

# the TAPE RECORDER

PRICE 1/6

January 1963  
Vol. 4 No. 12

INCORPORATING "SOUND AND CINE"



## — IN THIS NUMBER —

Tape Recorder Service • Details of New Products • Peak Programme Meters • Equipment Reviewed  
News from the World of Tape • Sound and Cine • Readers' Problems • Tape Recorder Workbench  
• Readers' Letters • News and Pictures from Clubs

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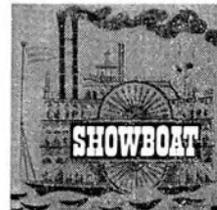
37. Revolutionary Study, Polonaises A and A-flat, Fantaisie-Improptu—12 favourites in all played by the pianist of Dirk Bogarde's 'Song Without End'. Also on disc: mono only



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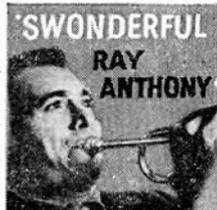
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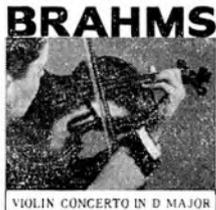
36. Beale Street Blues, After You've Gone, The Sheik of Araby, My Kind of Love, 12 tremendous hits by one of the world's greatest jazz trombonists. Also on disc: mono only



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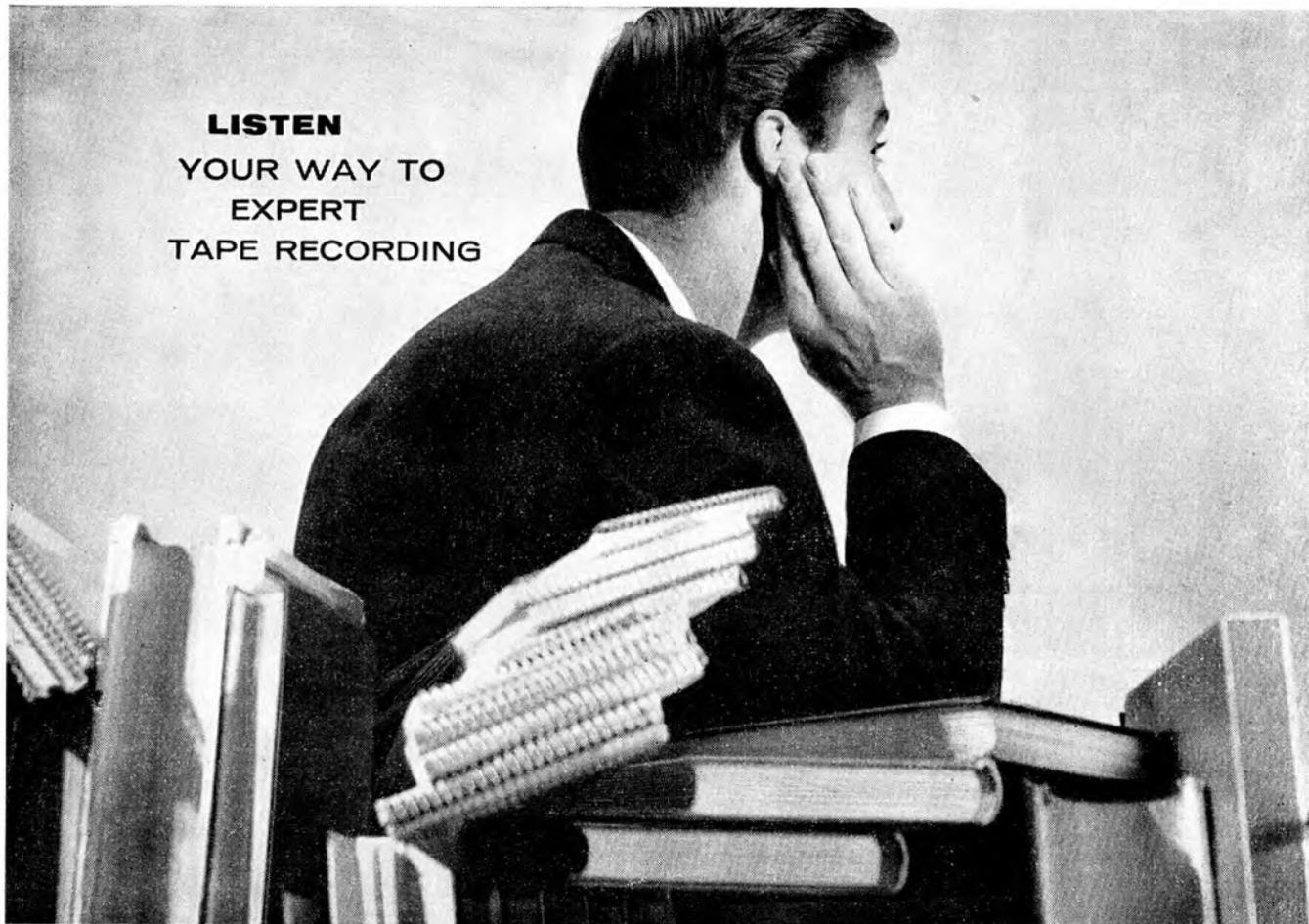
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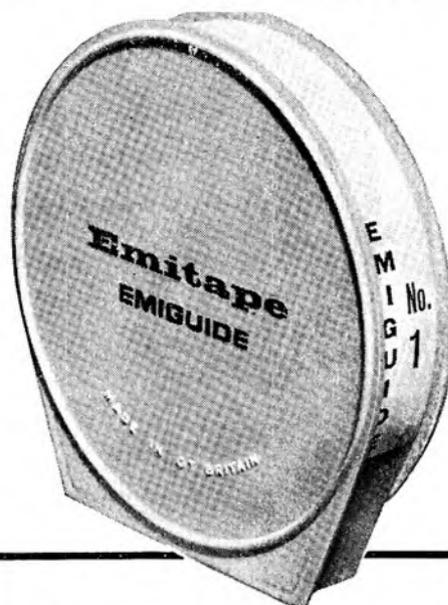


## Emiguide's guide where books can't take you

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# the TAPE RECORDER

Editor ----- MILES HENSLOW  
 News Editor ----- Alan Lovell  
 Advertisement Editor ----- Julian Berrisford  
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★  
**EDITORIAL**

MEMBER OF THE  
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 OF CIRCULATIONS

THIS is the twelfth and final number of our fourth volume, and we are sorry to have to announce that it must be the last number of the magazine to carry the *one-and-sixpenny* price tag. As from next month—Volume five, Number one—the price of *The Tape Recorder* will be two shillings. We do not believe in coating pills in sugar for intelligent people to swallow: hence the above straightforward facts in the minimum amount of words. However, the point made, we feel it only right to give the reasons.

First let us say that we are dead against the almost automatic procedure of passing on each and every increase to the customer, for we think that if this were done a little less often, and if a few more concerns (some large, some small) were to absorb a few of the increases themselves, there would inevitably be less need for increases all round. We not only feel very strongly about this, but we have always put our feelings into practice; and particularly so in the case of this magazine. During the four years of its publication our printers have twice asked us to accept price increases—the result of wage and other increases. Just over a year ago, because we were not satisfied with the quality of the paper on which the magazine was printed, we cancelled our supplies and introduced a much superior grade. This cost money. Only a few months after ordering the new paper, its price went up. We swallowed that one, too!

Now, however, our printers have asked us to accept yet another price increase—the third in four years—to take effect from January 1st, 1963. This is by no means the whole story, of course, for other things have gone up, too, including postage, delivery and other items which are involved in production; but

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it is enough to show that we have genuinely practiced what we preach for as long as it has been economically possible for us to do so. We have absorbed the lot, and have also improved quality in the meantime. But this time, much as we sincerely regret having to do so, we ask our readers to accept a price change.

We are fairly confident that the majority of our readers endorse our views and our policy on quality. If a thing is worth doing, or putting together, it is worth seeking out the best materials and the most skilful hands to match the effort. Nothing short of that interests us. We have written of future plans for this magazine, and we have other plans which we have not yet mentioned. We think that all these things should combine to make *The Tape Recorder* a very worthwhile paper. But this is not "sugar". Our real hope is that the majority of our readers will consider this magazine to be well worth its new price of two shillings in its present form.

And now, to end on a different note, as the telescopes of the world watch the accumulating bunch of satellites nearing the end of another 365-day journey round the sun, we wish you all a very happy and peaceful 1963.

COVER NOTE

HOW many miles of tape have passed the sound heads of *your* recorder during the past 12 months? How many spools will you fill during 1963? These were the thoughts that produced the idea for our cover picture as the sands of 1962 ran out. In actual fact the sand runs for precisely 2½ minutes in the glass on the cover, and was probably used for timing the eggs in some Austrian kitchen during the last century—once for soft, twice for normal, thrice for hard. But don't let that spoil the picture!

SUBSCRIPTION RATES

The subscription rate to *The Tape Recorder* is 27/6 per annum (U.S.A. \$4.00) from The Tape Recorder, 99 Mortimer Street, London, W.1. Subscription + Index, 30/- (U.S.A. \$4.25).

The subscription rate to *Hi-Fi News* is 27/6 per annum (U.S.A. \$4.00) from Hi-Fi News, 99 Mortimer Street, London, W.1. Subscription + Index, 30/- (U.S.A. \$4.25).



**JANUARY  
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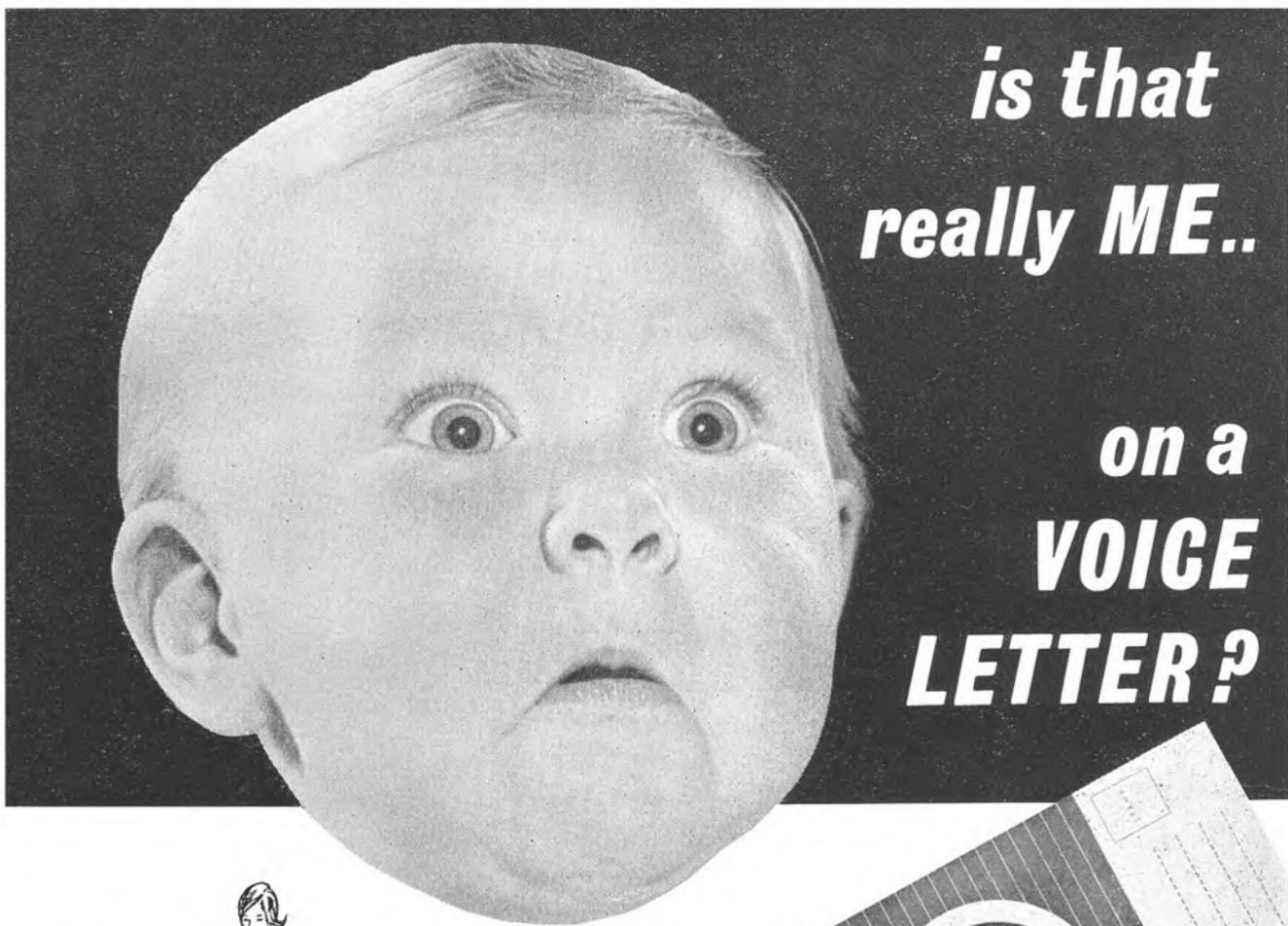
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# NEWS FROM THE WORLD OF TAPE

## Ampex Introduce Portable Instrumentation Recorder

AMPEX have introduced the first portable instrumentation recorder designed as standard equipment for both research and other applications in medicine, industry and education. Designated the SP-300, it combines much of the advanced technology of Ampex's larger, more complex instrumentation recorders together with portability, compactness and economy.

In addition, its four tracks make it suitable as a teaching aid in medical studies such as that of the cardiovascular system. For example, cardiogram and blood pressure readings that have each been recorded on separate channels could be displayed on an oscilloscope while the simultaneous heart sounds and the instructor's voice, recorded on the other two channels, are played back through a loudspeaker.

Possessing solid-state circuitry throughout, its four channels, with electrically switched amplifiers, offer both direct and FM record/reproduce electronics. The direct record process allows recording of rapidly-varying phenomena over a range of 50 to 40,000 cycles per second. The FM circuitry complements the direct process by recording phenomena varying at low rates in the range of from 0 to 2,400 cycles.

