

Amateur Tape Recording

AUDIO-VIDEO

July 1967 Vol 8 No 12 2/6



CREATIVE RECORDING FOR ACTUALITY DOCUMENTARY PROGRAMMES

TAPES RECORDED FOR YOU



3³/₄ I.P.S.

The Beatles

Sgt. Pepper's
Lonely Hearts
Club Band

**Parlophone
TA-PMC 7027**

The Hollies

Evolution

**Parlophone
TA-PMC 7022**

Vince Hill

Edelweiss

**Columbia
TA-SX 6141**

The Royal Guardsmen

Snoopy vs.
The Red Baron

**Stateside
TA-SL 10202**

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Editor: F. C. Judd, A.Inst.E. Assistant Editor: Moira Shippard. Advertisement Director: Lindsay Masters. Advertisement Manager: E. McKeown. Circulation Manager: David Hughes. Editorial, Advertising and Subscriptions: Amateur Tape Recording, Haymarket Press Ltd, 9 Harrow Road, London W2, Ambassador 3200. Amateur Tape Recording is published by Haymarket Press Ltd. © 1967 Printed by The Sidney Press Ltd, Bedford. Title registered at Stationers' Hall. Subscription Rates: 36s post paid UK, 42s overseas.

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EDITORIAL COMMENT

An exciting challenge to amateur tape recording enthusiasts

We quote from the news letter sent in by the *Federation of British Tape Recording Clubs* published elsewhere in this issue of *ATR* and which deals with Local Broadcasting and the amateur recordist. As this letter points out, it would be a miserable failure on the part of all recording enthusiasts if the challenge cannot be accepted. Brighton, Merseyside, Sheffield, Leicester, Nottingham, Stoke-on-Trent and Manchester are already listed as the first local stations and tape clubs in some of these areas are already 'on the ball'. The demand for recorded material, planned, produced and edited will not be insignificant.

This is the opportunity we have all been waiting for and the chance to prove that

amateurs can emulate the professionals. The local broadcasters mentioned above are only the first few, which means that the eventual demand may be almost nationwide. Could you produce an interesting three or four minute recorded programme, right now, for your local station? How quickly could you have a recorded report on a local event edited and ready for transmission? Could you successfully interview a local or visiting personality, remembering that interviewing calls for a technique all of its own? Could you produce a recording with sound quality that wouldn't cause the professionals at the local broadcasting station to raise their eyebrows?

At the moment we can only say 'be ready' but this doesn't mean just having your recording equipment in working order. Prac-

tise now, making the kind of recordings you think may be required and listen to them with a critical ear.

Remember that your audience may be pretty large and quite varied in its likes and dislikes and it will be critical as well.

FRONT COVER

This month we feature an *ATR* reader from Holland. He is Sergeant I. A. de Kramer of the Netherlands Royal Air Force. Our cover photograph shows him at the harbour in Den Helder interviewing a local fisherman, using the popular (in Holland) Uher 4000L Report portable recorder with a Sennheiser MD421 microphone.

INTRODUCTION TO TAPE RECORDING PART 3

This month — tape
speeds and tape tracks
by Gordon J. King

We left last month's article contemplating tape speed. The reasons why many professional machines run at higher tape speeds than semi-professional or domestic ones, in spite of the latter variety having extended treble response at the lower speeds, were also thoroughly discussed in the article. What, then, can the beginner learn from all this?

Well, first, the faster the tape passes through a recorder, the better the treble performance, other things being equal. Secondly, speed increase has no significant effect on bass-end performance, apart from what the inbuilt equalization may do. Thirdly, tapes that will need editing should always be made at the highest possible speed, even though the extra treble thus obtained may be of no interest. There are other, more technical aspects of tape speed, but these need not bother us right now. However, it would be instructive to look at the elementary reasons why better treble is delivered at the higher speeds and why bass is not unduly affected. Fig. 1 shows a recording/playback head laying down a half-track recording. The tape head is nothing more than a rather special electromagnet whose polepieces terminate at a very narrow gap across which a magnetic field develops when an electric current flows in the winding. Direct-current (dc) fed to this winding would create a fixed magnetic field across the gap, one side north pole and the other south, depending on the direction of current flow. In a tape recorder we avoid dc in the head since this can erase the higher frequencies and produce bad noise on replay. We feed to the winding instead a signal current which is a magnified replica of the current delivered by the microphone and/or other sound source. This is a very complex alternating-current (ac), having a pattern given by the exact nature of the sound picked up by the microphone. A good way of looking at this is to assume that the microphone is picking up a non-complex sound — a pure sound, in fact, from a tuning-fork. Let us suppose that we have a set of such forks embracing the whole of the musical spectrum and that we can easily cause any one of them to sound in front of the microphone connected to

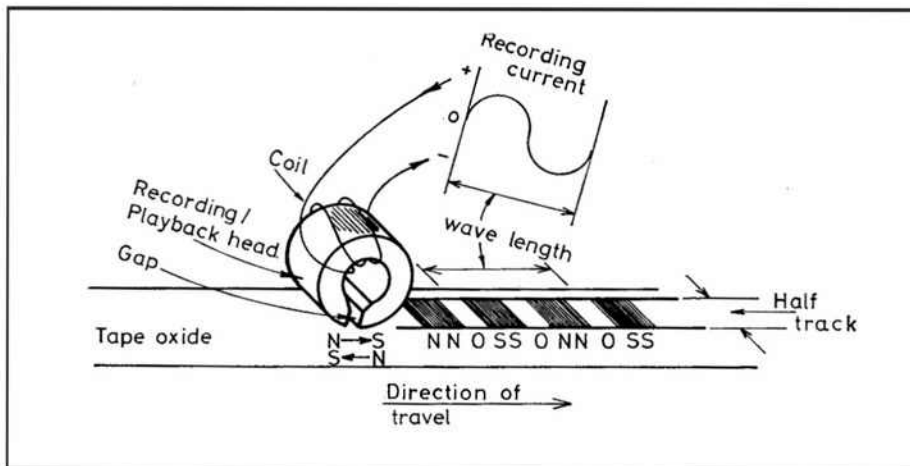


Fig. 1. Illustrating the elementary principles of tape recording.

our tape recorder.

With the recording level turned up, the current in the head, with the machine set to record, would be something like the wave going into the winding of the head, shown in Fig. 1. The frequency (Hz) is given by how many complete wavelengths of signal occur in one second. For instance, a tuning-fork sounding at middle C would produce 261 complete signal waves per second (i.e. 261Hz).

Note: The older term for frequency is cycles per second — cps. Ed.

It will be seen that the current is rising in a positive direction up to the peak of one half-cycle and in a negative direction up to the peak of the partnering half-cycle.

Magnetic Reversals

This means that the current in the winding goes through a total reversal during a complete cycle of signal, and this in turn causes a complete reversal of magnet field across the gap. Thus, for every complete cycle or wavelength of signal the magnetic field across the gap goes through a complete alternation.

The tape is moving past the gap, of course, while this is going on, and this results in the magnetic field changes across the gap being transferred permanently on to the tape oxide. Changes both in magnetic intensity and polarity are recorded in this way. On the peak of one half-cycle, therefore, maximum magnetism in one polarity occurs on the tape. The intensity of magnetism gradually diminishes as the tape moves past the head to zero, and then it gradually increases again to maximum in the opposite polarity. An attempt has been made in Fig. 1 to indicate the magnetic effect on the tape by shading. The wave shown starts at zero, rises positively and records a south pole. Then it falls to zero after the first half-cycle, rises negatively and records a north pole. After this it falls to zero again, thereby completing the full signal cycle or wavelength. One can just imagine from this the complexity of the magnetic pattern resulting from a complicated sound or a combination of complex sounds — a complete orchestra, for instance! It is not possible to see the magnetic patterns imparted to the tape, of course, although at one time there was a preparation available that could be applied to the tape to make visible the width of the recorded track, ensuring cor-

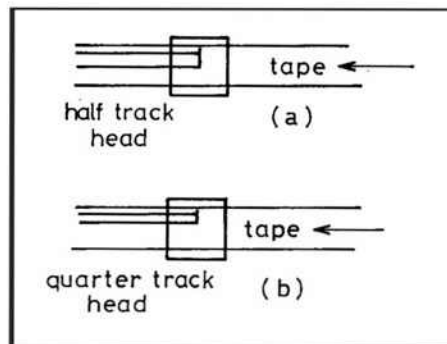


Fig. 2. Creating the tracks, half-track (a) and quarter-track (b).

rect head setting, but this would not show the separate wave patterns.

Clearly, the actual length of a recorded wavelength on the tape is governed by both the signal frequency and the tape speed. If the frequency remains constant and the tape speed is doubled, the length of the recorded wavelength on the tape is also doubled. The recorded wavelength is also made twice as long by halving the signal frequency. If the frequency is doubled, the recorded wavelength is made half the original length.

Disappearing Magnets

Now, at low and middle frequencies the recorded wavelength is always substantially greater than the width of the head gap, even at the lowest tape speed. As the frequency of the signal rises, however, the recorded wavelength becomes smaller and smaller until eventually it assumes proportions equal to the gap itself — which is extremely small. Magnets of such small dimensions, assuming they could be produced, would soon disappear from the tape because of the small distance between their north and south poles. This is called 'self-demagnetization' — a natural enemy of tape recording.

We can now see, then, that one way of keeping magnets corresponding to high frequency signals on the tape is to make the tape pass the head at greater speed. We can also see why tape speed does not unduly influence the recording of the lower frequencies. You may already know that a high-frequency (hf) bass signal is applied

to the winding of the recording head in addition to the recording signal. We shall not bother for a moment with the reasons for this, but it is worth noting at this juncture that this hf signal can also have the effect of demagnetizing the very high-frequency magnets applied to the tape by the recording signal. This is another enemy which, to some extent, has been combated by so-called cross-field recording, where the hf bias is applied in magnetic terms to the tape from a separate head. This has been dealt with in past issues of *ATR*.

Makers of recording tape have themselves been investigating the problem of disappearing magnets over the years and most tape now produced is of a type that holds on to the high frequency magnets far more efficiently than some of the early tape, or even recording wire, for that matter. The ability of magnetic tape to withstand demagnetization is called *coercivity*, and the latest tapes have a very *high coercivity*, a term that we have probably wondered about in tape literature. Nevertheless, there is a limit to the high frequency magnetism that even high coercivity tape can retain.

In practice, magnets of wavelength approaching the gap dimension of the recording head can be retained by the tape, but whether or not these are reproduced on playback depends greatly on the dimension of the playback head gap.

Replay Definition

Here the head will 'define' recorded signals whose half-wavelength is no smaller than the gap width. A complete change (from zero to maximum peak and back to zero) of magnetism has to occur across the gap for a corresponding signal current to occur in the head winding. Relative to tape speed, the playback head gap usually sets the limit to the treble performance of the machine, but since there is a practical limit to the smallness of the gap, the treble performance is influenced mostly by tape speed. By doubling the tape speed, other things being equal, we could expect to double the treble frequency reproduced, but this law rarely holds in practice because as the signal frequency in the playback head rises the electrical losses increase.

Various artifices are adopted to retain the treble response at domestic tape speeds, and one is treble boosting during recording and playback. Sadly, excessive treble boost brings in noise (hiss) which is one reason why the signal/noise performance is better on professional machines at the higher tape speeds, needing little or no boost, than on domestic ones running at lower speeds. Anyway, designs have improved so much over the last several years that a tape speed of $3\frac{3}{4}$ ips is now capable of remarkably good quality recording and reproduction. Within ± 2 dB, for instance, the Tandberg Series 12 recorder responds up to 10,000Hz (while giving useful output up to 12,000Hz). At $7\frac{1}{2}$ ips a useful output is obtained up to 20,000Hz and up to 7,000Hz at the lowest speed of $1\frac{1}{8}$ ips.

For hi-fi reproduction of music, a response up to about 20,000Hz is desirable, while good quality reproduction is possible up to about 12,000Hz. Anything below this would be mediocre reproduction, suitable for speech or low quality music. Of course, there is no point running at top tape speed if the signals being recorded fail to carry

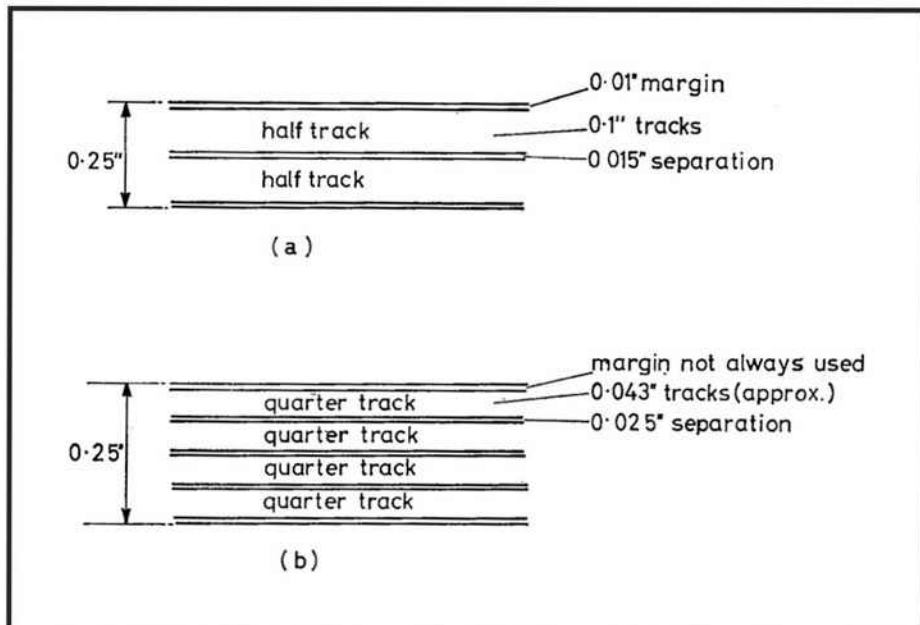


Fig. 3. Track standards and dimensions, half-track (a) and quarter-track (b).

information much above 8,000Hz, but for good microphone recording the top tape speed should always be used. Speech only can run at lower speeds, dictated by tape economy. Recording from the FM channel of a radio, for instance, should be done at the highest speed, but similar recording from the AM (medium- and long-wave) channel can be at a lower speed due to frequency cutting on this low-fi system. Dubbing from one tape to another or from disc to tape often demands the highest speed, if not from the quality at least from the noise aspect.

Tape Tracks

So much, then, for tape speed. Now let us look at tape tracks. Very early domestic machines recorded just a single track across the whole width of tape. Professional machines still adopt full-track recording for several reasons, one being ease of editing, a major function of the professional recordist. Our domestic machines, though, are designed to lay two or four tracks side-by-side, giving so-called half-track and quarter-track recordings respectively. The tracks do not exist on the tape in its virgin state, but are created by the recording head (or heads). Fig. 2 shows that the length of the gap and polepieces of the head gives the width dimension of the track, (a) half-track and (b) quarter-track. The track standards are shown in Fig. 3, (a) half-track and (b) quarter track, and tape recorder makers endeavour to design their machines and arrange the recording and replay heads on them so they create and replay these tracks as accurately as possible. It will be understood, of course, that if a composite recording/replay head is used on a machine, a tape made on that machine will be reproduced accurately by the same head. It is a very different matter, though, when one considers tape interchange, for unless the machine on which the tape recording is played corresponds track-wise to the machine which made the recording, poor quality reproduction or crosstalk between adjacent tracks would most likely occur. Hence the track standard.

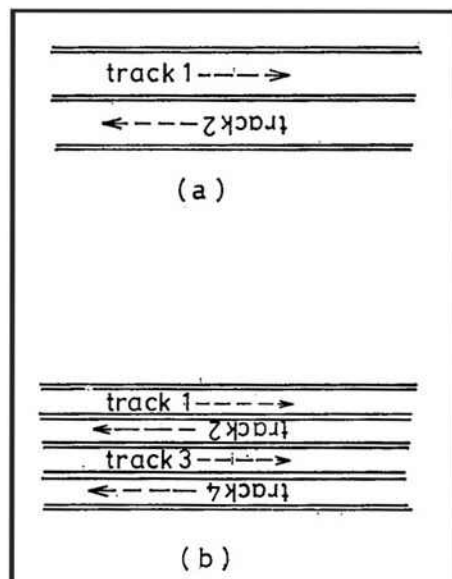


Fig. 4. Tracks defined, half-track (a) and quarter-track (b).

Later on in this series we shall be looking at stereo recording and replay, and then it will be shown that two tracks are needed for one stereo programme, and that these can be the two tracks of a half-track recording or two times two tracks of a quarter-track recording. For the moment, however, we shall not bother about this, but concentrate on track numbers and the disadvantages and/or advantages of the two systems. Fig. 4 defines half- and quarter-tracks at (a) and (b) respectively. Half-track recording uses a head with a single gap assembly and this is arranged to scan the top half of the tape, making track 1. The tape is then turned over so that the unscanned half is then treated, giving track 2. Quarter-track recording uses a head with two windings and gaps placed one above the other. The top gap of the head scans the first quarter of the tape, giving track 1. The bottom gap scans the third quarter section of the tape, giving track 3. The tape

continued on page 35

Brian Vaughton deals with

CREATIVE EDITING FOR ACTUALITY DOCUMENTARY PROGRAMMES

In my last article I discussed the various methods of interviewing for actuality documentary programmes. After you have obtained all the raw material you need, the time arrives to return from location work to the long hours of inside work – and the sifting, sorting, editing, and moulding of the programme into its final shape. The number of hours of recorded tape you obtain can naturally vary, both with the length of the proposed programme and the subject being tackled. For a 60 minute programme my average has usually been in the order of 12-15 hours-worth, but I do know of cases of producers collecting 60 hours-worth for a one-hour programme, of which only 25 minutes was used – the rest being music! This is obviously an extreme case of a full-time professional perfectionist – and hardly practical for the struggling, spare-time amateur. However, the example will serve to illustrate that there is really no definite yardstick to the amount of recording done.

First Stages in Editing

The first stage of the editing process is to get the 'feel' of all the material as a whole. This is best done by shutting oneself away in the quietest room of the house and religiously listening to every recorded tape – if possible in one or two sittings. Don't take any notes – just listen, and inwardly digest. After this long stint you will not only be full of programme, but ideas of shape and form will begin to emerge. The next step is to repeat the process, this time armed with pencil and paper and take brief notes. What I do is to play the tapes through again non-stop, making short references to the subject-matter being talked about. The third stage is to yet again repeat the process – but this time listening at length to each section of the tapes that your previous notes detailed as 'possible usable material'. Unless you are a shorthand expert there is no alternative but to write out in longhand all this 'p.u.m.' – making a careful note of the reel number and position on the tape, either by a stop-watch timing, or tape recorder indicator reference, so that any section can readily be found again as and when required. Stage four is to divide this written material into 'sequences' – for in the interviewing you will have doubtless asked many similar questions to several different people, and all the answers want to be grouped together. For in-

stance, in my programme on Canals I had sections to cover *History, Lockgate-making, Boat-building, Traditions and Customs, Horse Boats, Steam Boats, Decorative Painting, Birth and Death on the Boats, the Future of the Canals*, etc, etc. Such sequences lead you to stage five, and the writing of a draft script. Stage six brings you back to the tapes again, and the start of the editing process proper. What is normally done is to compile an actuality 'inserts' tape on one reel, an 'effects' tape on another, with narration and music being added live or from yet a further reel.

Whilst it is certainly possible to edit at 7½ ips – presuming this is your recording speed – it does make life much easier if you can copy all the material you require for the programme off the original recording tapes on to tape travelling at 15 ips. Not only does this give you twice as much space when cutting, but also allows your reels of virgin recording tape to remain uncut, so that they can be erased and used again for future occasion. The seventh stage requires a sharp, shielded razor blade, a chinagraph pencil, reels of jointing and leader tape, and a tape recorder with easy access to the replay head. I normally use a Mark 5 Brenell deck, which not only gives me 15 inches per second, but by threading the tape so as to bypass the drive-pulley the facility of 'inching' can be obtained – the to and fro motion of the tape across the head which is vitally necessary if accurate cutting is to be done.

Editing is an Art

I don't propose to go into a physical description of tape-editing, as I have no doubt that this subject will have already been well covered in previous issues of this magazine. May it suffice to say that, whilst the technique in itself is reasonably easy to learn, it is how you apply it that really distinguishes between the good and bad tape editor. To succeed one must possess a feeling for speech, and an inborn sense of rhythm and balance. To a degree good editors are born, not made – for who can teach a tone deaf person to sing in tune? But if the basic qualities are present it becomes a matter of practice, and of sharpening the perceptive senses. If you can watch an expert at work so much the better, for there are a few exponents who can bring the technique up



to such a pitch so as to almost approach an art-form.

Many people will ask: 'Why is it necessary to edit at all – why not just let people be heard exactly as they said things?' The short answer is, of course, time and intelligibility. In this respect the work can be likened to a newspaper editor, who brings you only the important points of the news and leaves out the inessentials. And you have only to listen to the majority of unedited interviews to realize the abundance of inessentials! Therefore, the basic aim of tape editing is to condense a long interview, extracting from it the very substance of what has been said. But this is a only a small part of what is involved as a whole for, whilst the draft script will act as a guide to your cutting activities, you will soon discover that on playing back your efforts it is impossible to edit from the written page alone. Often a cut that makes perfect sense on paper will turn out to be quite unacceptable in sound – because of a wrong voice inflexion or a change in the speed of delivery. Therefore, a golden rule to remember is never to throw away any cut-out tape until you have made the join, replayed it, and found it to your liking.

