-axial sockets are mounted on top of the bottom, so to speak, the lid of the tin will effectively shield the various components. If the lid is a good fit it can be affixed to the deck, allowing a form of plug-in assembly for the amplifier itself.

The choice of circuit will depend largely on the main amplifier sensitivity. Assuming an average tape head signal of 2 mV @ 1 Kc/s, if the amplifier requires a signal of upward of 150 mV, **fig. 1** should be used, while a more sensitive unit would allow the adoption of **fig. 2**. The difference between the two circuits lies in the application of about 10 dB of negative feedback, sufficient to reduce the already low noise level of this type of valve to negligible proportions. The input connection arrangement shown for **fig. 2** requires some explanation. If a single screened or co-axial lead is available from the head, this should be connected with the screen earthed and the inner,



* DENOTES HIGH STABILITY RESISTOR.

VALVE:-
6BR7
6BR7
6BR7
6BR7



or live lead to the upper of the two connections. The lower connection, going to the junction of two resistors may be omitted. On a number of decks, however, the head connections are brought out by twin screened cable. In such a case the screen should still be earthed, but the two inner wires, provided neither of them are connected to earth, may be wired as shown. This arrangement puts much more of the head circuitry inside the feedback loop, helping to cut down noise pick-up. I have found also that it can reduce tape hiss, though I must confess that I am not exactly sure why this happens.

All resistors can be 1/2 watt rating, and high stability types should, if possible, be used where shown as they tend to be less noisy. Capacitors can be 250V or 350V rating, the former will allow a more compact assembly. All the components should be available from any radio shop dealing in components.

Little can go wrong in the assembly. Good soldered joints are a must, and earthing to chassis should only be carried out at one point, as close to the grid pin as possible. Most amplifiers have power available for a radio tuner and so on, but the power requirement is so small that it could be "pinched" if need be. If the heater supply has a centre tapped earth, so much the better.

Next Month—Mixers

I propose, next month, to talk about home made mixer units, and I shall refer back to these circuits in that connection. I hope to be able to describe a transistor pre-amplifier circuit to fulfil much the same purpose, so perhaps those who wish to boost their tape signal, but can only find a 1 ounce tobacco tin, had better wait until then!

A. Bartlett Still

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By A. G. WATLING

A CUSTOM-BUILT STEREO

DESCRIBING THE CONSTRUCTION OF A HANDSOME MACHINE

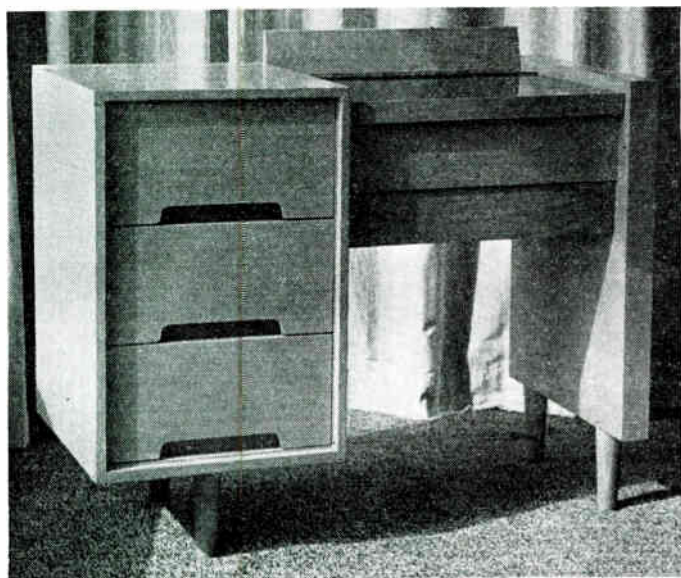
Part One — Drawing up the Specification

ANYONE who sits down to design electronic equipment these days is faced, not only with a blank sheet of paper, but also with a few primary decisions before he can think of detailed circuits. Valves or transistors? Mains or battery? Fixed or portable? And for tape recorders—2 or 4 track? A commercial designer has some of these questions answered for him by the market he is aiming for and the price limit set him. An amateur also has a price limit, but beyond that he is bound only by his ability to design, research and test. An additional complication is, however, the need for a "professional finish." The chassis and cabinet should not look "home-made" (a compliment to cooking but not to cabinets!)

In this instance the decisions were easy. The aim was to build a stereo-mono recorder of above average quality for use at home as an adjunct to an existing high-quality system. Thus it became "mains" and fixed. My knowledge of transistor circuitry being strictly limited, the need for above-average quality and high signal-noise ratio settled me on a 2 track, valve design.

A fine Housing Idea

The cabinet was a lucky chance. As the picture shows it is a small "Stag" dressing table, using the mirror compartment for the tape-deck. The drawers were shortened to a mere 6 in. and the space behind them used to house a recovered TV chassis (made in the days when they were double-deckers and built like battle-ships!). Then the top of the drawer unit was made into a lifting lid, and the inside surface lined with felt to hide the scars. The

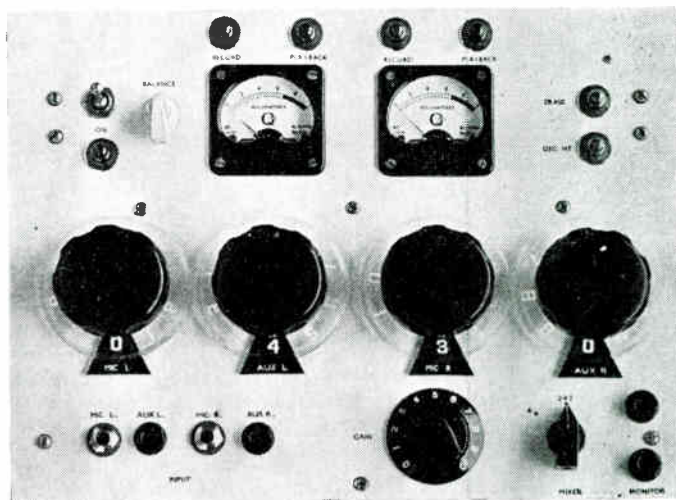


This extraordinarily neat and attractive piece of bedroom furniture was a "ready-made" answer to the author's problem when searching for the ideal cabinet. The designer of the "Stag" dressing table deserves—and will probably get—many more sales from our readers.

main requirement for this sort of conversion is blind faith and a brand of ignorance that turns cabinet-makers grey! (In this case the manufacturers have expressed interest in the result.). The conversion has the advantage that it can be used as a desk (black Formica surface), and the "stub" drawers conveniently take microphones, connecting leads, jointing tape, defluxer and all the miscellaneous tools of the trade. No tape storage is provided as the mains transformer is right behind!

Appearance is Important

You may gather from all this that the external appearance of the recorder was by no means the least important consideration. I do not believe in the legend that wives are always responsible for the good looks and neatness of Hi-Fi equipment. An engineer worthy



Neatness of layout goes hand-in-hand with workmanlike design, and this control panel will hold its own with some of the best professional equipment on the market. Note the useful size of the control knobs.

of the name looks for design in appearance as well as in circuitry. The attraction of the "Stag" dressing table in this instance was so strong that the chassis was made to fit the cabinet rather than the other way round.

The Specification

A specification was next drawn up in the form of a block diagram showing power supplies, switching points, earth connections, etc. The main requirements were: Function: Stereo/mono tape recorder to record from two ribbon microphones and two auxiliary (100mV) inputs. These inputs to be all available on one channel for monaural recording and split Mike/Aux. Left + Mike/Aux. Right for stereo. All inputs to be fully mixable and simultaneously controlled by a "Master Gain" potentiometer. C.C.I.R. Playback

RECORDER

OF UNIQUE DESIGN

● As we know from our monthly mail-bag, there are scores of home constructors among our regular readers. It therefore gives us great pleasure to offer this piece of Autumn homework to all who are interested in building something which is both useful and presentable for the living room. Stereo from tape, using good equipment, provides a unique form of musical enjoyment that can be free from many of the troubles that are associated with stereo from disc. This, the serious experimenter will soon find out for himself to be very true; and as stereo tape records become available, we venture the prophesy that the tape recorder will present the gramophone with a formidable challenge.



(from separate pre-amplifiers) to give 0.5 volt output from each channel to feed a Hi-Fi system. Speed: $7\frac{1}{2}$ i/s only; Frequency Response: 40 - 12,000 c/s \pm 2dB, with response held \pm 1dB from 5,000 - 10,000 c/s, and channel to channel comparison to be within 1dB; Distortion: 2 per cent total, peak recording level; Background: -50dB below peak level to be aimed at. Mechanical noise from deck to be negligible; Crosstalk: Better than 40dB; Level indication: Peak reading voltmeter for each channel; Pilot indicators: To show state of: Mains, record/playback switching, erase volts and oscillator H. T.; Monitoring: In the absence of a separate monitor head, high impedance circuits after recording output valves to feed low impedance headphones (one for each channel).

