

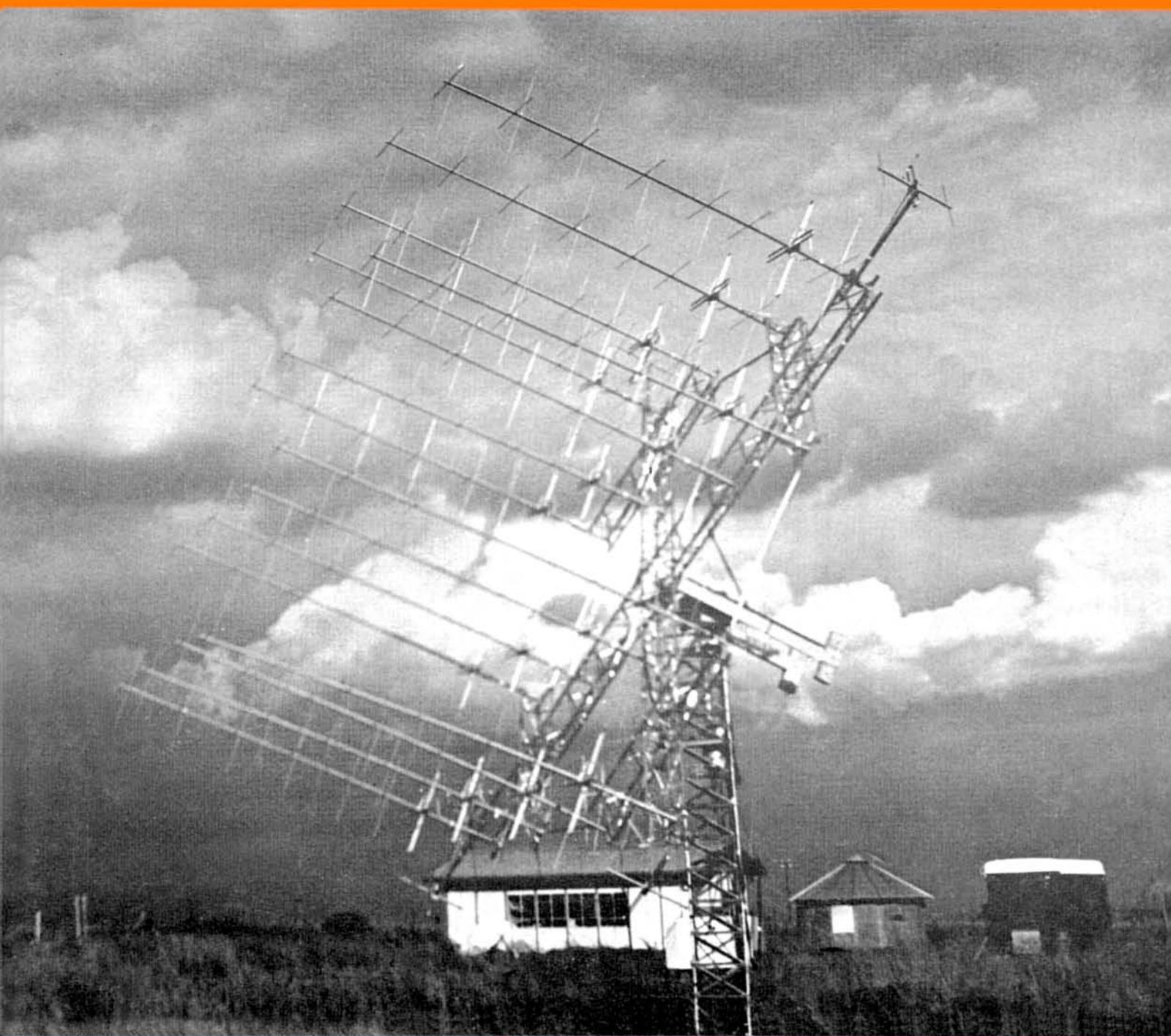
the TAPE RECORDER

PRICE 1/6

June 1961

Vol. 3 No. 5

INCORPORATING "SOUND AND CINE"



IN THIS NUMBER

- Six Pages of news and Pictures
- Tracking Satellites—by VHF Radio, Tape and Telemetry
- Hints
- Tape Workbench
- Reader's Letters and Problems
- First Details of a New Japanese Portable
- Taping a Wedding
- Details of New Products
- Sound and Ciné
- Home Recording
- Three Pages of Equipment Reviewed

New sounds for old'



BBC choose Emitape

The BBC Radiophonics Section, at Maida Vale, produces any kind of noise a sound or TV broadcast could ever want; sounds to menace, soothe, exhilarate... everything from space travel to Goonery. Their tools are natural sounds, frequency manipulation, and miles and miles of Emitape.

Here the sound of the mijwiz, an Arabian double-reed pipe, is recorded. Later, it will be treated elec-

tronically in the Radiophonics Workshop to create unusual effects.

The Radiophonics people make their effects from 'white noise'—every frequency from zero to infinity sounded simultaneously. Emitape records it unflinchingly, and it is finally edited to produce the desired result. Frequencies are flattened, sharpened, added, removed. Emitape thrives on it all to make effects as far removed from the galloping coconuts era as the Comet from Bleriot.



The BBC rely on Emitape for the great majority of their recordings. Standards must be high. One recording fault could mean dozens of complaints.

Emitape

—used by the BBC 9 times out of 10



EMITAPE DIVISION, EMI SALES & SERVICE LTD., HAYES, MIDDLESEX



YES!



tapes

are records too!



REVOLUTIONARY QUESTION: *what is a Gramophone?*

REVOLUTIONARY ANSWER: *there are two sorts of Gramophone—those which play discs, those which play tapes.*



REVOLUTIONARY QUESTION: *what is a Gramophone record?*

OBVIOUS ANSWER: *a disc or tape.*

Yes! your tape-recorder is first and foremost a gramophone too. It is more flexible than a disc-gramophone because it can also record. But its primary purpose is to reproduce *original* sound, and this is more perfectly recorded, more permanently recorded, more precisely recorded on tape-records. This view, increasingly held by music-lovers who value the *original* sound, has caused the fantastic upsurge in the sale of tape-record gramophones. Besides, the stereo of the concert hall and recording studios goes straight to tape and stays on tape on *tape-records*.

SAGA tape-records, both mono and stereo, on 7 $\frac{1}{2}$ " and 3 $\frac{1}{4}$ ", are the Commonwealth's most *accepted* tape-records. SAGA tape-records are on sale at your nearest record-retailer (naturally). Alert record-retailers retail both sorts of records—pure, perfect, and permanent tape-records, as well as other records. SAGA tape-records use SCOTCH *Brand* tape exclusively. Ask your nearest record-retailer for a free SAGA tape-record catalogue. In case of difficulty write direct to SAGA SOUND, at 127 Kensal Road, London W.10.



Ask for     *by name* 



SAGA tape-records are made by SAGA SOUND, manufacturers of famous SAGA Sovereigns, SAGA Language Records, SAGA Dandies (for the children)



SAGA SOUND,
127 KENSAL ROAD, LONDON W.10

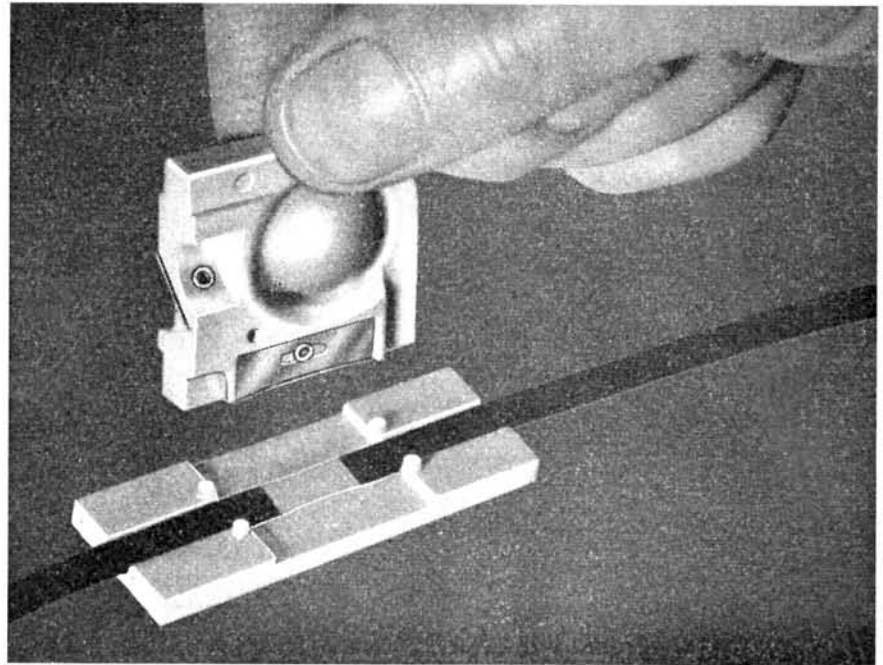
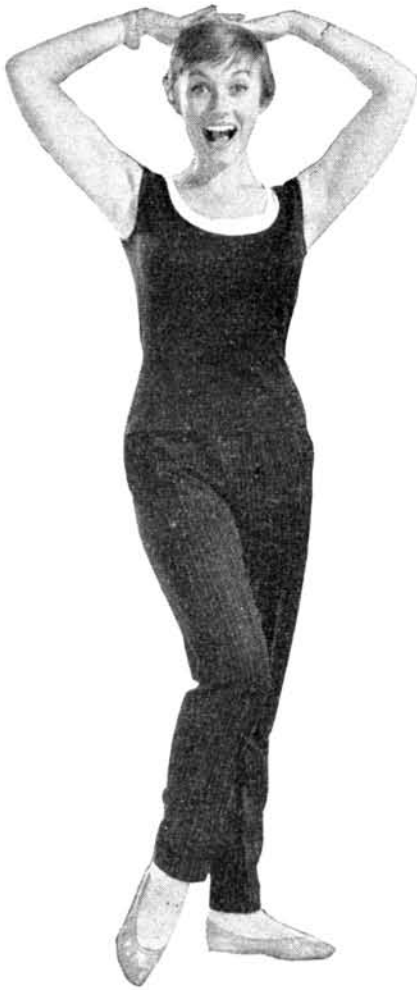
Please send me FREE, without obligation, a copy of your new SAGA tape-record catalogue.

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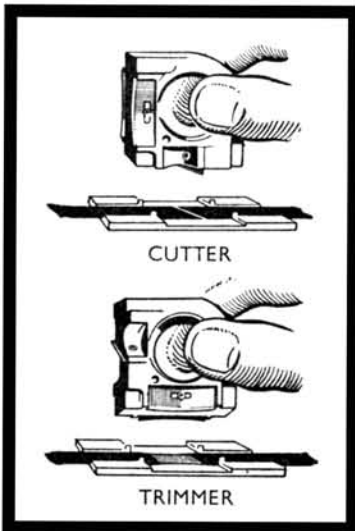
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..... ST-7



the original
“GIBSON GIRL”
precision tape splicer

gives a lifetime of splicing for only 18/3



Now available in Great Britain for the first time—
 the *original* “Gibson Girl” high precision splicer at the down to earth price of 18/3d. The “Gibson Girl” has high grade surgical steel cutters studio proved to give more than 2,000 perfect splices.

Hand held, the “Gibson Girl” cuts the tape ends diagonally to give a perfect butt fit—the slightly concave blades are then used to give the splice the “Gibson Girl” shape, leaving the edges of the tape (which contact critical recorder parts) entirely free of adhesive.

Contact adhesive on the back of the splicing block enables it to be mounted on a tape deck.

complete with blade cover only 18/3^D

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



TK 24 4 TRACK MODEL

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

It doesn't ask you to scrap all your existing conventional twin track 3 $\frac{3}{8}$ i.p.s. tapes—it lets you play them back as well (and how good they sound!).

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

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

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

PRICE **55** guineas (including Microphone)

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Address

Nearest Town

GS. TR. 235

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at lowest possible prices

HI-FI F.M. TUNER, Model FM-4U

This model is available in two units which, for your convenience, are sold separately. They comprise a Tuning Unit (model FMT-4U) at £3.5.0 incl P.T. and an I.F. amplifier unit (model FMA-4U) at £11.11.0. The Tuner Unit is despatched wired and tested. Provision is made for stereophonic F.M. radio transmissions. Printed circuit for I.F. amplifiers and ratio detector. Built-in power supply, 7 valves, many refinements. Range 88-108 Mc/s. (Illustration bottom centre). Total cost **£14.16.0**

TO ALL MUSIC LOVERS AND HI-FI ENTHUSIASTS

Our wide range does not permit of adequate coverage of all models. A FREE CATALOGUE and full specifications of any particular models will gladly be sent on request, without obligation on your part. **WIRED AND TESTED MODELS NOW AVAILABLE. PRICES ON REQUEST.**

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Here are some other interesting Heathkit Models for you.

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A 10-12 watt high fidelity amplifier having extremely low distortion and wide frequency range. 30mA 300V auxiliary power available. Ideal for stereo, conversions **£10.19.6**



AG-9U



RSW-1



RP-1U

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S-33

S-88

S-88

FM TUNER



SSU-1

USC-1

UXR-1

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FULL DETAILS OF MODEL(S).....

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FOR more than twelve years — longer, probably, than any other firm in the industry — we have been making Tape Recorders. But never have we aspired to produce the greatest number nor to cater for all sections of the market.

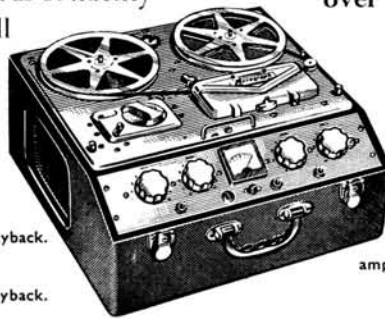
Ferrographs, in fact, are **not** mass-produced. Each is built with painstaking skill in a series of complicated operations that can only be carried out by experienced technicians dedicated to the pursuit of quality.

Long ago we foresaw that a time would come when many would expect the Tape Recorder to compete with — perhaps even to oust — the gramophone as a home entertainer. We have never shared this viewpoint. Because **Recording** has always been our business we have consistently and whole-heartedly directed our energies towards the attainment of the highest standards of fidelity in tape **recording** — realising full well that magnetic tape stands supreme as a recording medium.

The unrivalled reputation enjoyed throughout the world today by the Ferrograph is the direct result of this wise and logical policy.

We have no intention of introducing features into the Ferrograph for the purpose of competing with the gramophone. We believe that such developments as ultra-slow tape speeds, very narrow tracks and suchlike are 'gimmicks' that could, at the present state of the art, lead to a general lowering of performance standards in tape recording. We at Ferrograph refuse to make any such compromise with quality as would be inevitable.

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Series 4A

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the brilliant
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HERON is

*only 25 gms
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with microphone,
850 ft. of tape, spools
and spare plug



At last it's an accomplished fact—a really smart-looking mains tape recorder with a performance quite unique at the price. The secret is an entirely new audio valve and a 7" x 4" speaker with 10,000 lines gauss (and if that means nothing you'll just have to hear the "Heron" for yourself). But that isn't all. The case is as modern as a space flight—elegant and distinctive in blue-grained Swedish fibreboard. All in all an achievement in design which has to be seen and heard to be believed.

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Telephone: ENTERPRISE 2226/7 Telegrams: WYNDRECO, LONDON

- ★ 3½ i.p.s.
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- ★ Pocket for microphone and leads.

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VERSATILITY ADAPTABILITY PORTABILITY

**twin channel
stereophonic
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TR52/2**



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NOT MASS PRODUCED BUT VIRTUALLY HAND-MADE FOR RELIABILITY
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R10 SPECIFICATION:

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

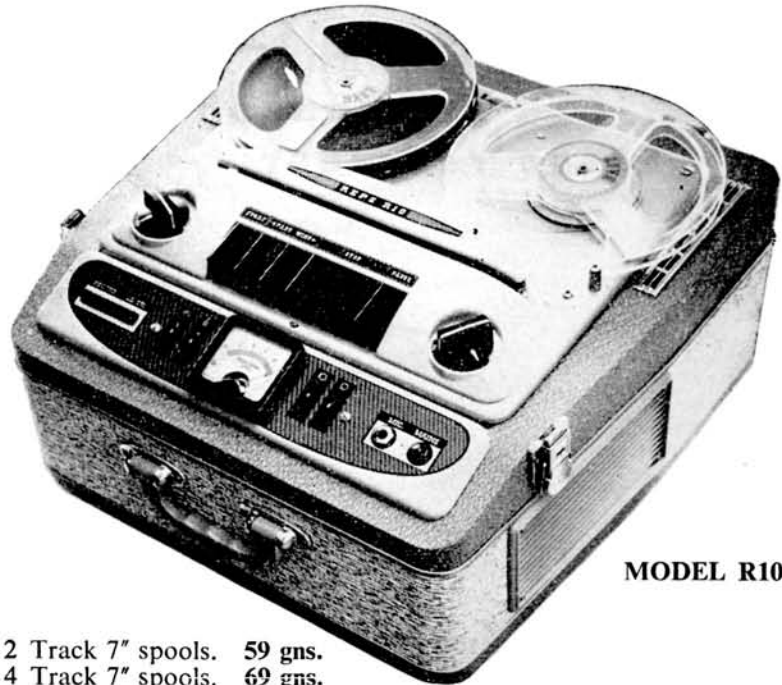
Record Replay Responses—

$7\frac{1}{2}$ ips. 40-16,000 C.P.S. } ± 3 dBs.
 $3\frac{3}{4}$ ips. 40-10,000 C.P.S. } At optimum
 $1\frac{7}{8}$ ips. 50- 6,000 C.P.S. } bias setting.

Signal/Noise ratio—

half track 50 dBs at $3\frac{3}{4}$ ips.
 quarter track 45 dBs at $3\frac{3}{4}$ ips.

Modified Collaro Studio Deck. Microphone and Radio/Gram inputs each with separate gain controls for mixing. Separate bass and treble controls. ± 12 dBs at 50 cycles and 12 k/cs. Adjustable monitor volume control independent of record level. Peak signal level meter $2\frac{1}{4}$ in. square. Bogen heads. Record safety device. 600 ohms Cathode follower output. Two per cent total harmonic distortion on peaks. 200/250 volts 50 cycles or 100/120 volts 60 cycles. Valve line up: 3 EF86, 2 ECC83, 1 ECC82, 2 ECL86. Metal rectifier, contact cooled.



MODEL R10

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

R40 SPECIFICATION:

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 $7\frac{1}{2}$ ips. 50-15,000 ± 3 dBs.
 15 ips. 40-20,000 ± 3 dBs.
 (signal noise ratio at $7\frac{1}{2}$ ips.—
 47 dBs).

Separate record amplifier.

Push/pull bias erase oscillator for low tape hiss.

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

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

MODELS

R20 62 GNS. with magic eye record indicator.

R30 66 GNS. with meter record level indicator.

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



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

Mr

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Phone: Acorn 4141

the TAPE RECORDER

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 Telephone - - - - - MUSEum 3967 to 3969



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 OF CIRCULATIONS

EDITORIAL

OUR remarks in this column last month brought us a deluge of correspondence—and also a lot of hard work, because numerous readers immediately asked our advice about what to buy and what to avoid. Still more wrote to us, sending a list, expressing preference, and requesting approval. It is, of course, impossible for us to set ourselves up as Judge and Jury in this way, and we hope readers will appreciate this point. However, lest anyone should think that we are thereby dodging the issue, let us first repeat the concluding lines of our column last month: “We have many times refused the advertising of goods that we ourselves would not like to buy, and we intend to continue with this policy.” And, second, let us say definitely that we have received favourable reports of all the recorders currently advertised in this journal. Obviously there will be cases of failure—even frustrations; but that applies to almost every product in every field, from tins of soup to cameras, cars and fountain pens.

The driving point behind our “Editorial” was that *too many people* have been too careless about too many products, in the past year in particular; and that readers who are potential buyers of recorders should buy with discrimination. The opinion of a good dealer is worth a lot. He knows—or *should* know—the makes of recorder which have made satisfied customers, and vice versa. But let us here underline the adjective “good” dealer. The person who walks into a furniture store and buys a recorder that he has seen in the window can well be asking for trouble. What if it fails? Does the man who sells double beds and occasional tables know what to do with it? Does he in fact care? At the best he will send it back to the maker (if still in business) with all the hazards of a double rail journey.

Buy with care: prefer the dealer who has his own good service department. Study the literature that goes with the instrument. Ask the dealer’s advice, *before purchase*, about suitability of microphones, different brands of tape, extension speakers, matching arrangements for whatever other equipment the recorder may be used with. It is his job to know these things, and if he is a good dealer he will be just as ready to advise as he will to make the sale. It is a damning fact that so many readers have written to us, asking us for the simplest details about their purchases, which should have been made abundantly clear in the instruction manuals.

In conclusion, however, let us repeat the fact that the majority of these sloppy makers have paid dearly for their carelessness, and have vanished from the scene. The position has improved immeasurably. It will improve still further as purchasers ignore the doubtful product, demand more pre-purchase information, and deal with established and reputable dealers.