Four tape speeds, between  $1\frac{1}{2}$  and 15 i/s, are provided, permitting time-scale compression and expansion of all recorded phenomena. Each speed is electrically switched by a single front panel control. The SP-300 records on  $\frac{1}{4}$ -in. tape on 7 or 10 $\frac{1}{2}$ -in. reels.

The SP-300 measures 22 x 13 x 19 $\frac{1}{2}$  in., and weighs 85 lbs.

## Westrex Awarded Contract

THE Westrex Company, a division of Litton Industries, has been awarded a Contract by the British Broadcasting Corporation amounting to over £48,000, for the supply of magnetic sound reproducing and recording equipment. The equipment is intended for use with the British Broadcasting Corporation's new second television channel, which is to come into service during 1964.

There will be a total of thirty-four magnetic film reproducers and recorder/reproducers of the very latest Westrex design, incorporating special features required by the British Broadcasting Corporation. Some of the machines will be for use with 16 mm. and some with 35 mm. magnetic film.

## E.M.I. Tape Recorders for Divorce Courts

PROCEEDINGS of divorce cases being held in one of the court rooms at the Law Courts in the Strand are being recorded as an experiment by professional tape recorders supplied by E.M.I. Electronics Ltd.

Six microphones are positioned in the court, for the witness box, for the judge, for the clerk of the court—the Associate—and three for the barristers. These are connected to an E.M.I. control console where the microphone outputs are mixed and passed to one of two RE 301 remotely-controlled tape recorders. Limiter amplifiers and correction networks are installed in the console to obtain a clear recording of the spoken words by reducing extraneous noises, such as the slamming of doors and the sounds of traffic outside the building.

Recording levels are pre-set to court conditions and the Associate need only operate a switch to start the recording system, when proceedings begin. Emitape type 100 on 8 $\frac{1}{2}$  in. tape reels is used and as each track on a reel can cope with at least three hours' recording time, a reel can contain a whole day's proceedings. Should more than three hours' continuous recording be required, the second RE 301 can be started up and the first stopped by the use of one switch on the console.

If any queries are raised on evidence given earlier in the hearing the E.M.I. tape recorders provide immediate play-back



During a visit to Llandudno, Mr. E. A. Elcock, of Liverpool, recorded an interview with a Welsh girl in national costume.

facilities, and the meanings behind voice inflections can be assessed as well as the exact wording.

Another E.M.I. tape recorder, a variable speed replay machine with stop/start spool, is used to transcribe the recorded tapes. If, as in most cases, a typewritten copy of the proceedings is not immediately required, the tapes can be stored for future reference. The experiment will show whether tape recorders offer a more economic means than present methods of recording court proceedings.

## Preliminary List of Exhibitors

THE preliminary list of exhibitors for the 1963 International Festival and Fair has been issued by the organisers. It reads:—Acoustical Manufacturing Co. Ltd. A.K.G. Ampex Ltd. Armstrong Wireless and Television Co. Ltd. B.A.S.F. Brenell Engineering Co. Ltd. Butoba. Chapman Ultrasonics Ltd. Clarke and Smith Mfg. Co. Ltd. Cosmocord Ltd. Decca Record Co. Ltd. E.M.I. Ltd. Fi-Cord Ltd. Ferrograph Company Ltd. N.S.B. Field Ltd. Federation of British Tape Recording Clubs. G.K.D. Ltd. Garrard Engineering and Manufacturing Co. Gevaert Photo-Producten N.V. Goldring Manufacturing Co. (G.B.) Ltd. Goodmans Industries Ltd. Grampian Reproducers Ltd. Grundig (G.B.) Ltd. Instrumatic Ltd. K.E.F. Electronics Ltd. H. J. Leak and Co. Ltd. Lowe-Opta A.G. Long Playing Record Co. Ltd. Lowther Mfg. Co. Ltd. Lustraphone Ltd. Lockwood and Co. Ltd. M.S.S. Recording Co. Ltd. Mullard Ltd. Minnesota Mining and Manufacturing Co. Ltd. Miles Henslow Publications Ltd. Mordaunt Sound Reproducers Ltd. Ortofon A/S. Oriole Records Ltd. Philips Electrical Ltd. Planet Projects Ltd. Pye Ltd. Rola Celestion Ltd. Rogers Developments Ltd. Sherwood Electronic Laboratories Inc. Stuzzi. S.M.E. Ltd. A. R. Sugden Ltd. Shure Bros. Inc. Siemens. Sony Corporation of Tokyo. Standard Telephones and Cables Ltd. H. H. Scott (Ltd.) Inc. Simon Equipment Ltd. Twinsonic Ltd. Tannoy Products Ltd. Telefunken. Truvox Ltd. Tandberg. Thorens S/A. Vitavox Ltd. Vortexion Ltd. Waverley Records Ltd. Willi Studer (Revox) A/S. K. H. Williman and Co. Ltd. Wharfedale Wireless Works Ltd. Whiteley Electrical Radio Co. Ltd. Zonal Film (Magnetic Coatings) Ltd.

The festival will be held at the Hotel Russell, London, on April 18th, 19th, 20th and 21st.

# NEWS AND PICTURES FROM THE CLUBS

**T**HE Glasgow Tape Recording Club has produced a tape on the last day of Glasgow's famous trams, lasting three-quarters of an hour and including many tram sounds, a full description of the last tram procession and a number of interviews with tramway workers and members of the public.

The Glasgow club has now obtained the use of new and more suitable premises from the firm of M. and M. Electronics Ltd., 91 North Hanover Street, and meetings are now held on alternate Monday evenings at 7.30 p.m. A full syllabus of talks, demonstrations, competitions, etc., has been prepared and should keep members very busy during 1963. Further information can be obtained from *D. Anderson, 33 Millbrae Road, Glasgow, S.2.*

\* \* \*

**D**URING the past month members of the Thornton Heath Tape Recording Club have had the second "Out and About" programme and owing to more members having portables than before, smaller groups were able to go out and move around more freely. The items needed this time were, a bus, a bell, a train sound and an interview on any subject. All teams had to be back by 9.30 p.m. when all the tapes were played, and some very good recordings were heard. Another "Out and About" is planned for the future, by request.

The club's new "Advisory Panel for Beginners" was in action at a "Beginners' Night" meeting, headed by E. J. Bashford. Mr. B. Marlow, secretary, gave hints on maintaining machines and cleaning the heads, etc. The third member of the panel, Mr. M. Webb, demonstrated some of his extension speaker cabinets, and explained how they were built and how much they cost to build.

Further details can be obtained from *E. J. Bashford, 4 Dunheved Road North, Thornton Heath, Surrey.*

\* \* \*

**S**INCE moving into their new premises the Middleton Tape Recording Club has had quite a full programme. Its activities have included a sound hunt, a talk on echo effects with demonstrations given by George West, and a lecture on brass bands by Brian Gilbert. Both lecturers used their tape recorders to illustrate their talks.

Recently the club members were the guests of Oldham Gramophone Society at a film show which included a showing of "The Magic Tape"—a film describing the manufacture of recording tape. Further details can be obtained from *J. R. Witts, 119 Heywood Old Road, Rhodes, Middleton, Lancs.*

\* \* \*

**O**N November 12th the Cotswold Tape Recording Society (Cheltenham) made its first attempts at play-reading and recording. Two victims—the hon. secretaries—were designated to read a short and very silly playlet, being produced by Mary Lamb. This was then played back and criticised; and on the basis of this experience, two further victims had a go—this time Farleigh Price and Mostyn Pryce.

After the interval a larger group tackled a Victorian melodrama. Two new members nobly tackled the effects side, which included hoofs galloping and a donkey braying. They had to improvise everything with whatever happened to be in the hall. The result was surprisingly good, with audience and recordists joining in with boos, hisses and cheers according to the state of victory of vice or virtue—which triumphed in the end.

One member—Colin Woods—recorded the play in stereo; and although there was a great deal of hilarity over the whole thing, valuable experience was gained in balancing readers at the microphones, cueing in effects, and voice-control in reading to a microphone, which is a very different thing from acting

from a stage. More ambitious efforts in this technique are planned for the future; and the weariest man of all at the end was Ernest Morris, who kept the whole thing going with consummate generalship.

The society's hospital service has now been extended to include Cheltenham General Hospital and the Cirencester Memorial Hospital. It is hoped that other foundations will be included before very long. Information is available from *P. D. Turner, Pike Cottage, Frampton Mansell, Stroud, Glos.*

\* \* \*

**A**T the annual general meeting of the Bethnal Green Tape Recording Society, held recently, it was agreed that the society has made great progress during the past year, and this coming year, coupled with the new premises at the Bethnal Green Town Hall, even greater success is confidently expected.

Programmes are being prepared for 1963 and an effort is being made to encourage members to participate in more active recording sessions. In the technical field, apart from the normal demonstrations, etc. arranged with manufacturers, Mr. J. Burchell of the club is arranging a series of regular talks of a more technical nature.

Further information on the club can be obtained from *R. Gentle, 24 Hyde Road, Hoxton, London, N.1.*

\* \* \*

**A**S a novel recruiting drive, Walsall Tape Recording Club has prepared a short "commercial" for give-away distribution by a local trader. Copies of the five-minute master tape will be prepared by M. L. Chambers, of Audio Electronics Ltd., and presented to purchasers of new machines.

The item brings the customer's attention to the existence and activities of the club, gives several brief examples of the uses of a recorder, invites listeners to visit the club, and offers them six months' free membership for doing so.

Details are available from *P. A. Clark, 20 Springvale Avenue, Parkhall, Walsall.*

\* \* \*

**A**CTIVITIES in the South Birmingham Tape Recording Club have become very hectic over the past few weeks. Club meetings have taken place once a fortnight as usual, in addition there has been a visit to Kidderminster Club and the supplying of sound effects to the Alexandra Playgoers Club.

The Players were faced with the problem that they required numerous sound effects and approached the club for assistance. This soon proved to be more difficult than was first expected. There were over forty different cues.

The action of the play taking place in the Orkney Islands, required the sounds of gulls and rolling of the sea almost throughout. This was faded in and out on one tape recorder. In addition, a second recorder supplied such sounds as a horse and cart arriving and departing, a dog barking and a thunderstorm.

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# NEWS AND PICTURES FROM THE CLUBS

The fact that one of the actors was required to play the piano, but was not a pianist presented no difficulty, as this was recorded and synchronised in a most convincing manner. Three or more members attended rehearsals twice a week and the play was presented for five performances.

This was the first time the South Birmingham Club has had the opportunity of helping the amateur theatre, but it proved a great success and already there have been requests for assistance from other societies.

Further details can be obtained from *J. T. Gilbert, "Woodcote," Box Trees Road, Dorridge, Solihull, Warwickshire.*

ONE of the latest clubs to be formed is the **West of Scotland Tape Recording Club**. Meetings are held every Monday in the Glasgow area. Founder members, secretary *A. McCallum* and chairman, *G. Wood*, have compiled a syllabus of meetings for a year ahead. Among the evenings planned are, the making of "Feature Tapes", "Getting more with a Portable" and the mixing of "Tape and Slides".

Anyone living within reach of Glasgow, who would like further details should contact the secretary *A. McCallum, 9 Glendevon Square, Glasgow, E.3.*

THE second November meeting of the **Whitstable and District Tape Recording Club** was the annual general meeting, and the reports of the secretary and the treasurer revealed that the club was in a healthy state both as regards members and funds. There were now 36 members, excluding the doubtfuls, and the average attendance in the first year of the club had been 16. Funds in hand amounted to £20, and in view of this satisfactory state subscriptions were to be reduced in the coming year from 20s. to 15s. As before, there would be no subscription payable by girl friends or wives of members, nor by junior members under the age of 17.

The present club officials were all re-elected for a further term, *Bill Blake* as chairman, *Tom Robinson* as secretary, and *Peter Hadley* as treasurer, and there was to be a new technical sub-committee set up, to offer technical advice and assistance to members. This would consist of boffins *Ken Pearce* and new member *Jim Campion*. It was announced that there would be a change of headquarters in the new year, and that meetings from Monday, January 14th, would be held fortnightly at The Record Centre, Oxford Street, Whitstable.

Further details may be obtained from *T. Robinson, 17a St. Anne's Road, Whitstable, Kent.*

A NUMBER of tape recording enthusiasts met in the Dorris Tearooms, Ayr, recently, with a view to forming a tape recording club for Ayr and district. *Mr. Stanley J. Hourston* proposed the formation and was seconded by *Mr. E. W. Reid*. *Mr. H. Copinger, Kilmarnock*, proposed that the club be named **Ayr and District Tape Recording Club** and *Mr. Hourston* seconded.

A proposed constitution was read and, with amendments, was put to a full meeting on Monday, December 17. An organising committee has been formed and consists of Messrs. *Hourston, R. McDonald, J. Rae, E. W. Reid* and *W. Holmes*.

All inquiries regarding the club should, in the meantime, be addressed to *S. J. Hourston, 93 Whitlatts Road, Ayr.*

THE **Reading Cine and Tape Recording Society** has welcomed more new members this season and is now well into an interesting series of weekly meetings. Combining, as it does, the worlds of the cinema and sound recording, it provides a meeting place for people with varying shades of interest in two arts



*Daphne Oram, president of The Dartford Tape Recording Society, is seen demonstrating electronic music to club members during their visit to her studio.*

which are frequently complementary to each other. Indeed the society can claim to be a pioneer in the application of tape sound to both colour slides and amateur films.

Recently invited to share an evening with the Kingston-on-Thames Cine Club, Reading arrived with a formidable array of equipment including *Doug. Noyes'* speciality, a device for fading slides on and off the screen in sync. with tape commentary and music. It was effectively used on this occasion to project *Jack Lee's* slide sequence "Paris". Also in the programme was *Derek Purslow's* award winning cartoon "The Runaway Train", with pictures and sound painstakingly drawn on the film.

The society encourages its members to play an active part in the proceedings and exercises are organised in which all can participate. At the moment everyone is feverishly working on their own interpretation of the title "Wheels", for film or tape.