It will be recalled that, in interviewing for actuality programmes, the questions to speakers were put on the assumption they would be cut out in the editing. In now doing this it naturally becomes necessary to join up your speaker's answers, and those of others, so that an uninterrupted flow of actuality results – giving the impression that the speakers are talking direct to the listener, and not through any intermediary. To gain this end it will be necessary for the editor to change the order of sentences, and erase and add words out of the context they were given, to suit his own purpose. In fact, he will become a language-manipulator. The moment the editor starts to work in this way he takes on very considerable responsibility – and anything he does must be for the best motives. You may recall the considerable furore that was caused a few months ago over a television programme about the Police. In this case it was filmed interviews that, when edited and placed out of context, caused the speakers to complain of being misrepresented. Exactly the same conditions can prevail in edited sound programmes where it is quite easy with a few



The EMI LA portable tape recorder being used by a television newsreel camera crew covering the voyage of Sir Francis Chichester round Cape Horn in Gypsy Moth IV. (photo by courtesy of EMI)

cuts here and a join or two there, to gravely distort what was really said – such are some of the temptations to be avoided.

Some Hints on Good Editing

Other pitfalls are to edit a piece so that a person speaks for two minutes without taking a single breath! If necessary, both breaths and pauses can be added from unused sections of the speaker's tape to ensure a natural delivery is maintained. This brings up the question of excessive cutting, and the excising of every single flaw in a person's speech – pauses, coughs, stutters, sniffs, and those well-known phrases, 'Well I' or 'You see', etc. In part these imperfections are the very essence of character in speech, and whilst those that seemingly impede the flow of clear speech must rightly go, the editor must discriminate carefully so as to avoid ending up with nothing better than 'Dalek' type utterances. I think the secret of doing this correctly is to 'so immerse yourself in the actuality that you literally live with it, and then mistakes in editing will readily show themselves. You will think to yourself, 'Mr A would never say it like that – the "you know" I've just cut out from the end of that sentence will have to go back in!'

When I edit I also find myself remembering the actual person involved, and in a sense you are manipulating a living person – you have him or her literally under the power of your razor blade and jointing tape. Integrity is a word that must be uppermost in your mind. At least none of the people I have cut to ribbons has ever complained yet. Indeed, one delightful old lady even

wrote to congratulate me on making her sound more cheerful than she really was at the time of the recording. She happened to be an absolutely vital part of the programme, but unfortunately was in very poor health. Although the material she gave was moving in content her delivery was painfully slow – and, as it stood, quite unusable. The only answer was to speed up her rate of delivery by shortening the time lapse between virtually every other word. I think it took me some 5 hours to do less than 2 minutes of speech. Over-fussy, you may think – but the end product, and the old lady's reaction, made the effort well worthwhile.

The Final Recording

As the actuality tape 'inserts' are compiled it is necessary to splice in leader tape whenever narration, sound effects, or music, etc, are to be brought in. In the final 'mixing' of the programme it is necessary to have three tape machines and mixer-unit available. Machine 1 will replay the actuality inserts tape, machine 2 the effects tape, music, pre-recorded narration, etc, and, with an intermediate mixing facility, machine 3 will record the overall result. It is common knowledge that each time you 'copy' off tape you lose quality. Therefore, it is a good idea to physically use the actuality tape on machine 1, joining it to the programme tape on machine 3 whenever there is no second source being added at the same time. For instance, presume that your actuality inserts tape is approaching the point when music will feature in the programme. To achieve a smooth 'mix' you will probably start gradually fading in the music

on machine 2 some 10-15 seconds before the speech actually finishes. At this point machine 1 is stopped on the short length of leader tape, and the music on machine 2 is brought up to full recording level for the required length of time. The music is then slowly faded as machine 1 is started again bringing in the next section of actuality speech, with the music finally disappearing 10-15 seconds onwards. As soon as the music has gone stop all three machines. Replay the music 'mix' on machine 3 and, at a suitable point after the music has disappeared, and speech only is apparent, cut the tape. Then cut the tape at exactly the same point on your actuality inserts reel on machine 1, join it to the programme tape on machine 3, and wind on the full length of the next actuality piece until another 'mix' is required, when the process can be repeated as before. This will ensure that you don't lose quality by unnecessary 'copy' recording.

When the programme tape is finished, further replaying will probably reveal other points where cuts will improve the overall presentation. Remember – when in doubt 'cut'. A final copy recorded on to virgin tape will bring your efforts to completion and 'efforts' will certainly be the operative word for anybody embarking on work of this nature. As a reward you will have gained an expert's insight into your chosen subject, met and talked with a host of interesting people and, by using your own creative imagination, assembled and presented the story they tell in all the vivid, real-life immediacy that actuality work offers both its compilers and listeners.

ON TEST GRUNDIG TK125

by Peter Knight



Fig. 1. General view of the TK125 with lid removed.

This Grundig newcomer is a mains-powered, two-track transportable with auto recording level control facilities. It is single-speed at $3\frac{1}{2}$ ips and caters for spools up to $5\frac{1}{2}$ inches in diameter. It will hold a special interest to those who still prefer valves, for it breaks the trend by employing valves instead of transistors in a circuit that is simple yet highly efficient in all aspects. Fig. 1 shows the clean top-panel layout. An interesting feature is the single functions control instead of the now more usual press-key switching – again breaking the trend. This control is located on the extreme right of the front panel. Directly above is a four-digit tape position indicator with press-to-zero button, while on the other side are two edge-type controls giving *replay volume* (and recording-level on manual) and *tone*. The former operates the mains on/off switch and the latter the internal loudspeaker on/off switch.

The single knob to the right of the edge-type controls can be both depressed and rotated. Its depression changes the circuits from replay to record, while its rotary position when depressed selects manual or auto level control. Two auto positions provide speech and music time-constants and one of the two manual positions is for 'trick' recordings (i.e., superimposition). When the knob is depressed in that position the machine records with a muted erase head. This allows a further recording to be made on an already recorded tape. The recording selector control knob fails to lock into position when depressed, and locking can only be achieved when the functions control knob is set to the record (or pause) position. This represents an effective safety factor, avoiding accidental erasure of a tape record.

The functions control knob has positions for *start* (on both record and playback), *stop*, *pause*, *fast rewind* and *fast forward wind*. When turning the control to the stop position after making a recording, the recording selector knob automatically jumps up from its depressed position and switches the circuits back to the playback mode. In the

pause position, however, the circuits remain in the record or playback mode, according to the prior selection. This is useful for it allows the recording level (on manual) to be established accurately without the tape running.

The recording level indicator is a magic-eye (valve type EM87) and is located conveniently in the centre of the plastic covering over the head section of the control panel. This produces two ribbons of light moving towards the centre of the indicator with increasing recording level. The indicator comes into operation only when the machine is in the record mode, but functions on both manual and auto. It produces no illumination at all in the playback mode. The position selected by the functions control knob is illuminated from a small bulb beneath. This shows that the machine is connected to the mains supply and switched on.

The case of the machine is made of plastic, dark grey with light-grey loudspeaker grille and top cover. The control panel is polished silver metal and the control knobs and front carrying handle are also trimmed in a like manner. As the photograph shows, the carrying handle can be folded under the machine when not in use. The approximate overall dimensions are $15\frac{1}{2} \times 11\frac{1}{2} \times 7$ inches and the weight $18\frac{1}{2}$ lb. A compartment beneath the main cabinet is designed to accommodate the mains lead and plug when not in use and also the microphone. Signal inputs and outputs are at the top left-hand corner and at the rear of the cabinet.

Signals in and out

The DIN socket system is used throughout. The main high impedance input and output socket is that located at the top of the cabinet. This has an input sensitivity of 2mV (100mV maximum) across 1.5 ohms and an output of 500mV across 15,000 ohms. The DIN sockets at the rear are for extension loudspeaker and monitor headphones. The loudspeaker socket is a two-way type with a switch, allowing the internal loud-

speaker to be operated with the extension when the DIN plug is inserted one way, while cutting out the internal loudspeaker while operating only the extension with the plug inserted the other way. It is not possible to employ the internal loudspeaker for monitoring while a recording is being made. This monitoring facility is provided only for headphones at the socket just mentioned. It is interesting to note that the internal loudspeaker on/off switch, brought into operation by the tone control, works by shorting the secondary of the output transformer. In the 'off' position, therefore, the output stage is not devoid of a load.

The Circuit

The circuit uses four valves plus the magic eye recording-level indicator and three selenium rectifiers. A full-wave selenium bridge unit is employed for h.t. rectification, and the isolated mains transformer is composed of the windings on the drive motor. The core of the transformer represents the field of the motor in which the rotor spins. The primary winding (i.e., the main motor field winding) can be switched for nominal supplies of 115V and 230V at 50Hz. 60Hz operation is possible by changing the drive ratio from the motor. A kit is available for this adjustment, but would not interest users in Great Britain where the supply is standardized at 50Hz.

There are two secondary windings, one for h.t. (to the bridge rectifier) and the other for the heaters of the valves and pilot lamp. The heaters are not earthed direct, but a 1Kohm hum-dinger is connected across the h.t. supply with its slider earthed. This is adjusted for optimum heater supply balance, signified by the least replay hum at full gain. The first amplifier valve is a low-noise EF86 pentode, working on both replay and record. This is followed by a variable-mu EF83 pentode, which is the controlling valve for the auto recording level. The final valve in the amplifier section is an ECL86, the pentode as replay output and the triode as replay driver and record output.

The two triode sections of an ECC81 pro-

duce the control potential for the variable-mu EF83 on auto. These are connected in cascade with the final one arranged as a cathode-follower. They pick up signals from the output of the recording amplifier (the ECL86 triode), and the cathode of the second drives the rectifier which translates the signal into the dc control potential. The low impedance of the cathode-follower output ensures a very rapid attack, while the decay is provided by the discharging of the rectifier reservoir capacitor through resistors. The characteristics of this circuit are switchable for speech or music, as already intimated. The dc control potential is applied to the control grid of the EF83 in the usual automatic gain-control manner. The EM87 recording-level magic-eye valve also receives signals from the recording output valve. The signals are first rectified (peak rectifier) and then tapped from a potentiometer (preset) to give full deflection of the light ribbons just before tape saturation. The preset allows the indicated level to be adjusted to suit the tape and hf bias parameters. The recording and erase hf signal (bias) is generated by the pentode of the ECL86 when the circuit is switched to record. This valve is not used for signals under this condition and switches bring in an oscillator coil in place of the output transformer. The resulting hf signal due to feedback from anode to grid of the valve is fed to the erase head (via the 'trick' switch - see earlier text) and to the record head, the latter through a preset capacitor to allow bias current adjustment.

On Test

The machine was used under ordinary domestic conditions for several weeks and was found to perform adequately in all ways. The high impedance, low-level input makes it possible to connect a ceramic pick-up direct to the socket without equalization. This produces very good quality dubbings from disc to tape with very little trouble and with only a ceramic-cartridge pick-up and gram motor. Equalization would, of course, be necessary with a magnetic cartridge, and the load would also have to be dropped to about 50,000 ohms. The torpedo-shaped, high impedance microphone, supplied with a wire stand with the machine, gives full recording level on manual with the level control set to position six and at normal speech level about three feet from the microphone. On auto, great sensitivity is achieved, for then the recording amplifier is working at full gain on very

weak inputs, the sensitivity falling as the signal input increases. With the microphone set up in the middle of a room about 15 x 12 ft, excellent recording intelligibility from a discussion group seated round the walls of the room was secured with the recorder operating in the 'auto' position.

A big advantage of a valved first stage is the ability of handling a wide-range signal input. Radio signals rising to 100mV were applied to the input socket (in place of the microphone) and with the level control turned well down (on manual) virtually no recording overload distortion was discerned. This by feeding straight into the socket without attenuation. In the auto (music) position with the radio input at the same level there was no tendency for tape saturation, but signals reaching 200mV introduced a fairly high degree of second-harmonic distortion, possibly caused by the heavy control bias applied to the EF83, and the resulting non-linearity. At normal inputs, however, up to 100mV, distortion from this control source was low and there was hardly a suspicion of signal compression. The good attack performance of the auto control, due to the low impedance feed from the cathode-follower to the rectifier, makes it virtually impossible to 'hear' the action of the auto circuits. This sort of performance is difficult to produce in transistor circuits, and although it can be achieved it is more expensive than the single control-valve system described.

The tape supplied with the machine was recorded with a constant 1,000Hz tone to full level as indicated by the magic-eye, and this was then played back with a 5 ohm load across the extension loudspeaker socket with the internal loudspeaker switched off. The signal power across the load was read on a wattmeter and monitored on an oscilloscope, and the replay volume control was advanced until the commencement of waveform clipping. The power at this point was found to be 1.25 watts rms.

Signals from an audio generator were applied, correctly terminated, to the input and then swept over the radio spectrum with the machine switched to manual record. The input signal level was kept constant and the deflection on the magic-eye level indicator noted. Peak occurred at approximately 11.5Hz, indicating treble-boost focused on that frequency in the recording channel. The recording level control (manual operation) was then set at 11.5Hz for full recording indication on the magic-eye,

and this setting was used to make a series of frequency (test-tone) recordings on the tape at constant input voltage over the entire audio spectrum. The tape was then played back while the output power was read across a 5 ohm load in place of the loudspeaker and while the signal waveform was monitored. The replay level control was set to give 1 watt at 1,000Hz, and Fig. 2 gives the resulting power response curve based on 1 watt at 1,000Hz.

The process with the tape on replay was repeated but this time the signal voltage across the high impedance DIN output socket was monitored and the frequency response curve in Fig. 3 was obtained. Note here that 0dB is referred to 140mV and this output was established initially at 1,000Hz. While the power response curve may appear to have startling undulations, the lf power increase works out only to about 1.5dB and the hf decrease about the same amount, relative to 1,000Hz. In Fig. 3 we are dealing with voltage ratio instead of power ratio, but from about 40Hz to 10,000Hz the response is good for a machine of such simplicity.

The auto recording level control was appraised by applying a 1,000Hz input and turning up the signal until the magic-eye just indicated full recording level. A section of tape was then recorded with that signal. The input was next advanced by 20dB and a second section of tape recorded. The tape was then played back and the waveform on both sections closely examined. An increase in distortion amounting to about 10% was observed on the section tape section. This was thought to be very good, having in mind that a 20dB signal increase (voltage-wise) represents a ten-times increase in signal input.

This is certainly a machine that can be thoroughly recommended for the beginner and for the person who requires the maximum of flexibility with the minimum of complexity. It is not hi-fi, of course - it is not meant to be, but it can, nevertheless, create very pleasant sounds.

Maker's Specifications

Mains input: 115V and 230V at 50Hz. Power consumption: 45W approx. Tape speed: 3½ ips only. Wow and flutter: less than 0.2%. Frequency range: 40-12,500Hz. Signal/noise ratio: Better than 50dB. Dynamic range: Better than 48dB (about 200 to 1). Max. spool size: 5½ in. Fast wind time: About 220S. Loudspeaker: 6 x 4 inch elliptical. Power output: 2.5W across 5 ohms.

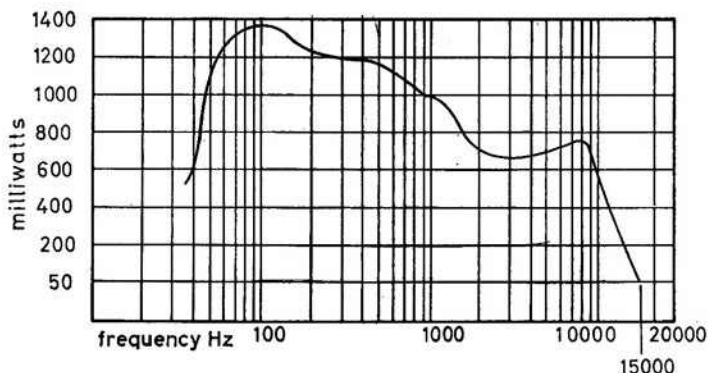


Fig. 2. Power response curve (see text).

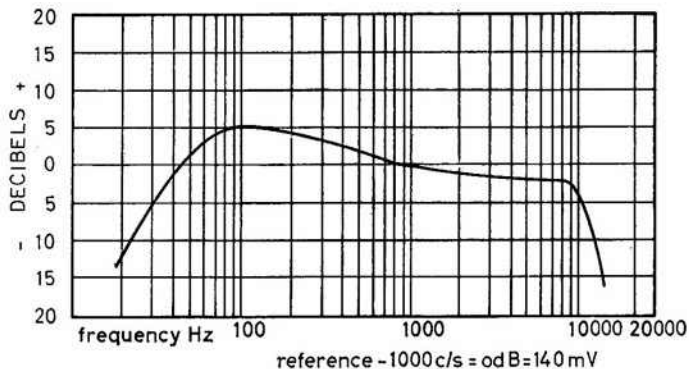
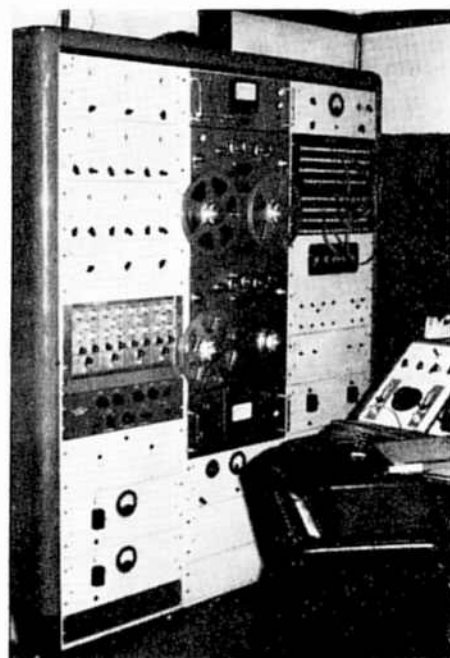


Fig. 3. Frequency response curve (see text).

THE PROFESSIONAL AT WORK

A day—or a night—in the life of a recording engineer

by G. W. Chevin



Studio control room (Advision Sound Studios Ltd).

A recording engineer is offered a wider sphere of action than one might imagine. His duties range from re-editing the latest cat food commercial to recording this week's No. 1 pop group. The procedure of the latter is the subject of this article.

The pop groups are usually long-haired invaders from the North of England who invariably bring their 'op-art' clothing as well as their music. But this does not deter a dedicated engineer. When the components of the 'line-up' are known (normally two guitars, bass and lead, drums and piano) the separation screens, whose function is to prevent too much sound from the drums reaching the microphone, are placed around the lead guitar. The remainder of the instruments are then positioned in the studio. This method is generally recognized as 'good separation'—an essential factor in high quality recording. The type and number of microphones to be employed is decided by the engineer who, it must be stressed, uses his own discretion as to their positioning. The drums are usually the most difficult, so the snare drum and high-hat, in most cases, are closely microphoned, as are the bass and lead guitar loudspeakers. A microphone may also be used for the tom-tom and cymbals, and if that extra 'thudding' effect is required, a separate microphone is provided for the bass drum. The piano is part of the studio furniture and

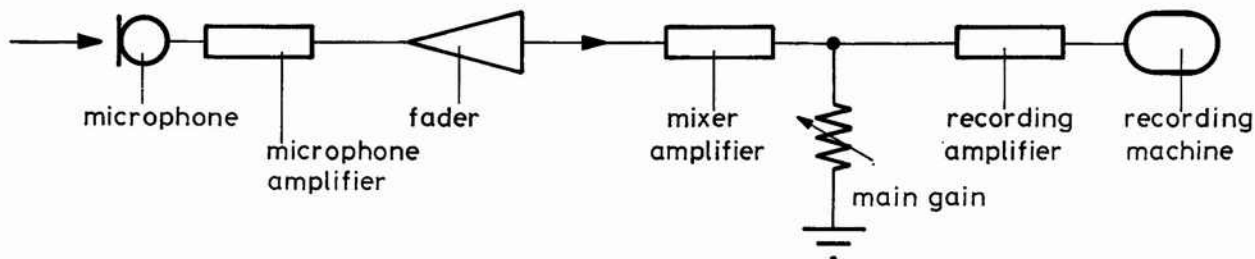
the engineer knows by experience the most suitable allocation for its microphone.

When the positioning is resolved, the microphones are connected (through power supplies if they are of the condenser type) to microphone amplifiers. The passage of signal to the tape machine is illustrated in Fig. 1. The microphone amplifier has a stepped gain which is produced by introducing maximum negative feedback at its lowest gain and vice versa. The output is then fed into a fader which attenuates the signal like a potentiometer, but with a constant impedance for any value of resistance; no electrical noise is present. Bridged T or ladder type faders are widely used. Thus the level of each instrument is controlled by a separate microphone amplifier and fader. The fader output is then connected to a mixer amplifier which mixes all the signals and feeds them into a recording amplifier which is usually an integral part of the tape recorder.