JUNE - - - - - 1961
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COVER PICTURE

MILLIONS upon millions of feet of magnetic recording tape are made and sold each year by the firms whose names are household words. Where does it all go? Certainly not on to 7-inch and 3-inch spools for the domestic tape recorder market! Big as this demand is, and growing rapidly, it still only accounts for a very small part of the world’s total annual tape output. The answer lies in the phrase “industrial and scientific applications”. Our cover picture—a section of the photo which also appears on page 239—indicates one such application. There are probably scores of satellite tracking stations dotted about the planet. All use tape—miles of it. Whatever information has to be recorded in laboratories, stored for analysis, or fed into a hundred and one other electronic devices—tape is the medium.



JUNE NUMBER

★
 Contents include:

Electronic Organ, First
 Constructional Details

Forty Years of
 Loudspeakers

Hearing Aids

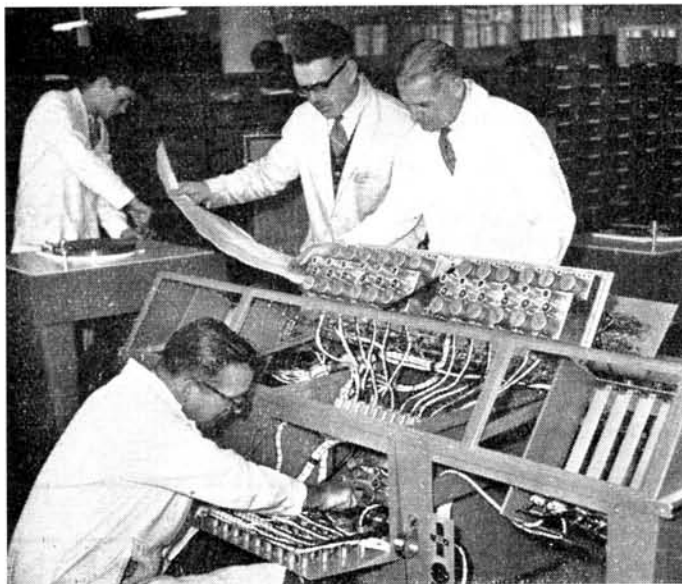
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NOW ON SALE

SUBSCRIPTION RATES

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

HERE AND THERE AND EVERY WHERE

New EMI Recording Equipment For Rumania



FIRST two models of a new-type 10-way mono-stereo mixing control console are included in two recording suites, for making mono and stereo gramophone records, recently despatched by EMI Electronics Ltd., to the Rumanian Record Industry. These consoles will record stereo by the conventional spaced microphone technique or—with the addition of special transformers—by EMI's "sum and difference" system. Results are more faithful to the original when the sum and difference system is used. This is particularly valuable when recording orchestras or choirs, which cannot easily be adequately covered by the spaced microphone technique.

Included in the order were ten TR90 stereo magnetic tape recording consoles, two dubbing mixing consoles, two disc replay units, eight large studio monitor loud-speakers and associated equipment. The order was placed with EMI Electronics through Masinimport of Bucharest.

Salvation Army Uses Fi-Cords

A PAIR of tape recorders will play an important role during a 1,500 mile Whitsun tour of Denmark planned by the Luton Temple Salvation Army band, led by 35-year-old industrial executive, Zander Greig. The Army's own newspaper, "The Musician," will receive by air each day a tape recorded report of the 10-day tour, which will cover 14 centres in Denmark. Recordings will be taken on Fi-Cord 101. "This marks a new era in Salvation Army journalism," commented one officer.

A second tape recorder will be used for daily domestic reports home by members of the band. Leading Luton retailers, S. Farmers Ltd., will provide a Grundig TK1 so that friends and relatives of the bandmen may call in to hear an up-to-date progress report of the tour. On this, the band's first overseas tour, the Luton players will be representing some 25,000 British Salvation Army bandmen.

Stop Thief!

SEVEN Master tapes were missing from the demonstration room of Irish Brand Tape (Wilmex) on the final day of the Audio Festival. The titles and numbers are LJA 109, *Latin*

Moderne; LJA 128, *Trad Mad*; LMA 118, *Two Moods*; LMA 120, *String Time*; LMB 122, *Light and Easy*; and SW 142 *Mr. Chairman*. Anyone with any information should contact Bi-Tapes Ltd., 78 Upper Berkeley Street, London, W.1. The tapes were in Irish Brand boxes, with black lettering stating the contents on the outside. Two of the tapes are irreplaceable.

A Vortexion tape recorder serial number 3677/D was stolen from the flat of Mr. Fitzpatrick, 110 Frampton Street, London, N.W.8. on Friday the 28th April. Anyone receiving any information of this recorder should contact the owner.

4th National Tape Course

THE Rose Bruford Training College, Sidcup, Kent, organised another of their popular training courses again this Easter, and the full complement of 50 students enrolled. These included school teachers, tape club members, and private individuals, and the usual scheme was followed by which the first three days covered all the basic operations and editing of tape, while the remaining two and a half days were given to full-scale magazine and drama productions. B.B.C. representatives amongst the tutors were Jack Singleton, Kenneth Pragnell, Richard Burwood and Desmond Briscoe. Geoffrey Hodson, Peter Palmer, and Graham Jones organised the frantic activities which included a special (legally pre-arranged) 999 call with Sidcup Fire Station supplying plenty of noisy recordings, and technical operations and instruction were in the hands of F. C. Judd and John Borwick.

Another course is planned for next year, and early booking is recommended. Further information can be had from the Special Courses Organiser, Rose Bruford Training College, Lamorbey Park, Sidcup, Kent.

Hospital Tape Services

AT a demonstration and lecture to Welfare Officers of the British Red Cross Society held recently in Guildford, Surrey, a representative of the Hospital Broadcasting Service described the types of recording most enjoyed by patients. Brief snippets were played to the audience on a Butoba tape recorder kindly loaned for the weekend by the distributors, Denham and Morley Ltd. If your club provides programmes to Hospitals, or if you are considering starting a Hospital Service, why not start on the right lines from the beginning? Clubs in and around London are invited to write to the Hospital Broadcasting Service, 21 The Avenue, Wanstead, giving dates when a representative may visit the club.

New Garrard Booklet

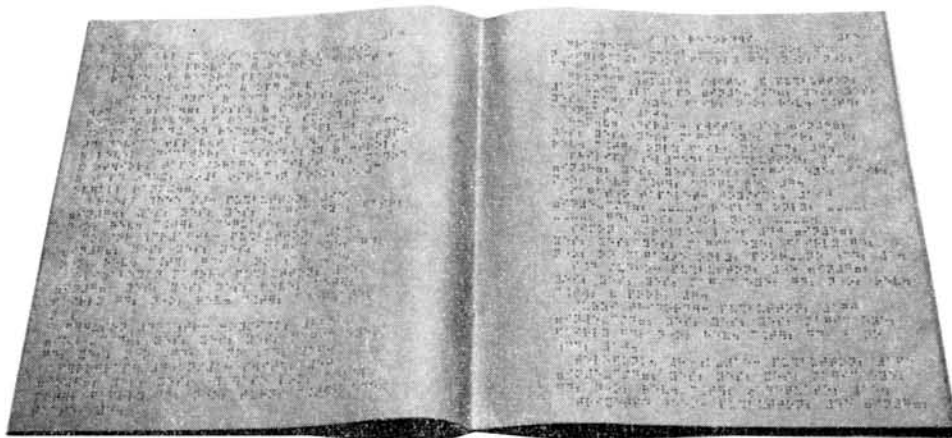
A NEW booklet has been issued by the Garrard Engineering and Manufacturing Co. Ltd., giving details of the latest accessories available for use with the Garrard Magazine Tape Deck. Operation of the deck is fully dealt with in this leaflet together with notes on the Tape position indicator and the Library Storage Unit. Copies are available from the manufacturers, free upon request.

Minivox Distribution Changes

THE CHALLENGER INSTRUMENT CO., manufacturers of the Minivox range of tape recorders have announced that in future representatives will call direct on retailers and that all sales will be made direct, instead of, as at present, through wholesalers. Due to this change in distribution policy it has been possible to reduce the retail selling price of the Minivox 'C' to £31 10s.—a reduction of £11 11s. on the existing price.

HERE AND THERE AND EVERYWHERE *cont.*

● Readers are reminded that we welcome news items and pictures for these "Here-and-There-and-Everywhere" pages. The range of material is almost unlimited, provided only that the basic subject is "Tape and its uses." In the case of photographs, please note that the full name and address of the sender should be clearly marked on the back, regardless of the fact that such photos may be sent with a covering letter. *Editor.*



Tape News by Braille

REPRODUCED on this page is a photograph of the "Tape Record" a magazine produced for the blind by the Royal National Institute for the Blind. Using the Sold Dot technique recently perfected, it will be on sale quarterly on a subscription basis of 5s. per year. The first copy contained extracts of *Here and There and Everywhere* and articles from the *Tape Recorder's* sister magazine *Hi-Fi News*. The magazine contains items of interest to tape enthusiasts and a list of gramophone record releases which has hitherto been unobtainable in Braille. Readers with blind friends can help by bringing this new magazine to their notice enabling them to purchase the second copy which was published on May 12th.

* * *



Tape Recorders for County Councils

NEWS from two important County Councils shows how tape recorders can be of value in Council work—in very different ways. The Children's Department of Middlesex County Council has been interested in tape dictating machines for some time, and three instruments were installed by the Dictation Machine Division of The Tape Recorder Centre Ltd. in three area offices on a trial basis. The recorder selected was the Philips Dictation Machine. This instrument has cassette tape loading, which is particularly useful for this application: Each Area Officer has his own cassette, and does his dictation when it suits him best. As soon as his dictation is complete, he removes his own cassette, which is then transcribed. Reviewing the results, Mrs. Ashdown, the Chairman of the Children's Committee, said that the dictating machines had considerably relieved congestion of office work, and proved invaluable to the Area Officers. In the light of this test, The Tape Recorder Centre Ltd. have now installed a total of 19 Dictation Machines, with cassettes for all Area Officers (total costs are around £1,000).

A very different application of tape recorders is reported by the Surrey County Council. In connection with the preparation of a master plan for the redevelopment of the central area of Sutton, a detailed traffic survey has been undertaken jointly by Technical officers of the Borough and County Councils. Here, Saja Tape Dictation Machines were selected for the recording of registration numbers on the six busiest routes, since the sensitivity of this unit's microphone is so versatile that successful recordings can be made in very noisy conditions. A new improved model of the *Saja* called the *Graetz* will be available in June. Twelve of these machines were used, again supplied by the Dictation Machine Division of The Tape Recorder Centre Ltd., who assisted with the first recordings made. The machines were plugged into lamp posts and recordings made during selected control periods, providing a simultaneous and accurate record with a considerable saving in man-power.

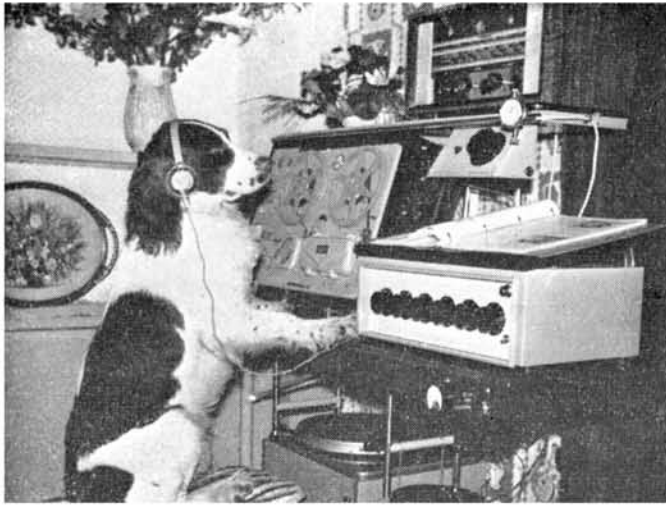
The Tape Recorder Centre Ltd. specialises in the supply of recording equipment for all purposes and are always very happy to advise Councils on all conceivable tape and dictating applications. The Head Office is at 75 Grand Parade, Harringay, N.4. Tel.: STA 1146/2097 and there is a Central London Showroom at 82 High Holborn, London, W.C.1. Tel.: CHA 7401.

* * *

BBC Orders 30 EMI Tape Recorders

THE British Broadcasting Corporation has placed a contract with EMI Electronics Ltd. for 30 TR 90 professional tape recorders and 42 TR 90 replay machines. This equipment will be used in BBC broadcasting studios throughout the various Regions. Most of the equipment will be trolley-mounted for easy movement between studios, but four of the tape recorders will be fitted into transportable cases in mobile recordings. These machines are used in nearly all the broadcasting studios in the world, and by recording companies for the all-important tape recording from which the lacquer disc is prepared. *(Continued overleaf)*

NEWS FROM THE WORLD OF TAPE



Hidey Fido

Mr G. Carrick of Girvan Ayrshire, supplied the above photograph of his equipment comprising a Vortexion recorder and mixer, being given the 'try it on the dog test'.

Shorthand Practice by Tape

SINCE the introduction of pre-recorded tapes for education by Teach-U-Tapes early this year, there has been a growing demand which has resulted in the manufacturers being able to reduce the price to £1 15s. each, and the set to £7 10s. Recently, a new series has been produced entitled *Speed in Shorthand* which was prepared by a qualified shorthand teacher to give the listener the right kind of practice by a variety of carefully-chosen and clearly-spoken passages, at speeds ranging from 60 to 130 words per minute. These are available on four tapes price £1 15s. or for the complete course £6. Each tape is recorded at 3½ i/s, and plays for approximately half an hour. The latest tape produced is "Speaking in Public" which gives a clear guide to public speaking whether it be to a small club or large audience. Full details of the tapes available can be obtained from K.L.P. Film Services.

Nature Film has Synchronised Sound

ONE of the first nature study films to have a fully synchronised soundtrack—Philip Wayre's colour film of wild life on the Norfolk Broads, "Wind in the Reeds"—used an RE 321 battery portable tape recorder, the latest transistorised version manufactured by E.M.I. Ltd.

"Wind in the Reeds," which bears comparison with Walt Disney at his best, took three years to make. Its première will be the main attraction of a film show in aid of the Imperial Cancer Research Fund, at the Royal Festival Hall, on April 15. Among the actual bird calls heard in the film are those of herons, kingfishers, duck and moorhens. Winds and other Broadland noises were also recorded on location. EMI's portable recorder is widely used for on-the-spot news reporting by broadcasting organisations throughout the world, and for data recording by government and industrial establishments. Its compactness and reliability in all climates have also made it very popular with such well-known explorers as Armand and Michaela Denis, and it was used on the Mount Everest expedition.

Tape Recorder in Education

THE provision of tape recorders for use in classroom teaching has expanded considerably in recent years. As a result of this there is an increased interest in ways of using the machine effectively in schools. It has been decided, therefore, that the National Committee's permanent committee of teachers—the Central Committee for Teachers' Visual Aids Groups—should collect information on this subject on a nation wide basis.

There are to be two main lines of enquiry. The first will aim to collect information about the types of courses on the use of tape recorders which have been held, including the names of the speakers and suggestions for future courses. The second will be to seek information about work which is being done by individual teachers. A questionnaire has been drawn up in relation to this second point and is now being circulated.

The Central Committee is seeking the co-operation of anyone who is interested in the educational uses of the tape recorder. Information on any of the subjects mentioned should be sent to the Secretary, Central Committee for Teachers' Visual Aids Groups, 33 Queen Anne Street, London, W.1., who will also be glad to send copies of the questionnaire on request.

* * *

Build Your Own Portable

WE have more "do-it-yourself" enthusiasts among our readership than we thought. The first series of A. Tutchings' article was reprinted and has already sold out. Now, as a result of this demand, we have decided to re-print the full 12 instalments in small, booklet form. These illustrated articles take the beginner from the basic principles of tape recording and replay to the finished, home-built portable recorder. The price of this booklet has not yet been fixed, but will probably be 5s. and the print order will be limited. A further announcement will be made next month.

* * *

Miss Brenda Norman of 50 Roslyn Way, Bromley, Kent, receiving from Mr. Peter Dimmock the Stuzzi Mannequin Tape Recorder, kindly donated by Recording Devices Ltd., which she won in the Sportsman's Night Raffle, tickets for which were drawn by Mr. Peter Dimmock on Sportsman's Night at the Players Theatre. Top British Sportsmen and Sportswomen took part in the evening, the proceeds of which were donated to the Sunshine Homes for Blind Babies and Children.



NEWS FROM THE WORLD OF TAPE cont.

WILMEX (DISTRIBUTORS) LTD.

Sent the following as a guide to readers purchasing tape.

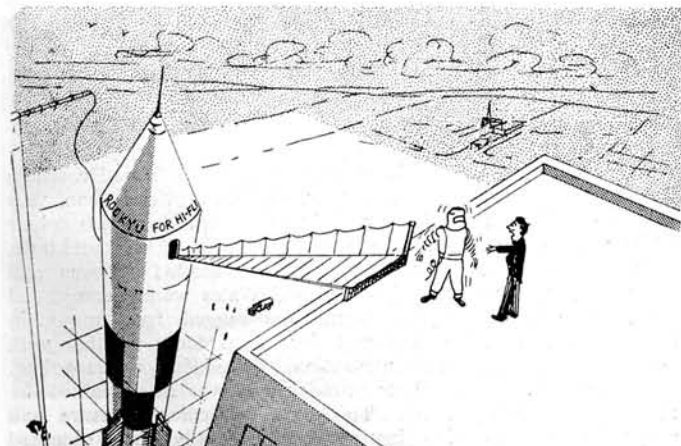
WE believe that there are many users of tape recorders in this country and in particular people who have not possessed machines for very long, that may become confused and misled by various attempts to colour code Magnetic Recording Tape. Perhaps some of these people may be interested to learn that the British Standards Institute some while ago proposed a definite colour coding for recording tape on the following basis:

All trailer ends would be Red. Standard Play Tape would be fitted with White Leaders. Long Play Tape would be fitted with Green Leaders. Double Play Tape would be fitted with Blue Leaders.

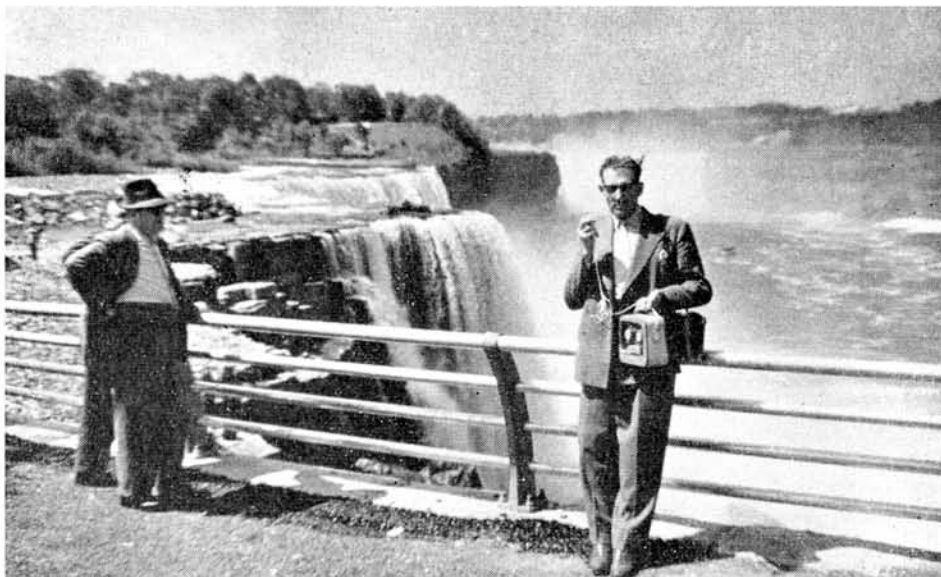
The reasons lying behind this colour coding are self apparent and can prove to be extremely useful, particularly where a tape becomes separated from its original box.

While this is at present only a proposed recommendation, it is interesting to note that the British Standards Institute are endeavouring to obtain international recognition. However, like so many things which require international approval and particularly those pertaining to Standards of the Radio and Electrical industry, this recommendation is not being very well received by certain makers. Surely it is in the interests of manufacturers, retailers and the public alike that a definite standard was adopted for all makes of recording tape. If this were done one would always know, irrespective of the make of the tape, whether the upper or lower tracks were being used, and more important, whether the tape was Standard, Long or Double Play.

IN order to give members of the **Walsall and District Tape Recording Club** some incentive to use their recorders and ingenuity, a sub-committee has been formed with the object of producing a tape about the town of Walsall. Some interesting results should arise and it is hoped to be completed within 3 months. A competition is shortly to be held for the best and most original humorous tape, to be judged by the club, with a 5 in. tape as prize. Further details obtainable from *Mrs J. Walford, 41 Mill Road, Pelsall, Walsall.*



"Be reasonable, Charlie . . . there are six tape recorders up there somewhere and somebody has to service them."