Practical "How-to-do-it" sessions are a feature of the society's activities and already this season there have been evenings devoted to indoor filming, title-making and tape work. In the full programme ahead there is certainly something for everyone and newcomers will be well catered for. Meetings are held each Monday at 8 p.m. Details are available from *T. Fisher, 5 Maple-durham Drive, Purley, Reading.*

MEMBERS of the **Dartford Tape Recording Society** travelled to *Wrotham* for a demonstration of Electronic Music by *Miss Daphne Oram* in her studio, which is a converted oasthouse, packed with recording equipment and electronic devices.

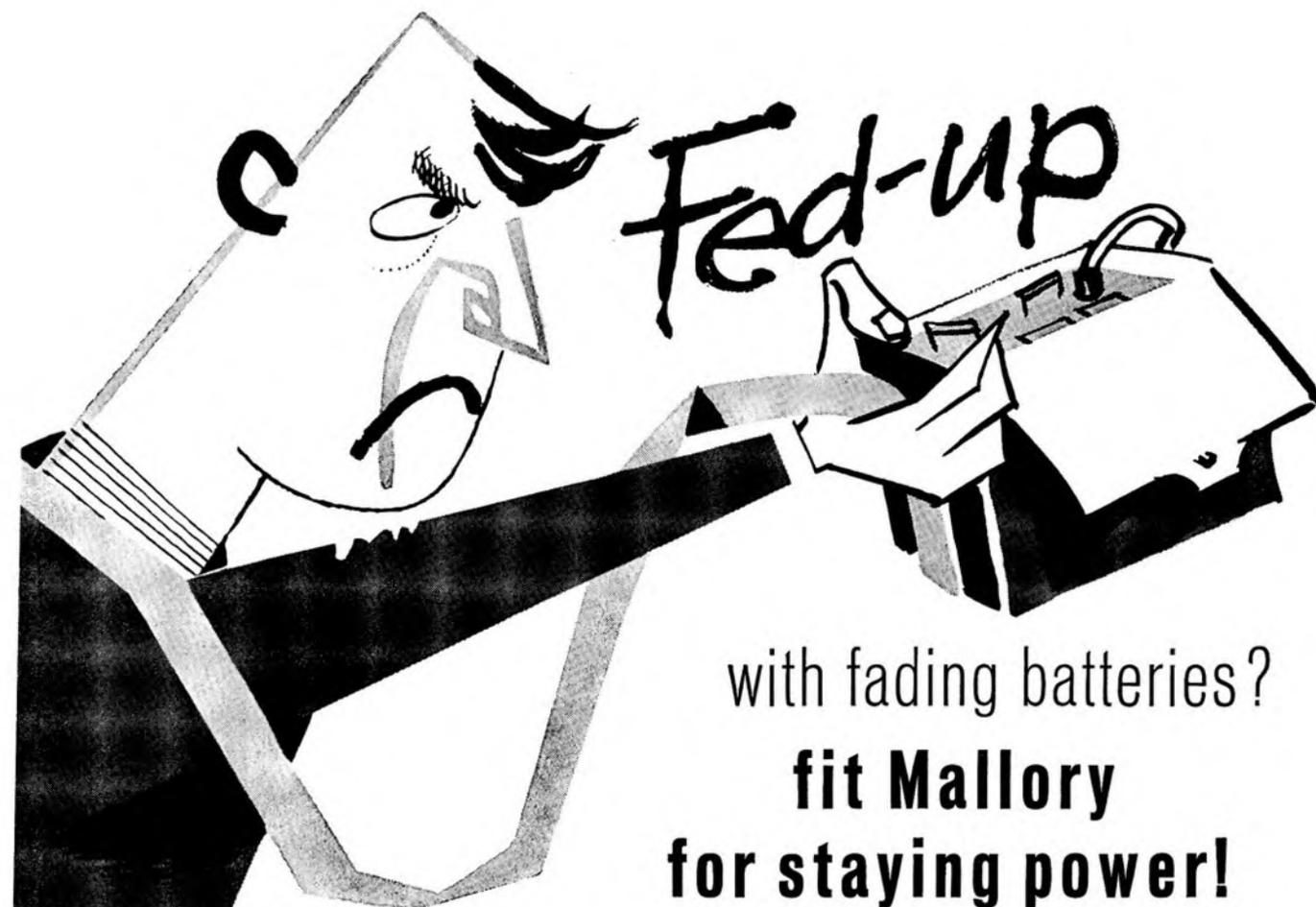
It is here that she composed the weird "out of this world" electronic music that has earned her the *Gulbenkian* grant which will be used on research for producing other ways for the creation of electronic music.

In the studio members were given a very interesting demonstration on the various ways of producing electronic music, such as speeding up, cutting the attack or delay of music or sound, playing the tape backwards, cutting and splicing the tape, echo or reverberation and the use of filters to cut out different parts of the frequency band.

Further information is available from *E. H. Foreman, 117 Westgate Road, Dartford.*

A SUGGESTION for the formation of an **Association of Midland Tape Clubs** has been approved by the following clubs: *South Birmingham Tape Recording Society, Birmingham Tape Recording and Audio Club, Kidderminster Audio and Tape Society, Warwick and Leamington Amateur Tape Recording Society and Cotswold Tape Recording Society.* It is hoped that such Association will further the activities and interests of tape recording and lead to a greater co-operation between clubs.

Seventeen clubs have now been notified. Any other clubs in the Midland area wishing to obtain further details should contact *J. T. Gilbert, "Woodcote," Box Trees Road, Dorridge, Solihull, Warwickshire.*



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by Richard Golding

# SOUND AND CINE

**"HOLD** Back the Dark", the current 16 mm. sound film from the Ardleigh House Cine Group of Hornchurch, Essex, tells of a man who is dared, one evening in the local pub, to stay the night in a Haunted House. Weird things happen to him, emphasised in the film by an imaginative sound track containing quite an amount of lip sync.

The recording system used by Ardleigh House is quite impressive. The camera is driven by a synchronous *Parvalux* motor via a gearbox which drives through a dog-clutch into the *Bolex* external motor-drive socket. The system incorporates a synchronous starting unit which is a low voltage slave unit and which can operate either the camera motor or the projector motor (separate units are built into (a) the camera blimp and (b) the projector stand). The *Ferroglyph* recorder that the Group uses has been slightly modified in such that it has a micro-switch fitted under the start lever. Starting the recorder closes the contacts of the micro-switch thus completing the low voltage relay circuit. This in turn switches the mains to the camera motor so that the instant the recorder is started so is the camera.

Additional fittings to the blimp unit are a remote control for the camera operator and a flashing-run indicator consisting of a lamp operated from the low voltage supply via a micro-switch (this is operated by a cam fitted on the final motor drive shaft—the switch closing once per rev of the spindle). The need for a flashing indicator

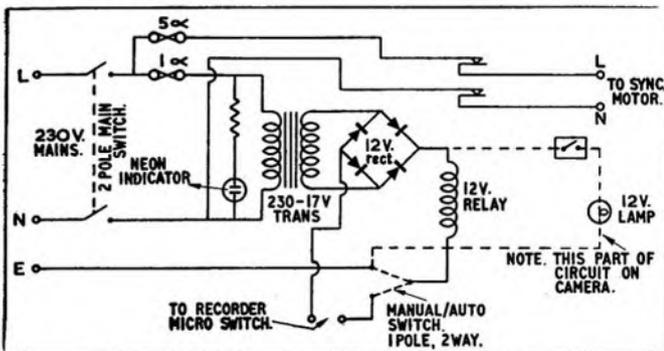


Diagram of the synchronous starting unit.

of this type is because the synchronous motor has a very low torque and sometimes stalls on start-up. Any trouble within the system is easily observed by the camera operator who can cut immediately. Low voltage D.C. is preferred for reasons of operator safety but also to prevent hum getting into the recording.

## The Blimp

The blimp is constructed of  $\frac{1}{4}$  in. ply with the camera gearbox and motor unit all mounted on a common panel, suspended on rubber blocks fixed within the blimp case. The only parts of the camera projecting from the blimp are the lens turret and the viewfinder. The whole of the blimp is insulated with half-inch plastic foam.

On projection the projector motor is disconnected from its transport mechanism and a *Framco* synchronous motor is used to drive the projector through a twin-ratio gearbox for 16 and 24 f.p.s. The *Ferroglyph*, with tape-sync marking pre-aligned at the recording head, is started up. This closes the low voltage circuit, pulling in the mains



Camera set-up showing the lower half of blimp with *Parvalux* motor and gearbox.

relay and thereby switching the mains to the synchronous motor and to the projector motor. The film, of course, having been positioned with a sync mark in the gate. As soon as the projector starts to run another indicator lamp is switched on showing that a synched start has been effected.

Ardleigh House do not claim that every shot that they have in the can is perfect as far as lip sync goes but results to date have been extremely encouraging. Encouraging enough to warrant extra outlay on sprocketed accessories and the replacement of all their press-fit rubber tubes on the drive spindles by flexible mechanical couplings. These improvements, they hope, will give them 100 per cent. lip sync at all times. Details of membership may be obtained from G. H. Morgan, Esq., 25, Cromer Road, Hornchurch, Essex.

## Make Your Own Sound Effects

A reader asks if there is a standard system laid down for the creation of faked sound effects. There is no standard as such, laid down by any authority, as far as I know. There are, of course, many methods used in producing desired effects and the best of these have become recognised throughout sound recording circles, representing an unofficial standard to be followed. The creation of a sound effect is a prime tape technique which can be developed from any one of a number of prolific sound sources to be found in most households: a box of matches, an electric razor, a piano, a typewriter, a clock, a tap, a fan, an oven, a vacuum cleaner and a hair dryer. Consider the sound of an electric razor. Its sound changes from a buzz to a drone when pressed against a table surface. Try it against other types of surface—a window pane, a door, a coal bin. Record it inside a cardboard box, a cake tin and a glass jug. Play back these tests at the recorded speed, then at double speed, and, if your recorder has three speeds, to the extremes provided by these. Now, extend this experiment and bring in other sound sources, doing the same thing with each one. In this way you will begin to build-up an appreciation of the difference between sounds and, if you care to note down the impression produced by each source, you will have a valuable reference for whenever an unusual sound is required.

## Analyse the Actual Sound

An important part in the reproduction of a sound effect is the correct analysis of what actually makes up the whole sound. Effects are usually made up from a number of other, smaller effects following a pattern or rhythm, examples of which are given in my glossary. The glossary, which has taken many weeks of experimentation to produce, is made up of most of the recognised methods and some new ones that have simply evolved through experiment. There is, however, room for additions and I should be pleased to hear from any reader who has something of his own to add to what, I believe, is the most comprehensive list to be published.

*Aeroplanes:* Fix a piece of card against the blades of an electric fan. When the blades are set in motion, they give the effect of a pre-war aeroplane engine starting up. For a modern pressurised cabin effect, try a hair dryer. The sound of a jet plane may be faked by tearing a strip of Sellotape from its roll or a sheet of glass. The actual tape recorder noise can be used. The hum of any domestic appliance or even the steady hum of the voice, provided that there is no break in

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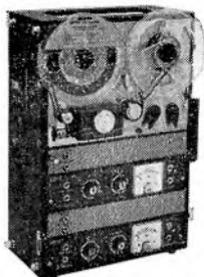
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## SOUND AND CINE — continued

continuity, can simulate the sound of a passing plane if the microphone can be moved in and out.

**Birds:** Record the sound of your own whistling or try rubbing a cork over a bottle, playing back at a higher speed.

**Burning buildings:** Crumple a sheet of cellophane close to the microphone, slowly for the most part but with energetic bursts at intervals. Cracking beams and woodwork can be produced by crushing matchboxes or sticks at various volume levels or mike distances. Play back at varying speeds for variety.

**Cars:** When recording effects for a crash it is possible to manufacture most of them without using a car at all. The screech of tyres can be produced by rubbing a finger over the surface of an inflated balloon. The impact, by crashing down a tin tray full of objects followed by the crumbling of a matchbox and the splintering of a drinking glass as it hits the floor. The sound of traffic, motor horns and gear changing is best recorded live or taken from disc. The *Doppler effect*, i.e., the change in pitch of a rapidly passing noise, can be introduced manually into the re-recording by slowing down the supply reel with the finger at the point where the effect begins. The sound of a car door can be simulated by briskly closing the oven door.

**Church Bells:** The typewriter bell recorded at top speed with intervals between each strike. Play back at lower speed.

**Crowds:** A small group of friends at some distance from the microphone murmuring the word "rhubarb" but, with the addition, now and again of something like "soda-syphon" to break up any rhythm that may creep in.

**Doors:** The effect of a door being opened and closed and the click of the catch may be easier to control if a small cabinet is used rather than a real door. Iron doors can be produced by sliding a dustbin lid over the bin rim and then replacing the lid with a clang to give the final shutting sound. For creaking doors try turning a wooden peg in a hole in a wooden slat.

**Explosions:** Are best arranged outdoors to avoid room echo but a really terrific explosion can be made with a piano by depressing all the low notes simultaneously with the loud pedal down. Outdoors, however, fireworks, bursting a paper bag, blowing quickly across the mike or even banging two large empty tins together will do the trick. Play back at lower speed.

**Footsteps:** The needed beats can be produced by any method you like but they should be most carefully done so that the walking rhythm and the material in or on which they are proceeding appears correct. For hard surfaces, pavements, etc., beats on very hard surfaces are needed.

**Horses:** The well-known method of using half a coconut shell in each hand is by far the best. Remember that the horse has four legs (this is where sound analysis comes in) and use the back and front rims just slightly out of step with each other. Fingers can be flicked on a hard surface (try a hollow one), the first and second fingers of both hands used together in a fast rhythm. The tongue can be clicked against the roof of the mouth in a double beat but care must be taken not to record the breathing. For running over grass the same methods can be used on a blanket covered surface. The harness may be reproduced by rattling a bunch of keys. The whinnying will have to be taken from disc or produced by the voice.

**Ice Skating:** Can be simulated by any number of methods from a very hard point on a sheet of glass to a pencil loosely run over the linoleum. Sound perspective is important here.

**Lifts:** Record a vacuum cleaner, starting, running and stopping at your fast speed. Play back at half speed and your lift will be heard setting off, travelling up or down (it's a two-way sound) and arriving.