When the formalities have been accomplished, the group are free to practise their repertoire. Meanwhile, the engineer chooses a specific instrument, e.g. bass guitar, and 'patches in' an equalizer which bends the frequencies of the incoming signal at pre-selected points in the audio spectrum; for example, a 10dB boost at 100Hz may supplement the bass guitar with a fuller, rounder sound, whilst attenuating it at 3000Hz to

suppress noise from the amplifier. It might also be necessary to 'limit' the bass guitar by 'patching in' a limiter which controls the peaks of a signal, as shown in Fig. 2, and restricts the sound to a predetermined level. If a guitar is limited heavily it will produce a thud or clicking which is sometimes intentionally mixed in with the overall sound. Having convinced himself and the producer that the sound is now greatly improved, the engineer turns his attentions to another instrument, e.g. the bass drum. He may feel that the sound is too open and no amount of equalization will rectify this, in which case the bass drum is damped with a blanket over the front skin. The sound may also be compressed to give it power and attack. NB: It is not always necessary to compress or equalize sounds—this is also left to the engineer's discretion. The compressor is introduced into the circuit in the same way as a limiter. A compressor squashes the dynamic range which is the amplitude between the loudest and softest sounds of the signal measured in decibels. Compression is measured as a ratio; e.g. a compression of 20 to 10 signifies that for a 20dB rise in level at the input, the output will only rise 10dB.

On standard studio mixers, it is usual to have Baxandall tone controls, for treble lift and cut, as well as bass lift and cut. When the sounds of each instrument have been balan-



ced they are 'split-up'. This means they are switched (or patched) on to separate tracks of a four-track machine, as shown in Fig. 3 (not to be confused with a domestic four-track machine). A professional four-track machine uses $\frac{1}{2}$ or 1 inch wide tape with all four tracks recorded in the same direction – left to right. A four-track domestic machine uses $\frac{1}{4}$ inch wide tape and quarter-track heads, with tracks 1 and 3 on one half of the tape and 2 and 4 on the other. With four tracks each musical instrument can be recorded on a separate track as follows:

- Track 1 – Bass Guitar
- Track 2 – Lead Guitar
- Track 3 – Piano
- Track 4 – Bass Drum, Snare, High-hat and Tom-tom

This is advantageous, because the relative sound balance of each instrument may be altered after recording. With four tracks it is necessary to employ four monitor loudspeakers to ensure that each track is recorded. It is still possible to re-equalize the signals after they have been recorded and to increase the bass or treble.

Reverberation

There are two basic sources of reverberation which are the *reverb chamber* and the *echo plate*. Reverberation and echo are not synonymous, i.e. echo or flutter echo is a repetitive sound, whilst reverberation, or musical echo, increases the duration of the signals so as to create the impression that the performers are in a large auditorium. Hence when we speak of an echo plate we are still referring to a musical echo. Studio mixers have controls for reverberation called *echo send* and *echo return*. Each fader has its own 'echo send' control and a group of faders an overall 'echo return'. The arrangement is shown in Fig. 4.

A reverb chamber functions in this way: a sample of the main sound (controlled by the 'echo send' potentiometer) is fed to a monitor in the reverb chamber which is an irregular-shaped room with very smooth walls which is very 'live'. The sound is reflected from the walls and is delayed before it reaches the microphone at the other end. The output from this is fed into the main signal source by the 'echo return' potentiometer and so adds reverberation to the original sound. A simple echo plate operates as follows (see Fig. 5). A sample of the main sound is fed into the drive unit of a loudspeaker mechanically connected to a large thin metal sheet. This vibrates in sympathy with the sound and the vibrations are detected by a sensitive pick-up, the output from this being connected into the main sound source. The vibrations are controlled by variable damping remotely activated by servo-motors which control the echo delay time, usually between $\frac{1}{2}$ and 5 seconds. An echo plate is better than a reverberation chamber as the echo delay may be externally controlled.

Now, back to our pop group. Once the appropriate amount of reverberation and the correct recording level for each track has been found, the backing track is recorded. This is usually done in three or four takes and after playback the master 'take' is chosen. It may be necessary to edit between 'takes' and this can be rather complicated. Eventually the time comes when the four-track master has to be dubbed on to one track, as shown in Fig. 6. Since the two guitars and piano are on separate tracks it is possible to

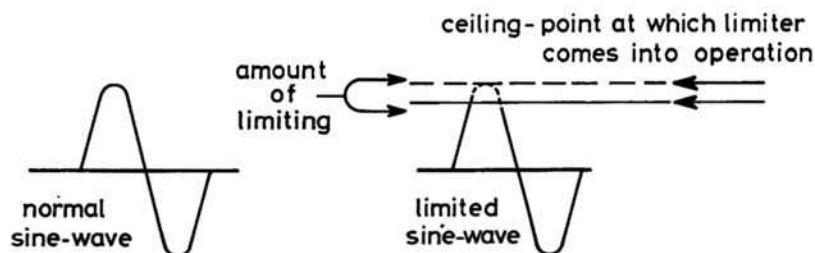


Fig. 2. Signal limiting.

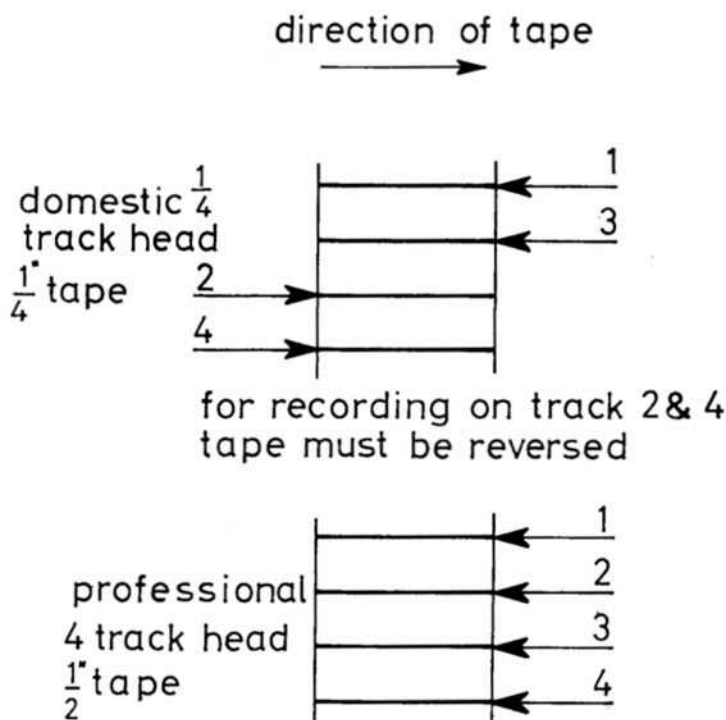


Fig. 3. Four-track operation on professional recorders is shown in lower diagram.

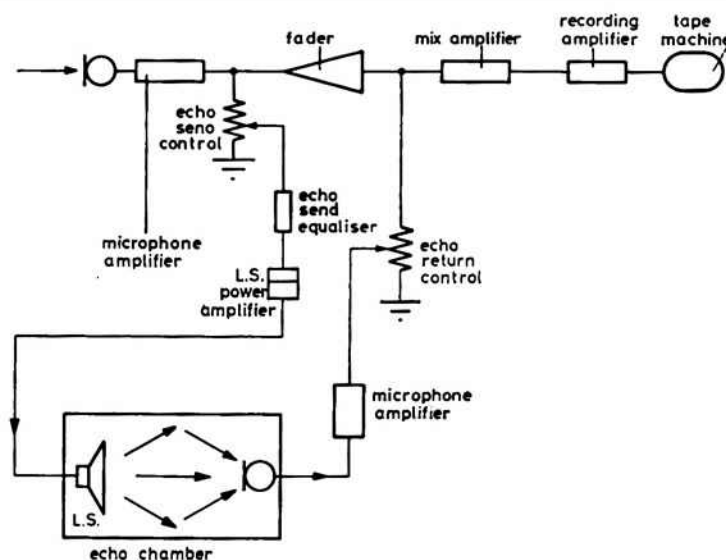


Fig. 4. The echo or reverberation chamber system.

THE PROFESSIONAL AT WORK

continued



The author Gerald Chevin at work sound balancing.

re-equalize them and even add reverberation if necessary. The drums may also be re-equalized so each track will be switched on to a separate fader. This final 15 ips recording of the backing is now transferred to track 1 of the four-track tape machine ready for the addition of vocals on the other three tracks.

The leading vocalist is now located in the studio and the backing track is played to him or her through headphones. When the voice has been *equalized* and the correct level obtained, track one is switched to *sync*, which means that the backing track is replayed from a 'record' head so that the voice and backing will be synchronized. As soon as the first vocal has been recorded, track 1 and track 2 can be played back and the vocalist can double track his voice if necessary on track 3. Backing vocals are recorded on track 4.

Now comes the final mix of the backing track and voices, with reverberation if necessary. From this a 15 ips monophonic master tape is recorded which is played on the studio monitor loudspeaker and on a domestic type speaker to ensure that the mix is suitable for any audio system, i.e. that the vocal is audible and the backing has sufficient bass and treble. The recording session, which probably commenced about 8 pm (a better atmosphere is created at night), is, after eight long hours, almost over. Copies are made on acetate discs and given to the producer and the group so that they may listen at leisure to the final product of their efforts. After a week or so and when everyone is satisfied, a master disc is cut and sent to the processing plant where pressings are made for distribution to the record shops. Within a few weeks the record may have soared to the top of the charts and the artists may have found fame and fortune, but the recording engineer? Well, he's recording another pop group.

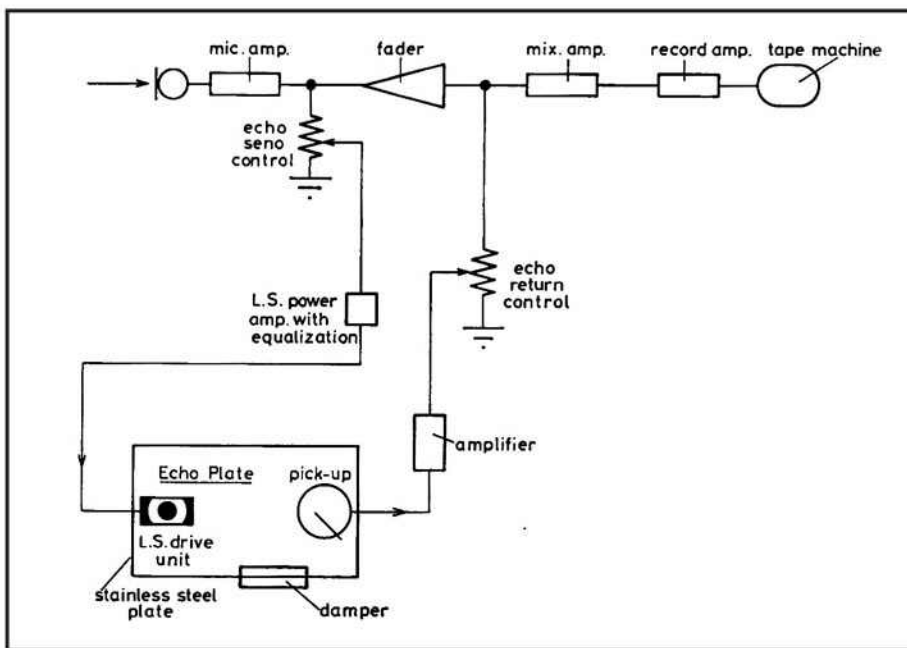


Fig. 5. The echo plate system for introducing reverberation.

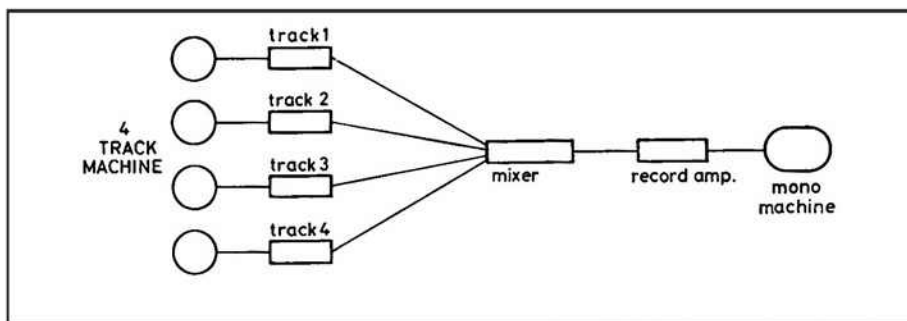


Fig. 6. The four-track backing recording is copied on to one track.

SOUND SCENE

BBC Programme Effects Generator

The BBC Programme Effects Generator enables recorded sound effects and other short programme inserts to be reproduced accurately on cue and to be repeated in rapid succession. It consists of a number of tape reproducer modules of novel design, using lengths of quarter inch magnetic tape, each sufficient for a duration of thirty seconds, in cassettes of about the same size as a matchbox. The capacity of the generator is virtually unlimited, being restricted only by the number of cassettes available. An indefinite number of reproducing channels may be combined but four or six are enough for most purposes. Facilities are incorporated to enable new effects recordings to be made rapidly, either from new programme material or by recording into a new cassette, combinations of effects derived from the replay of existing cassettes. The main unit of the generator is a four-channel combination built into a cabinet containing common amplifier and power supply sections (Fig. 1). Auxiliary units containing two or more channels can be connected to the main unit to increase the number of channels available. All reproducing modules are identical and can be used in any of the channel receptacles in the main and auxiliary units.

A channel module is prepared for operation by inserting a cassette into it. When the cassette is pressed down it locks in place and the tape is drawn out and automatically laced into the stand-by or ready-to-run position. This operation takes about one and a half seconds and when it is completed the lamp in the green run button illuminates. On pressing the button, reproduction starts instantly from the beginning of the recording in the cassette. The replay fader enables the reproduced level to be pre-set to the required value or to be varied smoothly during reproduction.

BBC VHF Stereophonic Transmissions

Work is in hand to extend the stereophonic transmission, at present radiated from Wrotham, Swingate and Brighton, to Sutton Coldfield and Holme Moss and certain relay stations fed from them, early in 1968. In places where the field strength is low, increased background noise may be heard on stereophonic programmes; improvements to the receiving aerial should enable the noise level to be reduced.

Bang & Olufsen - a New Loudspeaker (Fig. 2)

Bang & Olufsen announce the release of a newly designed loudspeaker. Called the Beovox 1500, the loudspeaker replaces the type 'S' and follows the B & O pressure chamber principle. It is of medium size, suitable for bookshelves or free standing. Capable of handling 15 watts rms the Beovox 1500 has three drive units with a crossover frequency of 800Hz and 5KHz. The mid-frequency unit

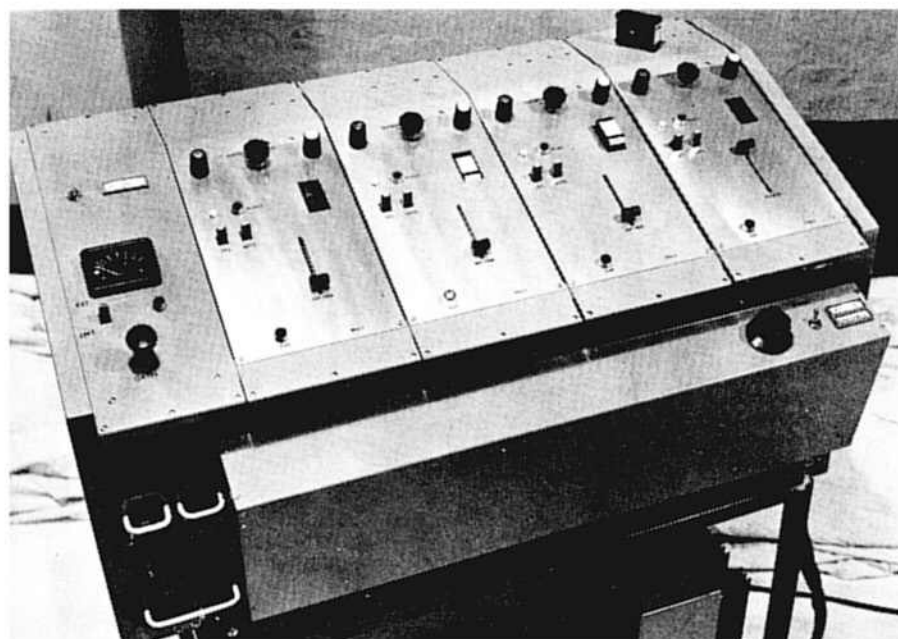


Fig. 1. BBC Programme Effects Generator.

is fitted with a five-position variable attenuator for adjusting the loudspeaker to suit any domestic acoustic conditions. The Beovox 1500 is available in teak or rosewood and the recommended retail price is 25 guineas.

New Ultra Tape Recorder

Ultra announce the new model 6216 shown in Fig. 3. It has sockets for microphone, radio and pick-up inputs, a high impedance output (500mV into 22Kohm) and an external 3 ohm speaker. An accessory socket provides facilities for foot-switched remote pause control, an auxiliary dc power supply outlet, monitoring with high impedance 'phones and access to the unselected track head. The front of the cabinet is veneered in natural teak whilst the sides and back are of black pvc with a leathergrain effect. The detachable lid

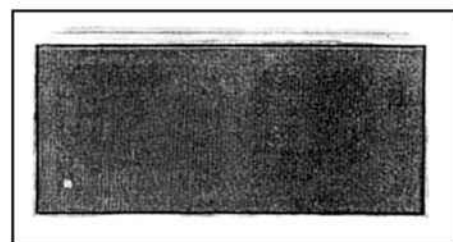


Fig. 2. B & O Beovox 1500 Loudspeaker.

is moulded in transparent 'smoke grey' dia-kon. Retail price of the model 6216 is 35 guineas and it is a two-speed recorder for four-track operation. Spool size is 5½ inches and accessories such as microphone and tape are included.

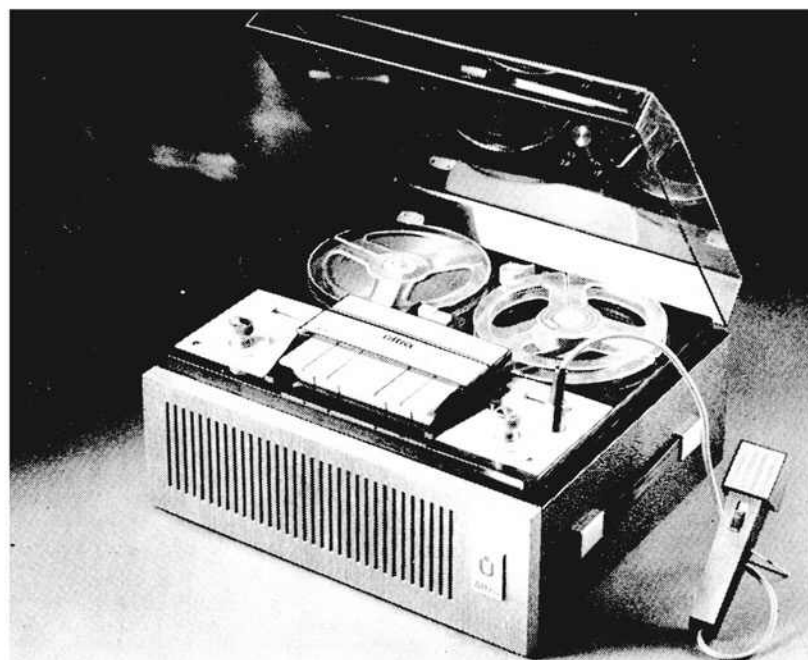


Fig. 3. The new Ultra 6216 tape recorder.

Gordon J. King and
Susan King relate the
experience of

LEARNING WHILE ASLEEP



Fig. 1. The equipment of Psychology Tapes Limited (and Symphony Amplifiers Limited) of 153 Fellows Road, London NW3. This is fully described in the text.

There seems little doubt that the subconscious mind is at receptive peak just before and after deep sleep. This twilight state is called *reverie*, and is a good time for suggestions and information to be processed by the subconscious direct. Normally, at other times the conscious mind stands guard as it were over the subconscious, protecting it and making direct communication difficult. Information passed to the subconscious during *reverie* should be highly positive, and an example 'message' is the classic 'day by day in every way I'm getting better and better'. Repeating this during *reverie* is said eventually to lead to physical betterment. Similar techniques are adopted by those desirous of deleting a bad habit, such as excessive smoking, drinking and so forth. And there are also reports of illnesses having been cured by this method of auto-suggestion.

The tape recorder has brought this up to date, now making it possible to record the information required for the subconscious mind to process and to play it back through a pillow loudspeaker. A time-switch is arranged to switch on the tape message during times of *reverie*, typically about thirty minutes or so after getting into bed and about the same time before normally waking in the morning.

The idea has been extended to absorbing information while in the *reverie* state, and several organizations are offering equipment and advice concerning this *sleep learning* aspect. At the outset, however, it must be made perfectly clear that there are several

schools of thought on the subject of sleep learning, on its effectiveness and possible harmful side effects.

Basically, one school considers that any form of sleep learning could prove harmful by interfering with the 'dream mechanism' at some stage. This school is of the opinion that dreams effectively 'de-programme' the brain, in rather the same way that a computer must be de-programmed to accept new data, so that by inhibiting the normal condition of dreaming the brain might have difficulty in rejecting redundant information to make way for the new. Another school implies that since true dreaming does not occur in *reverie*, sleep learning confined to these periods is unlikely to produce harmful overtones. There appears to be no information available on actual cases of harm being caused due to sleep learning.