American Holiday

MOST of us dream of one day visiting America—the land of the fabulous, biggest, tallest, most expensive. Therefore you'll probably feel a little envious of Mr. Winston Shepherd of Blackpool, who spent his holiday last year visiting the U.S.A. Like the American abroad he carried a camera, but he also carried a Stuzzi Magnette. This British tourist was determined to bring home a complete souvenir of his holiday—sound effects and all. Mr. Shepherd sailed to America on board the Queen Elizabeth and from mid-Atlantic telephoned his wife in Blackpool. By simply holding the Stuzzi's microphone close to the hearing section of the hand telephone, he made a very good quality recording of a trans-Atlantic telephone conversation. In America he flew in a helicopter from the north section of Chicago to the west section of Chicago, over some of the tallest skyscrapers in the world. His impressions of this exciting trip are all faithfully recorded on his Magnette. And Mr. Shepherd is one of the very few holiday makers who can invite you to listen to his recording of the Niagara Falls. When he visited the largest waterfall in the world, he made a recording on his Stuzzi that truly captures their majestic might. Yes, Mr. Shepherd certainly had a marvellous holiday—and he has the tapes to prove it!

IT has just been announced that the 'Sound Stories' discs are now available on tape in half track or full track recordings. These are issued by Stanley Schofield Productions Ltd. 6-8 Old Bond Street, London, W.1., with a choice of speeds of 3½ or 7½ i/s. Prices range from 35s. 6d. to £16 17s. 6d. for the complete set. Car and motor cycle racing enthusiasts are well catered for with recordings of Grand Prix racing, at Silverstone, Aintree and stories of cars such as the B.R.M. The tapes are available from 600 stockists throughout the country and in fifteen countries overseas.

Club News

AT a meeting of the **West Herts Tape Recording Society** a Sound Hunt was arranged by Mr. J. Hill and members divided into groups of four, each with a battery portable, and received sealed instructions which were not to be opened until the groups had split up. Each group was sent to a railway station and the engine driver of a certain train was most surprised to find a group of recording enthusiasts waiting for him at each station. On returning to the club house the tapes were played and it was decided that the best tape was made by the brothers Coates and A. Mould. Further details of club activities can be obtained from *P. Holloway, 29 Fishery Road, Boxmoor, Hemel Hempstead.*

NEWS AND PICTURES FROM THE CLUBS



The Dartford and District Tape Recording Club have elected their first President, Mr. A. Woods (seen fifth from the left). Meetings are now held every second and fourth Thursday of the month at 41 Windsor Drive, Dartford. Recently a recording was made in Dartford Holy Trinity Church, a few technical faults were encountered, but fortunately these were traced before recording commenced. Visitors wishing to visit the club should contact Mr. E. H. Foreman, 117 Westgate Road, Dartford, Kent.

IT has been announced that a tape recording club has been formed in Bath, and will be called the **Bath Sound Recording Society**. Two services have been formed so far. These are a hospital service, and recording local events. Tapes have been exchanged with the Leamington Spa Recording Club, and they have arranged to meet this Club at Slimbridge Wild Fowl Trust later in the year for some outside recordings. The Society meet every other Wednesday at St. Mary's Church Hall, Grove Street, Bath at 7.30 p.m. Members of all ages are welcome, and further information can be obtained from Mr. K. W. J. Gingell, 9 Norfolk Crescent, (Top Rear), Bath.

MR. J. O. BANNISTER, President of the **Rugby Tape Recording Society**, opened the meeting held on the 9th March at which there was a talk and demonstration by Mr. Ronald Hamblin, who showed a very interesting film on the Rugby Sailing Club, which was synchronised with a sound commentary on a Walters tape recorder and Stroboscope. Three new Club members were present at this meeting, and some members of the Photographic Society also attended. Mrs. V. Tilcock will be pleased to supply any meeting dates to readers, and her address is 53 Fleet Crescent, Rugby.

MR. G. PONTZEN, Lustraphone's technical manager, gave a lecture and demonstration on Lustraphone microphones to members of the **Cambridge Amateur Tape Recording Society**. This was the first visit from a company manufacturing equipment for recorders, and Mr. Pontzen lectured on the different types of microphones and their uses. Ten members of the Society visited a local hostelry to make some recordings of a Hammond Electric Organ. Over three-quarters of an hour's recording was obtained, and further visits are planned for the future. The target of the Society is to enrol 30 members by the end of May. Any reader interested in helping them reach this number should write to Mr. M. E. Renshaw, 6 St. Vincent's Close, Girton, Cambridge.

THE 1960 Amateur Talent Competition organised by the Crawley "Courier" was such a success that the **Crawley and Sussex Tape Recording Club** have again been asked to organise this year's competition. Initial plans have already been made by the Committee and volunteers are needed to assist. It is aimed to start recording around May/June and the Grand Final, which will again be "live", is scheduled for September 9th. The Club is expecting a much larger interest and several "gimmicks" have been arranged. Details of Club activities can be obtained from Mr. R. C. Watson, 32 Southgate Drive, Crawley, Sussex.

AT the Man Friday Café, Torquay, Mr. D. W. Aldous, President of the **South Devon Tape Recording Club**, introduced a fellow recording engineer, Mr. Peter Perry, who demonstrated the extra quality obtainable from a recorder using external speakers. He brought with him two speaker cabinets,

which he had designed and constructed himself, showing that for a modest outlay and a little time enthusiasts could really do justice to the reproduction of their machines. At a later meeting the chairman, Mr. Gordon Furneaux, demonstrated a "Gramdeck", which he acquired for the evening, and Mr. A. S. Heather showed how to remove unwanted words and sounds from a tape by editing. Finally, members and guests joined in recording a short comedy play by Roy Russell. Meetings are held at the Man Friday Café, Torwood Street, Torquay, and details can be obtained from Miss S. Harris, 123, Sherwell Valley Road, Shelston, Torquay.

THE **Leeds and District Tape Recording Club** held its first meeting, since reorganising, at the Church Institute, Albion Place, Leeds 1, on Friday, March 3rd. A new chairman, treasurer and secretary were elected, and it was decided to print a leaflet containing programme details for the next six months. Any further details and application forms can be obtained from Mr. R. Crossley, 96, Stainbeck Road, Leeds 7.

"Tape Life" the newsletter published by the **Rugby Amateur Tape Recording Society** has now reached its 39th issue. Over 80 copies are published each month, but this will have to be increased if the membership figure continues to rise during the coming months. The second visit by Mr. Wells and Mr. Adams of Cosmocord Ltd. was well attended, and a talk on recording problems gave members the opportunity of asking technical questions.

At the last meeting of the **Weymouth Hi-Fi and Tape Recording Club** a demonstration was given by Mr. Neve Director of C.Q. Audio Ltd. of the Sceptre four-track recorder, together with a talk on Hi-Fi speakers. Three new members enrolled during the evening bringing the membership to quite a respectable total. Future plans include a screening of the film "This is the B.B.C." Details can be obtained from Mr. G. Butler, 53 Chapelhay Heights, Weymouth, Dorset.

At the meeting held on May 1st, the **Cotswold Tape Recording Society** welcomed one of its members, Mr. Clifford Benn, who gave a delightful and highly artistic programme in which colour slides were projected, to the accompaniment of a sound-track recorded on tape. In the first section, headed "Green and Pleasant Land," views of England and Wales were accompanied by music selected by Mr. Benn, and ranged from mountain scenery to church interiors and formal gardens, together with action shots taken at the International Eisteddfod at Llangollen. In a further section, colour photography was accompanied by music and verse-speaking. This gave particular pleasure and scope for the creative imagination. Further details can be obtained from Peter D. Turner, Cave Cottage, Oakridge Lynch, Stroud, Glos.

NEWS AND PICTURES FROM THE CLUBS *cont.*

AT their meeting at the Priory Hotel, Dover, on April 17th last, the **Dover & District Tape Recording Club** reluctantly received the resignation of their newly appointed Hon. Secretary owing to domestic reasons. It was decided to ask Mr. E. Gilbert a founder member to assume the responsibilities of Secretary until someone else is forthcoming to fill the vacancy caused by the resignation of Mr. Files. For the summer months the club will meet at various outdoor locations, and it is hoped that another attempt will be made to record the song of the nightingale in the nearby Folkestone Warren as they did last year with such excellent results. Any further information required can be obtained from E. Gilbert, 67 Old Dover Road, Capel-le-Ferne, Nr. Folkestone.

HIGHLIGHTS of the last few meetings of the **Enfield and District Tape Club** have been two competitions. For the first, members had to tape ten sound effects, real or home-made, and the entries were played back at a club meeting, where attempts were made to identify the sounds. The person recognising the most was Mr. Don Hughes, the chairman. In another competition members were given "milk" as a subject on which to base a five-minute programme on tape. A humorous story of the drink, from the cow to the doorstep, gained first prize: two reels of tape. This was submitted by the treasurer, Miss Pat Allbutt. Judging this contest was the secretary of the Ware and District Club, Mrs. Sheila Wakeley, and a member of the Walthamstow Club. Other members of the Ware Club were visitors on this occasion. Don Hughes has also given a certain amount of time to talking about microphone placing and explaining simply, the work of an amplifier and a loudspeaker. Other successful events have been two maintenance nights, where members' machines have been cleaned. Demonstrations have also been made to show other members the correct way to clean a machine.

The secretary of the club, Mr. Richard Collinson recently gave a short talk on some of the hints he gained when attending the National Tape Recording Course at Rose Bruford's Training College in Kent. Further details can be obtained from Richard Collinson, 30 Ridler Road, Forty Hill, Enfield.

THE Woolwich and District Tape Recording Club now meet at The North Kent Tavern, Spray Street, Woolwich, London, S.E.18. Dates and times of meetings can be obtained from F. J. Blaby, 331 Rochester Way, Eliham, London, S.E.9.



Robert Coote—now appointed the United Kingdom Publicity Chairman of the *Voicespandence Club of America*, has been active in tape recording as a hobby since 1954. He first realised the value of a tape recorder as a replacement for pen and paper in communicating with friends, back in 1957 and soon learned of the existence of

The *Voicespandence club*, run by Charles Owen of Noel, Virginia. Seventeen tapespondents keep the twin recorders in the Coote home busy—he also runs two round robin tapes in this country and is a member of two other international circulating robins.



Members of the **Reading Cine & Tape Recording Society** preparing to film and record the Reading University's rag day. Five cameras and three Fi-Cord recorders were used. The members shown (left to right) are: D. M. Noyes, C. Keston, E. R. Ash, N. Chescoe, J. D. Lloyd, C. De Placito and H. Henderson.

A Club has been formed in the South Birmingham area and will be known as the **South Birmingham Tape Club**. The temporary club room is at the Stirchley Institute, Hazelwell Street, Stirchley Birmingham, 30. Further details are available from the Secretary, W. A. Judd, 1 Jeremy Grove, Sheldon.

MEMBERSHIP of the **Ilford Tape Recording Society** now stands at thirty and the average attendance for the four months, November to March was twelve. During the fifteen months since the Society was formed, eleven manufacturers have demonstrated equipment, four tapes containing lectures and talks have been added to the Library, and two more are being produced. The club meets weekly, at the R.A.F.A. headquarters in Cranbrook Road, Ilford and details of meetings can be obtained from D. Bolton, 13 Gloucester Road, Manor Park, London, E.12.

MR. J. Buckler, president of the **Leicester Tape Recording and Hi-Fi Club** has just completed a ten watt amplifier designed by Mullard Ltd. Using a reflex speaker cabinet he demonstrated it to members using inputs from various sources. The fourth Leicester Audio and Photographic Fair was held on the 2nd, 3rd and 4th May at the Co-operative Hall, Leicester. Many well-known manufacturers demonstrated equipment and the organisers must be congratulated for staging such a fine exhibition. The Leicester club provided two tapes entitled "So now you have a tape recorder" and "The Voice of Leicester" these played continuously throughout the three days of the show. Decca Records Ltd. are to visit the club on July 7th and visitors are invited. Details are available from P. Starrie, 56 Minehead Street, Leicester.

A group of local amateur tape recording enthusiasts are currently engaged in forming the **Bromley Tape Recording Club**. Mr. D. A. Cornet of 110 Princes Plain, Bromley, Kent, will be pleased to hear from any reader in that area interested in joining.



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EXTRA FLAY



DOUBLE PLAY



POLYESTER TAPE

SCOTCH BRAND POLYESTER TAPES enable good equipment to give of its best. They provide crisp, clear reproduction, high frequency response and an improved signal to print-through ratio. The biggest benefit they offer to the discerning user is exceptional physical stability. SCOTCH Brand Polyester Tapes are unaffected by temperature and humidity changes and can be stored indefinitely without deterioration. Stronger and more stable, they are the perfect complement to your equipment.

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**OFFERS A COMPLETE RANGE
OF POLYESTER MAGNETIC TAPES**

—in addition to acetate and P.V.C.

ANOTHER  PRODUCT

MINNESOTA MINING & MANUFACTURING COMPANY LTD.,
3M HOUSE, WIGMORE STREET, LONDON, W.1.

JAPANESE RECORDERS

FIRST DETAILS AND PICTURES OF THE NEWLY ANNOUNCED "SONY" RANGE, AS SEEN AT THE AUDIO SHOW

● We hope to publish further photos and details of other Japanese recorders in an early issue. In the meantime, will readers please note that we cannot answer any queries about these instruments. Full details and price are available from the British Distributors, Tellux Ltd., 44 Brunel Road, London, W.3.

DURING the past year there have been many reports about Japanese progress in the tape recorder field, and many stories brought back by visitors to Japan of new and revolutionary ideas. At the recent Audio Festival, visitors were able to see the first samples of these products, and to judge for themselves how they compared with the products of this country, of Europe and the U.S.A. Outwardly, they were certainly impressive, and the results, as demonstrated, were very good. We have asked for, and have been promised, several models from the Sony range for review, and we have now received the first of these, the E.M-1, which is illustrated on the right.

These pictures were taken in our own studio before the machine was passed on to our reviewer, A. Tutchings, for testing; and it must be understood that this initial notice is in no way a review.

Portable for Professional Use

The E.M-1 has been designed for the professional user for radio and news reporting. Its price is not yet fixed, but it is likely to be high. As the two top pictures show, it is very neat in appearance and layout, with all controls easily accessible. These are, from left to right—On/off and level: playback/record switch. Press button for the battery meter indicator immediately above it. Monitor socket for lightweight deaf-aid type 'phone. Microphone socket. The handle on the left of photo 2 is for the clockwork drive, and spring tension (i.e. "stored mechanical power in hand") is indicated in a panel above the mic. socket. A hinged tape re-wind handle folds away, as shown, between and above the on/off and record/replay controls. The start-stop motor control is below the wind handle (photo 2). A strobe disc is fitted to the pinch roller, and a tuning fork with shutters is supplied for viewing it. A variable speed control is located above the winding handle (hidden by it in photo 2).

The complete electronics can be withdrawn from the case (photo 3) by unscrewing two knurled screws on the panel. The batteries (a group of 6 flash-type cells in a plastic container $4\frac{1}{2} \times 1\frac{3}{4} \times \frac{5}{8}$ inches) slide into the rectangular part of the chassis (right), and are interchangeable in a matter of seconds via a door in the base of the case (photo 4).

Long-Running Clockwork Motor

This Sony portable is fully transistorised, takes 5-inch spools, and has a running time per winding (85 hand turns!) of about 6 minutes, of which $4\frac{1}{2}$ minutes elapses before the indicator passes "Red" to indicate loss of spring tension.

We await the reviewer's report with interest, for our initial examination shows it to be a recorder of very great promise. It is light ($12\frac{1}{2}$ lbs.) and measures only $13\frac{1}{2} \times 5 \times 7\frac{1}{4}$ in. high. Our editorial test recordings and playbacks were good.

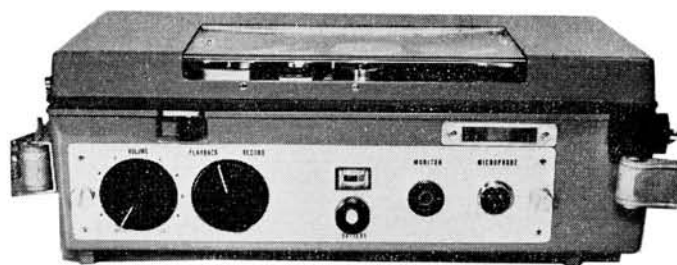


Photo 1: Viewed from the top. Controls very accessible, including battery and spring tension indicators.

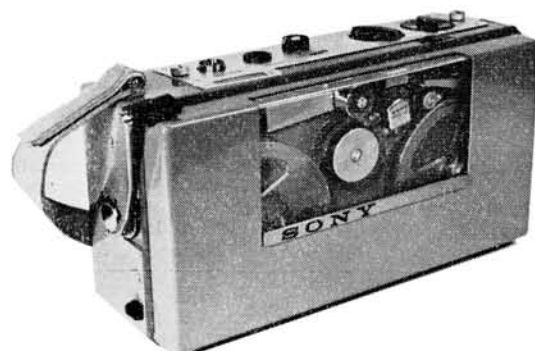


Photo 2: General view showing front cover with transparent plastic window, hinged and quickly detachable.

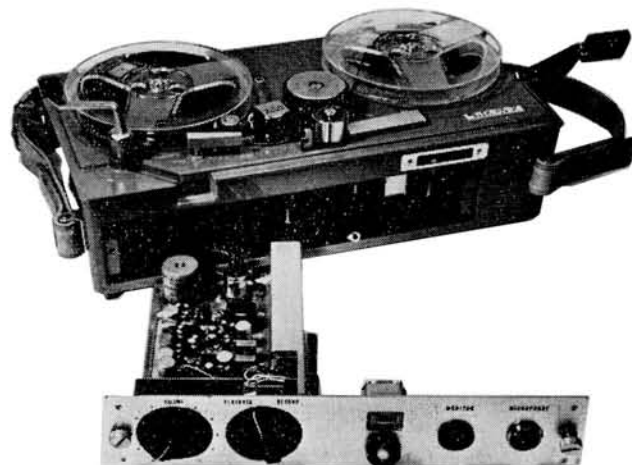


Photo 3: Chassis and electronics removed en bloc by turning 2 screws and pulling out one plug.

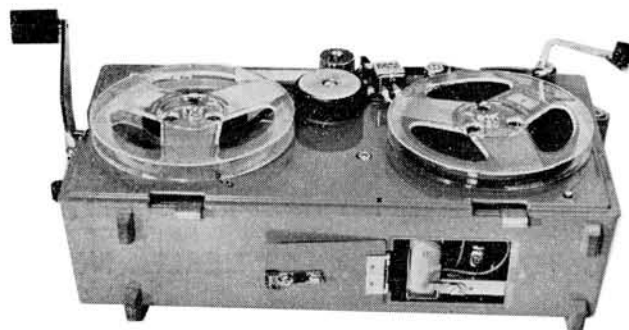
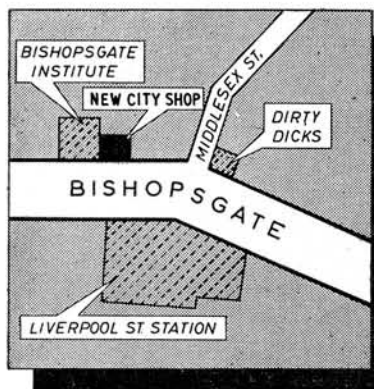


Photo 4: View showing cover removed, battery door open, and wind and re-wind handles extended.

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By Alan Brundrett

FROM SCRIPT

(VIA TAPE WHEN POSSIBLE!)

TO BROADCAST



The BBC Effects Store has something for almost everything.

THE problems met daily in the business of putting sound radio programmes on the air are never the same on two programmes together, and are continually changing with the normal development process. Of course, there is much common ground—certain things have always to be done, such as routine checks and BBC standards of operation and procedure to be maintained—but it is the solving of a different grouping from a mass of non-standard problems that makes every big show full of interest for the conscientious, sensitive studio manager.

I would like to illustrate this by describing a serial play I covered last year called *"The Spanish Cave"*. This was adapted from the novel of the same name by Geoffrey Household, into only three half-hour episodes. The setting was the coast of Spain in 1936, and it was an adventure story full of mystery, with a fantastic sea-monster, an English boy and a young Spanish countess as the juvenile leads, aided by a number of well-drawn characters. Naturally, the novel had had to be condensed a great deal into 1½ hours playing time, and each radio episode contained a lot of action both on land, in caves, and at sea, with some hair-raising moments. It was a challenge to the producer, Mr. Graham Gauld of BBC Children's Hour staff, to the cast of eight headed by Alaric Cotter and June Spencer, and to the studio manager, plus a team of three engineers who recorded and edited various scenes for the series.

Snags can, and do, crop up!

Owing to abnormal circumstances, including illness, the draft script of the first episode did not arrive in the producer's hands until five days before transmission. Then it had to be read, re-typed for duplicating in the standard form the BBC uses for dramatic productions (very important), and sent to the duplicating department for 30 copies to be run off. The studio managers did not see the script proper until two days before transmission, i.e. one day before the effects rehearsal. However, it is usual for the SM in charge of the team, that is the Panel Operator in the case of a play, and if possible the Grams/tape and Spot Effects Operators (both assistant studio managers, or A.S.M.s in BBC parlance) to see the producer to discuss the draft script more or less as soon as he gets it. This gives the whole production team a chance to size up the written play so that adequate preparations can be made to translate it into radio terms. It also gives the producer an opportunity to tell his SM team how he sees the finished product and what kind of treatment or special effects he wants. It is the SM's job to interpret the producer's ideas into the technical/artistic business of studio production, which results in a complex alternating current that is passed on, eventually, to the transmitters. Fortunately, the above time schedule isn't normal. The SMs usually have a duplicated script at least a week in advance. In our case, it meant reading, thinking, planning and, as a result, booking certain extra facilities in a hurry.