**Marching:** Use an ordinary cardboard box containing a number of small objects; nuts and bolts, dried peas, rice, buttons, etc., and shake it in a steady marching rhythm (you can silently mark time yourself to keep this rhythm). The fade in and out of the passing marchers can be managed by bringing the box up from ground level close to the mike and then down again. The box may be muffled with a cloth layer if desired. The effect may also be produced by crunching sugar in a bowl close to the mike.

**Monster voices:** Recordings of cat or dog sounds replayed at a lower speed.

**Rain:** This is most easily reproduced by using the nearest equivalent—the bathroom shower or garden hosepipe and the surface on which

the rain is to fall should be as near the real thing as possible, i.e., for flat tin roof use a flat sheet of tin of not too great a thickness.

**Radio Commentary:** Tune the radio set so that only atmospherics are present. Use this sound as a background for your spoken commentary.

**Rockets:** The blast-off can be provided by a pressure cooker.

**Rowing:** Rowing or paddling can be manufactured in an open bath by hitting the water level with a flat piece of wood.

**Sea:** For surf try rocking a long shallow trough filled with rice to and fro combined with a background wind effect. A wire brush pushed along a rough surface (try dashing the brush down on the surface and then following through) will give a rough sea effect.

**Ships:** For creaking rigging stand on a loose floorboard and pivot back and forwards. Subsidiary creakings can be made by rubbing a tightly stretched string with a resin-coated cloth. **Ship's fog-horn:** Make the sound of "O" with the lips pursed and the sound coming from the back of the throat. As the deep sound emerges, allow the lower parts of the cheeks to quiver for added resonance. **Motorboats:** A recording of the exhaust pipe of an ordinary car engine idling overplayed at the same or higher speed. A lower speed play back will sound like a diesel engine.

**Shots:** All manner of violent blows on all sorts of materials can be used and all can be quite effective. Whatever method, bursting a paper bag or striking a cushion with a stick, etc., the associated reverberation time should be in harmony with the visuals and if the film shows the action taking place in a large empty room, for instance, then the sound effect should be manufactured in the same sort of acoustic conditions, producing a hollowness.

**Space:** To create an effect of space, distance must be used as a part of the effect itself. This is to say that when re-recording an already existing sound effect, the two recorders should be set-up in a long empty room or closed-in corridor with the recording microphone as far as possible from the amplifier of the other machine playing the effect back.

**Swimming:** Use the filled-up bath and make the motions of the desired stroke with the hands through the surface of the water. If close-ups are intended don't forget the swimmer's breathing. This is a difficult one and will probably require a lot of practice and many retakes.

### Telephones, Trains and Thunder

**Telephone Voice:** Speak into a long narrow glass close up to the mike.

**Thunder:** Suspend a large sheet of tinplate over the microphone and shake it for periods from just under a second to just over a second. A double take, i.e., a fairly gentle shake which has a violent finish, is quite effective.

**Trains:** A steam engine can be simulated by puffing gently across the mike. The sound of the wheels striking the joints in the permanent way can be made by recording the sound of a roller skate running over the floorboards. This is best kept as a background loop and used as a constant noise. Other train engine noises can be supplied by domestic appliances. The pressure cooker was successfully used by Alan Sidi of Guiseley, Yorks, in his Gold Star award 4 minute film "Eight O'Clock Special" and the Walton film "Speed Crazy", has a vacuum cleaner sound source.

**Underwater Caves:** Record a tap dripping into a bowl at double the final speed required. Then superimpose on this the voices of your subterranean explorers recorded at the slower speed and with the microphone hanging inside the piano with the loud pedal depressed.

**Water:** Most water noises can be produced in the bath or even in the kitchen sink. Various types of waterfalls, slow or fast streams, babbling brooks or even raging torrents can be obtained by using a hose or rubber spout from the tap and allowing the jet of water to fall on various surfaces from various heights. A series of natural sounds of a small waterfall can be produced by running one bath tap full on and the other at half speed. Under both taps should be set glass receptacles at differing heights. For a gentle, lapping sound try drawing a wooden spoon through the surface of the bath water.

**Wind:** Moaning wind can sometimes be recorded at an open fireplace. A long, low whistle with the voice falling at the end of its breath will superimpose quite well but you will need more than one background loop as wind noise is never constant.

Your live effects may be supplemented by some of the many discs detailed in next month's *Sound & Cine* compilation of *Recorded Sound Effects*.

# our readers write . . . . .

## . . . about two subjects

**From: M. J. Lee, 28 Dickens Drive, Addlestone, Weybridge, Surrey.**

*Dear Sir:*—As a regular reader of *The Tape Recorder*, I am getting just a little tired of the correspondence regarding “2-track or 4-track”, “3½ i/s or 7½ i/s” and professional versus domestic machines. I know your editorial policy is “no compromise”, and a very laudable one at that, but some of us just have not got the cash to use full track at 15 i/s on an Ampex. Anyway it cannot be so long ago that the correspondence was “full or half-track” at “15 or 7½ i/s” and people were saying that man could not survive travel at 60 m.p.h.

As to the price of tape coming down as the demand goes up as Mr. Johns suggests, perhaps a look at the price of 1,800 ft. of LP tape four years ago and today might be enlightening. It is a very funny thing that when a certain American tape came over here the import duty and carriage brought the price up to exactly the same as British or Continental tapes. The price ring which decides just how high a price the market will stand is a very vicious one and the sooner it is stamped out the better.

Also, if the activities of a friend of mine are anywhere near typical, the increased sales of recorders have not increased the sale of tape. After 18 months he is still using the original 5 in. standard tape that came with the machine and has never bought another tape. “Top 20” each week from a certain Continental station and that is all. The amateur market can only be a drop in the ocean compared with the professional use of tape.

No, the old motto about cutting one’s coat according to the cloth is still true today as should be the one about live and let live.

*Yours faithfully.*

## . . . about good service

**From: S. W. Buxton, 14 Gloucester Avenue, Nuthall, Notts.**

*Dear Sir:*—Rather belatedly perusing the October issue of your periodical, I was very pleased to read Mr. D. Herkes’ letter praising Messrs. Repts (Tape Recorders) Limited, for the excellence of their products and after-sales service. Although I am normally very slothful, nevertheless, his letter caused me to stir myself and add my praises in support.

My adventure into tape recording began some 18 months ago, when it occurred to me that perhaps I was missing something in not possessing a tape recorder—in consequence I invested in a machine bearing a name associated with the present era. This was a most astonishing machine, which for the first month in my possession never functioned and thereafter, having been returned twice to the makers, developed every possible fault from A to Z until eventually I decided that we could not exist together and for me to retain my sanity.

The decision made to change the equipment as a matter of great urgency, a trip to London ensued where most helpful advice was received from the manager of the City and Essex Tape Recorder Centre, Maryland Station. He spent nearly two hours explaining with the utmost patience, to me probably his most cynical and difficult customer, that there was something in tape recording and that the Repts R10 (4-track) which I had noted from the advertisement that usually appears in your magazine, would give me every satisfaction and was one he personally recommended very highly.

How true his advice has proved. In fact, the machine has given such excellent results of so high a standard that I have now invested in a Goodmans Sherwood Enclosure, complete with 12 in. Axiom speaker, tweeter, etc., which the Repts machine fully justifies, although it was an expense I never envisaged when first commencing with tape recording. The result is that there have been many enjoyable recording and listening hours.

Like Mr. Herkes, I have found their after-sales service really first class. They reply by return of post, almost within 48 hours, and once they sent a replacement valve, free of charge, without question, in fact their guarantee is a real guarantee, the like of which I have never experienced before. In conclusion I can

only repeat that the Repts R10 is very well made and gives an excellent Hi-Fi quality output. Their advertisement is most conservatively worded and the machine excels on every point they claim. For anyone interested in a tape recorder, they cannot do better in my opinion than invest in this make of machine.

However, I would mention that I have no connection whatsoever with the firm concerned, being merely a very satisfied customer.

*Yours faithfully.*

## . . . about bad service

**From: P. L. Bastin, 2 Canynge Street, Barbourne, Worcester.**

*Dear Sir:*—From time to time, some conscientious editor will take up the cudgels on behalf of the public and mount an attack on shoddy and un-British practice in the tape recording industry. To date, these attacks have been aimed at the unscrupulous dealer and the sharp-practice repairer. But what about the manufacturer who does not measure up to his specifications, who puts a recorder on the market which is overpriced, unreliable and lacking in after-sales service?

I have a personal example of scandalous and unprofessional service by a manufacturer of what I always imagined to be first-class equipment. In November 1961, I bought an 88 gn., hysteresis-motor, two-track semi-professional recorder manufactured in London. As soon as I got it home, it refused to record. It was returned to the dealer who was unprepared to repair it and who returned it to the Works—without it ever having recorded a sound! I received it back two months later with a (requested) list of faults which would make the owner of a five-year-old machine blanch. For 5½ months it behaved reasonably well until the VU meter suddenly packed up. The manufacturers replaced the meter without delay but this did not seem to be the trouble for, by now, the machine was dead in its audio stages. Back to the Works it went and returned two weeks later. I switched on. Nothing. Dead as a doornail.

By now, I was hopping mad. I have a small studio and the loss of one of my three machines was catastrophic. The manufacturers blamed the railway yet the machine was packed in a cardboard box which, it was claimed, was accepted as suitable packing by the railway. There were visits from inspectors, letters, accusations and all the flim-flam of responsibility-dodging from all sides.

By now, I had lost four months’ use out of the 9½ months I had owned the machine, so I referred the matter to my solicitor who said that the machine was clearly not up to specification and should be replaced with a new one which was. The machine was last in my studio on September 17th, and has not been returned yet—3 months. The upshot of the whole disgusting business is that the manufacturers refuse point blank to replace the machine and I must make do with a patched-up thing which has already spent 6½ months of its 12-month life in transit or Works.

I have owned 15 recorders since 1954, so I think I may be regarded as having some little experience of these machines. Certainly, I have found that continental machines are far more reliable than even the best (?) British machines. After all, if you spend 88 gns. on a semi-pro machine and it consistently gives atrocious service for the first six months or so of its life, you have, I think, every right to expect the thing to be exchanged on the basis that it is clearly a Bad one from the start.

I am sure there must be similar instances of bad behaviour and bad workmanship elsewhere and I think it is time that these irresponsible manufacturers were shown up in order to warn newcomers to recording where the dangers lie. I will willingly supply the name of the manufacturer to any who are interested.

*Yours faithfully.*

## . . . about readers’ requests

**From: C. Braddock, The Tape Recorder Centre (Blackpool), 266 Waterloo Road, Blackpool, Lancs.**

*Dear Sir:*—I have been unable to obtain circuit diagrams and certain spares for the Saja range of machines, distributed by Perth Radios until liquidation. Could you please ask manufacturers and public alike if anyone has circuit diagrams, etc., for Saja machines for sale. Especially the Mk. 40.

*Yours faithfully.*

# TAPE RECORDER SERVICE

## No. 13 Ferrograph Recorders by H.W. Hellyer

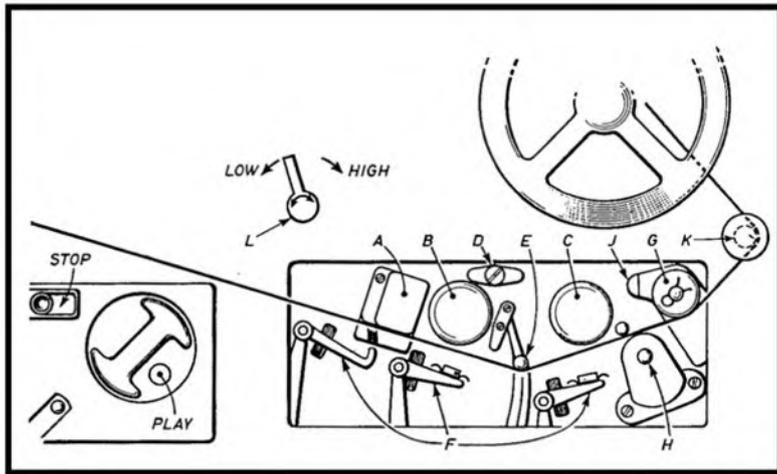


Fig. 1: The basic sound channel of the Ferrograph Series 4, showing the erase, record/replay and dummy heads.

THE tape recorder market falls neatly into three pigeon-holes. First, and cheapest, those machines that can only rightly be called "toys", which make no pretension to mechanical stability or electrical efficiency, and in which readers of this magazine are no doubt only faintly interested.

The largest group is the "domestic player", which contains a wide range of quality and facilities. In a price bracket below £50 it is still possible to get tape recorders with remarkably good mechanical construction and amplifiers that have a good frequency response. Indeed, by feeding the output from one of these models through a high quality power amplifier and loud-speaker system, results can be obtained that may satisfy even some of the erudite contributors to our companion periodical, *Hi-Fi News*.

The "professional" machine has a following that has increased greatly in the past couple of years. This may be a symptom of our affluent society: we like to think, however, it is indicative of the tape recording enthusiast's growing appreciation of the finer points of the art.

A number of readers write to ask for servicing details, or rather more specifications than appear in the advertisements for some of these "professional" machines, notably the Ferrograph.

These are not all Ferrograph owners: indeed, some readers have specifically asked for information on both the Wearite deck (which this machine incorporates) and the Truvox decks in current production, to which a later article will be devoted as space becomes available. The information is required to help them make up their minds before speculating a fair amount of cash. This article, then, is meant to serve the purpose of explaining the Ferrograph machines, pointing out the differences between models, and outlining some of the minor servicing details that have arisen in the writer's workshop.

### The Wearite Deck

Ferrograph models are based upon the Wearite deck, which has altered little over the years. It is made by Wright and Weaire Ltd., a subsidiary of The Ferrograph Co. Ltd. The Series 4 is supplied in two alternative combinations, with speeds of  $7\frac{1}{2}$  and 15 i/s or  $3\frac{1}{2}$  and  $7\frac{1}{2}$  i/s, with the small differences that this entails. Other differences include the provision of extra heads, stereo and "staggered head systems", and 110 volt, 60 c/s models with NARTB characteristics.