It is certainly not proposed to delve into the psychological aspects of sleep learning – this would be the job of a skilled psychologist – but since much is heard about the subject, and since it has a direct connection with tape recording, a complete set of equipment marketed by *Psychology Tapes Limited* was examined and actually tested in a sleep learning exercise. This is sure to be of interest to many of our readers.

The author's daughter, Susan, was the guinea-pig of the experiment, the results of which will be dealt with later, and because she was studying for the CSE ordinary levels it was decided to relate the learning material to these examinations. The weak subject was

dates in history, and the experiment was based on these, as will be seen.

Sleep Learning Equipment

Before going on to the nature of the tests, however, let us have a look at the equipment employed. This is illustrated in Fig. 1. At the top of the picture is a complete sleep learning tape recorder, carrying a time-switch and its own internal loudspeaker. The pillow loudspeaker with jack-terminated lead is shown right at the bottom. When this is plugged into the sleep learning machine the internal loudspeaker is muted.

Above the pillow loudspeaker is shown an endless tape cassette, useful for the continuous repetition of information, and above that is a separate time-switch. This can be used with any recorder along with a pillow loudspeaker or external to the recorder shown in Fig. 1 without the time-switch. *Psychology Tapes Limited* handle and distribute all this equipment, along with special induction and sleep learning tapes.

The time-switch integrated recorder was that used for the tests. This, as sleep learning kit No. 2, comprises the recorder with microphone at 39½gns, information and demonstration tape for sleep learning and therapy at 3gns, induction tape for learning or for therapy, as required, at 3gns and the pillow loudspeaker with jack plug also at 3gns. The whole lot selling at 48½gns, or packaged-deal for 46gns, available also on deferred terms. The recorder without time-switch sells at 25gns and the time-switch at 4½gns. Or the

whole kit as a packaged-deal as before, but with the above items instead of time-switch-integrated recorder at 36gns. This is called sleep learning kit No. 1.

The information/demonstration tape explains the science of sleep learning and therapy, while the induction tape is specially designed to optimize one's receptivity to the learning material that follows. The learning material, particularly language tapes, can be purchased already recorded, or one can record one's own material directly following the induction, there being room on this tape, after the induction, for information recording.

Tapes can be obtained recorded at either 3½ ips or 1½ ips on two tracks (i.e., half-track) and will thus work also on four-track machines. The induction information is repeated on both tracks.

Induction Tape

The sleep learning induction tape is of a hypnotic character, not meant to put the listener to sleep exactly, but to instill a state of deep relaxation and thus to incite reverie. The induction runs for about twenty minutes, and there is no doubt that the majority of listeners, especially if in bed, would be perfectly relaxed from head to toe at the conclusion of the induction, at which time they would be fully receptive to the learning material.

After referring to each limb of the body in turn, concentrating on its particular relaxation, the voice on the induction tape suggests that the listener is standing backwards on a descending escalator while watching lights at the top receding and becoming less and less bright, while numbers, implying depth of relaxation, are passing by progressively at the side. Finally, when the escalator descent is concluded, the voice suggests that the listener is in an absolute state of relaxation. The listener is then transferred to the learning material by the voice saying '... you are now responding fully to the next voice you hear'. This, of course, is the spoken learning material, which can be recorded by the learner himself or by a third person.

At the start of the induction, the voice implies that if the tape has been heard before relaxation will be almost immediate. And this certainly works in the majority of cases, as proved by tests made by playing the tape repeatedly to groups of listeners relaxing in arm chairs.

The induction, therefore, is designed to take the learner into the deep relaxation necessary for sleep learning, and as this is set by the time-switch to commence about thirty minutes after getting into bed, complete relaxation to the state of reverie is ensured before the learning information commences, and this may or may not actually be heard consciously by the learner. The time-switch then closes the machine down and switches it on again about thirty minutes before normal waking time - this time without the induction. That is, the learning material only.

Symphony Amplifiers Limited is the associated company of *Psychology Tapes Limited* dealing with the amplifying side. The time-switch provides three or more 'ons' and 'offs' from its 24-hour, 4½ inch setting dial. Times are selected by inserting pins into appropriate holes on the dial, and the switching contacts will accommodate loads up to 3kW. An over-riding manual button allows the equipment to be switched on and off, via the time-switch, to check that all is working

correctly and that the machine will, in fact, switch on and start playing back at the selected time.

The recorder is perfectly suitable for ordinary recording activities, as well as for sleep learning. The model used was two-track at 3½ and 1½ ips. Spools up to 5½ inches can be accommodated, giving 1½ hours of continuous operation at 3½ ips or double the time at 1½ ips. At 3½ ips, the response overall is from 70Hz to 9kHz with signal/noise ratio in the order of -50dB. The ordinary rewind and pause buttons are featured and a three-digit counter indicates tape position. High- and low-level inputs and monitor and speaker outputs are provided, the latter working the pillow loudspeaker, via a switched jack socket, the insertion of the jack-plug cutting out the internal speaker.

Reproduction from the pillow loudspeaker is remarkably good, and correct matching is achieved between the playback output stage and the pillow loudspeaker. The transducer proper is enclosed in plastic foam and covered with a soft, felt envelope of about 4 inches square. This is best placed just at the side of the normal pillow, rather than beneath it. High intelligibility is obtained at low volume levels with very little residual mains hum. It was found, however, that the recorder's tone control is best set for maximum treble.

The integrated outfit tested produced rather a loud ticking from the time-switch, even with the top-cover in position, while the function noise when switching on and off was singularly disconcerting in the quiet of a bedroom at night! Light sleepers, therefore, would be advised to set up the machine on the landing or in another room and to run an extension wire to the pillow loudspeaker.

The Test

The test consisted of 22 complex dates in

Fig. 2. Single- or multi-channel rack sleep learning equipment (Inductive Learning).

history, some including times as well as from and to dates. The 22 questions were selected from a number that the subject could not

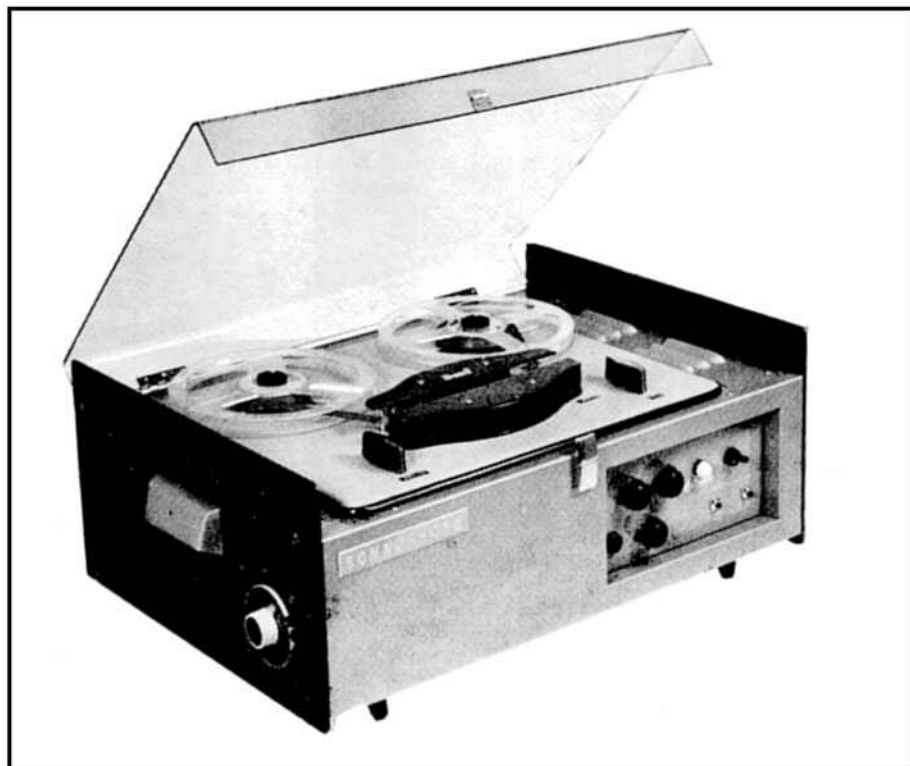


Fig. 3. This 'Somnophone' Tape Player has been specially designed for use in residential schools for group sleep learning. Reverse track facilities provide endless repetition of any duration of pre-recorded tape (Inductive Learning).

LEARNING WHILE ASLEEP

continued

answer, even after considerable thought, and they were recorded with their answers in groups of three repeats following the induction. They were recorded again similarly to coincide with the morning session. Thus, the learning tape consisted of the induction followed by the 22 questions and answers in repeat groups of three, a length of unrecorded tape to allow the machine time to switch off and to warm up after the morning auto switch-on, followed by the 22 questions and answers again in repeat groups of three. The exercise was to discover how many sessions would be necessary for the subject to be word-perfect, with an interval of one night between each session. The results were as follows:

After one night two questions were answered correctly, nine after two nights, seventeen after three nights and the whole twenty-two after four nights. The retention efficiency of the process was tested after periods of fourteen and twenty-eight days, and in both instances only one answer was completely lost. It will be appreciated, of course, that the whole of this learning might not be attributable to *hypnopedia* (the technical name for sleep learning), for it is extremely difficult to obtain absolute control of such tests. Nevertheless, the results certainly prove that sleep learning is more than just a gimmick, as some people seem to think. Some idea of what it feels like to learn via tape during sleep is now given by Susan.

'The thought of sleep learning frightened me, but I was willing to try an easier and quicker way of learning. The first night I was very conscious of the clatter of the time-switch and the noise made by the tape recorder. About half an hour after going to bed the recorder suddenly clicked on and I was wide awake. A quiet, friendly voice spoke softly into my ear, telling me to relax and that there was nothing to be frightened about. Later, another voice came on and repeated information to me. All this time I was conscious of the voices and what they were saying.

'The tape recorder switched off as suddenly as it had switched on and all was quiet except for the noise of the time-switch. My imagination began to play tricks and I thought I saw weird figures in the shadowy corners of my room. At last I fell asleep from exhaustion, a sleep that was haunted by nightmares, and I dreamed of footsteps and ghostly

noises, which I later realized must have been the time-switch. Coffins and bodies came into my dreams that night. I was later told that dreams like this are not uncommon when you first start using sleep learning tape. 'It must have been about 6.30 when I awoke next morning. My head ached a lot and I felt as though I had not been to sleep at all. I lay awake waiting for the machine to click on again. At last it did and the information of the night before was repeated. After about fifteen minutes the recorder switched off and I tried to return to sleep, but found this impossible.

'The next three nights of sleep learning I went to bed about half an hour earlier than usual. The noise of the time-switch troubled me much less and when the tape started I managed to reject the voices from my conscious mind. On these nights sleep came much easier than the first night until I was awakened in the morning by the clicking on of the machine. But I soon went into semi-sleep again. This lasted for about an hour and then it was time to rise, anyway. I felt refreshed and my mind was clear.

'The first part of the tape helped me to relax and forget about the problems of learning. The second part consisted of information I found difficult to remember: dates in history. After each night of sleep learning I was tested and was told that I had made some

improvement each time. On being tested I was very surprised to find that the dates came easily to my mind. I had the impression of guessing them, but I really knew them. This is a difficult feeling to put into words. The fourth night the sleep learning action took place without me being conscious of anything at all, and I was amazed to discover that I could write down all the dates without error.'

That, then, is Susan's story. Bad dreams apparently are not uncommon when the technique is first adopted, depending on the person, and it takes a couple or more sessions to become accustomed to the novelty and possible machine noise. Just how much of the actual information was normally memorized by Susan during the non-sleeping periods is difficult to assess, but it would appear not to be very much judging by the first- and second-session test results. The answers to the questions were never given to Susan other than on the tape.

Another firm marketing sleep learning equipment is *Inductive Learning* of Baker Street, London W1, some of which is shown in Figs. 2, 3 and 4. This equipment is specially designed for safe unattended operation for indefinite periods. The firm also markets basic vocabulary language series and educational courses of various kinds both on tape and disc.



Fig. 4. Record player with built-in time-switch made to the specifications of *Inductive Learning* by *Dansette Products Limited*. For battery or mains operation, it will endlessly repeat one side of a record or act as a standard autochanger.

ATR AUGUST

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TAPE CLUB NEWS

Sound and Sync

'Quiet everybody' cried the Chairman. As a hush fell over the crowded meeting of the Reading Cine and Tape Recording Society, a noise like a burst from a giant typewriter heralded the switching on of nearly twenty tape recorders. Unabashed by this battery of whirring motors, Anne Goodson accompanied by Clive Woodland on guitar sang that 'she's a woman' and invited the audience to 'hold her hand' (see photograph). Unfortunately, although the first statement is obvious, male club members were too concerned with monitoring, microphone balance and recording to take her up on her invitation. As microphones jockeyed for position and magic eyes and meters registered their protest, the club set off on a very successful practical tape evening. Soon, however, living up to its combined club title, a further technical complication entangled the long-suffering musicians when lights and cameras moved in. Complex electronic control systems entwined cameras and tape and soon added their own clicking and whirring to the general background confusion! For further details of club activities contact Beryl Helder, Publicity Officer, 21 Denton Road, Wokingham, Berks.

Dramatics on Tape

Barrow Soundtrack Club's studio and equipment were on show recently when a successful 'open evening' was held and four new members were welcomed. The new members threw themselves enthusiastically into amateur dramatics on tape when a six-character play with numerous sound effects was recorded for the tape library. The club had been inspired by a visit of a dramatic society from Ulverston, a town nine miles from Barrow, when a spirited rendering of *The Monkey's Paw* was the macabre highlight of an evening's recording of plays.

Drama seems to have been the club's spring theme as sound effects were also recorded by Ron Duxbury and Roger Hunt for a play presented by a Barrow Dramatic Society at the local repertory theatre.

The four lady members had a half-page newspaper 'write-up' in the local press recently. A 'Woman's Page' reporter visited Jane Rayner, the club's press officer, and as a result included a full survey of the club's activities in her article. The men are now wondering when it will be their turn!

The club recommends a jumble sale as a sure means of financing club equipment. The club's most recent sale netted £42 and, of course, arguments are now raging on how the money should be spent!

Barrow also recommend a weekly hospital record request and news programme as a worthwhile activity for clubs seeking to extend their tape recording work. Hospital Liaison Officer Brian Rayner has been issuing statistics lately and reports have been made, with an average number of 55 per week during 1967. The local hospital management committee has been most co-operative from the inception of the programme and has even provided equipment for the club's use.

Another very popular local activity is the club's regular weekly visit to a local home for the blind where a 45-minute tape recording of stories, sketches and music is provided by members in turn.

Further details available from Mrs Jane Rayner, Public Relations Officer, 123 Abbey Road, Barrow-in-Furness.

Membership Soaring

Since the National Tape Club was spotlighted in the April issue of *ATR*, members are being enrolled at an encouraging rate. In addition, the County Scheme is gradually taking shape and many county accents make up the 'Voice of NTC'. Added to the original northern regions, Devon, Suffolk, Dorset, London, Midlothian and Scotland swell the numbers of the club (see photograph).

NTC prides itself in being unique in the ranks of similar organizations and is constantly seeking new ideas for its activities. One such event is a members' convention in August which will be a combined business and social affair with Chairman Taylor C. Foggon as host and organizer of the entertainment. This will include tours of the Roman Wall and Camps in Northumberland, a visit to a rocket re-

search establishment, local tours of the area and a social evening.

Club officials are also hoping that the proposed local radio station - *Radio Manchester* - will provide facilities for groups such as NTC to broadcast features and illustrate the objects of tape recording clubs. If so, the club is prepared with a number of features and documentaries including a recording of the Breman Youth Orchestra made at Stockport Town Hall. A *Tape of the Year* competition is being organized and this will involve entry of individual programme tapes now in circulation and the winner will be selected by members. Also envisaged is a club league project which participation in various activities will earn merit points towards an award at the end of the year.

All enquiries regarding the club to George Greenhough, 24 Florist Street, Shawheath, Stockport, Cheshire.

Stereo Scene

Blind member of the Newcastle and District TRC, Gordon Atkinson, was definitely the star of the evening when he demonstrated his fine stereo set-up with a compact cabinet containing a Leak tuner and amplifier and Garrard record deck, together with a brace of speakers. To complete the stereo scene Derek Seward played his latest composition on his Philips machine, a mad but very amusing piece of nonsense about the wild and woolly west of Framwellgate Moor, County Durham, where he lives. On the same evening Brian Shenton treated the club to some excellent stereo recordings featuring the choir in his local church. It's the feeling that there will be a few mono recorders for sale in Newcastle in the near future!

The February *ATR* cover, picturing Chairman Malcolm Hill at work, now has pride of place in the club's press file. This comprises one section of the Club Book which also contains a diary of events, photographs, and special articles submitted by members. This is the sort of project recommended to clubs who are perhaps looking for something different to try and, of course, the longer it is persevered with, the greater becomes its interest and value.



George Greenhough, County Organizer of the National Tape Club, studying the locations of NTC members and pinpointing those who have joined as a result of *ATR* coverage.

Enquiries regarding membership should be addressed to the Hon. Secretary, R. Turner, 43 Richmond Street, Gateshead 8, Co. Durham.

Do-it-yourself

During the last month at the Derby TRC Harold Burton has been giving demonstrations in the do-it-yourself field. Firstly he gave a repeat of his very useful demonstration on soldering, with particular emphasis on making up leads and the various plugs and sockets encountered in tape recording. Secondly, he showed his home constructed stereo recorder based on a Truvox R86 deck with every conceivable built-in facility. Peter Milner showed the results of his do-it-yourself activities - a Heathkit S33H stereo amplifier and two Heathkit SSU loudspeakers. Results for equipment in this price bracket were most impressive. More and more of the club's members are becoming interested in better quality reproduction, very

continued overleaf



Chairman of the Reading Cine and Tape Recording Society, Doug Noyes, with his synchronizing attachment to the Bolex P4, subjecting the guest artists to a burst of iodine quartz and lip sync!

TAPE CLUB NEWS (cont.)

possibly as a direct result of hearing top quality equipment at club meetings. An example is Chairman Ernie Flecknoe's selection of stereo on a Tandberg 6, Leak stereo 30 amplifier and Wharfedale W2 speakers.

Dennis Land has been organizing a form of round-robin tape about a racehorse *The Wreck*. After passing the tape to various members Dennis finished it off and the result on playback at the club was, to say the least, highly ingenious - and enjoyable. Further information of club activities can be obtained from A. F. Staaway, 8 Midland Road, Derby.

Attendances High

Attempts to vary the programmes to suit all tastes have succeeded with the result that attendances at the Coventry TRC have kept to a high level this year. A members' equipment night encouraged members to bring along a large and varied collection of items including an Edison cylinder record player owned by Tom Bagley, a Tandberg tape recorder belonging to Tony Sprung, and a speaker cabinet built to Goodmans' specification by Peter Warden. The second instructional programme of this year was a demonstration of splicing and editing by Peter Warden and Roy Reynolds. Members were also given a short tape consisting of a jumbled-up poem which they were invited to splice into the correct sequence. Requests to provide programmes for various organizations continue to come in and a visit to a group of senior scouts was made by members P. Warden, R. Reynolds, K. Preston and T. Sprung. Material included a talk with illustrated recording about the club, slides of Coventry and Blackpool accompanied by tape, an introduction to tapesponding and examples of stereo reproduction. Club meetings are now being held at the Rising Sun Hotel, Spon Street, Coventry and further details are available from the Secretary, K. W. Preston, 42 Four Pounds Avenue, Coventry.

Sounds of Nature

A joint meeting of the South Devon TRC and the Torquay Natural History Society was held at the Pengelly Hall. Mr H. G. Hurrell, the well-known naturalist and broadcaster, gave a talk entitled *The Sounds of Nature* illustrated with two natural history films and tape recordings of bird songs. At a later

meeting twenty five members and friends joined members of the Torquay Photographic Club for an outing to Peter Scott's Wildfowl Trust at Slimbridge, Gloucestershire. Cameras and recorders were working overtime and countless feet of tape and film were used to capture the 161 forms of wild life on view. In light of the recent dissension, one member was prompted to comment: 'It's a good job birds don't worry about copyright!'

At the recent AGM it was reported that membership has increased from 46 to 61 in the past twelve months, average attendances at meetings have risen and the club's financial position has improved considerably - definitely a successful year. Secretary of the South Devon Club is Gordon Furseaux of 45 Kenwyn Road, Ellacombe, Torquay.

Newsletter Trophy Winners

At a meeting of the Yorkshire Federation of Tape Recording Clubs in York, Leeds and District TRC were presented with the *Newsletter Trophy* for the third consecutive year. After the presentation recording commenced and sounds of a brass band and the York Madrigal Singers were captured. Representatives from the British Ferrograph Owners Club were present and later judged the tape competition in which York came out on top. The competition included such items as a one-armed bandit, two fleas running up a lamp post and a rustle of spring. A recent clubroom meeting was entitled *Microphones*. After an explanation of how they work and their patterns, recordings were made using a moving coil, ribbon and condenser microphones. On playback members found the differences quite surprising, even in speech.

Tape Indexing was the subject of another clubroom meeting when Mr J. Priestley, Mr J. Newton and Mr Eagle explained their respective systems. Mr Rowe who works for a leading Leeds stationer outlined methods of starting a tape index using a book, loose leaf or cards. He suggested listing the tapes contents and from this making up a title index and artist index.

Full details of the club are available from Mr W. H. Rowe, 34 Bristol Road, Leeds 7.