Choice of Deck

A Wearite Type 3 deck was available (to match the existing single-channel recorder). The head line-up of "Auto Switch, $\frac{1}{2}$ track-Erase, $\frac{1}{2}$ track Record/Playback" was changed to "full-track Erase, $\frac{1}{2}$ track Erase, Stereo Record/Playback." It was then necessary to provide extra switching for the Erase heads and the second Record/Playback Channel, to switch in a dummy bias load when on "monaural," and to signal back to the control panel what position all the switches were in. This necessitated a rearrangement of the selector switch connections, and the speed-change lever became a "Mono-Stereo" switch. This was possible since the deck was to work at $7\frac{1}{2}$ i/s only, the $3\frac{1}{2}$ i/s pulley and change-lever being removed. The modifications were dictated by the circuit being used—there seem to be endless permutations of how it can be done. I found that the unused playback head of the stereo pair should be disconnected, not earthed, when switched to "Monaural," or there was considerable crosstalk from the bottom track induced in the head itself. This meant that the amplifier input on that channel had to be earthed separately instead (another switch contact to be found!)

Plus a Hint from this Journal!

The very useful hint from Mr. Griffith in *The Tape Recorder* (October 1959) of breaking the oscillator HT by a micro-switch on the "Start" lever was used. This, with the clearly labelled "Mono-Stereo" switch in a good position on the deck, coupled to pilot lights above the recording meters, considerably reduces the danger of erasing two tracks instead of one.

Particular attention was paid to the control panel layout and the need for clearly indicating the functions of "playback" or "record" on one or two channels. When one is recording, the

manipulation of controls must not be intrusive—all attention should be on the material being recorded. The clutter of numbers and graduations that can surround a four-channel mixer was reduced by an original (I think) design of knob. A Perspex "skirt" was attached to a large knob and white figures transferred to the underside. As the control panel is white Formica, these figures are not normally seen. Under each skirt on the panel is a black Perspex "wedge" on which is shown the function of that knob, so as the figures come over the black "wedge" they show up immediately. A quick glance at the panel then shows the setting for any control without looking for pointers or spots.

Jacks are sited where connecting cords do not obstruct working. The pilot lights are above and around the meters so that the eyes do not have to move far. The master gain control is where the right hand naturally falls, and cannot be confused even momentarily with any of the mixer knobs. The monitor jacks are colour-coded for "left" and "right," as are the headphone plugs and all appropriate interconnection cables throughout the equipment.

The next article will deal with the circuits used and the layout of the equipment on the chassis.



Flashback. Here is the monaural recorder built by the author some months ago. Readers who wish to try their hands at something less advanced than the current stereo design will find details of this model in the *Tape Recorder* of April, Vol. 2, No. 3.

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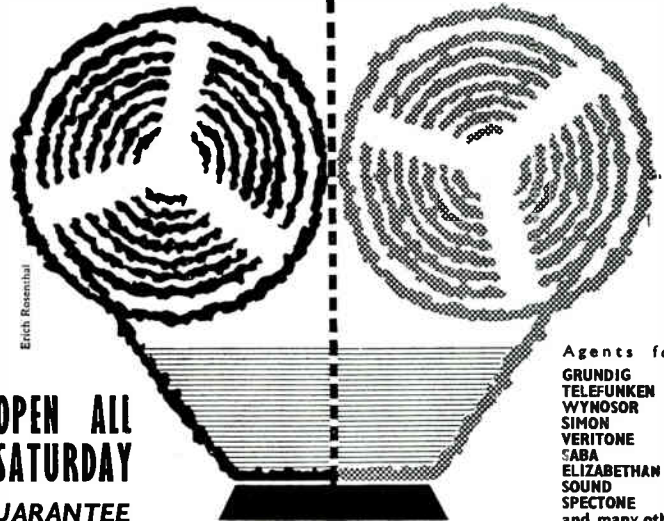
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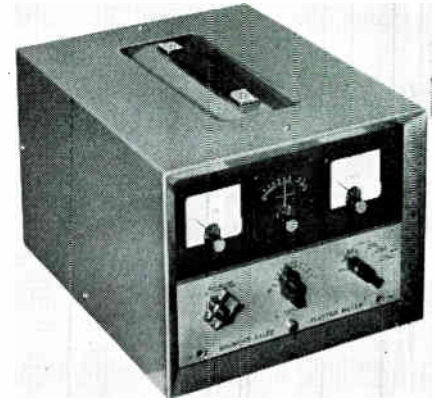
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T.R.

By James Moir

REVIEWING TAPE RECORDERS



PART SIX — MEASURING WOW AND FLUTTER

THE instalment of "Reviewing Tape Recorders" in the August issue dealt with the subject of "Wow and Flutter", and it is thought that a discussion of the instrumental methods of measuring the trouble would be of interest.

It was shown that the instant-to-instant speed changes we know as wow and flutter result in frequency modulation of any signal recorded on the tape. Thus as an example, a constant frequency tone of 3,000 c/s recorded on an ideal "wow-less" machine might on replaying on any typical commercial machine, result in the 3,000 c/s signal being varied continuously between say 3,030 and 2,970 c/s at a rate of 5 cycles per second.

Eccentric Capstans

In the simple example where the variations in mean speed are due to an eccentric capstan, the ± 30 c/s excursion is a measure of the capstan eccentricity and the 5 c/s is the one cycle per rev. of the capstan shaft. With these specific conditions, signals of all frequencies will be varied continuously by 1 per cent. (i.e. $30/3,000 \times 100$ per cent.) at the shaft speed of 5 c/s. This change of 1 per cent. may seem insignificant, but the ear's sensitivity to such variation is so high that a 1 per cent. change has a quite intolerable effect on certain types of music though it may be tolerable (but objectionable) on speech.

It may be shown that the frequency modulation of a steady tone, such as occurs due to capstan eccentricity, results in the appearance of additional components spaced from the original signal at intervals of 5 c/s (in this particular example). These extra "noise" components have amplitudes that are a function of the extent to which the original signal is varied in frequency, ± 30 c/s in the example.

Measurement of wow and flutter requires that these new noise components be separated from the original (3,000 c/s) signal, and their amplitude measured for comparison with the amplitude of the original 3,000 c/s signal. To those untutored in the art it would seem a simple solution to introduce filters (crystal filters possibly) to separate the 2,970, 2,940, 2,910—3,030, 3,060, 3,090 c/s etc. noise from the original 3,000 c/s signal, but in fact it would be extremely difficult to produce filters to achieve this. The preferred solution is to make use of frequency discrimination circuits of the Foster-Seely type used in the ordinary domestic FM receivers.

Frequency Discrimination Tests

A signal at "centre" frequency produces no output voltage, but as the applied signal either increases or decreases in frequency, a signal voltage appears across the discriminator output terminals. The amplitude of this voltage is proportional to the difference between the centre frequency and the frequency of the side band, and thus the desired result is achieved, the centre frequency is eliminated, and only the changes in centre frequency produce an output signal which can be read on a meter. If the input signal can be set to some specified

value the meter may be directly calibrated in per cent. wow and flutter.

If "wow" (all the disturbance frequency components below 20 c/s) and "flutter" (those disturbance frequency components between 20 and 200 c/s) are to be separately measured some extra filter circuits must be incorporated to pass only the desired frequency band to the indicating meter. Filters to achieve this separation are not a difficult problem.

Practical Requirements

With this general discussion of principles let us see how the requirements are realised in practice. The standard instrument for wow and flutter measurement in Great Britain is the Gaumont Kalee Type 1740 Flutter Meter pictured in fig. 1. This is a compact ($12 \times 19\frac{1}{2} \times 9\frac{1}{2}$ in.; Weight 28 lb.) portable meter primarily developed for the sound film industry, but directly applicable to any form of sound recording and replay equipment. A block diagram of the circuit is shown in fig. 2. The first two valves (actually a twin triode) are straightforward amplifiers tuned to 3 Kc/s to provide adequate

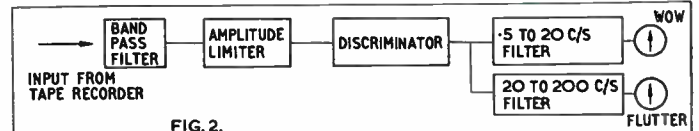


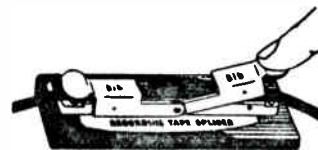
FIG. 2.

gain and at the same time eliminate noise components outside the frequency band being used for measurement of flutter. Any frequency could be chosen but 3 Kc/s has been internationally standardised for such measurement.

Results of Erratic Tape Contact

Fluctuations in the amplitude of the 3 Kc/s signal, introduced for example by erratic contact between head and tape, produce side frequencies which can introduce errors into the measurement of wow and flutter, so the next stage is a double diode

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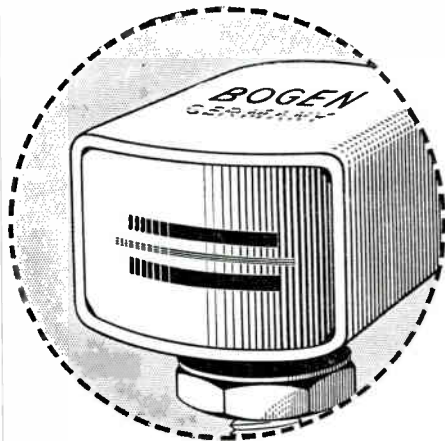
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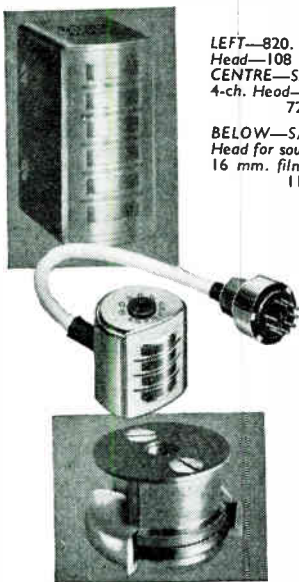
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REVIEWING TAPE RECORDERS—(continued)

limiter. This reduces amplitude fluctuations to a level at which they produce no significant error.