The basic sound channel of the Series 4 is shown in fig. 1. The erase head is A, the Record/Play head B and position C has a dummy head in the standard model. The R/P head, B, has a single-screw azimuth adjustment, D, but factory setting is carried out by precise adjustment of the four corner screws in the mounting plate, the head being mounted on a 0.05 in. roller. Normal adjustment is made, playing back a steady tone (1,000 c/s) and setting the head in the vertical and "front-to-back" sense for maximum output.

At this point it may be as well to remark that the correct adjustment of the R/P head, on any machine, is vital to good performance. This is not just a matter of loss of gain—the losses are greater at the higher frequencies and overall response

is greatly impaired by quite small misalignment factors. Playing back a recording of Grandma's birthday party and adjusting "by ear" is simply not good enough. A meter across the output will give distinct indications that the human ear cannot be trusted to detect—but which, in the final assessment, give an unsatisfactory quality to the reproduction. A steady tone is necessary to be able to judge variations accurately—but this can be made by recording the "test-tone" of the television transmitter during off-programme periods.

Between the R/P and dummy heads there is a tape guide pin, E in fig. 1. This works in conjunction with the pressure arms, F, with a leverage system above the deckplate, but the return springs are beneath the plate, and should be checked if overall sluggish action is noted. If there is individual sluggish action, check the separate levers, as the pressure pads are delicately sprung for fine contact. Make sure there is no binding of the leverage system, check the hinge points, and always re-check after fitting the top cover, ensuring that the ornamental screws are secure.

### Emergency Stop Finger

The left-hand of these pressure arms has a "finger" which engages the tape and is sprung to ride in the slot of the erase head mounting if the tape breaks, applying an emergency stop. Note that any tests made on the machine with the tape removed will require this switch to be kept open by wedging the lever clear of the gap. The action of the auto-stop is to de-energise the hold-in solenoid (seen in a central position, just beneath the main cross-member F, in fig. 2). This solenoid is energised by closure of the motor switch G and pulls in when a current of between 25 and 90 mA flows. Before making too many mechanical tests for sluggish start and hesitant stop action, check this operating current. This applies especially to models that employ the Wearite deck in other equipment, where the solenoid may be included in the H.T. smoothing of the amplifier—an electrical fault bypassing the necessary solenoid energising current. Incidentally, the manual stop switch also short-circuits this solenoid.

Reverting to fig. 1, the capstan roller will be seen at H, with the outer surface of the tape running against it, pressure roller G engaging the active tape surface. From this it follows that a clean pressure roller is absolutely essential on these machines. Note the presence of the rocker arm J, which provides an extra tape guiding level, as well as its prime purpose of supplying a "Pause" facility when the push-rod in the head cover engages its end. Check that this is not loose, that the main lever system on which the roller is mounted does not foul the underside of the deckplate and that the circlip above the roller has not become dislodged or distorted.

The right-hand tape guide K has a knurled nut fixing arrangement. Other items in fig. 1 are the function switch, stop button and the start button at the lower left-hand side, with the speed-change selector L.

Operation of the start button slides the lever H, see fig. 2, closing the motor switch G and releasing the brakes. The auto-

# TAPE RECORDER SERVICE

## No. 13 Ferrograph Recorders by H.W. Hellyer

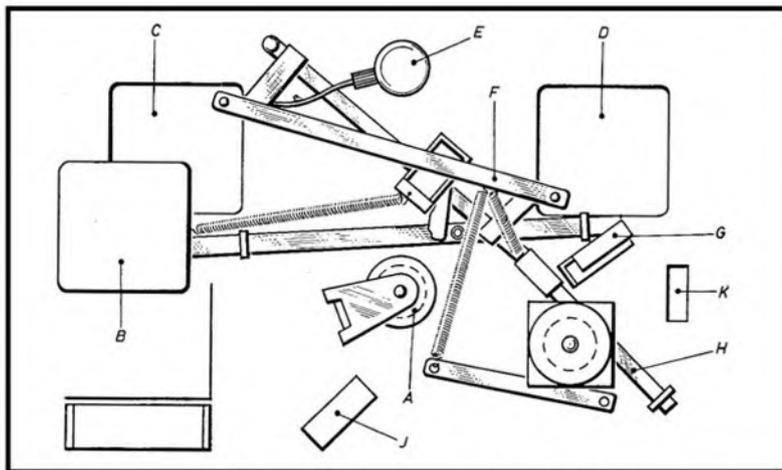


Fig. 2: The underside diagram of the deck showing solenoid, spooling motors, capstan motor and cueing indicator.

stop switch is seen at *J* and the manual stop at *K*. It will be noted that the lever linkage system beneath the deck is quite simple, and apart from checking the return springs there is little attention needed. The usual precautions should be taken, sliding members thoroughly cleaned and very lightly greased—but more about lubrication later.

The two spooling motors, *C* and *D*, are squirrel-cage induction type, which take full power during appropriate fast wind, the inactive motor being shorted. This gives a fast wind, less than a minute for a 1,200 ft. spool of standard tape. Note that it is quite normal for the spindles of these motors to get hot after a period of use, because of heat losses in the rotor.

### “Octoquad” Synchronous Motor

The capstan motor *B* is a synchronous “Octoquad” type. Being synchronous, it is not sensitive to small changes in supply voltage, but the makers recommend that the 205 volt tapping on the tag panel be used for the  $3\frac{1}{2}/7\frac{1}{2}$  i/s version, and the 245 volt tapping used for the higher speed version and also for supply to the take-up motors. If the machine has not been used for a period, there may be a delay before the capstan motor pulls in to synchronism, sometimes as long as a minute, during which the sound of the motor “hunting” may alarm the user. This is not serious, but if it persists, a check on mains supply voltage may be necessary. Measure the actual voltage at the tag panel whence the motor supply leads are taken.

A further possibility is misalignment of bearings. If the motor has been mechanically shocked, this may result in the symptom of sluggish drive. Raise the deck and spin the motor by hand—*don't forget to disconnect first!* If there appears to be any retardation, a slight tap with a small hammer or spanner on the bottom bearing strap of the motor on each pillar will free this.

The capstan motor carries a two-step pulley, against which a neoprene rimmed idler engages, contacting the heavy flywheel. The capstan is a brass cylinder with a bonded neoprene traction surface at its upper end, mounted in a bearing which contains a ball race and small spring. To remount the flywheel correctly, or to check its easy running, slacken back the top cap about one-eighth turn, check for end play by moving the flywheel up and down, fix the top cap to a position where there is no play, and replace the bracket. After running, with the stop switch pressed, the capstan should run on freely for at least twelve seconds. Less than this indicates the bearing is set too tightly. The speed of the flywheel at  $7\frac{1}{2}$  i/s is approximately 177 r.p.m., for the correct capstan diameter of 0.810 in.

### Lubrication

After these operations, it is advisable to check that the pressure roller is vertical to the capstan surface. With a bright lamp at one side, look at the vertical gap between the two surfaces and note that it closes completely when the machine is switched to Play. Check this with tape removed and the deck operating. Any gap indicates that the roller requires straightening. To do this, first remove the circlip and roller, fit

a piece of brass tubing over the spindle and bend the spindle gently—actually, this operation bends the bracket on which the spindle mounts, the rocker arm bracket. When refitting the roller, check that there is no tendency to ride hard down, or rise on the spindle when running, indicating that the adjustment has been overdone.

Lubrication of the motors may be necessary after 1,000 hours' running. But this should be done sparingly. The recommended lubricant is *Aeroshell No. 3* and only a few drops should be applied to the bearings. The flywheel bearing is packed with silicone grease, which does not normally require changing. The sliding members can be lightly smeared over the friction surfaces with a grease such as ordinary petroleum jelly. A small amount of lubrication may also help at the flexible drive and worm assembly to the cueing indicator *E*, fig. 2.

Wow and flutter on this deck is stated to be less than 0.2 per cent., a conservative figure when the deck is correctly aligned, lubricated and operated. In the Series 4 machine, the signal to noise ratio is better than 50 dB, in the range 200 c/s to 12 Kc/s. Unweighted, including hum, 45 dB. The frequency response at  $7\frac{1}{2}$  i/s is 50-10,000 c/s  $\pm$  2 dB. Input levels, for full depth recording are: Input 1, 0.003 v into 1 Megohm and Input 2, 0.1 v into 80 K-ohms. Output power is  $2\frac{1}{2}$  watts into 15 ohms.

### Electrical Checks

Electrically, the Ferrograph has a number of small differences between models, as follows:

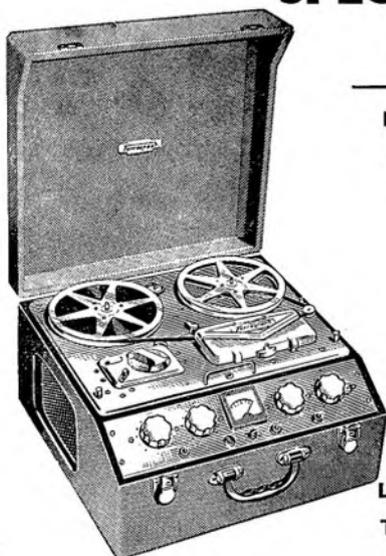
Series 4C/FN is two-channel, with staggered heads for simultaneous recording of both tracks 4S has additional stacked stereo head, type FP16. (The lower track has a red sleeve on its screened lead.) As an alternative arrangement, a standard FR7A head can be fitted in the place of the dummy, providing monitoring facilities.

The Stereo 808 combines the foregoing and has the recording level meter switched for upper and lower channel indication. Each channel gives 1.5 v output across 5,000 ohms for connection to a two-channel system. The 420 series is basically similar, but uses a different head configuration. The Series YD are portable instruments (if 53 lbs. weight can be regarded as portable these days!) for semi-professional standards. They operate into 600 ohms and a high-gain stage for direct recording from a high-impedance microphone.

Special features are the recording level meter circuit, arranged for rapid rise and slow fall-off. For further reference to these characteristics, see the current series of articles by Graham Balmain. To check a machine with unknown characteristics—as when purchasing a second-hand model—it is necessary to ensure that the maximum signal applied to the head network gives no more than 5 per cent. distortion on peaks, after checking correct bias.

The bias frequency is 53 Kc/s and a compromise between adequate bias voltage at the head and minimum bias voltage breaking through to the output valve circuits must be made. Referring to fig. 3, it will be seen that coil L3, in conjunction

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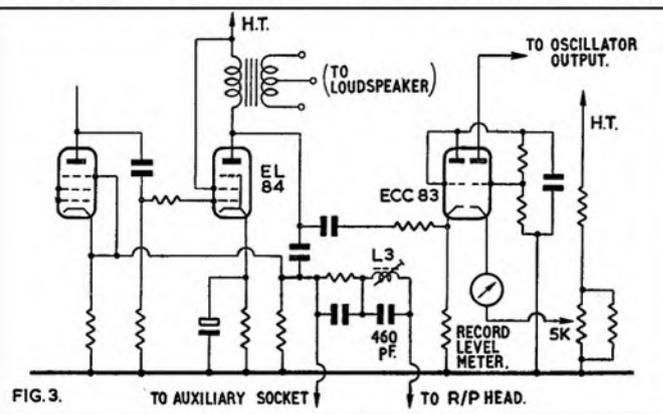
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## TAPE RECORDER SERVICE—(continued)

with the 460 pf capacitor, forms a "trap" circuit to reduce this undesirable breakthrough. There should be a low value of the 53 Kc/s bias component in the output from the EL84 output valve. No more than 0.5 v of HF at this point should be registered, and between 12 and 16 volts bias at the head should still be noted. The 5 K-ohm wire-wound potentiometer in the bias oscillator circuit can be adjusted for optimum results. If a steady 200 c/s tone is recorded, using different settings of



this preset and checking with a valve-voltmeter at the monitoring socket, when these recordings are played back it will be heard that the output signal rises as bias is increased. The correct setting is slightly higher than that producing maximum signal output

The bias, as set at the Works, is marked on a small label on a plate under the flywheel, and can be measured between the deck tags 1 and 3 with a valve-voltmeter. If the record level meter is adjusted to zero (switch to record with no signal input and zero with the knob on the panel—not the set zero on the meter itself), the correct recording level should maintain a reading of about 8 with a 400 c/s input to Input 1 at approximately 10 mV.

If hum is bothersome, check the position of the mains transformer, which can be rotated for minimum hum pickup. Make this adjustment with the motors running. Check that the hum does not vary with motors on and off, which would indicate hum-bucking (injection of hum voltage in anti-phase to that arising from another part of the circuit). If a good meter or cathode ray oscilloscope is available, the hum level can be measured across pins 1 and 3 of the auxiliary socket 1. Finally, move the mumetal wing on the R/P head pressure pad for minimum pickup.

These notes are really too brief to do full justice to a professional machine, but it is hoped that some guidance has been given to the readers who requested information.

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# TWO HEADS ARE BETTER THAN ONE

## FITTING AN ADDITIONAL HEAD TO A FERROGRAPH

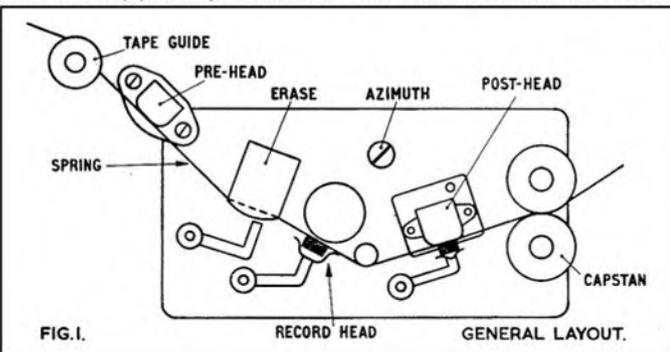
ALTHOUGH the Ferrograph is an excellent tape recorder, recording all that is set it with the utmost fidelity, there are still several useful facilities which are not included, but can be added at small cost, to give very interesting results. The cost, £4 maximum, the time required, two or three evenings (even for the veriest tiro!) The resulting benefits are exactly synchronised overlay with no loss of level (I think that this might well be called "Super-Superimposition"), monitoring of a recorded signal off the tape, and, of course the famous "Echo Effect". Thus it is possible to record a four-part harmony with echo, for only one singer.