Before I leave this subject of the scripts, the same problems arose with each of the three episodes, because the adaptor sent in the drafts of episodes 2 and 3 on transmission days of 1 and 2. As a general rule, it is better to avoid rush of any kind if a polished performance is to be obtained.

When the producer arranged for the SM team to meet him after we had had a chance to look at the draft script, we got down to discussing the play with its dramatic possibilities and technical requirements in mind. First, you have to feel the mood of the play, because this determines the dramatic treatment. In our case, the mood was one of mystery and adventure from a young teenager's point of view, with plenty of broad characters and rich language, and a nice boy-and-girl personal interest. The treatment decided on was that it should be fairly fast-moving, there should be a number of changes of scene and of atmosphere, changes of tempo, with music used more to accentuate the drama of mysteriousness than for bridges between scenes.

Then we discussed the studio treatment and technical requirements. It was obvious from the start that the adaptor had thrown in practically everything in the book! The action began in a Spanish drawing-room, then led into the stone-flagged kitchen, into the open-air, down to the harbour, into a motor fishing-boat at sea, into a cave, into a sailing-boat at sea and landing the Contessa on the beach, into a storm at sea and the sailing-boat being overwhelmed, and into a huge inner cave under the cliffs. In addition, we had a sort of "pure-radio" sequence of the boy's thoughts and voices racing through his head as he was taken down deep into the sea.

... and one has luck, too

For our serial we were fortunate in being given the ideal studio for all three transmission days, spaced a week apart, with different (though suitable) studios for the effects pre-rehearsals. However, with the cast called at 10.30 for Episode 1, with transmission from 17.25 to 17.55 and the lunch-break intervening, it would leave us only about five hours proper rehearsal time for a very tricky, half-hour play. It was imperative that we should organise carefully if we were to be able to do what was projected in the time available.

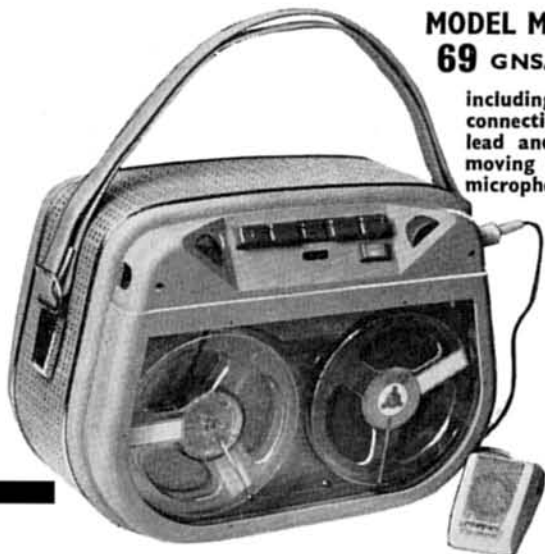
As I have said, for each episode we had an effects rehearsal booked for the afternoon before, with a disc-channel for half-an-hour for any dubbings that may be necessary. (This session also had its own recording number). This is a wise precaution with a play that has only a limited rehearsal, as so much time can be wasted when either ASM has to go away and look for alternative effects. But having gone through the script, we all came to the conclusion that the middle part was so full of action and effects, music, distort, echo, etc., that it would be extremely hazardous to attempt to do it live. We decided the best thing to do would be to try to make a late booking for a mobile tape recorder plus recording engineer to be in the studio for the last three-quarters of an hour of our morning rehearsal, and to pre-record this section, if need be more than once, and for the engineer to edit it and leave the tape all ready for the ASM to insert during the live transmission. That meant

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* Mr. John Borwick, Technical Editor of a leading tape recording magazine.

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FROM SCRIPT TO BROADCAST—(continued)

the producer would have to arrange his rehearsal plan so that this section would be rehearsed first of all and recorded, leaving the afternoon free to rehearse the beginning and end sections and make any cuts for timing. As it turned out, we had correctly judged that this plan was essential in order to give justice to the excellent script that it was, and the extra effort involved was quite worth while.

Between discussing the script with the producer and arriving in the studio for the actual effects rehearsal, the SM team is busy individually and collectively, each preparing for his own particular job. For example, the spot ASM has to pay a visit to the spot effects store and selects his wares from the enormous array of hand-operated effects that is available to choose from. There is usually some consultation between the ASMs and the panel SM about ideas for particular sequences, each calling on the others' experience, and this is just one example of the need for the SM team to work in the closest harmony. There is no short-cut to gaining experience in this business of choosing effects. The BBC probably has the most comprehensive stock of sound effects recordings, incidental and "mood music" recordings, spot effects apparatus, "distort" units, etc., of any broadcasting or film-producing organisation, and you could not expect anyone to memorise everything that is available to choose from, or to keep pace with new ones that are continually being added.

Disc Labels—a guide

Few people seem to realise that what's written on the label of an effects disc is no sure guide to the gram operator. The "sound" is the important thing. The speed at which you run the turntable will materially alter the sound of something recorded at the correct speed. There was a case in point in "The Spanish Cave". The script called for a prehistoric sea-monster, but in the first episode the listener was made to guess what it was—they weren't told it was a monster, only a rather alarming roaring noise was to be heard while the boy was alone in the cave. And what combination of effects discs do you suppose we finally used for that? A fox-hound baying, running very slowly, plus escaping steam slightly slowed, with a good deal of artificial echo on them. In this way we produced a deep-throated roar that bore no resemblance to a known creature's voice, simply because we changed a known sound both in frequency content and rhythm by reproducing it at an abnormal speed, and by adding a supplementary sound suggestive of heavy breathing, with echo to give size and distance. Put like this, some of you I'm sure will be thinking that's simple enough. But may I say that when you are called on to do this sort of thing, it helps a great deal to be able to analyse sounds of all kinds and to be able to approach the artistic requirement with technical knowledge, imagination and experience.

The use of music in dramatic productions is also very important. It should if possible enhance the drama, provide suitable bridges for time-lag, and sometimes provide an attractive opening that will make the listener want to hear the play, or an enticing conclusion that will make him want to hear the sequel if it is a serial, or to tie the whole thing up nicely. But generally speaking, it should not obtrude too much, nor take up over much time without overlapping action. It is nearly always true to say that—as with sound effects—if it is right it will go unnoticed. If it is wrong it will obtrude and will (even though only slightly) divert your attention away from the illusion. In our case, the producer chose a BBC recording of a Spanish gipsy guitarist playing extempore in various moods, and it was exactly right for this play. Various parts of this disc were used at different times, sometimes as background "mood" music, sometimes as a bridge, sometimes very loud at the end of a scene to increase the excitement, and as both opening and closing "Signature-tune".

Now, a complicated script like this is a joy to do provided you can rehearse it sufficiently to give it polish. But it also takes away a lot of the anxiety and risk of spoiling a live transmission if it can be pre-recorded in whole or in part on to tape, perhaps two or three times, and the best take (or parts of each take) used for transmission.

Sound and Cine

Renée Ducros

WHY NOT COMPETE?

★

DETAILS AND HINTS FOR
AMATEURS WITH SOUND
AND CINE INTERESTS

by RICHARD GOLDING

★ *Renée Ducros teaches design in a girls' school at St. Etienne in the South of France. For some years now she has been well known for her animated films on 8mm. Recently she has gone over to 16mm and now owns a Bolex Reflex with an Angénieux Zoom lens.*

Her first film in the new medium is "A Story of Everyday", a compromise with animation and live action. The star of the film is one of her small girl pupils.

Branching out from animation and finding a keen interest in the subject she has now begun a series on veterinary surgery in the farms around St. Etienne. Within a few hours one weekend she had filmed a stomach operation and then a caesarian. She says that generally filming conditions are quite sordid and lighting is always a problem for the spots must never get in the way of the surgeon.

She intends entering two films at Cannes this year. One will be the "Story of Everyday" and the other on her latest passion—the animals.



THIS year the major European competitions will no doubt feature names we know well among the prize-winners. Great Britain will have its share of the familiar pothunters (and each of these is a dedicated amateur), Oscar Reisel, that prolific film maker whose sense of the dramatic is at times frightening, Edwin Lambert with his deep concern for road safety, and Frederick O'Neill of the superb visual timing in his "out of this world" animated plastic films.

On the Continent, Herman Wuyts will come up with yet another of his fantastic film experiments, Per Ormer of Norway will be well to the front with another of his bubbling comedies, and in the South of France Renee Ducros will astonish amateur audiences by her versatility in presenting two films of violently differing style in the same programme. For each of these experienced cineastes, however, there will be a hundred new ones who will be entering a film for the first time and hoping to share in the prestige that goes with a major award.

Banquets at Unica

The top world competition is the one held during the annual Congress of the Union International du Cinema d'Amateur. This year the Congress is to be held at Mulhouse, France, from 24th to 31st August. The organising secretary, Dr. Rolf Benner, tells me that many excursions have been planned and that the banquets will be well up to the gastronomic reputation of Alsace. The screening and sound facilities will be handled by a team of French, German and Swiss technicians. The films to represent Great Britain will no doubt be chosen from this year's *Ten Best* show at the National Film Theatre in May. The categories are: Documentary, Scenario and Genre, and we are allowed four films, two in any one section and one in each of the other two. Although this is not an open competition anyone may attend the Congress to watch the three days screening and to take part in all the festivities. Details from: FFCCA, 92 Boulevard Murat, Paris XVI.

One of the most glittering amateur film festivals is held at Cannes. Last year 80 films were presented to a holiday audience at evening sessions. 35 of the films had mag/stripe tracks, 30

were sound on separate tape, 10 were optical and the other 5 relied on discs or direct commentary from the soundbooth. The organisers of the Cannes Amateur Film Festival are fortunate in having the beautiful Palais des Festivals, in which the professional Feature and Documentary Festivals are presented, and where the projection facilities are unique.

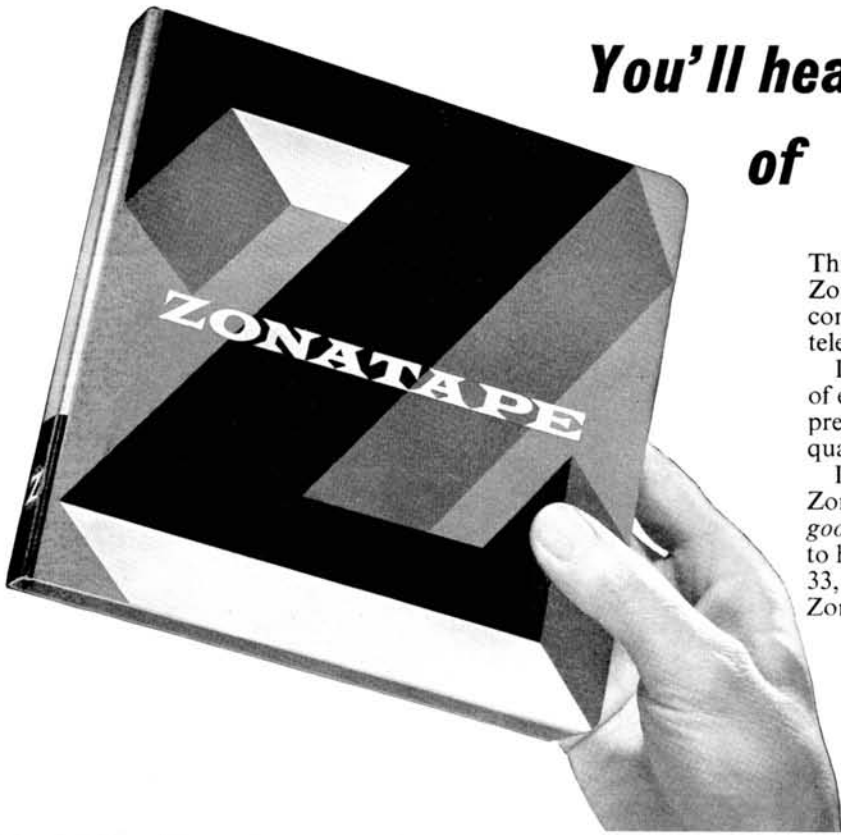
Projection Details

The throw from box to screen is nearly 150 ft., but the twin arc projectors at this range give a brilliant and rock-steady picture on a screen 22ft. by 15 ft. for 16 mm, and a picture 15 ft. by 10 ft. for 8 mm. Magnification at this size represents, for 8 mm, an enlargement of over 3 million times the area of the original frame. The same arc projectors are used for all three gauges, but specially designed mechanisms for adjustment of condensers and lenses are used for conversion to the other gauges. This year the Festival takes place from 2nd to 12th September, and details may be had from the Cannes Municipality.

Money Prizes

Here, at least, the weather is against our combining film festivals with holidays; but Southend have hit on a possible solution by offering £50 for the best film on Southend as a holiday resort and £50 for the best film on the Kursaal, in their annual competition. The entry fee is only 1s. and details are available from the Pier and Foreshore Department, Southend-on-Sea, Essex.

The Premier British competition, however, is the *Ten Best*, organised by the Amateur Cine World, and for which entries are accepted during the month of December. The competition is closely watched by BBC and ITV and has been instrumental in many amateurs joining the professional ranks. This is one of the few leading competitions without sections; on the other hand the Institute of Amateur Cinematographers runs six: Experimental, Documentary, Fiction, Family, Instructional, and Travel. Added to the awards for each section is the Daily Mail Challenge Trophy for the best amateur film of the year. As



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the IAC has a North American Chapter many films from the U.S.A. are among the awards, but as this competition is generally regarded as inferior to the Ten Best, the British standard of entry is not usually very high.

Amateur "Fringe" Festival, Edinburgh

This is something new this year and is to be organised by the students of Sheffield University. The cost of entry is one guinea per film and this charge is made to cover the many administrative costs involved, carriage, publicity, hall hire and equipment, etc. It is hoped that the response will be such that it will be possible to institute a regular amateur film festival as an integral part of the Edinburgh Festival itself. Write for details to: Film Festival, Students' Union, Leavygreave, Sheffield, 3.

In almost every country in Europe, apart from Great Britain, it is possible to combine your holiday with an amateur film festival (details from any National Tourist Office), but if you decide to send your film the following points may be of help to you.

Ten Competition Checkpoints

1. Supply plenty of leader at the beginning and trailer at the end. 10 ft. is not too long for 8 mm and 20 ft. for 16 mm leaders. These will save the film from damage as well as making the projectionist's job easier when lacing up and testing.
2. Give your film the best title possible. White letters on a coloured background are better than poorly imagined gimmick titles. But whatever you choose keep them as short as possible.
3. Run the film through and check every splice. Besides ensuring that there is no breakdown during projection, and this can influence a judge's decision, there is more chance of getting your whole film returned in one piece.
4. Make sure that the film is wound correctly and that the picture is right way round for screening.
5. Send precise synchronisation details including the running times of film and tape, the projection speed of your mag/stripe.
6. Don't forget to fill in the entry form and to enclose necessary fee.
7. Enclose your own name and address on a sticky label.
8. Secure the ends of the film and tape.
9. If you are sending off to another country check on the necessary customs clearance forms.
10. Allow plenty of time for your film to arrive before the closing date.

Where Mag/Stripe Scores

In all these competitions projection equipment is more or less standard, but when it comes to sound reproduction the organisers meet with all sorts of problems, for there is yet no standardisation where synchronisation is involved. As we see from the 1960 Cannes Festival, magnetic stripe is gaining in popularity and is probably the best method where the amateur is concerned, but the initial outlay on equipment is high. Separate editing of sound and picture requires extra equipment and synchronous re-recording facilities. For 8 mm there is no method of separate editing for sound and picture, and the equipment is relatively more expensive than 16 mm. Nevertheless, the production of a single sound copy—and after all that is all most of us can afford—is cheaper than optical. Sound stripe offers significant practical advantages over separate tape, whether on a loop coupler, or as stroboscopic, or as perforated. Absolute sync. can be maintained even if the film breaks, whereas with separate tape a broken film splice may mean disastrous loss of sound to picture relationship and, in consequence, a possible downgrade in marking. As for the inferior quality of stripe as compared to tape, I don't really think that there is all that much in it when run at 24 f/s. Even on 8 mm at this speed I have heard some fine tracks comparing more than favourably with 16 mm optical.

For those of you with 8 mm magnetic projectors who would like to hear how professionally recorded tracks sound on your

own equipment, the announcement by the G.B. Film Library that they are issuing twenty 8 mm mag/striped films will be of interest. These films will be obtainable through photographic dealers and will include cartoons, adventure features, comedies and sports. Each film has a running time of 8 to 10 minutes at 24 f/s, sound 56 frames in advance of picture. The price, £6 each, B. & W. This will no doubt be followed by the renting libraries issuing 8 mm striped films for hire once they have discovered a method of checking the magnetic track during the normal quick rewinding of the film on return.

Tape Splices for Stripe

If you use adhesive tape for splicing your films before sending them off for striping, it is advisable to use the special QUIK-SPLICE patches which are cut back over the striping area. Cost, 6s. 6d. for a packet of 40.

Weekend Cine Course

Practical demonstrations in film making, simple lighting set-ups, and sound recording, are the principal features of an amateur cine course to be held at Missenden Abbey, Bucks., from the evening of Friday, July 7th, to the afternoon of Sunday, July 9th. Students are invited to bring their own cameras and filmstock and shoot scenes under the direction of professionals George Sewell and Julian Caunter. There will be a special class for beginners. Then there will follow an analysis of scenes similar to those shot and an editing session, so that students will later be able to edit their own material in accordance with the recommendations made. Details from F. J. North, Education Officer, Buckingham C.C., Aylesbury, Bucks.

International Photo-Cine Fair

Among the interesting cine exhibits at Olympia from 29th May to 3rd June will be the Fairchild Cinephonic combined film and recording apparatus, the Cinecorder, the very latest in Zooms, and the Brownie Cine 8, which is selling at £12 7s.

THE 1961 INTERNATIONAL PHOTO-CINE FAIR

EARLIER this month twenty-five young ladies appeared before the most experienced photographers and cameramen whose job it was to select the twelve most beautiful models for the International Photo-Cine Fair to be held at Olympia from May 29th to June 3rd. During that week until Saturday evening, these girls will be available to pose in two different sets with professional props and lighting for any visiting photographer and cinematographer who cares to try his hand at making pictures with just that extra professional polish which distinguishes a good photograph from a mediocre one.

To ensure that every camera used in the Fair has an equal chance of securing the best possible results in the many competitions, and in the two especially equipped studios there, a Publishing House in the photographic field is installing all the latest electronic apparatus for checking the performance of camera shutters. Any visitor to Olympia during the week will be able to see his camera thoroughly timed so that he can shoot with confidence.

Tickets can be obtained at the door, priced 2s. 6d., or from any photographic dealer. Parties of twenty-five or over, 1s. 6d. each.

* * *
RICHARD GOLDING, author of the current series of articles in *The Tape Recorder*, will be covering the International Photo-Cine Fair and will be reporting on the new equipment, items of interest, and the latest news from the manufacturers in the July issue of this magazine. Be sure to order your copy from the newsagent!

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TRACKING SATELLITES

TAPE, TELEMETRY AND VHF RADIO

by Peter Fleming



A Corner of the Measuring and Recording Laboratory.

ON a flat hilltop some twenty miles from Johannesburg stands a "Minitrack" earth satellite radio tracking station. This is one of a number of similar stations erected by, or on behalf of, United States National Aeronautics and Space Administration, in a global network, to facilitate the tracking and recording of information from the ever-increasing number of satellites being fired into orbit.

This "Minitrack" station is the only operational establishment on the African continent, although at the moment construction is well advanced in erecting several new tracking stations. As such, it is in a very strategic position, as when a satellite is fired from the United States East Coast missile bases, such as Cape Canaveral and Wallops Island, South Africa is often the first to report contact with the satellite, and to ascertain that everything went as planned.

Determining the Orbit

To be able to tackle the task of tracking satellites, two very important things are essential. One is to determine the precise orbit of the satellite; and the other, following upon this orbit being determined and predicted for the future, is to receive telemetry information from the satellite. The possibility of being able to do telemetry successfully without knowing precisely the satellites orbit is very slim indeed. Therefore, at "Minitrack", there exist two individual and, one may say, isolated systems. The first, and most important, is known as the radio interferometer system. This, by a complex process involving several pairs of specialised aerials and a phase determination system, produces information for a centralised electronic computer in the computing centre at Washington D.C. which is able to predict the future movements of satellites very accurately indeed. It is so accurate that the time, when a satellite crosses overhead "Minitrack" on each orbit, is predicted for several weeks in advance and proves to be accurate to a second or so. This is really a small miracle, when one considers the speed at which the satellites travel, their distance from earth, and any stray forces which may be acting upon them. Thus any small error in the measurements taken, which are later used to drive the computer, must be eliminated.