The third stage is a double tuned discriminator circuit of the type used in FM broadcast receivers, though operating in this instance at only 3 Kc/s. It eliminates the recorded 3 Kc/s tone leaving only the wow and flutter components. These are separated by RC filters into the wow components between 0.5 and 20 c/s and the flutter components between 20 and 200 c/s. The signals in these two bands are amplified and applied to two meters to allow wow and flutter to be read off simultaneously. Total wow and flutter (everything between 0.5 and 200 c/s can be read on one of the meters by switching out the appropriate filter.

The Basic 3 Kc/s Signal

Operation is simple and straightforward. The 3 Kc/s signal from the tape recorder output terminals is applied to the input of the flutter meter and adjusted to the correct level as indicated by a calibration mark on one of the meters. 3 Kc/s signals are rarely exactly 3 Kc/s so the discriminator is tuned to the exact signal frequency by a small variable capacitor having a dial calibrated to show the percentage difference between 3 Kc/s and the applied frequency. Total wow and flutter and the separate values of wow and flutter can then be read off the two meters, two ranges being available, 0.2 per cent., and 1 per cent. full scale. This may sound a rather complex operation, but after a few minutes experience it can be carried out more quickly than it can be described.

A 3 Kc/s recording is of course required for any measurement of wow and flutter. If one is interested only in the disturbances introduced on replay, it is necessary to have a 3 Kc/s test tape recorded on a machine having speed disturbances appreciably lower than those in the machine under test. In my laboratory I use a tape recorded on a professional machine having a measured total record and replay flutter below 0.5 per cent. This is so much better than the average domestic machine that any error introduced by the recording process can generally be neglected.

When interested in the overall performance of a specific machine the total flutter is the RMS sum of the flutter introduced during recording and that occurring on replay. This determination requires the recording of a 3,000 c/s tone and to facilitate this the Type 1740 flutter meter incorporates a 3 Kc/s oscillator, obtained rather neatly by arranging to switch the first twin triode from acting as a band pass amplifier to being an oscillator.

Searching for the Causes

While this is a very simple solution it is a disadvantage when using the meter to investigate the cause of flutter in a mechanism unless a separate oscillator is available. During such an investigation it is often useful to be able to fiddle with capstan, pressure roller, pressure pads, etc. while recording and replaying. This allows the effect of each adjustment to be observed on the meter, an invaluable aid in fault finding. The incorporation of a separate oscillator may be worth considering when the next instrument in the series is being designed.

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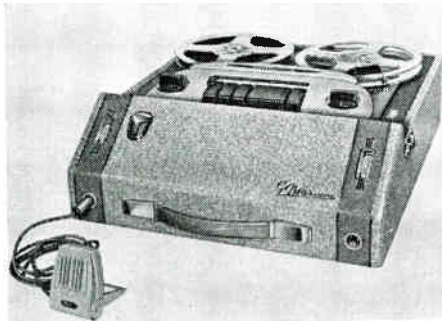
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TAPE, RECORDERS & ACCESSORIES

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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.



Left. Marconiphone MTR.1.

Above. Marconiphone MTR.2.



Right. Walter Transistor Portable.

MARCONIPHONE have just introduced two new tape recorders in this country. Both machines use the Collaro Studio Tape deck and are known as the MTR1 and MTR2 respectively.

Facilities of the MTR1 include microphone and radio inputs, magic eye level indicator, and low level high fidelity output. Tape speeds are $1\frac{1}{2}$, $3\frac{1}{2}$ and $7\frac{1}{2}$ i/s. It has an output of 2.5 watts which is fed into a 7 in. by 4 in. speaker. Weight 28 lb. Price £44 2s.

The MTR2 has a 7 in. by $3\frac{1}{2}$ in. speaker and is fitted with a tape position indicator, pause control and interlock to prevent accidental erasure. Priced at £40 19s., it measures 15 in. by 18 in. by $6\frac{1}{2}$ in. and weighs 26 lb. Manufactured by **The Gramophone Co. Ltd., Blyth Road, Hayes, Middlesex.**

setting of the recording level. It is priced at 28 gns. The same manufacturers have marketed **Ekcotape**—a high performance tape suitable for all recorders, with low background noise and a wide frequency response. **E. K. Cole Ltd., Southend-on-Sea, Essex.**

WALTER INSTRUMENTS LTD. will be exhibiting their new transistor mains/battery tape recorder at the Radio Show. This big instrument gives over 2 watts of undistorted output on mains or battery supply, and can play for three hours using $5\frac{1}{2}$ in. spools. Weighting $17\frac{1}{2}$ lb without batteries, it records at $3\frac{1}{2}$ i/s and has a claimed frequency response of 50 to 9,000 c/s. Features include. Magic Eye level indicator. revolution counter, mixing facilities, and a 7 in. X 4 in. high flux speaker. It is priced at 55 gns complete with Walter crystal microphone, radio lead and reel of tape. The manufacturers are: **Walter Instruments Ltd., Garth Road, Morden, Surrey.**

TWO four track recorders join the **Elizabethan** range, Models FT1 and FT3, selling at 39 gns and 55 gns respectively. Features include independent bass and treble controls, separate mixing controls for inputs, magic eye recording level indicator. This recorder can be adapted (with additional equipment) for playback of stereophonic recordings.

The FT1 operates at $3\frac{1}{2}$ i/s with a frequency response claimed to be better than 50 to 12,000 c/s. Six hours recording can be obtained on double play tape with $5\frac{1}{2}$ inch spools. Priced at 39 gns, it is supplied complete with microphone, tape and spare spool.

With the four head system on the Model. FT3, and a 7-inch reel of tape, it is possible to achieve over 17 hours continuous playing time. There are three speeds, $1\frac{1}{2}$, $3\frac{1}{2}$ and $7\frac{1}{2}$ i/s, the frequency response at the latter speed is claimed to be 50 to 16,000 c/s. Independent input controls allow full mixing of two programmes and separate base and treble controls are provided. Safety interlock prevents accidental erasure and the machine can be used as an independent amplifier. Housed in a portable cabinet with facilities for microphone and tape storage, the FT3 is supplied complete with microphone, 1,200 ft of tape, spare spool and radio lead. Price, 55 gns.

Manufacturers: **Elizabethan (Tape Recorders) Ltd, Bridge Close, Oldchurch Road, Romford, Essex.**

A NEW version of the Stuzzi Magnette battery-powered tape recorder has been introduced with a single speed of $7\frac{1}{2}$ i/s. To provide a professional quality recorder, the manufacturers have had to modify the replay channel, but this still provides ample playback volume for checking purposes. Signal to noise ratio is 50dB and wow and flutter is 0.25%. Frequency response: 50—14,000 c/s. Batteries provide 15 hours recording time, and a reel of double play tape gives 16 minutes recording on each track. The distributors are Recording Devices Ltd., 44 Southern Row, Kensington, London, W.10.

A NEW popular priced tape recorder will be introduced by **Ecko** at this year's Radio Show. Using the **B.S.R.** tape deck with a speed of $3\frac{1}{2}$ i/s and taking $5\frac{1}{2}$ in. reels, $1\frac{1}{2}$ hours of playing time can be obtained using standard play tape. A high-quality amplifier provides an output up to three watts to a built-in speaker. An **Acos** microphone is provided, and both high and low sensitivity input socket are fitted for radio and microphone recordings. Accidental erasure is prevented by a spring loaded interlocking device and a magic eye ensures accurate

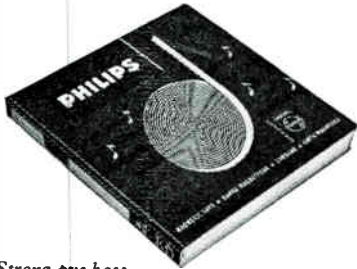
C. Q. AUDIO announce an all-British four track tape recorder. Known as the **Conquest**, it uses a specially adapted Collaro Studio deck, with the three speeds $1\frac{1}{2}$, $3\frac{1}{2}$ and $7\frac{1}{2}$ i/s. The frequency response is 40—10,000 c/s ± 2 dB at $3\frac{1}{2}$ i/s, and separate bass and treble controls are provided on replay. The modulation indicator is an EM 84 magic eye. Other facilities included are: separate gain controls for recording enabling the operator to monitor radio etc., at any required listening volume, record/replay switch with a "straight-through" amplifier position, superimpose switch, external speaker and high fidelity outputs. Price £57 15s.