Two heads are used, one being mounted before the erase head, the other after the playback head. The outputs of the two heads are brought to two jack sockets at the rear, and from there they are taken to be equalised, and pre-amplified, ready for feeding into a radio P.U. socket, or into an amplifier. The amplifier then feeds its contribution into the Ferrograph, where it is mixed with the new signal. The whole proceedings are monitored on headphones from the output socket on the front of the recorder, as the recording takes place.

### Two Heads

The two heads used are B.S.R. low impedance playback heads, which were fairly easy to buy. They already have a base for azimuth adjustment, and they cost about £1 7s. 6d. each, these being the most expensive items.

The heads will be called the "Pre", and "Post" heads for ease of reference. The pre-head is fitted first. Remove the plastic head cover to give more room. Lace up a tape, and set the function knob to record. Place the head so that it deflects the tape an eighth of an inch between the tape guide and the erase head (fig. 1). The rocker, and one hole of the base should be over the grey deck, the other fixing hole over the bare metal plate beneath the head cover. Mark, and drill the two holes (3/32 in.). Take the head and file down the rocker



until the head is scanning the top tape track. Two 8 B.A. bolts, with a compression spring hold the head to the deck, and agile fingers the nut to the bit of bolt that penetrates the dark interior of the recorder. One head is fixed.

The post-head is mounted on a plate of Duralumin of the same shape as the dummy stereo head base. Bolt the head to the plate, (fig. 1) in such a position that the felt pad presses the tape snugly to it, not forgetting to file the rocker, so that the head scans as before. This new head assembly can now be screwed to the place previously occupied by the now redundant dummy head, using the same bolts.

The coils of the head are joined in parallel (see fig. 2), and the output taken by tightly twisted insulated wires, to a jack socket, which is fixed in a hole in the aluminium plate bearing

the model, and serial number. There is room for the two output jacks.

### Transistor Pre-Amp

This is the well-known design, which works so well (fig. 3). The components are mounted on a 4 plus 4 tag strip, which can be mounted with the battery in a small case, the input lead

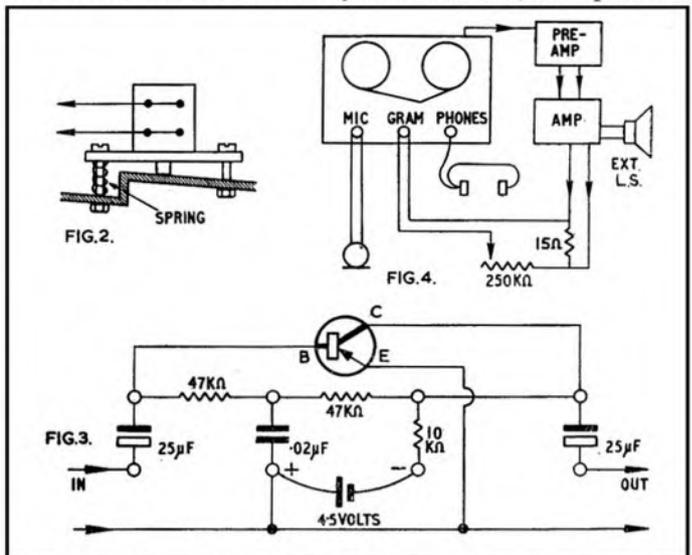


Fig. 2. Head connections. Fig. 3. Circuit of transistor pre-amplifier. Fig. 4. Recording set-up.

terminating in a standard jack plug, the output lead ending in a suitable plug for the radio, or amplifier.

The transistor should be an A.F. type of reasonable quality, and the usual precautions should be taken when soldering. Use a pair of pliers as a heat shunt. The capacitors are 12 volt D.C. working, notice being taken of their polarity. The total cost of the pre-amp, 10s.

### Ready To Use . . .

All the units are ready to use. All that is required is a mixer, or the little gadget shown in the diagram (fig. 4), which is useful to have, even if you do not build the rest of the things. By turning the knob on the 250K potentiometer, the music input from the amplifier is faded down, and the microphone fades up. What could be more useful? Of course the relative levels of the two signals must be set beforehand, and the music must come from the low impedance (i.e. loudspeaker) socket on the amplifier. If the controls are set correctly, it is possible to change smoothly from music with no microphone signal, to background music, and the microphone at full level, ready for a commentary.

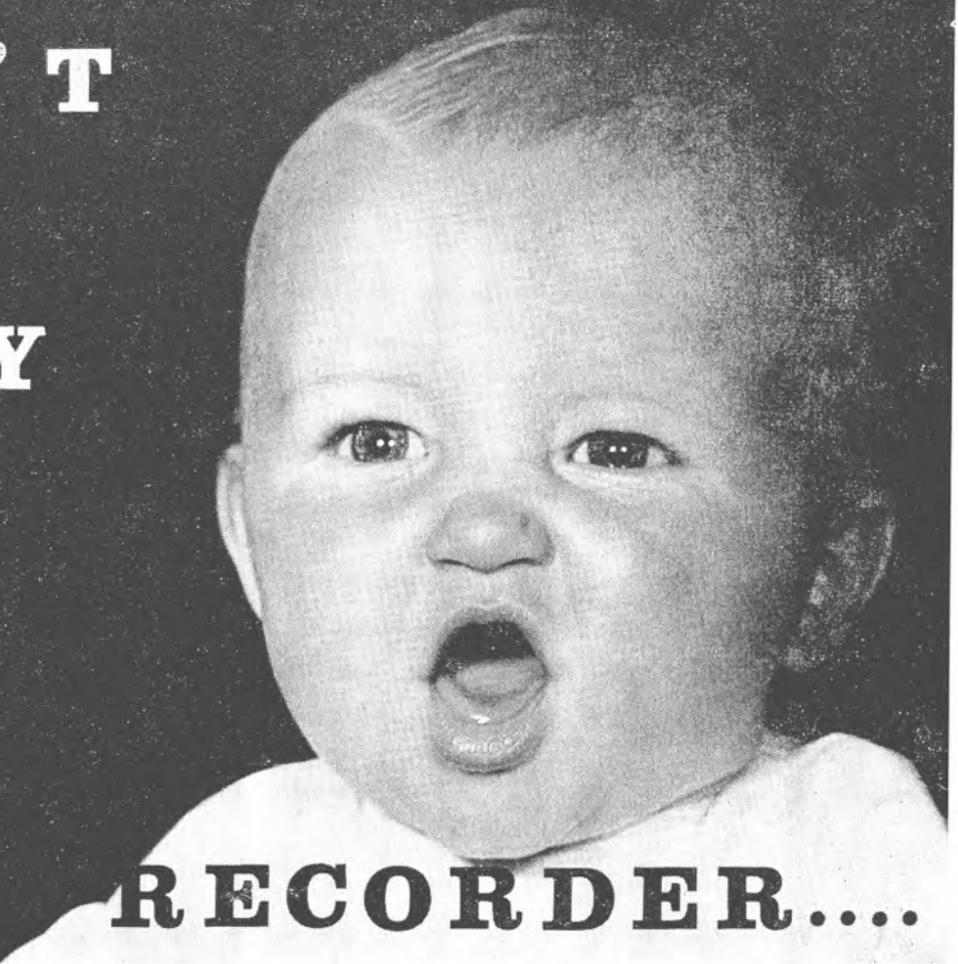
With everything joined up, take a deep breath, a good insurance policy, and a look at the polarity of the battery connections, then switch on. Check that each head is working by playing a tape using the head and pre-amp. When both heads have been shown to work, it will be necessary to adjust the azimuth, and you will need to brew up a couple of Phons of White-type Noise. Hiss sibilantly into your microphone, and record several feet of it at 7½ i/s. Play this back via the new head, and adjust to give maximum ssssss. This will mean loosening one bolt and tightening the other on the pre-head,

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## TWO HEADS ARE BETTER THAN ONE — cont.

letting the spring do some work; and simply turning the knurled screw behind the record head, which has been generously provided by Ferrograph for the occasion for the post-head. This will rock the head for you.

No tape-guides are needed, as they are already there in the form of erase head, and fixed tape-guide. For the earlier Ferrographs with no proper tape-guides, special ones would have to be made. It may be necessary to file a little off the head cover to fit.

### And Now To Record . . .

The "Echo" effect is achieved by feeding the signal from the "Post" head into the amplifier via the transistor pre-amp, and then mixing the output from the amplifier with the in-coming microphone signal, using the 250K Pot. It is found that better effects can be obtained by turning the amplifier tone controls to give maximum bass, and minimum treble. The combined

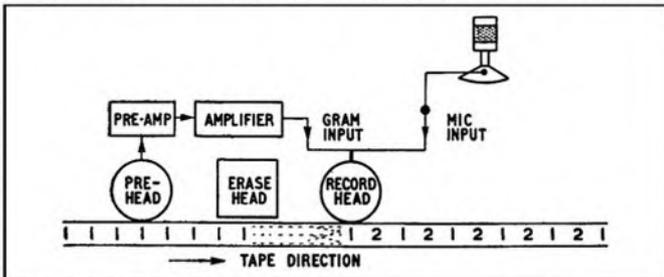


Fig. 5. Schematic diagram showing the super-superimposition process.

signals should be listened to using a pair of headphones plugged into the tape recorder output socket, the phones being loaded with a 15 ohm resistor; thus the degree of "echo" can be controlled with the volume control of the amplifier.

### Balancing Recordings

The "Super-superimposition" is more difficult to control, and some test recordings will be needed to indicate the settings of the controls needed for a balanced recording. The first layer of sound is recorded in the normal way, leaving gaps of the right lengths if a dual conversation is being recorded. Play this recording back via the "Pre-" head and the Pre-amp and amplifier, adjusting the controls to give the best playback response. This is best done by setting the recorder to *play*, and turning the main gain control of the Ferrograph to zero, then the tape will be played back without using any of the Ferrograph's electronics. Set the Ferrograph to *record* (fig 5), adjust the gain control for the microphone signal, and set the tape in motion. On the headphones will be heard the old signal being played back via the "pre-" head, so that the second layer of sound can be recorded in exact synchronisation with the original signal, the level of which can be adjusted using the amplifier volume control. This overlaying of recordings can be repeated until the signal to noise ratio becomes unacceptable.

### Finally

So there it is, in words and pictures. Why don't you try it in heads and transistors? The results are well worth the effort, and are almost unique on a domestic recorder, vast new fields being opened up for feature tapes . . . perhaps even prize-winning tapes. . . .

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## No. 42 CHECKING THE PERFORMANCE OF RECORDERS

by A. Bartlett Still

IT is probably realised by most of my readers that their tape recorder, much like any other device that "works," and is not completely passive, must deteriorate with use. Very often this can happen so slowly as to be unnoticeable, a falling off in performance that would be quite marked if immediately compared with that when new, but undetected with normal intermittent usage.

On the electrical side the effect, after some considerable time, may be no more than a loss of gain, which may very well be compensated by an increase in the volume control setting. There being no standard, no judgment is made. Should a stage be reached when the gain control is "full up," without the desired result, the trouble is now noticeable. The stop at the end of the control's travel has itself provided the "standard" required and called attention to the trouble. The chances are that a new set of valves will set the matter to rights and all will be well.

Apart from a sudden, unfortunate, component failure, what I have just described might be a typical *electronic* history of the average machine over anything up to two or three thousand hours of use. Incidentally, the average radio valve is expected to operate for upwards of one thousand hours, which sounds a great deal, but it is surprising how the time mounts up with anything like regular use.

Now it is, surely, reasonable to suppose that there is going to be deterioration in the performance of the mechanical functions of your machine, all the more rapidly if it is not looked after and cleaned regularly. Will *this* be noticeable?

### Tape Speeds

The tape on a machine is supposed to be conveyed past the heads at a uniform speed. Whether the speed is exactly  $7\frac{1}{2}$  i/s, or whichever standard is quoted, is not so important as the maintenance of a constant speed. Suppose a signal of constant frequency, 1,000 c/s, is recorded on a perfect machine, and then replayed on one that is not so good as regards tape speed. With a speed 1 per cent. below nominal the signal would play back as a steady 990 c/s tone, a difference of about  $\frac{1}{10}$  of a tone, unnoticeable, except by comparison, to the average person. If the steady tone were replaced by normal programme material the relationship would hold for all the frequencies included and nothing would be, or, in many cases, is, noticed.

We now suppose, however, that the speed of the playback machine is *not* constant. Let us say that, due to some mechanical defect, during one second the speed is 1 per cent. low, but that in the next second the speed is 1 per cent. high. The tone is no longer steady, but wavering from 990 c/s to 1,010 c/s, a difference of twice as much. Many people could not discern this—if it were not for the fact that both notes are produced in sequence to make the comparison obvious, if not odious! Incidentally, the sort of variation I have quoted here would be, in actual fact, an unbearably high level, but it makes the principle easier to understand.

Comparing with my earlier remarks it will, perhaps, be seen that each note tends to act as a "standard" by which the other is judged, so that the detection of "Wow" or "Flutter," which is what we are talking about, is that much easier. This, in itself, is a blessing in disguise, because, although it can be most annoying, and possibly spoil a recording, it does warn of mechanical trouble at a stage when it can be easily rectified. From this it follows that a regular, if infrequent, check on the performance of your machine in this respect would be a good thing if it can be easily carried out, and, in reality, nothing could be simpler.

### Test Tapes

It is very difficult to find out just how good, or bad, your machine is by playing normal programme material, a sustained single frequency note is far better. Those who like to invest in a frequency tape, such as the E.M.I. TBT1, will find a whole range of frequencies well recorded. But a lot can be discovered by recording the B.B.C. 1 Kc/s tuning signal, on for several minutes before the start of programmes. Try a recording at each of the speeds your machine may have, since

each speed is equally important from this point of view. You would also be well advised to ensure that you record at a level some little way below full modulation, we don't want the issue clouded by undue distortion.

Replay the tape, at not too loud a level, in a quiet room, and listen carefully and critically. If you cannot detect any warble or change of pitch, replay the slowest recording at the fastest speed and listen again. If you are still satisfied you can chalk up your machine as inside about 0.25 per cent., and you need read no further. Should you feel, however, that your machine does not pass this test, and you would like to find out why, you will have to follow certain principles of diagnosis.