One may wonder how contact is maintained with America. Two radio-teletype links are employed twenty-four hours a day, giving direct incoming and outgoing contact with the U.S.A. The outgoing circuit handles the semi-coded information re-

corded at "Minitrack". From these figures, in conjunction with the figures from all the other "Minitrack" stations around the world, the electronic computer issues predictions for each station, and for all the satellites that the station tracks.

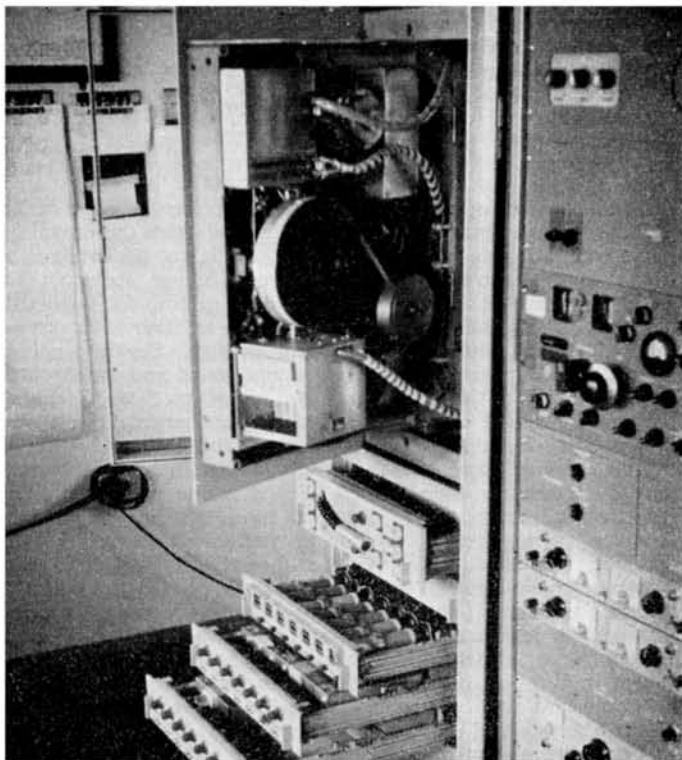
The tracking system poses a few complicated problems. One is that the beacon transmitters on the satellite, transmitting either on 108 Mc/s or 136 Mc/s, are generally not very powerful. Only a few milliwatts of power are radiated. This means that unless a special low-noise receiver system is used, one will not receive any signal. The latest electronic techniques, employing such devices as ceramic triode valves, are used to eliminate this. Also, a very accurate time standard is required. The time pips from the Union Observatory are not ideal, nor can trustworthy reception of WWV be obtained for a full 24 hours.

Thus a very stable crystal clock is employed. This is a simple device in conception, but the actual 100 K/C crystal oscillator, and the divide-by-ten count down units to obtain one pulse per second, and also other frequencies such as 1 K/C and

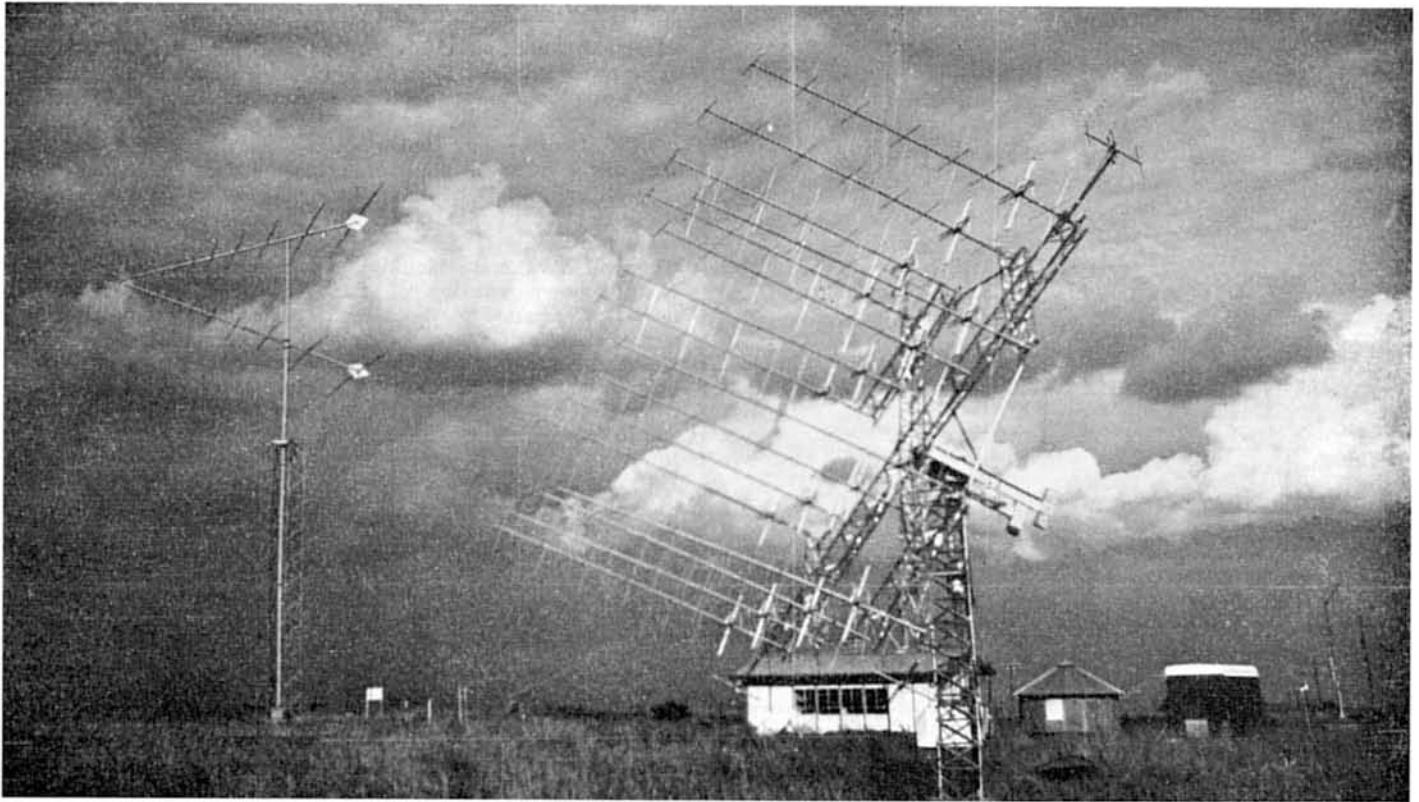


10 K/C obtained in the process, the precise timing of all operations is obtained. A time readout is also obtained, enabling the actual time (G.M.T.) to be read out. This occurs every ten seconds. The above graph of this time readout will explain how this time-code is read:

The time at point "X" is 11 hrs. 43 mins. 27 secs. The



Tape recorders and their electronics fill several racks.



first blip is the second; other blips which follow allow the time to be read. Also the start of a ten second readout period always has two blips plus any extra. One could visualise the above example better if it is thought of as being made by a moving pen on paper moving from right to left, as is actually done in one type of recorder. However for tape recorders, the pulses are recorded as electrical impulses. One further point; when the time signals transmitted by WWV are received well, this time is used to check and if necessary to reset the crystal clock. This is done on average once a day, cancelling an average error of about 3 milli-seconds.

Rotating Aerials

Now comes the second, and more interesting task of recording actual live information from the satellites. An attempt has been made to condense an explanation of the more important function of finding out where the satellites travel; following on this, the satellites can now be tracked across the sky with rotatable antennas, in much the same way that a gunner follows an aircraft across the sky. The electronic computer issues predictions for this purpose, giving the exact position in the sky every minute, for as long as the satellite is above the viewer's horizon. Thus the "look-angles" give an elevation, and an azimuth bearing for each minute, enabling the rather awesome aerials you can see in the photographs, to be set to track the rapidly-moving satellites across the sky. (Satellites travel at a speed of about fifteen thousand miles per hour.)

You may wonder what type of information is sent out by the satellites. Amongst others, such things as ionisation readings, temperatures, meteorite collisions, geiger counter readings and various voltages in the equipment are coded in the satellite, and then transmitted back to earth. Scientists analysing those readings after decoding them, have found out many startling new facts about the composition of the atmosphere above the earth, and also more facts about the earth itself.

At "Minitrack", only recordings of the telemetry information picked up from the satellite are made, and these recordings are sent back to the U.S.A. for analysis. (The beacon transmitters are not recorded; they are only used for positional tracking purposes.) To accomplish this recording, tape recorders are the ideal machines. The information fed into them can be very

varied, yet it remains permanent. The recordings can be played over and over again, as users of tape recorders well know. However, the signal that is replayed must be a perfect reproduction of the original, and as you will see in the photographs, the tape recorders used for this purpose are vastly superior to the model you or I could own!

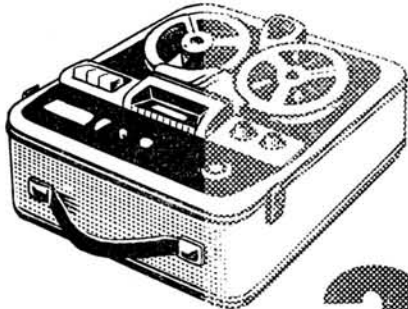
For a start, a private person could never afford to purchase a machine such as the Ampex model FR600 recorder. A couple of Rolls-Royce cars are in the same price bracket; but then the FR 600 is a fabulous tape recorder, built with the craftsmanship of a fine watch. The other two recorders used at "Minitrack" are also top notch; Ampex models FR 100, and model FR 1100, but they do not have the versatility of the FR 600. A description of the equipment used to feed information to these recorders will give a good idea as to why they must be so good.

Recorder Details

Signals can be received in the range 20 to 440 Megacycles, but the aerials presently installed are only capable of reception in a few selected portions of this range. The large aerial (shaped like an "A" on its side) receives from 10 to 60 Mc/s with a gain of 15 dB., the 16 crossed-yagi antenna is tuned for 108 Mc/s with a gain of 22 dB., and other aerials for 136 Mc/s and 20 Mc/s are also installed. Signals received by these antenna are pre-amplified at the antenna and then fed into the appropriate receivers in the control building. After detection, amplification, and possibly slight decoding, the signals are fed into the tape recorders. Other information, such as A.V.C. voltages, (i.e. signal strength), time code, a reference 10 Kc/s or 100 Kc/s, a precision 60 c/s signal, and often a voice channel, are recorded simultaneously on other channels. Seven channels of information on $\frac{1}{2}$ -in. tape are usually recorded. Two recorders cater for this, the other one recording two channels on $\frac{1}{4}$ in. tape.

A brief specification of the recorders will be of great interest I am sure. The "baby" is the model FR 1100, a dual track $\frac{1}{4}$ in. wide tape machine. This has the range of speeds from $1\frac{1}{4}$ to 15 i/s. and is similar to the machine featured on the cover of the November 1960 issue of the *Tape Recorder*. This recorder is used at $1\frac{1}{4}$ i/s at present, recording on one channel

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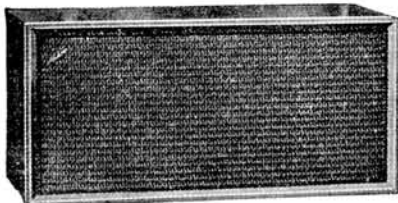
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TRACKING SATELLITES—(continued)

time code; and on the other channel, plain telemetry signals as received with a 4 Kc/s band-width. To ensure uniformity of readings (this applies to all tapes recorded), a signal generator is substituted for the aerial, set to a pre-determined reference output strength, and the resulting signal received, detected, and adjusted to a constant voltage before recording. This ensures that all recordings have the same parameters, and eliminates doubt as to whether a receiver has changed its characteristics over a period of time. Also, none of the recorders have erase facilities, thus virgin tape must be used. Continuous monitoring of the recorded signals is possible through a separate playback system, which replays the recorded signals about half a second after they were recorded.

The other two recorders are more versatile, and hence more complicated, but basically are similar. They record seven channels on $\frac{1}{2}$ -inch tape, at speeds varying from $1\frac{1}{2}$, $3\frac{1}{2}$, $7\frac{1}{2}$, 15, 30 to 60 i/s. The particular speed is selected to suit the information to be recorded. At 60 i/s, the recorders can record D.C. voltages (by using Frequency Modulation recording techniques) up to frequencies as high as 250 Kc/s (Model FR 600) or 125 Kc/s (Model FR 100). The high frequency response of course drops with a reduction in speed.

The programming of the type of amplifiers for each channel is simplified by having plug-in electronic units, or "modules" as they are now called. Various types are; conventional recording amplifiers, Frequency Modulation amplifiers, Pulse Duration Modulation amplifiers, etc. Thus all types of signals can be recorded. The recording and playback facilities are completely separate units. The model FR 100 is a conventional machine using valves, while the FR 600 is almost completely transistorised. This machine, as set up at "Minitrack", has seven monitoring oscilloscopes, one for each channel, monitoring recording or playback at the flick of a switch; remote control panel; and a photo-electric type of speed governor. Also the model FR 600 has recording and playback heads that only touch the tape when they are being used, moving away when the tape travels in a fast forward or reverse direction.

Compressed Air for Tape Guides

The tape guides are also novel. Compressed air is blown under the tape at the guides, thus the tape runs on a film of air, eliminating friction. No pressure pads are used on any of the recorders, the tape tension is automatically adjusted by the varying of the drag the emptying spool of tape exerts over the take up spool drive. To give any more information about these recorders would involve too many technicalities, but they have no "Wow", and virtually negligible "Flutter". In short, they are almost perfect.

To enable the recorded tape to yield exactly the correct output voltages and frequencies on playback, certain channels are recorded with reference signals. A precision 60 c/s, and usually 10 Kc/s or 100 Kc/s, accurately recorded, will give scientists signals to compare with accurate standards at the playback laboratory, to compensate for any maladjustment. The most common cause of trouble is a fluctuating frequency A.C. mains supply.

To attempt to describe the individual components of the telemetry equipment (the equipment housed in the racks seen in the photographs) is beyond the scope of this article, but two further abilities should be mentioned. One, is that Doppler information is readily obtainable in digital form, simultaneously with telemetry information; hence some equipment is duplicated. Also, on a limited scale, photographic plates are made of satellites such as the 100 ft. diameter plastic balloon, the "Echo 2" satellite. A specially constructed astronomical camera is used for this purpose. One must add that when a good view of this "Echo" satellite is obtained, the sight of a tiny pinpoint of light, similar to a star, floating across the heavens from horizon to horizon in about half an hour, against a backdrop of the clear star-spangled sky as seen from the Transvaal highveld, is a sight never to be forgotten. It is a spectacle that tells of the amazing achievements made by mankind in recent years.

HOW TO TAPE A WEDDING

by K. SHORT*

MARRIAGES may be made in Heaven but their attendant ceremonies take place on earth, and the parties concerned would in many cases dearly like to have a tape record of this memorable occasion in their lives. The problem is how to make such a record, or more accurately, how to set about it in the case of a church wedding; for a registry office ceremony is so much less formal that one can apply virtually any away-from-home recording technique with a portable without much fear of upsetting anyone or anything.

In the case of a church wedding however there are quite a number of additional factors both technical and circumstantial that must be considered. The first requirement is that the dignity of the Service should not be disturbed in any way. All other planning of the job must be done in the light of this need. And that makes it very tricky, since it is technically desirable to get as close to the couple to be married as ever possible. The fact here is of course that the focal point of the ceremony is the taking of the vows and therefore this act should be recorded.

Make a Plan—and a Script

This, then, is the background against which the problem as a whole must be considered; and having understood this, make a plan and prepare the equivalent of a script. Here a lot depends on how elaborate one wants to make the whole thing and how much time is allocated to the programme. The result should in any case be something like a broadcast of such an occasion, complete with commentary, incidental noises, etc. That is the ideal to be approached as nearly as possible. Consequently the script may include scenes on the departure of bride and bridegroom from their homes, the arrival of the guests at the church, the waiting inside the church (against perhaps the background of the organ playing), then the ceremony, followed by the departure from the church and scenes at the reception. Perhaps speeches, toasts, etc., concluding with the departure for the honeymoon. The final record will include commentaries throughout so as to set the scene in each case.

Having decided on the sequence of events, put them down in order and allocate a time to them. From this information one obtains the total amount of tape needed—and then take at least 50 per cent. excess!

The next step is a survey of the locations. Probably the most difficult one is the church, and it is a good idea to have a look at the layout a few days in advance of the wedding. Talk it over with the vicar, enlist his help, and decide where to place the microphone, the equipment, and indeed the person who will



The Author puts his advice into practice!

be making the recording. At a wedding which I recorded recently I sat in the choir (with the consent of the vicar of course), concealed the recorder near my feet and kept the microphone in my hand, but hidden behind a low pile of prayer books. In this way it was quite impossible for any of the equipment to be seen by the congregation.

Hand in hand with the question of siting goes the problem of equipment. There can be no doubt that a battery operated machine is much to be preferred. You avoid all the complications of trailing cables, different types of plugs in different places and so on. Moreover it should be a machine with a reasonably long playing time; about 30 minutes non-stop is quite suitable. To go with it, take a directional microphone, if at all possible, as this will really improve the standard of recordings. Then, on the appointed day, follow the plan you have worked out.

For the recording sessions themselves there are a few tips worth remembering. If holding the microphone, never allow it to touch anything, nor allow the cable to scrape against objects or clothing. Keep it away from the machine as you may have to have the gain fairly high and it might pick up motor or tape noises from the recorder. Point it at the source of sound and watch the recording indicator to avoid overloading. In this connection always *under record* organ music. It is very difficult to judge by the indicator and some of the very low notes may overload the tape without this showing on the magic eye. If you are recording while walking with the machine, avoid moving the recorder very jerkily to make sure that wow is not created.

The Commentary Comes Later

It is clearly impracticable to add the commentary in the church, for instance, but this can easily be added later; and in fact one of the most important operations is the editing of the tape to make one coherent story from the various recordings. The easiest way is to use another recorder for this and perhaps, if you do not own one, a friend will co-operate. Transcribe the required sections from the master tape in the required order and add the commentary, either by mixing or by superimposition, and at the same time eliminate unwanted sections.

Avoid clicks on the tape but if the nature of the recorder makes that impossible then cut them out later, using non-magnetic scissors. If the quality of the equipment is good enough you can then once more transcribe the finished tape (which may have a lot of joints in it) to a continuous length, and this constitutes the final result of your labours. And if sufficient trouble has been taken, both in the recording and the editing, the result will be a tape which you can confidently present to the couple whose wedding it was; and for them it will be a reminder of one of the most important occasions in their lives.

*Director of Recording Devices Ltd. (Stuzzi)

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HOME RECORDING

By JOHN BORWICK

PART TWO — OUTDOOR RECORDING

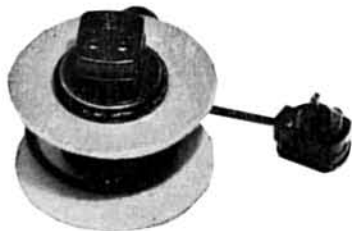


FIG. 1: The extension mains cable showing the socket permanently mounted on a cable drum.

WE assumed last month that you had just acquired a tape recorder, and I gave various suggestions on how you should quickly become familiar with its controls, performance, etc. By now you have no doubt made quite a number of successful recordings of family doings, radio programmes and the like and are now ready to try something else. There are snags to recording indoors, one room sounding lifeless and another "bathroomy", and we shall come back to this question in a later article.

This month, however, with the longest day almost upon us, I suggest we try some outdoor recording. Readers with battery portable recorders will no doubt look smug at this point, because they can wander in and out of doors as they please. But a mains machine is by no means so tied, as I shall show in a moment.

Certainly I think everyone should include some open air recordings in his collection. There is far more scope for interesting natural sounds, for one thing, and you have none of the bother with room acoustics we mentioned in the beginning. Yes, there are usually more extraneous sounds, but these sometimes add to the overall picture, or if they really intrude, a bit of ingenuity in microphone positioning or patience will get round the trouble.

Lengthening the Mains Lead

It is possible, you know, to run a mains recorder from the battery of your car. What you need is a DC/AC converter, some stout insulated cable and battery clips. Both *Valradio* and *Vortexion* make suitable converters, accepting 6 or 12 volts DC and supplying 250 volts AC. They cost something in the region of £6 to £12 depending on how many watts your recorder consumes. But you can get out of doors without all this added expense, and still run from the mains supply, by extending the mains lead, the microphone lead or both. Taking the mains lead first of all, because surprisingly enough it is the simplest, the principal worry is safety from electrical short-circuits. Do use heavy or medium duty cable, covered with rubber or thick plastic, and don't let it or the recorder stand in wet grass, etc.

In fact, the joining of the new length of cable—30 feet or so gives plenty of scope—to the existing flex is the weakest element. For this reason, and for the highly practical desirability of keeping the existing lead and plug intact for when you move indoors again, I strongly recommend you to make a kind of junction box. You will get ideas for doing this from the illustrations, but the basic requirement is to fit an ordinary mains plug to one end of your extension lead, and a block-mounted socket to match on the other. The cable and the mounting block must be impervious to moisture. A final professional touch is to mount the block on a small cable drum—I got mine on request at Woolworths.