Manufacturers, **CQ Audio Ltd., No. 3 Factory, Bush Fair, Tye Green, Harlow, Essex.**

(Continued on page 407)

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H.M.V.	£50
Grundig TK20	52
Telefunken 75 with Mic	56
Perth Saja Deluxe	56
Brenell 3 Star	58
Veritone	58
Mobile	58
Ficord	59
Grundig TK25*	62
Telefunken Deck*	63
Korting Stereo*	68
Telefunken 4 track with Mic	68
Stuzzi-Magnette	69
Brenell MKV with Mic	69
Grundig TK 30*	72
Brenell M.V. with meter, Mic	74
Electron Stereo*	77
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MORE NEW TAPE PRODUCTS



THE Model RT 20, Kolster Brandes tape recorder uses the B.S.R. tape deck with a speed of $3\frac{1}{2}$ i/s. Priced at 27 gns., it includes magic eye recording indicator and sockets for extension speakers. Monitoring can be done through headphones or the microphone. Covered in astra green leathercloth and soft grey Vynair, it has storage room for microphone, spare leads and tapes. A four stage amplifier gives a 2.5 watt output into a 7 in. \times 4 in. speaker. Manufacturer's address: Kolster-Brandes Ltd., Footscray, Sidcup, Kent.

THE popular 'Sound Studio' and 'Sound Prince' are now available in a four track version. The 'Sound Prince De Luxe' provides six hours' playing time and has a claimed high fidelity amplifier response of 20 c/s to 20 Kc/s \pm 6 dB, and a record/playback frequency response 65 c/s to 10 Kc/s \pm 6 dB. It is supplied complete with crystal microphone, spool of tape, spare spool and radio recording lead at 37 gns.

The four track version of the 'Sound Studio' has the following features:—four tracks giving up to 18 hours playing time, claimed amplifier frequency response 20 c/s to 20 Kc/s \pm 6 dB, and record/playback frequency 60 c/s to 15 Kc/s at $7\frac{1}{2}$ i/s \pm 6 dB. Price, 45 gns. complete with crystal microphone, spool of tape, spare spool and radio recording lead.

A new 'Soundmaster de luxe' three speed, four track, tape recorder of professional standard. This comprises a high fidelity reproducer with separate record and playback amplifiers (ultra-linear push-pull, 10 watts, rated 14 watts peak), with negative feedback and comprehensive bass and treble controls. Signal to noise ratio is better than 45 dB. The recorder is fitted with a moving coil meter. There are full facilities for mixing, monitoring and multiple superimposition, and a 10 in. \times 4 in. moving coil speaker is supplied, mounted in a loaded reflex enclosure. The price is to be announced shortly.

The 'Sound Officemaster' is a small dictating machine. It is fully automatic and is capable of back-spacing, fast wind and rewind, recording and playback, by remote control. It will accept standard tape spools up to four inches in diameter, giving seventy minutes playing time which can be increased to one hundred minutes if necessary. The Officemaster has a built-in speaker but can be used with headphones or stethosets. The frequency response is stated to be such that it can record speech and music. It is fitted with large position indicators, automatic level control, and it can be back-spaced to half a word. A warning light is fitted to the microphone handle and the machine will accept microphone, radio and telephone inputs. The price is to be announced later. Manufacturers: Tape Recorders (Electronics) Ltd., 784-788, High Road, Tottenham, London, N.17.

SONOCOLOR Tapes are now available for use with four track and stereo recorders, for which they have been specially developed. Due to its great suppleness, this tape allows no deviation from the tracks during recording. It is available at the following prices: 5 in. (900 ft.) 32s. 6d.; $5\frac{1}{2}$ in. (1200 ft.) 42s.; 7 in. (1800 ft.) 57s. 6d. Details from Tape Recorder (Electronics) Ltd., 784-788 High Road, Tottenham, London, N.17.

THE second Gainsborough tape recorder is now available from the manufacturers. Known as the Mark 2, this model also uses the Collaro Studio deck, but this model is equipped with a third head for monitoring the tape when recording. Facilities include mixing, feed-back tone circuit, separate record and playback amplifiers, 9 in. \times 5 in. speaker, high and low gain input. Tape speeds, $1\frac{1}{2}$, $3\frac{1}{2}$ and $7\frac{1}{2}$ i/s maximum spool size 7 in. Price complete with 1,200 ft of tape and studio microphone £51 19s. Manufacturers: Gainsborough Tape Recorders, 189, Northcote Road, London, S.W.11.

THE latest piece of equipment in the Heathkit range is a combined Tape Record/Replay amplifier unit intended for use with a tape deck and Hi-Fi amplifying system. Provision has been made for matching it to any type of tape deck using heads of high or low impedance. Type TA—1M is a single channel model, and the stereo version is type TA—1S. The mono model can easily be converted to stereo when desired by the addition of a conversion kit type TA—1C.

Special features are the provision of a 3 position bias level control to enable optimum results to be obtained from any type of recording tape, an easy-to-read, thermometer type recording level indicator, the use of a buffer between the recording stage and the level indicator to avoid distortion, press button controls, etc. Construction is greatly simplified by the use of a large printed circuit boards, and the copiously illustrated instruction manual with its well-known Heathkit step-by-step procedure can be followed by even the absolute beginner. Specially recommended decks are the Collaro Studio, price £17 10s. and the Truvox Mk 6 type TD—1 stereo deck price £38 17s. These cannot be obtained separately but through an agreement with the manufacturers they can be supplied in conjunction with the TA—1 (M or S) or associated equipment.

Prices:—
TA—1M £16 14s. TA—1S £22 4s.
With Collaro Studio £30 10s. With Collaro Studio £35 14s.
With Truvox Mk 6 £49 5s. With Truvox Mk 6 £54 7s.

Manufacturers:—Daystrom Ltd. Gloucester.

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AKG Dynamic Stereo, D88, High Z	19	19 0
Simon "Cadenza" Ribbon	10	10 0
Simon "Cadenza" Crystal	3	13 6
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Decca ffs P.U.	20	9	5	Garrard 301	22	7	3
Dulci AM/FM	23	15	8	Garrard 301/strob	23	18	4
Jason FM	22	15	8	Garrard 4HF	18	9	9
Jason JTV/2	25	7	3	Leak Stereo 20	30	9	0
Jason "Monitor"	19	16	3	Loudspeakers by—			
Jason J2-10/MKIII	39	gns.		Tony Cartridges			
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Quad II Control Unit	25	0	0	Wharfedale, etc.			

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Grundig TK 24	62	gns.			
*Grundig TK25	62	gns.			
*Grundig TK30	72	gns.			
*Grundig TK35	82	gns.			
*Harting 4 Track Stereo	86	gns.			
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Magnafon	49	gns.			
Philips 4 Track 3541	34	gns.			
Philips 4 Track 3542	59	gns.			
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EQUIPMENT REVIEWED

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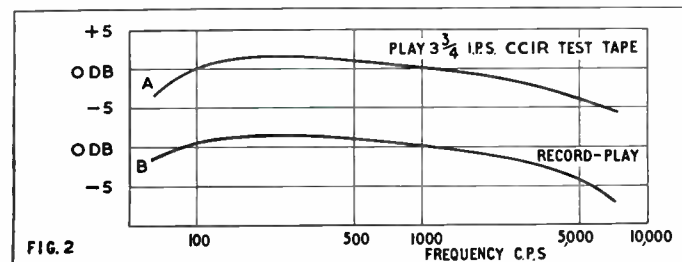
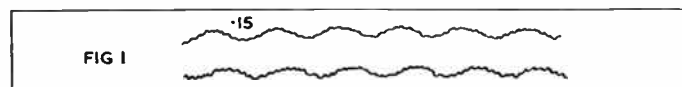


Manufacturer's Specification

Supply: 200-250v. AC, 50 c/s. **Maximum power consumption:** 80 watts. **Tape deck:** Garrard Cassette Loaded. **Speed:** $3\frac{1}{4}$ i/s. **Rewind time:** 50 secs. approx. **Frequency response:** 50 c/s—10 Kc/s \pm 3 dB. **Wow and flutter:** Better than 0.2% and 0.1% respectively. **Bias and erase frequency:** Approx. 60 Kc/s. **Erase socket:** Used when superimposing one recording on top of another. **Inputs:** Mic. High impedance; Radio, 500,000 ohms. **Outputs:** Extension amplifier, 1 volt RMS peak output. **Extension Speaker;** 15 ohms $2\frac{1}{2}$ watts. **Sensitivities:** For peak output; Radio 100 mv. Mic. 2 mv. For peak recording; Radio 100 mv. Mic. 2 mv. **Valves:** 2-ECC83, ECL82, EL84, EM84. **Speaker:** 7 x 3 in. elliptical, 15 ohms P.M. **Microphone:** Hand held crystal. **Controls (Other than Tape Deck):** Mains on/off, Tone, Microphone volume, Radio volume, Monitor volume. Full mixing facilities on recording. **Weight:** 21 lb. (complete) approx. **Dimensions:** 14 x 12 $\frac{1}{4}$ x 6 $\frac{1}{2}$ in. (Lid closed).

THIS is another unit which uses the Garrard Magazine Tape Deck; this time it is presented in a portable type case with a number of novel styling features. The controls are edge operated, which results in a compact, and yet very accessible, control panel. All the input and output sockets are situated at the rear of the machine, and are covered by a removable lid. The mains lead can be stowed away in another small compartment under the cabinet.