Interesting Visitors

An old friend of the London TRC, Walter Buchanan gave a very interesting talk on the value for money that can be expected when buying a recorder. He

also discussed with members of the club a number of problems commonly encountered in recording. Another old friend and past secretary of the club, Terry Devereux recently visited the club. Mr Devereux teaches the technique of creative recording at night school and the club enjoyed hearing programmes written and produced by his pupils and himself.

At a later meeting the club was joined by a pianist and studio staff who demonstrated various mics and positions for recording live at a grand piano. Members were also shown round the studio to see the equipment used in making a record. It is hoped that future meetings of this kind can be arranged.

For more information about the club contact David Campbell, 46 Aberdare Gardens, London NW6.

Demonstrations are Popular

Members of the Leicester TRC were given an excellent demonstration of the Tandberg 12 by Mr A. W. Dakin of Elstone Electronics. At a later meeting members of the newly-formed BUAC TRC joined Leicester to view the Heathkit range of equipment and the combination of clubs produced a record attendance. This visit by the BUAC TRC was reciprocated the next week when members journeyed to their premises to record their own and very excellent choir.

Mr Trevor Gilbert recently visited the club bringing with him two films, one of Australia and the other of potholing in Derbyshire. Both films were accompanied by four-track stereo sound on Mr Gilbert's specially adapted Revox. Members of the Hinckley Tape Club were also present on this occasion, making a large and appreciative audience for Mr Gilbert. Coming events sound interesting and include a visit to the Newarke House Museum to see and hear some of the musical instruments of the past. Further enquiries should be addressed to the Hon. Secretary, John Moule, 55 Kitchener Road, Leicester.

Club AGM

At the recent AGM of the South Birmingham TRC, the following committee members were elected: Mr R. Truman, Chairman; Mrs L. Moxon, Vice Chairman; Mrs G. Chalmers, Secretary; Mr F. Banister, Treasurer; Mr T. Coveney, Public Relations Officer. Future programmes include a trip to London Dormstone House to record the organ and a visit to Peter Scott's wild fowl trust at Slimbridge. Further details from the new secretary, Mrs G. Chalmers, 180 West Heath Road, Birmingham.

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Side 1—Male and female lions Gibbons Chimpanzees Bell bird
Rattlesnake Baboon Viper Emperor geese Fish eagles Mountain lion (puma) Kookaburra (laughing jackass)
Side 2—Elephants Mississippi alligator Indian tiger Sea lions
Male lion In the jungle (a background of typical sounds)

C BGX/1-BACKGROUND SOUND EFFECTS

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Side 1—Sea (breakers) Wind (howling—erie) Thunder (light rain)
Side 2—Rain (heavy shower) Factory sounds (industrial) Traffic (busy street)

D EFX/1-ELECTRONIC SOUNDS AND MUSIC

Price 7/6

Side 1—Space ship—take off Space vehicle—imaginary take-off
Space vehicle—imaginary landing Ring modulation—tonal Modulated tone glide (descending) Modulated tone glide (ascending)
Sibilant—white noise (pitch octave low) Sibilant—white noise (pitch octave high) Three-tone undulation Filtered tone Stridor (tonal) Ring modulation and sibilant

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CASTLE, 7" 45 rpm records, approximate playing time 10 minutes. Each contains selection of sound effects in separate tracks. Complete with sleeve and paper inner jacket. Sleeve includes description of each sound effect and playing time in seconds.

E EFX/2-ELECTRONIC THEMES AND MUSIC CONCRETE

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Side 2—Sound object Montage

F HMX/1-HAUNTED HOUSE, MYSTERY SOUNDS AND MUSIC

Price 7/6

Side 1—Thunderstorm Mysterious Electronic Music
Side 2—Spooks Intruder Creaks Fright Dungeon Ghosts Ghoulie Maniac laughter

G MFX/1-AUTHENTIC HIGH-FIDELITY SOUND EFFECTS

Price 7/6

Side 1—Lion roaring Twin piston aircraft landing Building and debris falling Road drills and compressor Ship's siren Steam train leaving station Small steam loco and whistle Cell door, keys and locks
Side 2—Police car and bell, chase Police launch and siren Steam goods train and whistle Car door slam, and starter Storm at sea, thunder, wind and gulls Tube train, stop, doors and start

H MFX/2-AUTHENTIC HIGH-FIDELITY SOUND EFFECTS

Price 7/6

Side 1—American police car with siren—arriving American police car with siren—departing American police car escort with siren—passing American police motor-cycle patrol with siren—stopping Applause (hand clapping) Orchestra tuning up Car crash Glass breaking (repeated)
Side 2—City and Waterloo tube train—arriving City and Waterloo tube train—departing Footsteps (continuous track) In subway (mixed) In narrow streets (female) On pavement (mixed) Running in street (female) Running in street (male) Up and down (wooden stairs) Workmen hammering and sawing

I MPX/1-MILITARY PARADE AND WARFARE SOUNDS

Price 7/6

Side 1—March past—Guards and crowd sounds, etc. Royal Salute—Parade commands and National Anthem Drums and pipes—with parade commands
Side 2—Aircraft—low level attack (bombs, machine-gun fire, aircraft) Artillery—tanks—rifle fire, etc.

J TFX/1-AUTHENTIC BRITISH TRAIN SOUNDS

Price 7/6

Side 1—Train departure—main line Train arrival—main line Express train passing—with whistle Fast goods train passing—with whistle Express train passing Small tank loco—passing
Side 2—Local passenger—arrive and depart Fast goods train—passing Central London tube train—arrive and depart Train over points and crossing Slow goods train passing—with whistle

K MFX/3-HORSES

Price 7/6

(10 effects) Trotting Walking Jumping Composite recording of foxhounds, calls, horns, etc. Cows Cattle Pigs Blacksmith's shop

L LFX/1-SOUNDS OF LONDON

Price 7/6

Guards, Bow Bells, River, Markets etc., with linking commentary Ideal for cine films and colour slides

M RSX/1-ROAD SAFETY

Price 7/6

With Jack Warner (Dixon of Dock Green) and Coco (Bertram Mills Circus) Documentary with sound

O MFX/4-MIXED SOUND EFFECTS

Price 7/6

Side 1—Hovercraft passing. Hovercraft departure. Car start, drive away (interior) Car engine rev and idlerover Car starter (continuous) Car skid Car skid and crash
Side 2—Continental town—street sounds and glockenspiel (clock chimes) Warning siren Warning bell (all typical continental sounds)

P BGX/2-BACKGROUND SOUND EFFECTS

Price 7/6

Side 1—London Airport main lounge Passenger flight departure (announcements in English and German) Passenger flight departure (announcements in English and French)
Side 2—Train interior (continuous) Children playing Racing Cars (circuit)

Q EFX/3-RHYTHMIC ELECTRONIC MUSIC

Price 7/6

Side 1—Automation (theme of rhythm and melody) Perpetua (theme suggesting movement) Merry-go-round (theme suggesting fairground or street organ) Tempotone (electronic sounds in rhythm)

THE TAPE DIRECTORY

This is a service operated by ATR through which readers can tapespond with one another. If you wish to be included in the Tape Directory, complete the coupon on page 36.

Particulars of tapesponders are given in the following order: name, age, occupation, address; special interests, tastes in music; type of machine, spool size, speeds; area of tapesponding required.

Australia

Peter Caprioli, 19, laboratory attendant, University of New South Wales, Broken Hill Division, Box 334, PO Broken Hill, NSW, Australia. Photography, reading, dramatics, rock and stamp collecting; opera to pop. National RQ-503S, 5 in, 1½, 3½. England, Italy and Germany. English or Italian speaking.

Miss Joan Fairweather, 20, credit clerk, 17 Thomas Street, Corrimal, NSW, Australia. Music, cars, clubs; honky-tonk, Sony-o-Matic TC135, 5 in, 1½, 3½. Anywhere, especially Scotland.

Ronald Nicholls, 36, time keeper, 33 Harley Way, Medina, Western Australia. First aid; light classical, folk. Sanyo MR929, 4 track stereo, 3½, 7½. Anywhere English speaking.

British Forces

2402856 SPR Robert Billingham, 19, HMF, HQ Troop, 43 Field, Park SQN (RE), BFPO 36. Photography, cars, motor cycles; pop. R&B. Grundig TK320, 7 in, 1½, 3½, 7½. Anywhere.

Roger C. Maytum, 24, musician (HMF), Band, 1st Royal Dragoons, BFPO 41. Current affairs, sports; big band modern jazz, modern classics. Sony TC260 stereo, 7 in, 3½, 7½. UK and Ireland.

Leon Smith, 25, ARI Signals (Army), The Chesnut Troop, 1st RNA, BFPO 69, Aden. Ham radio; pop. Akai 1710 4 track, 7 in, 1½, 3½, 7½. USA and Canada. **Jack Warner**, 38, HMF, 7 Duckett Road, Haringey, London N4. Travel, cine; C&W, pop. Ferguson 3214, 4 track, 7 in, 1½, 3½, 7½. Anywhere.

Ireland

Thomas Fagan, 24, hairdresser, 18 Ballyfermont Crescent, Dublin 10, Eire. Cine and still photography, judo; jazz and all but heavy classical. Philips 7 in, 3½. Anywhere especially Greece.

Malta

Walter V. Massa, 18, apprentice, 5 By St Ubaldesca Street, Pawla, Malta. Model making, reading; all kinds. Telefunken 204E stereo, 7 in, 3½, 7½. Italy, Spain, France, Germany, Japan (English speaking).

New Zealand

Warren Walter Prescott, 27, truck driver, 455 Ilam Road, Bryndwr, Christchurch, New Zealand 5. Travel, driving for the blind, hospital tape service; show music, classics. Sanyo Studio MK 5 and 6, 7 in, 1½, 3½, 7½. Anywhere English speaking.

Ray Wolf, 30, hospital storeman, 508 The Terrace, Thames, New Zealand. Photography, swimming, folk lore; all. Homemade (BSR deck), 5½ in, 3½. Anywhere. Male contacts preferred.

Scotland

Selwyn Cowan, 38, salesman, 78 Braidholm Road, Giffnock, Glasgow. Big swing bands 1930-45. Stella 459, Cossor 1605 4 track, 7 in, 1½, 1½, 3½, 7½. UK, USA, Canada, France, Australia, Belgium. **Allan Geekie**, 15, student, Craigewan Croft Road, Oban, Argyll. Model railways; French and British pop. National RQ1055, 3½ in, 1½, 3½. Anywhere English speaking.

S. George Jackman, over 40, photography and advertising, 28 Craigcrook Avenue, Edinburgh 4. Country-side, hill-climbing, old towns and villages, architecture, railways and tramways, radio engineering, theatre; light classical. Wyndor, 2 and 4 track, 7 in, 1½, 3½, 7½. London, Cotswold/Banbury area, Scotland and anyone in RAF 12 OTU 1941-5 and Warboys Pathfinders 1323 Flight 1945.

Fiona Lockie, 34, assistant housemother, 4 Maryfield Place, Bonnyrigg, Midlothian. 35mm photography, travel, reading, stamps, postcards; folk and show. Ferguson, 5½ in, 3½. Belgium, Portugal, Hebrides or anywhere in Scotland.

Singapore

Dyke Elsie, 38, housewife, 22 Brompton Rad, AMQ RAF Seletar, Singapore. Knitting, cooking; folk, C&W, organ. Reptsio, Grundig TK23L, 7 in, 1½, 3½, 7½. England, Canada, Australia, New Zealand. **Roger W. Honnywill**, 24, medical student, British Military Hospital, Singapore. Creating sound effects; mainly pop, some classical. Akai X355, 4 track stereo, 7 in, 3½, 7½. Anywhere.

South Africa

Elgar L. King, 58, supervisor, 24 Fourth Avenue, Newton Park, Port Elizabeth, South Africa. Colour slides, bowling; all types. Philips and Akai, 7 in, 1½, 3½, 7½. Anywhere. No letter required.

USA

Diek Kenny, 41 Bank Street, Stamford Connecticut. Documentaries, sounds; unusual. Ampex, Uher, Becant, 7 in, 7½ dual. Anywhere.

Wales

Andrew Canall, 16, trainee salesman, 22 Bridge Street, Neath, Glam, S. Wales. Radio and hi-fi construction, photography; pop, some classical. Ferguson 3208 4 track, 5½ in, 1½, 3½. Anywhere. Female contacts preferred.

Zambia

Lawrence N. Rathnavalu, 28, teacher, King George VI High School, PO Box 73, Broken Hill, Zambia. Chess, English Literature, theatre; classical and Spanish. Philips EL3556 4 track, 7 in, 1½, 1½, 3½, 7½. UK, France, Japan, West Indies.

Bedfordshire

Ian M. Jardine, 37, van driver/salesman, 103 Stanbridge Road, Leighton Buzzard, Beds. Cine and still photography; C&W, pop, light classics. Stella ST458 and 472 cassette, 7 in, 1½, 3½. Anywhere outside UK. English speaking.

Berkshire

Neville John Forrest, 23, clerk, 42 Hunters Hill, Burghfield Common, Nr Reading, Berks. Electronics, philately, photography; back to the Beatles. Truvox PD86 4 track, 7 in, 1½, 3½, 7½. Anywhere English speaking.

Cambridgeshire

P. Cost, 39, medical representative, 4 Huntingdon Road, Cambridge, Cambridgeshire. Music, reading, current affairs; classics, opera, pop. Sony TC530, 7 in, 1½, 3½, 7½. Anywhere.

Cheshire

William Henry Bennett, 37, railway guard, 3 Daresbury Close, Bridgehall, Adwood, Stockport, Cheshire. Reading, anything current; classics, pop and film music. Fidelity Playmaster, 5½ in, 3½. USA or anywhere English speaking.

Cornwall

Keth Shankster, 17, cinema projectionist, The Nook, Pennance Road, Lanner, Redruth, Cornwall. Anything and everything. Elizabethan, 7 in, 1½, 3½, 7½. Anywhere English speaking.

Devon

F. W. Richardson, over 60, semi-retired, Muntham, Barrington Road, Wellswood, Torquay, S. Devon. Colour photography; light music, Ferrograph stereo, 7 in, 1½, 3½, 7½. Anywhere abroad English speaking.

Essex

Stanley Watson Baker, 40, trained nurse, 7 Northumberland Villas, Linford, Stanford-Re-Hope, Essex. Wishes to contact all Christians desiring to form Evangelical tapesponding club; evangelical music. Repts 10, Truvox, National, Sony, 7 in, 1½, 3½, 7½. Everywhere. No letters required.

Leslie Hills, 47, draughtsman, 6 The Maypole, Thaxted, Essex. Pop, big band, trad. jazz. Phillips EL3553, 7 in, 1½, 3½. Anywhere.

Doug Smith, 29, 'Pettit's Farm', Heathway, Dagenham, Essex. Foreign travel, motorcycling, photography, camping; all. Grundig, 5½ in, 3½. UK, Europe, Israel, USA.

Gloucestershire

Rodney Frederick Cavanagh, 22, electrical draughtsman, 83 Hardenhuish Road, Brislington, Bristol 4. Hi-fi, sound effects, judo, under-water swimming, photography; pop, jazz and light classical. Revox 736, 10½ in, 3½, 7½. Anywhere English speaking.

Hampshire

William M. Day, 44, blind matmaker, 73 Strode Road, Stamshaw, Portsmouth, Hants. Guide dogs, walking, sport, general chat; pop and light music. Philips EL3552, 5½ in, 3½. Anywhere, either sex.

Hertfordshire

Roger Martin, 18, student, 27 Newstead, Hatfield, Herts. Old pubs, swimming, chemistry; most pop especially Beach Boys and Jan and Dean, modern jazz particularly Dave Brubeck. Fidelity Playmatic, 7 in, 1½, 3½, 7½. Anywhere English speaking.

Clyde Martindill, 18, student, 42 Holloways Lane, Welham Green, Hatfield, Herts. Amateur record shows, quaint pubs, stock car racing; pop, light classics. Stella 458, 7 in, 1½, 3½. Anywhere English speaking.

Kent

M. E. P. Coveney, 35, clerk, 32 Montefiore Avenue, Ramsgate, Kent. Choral society; classical and pop. Eltra, 7 in, 1½, 3½, 7½. UK, Europe.

Peter John Harper, 25, butcher (merchant navy), 38 Kingswood Road, Gillingham, Kent. Tenpin bowling, car rallies; modern (Ray Conniff). Akai X355, 10½ in, 3½, 7½. UK, Japan, USA.

Lancashire

Norman Thomas Briggs, 48, bus conductor, 33 London Road, Blackburn, Lancashire. Model railways, soccer; brass bands. Philips EL3558, 7 in, 1½, 3½. Anywhere.

John Norman Slack, 43, rent collector/clerk, 27 Heliers Road, Old Swan, Liverpool 13, Lancs. Photography, interior decorating; light music, B&W Minstrels, songs from the shows. Philips, 5 in, 3½. Anywhere.

Leicestershire

Douglas J. Bunney, 47, building inspector, 'Walcheren', Carter Dale, Thringstone, Coalville, Leics. 8mm filming, learning German; not too light, not too heavy. Stella 459 and 454, Grundig TK1, 7 in, 1½, 1½, 3½, 7½. Holland, Germany.

Lincolnshire

S. Fielding, 36, engineer, 84a High Street, Lincoln, Lincs. Woodwork, gardening; C&W. Ferguson, 5½ in, 1½, 3½. Anywhere English speaking.

ROUND THE WORLD IN EIGHT DAYS ★

Bob Danvers-Walker reports on a whirlwind dash to Australia and back



Tape 1, take 1. Bob's gold-plated Sennheiser MD421 records the voice of the Captain from the flight deck; first ingredient for a documentary on fast jet travel.

Last winter I nipped down to Australia to spend five sweltering days in Sydney and was back in the cold of England – all in 192 hours. During that time I appeared in three television shows and two radio programmes and was back in London in just over a week. I had covered 24,000 miles, set foot in eight foreign countries (six of them twice), and, in terms of global distance, travelled the equivalent of a voyage round the world in eight days. This was ten times faster than Phileas Fogg who, in his fictional race against time, went 'Round the World in Eighty Days', but some 128 times slower than today's planet-orbiting astronauts who can circumnavigate the earth in 90 minutes.

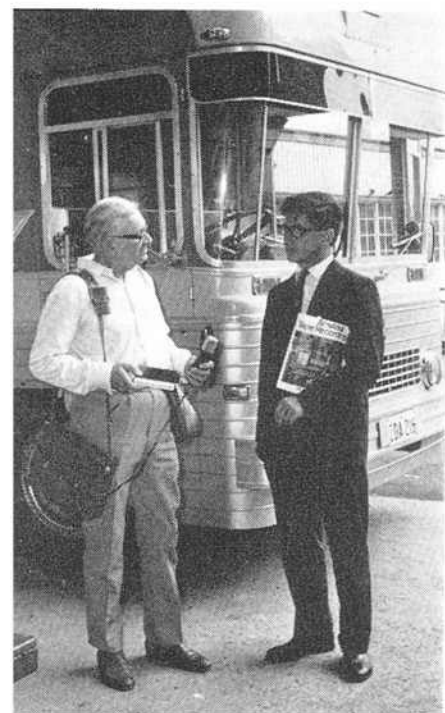
Mind you, in actual flying time the BOAC Rolls-Royce-engined Boeing 707 took only 26 hours to travel from London to Sydney. With six 35-minute intermediate stops to refuel at Zürich, Rome (Beirut on return flight), Delhi, Rangoon (Bangkok on return flight), Singapore and Perth (Darwin on return flight) the two journeys added up to just over 30 hours each way.

During the West-East outward flight I recorded every announcement given over the PA speakers in the aircraft using different types of microphones and testing 5 inch spools of Standard and LP Ampex tape on my Uher 4000 Report portable. Details about Ampex 600 Series Professional Audio Tape obtainable from Ampex Great Britain Ltd, Acre Road, Reading, Berks. It will be well worth your while trying this tape for yourself; I was much impressed. A couple of these recordings I used in one of my broad-

casts over 2FC Sydney. It was thirty-five years ago that I last broadcast from that station when, as a junior Australian Broadcasting Company announcer on loan from 3LO Melbourne, I commented part of the Sydney Harbour Bridge opening ceremony in 1932. To celebrate my immensely exciting return to the Commonwealth I was presented with a gold-plated Sennheiser MD421 microphone to use in my broadcasts – the first microphone of its kind ever to appear in Australia. The Editor of *ATR* rushed the mint-fresh, first-off-the-press copy of the March edition of *Amateur Tape Recording* to my home in time for me to take it to New South Wales within hours of publication. I handed this over to an Outside Broadcast producer of the ABC working on location at Circular Quay alongside the famous Harbour Bridge. He took possession of this copy in Sydney at least three days before bulk distribution of the magazines had started for bookstalls in London.

The temperature in Sydney was in the upper eighties with 91 degrees of humidity. Few people remembered it so uncomfortably hot. In the TV studios under the arc lights the thermometer was pushing the mercury over the 120 degree mark. I shed 4 lb in weight in two hours.