The movement of the tape past the heads is initiated and controlled by a number of rotating parts, motors, capstan, pinch roller, spools, etc. By and large, it can be said that eccentricity of quite a small order on any of these moving parts will cause trouble. If you can relate the frequency of any wow or flutter signal to the rate of revolution of any part of the machine, nine times out of ten that part is the cause of the trouble.

### Cleanliness

Where do we go from here? I have already hinted at the importance of cleanliness—let me now say, plainly, that no mechanical device, be it sports car, wrist watch, or tape deck, can give its best performance if it is dirty or ill-cared for. Now in nine cases out of ten thorough cleaning and *judicious* lubrication will cure noticeable wow or flutter, provided, of course, that the tape deck had an adequate performance in the first instance. What is to be done in the tenth case is a little more difficult to advise. There are some people who have a natural affinity for mechanical devices, without any service manual or instructions they would be able to sense the cause of trouble and cure it. If you are one of those it is unlikely you will need any help that I can offer. There are those, however, who could make the necessary checks and carry out adjustments with reasonable competence provided they are guided along the right lines. But, unfortunately, the right lines for one tape deck may be all wrong for another, so obtain the relevant information. This may be in one of the specific servicing articles that have appeared in *The Tape Recorder*, or it may be in the maker's service manual. These are often obtainable for a small charge on application.

If you are unable to obtain official guidance, or if you are one of those people who are hopeless with things mechanical, then it is better to let well alone for fear of making things worse. Get in touch with the maker's Service Department, telling them as fully, yet concisely, as possible what the trouble is, and be guided by them. Possibly the surest way to success in home servicing is to be able to make an accurate assessment of your own capabilities and, more important, your own, or your equipment's, limitations.



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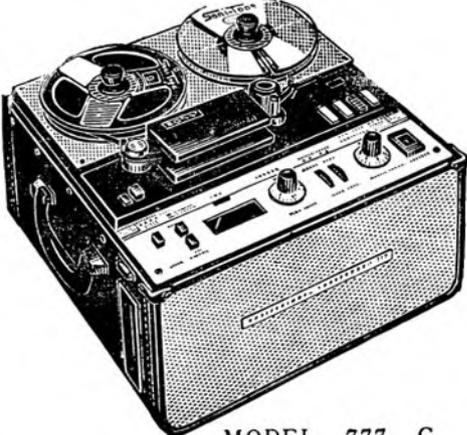
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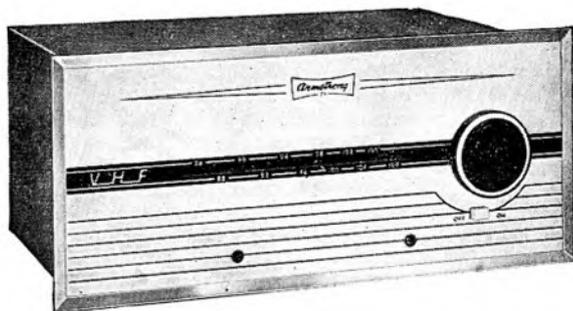
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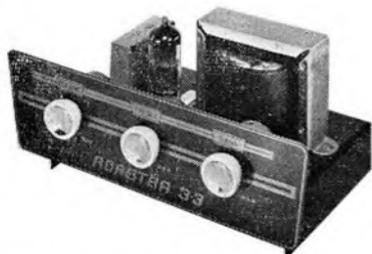
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# TAPE, RECORDERS & ACCESSORIES

## FIRST DETAILS OF NEW PRODUCTS

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



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manufacturers. Now a fluid, which can be painted on to tape, has been produced under the name of Metro-Stop. The liquid is dabbed on to the tape with the applicator and it can be removed if required with the clear fluid provided. Metro-Stop may be used on all grades of magnetic tape but the remover must *not* be used on Acetate-based tapes. The complete kit is priced at 17s. 6d. complete. Manufacturers: **Metro-Sound Manufacturing Co. Ltd., 19a Buckingham Road, London, N.1.**



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**PHILIPS**  
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**FOUR-SPEED**  
**RECORDER**

THE trend in Philips towards all-transistor mains tape recorders in their higher-priced models is extended by the introduction of their latest four-speed four-track machine, model EL3549. The successor to the famous EL3542, this new design has a new low speed for speech recording and a larger loud-speaker.

As with other new Philips recorders, the super-imposition feature has been dropped as this is now considered inferior to the parallel track replay switch of the new models. This enables two recordings on separate tracks to be played back simultaneously.

The all-transistor amplifier gives many advantages, not the least being the elimination of warm-up time.

The new deck layout has all controls grouped on the forward panel of the tape deck, each clearly labelled for easy operation. In the centre is the new moving coil recording level meter which replaces the magic eye indicator. The four digit revolution counter at the rear of the tape deck is now illuminated to indicate On/Off position.

A stereo socket for the connection of the Philips pre-amplifier EL3787 (available shortly) is fitted.

The specification of the EL3549 supplied by the manufacturers reads as follows—Tape speeds: 15/16, 1½, 3½ and 7½ i/s. Frequency response: 60-4,500 c/s at 15/16 i/s; 60-10,000 c/s at 1½ i/s; 60-13,000 c/s at 3½ i/s; 60-16,000 c/s at 7½ i/s; all ±3 dB. Power output: 2.5 watts. Signal to noise ratio: better than 40 dB. Wow and flutter: less than 0.6 "peak to peak" at 3½ i/s. Outputs: external loudspeaker, 2.5 W. 3-7 ohms; diode 1 V. 20 K ohms; headphones, 200 mV. 1.5 K ohms; stereo, 0.4 mV. 200 ohms approx.; voltage supply for pre-amplifier, 23 volts D.C. Inputs: microphone, 1 mV. 1 K ohm; diode, 3 mV. 20 K ohms; pickup, 150 mV. 500 K ohms. Loudspeaker: one 5 in. x 7 in. elliptical in cabinet. Weight: 26 lb. Size: 16½ x 15½ x 8½ in. Price £65 2s. complete with microphone, reel of LP tape, take-up spool and radio connecting leads. **Manufacturers: Philips Electrical Ltd., Century House, Shaftesbury Avenue, London, W.C.2.**



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A NEW long play magnetic recording tape suitable for all conventional recorders is announced by Ilford Limited.

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Ilfotape is available on standard polystyrene spools supplied in heat sealed polyethylene bags enclosed in distinctive hinged cardboard boxes. Each tape is provided with a coloured leader and trailer incorporating metal contact foils for the operation of an automatic stop device.

Three sizes of spool are available and the prices are 5 in. 900 ft. £1 8s., 5½ in. 1,200 ft. £1 15s., 7in. 1,800 ft. £2 10s. **Manufacturers Ilford Ltd., Ilford, Essex.**

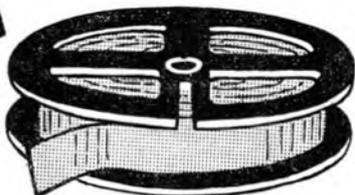
### Metro-Sound Introduce Metro-Stop

TAPE recorders with automatic stop facilities using metal foil strips at both ends of the tape have been available for a considerable time. Owners of these machines, have up to the present time, had to splice metal foils on tapes supplied by many

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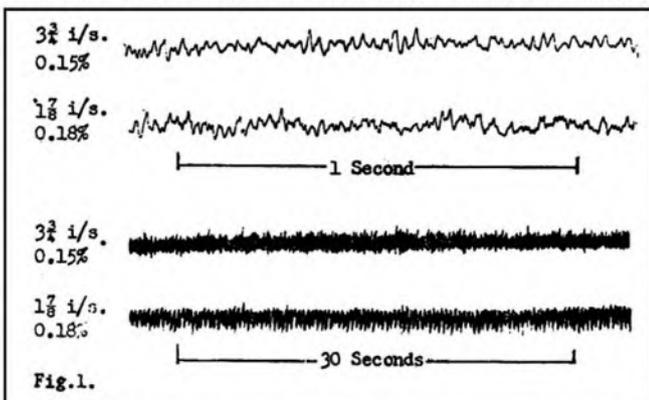
# EQUIPMENT REVIEWED



★  
**LOEWE-OPTA  
 OPTACORD 403  
 TWO-TRACK  
 RECORDER**  
 ★

**Manufacturer's Specification:** Power supply: A.C. of 50 c/s (on special demand also for 60 c/s. Instructions for subsequent modification available on request). Line voltages: 117, 150, 200, 220, 240 volts. Power consumption: about 45 watts. Safety fuses: 0.4 amp or 0.7 amp (117 v.). Tape speeds: 9.5 cm/sec. and 4.75 cm/sec. or  $3\frac{3}{4}$  i/s and  $1\frac{7}{8}$  i/s. Max. diameter of tape reels: 15 cm or 6 inches. Recording and playback: International standard double track. Playing time: 2 x 90 mins. at  $3\frac{3}{4}$  i/s on D.P. tapes 2 x 180 mins. at  $1\frac{7}{8}$  i/s on D.P. tape. Tape position indicator: Counting number of revolutions of reel. Three digit indicator with zero setting knob. Automatic stop: Electro-magnetically at both ends of the tape. Remote control: By foot switch. Rewind time: About 100 seconds for standard reel of 6 in. diameter. Frequency response: 40 to 16,000 c/s at  $3\frac{3}{4}$  i/s; 40 to 8,000 c/s at  $1\frac{7}{8}$  i/s. Premagnetisation: By H.F. current (100 Kc/s). Erasure: By H.F. current. Recording level indication: Magic light band indicator EM84. Input voltages: Microphone recording: 0.6 millivolts to 150 millivolts (1 megohm). Radio recording: 3 mV to 500 mV (150 K). Record player: 15 mV to 2 v. (1 megohm). Loudspeaker: P.M. dynamic speaker with powerful magnet and oval cone, with cut off switch. Plug in socket for extension speaker (about 5 ohms). Valve complement: EF86, ECC83, EC92, EL84, EM84, 2 dry rectifiers, 1 pilot light. Price: £45 3s. Distributors: Highgate Acoustics, 71-73 Gt. Portland Street, London, W.1.

ON this machine tape motion controls are grouped as a rotary knob and lever on the left-hand side of the keyboard; the press keys only select the recorder inputs. After a year or two of being conditioned to press key control of the tape motion, I occasionally



found myself frenziedly searching for the stop key only to realise after a second or two that I had to turn the knob instead, but a regular user would soon do this automatically.

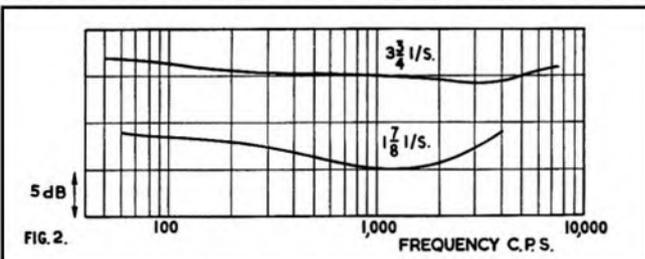
A more serious criticism must be made about the instruction book, which continually refers to the illustrations in the German operational manual—which was not supplied. The illustrations should in any case be contained in the translated instructions to avoid reference to

two leaflets. The magic eye is fitted with a cylindrical lens, presumably to make it more easily visible in a well lighted room. On the contrary I found it most distracting; the head has to be waved about like a snake charmer—or is it the snake—to see the beams at all.

The tone quality on the internal speaker sounded low pitched and rather muffled on speech but quite pleasant—if not Hi-Fi—on most music. I therefore set about the electronic and acoustic tests with some interest to see if they turned up a good reason for this effect.

### Wow and Flutter

Fig. 1 shows one second and thirty second pen recordings of the short and long term speed variations of this machine at the two speeds of  $3\frac{3}{4}$  i/s and  $1\frac{7}{8}$  i/s. There is very slight evidence of a 5 c/s



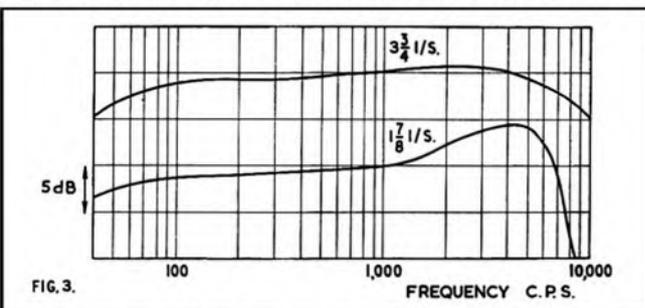
capstan wow at the lowest speed, but the total integrated wow and flutter figures of 0.15% and 0.18% r.m.s. are excellent for this class of recorder.

### Play Only Responses

200 and 400 microsecond test tapes were played and the output measured at the low level line output. These are shown in Fig. 2 and are again very satisfactory. Hum and noise were 35 dB below test tape level.

### Record Play Responses

The overall record replay responses were measured by feeding oscillator tones to the Phone input and measuring the output on replay at the line output. Fig. 3 indicates the curves so obtained.



The slight lift at 4-5 Kc/s at the lower speed helps to compensate for the sharper high note cut off. Peak level recording tests showed that a level 11 dB above test tape level was recorded when the magic eye beams just touched, and that a further 2 dB increase in level could be recorded before the onset of waveform distortion.

### Signal Noise Ratio

Recorded tape noise was 3-4 dB worse than bulk erased tape noise, and this indicates some unbalance in the bias and erase oscillator waveform. The ratio of peak recorded signal, as indicated by the magic eye, to recorded tape noise, hum and system noise was 42 dB which is satisfactory as a specification measurement figure but which sounded fairly noisy—mainly tape hiss and rumble.