Lengthening the Microphone Lead

The long mains lead alone will allow you to get out into the garden, or the precincts of school, church, etc., but a microphone extension cable gives even better freedom of operation. Fitting this is more or less complicated, unfortunately, depending on whether the microphone (and the recorder's input socket) is rated as high impedance or low impedance.

In the case of low impedance types, it's fairly plain sailing, provided you can avoid picking up mains hum from stray magnetic fields. Lengths up to 100 feet or more are O.K., and if your recorder has the balanced kind of input, you may get away with ordinary unscreened twin flex. A very slight loss in

quality occurs as the length is increased, but this is usually not serious.

High impedance systems are not so easy, however, and 9 out of 10 inexpensive recorders are of this type. They are supplied with a high impedance crystal microphone, and a single microphone input socket to suit. Here it is absolutely vital that the extension cable is of the fully-screened variety, and this screen-

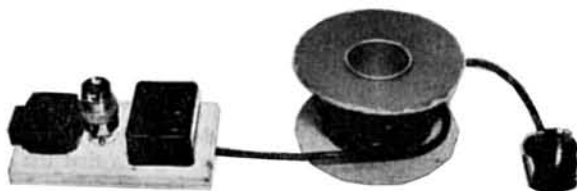


FIG. 2: A similar extension lead as shown FIG. 1, but fitted with an assortment of sockets to cater for equipment using two and three pin plugs.

ing must include any joins you make or mains hum will be louder than your recordings!

Just as with the mains lead, then, I would urge you to use a junction box of some kind in preference to the all-too-common twisting together of wires covered with insulating tape. As the illustration shows, I have found it easy to make a screened junction box by boring two holes in a small metal can. The aluminium boxes used for sending 35 mm. film through the post are ideal, and I was able to acquire 4 of these from a photographic dealer while making another "courtesy" purchase. A jack socket is fastened in one of the holes, to make good electrical contact with the bare inside of the can, and the extension lead emerges from the other. This useful idea appeared in a Reader's Letter in *The Tape Recorder*, December, 1960.

We're not out of the wood yet, though, because any lengthening of a high impedance microphone's cable weakens its signal strength, and the longer we make the cable, the feebler the signal. This factor is serious for professional recordings where the signal must be kept in as high a ratio to noise as possible. But for our purposes a little loss of signal doesn't matter too much, and I have found that 40 feet of screened cable still gives a useful output.

An Improvised Microphone

For various reasons, you may want to use a separate microphone for your outdoor recordings. You can do this, and avoid expense, if you can lay hands on a spare loudspeaker unit. The construction of the ordinary moving coil loudspeaker is such that it will work quite happily in reverse—collect sounds instead of emitting them—and so do double service as a moving coil microphone. The quality can be surprisingly good, too.

Electrically, the loudspeaker is low impedance—3 or 15 ohms usually—so a long piece of unscreened flex will suffice for a lead. No other precautions are necessary, provided your recorder has the right kind of low impedance input socket. If you have a high impedance input only, a fairly good match will be obtained using the usual type of loudspeaker transformer. The low impedance tags are wired to the loudspeaker in the ordinary way and the high impedance ("input") tags go to the recorder. You should put the transformer at the recorder end of the long lead so as to retain the advantage of low hum pickup in a low impedance line.

HOME RECORDING *continued*

PART TWO — OUTDOOR RECORDING

I suppose the loudspeaker unit ought to be housed in a cabinet of some sort, but I have found that simply laying the unit on its back gives perfectly good results. Most microphones in the amateur field lack any suitable stand. While it is difficult to improvise a microphone stand indoors, you will find that a piece of old aerial rod or cane can be stuck into the ground outside, and supplied with a Terry clip to hold the microphone.

Windshields

A frequent nuisance in open air recording is wind noise. This varies very much from one microphone to another, being so bad in ribbon microphones that they are virtually useless out of doors. Most other types will work perfectly well in a gentle breeze—including the improvised loudspeaker microphone—but they need protection in gusty conditions.

Properly designed windshields are manufactured for many professional microphones, allowing them to be used in all weathers, either as hand-held types or on booms in film location shooting, etc. These consist of a double layer of wire or plastic mesh with a filling of rubberised horse-hair or the like, and resemble a melon or football according to size! It would be possible to make up something on these lines for your own



FIG. 3: Extending a microphone lead using a film container, jack socket and screened cable.

microphone, using chicken wire or perhaps a pair of plastic colanders or tea strainers (all these have been used successfully), but unlike the professional, we can generally wait until conditions improve, and something less complicated should do.

Two folds of a pocket handkerchief are often effective, held on by an elastic band; or you can even use your jacket or an umbrella (!) to act as a screen and prevent the wind buffeting against the diaphragm. Believe it or not, but I was lecturing at the Rose Bruford Tape Recording Course a few weeks ago when a lady in the audience (actually it was Miss Eileen Jones, an active Tape Society member from Leamington Spa) described an "egg cosy" which she had knitted for her microphone. She produced this unique windshield afterwards, and during the rest of the day, students could be seen on the lawn outside making recordings beginning, "I am now recording with the egg cosy on/off . . ."

All windshields introduce some loss of high frequency sounds, so they should be removed when the wind dies down, or you come indoors again.

Things to Record

As soon as you've made a few recordings in the open, you'll begin to see how easy it is, and how varied the subjects are. I mean besides all the obvious things like birdsong, passing traffic and farmyard noises. You can make seasonal recordings,

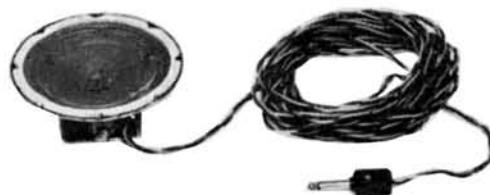


FIG. 4: An improvised microphone for outdoor recordings can be easily made from a loudspeaker and a length of unscreened flex.

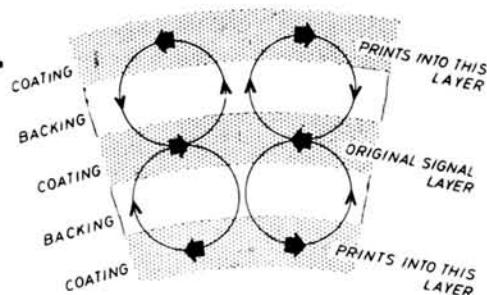
for instance. The whirring of a lawn mower conjures up summer as soon as you play back the recording, and its 10 to 1 that an obliging bumble bee will buzz past the microphone at some time or another. If it doesn't, look round to see which flowers are being visited, and stick the microphone in the middle. Guy Fawkes Night is another time for special recordings, and what about a thunderstorm, with the rain lashing down on leaves or a plastic mac stretched out deliberately. The list is endless. Don't forget that this is a reader participation series, and we should like to hear of any unusually successful recordings or practical hints to pass on to the others.

★ Next Month: Radio and Telephone recording.

TAPE TIPS — by Guy

— No. 7 —

**Minimise
Print
Through**



UNLESS certain precautions are taken there is a risk that when a recording is spooled up, the signal on one layer of the tape may print an attenuated copy of itself into adjacent layers. In really bad cases the print signals may penetrate up to five or more layers on either side of the original, giving a disconcerting pre-echo or post-echo effect.

To keep printing to a minimum do not record at too high a level and keep the recorded tape away from the heat of a fire or radiator. Also do not put it near any electrical apparatus that may subject it to weak, stray magnetic fields. Rapid spooling backwards and forwards will sometimes reduce the pre-echoes and post-echoes without impairing the wanted recorded signals.

These tips are abstracted by permission from "How to get the Best out of your Tape Recorder" by Percival J. Guy. Norman Price (Publishers) Ltd. 1958. 18s. 6d. net.

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... tape recorder workbench

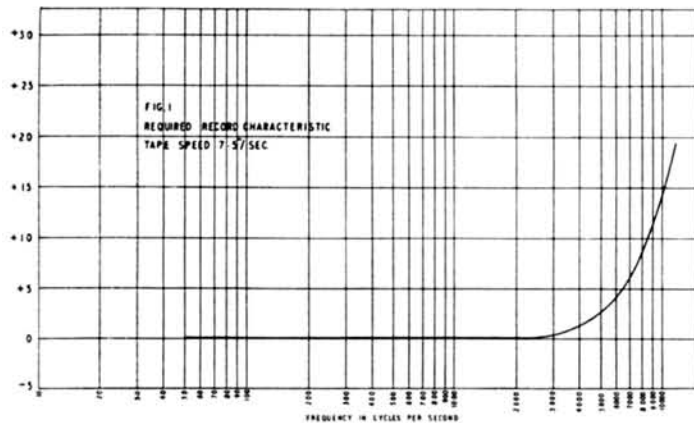
Practical suggestions for the tape handyman

by A. Bartlett Still

No. 23. RECORD EQUALISATION

IT was in the December issue last, after devoting some space to the question of equalisation in the replay amplifier, that I promised to deal with record equalisation, after first answering a few more practical queries. Such is the way of things that I find myself writing for the June issue; so, before December comes around once more, let me try to explain how the recording process fits in.

Perhaps it will be remembered that I gave a curve in the November issue (page 501) showing the various losses that are incurred in the overall record/playback process, and derived a frequency response that the total equalisation must compensate. Part of this compensation is carried out on replay (Dec. issue page 553) and is the subject of the C.C.I.R. specification. It is the remainder that becomes the function of the record ampli-



fier, resulting in a curve similar to **fig. 1**. This is the curve that may vary from one machine to another, depending upon the tape in use, and the particular qualities of the head used.

Another way of describing the aim of such a recording response is to say that it should result in equal magnetic strength on the tape for all signals, of whatever frequency, that are of equal amplitude. Examination of this curve with an eye to amplifier design indicates a flat response up to about 2½ Kc/s, beyond which the response rises with increasing steepness (once again we will consider initially 7½ i/s only). Now it is perhaps of interest that this curve can be reproduced almost exactly, with such slight modification of the slope as may be required, by a single valve stage, using a frequency selective feedback device known as a "Bridged-Tee" network. The circuit of **fig. 2** is of such a stage using a valve of the EF 86 type. Unfortunately, there are a couple of disadvantages that make it rather unpractical for normal tape recorder use.

Speed changes need compensation

Even if a scheme using separate record and replay amplifiers is being considered, it is probable that a change of tape speed will have to be catered for, requiring a lateral shift in the response curve. The alteration of values to the components in the Bridge-Tee circuit would require rather complicated switching. This switching would, I suspect, be simple compared with that necessary to turn this circuit into something suitable for replay equalisation, as is required when a common amplifier is required for both purposes.

The required frequency response can also be obtained from the circuit I give in **fig. 3**, and the ease with which a change in tape speed can be catered for is shown by the additional .002 mfd capacitors to be switched into circuit. Comparison with the playback amplifier circuit I gave last year will make it plain

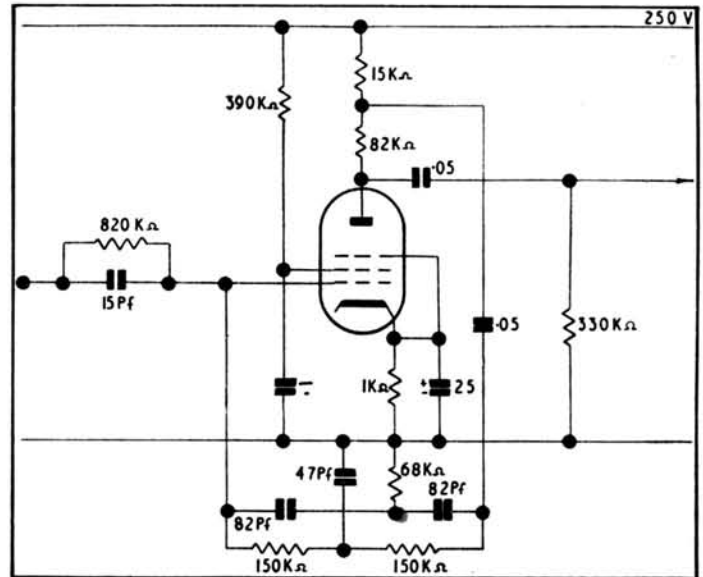


FIG. 2: A single valve, Bridged-Tee circuit.

that the only change is in the feedback line, and the amount of damping of the resonant circuit. The two circuits can thus readily be combined with the addition, even, of a purely resistive feed back line to allow "straight-through" amplification with a flat response.

But—Beware of Hum Pickup

Doubtless any arrangement would have its limitations, and it is fair to say that two small snags could crop up in practice with the proposed circuit. Unless some care and forethought is exercised in the placing of the coil, hum could be picked up. This would be most noticeable under playback conditions due to the large amount of bass boost that has to be used. The second snag is unlikely to arise, except with a poorly-made coil, when the possibility would exist of "ringing" at a high audio frequency. This ringing would have to be initiated by a strong signal of the appropriate frequency. It is, of course, under recording conditions that this is likely to apply due to the boosting of the treble frequencies. If noticeable, this fault would take the form of a harshness or distortion of certain notes recorded on the tape. However, if a properly-designed coil is bought for this

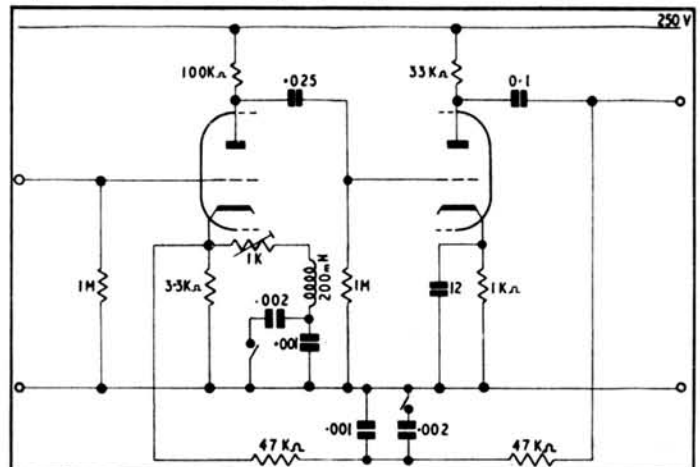


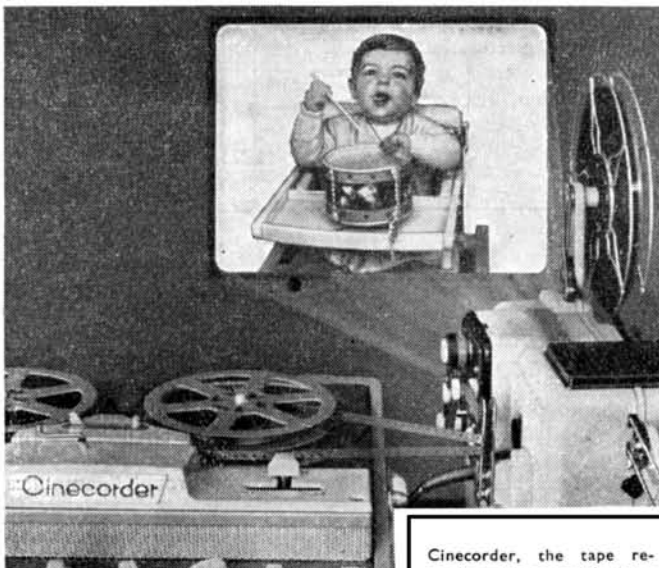
FIG. 3: Switching in more capacitance for a speed change.

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TAPE RECORDER WORKBENCH—(continued)

purpose, such as the one I recommended in the replay amplifier circuit, no trouble is likely to arise.

The thing always to be remembered when considering the performance of a record amplifier, or a common amplifier under record conditions, is that the frequency response should be determined by performance. Once C.C.I.R. replay has been obtained, the record characteristic will be the one that gives an overall flat response, and it will depend to a large extent on the tape in use and the degree of bias applied.

Finally, I would ask my readers to appreciate that I have not attempted to describe a complete recording amplifier, only one way of producing the sort of equalisation that is required. Both the circuits given could, however, be built into a complete amplifier, indeed, the double triode circuit, or variations of it, have been used many times with complete success.

Summer Slump?

SUMMER slump? Nonsense! There certainly used to be seasonal slackness in the electronics industries; but to-day things have changed. The summer is now the season when one really has the time to enjoy one's tape recorder, and make the investment worthwhile. The tape recorder has made for itself a unique place in the world of entertainment and business. With it you can go anywhere in the world... take your ciné-camera by all means, but add to your winter enjoyment when showing your pictures by adding the extra dimension of sound. Long train journeys to and from your destination can be enlivened; for remember, your tape recorder is also a tape player, and there is now a vast library of pre-recorded music available, from classics to pops. Our company (Bi-tapes) have made many spoofs of it, so have other enthusiastic manufacturers, including E.M.I., Saga, and Music On Tape. Between us we cater completely for the entire market, from the heaviest classical music right down to rock 'n' roll, and there is now a great emphasis on background and mood music for which the tape recorder is ideally suitable, not to mention our productions of electronic music, spoken word and sound effects.

To me, the summer is the best possible time for all this, for what could be simpler than a recording and playback machine all in one, many of them independent of mains supply? There are now tape machines to suit every pocket and, nearly without exception, all are "music players".

The Public are demanding Tape Records

Perhaps the public have realised this more rapidly than some of the tape dealers, and that may be why we have not felt the gloom of the so-called "summer slump". It doesn't really exist, you know. It need not exist in any branch of the entertainment world. You and I, by simply going out and asking for what we want, can remove it. Who benefits? Firstly, the customer, by virtue of an increase in the usage of your leisure. Secondly, the retailer, for obvious reasons. He doesn't want a slump. Thirdly, the manufacture, who can continue to keep the other two happy. Fourthly, the country, whose economy is helped. Since the industry employs many thousands of people this is no small factor.

Postscript!

So now I'm off to the country for my holiday, and in the back of my car will be a tape recorder/playback machine and half a dozen of the tapes from my stock!

Richard Sherren

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TAPE RECORDERS
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our readers write

. . . about the cost of tape

From:—W. T. Botley, 48 Windermere Way, Priory Estate, Slough, Bucks.

Dear Sir:—Having read with interest the letters from Mr. Parkinson and Messrs. Wilmex (Distributors) Ltd., on the subject of tape cost, I thought perhaps readers may be interested in my own experiences with regard to the purchase of the cheaper brands of magnetic tape which are now available, the majority of which has been imported from the west, or at least are purported to have been.

Although a particular brand of tape is recommended for the tape deck/pre-amplifier I am using at the moment, I am always on the look out for ways and means to improve reproduction by economic means. With this in mind I purchased a 1,200 ft. reel of imported tape for 19s. 6d., and was at first very pleased with results—it sounded so much better than the brand I had been using previously. However, after a period of using this particular reel of cheap tape I noticed that sustained notes around a particular frequency were inclined to “burble,” and I suspected that the flutter “bug” had found its way into the deck. After many adjustments, I could not improve the reproduction in any way. In fact the recordings seemed to get worse, losing their clarity and top response. This led to electronic tests but nothing could be found responsible apart perhaps from slightly magnetised tape heads and guides. However, I saved myself further trouble by doing some recordings on the recommended tape and was relieved to hear the recorder reproducing with clear top and without any trace of “Burble.”

There may, of course, be some other explanation for the faults which arose by using the cheaper tape, but even so I shall stick to the recommended brand from now on. I am wondering if any other readers have experienced similar faults through using cheap tape. If they have, then I think other intended purchasers should be aware of the pitfalls that they may encounter when buying this kind of tape.

May I add that some London shops are offering well-known brands of recording tape at slightly reduced prices, and I have found these to be perfect in every way. *Yours faithfully.*

* * *

. . . about fixed prices

From:—A. H. Parkinson, Avalon, South Elkington, Louth, Lincolnshire.

Dear Sir:—I am sure that many readers will be grateful to Wilmex (Distributors) Ltd., for the points raised regarding tape prices and quality in the April issue of the *Tape Recorder*. Nevertheless, even these need some qualification.

I agree that it is essential that the public should not be misled by firms offering extremely cheap tape for sale, although I should emphasise that the company I mentioned previously makes no attempt in its price list to do this. The same company incidentally now sell brand new American tape at £1 11s. per 1,800 ft. and the two best known brands available in Britain, at wholesale rates. The point that Wilmex did not attempt to answer was why so many manufacturers fix their prices at the same level. I realise that high quality, must be paid for, but until competitive prices are introduced I shall continue to assume that those operating at present are artificially high.

As regards splices, I am fully aware of the high standard of American tapes available over here, but in two brand new £2 10s., 1,800 ft. tapes manufactured by possibly the leading company in Britain, I found splices when they had worked loose after I had made recordings. These had to be remade and the quality of the recordings was obviously slightly impaired; yet when I wrote to the company, I received this answer “We should make it quite clear that we do not claim to supply splice free material, but considerable experience in the professional and domestic field has established that a well-made splice

is in no way detrimental to the tape, either in terms of physical strength or so far as its performance on a tape recorder is concerned . . . It is possible that some of our products contain up to two splices per 1,200 ft. length.” This company, it is true, does not advertise splice free tape, but at the same time makes no attempt to mention that splices may occur. Similarly I know that splices, well made, are not detrimental, but I prefer a flawless tape and anyway, in both the cases I noticed, the splices were very poorly made.