By the time I checked in for the homeward flight my Ampex tapes were carrying back for me familiar sounds of Sydney to file in my library. Now I could store away memories on tape; bring them back and listen to them again half a world away at any time I pleased. Thirty-five years ago sounds were



*With the Australian Broadcasting Commission's television outside broadcasting unit on location in Sydney. Bob hands over the March issue of *Amateur Tape Recording* to the Ampex VTR man at least three days before copies of the magazine appeared on London bookstalls.*

lost as soon as they were made. Remember that when you hesitate about taping a child's first words, a nostalgic sound or the noises associated with memories you want to preserve.

BOAC Flight BA.723 took off from Kingsford Smith Airport at 10.35 on the Saturday morning of my homeward flight. The four Conway jet engines develop a total thrust at take-off four times greater than the second stage of an astronaut's space rocket. And there's enough fuel in the tanks to last the average motorist 50 years – if he ran on paraffin. Because Australia is 10 hours ahead of GMT I would arrive in London at 8.55 the following morning.

The time differential makes meal times and the hours of waking and sleeping all rather nonsensical. The return trip (East-West) is made in two-thirds darkness. At an average speed of 550 mph we were flying away from the sunrise the whole time. During about 20 hours of continuous darkness – roughly speaking between Singapore and Zürich – breakfasts and dinners and lunches and light refreshments come to you on trays at the weirdest times. I wear two wrist watches to compare GMT with Sydney time (progressively altering one to read local times as we cross the meridians) and try to adjust my sleeps back to London day-and-night cycles to counter what aeromedical experts call 'the time-zone phenomenon' or jet exhaustion caused by flying too far too fast across the lines of longitude. Only six days earlier I had been trying to do the same thing the other way round. Here you have the reason why four different crews take over at stages on these BOAC scheduled flights which fold up time with their mileage-devouring aircraft. The human body takes time to adjust itself to being thrust through half a dozen time zones. The mind objects to this abuse to its customary 24-hour phasing, unless given rest and time to get in phase with local time. Six BOAC stewards and stewardesses forming the cabin crew concern themselves with the welfare of some 150 people. Armchair comfort in an air-conditioned environment travelling at ten miles a minute at 35,000 feet is not only *dolce vita* but positively therapeutic. These are the biological, physiological and statistical facts which can be put together to make a recorded study on long-distance jet travel.

The ingredients for a documentary are now mine. The personal experience, the taped sound effects and voices, the materials of actuality provide the substance of a programme. Maybe I do get the breaks where travel is concerned. But for a jet airliner substitute an underground train. What's to stop you doing a piece about that. Know when they were first built? Know which countries have them? How many people travel in them? How does the air circulate in the tunnels? What amount of electricity is needed to drive one? Start finding out. The Three R's of the tapeologist are Research, Record and Re-present. Meanwhile, back at the BOAC Air Terminal building I was thinking a good tag-line for my production might be: *It's only a matter of time before we have rocket travel*, which will make today's jets seem slow coach. But I'll say this: having just been round the world in eight days, I found that while my body went by jet my psychology had to follow up by covered wagon.



Harbour ferry boats at Circular Quay. Bob loads up with a spool of Standard Play Ampex tape – widely sold to the general public in Australia.



Recording comments about the world's most controversial building – Sydney's new Opera House styled in the form of billowing white sails. Thirty-five years ago Bob broadcast the opening of the Harbour Bridge.

NATIONAL TAPE RECORDING COMPETITION

BBC North is running its second competition for amateur tape recordists and this year the theme is 'On the Move'.

There was a big response to last year's competition and the BBC is again inviting entries in words and sounds from people living in any part of Britain. But competitors must be individuals, or groups of individuals, not engaged in sound recording as a profession. The object is to find evidence of the imaginative use of the tape recorder and the theme 'On the Move' can be interpreted broadly to cover a great many different subjects, demonstrating character and atmosphere in words and sounds. The judges will look for imagination in the composition of the tape as well as for technical quality; extreme technical skill, unaccompanied by imaginative effort, is unlikely to succeed.

Conditions:

1. Competitors must be individuals or groups of individuals not engaged in sound recording as a profession. They may reside in any part of Great Britain.
2. Entries must not exceed five minutes, although any competitor may submit up to three separate recordings. Recordings should be made on $\frac{1}{2}$ in tape at a speed of $3\frac{1}{2}$ ips or more, full or half-track. (Where half-track is used, the second track should be clean.)
3. The judges will look for imagination in the composition of the tape as well as for technical quality. Extreme technical skill, un-

accompanied by imaginative effort, is unlikely to succeed.

4. At the start of each tape, competitors should record their name and address, the sub-title of the recording (if any), and the duration of the recording.

5. Whilst every care will be taken of the recordings while they are in the possession of the BBC, the BBC cannot accept liability for any loss or damage sustained by the recordings. Competitors requiring acknowledgement of their entries' safe arrival should attach a stamped addressed postcard.

6. Material whose copyright is not owned by the competitor must not be submitted.

7. In addition to the prize money described below, the BBC will pay an appropriate fee for any recording which it broadcasts other than in a programme, at a date to be announced later, discussing the competition and announcing the results. The BBC does not, however, bind itself to broadcast any of the entries either in whole or in part.

8. Entries must reach the BBC not later than 30th September, 1967, and to be despatched to:

BBC North Region
Tape Recording Competition,
Broadcasting House,
Piccadilly,
Manchester.

The tapes will be returned as soon after the judging as possible.

Prizes:

9. A first prize of £50 will be awarded. There will be a second prize of £25. In addition, a prize of £25 will be awarded to the best entry from a competitor residing in the North of England, that is, in the counties of Cheshire, Lancashire, Derbyshire, Nottinghamshire, Lincolnshire, Yorkshire, Westmorland, Cumberland, Northumberland, Durham or the Isle of Man.

Judges:

10. The Chairman of the judges will be: Mr Colin Shaw, Planning Manager, Television, BBC.

The Judges will be:

1. Mr Timothy Eckersley, Assistant Head of Central Programme Operations (Recordings), BBC.
2. Mr Douglas Brown, President of the Federation of Tape Recording Clubs.
3. Mr David Sease, until recently Director of Productions, The Liverpool Playhouse.

The judges' decision is final and the BBC cannot enter into correspondence with competitors.

Guidance Note:

11. It will be seen that the judges hope to find evidence of the imaginative use of the tape recorder. The range of possibilities open to the modern, lightweight recorder is very great and the successful competitor is likely to be someone who exploits it fully. The theme of 'On the Move' can be interpreted broadly to cover a great many different subjects, demonstrating character and atmosphere.

AIRBORNE AMPEX

As an ex-parachutist I was particularly pleased to hear that one of the field trials of the new Ampex battery-operated portable recorder (model AG-20) involved its use by skydivers of the British Green Jackets Parachute Club.

Parachutists Sean Friel, John Saar and David Waterman (who took the airborne photographs) jumped from a Rapide aircraft at 12,000 feet over Thruxton, Hampshire, free-falling to 2,000 feet before opening their chutes. Sean and John jumped first and linked up immediately. Photographer David Waterman followed quickly and caught up with them at about 7,000 feet. With a motorized Nikon camera strapped to his arm and working on 'single shot', he then took a series of photographs - one of which we reproduce above - and finally peeled off to pull his own ripcord at about 2,000 feet.

John Saar, on the left in our picture, had a new Ampex AG-20 strapped to his chest and he operated the machine to interview his colleague on the wing of the aircraft while they were waiting to jump and during their ten thousand feet free fall. Despite aircraft engine and wind noise (their falling speed reached 120 mph) the recorder's automatic gain control minimized all background noise and the recording was of such high quality that it could be played back directly 'on the air'.

This new portable recorder was shown for the first time at the Montreux Television Exhibition, 22-26 May, in Switzerland. Developed by Ampex Electronics Limited, Reading, the AG-20 is the company's first battery-operated audio model. Weighing only 12 pounds (without batteries), it is designed for professional recording applications in broadcasting, education, government, news reporting, or other field



Free-falling at 120 mph about 5,000 ft up.

and studio applications where professional quality, light weight, and ruggedness are essential.

Three tape speed combinations can be provided on the AG-20: $1\frac{1}{2}$ and $3\frac{1}{2}$; $3\frac{1}{2}$ and $7\frac{1}{2}$; or $7\frac{1}{2}$ and 15 ips. Reels can be either standard 7 inch (when recorder lid is open) or 5 inch. Major specifications include:

Overall frequency response (at record level of -10 dB),
15 ips ± 1.5 dB 50 to 16,000 Hz
7 $\frac{1}{2}$ ips ± 1.5 dB 50 to 12,000 Hz
3 $\frac{1}{2}$ ips ± 2.0 dB 50 to 9,000 Hz
1 $\frac{1}{2}$ ips ± 3.0 dB 50 to 7,000 Hz

Signal-to-noise ratio:

Speed	Full track	Half track
15 ips	60 dB	55 dB
7 $\frac{1}{2}$ ips	60 dB	55 dB
3 $\frac{1}{2}$ ips	55 dB	50 dB
1 $\frac{1}{2}$ ips	50 dB	45 dB

Peak record level to unweighted noise. Includes bias erase and playback amplifier noise.

Signal overload:

+20 dB above normal operating level before clipping occurs. Start/Stop Start: Tape is accelerated to



Sean Friel being interviewed after landing.

full speed in less than $\frac{1}{2}$ second (for 7 $\frac{1}{2}$ ips tape speed). Stop: Tape moves less than 1 inch after depressing

Stop key (for 7 $\frac{1}{2}$ ips tape speed).

Fast/wind speed 50 ips (average).

Speed stability $\pm 0.25\%$.

Tape Width Standard $\frac{1}{2}$ inch tape.

Dimensions/Weight Height 9 $\frac{1}{2}$ in, depth 3 $\frac{1}{2}$ in, width 12 $\frac{1}{2}$ in. Weight recorder only 12 lbs: batteries approx. 1 lb 14 ozs.

Warranty Ampex one-year warranty.

A machine of this calibre will doubtless be quite expensive - we expect to hear about its price soon - but for those of our readers who want a really first-class battery-operated portable it looks as though the Ampex AG-20 will more than satisfy their needs.

E. McKEOWN

UP TO
50%
OFF!

FANTASTIC SAVINGS

We have a fantastic selection of tape recorders, new, shopsoiled and secondhand showing savings on the manufacturers' list price of up to 50%. Our quoted prices are absolutely unbeatable, so why not call at any of our showrooms and see the fantastic savings that we, as Britain's largest tape recorder specialists company, are able to offer you by virtue of our ability to purchase large quantities and pass the savings thus obtained on to you! (Personal Callers only.)

- UNBEATABLE NO-INTEREST TERMS
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- GENEROUS PART EXCHANGES
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PHILIPS EL4306—Latest 1967 4 track 2 speed model. List £44 2 0. Brand new, boxed.....	OUR PRICE	36gns.
SABA TK230 Superb 4 track, 3 speed stereo model. Absolutely as new. List £100.....	OUR PRICE	45gns.
AKAI M8—Stereo. One only S/S. Latest 1967 Model. List £146	OUR PRICE	99gns.
WYNDOR International. Superb 4 track, 3 speed model. 10 watts output. Absolutely perfect condition. List £78.	OUR PRICE	32gns.
AKAI 1710—Latest 4 track stereo. One only S/S. List £83	OUR PRICE	64gns.
B. & O. 2000—2 track suitcase. Stereo. Absolutely as new. List £129.....	OUR PRICE	79gns.
AKAI X4—4 track stereo battery/mains portable. List £143	OUR PRICE	79gns.
Two only. Brand new (Brown model).....	OUR PRICE	21gns.
PHILIPS TYPE—Cassette battery/mains portable. Brand new. List 27 gns. Few only.....	OUR PRICE	29½gns.
PHILIPS EL4305. Latest 1967 Model. List £37 16 0. Brand new, boxed. Few only.....	OUR PRICE	59gns.
GRUNDIG TK45—4 track stereo. Perfect condition. 1 only. List £112.....	OUR PRICE	42gns.
PHILIPS EL3536 4 track mono/stereo. Perfect condition. Original list £97.....	OUR PRICE	59gns.
UHER 4000S—Superb 4 track. Battery/mains portable. List £104. 1 only.....	OUR PRICE	59gns.
TELEFUNKEN 85KL—De luxe. Superb 2 track model. Brand new. List £95.....	OUR PRICE	59gns.
TANDBERG 64—4 track, 3 speed tape deck. As new. List £115. One only.....	OUR PRICE	69gns.

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228 BISHOPSGATE, E.C.2 (opp Liverpool St. Station)	BIShopsgate 2609
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242/4 PENTONVILLE ROAD, N.1 (200 yards Kings X)	TERminus 8200
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- * Monitoring of recorded programme.
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A VERSATILE MIXING UNIT

George Wilkinson
describes his own
method for keeping
tape recording tidy



Fig. 1. General layout of the mixing unit.

It was always the same every time we had a mixing session—missing leads, missing plugs, and a tangle of leads until once we had them sorted, it still seemed a mass of confusion. I had had my fill, and decided to do something about it. If I could build a permanent connecting unit that would accommodate three recorders then the nightmare of tangled connections could be ended. Tape units are made for incorporating into hi-fi outfits and are ideal for the purpose, but I had only the normal tape recorders for my use. My unit would have to be designed so that the tape recorders could be removed as and when necessary. Expense had to be considered and I decided to convert an old sideboard into a unit suitable to my requirements.

I based the design of my idea as a connecting, or mixing, unit on the telephone switchboard, which is constructed for the connection of audio lines. Splitting the sideboard down the centre gave me two cupboards, which, with the legs removed, would support the base board at a comfortable height for working the recorders. I made the base board six feet long and twenty inches wide, so that it would accommodate my two recorders and provide room for a script deck, still leaving room at one end for the occasional recorder.

The depth of the face portion was governed by the size of the amplifier which was the largest piece of equipment that would be installed in the face of the unit. Taking into consideration the amount of equipment I had to install, three feet six inches was the height of the face portion from the base board and it would require a length of four feet. Dividing the four foot length into three, so that the centre portion was long enough to take the amplifier, in my case fifteen inches, gave two good cupboards for the storing of tapes, etc.

Once the structure of the face unit was finished the boxing in of the recorders could be undertaken. Care had to be exercised here so that adequate ventilation could be provided for prolonged running of the recorders. I took care of this by extending the framework surrounding the recorders, so that it

projected forward, three inches over the base board. Templates of the decks of the recorders had to be made so that the fitting of the working top would be such that only the decks of the recorders would be seen. This working top I made into three parts to allow easy access to the connecting leads, and to facilitate the removal of the recorders. The centre portion formed my script desk. Naturally the recorders were of different heights, and the shorter of the two had to be packed up on the base board, so that the working top fitted flush.

Once again I borrowed from the GPO the idea for the filling in of the centre portion, by using $1\frac{1}{2}$ inch strips of wood instead of a solid piece for the front. In this part a number of shelves were constructed and spaced to take the monitoring speaker, amplifier, tuner, mixer, and still leave space at the

bottom for a panel of sockets. With the doors fitted to the cupboards, the construction of the unit was completed, at least as far as the woodwork was concerned. The finish of the unit was to be such that it matched the remainder of the furniture in the room. Having in mind that old polished wood, hard-board, new wood and reclaimed wood had been used in the construction, only a coat of flat paint would reduce the surfaces to a common factor. I used a light stone flat paint to give a uniformly even surface ready for the next process.

'Matsine' stainer, applied almost dry and rather thin, will transform a painted surface into one resembling natural wood. Two coats of good varnish, and I had a piece of furniture, ready to be equipped with my machines, and the means of connection.

With this part of the job finished, I then got



Fig. 2. Close-up view of a tape recorder recess and the main jack and socket connecting system.

down to connecting the various pieces together. I had decided to use standard jack plugs for interconnecting the pieces of apparatus and sockets for the various inputs. Two pieces, suitably stained and drilled to each take six sockets, were cut from the quarter-inch-thick wood to be used for the filling in of the centre face portion. Twelve sockets were fitted in position, and using co-axial cable the inputs to the amplifier were connected to two of the sockets. At this point I also connected the output from the amplifier via a two-way switch, to the monitoring speaker, and an extension speaker. This was a permanent connection so that one or the other of the two speakers are always connected. The tuner was the next to receive attention, its aerial being the only input and therefore connected direct. The mixer, having four inputs, also had four input sockets. Next came the recorders and one being a stereo machine required two input sockets. The other, a mono recorder, required only one. These three sockets were connected by co-axial cable to the appropriate plugs for the machines in question. Of the remaining sockets, one was tapped in on the extension speaker with a second for a pair of monitoring earphones, the last being extended to the side of the face panel so the occasional recorder could have its own input.

At the rear of the script desk I made provision for a double row of jack plugs, which are the outputs. Three of these are for the two recorders, and are connected by the same means as the sockets. Two are the outputs from the mixer, an essential feature, because one output can be connected to a recorder, and the other to the amplifier so the loudspeaker monitoring facilities are possible.

Another output is from the tuner, and two are extended again to the side for the occasional recorder. Two plugs are interconnected so that if required two sockets can be connected together. One is also used for monitoring purposes on one of the recorders. For easy identification, all the plugs and sockets are marked with their use and for this I used the 'instant lettering' sets which can be purchased from most art shops.

Before my unit could be operative, mains power was required and the safeguard of a pilot light was incorporated in the line, so that there could be no doubt that power was available. I wired in a ring mains circuit, giving each piece of equipment its own power point and in the case of the amplifier, which has no illuminated panel, its own neon indicator lamp. Two extra power points were fitted, one for the occasional recorder, and one under the face portion for a 9 volt power

supply for the transistorized mixer. Also in the space beneath the face portion I installed an oscillator which supplies the pulsing for synchronization with a slide projector. Its output was also taken to one of the jack plugs.

My unit was now complete, except for the filling in of the face of the centre portion, and this was done by using narrow strips of hardwood, some of which had to be drilled to allow the control spindles of the amplifier and tuner to pass through. The point I had overlooked was having only one output from the tuner, so I connected a second output via a switch to the amplifier. This allows the normal output via the jack plug to be connected to a recorder and to the amplifier so one can listen to the programme. If only the recording is required the connection between the tuner and amplifier can be broken via the switch.

This method of construction leaves room for additions at anytime to the unit and the size can be varied to suit the space required. The greatest advantage is, of course, the absence of tangled leads, or even exposed leads between the various pieces of equipment, as they are all under cover. This design is practical, and attractive, and with four cupboards will accommodate the impedimenta associated with tape recording.

KEEP TABS ON YOUR TAPES

Owners of tape recorders invariably make a list of the recordings made, but how many really make a proper index so that searching time is cut to a minimum? This omission can be quite a nuisance and very time-consuming. Friends wonder what's going on while they wait for the much-talked-of programme to commence or continue. But all this embarrassment can be cured very easily indeed with just a few 5 x 3 inch cards and a small box to keep them in, and just an hour or two of time. With these, a fully cross-referenced card index can be made so that any particular recording can be found on reference to one card only. Three sets of cards are required, one filed under the tape number, one under the 'title' of the recording and the third filed under the 'artist's' name.

The first set of cards is headed *Tape No. - Side and colour of leader*. It records every item upon that tape in order of footage, giving title and name of artist. The second set of cards records the titles, the artist, tape number, side, colour of lead and footage, while the third set resembles very closely set number two except that the columns marked *Title* and *Artist* are reversed to read *Artist* and *Title* respectively.

With this system one can find the *Beatles* submarine recording or that odd little scrap of music used as an introduction to some TV programme recorded some two years ago because of its beauty. After a year or two you cannot really rely upon your memory for absolute detail; you need the assistance of pencil and paper records. The system also gives you a complete list of all recordings made on each side of each tape. You can find details of any recording from either the title, the artist or the tape number in just two seconds flat. All three entries can be made in less than a minute and is really well worth the little trouble taken initially in making the entries.

The 5 x 3 inch cards (postcards will do although a little larger) can be obtained along with alphabetical indexes and filing cabinets from Woolworths or Boots at quite reasonable prices. File the first set of cards numerically according to tape number and the other two sets alphabetically, and you will never lose a recording. If desired, the alphabetical index can be dispensed with and the cards just kept in alphabetical order as the total number of tapes is not likely to be too large, and quite a large number of entries may be made on each card. Use pencil for

by Edward Marshall

TAPE NO.	SIZE	COLOUR	
FOOTAGE	TITLE	ARTIST	
CARD No. 1			

TITLE	ARTIST	TAPE NO.	SIDE	COLOUR	FOOTAGE
CARD No. 2					

ARTIST	TITLE	TAPE NO.	SIDE	COLOUR	FOOTAGE
CARD No. 3					

making all entries so that they can be easily altered when one recording is removed from a tape to be replaced with a more up-to-date recording.