On first handling the recorder one is rather surprised at the weight in relation to the size of the cabinet, but inspection of



the contents shows that every inch of space has been used, and that a generous power transformer has been fitted to avoid overheating in the confined space available.

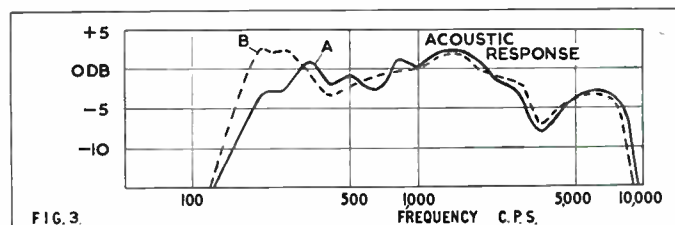
Wow and flutter

This particular deck showed a slight periodic speed variation at capstan rotation frequency, but the flutter content was remarkably low. The fluttergram is reproduced in fig. 1. The average RMS reading was 0.15%, but playback of a recording made on the same machine could result in readings varying from 0.08% to 0.2%. This was due to adding and subtraction of the nearly perfect sinusoidal speed variation which occurred on both recording and playback. This wow was only noticed on pure tones and was not audible on any programme material recorded during several week's testing.

Response curves

A $3\frac{1}{4}$ i/s C.C.I.R. test tape provided the playback only response of fig. 2A. The first curve is with the tone control fully clockwise, for maximum top response. The second curve is of record-play and gave the response shown (fig. 2B). These tests indicate that the recording characteristic is very close to C.C.I.R. recommendations, but that the playback response falls at high frequencies.

An overall acoustic test, including speaker and cabinet, was next made using a White Noise test tape and a calibrated microphone. Fig. 3A shows the response on the speaker axis with



the lid open, and fig. 3B with the lid closed. It will be seen that the bass response can be slightly improved by closing the lid; this prevents cancellation between the front and rear radiation of the speaker due to leakage around the deck mounting plate. The front radiation from the cone of the speaker was rather obstructed in this cabinet, the sound coming through an arrangement of narrow slots in the baffle; it is thought that internal reflection effects caused the dip in the response at $3\frac{1}{4}$ Kc/s.

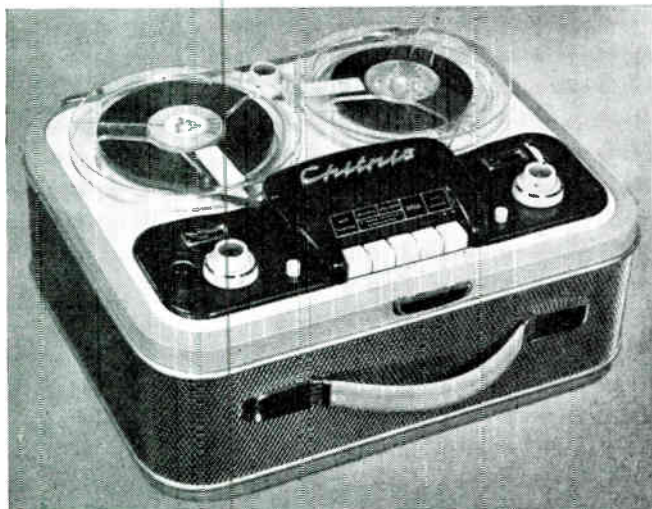
The quality on microphone, however, sounded particularly bright, and showed no lack of top response. The response of the microphone only, fig. 4, showed why; the peak at $3\frac{1}{4}$ Kc/s almost completely cancelled the dip in the speaker response, so that the overall response was sensibly level from 200 c/s to $7\frac{1}{2}$ Kc/s. This fortuitous cancellation of a peak in one response by a dip in another explains why many recorders sound much better than a simple electrical response curve would indicate, but it also shows that reliance on such compensation is dangerous, as a small shift in the peak or dip of either response could result in very poor performance indeed.

Signal noise ratio and volume indicator calibration

The hum and noise of this recorder was 36 dB below test tape level, which is 12 dB below peak recording level. A recording test at 500 c/s showed that peak recording level could be obtained with negligible distortion, so that the peak signal to noise ratio was 36 dB plus 12 dB or 48 dB. Hum pick up on the head was very low, and a closer examination of the pressure pad revealed a sandwich of felt/mu-metal/felt, so that the small piece of mu metal was brought very near to the head gap during record or play; this distorted the hum field in the immediate

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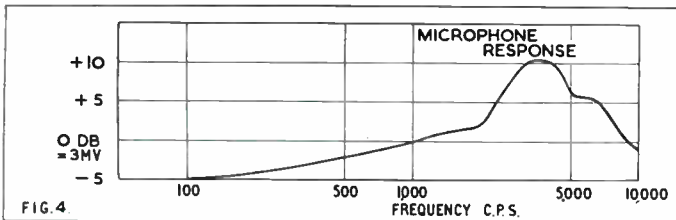
vicinity of the gap in such a way as to reduce hum pick up to a very low level.

Peak recording level on the tape was obtained when the volume indicator beams were about 1/10 in. apart. It was found that the level indication was non-linear when the beams were closer than 1/4 in., and it is suggested that a 1/4 in. wide cursor should be fitted to the centre of the indicator tube, and the sensitivity of the indicator reduced slightly, so that overload is indicated when the beams touch the cursor. This would define peak recording level more accurately, and prevent the occasional overload which is almost inevitable with the present setting of the indicator.

The output stage overloaded at approximately 1 watt, or 4 volts RMS across 15 ohms, so that the specification peak power of 2 1/2 watts was not obtained. An acoustic test showed that reference level of 10 dB above 1 dyne per sq. cm. was obtained at a distance of 1 ft. from the speaker fret, with a voltage across the speaker of 0.7 volts RMS. The calculated maximum undistorted steady tone output is therefore 98 phons.

Comment

I like the cabinet styling, and the good signal to noise ratio of this machine. I think the slight top loss in this particular sample is due to a low tolerance playback head, but, despite this, I suggest that the tone control should give a bit more lift at the maximum clockwise position so that a tubby recording could be brightened; this is particularly important as no bass



cut is provided, and the bass response is generous anyway. Less obstruction of the speaker cone would improve the high note response, and give the speaker more "presence".

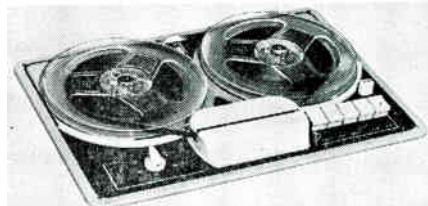
I personally found the edge operated controls rather foxing. I had to imagine myself lying in front of the cabinet and operating the controls as knobs before I could be sure whether I was turning a control up or down! I also missed any marking or calibration of the controls, and felt that a sequence of numbers from one to ten on the front face of the discs would meet these criticisms, and allow one to reset the controls for optimum mixing, etc.

With the usual reservations regarding cabinet and speaker size, I can say that this recorder gave a very good account of itself, and that used as a portable recorder, wherever mains are available, the reproduction is more than adequate for checking the quality and balance of a recording, but that advantage should be taken of the smooth response and excellent signal noise ratio to plug in a wide range extension speaker whenever possible. I think the maker's must have had this in mind in fitting a 15 ohm speaker, so that this matching impedance was made available at the output jack to suit most of the better quality cabinet speakers. A. Tutchings

Manufacturer's Comment: (1) Reference is made to the probable increase in performance if the recorder is operated with the lid closed. We do not consider this is desirable as we recommend, in the instruction book, that the recorder should not be used with the lid closed. The mounting of the Garrard deck on the motor board has been arranged to leave an appreciable gap all round for the promotion of ventilation. *If the lid is closed this idea of increased ventilation is inoperative,* and in small portable recorders every bit of ventilation that can be induced is desirable. (2) Re the speaker grille, actually there are four slots which provide approximately 60-65% free flow to the effective speaker area. It is appreciated, of course, that some obstruction is bound to exist by the very nature of the covering, but this now seems to be standard practice with all the better types of recorders. (3) Linearity of the indicator;

particularly the distance between the beams. This always is a difficult point to completely cover and whilst we appreciate the reviewer's observations we nevertheless clearly indicate in the Instruction Manual that a gap of 1/4 in. should be maintained. (4) With regard to the output power, all tape recorders of the 171 series must pass an output power test of 2 1/2 Watts into 15 ohms at 1,000 c/s with mains supply of 230V, and the mains setting panel set at 230V. We cannot quite understand the reference to 1 Watt power output, as a recorder of this characteristic would never pass our tests. (5) Again we appreciate the personal opinion of the reviewer, but we feel that perhaps the lateral control system is perhaps a little unduly heavily underlined. There is no real difficulty in operating any instrument, so far as we know, with this form of control. We trust that you will regard these points in the spirit to which they are advanced, and remain. Yours sincerely (for Specto Ltd.). A. E. GREEN, Sales Manager.