Faults like these make frequent tests and reviews demanding to the highest standards absolutely essential for the guidance of the rapidly increasing tape-conscious public. *Yours faithfully.*

* * *

. . . about the Audio Festival

From:—R. Hamilton, 94 Salisbury Avenue, Barking, Essex.

Dear Sir:—May I be allowed to voice my opinion on this year's Audio Festival and Fair. I was extremely disappointed at the lack of demonstrations that most manufacturers were prepared to give. Those that were displaying tape recorders for demonstration were only playing pre-recorded tapes, mostly on domestic machines. The tapes had obviously been recorded on equipment far superior than the playback equipment, and what did really annoy me was that one manufacturer was demonstrating such a tape on a cheap recorder, with the aid of a speaker unit costing *twice* the amount of the recorder itself. I think that this type of behaviour will only mislead the prospective buyer and ultimately lead to bad feeling between manufacturer, dealer and customer. If we are to have an Audio Festival next year, please let us have a straightforward one. *Yours faithfully.*

* * *

. . . about the tape deck rewind

From:—R. A. Denry, 3 Branksome Road, Redland, Bristol, 6.

Dear Sir:—I read with interest Mr. A. Bartlett Still's suggestion about tightening the rewind of a tape deck (May issue) and may I suggest a further improvement.

The main disadvantages of his system are, that the rewind path and the play/record path are different, and the rewind is still untidy.

The system I have used, is to stick a rubber sucker between the right hand (rewind take up) spool and the head cover, round which the tape travels. The sucker has a $\frac{1}{4}$ in. guide slot cut or filed in, so that the maximum depth is about 1 mm. The angle of the tape at the sucker should be about 90 degrees for a full seven inch spool and 45 degrees empty.

On my machine this tidies up and tightens the rewind completely, and the fast forward to a lesser but adequate extent. If preferred the sides may be reversed. On some machines difficulty may be experienced in starting the rewind with a full right hand spool, in that case the two sucker principle should not be tried. One final note, this modification *does not* like bad splices! *Yours faithfully.*

* * *

. . . about microphones

From:—Rev. D. W. Bell, The Presbytery, 5 Station Road, Stone, Staffs.

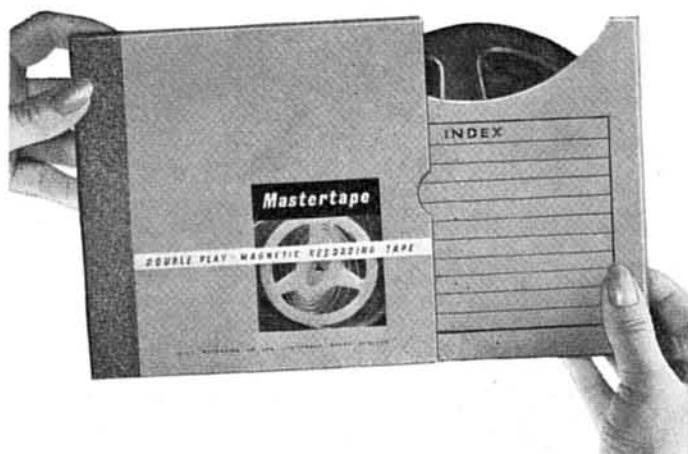
Dear Sir:—With reference to “R.D.” inquiry about line impedance microphones on page 139 of April issue, my own experience may be of interest (and use) to some readers.

I had been thinking of getting a better microphone than the crystal one originally included with the machine and was finally decided by the background noise, which is, apparently almost inseparable from crystals.

The supplier of my recorder—incidentally very different from the “couldn't-care-less-types” we hear so many complaints

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T/R.

OUR READERS WRITE—(continued)

about—advised a Grampian DP 4, Medium impedance, and I find this works perfectly well without any extra transformer, not quite as much output as the crystal, but still plenty of power to spare.

I can see no reason why this should not apply with most domestic recorders, provided there is sufficient pre-amplification—which means in fact, that a line impedance microphone can give you the best of both high and low impedance worlds.

Yours faithfully,

... about experimental models

From:—2762783 Cpl. Oxer G. S., SS, A.H.Q., B.F.P.O. 51.

Dear Sir:—I would like to ask if anyone can tell me why foreign tape recorders seem to take so long to appear in the U.K. I quote as an example Grundig, who at present market only one 4 track machine in the U.K., the T.K. 24. Out here it is possible to obtain the T.K. 28, T.K. 54 and T.K. 64 (which are 4 track versions of the 25, 50 and 60 respectively) for many months now.

There also appears to be more scope for importing pre-recorded tapes particularly the 4 track stereo variety. I learned that not only are there thirty different companies in the U.S.A. alone, concerned with the production of these tapes, but that currently there is a choice of 1,523, 4 track tapes.

With increased supplies of both 4 track machines and tapes, a good market should be found as each would help to sell the other.

Finally a hint for anyone who exchanges tapes between a 2 track and 4 track machine as I do. The owner of the 2 track has no problems, but the 4 track which has track 1 and 2 compatible with those of the 2 track machine will need to erase tracks 3 and 4 before returning the tape to the 2 track owner. On a 4 track machine a tape which was recorded on a 2 track will be heard backwards if tracks 3 and 4 are selected, which of course is no use, but if a reply to a message has already been recorded on tracks 1 and/or 2 of the 4 track machine and it is wished to make reference to the original recording which was received the following system will help.

Insert the full spool on the left as usual, but make a 180 degree turn in the tape before placing in the sound channel, thus running the smooth surface of the tape against the sound heads. Select tracks 3 and 4 and playback. The original message will still be heard but of course at lower volume and poorer quality. I always use double play tape and with the thin base the sound comes through quite well, but even with standard play tape it should still be practicable.

Yours faithfully,

Many visitors to the continent have asked the same question—why there are more models available than there are on the English market. The answer is a simple one. Many experimental models or interim models are released for overseas domestic markets, but only a percentage of these are stabilised into the form of general production models. It is only these really established models, which are eventually imported and released for the British market. For example, a model 123X may differ only very slightly from 123Y. To have both these models on the English market, so very alike, would only lead to confusion.—

(Editor.)

... about recorder standards

From:—M. R. Ratcliffe, 76 Horton Grange Road, Bradford, 7.

Dear Sir:—In the present uncertain position regarding tape recorder standards I find it hard to believe that even our best manufacturers seem to have committed themselves apparently firmly to one set of standards or another.

Why for example, has it been left to Japan (a newcomer here) to offer $\frac{1}{2}$ or $\frac{1}{4}$ track stereo/mono at the turn of a switch on one machine? Why, also, is the American Ampex the only available example of a machine giving both recording characteristics (RIAA & NAB) also at the turn of a switch? My ideal

specification would incorporate both the above features together with $7\frac{1}{2}$ and $3\frac{1}{2}$ i/s and independent replay amplifiers and heads (or possibly simply pre-amp stages), also V.U. meters for both channels instead of magic eyes.

The excuse of expense is hardly a fair one—good recorders are far from cheap now, and another 10 or 20 pounds on the purchase price is still far cheaper than having two machines. (Although I realise that 2 machines still offer advantages over the one machine set-up).

Yours faithfully,

... about bird-song

From:—M. E. W. North, Box No. 8225, Nairobi, Kenya, East Africa.

Dear Sir:—I get a lot of queries about bird-song recording from people in Africa, and I was particularly interested in Mr. Johnson's articles on the parabolic reflector, which I thought excellent.

I have done a lot of similar work myself out here, with equipment supplied by Cornell University, U.S.A.—with a mains set, an Ampex mounted in a jeep, and a 24 in. reflector, and I have had one 12 in. LP bird record published by Cornell, and am now working on a second. I haven't done any recording in England yet, though I know the songs of British birds better than many, being co-editor of Witherby's "Sound Guide to British Birds". I am a Government servant out here, but will be retiring at once, and will spend the next year out here doing my new Cornell record, then a couple of years in England, when I hope to pay my respects to you, then back to Kenya.

... about hum

From:—J. H. H. Swart, c/o. Thompson and Whitehead, 35 Eastern Road, Romford, Essex.

Dear Sir:—When assembling various units together it is important that the mains polarity is the same for all, and the usual earthing of the deck and all other equipment is taken to a central point. If the equipment has a separate mains pack, the filaments of all valves should be centre tapped at the point of the highest current drain, the E.L. 84 in the case of the output stage, a pair of 50 ohm wire wound resistors work wonders.

Re. Transistor Recorder (Phonotrix).

I am about to carry out some modifications to the above recorder to bring in a bias oscillator etc. and would be grateful for any news from others who have experimented along these lines. In the use of this recorder I have made use of an/off switch (bedside light drop switch) in the main battery lead and find this enables me to switch on immediately without a struggle with the normal slide switch, it also allows for an immediate stop.

Re. A Portable Transistor Recorder. A. Tutchings.

I have found these articles of great interest even though they seem to be quite the reverse of the Phonotrix circuit. Please continue these, and work up to a really professional machine.

Yours faithfully,

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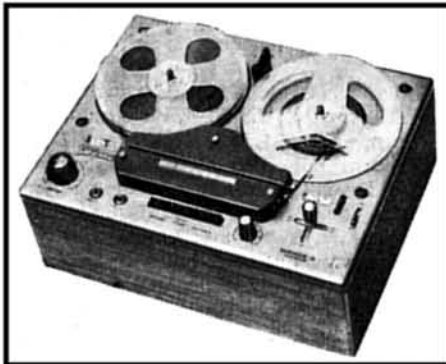
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Readers' Problems

Recording from Radio

Dear Sir:—Referring to your "Tape Recorder Workbench" Part 8—"connecting to radio or TV", January 1960, I had the work carried out on my Ferguson, Transportable, Model 1546, in accordance with figs. 1 and 3, but the hum in the output is so heavy that I have had to revert to fig. 2. Can you suggest any cure for the hum?
Yours faithfully, K. S. M., N.W.8.

The scheme I outlined for radio recording has been used many times, and is, in fact, a standard fitment on a number of continental radios.

I would ask you to check your earthing arrangements. If either the radio or the TR. have a high leakage current to earth hum could be caused by current flow along the connecting cable. May I suggest you try earthing as follows in turn?

- (1) Earth on T.R.—no earth on radio.
- (2) Earth on radio—no earth on T.R.
- (3) Earth on both T.R. and radio.
- (4) No earthing at all.

Doubtless one of these arrangements is the one you already have; I would expect (1) to give the best results.

Please let me know how you get on: if you still have trouble try to give me as much information as possible so that I am right in the picture.

Mixer Impedances

Dear Sir:—In your December, 1960, issue of *The Tape Recorder* you gave a review of the Saba "Regie Mixer" 100. The three microphone channels have an input impedance of 1 Kilohm as is stated under manufacturer's specification. The question I want to ask is this—is the input impedance of 1 Kilohm suitable for moving coil or ribbon microphones with an impedance of between 15 to 30 ohms? If not, what microphones are suitable for this mixer unit, or would it be necessary to use matching transformers?
Yours sincerely, J.S., Bradford, 8.

During my tests on the Saba mixer unit I did indeed connect it to a tape recorder using a low impedance microphone with quite satisfactory results. This is not to say that some improvement in terms of signal level might not be obtained if a matching transformer were used. However, I think that a suitable transformer might be difficult to find and one always has to consider that it might prove to be a source of hum pickup. The mixer is obtainable from Henri Selmer & Co., Ltd., 114 Charing Cross Road, London, W.G.2.

Fitting Different Heads

Dear Sir:—Can you help me with my problem. I possess a Brenell Mk. V tape deck with associated record/replay amplifier. I wish to fit Telefunken heads (half track) to this deck. My supplier has said that nothing need be altered because the frequency response is governed by the gap width of the head, not the amplifier itself. Being ignorant of such things I always understood the pre-amp controlled the frequency response when recording. Can you explain to me what part the correction circuit plays on the recording/replay side of the amplifier, and if in fact this will have to be altered in any way with new heads other than those fitted by Brenell, or if the extended frequency response of the Telefunken head will be unaffected by the amplifier correction circuit?

Yours faithfully, G.W.E., Hornsey, N.8.

I regret that the information you have been given so far is not, strictly speaking, accurate. It is quite true that the gap width of the tape head governs the frequency response of which the machine is capable, but both the amplifier response and the

bias current have to be adjusted to suit the head for optimum results. This means that a change of head on your tape deck, while possibly allowing an extended frequency range, would require adjustments to the amplifier and bias oscillator. Your query does seem to me to be one that might be of interest to a number of readers and so I shall take the opportunity of going further into this matter shortly in my "Workbench" column.

Converting to Stereo

Dear Sir:—Having just brought a tape recorder, the Vogue de luxe model twin track 7 in. spools, 3 speed, I wonder if you could give me some information having for the first time read your magazine. (1) What is the procedure for converting this to a stereo? (2) I have noticed that the tape deck on mine is made as a four track deck, according to the advice in your book could mine be made into a four track? (3) How can you superimpose on a tape that already has music on it, what I mean is how is it possible to use the mike and sing into it and follow music you can't hear? (4) What is a good cheap book to buy on this subject covering all the aspects of it, and last are these tuners any good for making it into a radio?

Yours truly, A.B., Liverpool, 14.

Unfortunately it is not possible to convert an existing recorder to stereo, nor do I consider it likely that it could be converted to four-track operation, should this even be desirable. However the manufacturers of your machine are in the best position to give a firm answer. Superimposition does not allow you to sing to an already recorded accompaniment but can be used to add a second recording when its relationship to the first is unimportant. There are various tuner units available that would allow you to make good recordings of broadcast material but I would never recommend that you used your recorder thus as a radio, it is not designed for this form of operation. Finally, the best suggestion I can make for a book on the subject, is one that is in preparation by this office at the moment. **Tape for Beginners** will be published towards the end of this year, and details will be given later.

D.C. Recorders

Dear Sir:—I wonder, would you be so kind as to give me some advice. I am unfortunately on D.C. current with very little hope of a change for some time. I would like to have a tape recorder but I am told they are all made for A.C. Is this correct? If this is correct, would you recommend me to buy an A.C. recorder plus a converter or a portable transistor recorder? Do the portable transistor recorders give a true reproduction? I have been told that transistor recorders are hard on batteries and their reproduction is poor in comparison to the mains recorder. If this is not so, is it possible for you to recommend some? My interest in tape recorders is for the purpose of speech training and languages. Thanking you in anticipation.
Yours sincerely, J.M., Belfast, 1.

If your interest in recording is solely speech training and languages then you would find that a battery portable tape recorder would be quite suitable, with the added advantage of portability. The Grundig TK1 is a good example of an inexpensive instrument with a reasonable performance. There can be no doubt however that should any question of quality musical recording arise, requiring a longer playing time, a mains operated machine would be more suitable. This should present no difficulties if the machine is operated via a DC/AC converter such as you would be able to obtain from Valradio, Ltd., Browells Lane, Feltham, Middx., who would be pleased to give you further details.

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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.

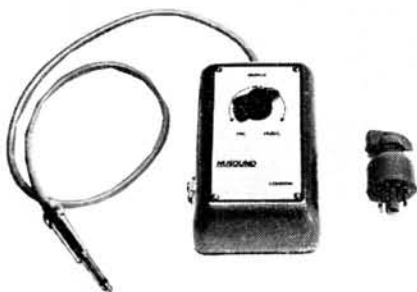
★

**POLYCORD
EXPORT
MODEL**

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RECORDING DEVICES, LTD., who market the Stuzzi range of tape recorders in this country, have opened an export division. Although most of the Stuzzi range are made in Austria by the Stuzzi company, Recording Devices have always manufactured some models themselves. Exclusively for their export division, Recording Devices have introduced a new tape recorder—the Polycord. Its facilities include superimposition; monitor on record control; mixer controls; microphone; telephone adaptor; pickup, and radio inputs; large accessory compartment; and an 8 in. built-in elliptical speaker. Recording speed is $3\frac{1}{2}$ i.p.s. giving up to 3 hours playing time. Frequency response is 90-10,000 cycles. Weight 22 lbs. Further information can be obtained from **Recording Devices Ltd., Export Division, 84-86 Grays Inn Road, W.C.2.**



★

**NUSOUND
MIXER
AND
MONITOR**

★

TWO products specially designed for Ferrograph users have been produced by the Nusound Recording Co. The first is the *Numix*, a mixer which enables two programmes to be faded and mixed from a microphone and radio/tape recorder. Any combination of programmes is possible with this device and the operation is controlled by a single knob. The second item is the *Monitor* which enables the listener to monitor through the internal speaker of the Ferrograph to programmes which are being recorded at a listening level, which may be adjusted independently of the recording level. This unit is plugged into the auxiliary socket on the front panel. The price of the *Numix* is £4 7s. 6d. and the *Monitor* £1 1s. or £1 5s. depending on the finish; available from the manufacturers, **Nusound Recording Co., Craven Street, Trafalgar Square, London, W.C.2.**

A NEW British Company has been formed to improve the quality of magnetic tape heads and to manufacture these in quantity to precise specifications. The tape heads are manu-

factured from a basic design of brass body. This has the advantage that the tape heads are directly interchangeable for the different track widths without alteration of the fixing centres. Further, the characteristics of a $\frac{1}{2}$ -track or $\frac{1}{4}$ -track can be very nearly matched so that circuit alterations are not required. Directly interchangeable heads are produced in $\frac{1}{2}$ -track, two $\frac{1}{2}$ -track, and two $\frac{1}{4}$ -tracks. Another feature is the fact that a $\frac{1}{4}$ -track head having tracks 1 and 3, can be turned through 180 degrees, so providing tracks 2 and 4. (Fixing holes being located either end of the head). Full information can be obtained on these new heads from the manufacturers, **Scopetronics, Ltd., 27 Soho Square, London, W.1.**

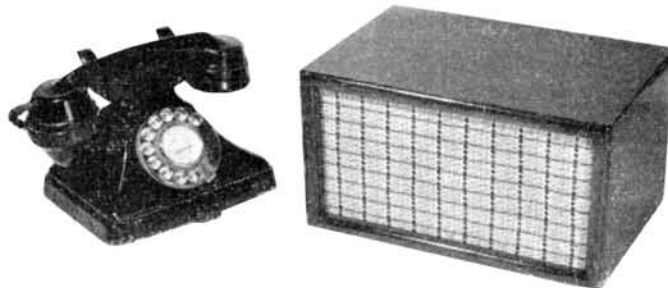
★

**BRENELL
MARK V.
TYPE M
RECORDER**

★



A RESTYLED version of the Brenell Mark V was first seen at this year's Audio Festival. The Type M, as it is named, incorporates four speeds, of 15, $7\frac{1}{2}$, $3\frac{1}{2}$ and $1\frac{1}{4}$ i/s, with a claimed frequency response at 15 i/s of 40 to 20,000 c/s ± 2 dB. Wow and flutter figures are quoted as less than 0.05% at 15 i/s. Separate record and replay amplifiers are fitted and the design of the amplifier panel has been completely restyled and features a recording meter. The price of the Brenell Mk. V, Type M, is £92 8s., and the manufacturers are **Brenell Engineering Co., Ltd., 1a Doughty Street, London, W.C.1.**



TECHNICAL SUPPLIERS, LTD., announce a new loud-speaker, the *High Q Flexette*, of almost sub-miniature dimensions. Incorporating a new type of speaker unit manufactured by Lorenz of Germany, it has a claimed frequency response of 45-15,000 c/s. Power output is stated to be better than 4 watts continuous or 8-10 watts peak. The size of the High Q Flexette is $11\frac{1}{2} \times 6\frac{1}{2} \times 7\frac{1}{2}$ in. It is veneered and polished in medium walnut. Price including purchase tax is £5 19s. 3d. Manufacturer and distributor: **Technical Suppliers Ltd., Hudson House, 63 Goldhawk Road, London, W.12.**

EQUIPMENT REVIEWED



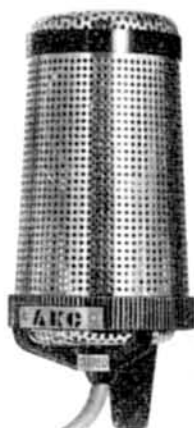
★
S. G. BROWN
SUPER "K"
STEREOPHONIC
HEADPHONES
★

THE pair of headphones presented for review were of the low impedance type, the actual figure being 26 ohms per earpiece @ 1,000 c/s. Supplied with them was a plotted frequency response produced by a Bruel and Kjoar instrument—I suspect that any reviewer would be brave to take issue with that! This curve, in a slightly smoothed out version, showed a good bass response and treble maintained to past 10 Kc/s. The smoothness of the response was immediately confirmed on a listening test which also demonstrated surprising sensitivity.

Quite comfortable listening requires only a few tens of millivolts. This is partly due, no doubt, to the very efficient sealing of the large soft plastic ear muffs, which successfully attenuate extraneous noise. To any readers who may have memories of hours with headphones clamped on for more serious business, I would commend these for comfort, after quite a short time the tendency is to forget them entirely.