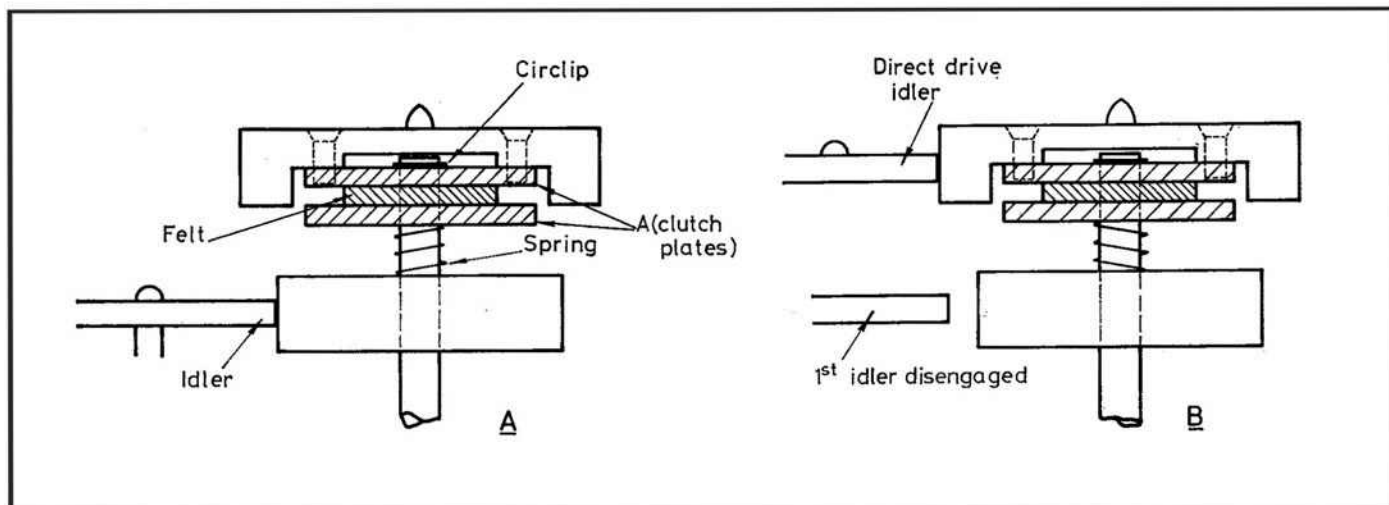


Fig. 1. (A) A commonly used spring clutch. (B) Clutch bypassed and direct drive applied for fast forward.

TAPE TAKE-UP

by Vivian Capel

One of the essential functions of any tape recorder is to spool the tape after it has passed across the heads. This is not quite the simple operation that it may at first appear, as there are several requirements which must be met by the *tape take-up system*. The chief complication is caused by the fact that as each layer of tape is wound on the take-up spool the effective diameter is increased and a slightly greater length of tape will be accommodated on the next layer. As the tape speed is constant, this means that the take-up spool will need to revolve slightly more slowly with each successive layer. Hence the rotational speed of the take-up spool continually decreases from the start of the tape right to its end.

Some idea of the range of speed variation required can be obtained by considering an example. One type of seven-inch spool in common use has a hub diameter of around 2½ inches. Hence the first layer of tape that will be wound on this spool will have a length of around 7½ inches. With a tape speed of 3½ ips this will mean that the take-up spool will be revolving at about 40 rpm. When the spool is nearly filled, however, no less than around 20 inches of tape will be spooled at each revolution. This would mean that the spool speed will now be around 11 rpm. It can be seen, then, that the speed ratio from the beginning to the end of the tape would be about three to one. To drive the spool at the exactly correct, continuously decreasing velocity would need a very complex drive system indeed if the spool were free-running. Fortunately matters are simplified by the tape itself which imposes a load that controls the speed of the spool and prevents it from turning too fast. In essence, then, the spool must be driven at a speed somewhat faster than the maximum required speed, and then the tape tension will limit this to the actual speed required. The question now arises as to what form of drive will meet this requirement, including others to be discussed later. Most of the medium and lower priced domestic recorders now on the market employ a single motor.

We will therefore consider the conditions existing in this particular arrangement. Any form of directly geared drive between the motor and the take-up spool would be impracticable. As the take-up spool fills and, as a result, slows down, the motor too would slow down, being directly coupled to it. This would mean that the tape speed would decrease and the take-up spool would revolve even more slowly, the whole mechanism eventually coming to a stop. Clearly the drive must be of an indirect nature so that it will allow the spool to revolve at its own speed, controlled only by the tape tension and without affecting the speed of the motor. A further requirement is involved here and this is the amount of torque or turning power of the spool, which must be sufficient to make the tape wind tightly and evenly on to the spool. It must also be sufficient to overcome any minor forms of friction such as the rubbing of tape on the inside cheeks of a warped spool. On the other hand, the torque must not be excessive. This would tend to stretch the tape, particularly the thin double- and triple-play varieties which are now in common use. Furthermore, there would be a tendency to pull the tape through the capstan and pinch wheel grip, and hence influence the actual tape speed.

Fortunately, it is possible to meet all of these various requirements in a relatively simple way by means of what is termed the 'slipping clutch' system. There are many versions of this arrangement but the principal one is illustrated in Fig. 1. The lower of the two clutch plates A is directly driven from the bottom wheel, which in turn is driven by the associated idler wheel. This bottom plate is keyed on to the shaft so that it can move in the vertical direction. The upper plate is not fixed to the shaft but is free to rotate independently. Between the two is a felt friction washer. A compression spring located between the bottom plate and the drive wheel forces it in an upward direction against the felt washer and upper plate. The latter is retained on the shaft by means of a washer and circlip. Screwed directly to this upper

plate is the spool turn-table. Drive is thereby transmitted to the turntable only by means of the friction of the felt washer between the two clutch plates. Thus the turntable can be slowed down or even stopped without materially affecting the speed of the bottom wheel. Of course, the friction introduced by this arrangement is bound to offer some braking effect which may tend to slow the bottom wheel. Provided the friction of the clutch is not excessive, and the motor is not under-powered, then the effect on tape speed should be negligible.

The amount of friction, which will of course affect the applied torque to the turntable, can be varied by several means. The texture and surface of the felt used and the total area of the felt in contact with the clutch plates will affect the friction, as will the tension of the compression spring. These points are carefully worked out by the designers and any attempt at an alteration in order to overcome any particular fault by the user, may result in other undesirable effects.

Another method used on many of the recorders manufactured by Philips Electrical and others is the *gravity clutch*. This is illustrated in Fig. 2. The bottom wheel is belt driven from the motor and the central shaft remains stationary. Illustration A shows the state of affairs during normal playing. The bottom clutch plate rests upon a small platform on the central spindle. It is driven by means of a peg extended from its underside which engages with a hole in the bottom wheel. Cemented to the underside of the turntable itself is the felt friction-washer; hence the turntable also forms the upper clutch plate. The turntable is weighted and it is this weight acting through the felt washer that provides the coupling with the lower clutch plate. Care must be taken not to tilt the machine far from its normal position, as otherwise a loss of drive can result and the take-up spool will cease to revolve, causing tape spillage.

When the fast forward key is depressed the centre spindle drops and so the bottom clutch plate drops away from the felt washer.

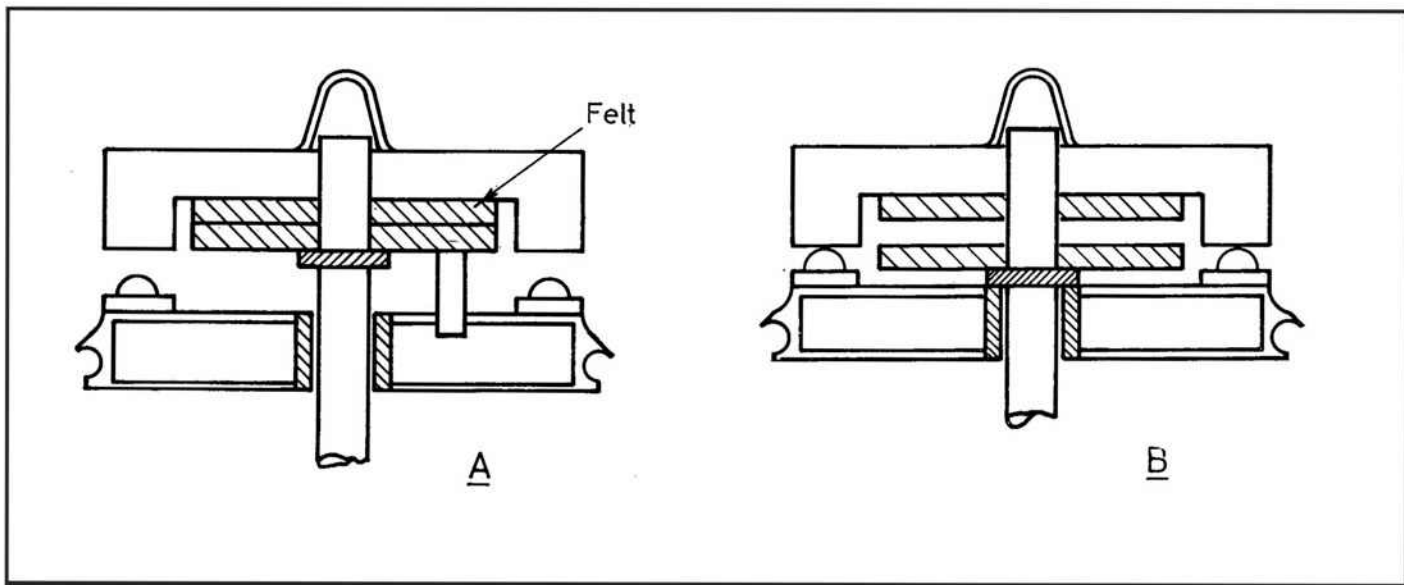


Fig. 2. (A) Gravity clutch as used on some Philips recorders. (B) Direct drive position for fast forward.

The turntable also drops until it rests upon the neoprene pads on the bottom drive wheel, which thereby affords direct drive. This state of affairs is shown in Fig. 2B. When a different tape speed is selected (multi-speed machines) the maximum speed of the take-up spool must likewise be altered. We have seen that for minimum friction the maximum free-running speed should be just a little greater than the maximum speed required at the start of a tape. Thus if the maximum speed required is around 30 rpm, then a speed of between 40 and 50 rpm would be a good free-running speed for the designer to select. If, however, the machine was now switched to the tape speed of $7\frac{1}{2}$ ips, then a maximum spool speed of at least 60 rpm would be required. Obviously the free-running speed used at $3\frac{1}{2}$ ips would be insufficient.

For this reason it is common to drive the take-up spool from the fly-wheel through either a belt or idler wheel. The fly-wheel is normally directly coupled to the tape drive capstan; hence the speed of the take-up spool will thus be automatically related to the tape speed. Speed changing devices are normally interposed between the motor and the fly-wheel. With some two-speed portable battery recorders which employ a collar over the tape drive capstan for the higher speed, the maximum speed of the take-up spool will have to be designed for use with the higher tape speed.

While it is the same tape spool turntable that is involved with the fast forward tape wind facility, the requirements for this function are completely different. Here there is no necessity for a variable speed factor, the tape speed being just as fast as the take-up spool will wind it on. One of the requirements with this function is in fact that it should be fast. A long wind or rewind time can be very tedious when trying to locate a passage toward the end of a 7 inch double-play tape for example. Another requirement is that the maximum torque available must be applied to the take-up spool which is necessary to overcome the friction of the paying-out spool. When the take-up spool is nearly full it tends to slow down, and as it is directly coupled to the motor this too will slow down. This means that a reduced torque

is applied. Additionally the paying-out spool is revolving much faster than at the start of the wind and this imposes an increasing load upon the motor. The effect of this is to cause an even greater reduction in the winding speed.

If there should be a loss of torque due to excessive friction in the paying-out spool bearing or in the motor bearings, etc, it is possible for the winding operation to cease before the tape is fully wound. Thus it can be seen why maximum power is needed, especially toward the end of the wind or rewind operation. For this reason the clutch system is completely by-passed during the winding operation and a separate drive is employed. This is shown in Figs. 1 and 2B respectively. Providing for a separate drive in this way obviously adds to the cost of the instrument and this is why the fast-forward facility is omitted on some of the cheaper battery portable recorders.

Coming now to the three-motor decks, matters are much simpler. No clutch or any involved drive arrangement is necessary. As

shown in Fig. 3, the motor is coupled directly to the take-up spool platform. This shows the usual method of connecting a resistor in series with the motor and a switch to by-pass this resistor. During playing or recording the switch is open-circuited; thus the current through the motor is limited and the torque reduced. If allowed to run free, that is without the restricting load of the tape, the motor will run up to almost full speed, being dependent under these conditions solely upon the mains frequency. When a load is applied because of the tape tension the speed will slow down to the required amount. If this, or a similar arrangement was not made, then excessive torque would be applied which could damage the tape. As it is, the motor can be slowed almost to a stop without any ill effects. To achieve the fast forward function, all that is required is to close the switch, thereby short circuiting the resistor. Thus the motor will drive the take-up spool directly at full power. A feature of the three-motor decks is that the wind and rewind times are much faster than for the single-motor variety.

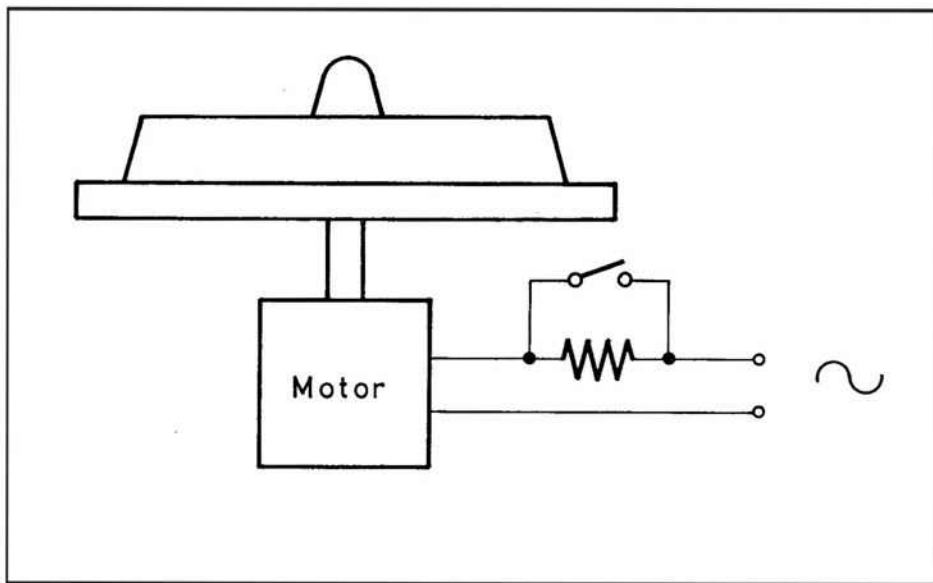


Fig. 3. Take-up drive with connections as used with three-motor decks.

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TEST REPORT GOODMANS MEZZO II LOUDSPEAKER

by Peter Knight

There are a number of ways of testing loudspeakers, ranging from clinical, objective laboratory tests to less scientific subjective tests. Objective testing of all-embracing exactness can only be performed by energizing the loudspeaker in an acoustically dead room, known as an anechoic chamber and then plotting, graph-like, the way that it reproduces its sound through an accurately calibrated microphone-amplifier-indicator channel.

This is fine for the designer of loudspeakers and is indeed essential, allowing him to mathematically compare one set of conditions or parameters against others. He can also discover what adjustments to make to the driver, crossover network, enclosure and so forth and so optimize his integrated design. Let's face it, the listener, while possibly vaguely interested in the objective aspects, is far more concerned about how the loudspeaker is going to sound in his lounge when connected to his own hi-fi. No matter what objective tests appear to tell, the final arbiter is the brain of the listener; this final link in the hi-fi chain is truly subjective!

We must also remember that the sound that we hear is not the true sound generated - or translated - by the loudspeaker, but sound which could be considerably 'coloured' by the character of and the furnishings in the listening room. The sound of the orchestra reaching the studio microphone is itself coloured by the acoustic environment of the concert hall to varying degrees, governed by the views of the sound consultant when the hall was designed; it is further modified in the listening room, as just mentioned. The influence here lies in the volume of the room, the heavy and sound-damping furnishings, the number of people, the position of the loudspeaker and even the room temperature! Small wonder, then, that true objective testing tells the listener so little about how the speaker will sound at home. There is also a vast difference between listening to a speaker in a dealer's showroom and the same speaker at home in the lounge. One cannot decide what a loudspeaker system is like by a quick listening test in a dealer's shop. The speaker must be run under known conditions, energized by an amplifier of known performance and fed with known programme material. This was basically how the Goodmans Mezzo II was

tested; indeed, this is how we test all loudspeakers at ATR. One has to use the loudspeaker for a number of weeks, and finally ask: is this a loudspeaker that can be lived with?

Since only a single Mezzo II was sent for test, the testing could only be for mono. The speaker was permanently connected to one 15 watt channel of a stereo amplifier. The other channel was connected to speakers of well-known characteristics and performance. Switching and controls allowed for listening to both speakers together or separately.

The Mezzo-II is an infinite baffle design of dimensions suitable for bookshelf placement. It is a follow-up from the acclaimed Goodmans Maxim, one of the smallest loudspeakers in the world. It is larger than the Maxim but smaller than the Magnum-K, of the Goodmans 'M-Range'. As would be expected, therefore, its bass is a little more extended than the Maxim (down to 40Hz, against the Maxim's 45Hz), but not as low as the Magnum-K which goes down to 30Hz. The bass is generated by a 12 inch long-throw driver and the treble and mid-frequencies by a 4 inch unit with sealed rear to avoid its output being affected by the bass frequencies. The two units are coupled through a crossover working at 1,200Hz into a common 8 ohm circuit. The speaker is thus highly suitable for the Goodmans Maxamp which has this impedance output (in addition to a 4 ohm output).

Treble Control

A feature of the loudspeaker is a variable attenuator between the crossover and the mid-range/treble unit. This is regulated by a small knob placed in a recess at the rear of the cabinet. This sort of control is not particularly new, and the author can recall the use of a number of early speaker systems with the idea, particularly an early Pamphonic, on which the attenuator was labelled 'presence control'.

The depth of the cabinet is a mere 9 inches and because the attenuator control is inset it does not protrude outside this dimension. The recess also accommodates a DIN signal input socket. The other two dimensions are 12 inches (width) and 19½ inches (height) and the cabinet cross-section is illustrated in Fig. 1. Teak or walnut finishes are available, and an acoustically transparent material in very dark grey, covered with

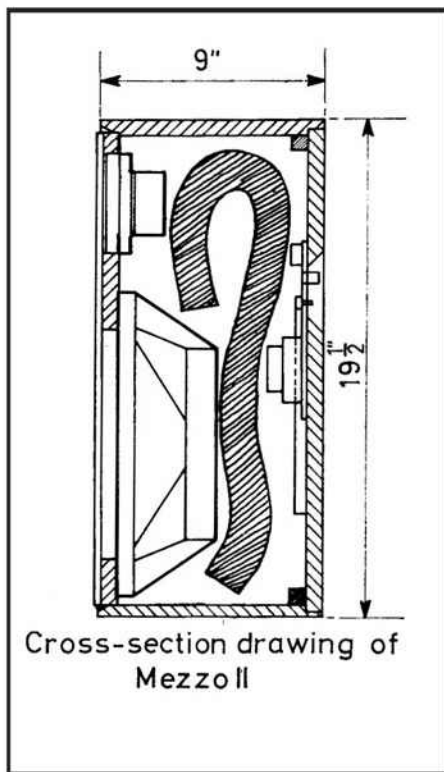


Fig. 1. Cross-section of Mezzo II by Goodmans.

white flecks, forms a highly attractive front on the teak test sample. Quite a bit of thought was given to the choice of material for the front to avoid muting the treble while maintaining attraction.

The cabinet can be placed with its largest dimension either vertically or horizontally, and a big attribute is the 9 inch depth which allows the speaker to fit comfortably on almost all bookshelves or stands of restricted depth.

The speaker was tested on sine and square-wave inputs in addition to music. The idea was to evoke resonances in the system at high power, so accordingly signals were fed in at 15 watts, the full rating at rms value. Sine-waves at this power were handled very smoothly over the entire frequency spectrum without a breath of distress. There were no resonances in the loudspeaker but plenty in the room in which

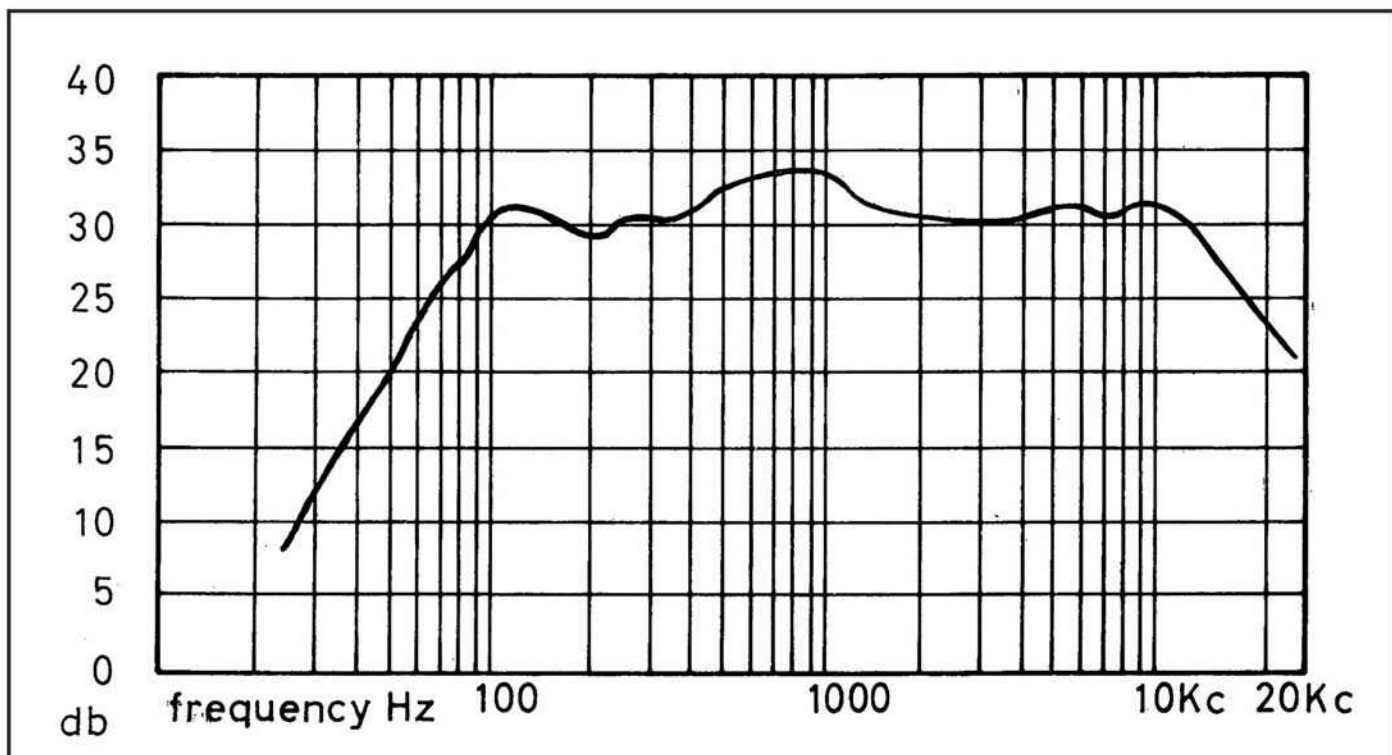


Fig. 2. Maker's response curve.

these tests were made. The harmonics of square-waves were handled equally as well and a white-noise input from a tape record confirmed the smoothness of response. The response curve as produced by the makers is shown in Fig. 2.