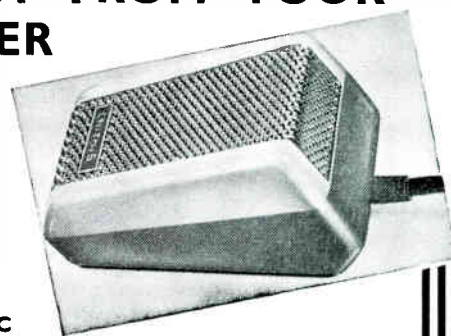
MOTEK RECORDER MODEL K10



THE new model K10 Motek tape deck is basically similar to the previous model K9. The external appearance has been considerably enhanced by the addition of a top cover to the main plate, allowing an unbroken surface. If it is said that the general appearance of this unit is of a workmanlike assembly of the necessary components without any frills, this must not be taken to be in any way uncomplimentary. Here are the basic requirements, well produced, and any streamlining must inevitably put the price up.

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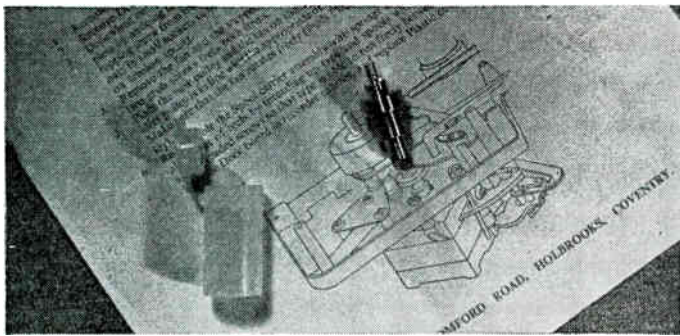
Quite a number of features have been retained from the K9, which itself means that they have been proved in service. The spool braking arrangement in particular appeals to the writer as being effective, and allowing simple adjustment. The speed change is easy to operate, though, in view of the fact that the user is recommended to leave the unit standing with the selector in an intermediate position, indexing in these positions would be desirable. The three speeds were measured to be remarkably close to nominal, and wow and flutter is of a low order. This is doubtless due in part to the careful machining of the heavy flywheel.

Concerning the Sound Channel, the heads are neat with a good potential performance. The azimuth adjustment provided on the Record/Replay head should be adequate for normal purposes. The way in which the tape is, to a large extent, wrapped round the heads while running is to be commended, one feels that the pressure pads are left with little to do, always a good point. With such an arrangement, it seems a pity that the tape could not be entirely clear of the heads during fast winding, on the deck examined they were still in contact. One thing was noticed that could be more important, no adjustment is provided, either on the heads or the tape guides, to vary the tracking of the tape. In the writer's experience, cross-tracking is not so infrequent that its existence can be ignored in design if the full width of tape available is to be utilised, though it must be stressed that there is no reason to expect this trouble on the K10!

The Motek K9 has proved popular with a number of Tape Recorder Manufacturers, there is every reason to believe that the K10 will prove a worthy successor. **A. Bartlett Still**

Manufacturer's Specification

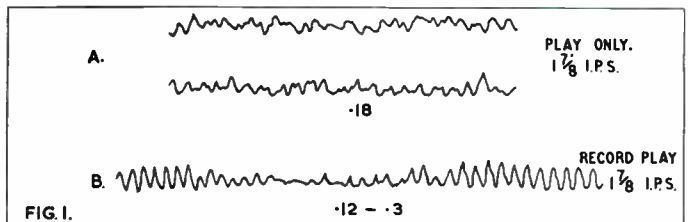
Three Speeds: $7\frac{1}{2}$, $3\frac{3}{4}$ and $1\frac{7}{8}$ i/s, giving a playing time of 2 to 8 hours with Double Play tape. Drop in tape loading. Pause Control. Three Digit tape position indicator. Safety record button. Three drive motors. Ample contacts for amplifier switching. **Mains consumption:** 70W (Fast winding 120W). Mechanical braking. **Size:** $15\frac{1}{4} \times 10\frac{3}{4} \times 4\frac{7}{8}$ in. **Weight:** $13\frac{1}{2}$ lbs. **Price:** £22 Is. Manufactured by Modern Techniques, Wedmore Street, London, N.19.



From Howard Freer, 5 Romford Road, Holbrooks, Coventry.

As shown in the photograph, this pulley consists of an aluminium turning which replaces one of the stepped drive pulleys on a Collaro deck so that the diameter of the drive members are exactly halved, so giving speeds of $7\frac{1}{2}$, $3\frac{3}{4}$, and $1\frac{7}{8}$ i/s instead of the usual ones of 15, $7\frac{1}{2}$, and $3\frac{3}{4}$ i/s. Full instructions for fitting are given in the leaflet supplied, and Mr. Freer has also passed on a copy of a letter from Messrs. Collaro which states that, in their opinion, the speed of the flywheel may be insufficient to do much smoothing at this speed, and that a considerable amount of wow might be expected.

I fitted the pulley to a Collaro Mk. 4 deck as per instructions, and replayed a test tape which was known to have a very low wow and flutter content. The fluttergram provided by this playback only test is shown in fig. 1A. The total wow and flutter reading remained reasonably steady at 0.18% RMS, and no wow was audible or visible on the pen recording; there was however signs of a 23 c/s flutter which is the rotational speed of the motor shaft to which the pulley was fitted.



Record-replay tests were next carried out, and as expected sum and difference "beats" between the recorded and played back flutter occurred as shown in fig. 1B. Due to the short recorded wavelength of the recorded flutter adding and cancelling occurred fairly frequently, and the RMS readings varied cyclically from 0.12% to 0.3%.

These tests indicate that flutter, rather than wow, is the main risk, and that it depends almost entirely on the true running of the pulley. I found that holding a pencil very near to the tip of the rotating pulley caused a 23 c/s "tick", and it is very possible that a series of cut and try fittings would have resulted in less eccentricity, and less flutter.

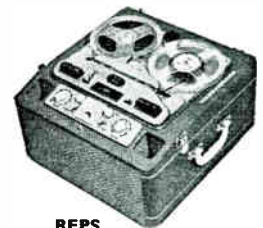
Critical listening on sustained musical notes did show a slight "burble" at times, but this only showed up periodically, and was not noticeable on speech or most types of pop music. Symphonic music might suffer slightly, but a tape speed higher than $1\frac{7}{8}$ i/s would be used for this type of music because of the wider frequency response required.

It is possible that slight binding or roughness in the flywheel spindle, or eccentricity in the pressure roller, could result in audible wow as well as the flutter found in my tests. The deck I used had been well "run-in", and had low wow at normal speeds. As tested, the modification was well worth while, and by fitting the new pulley to one motor only, speeds from $1\frac{7}{8}$ i/s up to 15 i/s were available on one deck. **A. Tutchings**

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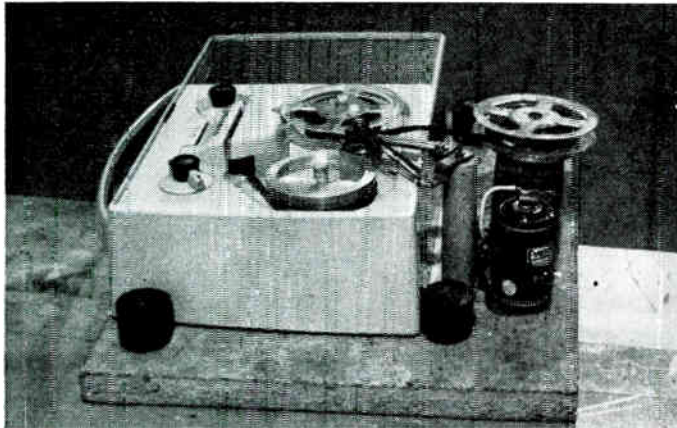
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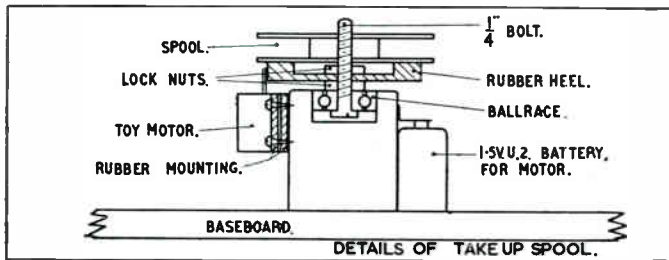
our readers write

... about a 'Cub' conversion



From:—D. L. Noble, 42c Church Street, Berwick-on-Tweed, Northumberland.

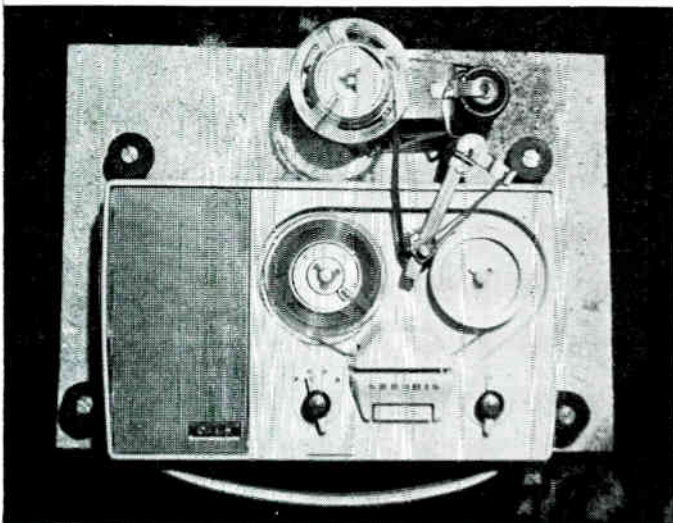
Dear Sir:—I have made an attachment for my "Grundig Cub" which permits it to operate at $3\frac{1}{2}$ in. or $1\frac{1}{2}$ in. per sec. The speeds are constant, and tapes so recorded can be played on any normal machine, and it is in the hope that some of



your other readers will find it interesting that I am sending this description.