Summing up, here is a moving coil headphone with a response worthy of quite serious programme material, nicely balanced in each earpiece, and more than adequate sensitivity, such as can be recommended to any prospective user. **Manufacturer: S. G. Brown Ltd., Shakespeare Street, Watford, Herts. A.B.S.**

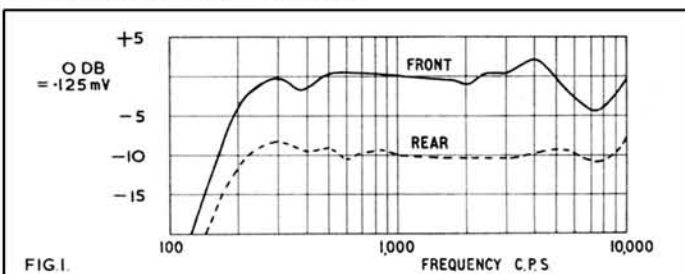
★
AKG D88
MOVING
COIL STEREO
★



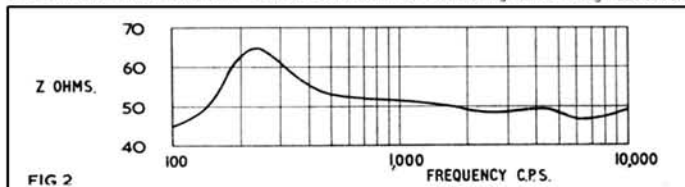
Technical Specification: Dual moving coil stereo microphone. **Frequency response:** 80-15,000 c/s. **Source impedance:** 200 ohms each channel, or 50,000 ohms with transformer. **Sensitivity:** 75db low impedance, -52db high impedance. Double Cardioid for stereo, broad cardioid for mono. **Price:** £15 10s. low impedance £18. high impedance. **Sole U.K. agents: Politechna (London) Ltd., 3 Percy Street, London, W.1.**

The design of each moving coil element in this microphone is similar to that of the Telefunken D11B Cardioid microphone

which I reviewed in the January issue of this magazine. Interested readers should refer to this for further details. The two units are mounted at right angles to each other within the acoustically transparent case, the top one facing to the left, and the bottom one facing to the right as viewed from behind the microphone. A "field trial" on this unit appeared in the March issue and described how it could be used, so I will content myself with a straightforward technical review.



Frequency Response: The solid line curve of fig. 1 shows the front axial response of the top unit, and the dotted curve is the rear response of the same unit. A quick check of the other unit showed a very similar response and front to back ratio. The sharp fall in bass response below 200 c/s is inherent in this simplified version of a single element moving coil cardioid microphone, but the response from 200 c/s to 5 Kc/s is remarkably smooth and well damped. The response above 5 Kc/s, as with all microphones of this size, is critically dependent on angle due to phase differences across the face of the diaphragm, but the subjective impression is of adequate extreme top response over a 90 degree pickup angle at the front of the microphone. The polar diagram at high frequencies shows a couple of sharp minima at approximately 140 and 220 degrees, i.e. in the rear sector. The bass cut is certainly not very notice-

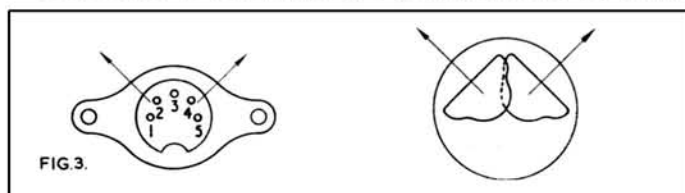


able on speech but it does show up on music when used with wide range reproducing equipment.

Sensitivity: The sensitivity was found to be 78db below 1 volt/dyne/cm². or .125 millivolts per bar, which is slightly low for a 200 ohm microphone but, as will be seen in the next paragraph, the actual impedance was in fact 50 ohms and not 200 ohms as stated in the specification. Even if we allow for the rise in impedance at the diaphragm resonance shown below, it would seem reasonable to use a transformer ratio of 25:1 for matching to the high impedance input of a recorder. This gives an open circuit voltage of just above 3 millivolts per bar sound pressure or 50dB below 1 volt/dyne/cm². which is within 2db of the specification for the high impedance output.

Impedance: The impedance was measured over the frequency range and is shown in fig. 2. The diaphragm resonance at 250 c/s is clearly seen and indicates the reason for the bass cut when the moving system becomes stiffness controlled.

Connections: A Continental-type plug is fitted to the micro-



phone lead and the connections, looking down into the socket, are as shown in fig. 3. It may not generally be realised that phasing of the microphones is equally important as phasing the loudspeakers for correct stereo effect, and that this phasing has to be carried through both the matching transformers. I found that connections 1 and 5, and 2 and 4 were of the same phase, i.e. if 1 and 5 are joined and used as one connection, and 2 and 4 are joined and used as the other connection the electrical outputs add in phase to give maximum pickup at the front of the microphone with a broad area of pickup extending over an arc of 180 degrees.

A. Tutchings

Zonatape

NOT so many years ago testing a tape was a relatively simple process. One simply spooled the tape to see how evenly it wound, and listened to it to see what it sounded like. There were quite obvious differences in the sound quality from various tapes, and physically they behaved quite differently. There were paper tapes, plastic tapes, red tapes and black tapes. There were tapes which, because of their famous surface lubricant, stuck to the heads like Sellotape; there were even tapes which appeared to increase in length and volume with use, so that when the take up reel was full there was still a fair quantity left over on the supply reel.

If a manufacturer found that his tape was less sensitive than that of a competitor he thought nothing of doubling the thickness of the oxide layer, which gave the necessary increase at low and middle frequencies, but left the high note response sadly lacking. Most tapes were extremely sensitive to climatic conditions and "cupping" and "curling", due to different rates of expansion or contraction in the base material and binder, were very common. Even the best types varied in sensitivity and response from batch to batch.

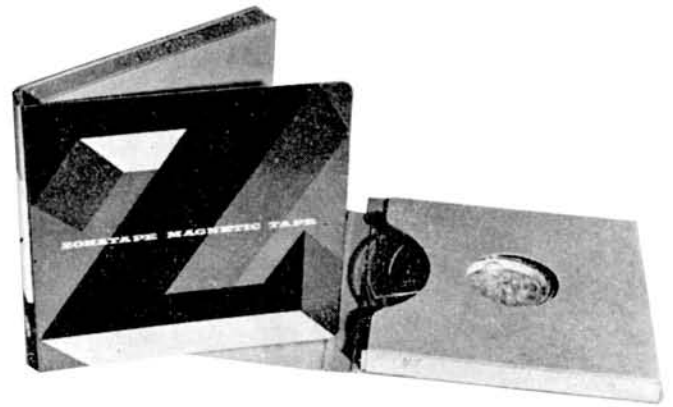
All these teething troubles are now a thing of the past, and modern tapes are extremely uniform in quality and performance. When a new tape makes an appearance, its most important asset is that it be compatible, or interchangeable, with other makes, and with no significant change of frequency response, playback level, or recording sensitivity. Indeed, if a new tape sounds superficially "brighter" "crisper" or "cleaner" it usually means that it needs more bias, and more careful tests would reveal distortion, inter-modulation and drop-outs if used under these conditions.

Modern Tape Testing Methods

Modern tape testing therefore reduces to comparison with "Brand X". This technique has been carried to the limit in Germany where a complete batch of the highest grade tape was set aside as a standard and issued to government departments and other test laboratories for reference during the testing of other tapes. No such official standard exists in this country, but all the reputable tape manufacturers "stay in step" within fairly narrow limits; and as all improvements nowadays are marginal, the standard can drift slowly upwards under the stimulus of competitions, without being bogged down by a rigid standard.

For the purposes of this review, new samples of tape from two British and one Continental manufacturer were compared with the Zonatape on a professional machine at 7.5 i/s for bias level, record level, playback level, overload and under signal noise—and of course frequency response. In these tests OdB represents a surface induction of 10 gauss, or 10 lines per sq. cm. at 1Kc/s; this also corresponds to the level on a standard test tape. "Optimum bias" in these tests is the bias which results in maximum output at 1Kc/s, and not the 1dB over biasing used on professional high speed machines. The tapes are identified as A, B, and C for the British and Continental reference tapes respectively, and Z for the Zonatape. The procedure was to place a tape on the machine and set the bias for maximum output at 1Kc/s. As the bias maximum was broad in most cases the figure given is the mean bracketed by the 1dB down points caused by over and under biasing.

Next, the input level was adjusted to make the output meter read exactly OdB. The bias and input level figures are in arbitrary units on a voltage or current scale. The actual figures are not quoted as they apply only to the particular record head used in



The New Book-style package of Zonatape

these tests, but the readings indicate the relative input and bias voltages necessary to place the standard record level on a given tape. Next, with the input maintained constant, the frequency response was plotted over the range 10Kc/s to 40 c/s.

The overload test was performed at 500 c/s by increasing the input signal until the output showed a total harmonic distortion of 5%. The results of these tests are shown in the following tables:

Tape	Signal	Bias	Overload
A	3.0	3.5	+15dB
B	3.7	3.5	+14dB
C	4.5	4.0	+14dB
Z	4.1	3.5	+13dB

Frequency	DB			
	A	B	C	Z
10 Kc/s	-3.0	-2.4	-0.4	-1.3
7.5	-0.25	0	+1.0	+1.1
5.0	0	+0.8	+1.0	+1.2
3.0	-0.4	+0.6	+0.4	+0.7
2.0	-0.4	0	0	+0.2
1.0	0	0	0	0
500 c/s	+0.6	0	+0.4	+0.3
250	+0.6	0	+0.5	+0.3
120	0	-0.7	0	-0.2
60	-2.0	-2.0	-1.7	-1.7
40	-4.0	-4.0	-3.8	-4.0

I have put down the exact readings from the sample tapes, but it should be pointed out that batch to batch differences of plus or minus 1dB are common, and that bias will not stay put to better than about plus or minus 20% without special stabiliser circuits. Many more samples would have to be tested, and a mean response for each type calculated, before any one tape could be said to be better or worse than the others. All these tests really show is that Zonatape is in the same class as other top quality tapes, and that generally speaking it should be possible to interchange this tape with any of them without having to change the bias, signal input level, or playback gain. All tapes tested recorded a level 12dB above test tape level with negligible distortion.

Erase and Bias Noise

It is difficult to dissociate tape noise from bias waveform purity, but all tapes showed an erased and biased noise only 1.5 to 2dB above bulk erased tape noise on the test machine. An effort was made to measure "under signal" noise by recording a 15 c/s signal at full modulation, and then filtering out the low frequency recorded signal to leave only the modulation noise—the grin without the cat in fact—but all tapes gave almost exactly the same answer of 4dB above bulk erased tape noise. This at least proves that the Zonatape has no vices in this direction, but

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in any
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then—neither have the others. I do know for a fact that this test would have showed up the imperfections of some of the bad old tapes mentioned earlier.

And now for a few easily measured facts about the tape. The base is P.V.C. 1.5 thou. thick, and the oxide layer is .4 thou. The surface of the oxide layer is "micro polished" to reduce drop-outs and modulation noise. The tape winds evenly and shows no tendency to cup or curl, and the edge slitting on the sample examined was straight and smooth.

The tape is packaged in an original book-like container with a useful index on the inside of the front cover. Zonal make no spectacular claims about this tape; but, like a perfect mirror, it will reproduce almost exactly what is fed into it—no more and no less. With their many years of experience in the coating of ciné films for professional use Zonal have accumulated a vast amount of "know how" on the maintenance of a uniform product, and I have little doubt that this high quality will be sustained in the wide range of tapes soon to be marketed by them.

A. Tutchings.

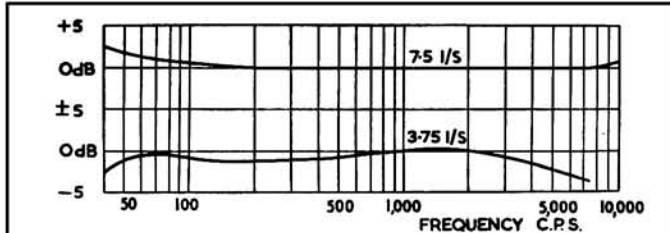
**HEATHKIT
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AMPLIFIER**



LIKE the Stern Type C amplifier reviewed last month, this record/replay amplifier is based on the well-known Mullard design, but, in this stereo version there are a few novel and interesting variations. The amplifiers and associated bias oscillators are completely separate units and the heater circuit of each amplifier is broken by a switch on the appropriate gain control so that either amplifier, or both together, may be switched on as desired. If the bias oscillators were able to run quite independently there would be trouble due to "beats" between the two high frequency signals. To prevent this the oscillators are synchronised by feeding the bias output of "B" channel to the grid of the oscillator valve of channel "A". When the frequencies of the channels are within about 20% of each other they pull into step and run at exactly the same frequency.

Another variation is the provision of a ganged three-way switch which allows the bias on the two heads to be changed in small steps to suit different tapes. The output sockets are tapped lower down the anode loads of the preamplifiers so that the sensitivity of the preamplifiers is slightly higher. No power supply was provided with this assembled kit so I ran it from a stabilised power supply with the H.T. set exactly to the specified 300 volts. The centre tap of the 6.3 volt heater circuit was earthed at the power unit, and under these conditions the hum level was approximately 15 millivolts on each channel. I found that a "humdinger" potentiometer on the heater line allowed the hum voltage to be reduced to less than 4 millivolts on each channel individually, and that a compromise position could be found which reduced the hum output of each channel to less than 7 millivolts.

Tape Deck: Messrs. Daystrom Ltd., the manufacturers of the Heathkit, kindly loaned us a Truvox Mk. 6 tape deck which is



the one specified for the stereo version of the preamplifier. I was particularly interested in testing the amplifier with the proper deck in view of the bias troubles encountered with the high inductance head with last month's kit.

Playback responses: Fig. 1 shows the playback responses from

EQUIPMENT REVIEWED—(continued)

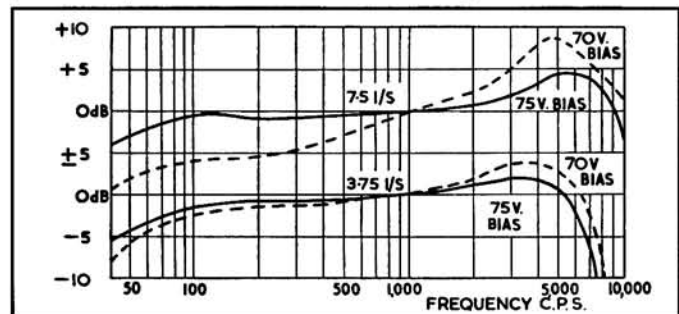
standard test tapes at 7½ and 3¾ i/s. The 7½ i/s response is absolutely flat from 10 Kc/s down to 120 c/s, and rises 2 dB at 40 c/s. The 3¾ playback response is almost equally smooth up to 3 Kc/s with a 4 dB roll off at 7.5 Kc/s, the top frequency on the tape. The playback level of each tape was .3 volts at the output socket. The lower track was checked and found to be within 1 dB of the top one over the whole range. As a matter of interest the azimuth adjustment of the stereo head was also identical on each channel. This is by no means the case with all stereo heads; occasionally a compromise setting must be found which balances the high frequency outputs of the two tracks.

Signal noise ratio: With the heads connected and the deck motors running the hum and noise output was between 3.5 and 4.0 millivolts; this is 38 dB below test tape level and 50 dB below peak recording level on the tape. It will be seen that the hum level with the motors running is slightly less than the amplifier hum mentioned above. This shows that some cancellation is taking place between the amplifier hum and that picked up by the heads, nevertheless reversing the mains connections to amplifier or deck only altered the hum by less than 3 dB, so the fortuitous cancellation effect is quite stable.

Recording tests: A fully modulated tape was placed on the deck and erased by switching to record. Erasure was complete and the erase and bias noise was within 3 dB of bulk erased tape noise—a tribute to the symmetrical waveform of the push-pull bias oscillator. The voltage across the erase head was exactly 200v, and the frequency 59 Kc/s. The bias voltage on the record heads was 75v on each channel with the bias switch on position 3. It fell to 70v and 65v on positions 2 and 1.

An overload test at 500 c/s showed slight distortion at 12 dB above test tape level indicating the need for more bias.

Frequency runs were next recorded at the two tape speeds provided by the Truvox deck at bias voltages of 75 and 70v at



each speed. The responses are shown in Fig. 2. It will be seen that the reduction of bias has quite a marked effect at the higher tape speed, but the difference is very slight at 3¾ i/s. The bump in the recorded response looked familiar and I remembered that I had obtained such a peak in last month's tests when endeavouring to raise the bias by increasing the value of the bias feed condenser. Examination of the bias feed circuits showed that C20 had already been increased from the specified 180pf to 300pf—presumably to raise the bias nearer optimum. Calculation showed that the 1,000 millihenry head would be tuned to 5 Kc/s by a shunt capacity of around 800pf.

It can be assumed that the self capacity of the head together with the lead and circuit capacities could easily total this figure, and that a reduction of the bias feed condenser would move the peak to a higher frequency. The oscillator matching instructions in the Heathkit manual give full details for altering the erase head tap on the oscillator coil secondary, but only mention a change of C20 for bias matching. This is in line with the Mullard instructions for the Oscillator coils Type WF1388 used in this kit. But the actual assembly instruction did mention that one side of C20 could be connected to any one of the three taps as required. I therefore connected the Grey lead from C20 to the White tap on the coil where a total bias voltage of 200v was available to feed the erase head. Tests indicated that 90 volts

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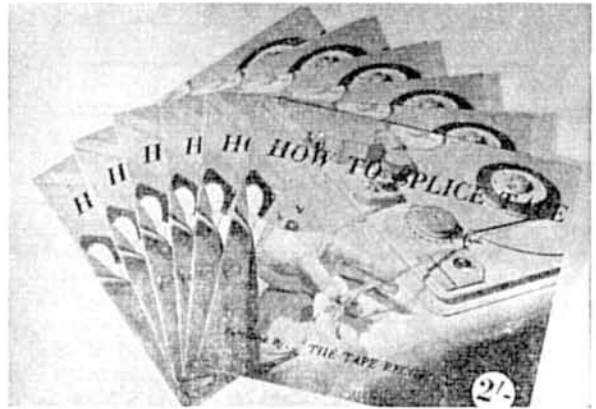
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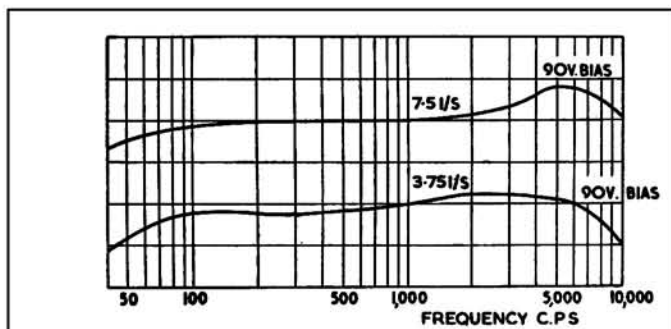
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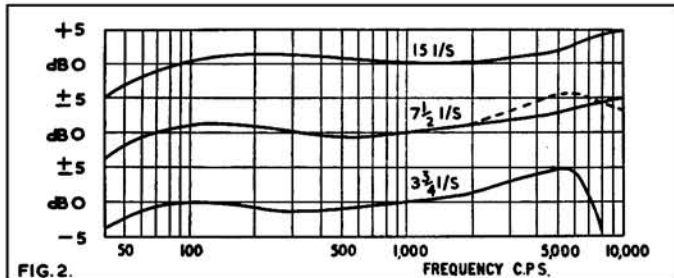
could be made available as bias by using a 250pf feed condenser. Further recording tests showed negligible distortion at peak recording level, indeed the level could be increased to nearly 15 dB above test tape level without distortion. Finally frequency responses were taken under these new conditions and these are shown in Fig. 3. A slight bump remains at around 6 Kc/s at 7½ i/s, but the 3½ i/s response is much improved. The recorded quality was now smooth and silky and altogether more satisfactory, with a slight extra fullness which is not indicated by the frequency responses.

Comment: With the modification detailed above the record and playback performance is satisfactory. I would like to see a preset adjustment to vary the sensitivity of the record level indicators so that peak recording level could be exactly matched to the tape. With the tape used for testing a level 12 dB above test tape level (3% distortion) was recorded with the magic eye beams about ¼ in. apart. Fully clashing the beams would have resulted in slight over recording. The Truvox deck is fitted with a stereo record-play head, but with only a top track erase head. It was probably meant originally for stereo play and mono record. If stereo recording is desired then the tape must be bulk erased or the bottom track erased by turning the reels over and erasing with the one and only erase head. A dummy load of around 80K (2 watt) must also be connected across the unused erase head socket to avoid bias unbalance during record. This is a well designed—and, of course, well constructed (by the Editor!)—unit which will provide mono or stereo record-play facilities for the highest of Hi-Fi installations.

A. Tutchings.

Correction and Apology

IN our review of the Stern tape pre-amplifier last month, we omitted the response curves of the unit, as measured by A. Tutchings. We print this diagram here, with our sincere apologies to everyone who was puzzled by the omission and in particular



to Stern Radio. The confusion originally arose due to a misunderstanding between ourselves and the manufacturer of the deck that was selected by us for review with the Stern Pre-amplifier. At the last minute, the deck manufacturer withdrew his permission to review the deck, other than with electronics of his own design. Fig. 2, as published, referred to this "unnamed" deck, and was left in by mistake. We repeat, "Sorry."

(Editor.)

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