### Acoustic Test

The test which really gave the game away was the overall acoustic test where twenty-one third octave bands of filtered white noise

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Prices: 2 Track 7" spools ... .. 59 gns.  
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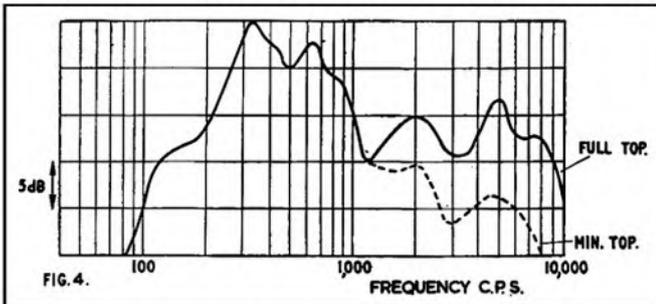
118 Park Road North, South Acton,  
 London, W3 Phone: Acorn 4141

## EQUIPMENT REVIEWED — continued

were recorded at the highest tape speed and the sound output on the axis of the speaker measured on subsequent replay, Fig. 4. This shows a large bump in the response in the middle low frequency range and accounts for the rather heavy speech quality noted in my introduction.

### Microphone Response

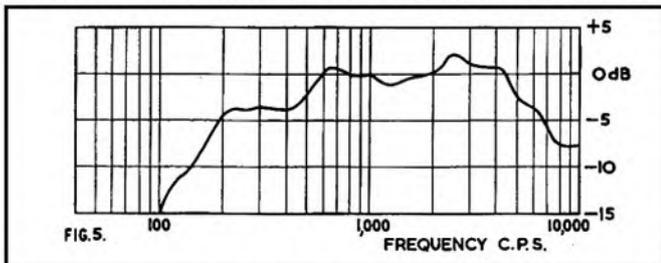
The microphone response was measured, Fig. 5, and is seen to be reasonably level from 200 c/s to 5 Kc/s. It sometimes happens that a microphone with a peaky high note response compensates to some



extent for a speaker or cabinet resonance in the low frequency range. In this case the microphone response does not help as the speaker peak is within the level range of the microphone.

### Comment

In common with many other West German recorders all the design effort seems to have been concentrated into the early stages of the unit, with the loudspeaker and output stage thrown in almost as an afterthought. This is due, I think, to the fact that all radio sets and radiograms in Germany carry a standard D.I.N. socket wired to the detector volume control so that detector output is fed directly into the tape recorder, without going through the output stage of the radio unit,



and the line output of the recorder is fed to the same point so that the output stage and speaker of the radio or radiogram is used to reproduce the tape signal. Used in this way this recorder will give excellent results, but the quality on its own internal speaker is really pretty dismal and the raw pentode output stage can not be recommended for feeding a wide range extension speaker directly.

Plus points for this recorder are: extremely fine styling and finish, excellent mechanical design and tape handling, good quality line output for feeding a radio set or amplifier.

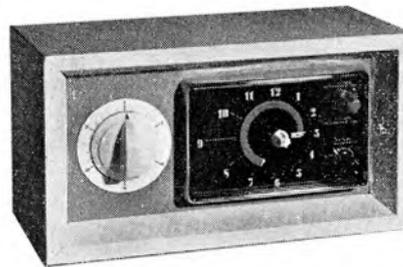
Minus points: High tape noise, poor speaker and output stage.

A. Tutchings.

### EMI Tape Ltd., Statement

Many readers of the review of the Ferguson model 3202 recorder (December, 1962) may have recognised the tape shown in the photograph as being Emitape; EMI Tape Ltd., wish to state that the tape supplied with this particular machine was *not* Emitape.

**Index to Volume 4 of THE TAPE RECORDER**  
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★  
**SYMPHONY  
TAPE TIMER  
UNIT**

★

TAPE recorder owners who have the misfortune to spend most of the time at work or, on the other hand, are fortunate enough to be able to spend most of the time touring the countryside will be interested in the Symphony Tape Timer Unit. This device switches a tape recorder on and off at any set time and, in fact, makes it completely automatic.

It consists of a special electric time unit with a twelve hour dial and two control knobs, one for setting "on" and "off" times, "off" only or manual operation. In addition there is a process timer with readings in one minute divisions up to 25 minutes. Situated on the back of the unit is a 13 amp socket for connecting the recorder. A heavy duty lead is provided for connection to the mains. An extra lead is fitted, terminated with a DIN plug for insertion in the remote control sockets of Continental recorders having electronically-controlled tape transport systems.

### Operation

Operation of the unit is very simple. The electric clock is set to the correct time, by the white knob situated in the middle of the face. The red knob mounted in the top right hand corner is then adjusted in a clockwise direction until the "off" time is set. By turning the same knob in an anti-clockwise direction the second white indicator is then turned to the "on" time allowing for the warming-up time of the equipment. The automatic/manual control (bottom right) should then be turned fully anti-clockwise and the Process Timer should be set allowing the desired warming-up period. It is essential, of course, to ensure the correct recording level before setting the unit. If the recorder has facilities for remote control the machine will "warm-up" at the preset time, and the pressure pads and idler wheel will be brought into contact on the second command from the Unit. Periods from 5 minutes up to 8 hours' duration may be set.

Some difficulty may be experienced with recorders that have to be operated manually, but in some cases springs or elastic bands may be used to hold the start button in position. This, however, keeps the idler wheel in contact with the capstan and "flats" can result.

### Check Tapes Beforehand

This Tape Timer Unit has been used daily for the last two months, recording items at various times during the day and night, and not once has it failed to obtain the required recordings. One most important thing to study before using this unit is the condition of the tape. Joints should be checked to make certain that breaks do not occur when recording. P.V.C. or polyester based tapes are most suitable as these are less likely to break during a recording.

Using this unit with a recorder is only one of the many possibilities open for consideration. It can be used for switching on any electrical device. High on the list of uses, in this summerless country, must be the switching on of electric fires one hour before returning home.

The unit is fitted in a rexine-covered wooden cabinet and operates on A.C. main voltages of 200 to 250, 50 cycles. Two models are produced, the Model A which is a Tape Timer without a Process Timer, but fitted with a neon indicator on the front panel and the Model B described above which has been developed specifically for use with Revox, Telefunken 75 and 85 and Stuzzi Magnette recorders. The prices are Model A £10 10s., Model B £15 15s. Manufactured by Symphony Amplifiers Ltd., 16 Kings College Road, London, N.W.3.

A.J.L.

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## READERS' PROBLEMS

★ Readers who encounter snags, or who run into trouble with their tape recording equipment, are invited to write to this editorial office for advice, marking the envelopes "Readers' Problems—Tape". Replies will either be sent direct by post, or published in this column if the subject is of general interest. However, we must emphasise that this advisory service cannot include requests for information about manufacturers' products when such information is obviously obtainable from the makers themselves. It is also essential to keep the queries reasonably short and to the point, and to limit them to one specific subject if at all possible. And, please, in no circumstances confuse such letters with references to other matters which may have to be dealt with by other departments in our office.

### "Off Key" Recordings

Dear Sir:—I have in my possession a Sound Studio tape recorder, the deck of which is the Collaro Studio. Over the past week I have recorded direct from radio and on playing the recording back the tone is "off key". Could you please give any reasons for this?—*Yours faithfully, D.N., Accrington.*

Because the tape deck of any tape recorder is made up as a separate mechanical unit there cannot be any difference in tape speed that is directly attributable to whether the machine is set to record or replay. Other conditions remaining the same, a machine cannot record at one speed and replay at another. I note from your letter that earlier recordings are replaying at the correct speed. I would therefore assume that this has not altered due to any mechanical defect. We must therefore assume that on the recording in question the "other conditions" were not the same. One possible cause of a variation in tape speed would be a variation in mains voltage, alternatively one of the brakes might have been rubbing slightly.

Should this fault happen again it might be worth while having the deck serviced, but otherwise if the machine is now functioning satisfactorily, I think it would be well left alone.

### Lubricating Synchronous Motors

Dear Sir:—I have one particular problem on a Ferrograph 2AN to which Messrs. Ferrographs appear to have fitted a die-casting to the top of the capstan bearing when they carried out a routine overhaul some two years ago. Otherwise the machine is standard.

The trouble is getting the machine to drop into synchronous speed, particularly when starting up from cold. The tape is running at a very inconstant speed with approximately a half-second cycle, with the motor itself obviously varying in the same manner. However, once getting the motor locked into synchronism, the performance is then perfectly satisfactory. The main flywheel is running perfectly freely and, on switching off, continues to rotate for some half minute or more, although sometimes there is the merest rumble from the bottom bearing. I have held the rubber idler wheels off the main motor when starting up under these conditions, and the motor itself still gives the changing note of a motor not running smoothly in synchronism. The queries are therefore as follows:—

1. Should the two bearings on the main driving motor ever require oiling?

2. After two years' use at the rate of—say—1,000 hours a year and no maintenance whatsoever, apart from just cleaning the heads, this trouble of not falling into constant speed occurred

(Continued on page 555)



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**READERS' PROBLEMS — continued**

more and more frequently, and it was found that the main motor, when not switched on, was very stiff and could not be spun with the finger. By slackening off the retaining sleeve it was possible to move the rotor shaft some  $\frac{1}{4}$  in. upwards, when it was found that the shaft itself was encrusted with a hard layer of black material, presumably graphite. This was cleaned off, after which the motor ran quite freely and fell rapidly into synchronisation after switching on. I duly gave both bearings a drop of thin sewing machine oil on the head of a matchstick, which put the machine in perfect running order for a matter of a week or two. However, although the bottom bearing always remains perfectly clean and free, the black material is still picking up on the upper bearing and now requires cleaning daily. Does this mean (a) having to replace the bearings completely, or (b) taking the motor off and thoroughly cleaning it, or (c) is the small amount of machine oil which I put on washing out the graphite?

3. To thoroughly clean the bearings it will be necessary to remove the main motor from the deck. While three of the bolts can easily be removed, the fourth bolt is in rather an inaccessible position, and I was wondering whether the normal maintenance procedure was just to remove the motor and curse the detail draughtsmen responsible for the positioning of this bolt, or whether someone had found an easier way by removing the deck or some sub-assembly?

4. Although I possess the normal Ferrograph Manual, which covers the electronic side very well, the mechanical maintenance is hardly touched on and I was wondering whether you could recommend any other publication which would help in the mechanical maintenance of this equipment.—*Yours faithfully, D.S.B., Debden.*

*Your problem does seem, as you surmise, to have its roots in the question of lubrication. Messrs. Ferrograph have said that a small amount of lubrication after 1,000 hours' use may be advisable. They recommend the use of Aeroshell 3, a small bottle of this being available as an accessory.*

*The black deposit you describe could be a mixture of oil and the sealing pitch from the stator, if the motor is getting overheated. But check that there is no entry of foreign matter through the upper vents of the motor housing—I had a case of a jamming rotor which proved, on investigation, to be the result of rubber scaling from a worn idler wheel getting between the angled slots of the rotor. Without seeing it, I should not dare to be too emphatic, but hazard a guess that you have lubricated a trifle too liberally, and with oil of too low a viscosity. If the motor is overheating, this could be due to a worn bearing, for which replacement is the only cure. Overheating would tend to aggravate the trouble you are getting, causing the oil to run more freely and the foreign matter to adhere more easily. Make sure the deck is adequately ventilated.*

*As to the dismantling enquiry, I cannot offer you an easy solution, except to suggest you partly dismantle by removing the sleeve and the lower bearing and withdraw the rotor; this, and the inner surface of the stator, can then be cleaned easily.*

*I have written to the manufacturers and will pass on to you any further comments they make. I cannot direct you to publication of more "mechanical" information on this deck; indeed, I do not believe a complete layout diagram has ever been published. I only wish I could keep a deck long enough in my workshop to prepare a detailed assembly sheet! But, as you will be well aware, the reliability of these models is such that they rarely land on our benches. The makers will never supply more than a "comprehensive" photograph.*

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(Continued on page 558)

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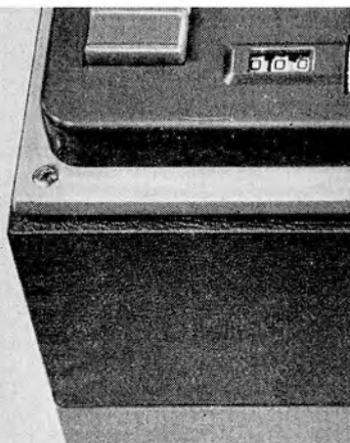
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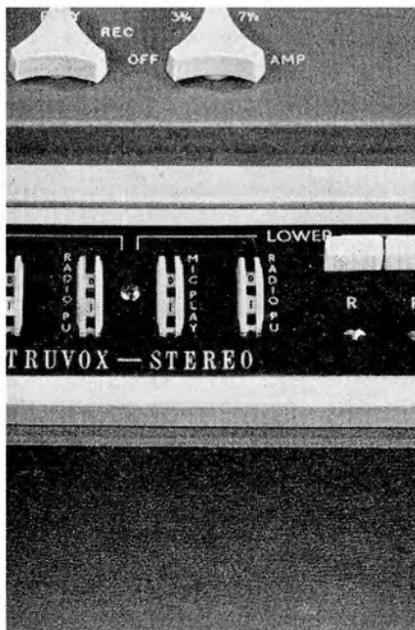
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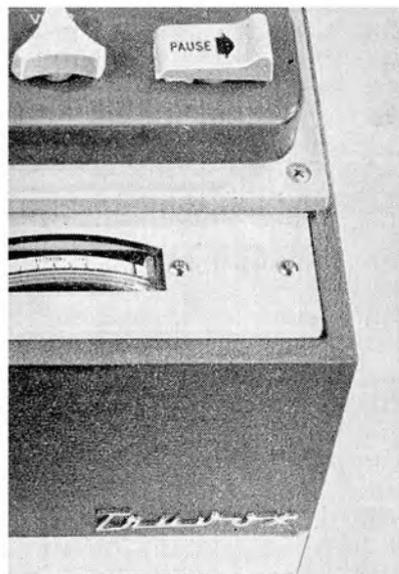
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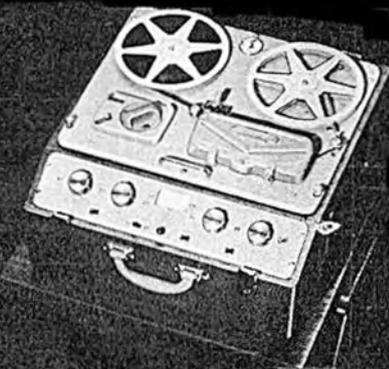
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