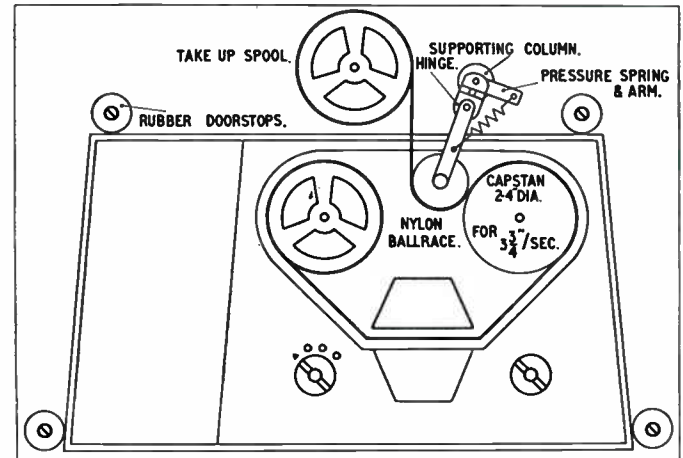
The recorder is held steady on a baseboard, and the take up spool is replaced with a disc $\frac{1}{2}$ in. thick and 2.4 in. in diameter (for $3\frac{1}{2}$ i/s; or 1.2 in. diameter for $1\frac{1}{2}$ i/s.

A rubber pressure roller bears against the disc (capstan) and is supported by an arm extending over the back of the recorder. The arm swivels horizontally and is spring loaded



toward the disc. It is also hinged vertically to its supporting column, which is screwed to the baseboard. Behind this and also screwed to the baseboard is another column to which the outside rim of a ballrace is fastened. A short bolt is passed through the centre of the ballrace and holds a circular rubber heel (thank you for the idea). The shaft of a small rubber mounted, battery powered electric motor is brought to bear on the outside rim of the rubber heel, which is at the same level as the back edge of the recorder case.

The tape is taken round the disc and, at a point mid-way between the disc and the full spool, passes inside the pressure



roller. It is then taken round the pressure roller, over the back edge of the recorder and on to a spool which has been placed on the rubber heel.

The take up spool is not essential. If the recorder is placed on the edge of a table, the tape will fall evenly on the floor. Rewind as normal and then rewind on to an empty spool, the second track may then be used.

Yours faithfully

... about trains in Moscow

From:—E. Watson, 12 Endsleigh Gardens, Blackpool, S.S., Lancashire.

Dear Sir:—Thanks for answering my recent query regarding a bulk-eraser. I found your reply very helpful. Now the following may be of interest to you.

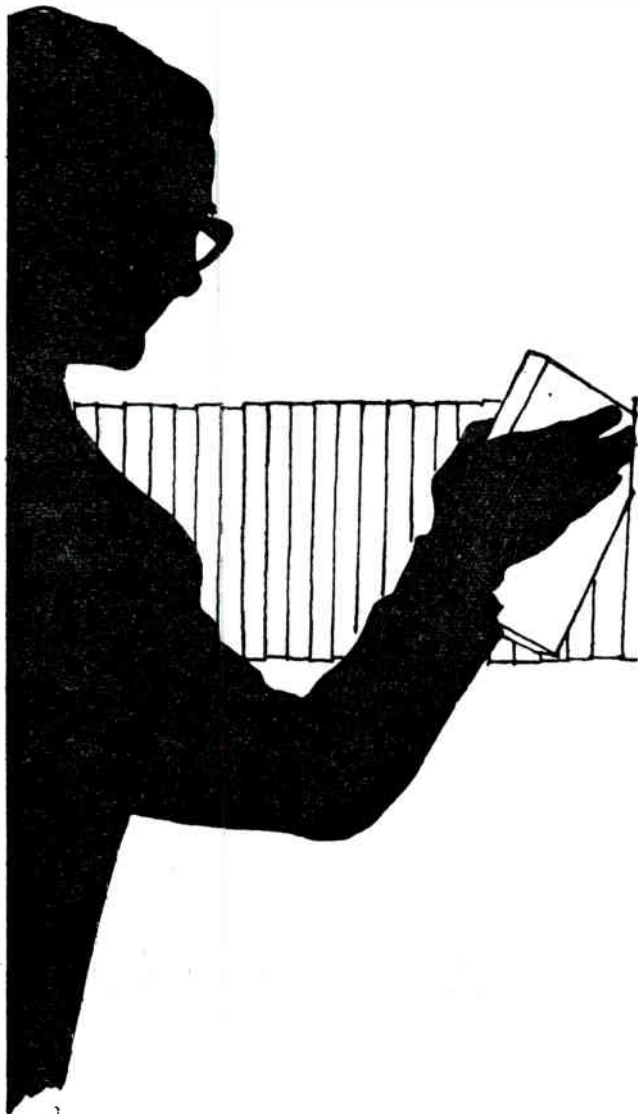
Some time ago I heard a broadcast on the short-wave radio from Radio Moscow, about the Moscow underground railway. So I wrote to them telling them that I am interested in railway sounds and asked them if they would dub sounds of the Moscow Metro if I sent them some recording tape.

I was very surprised some time later to receive a letter from them saying they had sent me a recording with their compliments. I have received the tape on a small reel and it plays for 4 minutes at $7\frac{1}{2}$ i/s. It is quite a good recording and consists of the sounds of 4 separate underground trains arriving and departing. The tape seems to be plastic with long paper leaders, and is dual track. The plastic reel is rather brittle, and seems to be a different type of plastic to the type used for our reels. Hoping the above is of interest, I am,

Yours sincerely

From:—W. Pearson, 115 Green Walk, Crayford, Kent.

Dear Sir:—I have had a tape recorder for the last five years first a Grundig now a Telefunken. There is one point I have noticed with both machines. That is that English tapes can't



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READERS' LETTERS—(continued)

be played on these machines satisfactorily. To explain myself fuller, I mean that the tape keeps on rubbing the side of the spool as it rotates. It appears that the spool does not fit properly. Several of my friends who have continental recorders experience the same trouble.

I have noticed that all the continental makes of tape fit okay, e.g. BASF, Agfa, Telefunken, Philips, etc. To me it appears that the English spool is at fault.

When I was in possession of a Grundig recorder and I noticed this fault, I did in fact write to E.M.I., and explain this to them, and they put it down to a warped spool; but after buying several other E.M.I. tapes I noticed that they were all the same. I was wondering if any of the readers of the magazine had the same trouble with their continental machines.

Yours faithfully,

. . . about club member's ages

From:—A. Sulman, 59 Hampshire Avenue, Slough, Bucks.

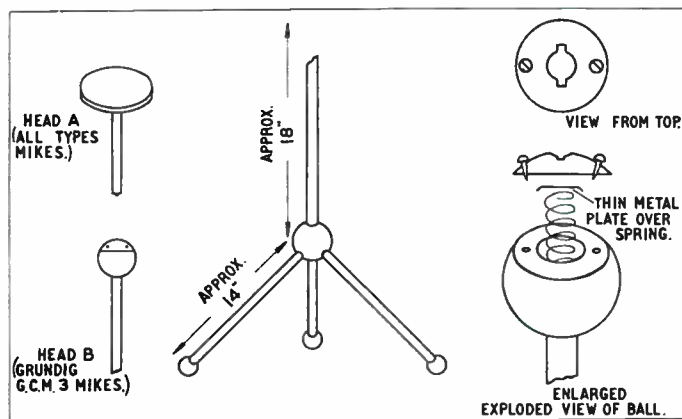
Dear Sir:—I have read with interest T. C. Nurse's article "Start a tape club", but on looking through nearly a year's publications of tape magazines there appeared a distinct lack of younger members. In fact, out of 90 people only 12 appeared under the age of 19; this could, of course, be attributed to the fact that tape recording is not a cheap hobby and, therefore, restricts the younger working generation. To me the thought of trying to ask learned men of 35 (who have handled tape recorders for many years, and are engaged in assembling a Ferrograph), the way to lace tape, makes me shudder and retreat back to a reliable tape magazine, and await the arrival of a club who will set an upper and not a lower age limit to encourage the really keen, but rather self conscious tape enthusiast.

Yours faithfully

. . . about a useful microphone stand

From:—A. V. Briggs, 6 Valentine Avenue, Sholing, Southampton.

Dear Sir:—As a regular reader I submit the following notes, as I enjoy reading of the construction of aids, gadgets etc., by readers. Do you tape-spond? Do you make family recordings? If you use a microphone at all in the home I am sure you would prefer to do so, at ease, in a comfortable chair and, unless you are already fortunate enough to own a mike stand, you always have to worry about the position of the mike being safe and suitable. I believe the following



to be the cheapest and most efficient method of solving this problem. It consists simply of a 3-leg stand, each leg radiating from a wooden ball and a central stem likewise in contemporary style. A smaller ball terminates each leg. The mounting of your microphone at the top of the column can simply be a circular platform possessing a clip to hold the microphone in position or, in my own case, I have used a

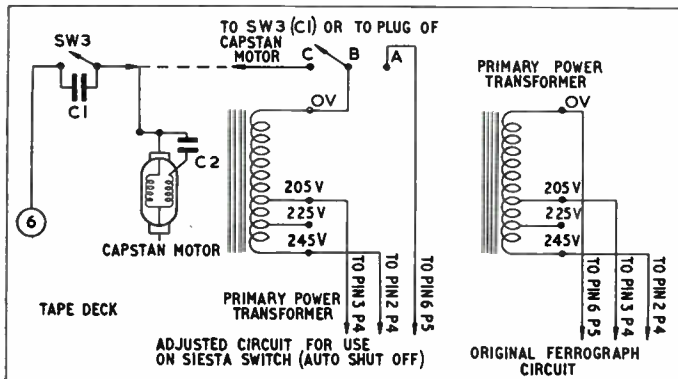
further ball (with a slice taken from the top) fully drilled and sprung within. The slice is drilled and cut to take the bayonet fitting of my Grundig mike GCM3 and the slice screwed back on top of the ball. This stand is intended for use at chair height only, and for such will be found to be reasonably safe.

The cable is better placed in a straight line from stand to tape recorder than trailing along the floor. The dowel rods and the wooden balls are readily obtainable at "Do it yourself" shops (balls costing approximately 3d. and 4½d. each) and though I experienced no difficulty in drilling my own, it is quite likely the shop would drill them for you for a nominal charge. A quick rub-over the finished article with french polish will impart a really professional finish and will add much of the pleasure of your recording sessions. Finally you could, if you wish, elaborate on the stand and make it of dual purpose. My own, when not in normal use, bears a small brass ash-tray held in position by a wooden plug (beneath) which is simply inserted into the circular hole at the top of the ball.

Yours faithfully

From:—Victor Richard Ribeiro, P.O. Box 618, Hongkong, B.C.C.

Dear Sir:—I have been a constant reader of your magazine and am still enjoying them immensely, I am a proud owner of a Ferrograph 4S tape recorder with Stereo Ad Unit and for some time now I have been wondering if you might be so



kind in publishing one or two points which the Ferrograph owner can make good use of his equipment.

Monitor: Compare input signals and recorded quality output through Stereo Ad Unit.

1. (a) I have built a Power Pack to supply the Voltages and Current (LT and HT) to the Stereo Ad Unit. (b) By placing the LT (Red Sleeves) output plug from the Ad Unit to the input of the Tape Recorder (UT), while recording the mono signals can be played back through the Stereo Head (UT) via the Stereo Ad Unit Amplifier so that the recorded signals can be compared against the input signals.

Siesta Switch: Automatic shut off of amplifier of recorder at the end of tape.

2. (a) By disconnecting the wire from the Power Transformer (Primary) usually the Blue Wire and re-connect (solder) to SPST (New Switch) point A and solder another wire of the same colour from the Power Transformer point O to point B (NS) and from point C (NS) to the Ferrograph SW.1 or to the Plug of the Capstan Motor (usually the Orange Wire) on the Tape Deck. (b) When using the auto switch, first switched to position A of (NS) and the Mains is switched ON and when the Amplifier is warmed up (Neon Light lighted) the switch is then placed (changeover) to position C (NS). Then as soon as the end of the tape passes the Tape Deck the Auto Stop of the Deck will also automatically shut the whole equipment OFF (c) I use a Acroelectric Switch Type 610 (SPDT) on the Supply Panel of the Ferrograph Recorder with the Spare Erase Link Plug taken out, and the Switch is installed in its place as it is the nearest place to the Power



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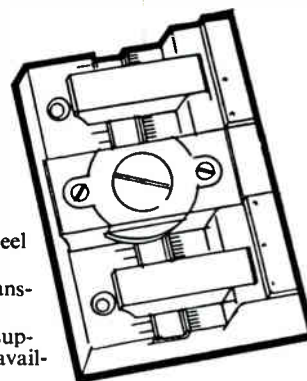
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READERS' LETTERS—continued

Amplifier of the Tape Recorder. This system has proved very useful, and can be recommended to all serious users who sometimes forget to shut off the tape recorder. With best wishes for the continued excellence of the magazine.

Yours sincerely,

From:—Mrs. Naomi Archer, 23 Gossops Drive, Gossops Green, Crawley, Sussex.

*Dear Sir:—*Surely I am not alone in my views and interest in tape-recording, although it seems that we "tape-recordists" (feminine?) are few and far between. Perhaps one reason for this is the great obstacle provided by our "tape-recorders" (masculine?). With a few exceptions, it appears that one should never question them nor argue over their hurried "technical" statements. They simply do not wish to know.

Dauntlessly and with much enthusiasm I was engaged in a discussion at a recent T.R. meeting with a group of amateur tape-recorder enthusiasts. There was a lengthy discussion on standardising connections and an almost unanimous decision that provision should be made by the manufacturers for high impedance, and low impedance inputs via an input transformer. No consideration was given to hum probabilities. This argument seemed a waste of time when that which really matters is what comes out of the cheaper recorder, after all, the higher priced machines have the connection problems more or less standardised. This opinion was, once more, given evasion or contempt treatment. Not surprisingly, the technical discussion turned out to be fruitless to their interests and ended with a manufacturer's sales lecture!

May I have the opportunity to express one suggestion where the question of hum content in domestic recorders leaves much to be desired?

The acceptance by our contemptuous male friends of a background of hum, must inevitably lead to the public acceptance of the poor performance of the majority of machines under say £100. Surely there is no necessity for this if manufacturers devote an extra few pounds towards eliminating hum (without bass cut), then perhaps a marketed £40 machine could be a worthwhile purchase at even £60 if it reproduces cleanly when connected to the usually provided for "external loudspeaker" read of in sales literature. There is no comparison, from a user's point of view, between tape-recorders, and transcription turntables with equipment which gives remarkable results for equivalent expenditures.

Please do not think that I am a Hi-Fi extremist. Naturally I do enjoy reasonable realism and more especially where this is a result of a much troubled over "live" recording on location—perhaps an indication that my criticism is not armchair borne.

Yours faithfully

BOOK REVIEW

Mon Magnétophone, by P. Hémarquinier and M. Aubier, 1960, 160 pages, 82 illustrations. Published by Editions Chirons, 8.70 NF.

IF you are fairly new to tape recording and can read French, this excellent little book would be well worth getting. Not only does it explain in non-technical language how tape recorders work, and the purpose of all the various controls, but it gives many examples of interesting uses for a recorder so that the newcomer's horizon will widen continuously from the word go. The opening chapter consists of a potted history of recording—with humorous sketches, and the final section of the book introduces the reader to such operations as mixing, recording from radio, and the making of sound effects. This is arranged in the form of a dialogue between Lex and Len (Lexpert and Lenovice), so that even conversational French may get you by! This well-illustrated paper-back is a useful addition to the beginners' library.

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All advertisements for the October issue must arrive not later than September 12th.

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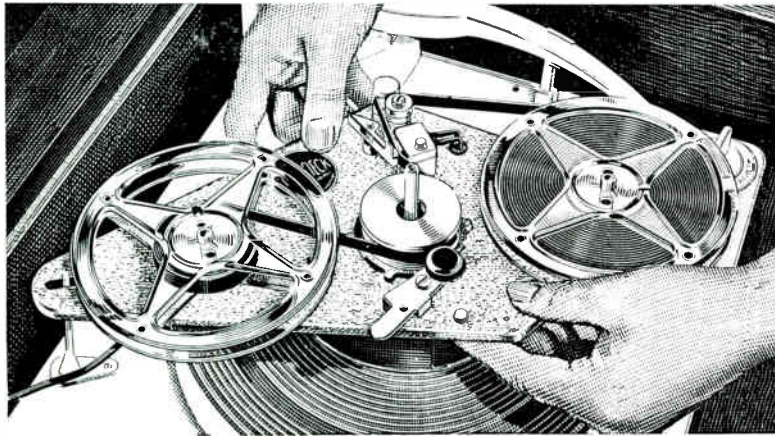
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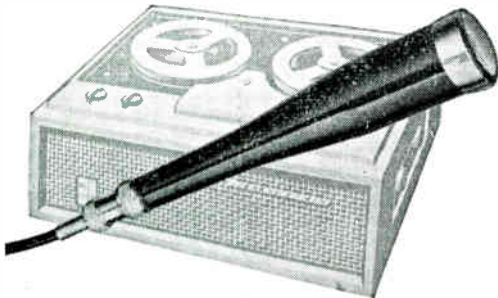
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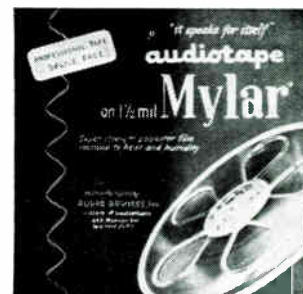
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