When set-up for reproducing normally from the author's hi-fi systems, the loudspeaker was placed on a low table not far away from a very much larger corner speaker system and it was sometimes difficult for people to realize that the sounds were emanating from the diminutive Mezzo II and not from the larger, corner system. This was particularly noticeable at high input powers. Indeed, the Mezzo II seems to thrive on large inputs and it certainly had this during the tests from some powerful organ music. At reduced powers some tendency towards box-like reproduction was observed with the speaker away from the corner of the room or a wall. The best position for bass gain was in the corner of the room, but very good performance was discovered with the speaker horizontally about 4ft from the ground and about 1ft from the wall on a bookshelf. The author's listening room is fairly well damped with carpet, wall-paper and the normal number of arm chairs and so forth and is approximately $20 \times 17 \times 9\frac{1}{2}$ ft high. In this environment the speaker control always had to be set for maximum treble output (i.e., minimum mid-range and treble attenuation). The treble control on the amplifier could then be run flat, with the bass given about 3dB (power) lift. Some might have preferred cutting the treble a little at the speaker and the bass-boost at the amplifier.

The speaker's treble attenuator is really a kind of presence control and could probably be of greater use than found by the author in smaller and possibly less damped environments. It does allow one to adjust at

the speaker, rather than at the amplifier, for room conditions. In short, it makes the speaker flexible, and to some extent gives the effect of a variable crossover. After running the speaker for three weeks under domestic conditions, your reviewer can vouch without any question of doubt that it is a speaker that one can live with; but would we expect anything else from the house of Goodmans?

It is a little better (bass-wise, at least) than the Maxim because of the higher price and extra size. Nevertheless, it is designed for modern hi-fi living where bookshelves

rather than walls and corners of rooms are now called upon to carry the speakers. A good point is the 8 ohm impedance, making it highly suitable for so many of today's transistor amplifiers. A good buy at £28 7s 0d.

Maker's Specifications

Frequency range: 40 to 20,000Hz. **Crossover:** 1,200Hz. **Attenuator:** Controlling mid- and high-frequencies, flush-fitted into cabinet rear. **Power handling:** 15 watts rms (30 watts American). **Impedance:** 8 ohms. **Finish:** Teak or walnut to order.

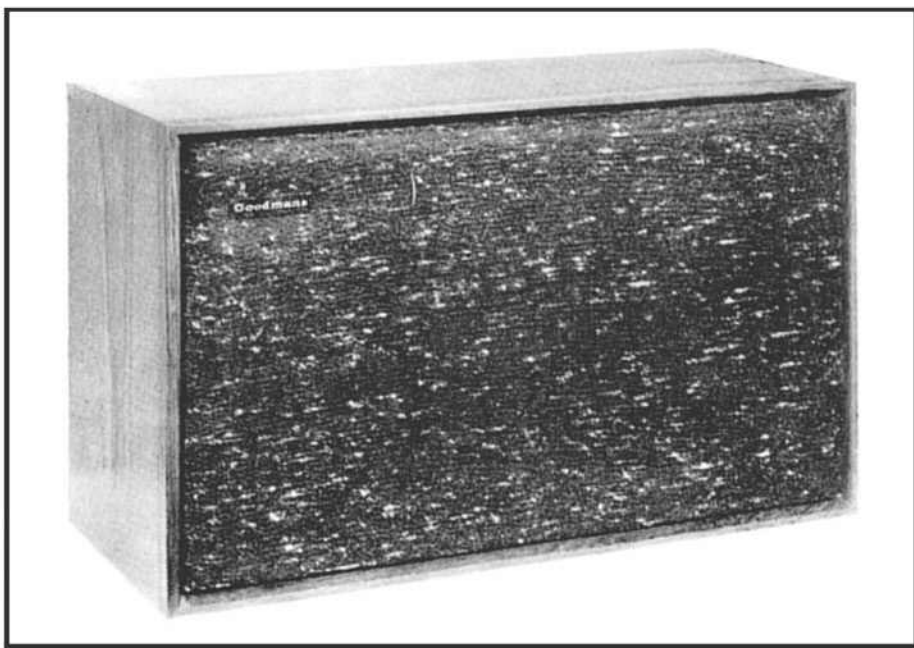


Fig. 3. General appearance of loudspeaker in horizontal orientation.

TAPE AND DISC REVIEW

by Russ Allen

To begin with pre-recorded tapes, let's give precedence to age, **The Fabulous Ray Charles, Music Tapes 4-track stereo MTR-24, 3½ or 7½ ips** Subtitled *The Original Ray Charles the First Vault Masters That Started a Legend*.

Recorded probably about ten or more years ago these tracks present Charles as a simple singer and player of the Blues. I like the uncluttered accompaniments, which I find preferable to full-orchestra-celestial-choir type of thing he uses today and I also like his singing style of this era more, less mannered, ungimmicky. On some tracks he sounds quite Nat King Cole influenced. But on all the twelve numbers he sounds really great, both vocally and piano-wise. He is accompanied by just bass, drums and an electric guitarist who contributes some pleasing solos.

The dubbing has been well done though there is some acetate hiss and crackle as is only to be expected, but well worth putting up with if you care to enjoy a superb sounding vintage Ray Charles at his bluesy best.

Sound Venture: Georgie Fame and the Harry South Big Band. Columbia TA-SX 6067 Twin-track Mono 3½ ips.

The best jazz vocal record emanating from Great Britain that I've heard. Fame sings a mixed batch of ballads and up-tempo songs entertainingly and tastefully with the exhilarating backing of the South band. In fact, I'd go so far as to say that this record will stand out as one of the best vocal records I've heard. The arrangements, presumably Harry South's, are just right, lifting the singer to his greatest possible heights and, further, they have been recorded well so that nothing has been lost and everything gained. Screaming brass, the beat – it is all very, very exciting.

Fame, to me, is a revelation. I've heard him on pop programmes and he was OK, but here he is so complete. He handles slow ballads like the delightful, new to me, *It's for Love the Petals Fall* and *Funny How Time Slips Away* with tremendous feeling and ability, and is even better on the up-beat tunes *Paps Got a Brand-new Bag*, etc. Georgie Fame is a highly versatile performer and, coupled with the grand swinging Harry South group plus the top quality recording, makes this a fabulous tape. A very sound venture indeed!

Soul of Mann – Manfred Mann. HMV Twin-Track Mono 3½ ips. TA-CLP 3594. I would like to know a lot more about this album than HMV have cared to tell us. All they have told us is the tune titles, which is a pity because it is such a good record with so many different things happening. Side one kicks off with the *Abominable Snowman* dominated by a strong blues bass – it's good – and then on to Sonny and Cher's *I Got You Babe*, again with a very

strong bass line and faster than the original – also good.

Bare Hug, the next item, features some very pretty flute, organ and vibes ensemble with the flute excellent in solo as well. *Spirit Feel* follows and is very jazzy with exciting electric bass line and fine solos from alto and organ. For good measure they throw in a jazz waltz, *Why Should We Not?*, followed by a vocal number with some fun harmonica called *LSD* and then going on to improve the Stones' *Satisfaction* which makes an amusing instrumental that features some solo drumming complete with echo.

Just to show how versatile everyone is, whoever 'they' are apart from Manfred, they next do an MIQ on *God Rest Ye Merry Gentlemen* with the addition of some more tasteful flute playing plus some lovely vibraphone and psuedo harpsichord.

With a big brass section and Mann playing Soul type organ we get Pete Townsend's *My Generation* and pass on to Rock and Roll, *Mr Anello*, with more harmonica and Boogie Woogie piano. A very fine tenor player pops up on *Still I'm Sad* plus trumpet, also good, both guys probably being responsible for the solos on Nat Adderley's *Tengo Tango* which stomps along merrily to *Brother Jack* – which isn't the Who one, but is based on that little French nursery rhyme you may remember – and finally to another Adderley number, *Sack O' Woe*, which features piano, vibes, harmonica and organ.

An unusual collection and certainly not meant for the pop market but a sure hit for those that go for the Jimmy Smith type of jazz. Very interesting indeed. Excellent in almost every way, though the organ tends at times to swamp the arranged backing, but with first-class solos.

Like Mann, it's got soul!

The Lonely One – Bud Powell Trio. World Record Club TT 595 Twin-track Mono 3½ ips.

Powell piano, with George Duvivier, bass, and Art Taylor, drums. The superb, sad, Negro pianist died in 1966 in New York, where in the early 'forties he developed his driving percussive piano style around the jazz clubs, particularly at Minton's, where he listened to Thelonious Monk, Charlie Parker, Dizzy Gillespie, Charlie Christien and others of the then *avant garde* Be-Bop school.

Deeply troubled by repeated mental breakdowns and constant recourse to artificial stimulants, Powell's forty-two years of life were not easy ones, yet during his spells of normality he produced some of the finest piano jazz on record.

This recording was made in 1955 when some say he was past his best, but it still makes a tremendous album. Duvivier and Taylor back him up splendidly, both also contributing some interesting solo work. Well recorded and with that little *gen sheet* tucked into the box, a refinement for which

I again applaud World Record Club. I shall play this recording a lot, for it has so much of interest apart from its memorial value. Now to Longplay Hi-Fi discs and two more from that fantastically cheap *Supraphon* label starting with **Dmitri Shostakovich – Symphony No. 1 in F op. 10 and Festive Overture op. 96. Czech Philharmonic** conducted by Karel Ancerl.

Shostakovich has written thirteen symphonies to date. This was his first and was written while he was still studying at the Leningrad Conservatory between 1924 and 1925. It has a cheerful marching theme to begin with, a great martial burst to end part one. Full of surprises and contrasts; moving bass themes against towering flutes and violins, the subtle use of percussion and, in part two, the dramatic piano runs.

Part three is full of sadness, a feeling of impending doom and so on to the fourth part rising to a stormy percussive ending, which in itself is a surprise. Not his greatest work naturally but with much that is brilliant and in which we can see the beginnings of the maestro's style.

The Festive Overture was written thirty years later in 1954. It is not a great work but is simple, bright and pleasing to the ear and not typical Shostakovich.

Recording, as on previous discs, is of an extremely high standard and the balance and packaging most satisfactory.

Bela Bartok – Concerto for Piano and Orchestra No. 3 and Concerto for Viola and Orchestra. Czech Philharmonic conducted by Karel Ancerl. *Supraphon Sua 50439 Stereo.*

Hungarian by birth, Bartok went to America with his family in 1940 at the age of 59 and died in New York only five years later. These two works were conceived during this period and neither completely finished at his death. Of the Piano Concerto, only seventeen bars were missing and these were completed according to his sketches by Tibor Serly, a personal friend who also arranged and instrumented the *Concerto for Viola* which was sketched out originally for the British viola player, William Primrose. Both works, and particularly the Piano Concerto, are full of nostalgia, no doubt for his native Hungary. Beautiful music and anyone who may be frightened of percussive piano style or discordant writing must forget such thoughts and listen to some truly wonderful music.

La Boutique Fantasque – Rossini – Respighi. L'Apprenti Sorcier – Dukas. The Philharmonia Orchestra conducted by Alceo Galliera. *World Record Club Stereo Disc T 582, 33½ rpm.*

La Boutique Fantasque is ballet music, the story of a toy shop where the dolls are quite lifelike and, when the shopkeeper has retired to bed, come alive. It was first performed in 1919, a Massine-Diaghilev production. The music stems from some short piano pieces written by Rossini after he had officially retired and were for the amusement of himself and friends. Respighi orchestrated several of them for the score of the ballet. The resultant music is light, bright and witty, prettily interpreted by Galliera and sparklingly played by the Philharmonia. Recording is splendid and stereo very good.

Any of you who have enjoyed Disney's brilliant *Fantasia* will be familiar with

continued on page 35 31

THE THINGS YOU SAY

Copyright – an accusation?

Re. Mr Sweetman's letter in the May issue of *ATR* on the question of copyright.

He states that he was surprised to read, among other things in your journal, that the South Devon Club makes choral recordings! Perhaps Mr Sweetman would be willing to state what he has against this. The Club, in common with many clubs, through the Federation of British Tape Recording Clubs, holds a MCPS licence. In any case, many of the choral works referred to were specially written and/or arranged by a local musician and full permission and co-operation from the performers obtained. One item was based on the old nursery theme *Baa, Baa, Black Sheep*, the composer of which we could not trace, otherwise his or her permission would have been obtained also. In some cases where professional musicians are employed, the appropriate Union rate has been paid.

Mr Sweetman also seems to be surprised to read about tape clubs producing stereo 'soundtracks' for slide features. May I point out that we recently held a very successful tape/slide competition for which we had ten finalists, none of whom infringed any copyright. Several of our members also record stereo quite legally – it is possible!

We think Mr Sweetman should make sure of his facts, before accusing us of 'illegal' acts, and we feel an apology should be forthcoming. Is he underestimating the ingenuity of tape club members?

The MCPS are fast enough in criticising people for copyright infringement, but when I wrote to them *twice* last year with a copyright query, I did not even get an acknowledgement. The *Performing Rights Society* not only acknowledged a letter to them, but forwarded my letter to the MCPS – still no reply! Because of the MCPS silence, I could not carry out a recording job which was probably done by someone who didn't bother about a licence.

We thoroughly agree with the MCPS protecting the rights of their members, but surely as an authoritative body they should help to ease the complicated copyright situation, and advise and help those who do not wish to break the law.

We would add one point which will probably please Mr Sweetman – the copyright laws are pointed out to our members, and they are not encouraged to break them.

G. Furneaux,
Hon. Secretary, South Devon Tape
Recording Club

Torquay, Devon

... and indignation!

I have just waded through two long columns of pompous verbiage, written by a Mr Sweetman, who seems well-qualified for a job as an investigator for the Inland Revenue. (May issue *ATR*).

When I first started recording fifteen years ago – and when there were very few magazines for people to write silly letters to – no one bothered a jot about the poor little chap who recorded music from the radio or taped

a disc or two which he had bought. Now, as is usually the case, a blob appears on the landscape.

It's a strange thing that when something new and exciting is developed, some crank or cranky organization appears almost overnight to kill the excitement. It seems that there are people and organizations with nothing better to do than say 'ah, so you're enjoying yourself, are you? Well, we'll soon put a stop to that'. Let's be honest. Every serious recordist – and even the flippant ones – regard this copyright nonsense and its extraordinary societies as a silly and pointless waste of time. Silly because no one *really* suffers. Pointless because no one can really stop it. At least people are paying some sort of compliment to the artists they are pirating. Mr Sweetman's letter is, in my opinion, not only pompous but mean-natured. He gleefully picks out all the vicious crimes reported through *ATR* in the holy name of copyright. I wonder, has Mr Sweetman ever blown his car horn after 11 pm, or has Mrs Sweetman ever banged a mat against the wall? I would like someone to write a letter to *The Times* if either of these things occur! I make no apology for this letter. I am frankly fed up to the back teeth with all the bilge talked about this holy state of copyright. When fairgrounds, pinball saloons, coffee bars and motor coaches *all* pay their dues, then I'll say that we're all in it and we've got to pay up. Until then I take the view that the artists on disc and on radio and television have been darn well paid for their performances and the record companies have reaped a nice fat reward as well. I know all about copyright and the law, but some laws are meant to be bent and in general nothing happens. I have never infringed this law, but I do not want reminding of it all the time by some society or other. Someone once said that if something enjoyable is discovered, there is bound to be a society or a crank who will say that it is illegal, immoral or fattening.

Barbourne,
Worcester

P. L. Bastin

Tapesponding Piracy

Your readers might like to know of a case of 'pirating' going on in Worldwide Tapetalk. A 'Miss Margaret Young' who gives her address as '108 Pemuda Tengah, Klaten, Djateng, Indonesia' is sending out pre-printed postcards in English to thousands of tapespondents asking them to tapespond with her, with a view to exchanging gifts, and she requests that they send her *textbooks and carvings*. She says she is a medical student, mother owns a drug store and father died ten years ago. She also requests that all gifts should be sent to her by *registered mail*. Miss Young mentions WWTT by name and is writing to WWTT members using their WWTT membership numbers, so she has obviously obtained copies of WWTT Contact Lists somehow. She is a pirate.

Many people have sent her textbooks to get nothing in return and no answers. I myself have sent her a letter inviting her to start the proceedings, and nothing started. Many people have been taken in by this harmless-looking card. Please print this letter in your magazine as a duty to all tapespondents, and also to clubs, to inform them that this is happening so as to enable them to warn their club members in advance about 'Miss Young' or other pirates bearing similar identifications from Indonesia. When tapesponding is a hobby that relies solely upon *trust* for its survival, this type of thing cannot be tolerated and simply *must* be fought, exposed and stamped out.

Paul Bailey,
WWTT Teens Officer

Melton Mowbray,
Leicestershire

Local Broadcasting and the Amateur

When the names of the first Local Broadcasting Stations were given, I wrote to Mr A. W. Coysh (Deputy General Manager, Local Radio Development) at Broadcasting House, suggesting the FBTRC should be put in the picture in view of the possibility of amateur material being used.

The result was an immediate invitation to meet Mr Coysh (who is in charge of training). The meeting was on 10 April, their first day of full-time operation, and I received a friendly reception from Mr Coysh and his Training Assistant, Miss Janet Robertson. It was confirmed that the first seven stations to be named were: Radio Brighton, Merseyside, Sheffield, Leicester, Nottingham, Stoke-on-Trent and Manchester. Each would be controlled by a Station Manager who would be, in the main, autonomous. He would have engineering and administrative staff but the studio and control room would be capable of single-handed operation. Once established by the BBC and the Station Manager trained and installed, the Station would be run and financed by a Committee set up by the Local Authority.

The Station Manager would have the services of radio journalists and professional interviewers and could call upon BBC programmes in the 'bank' when the need arose. The main emphasis, however, would be local in approach and this is where the amateur recording enthusiast comes into the picture. There will be 'slots' in the programme when the Station Manager could insert a ready-made item of a local nature. Just the sort of work amateurs use their equipment and know-how for, and local 'know-how' is a very important factor here! The Station Manager would need a reserve of such items to draw upon at will. Being single-handed, he will not have time to select and edit the material down to the length required (probably anything from 1½ to 15 minutes). Material must be supplied ready for instant use and the screening required would be undertaken ideally by a panel from the local tape club or clubs or recruited from individual enthusiasts.

Material thus submitted would not normally attract a fee, although it is possible that certain out-of-pocket expenses could be met. This has a bearing upon the vexed question of copyright and we undertook to confirm that the existing licence granted by MCPS through us would cover members for such non-commercial work. If work of first-class quality emerges (and we are certain it will),

further items may well be commissioned and these would attract fees in the normal way.

As the national organization, we will be keeping in touch with local tape recording interests to encourage the establishment of small panels for immediate consideration of items already existing in various amateur libraries, and those which can be prepared. We will give all the assistance and advice we can in this respect to members and non-members alike. A point of detail here: although the Station Managers will have one playback machine capable of operating at 3½ ips, it will be preferable to submit material at 7½ ips. This does not exclude original recordings made at a lower speed provided that a clean transfer to 7½ ips has been made.

The first full set of equipment (destined to be installed in the ninth LB Station in due course) has been installed in Langham Place and is to be used for the training of Station Managers. They will attend in twos and threes for this training and we have been asked to visit each training session. We should then meet each Station Manager before he assumes full duties. We will explain the kind of work amateurs are doing (and are capable of doing) and establish the first contact between him and the local amateur representatives in his area. Where it is possible, we will have already contacted these local enthusiasts and shall be fully

briefed; there are, however, two more of the first nine stations still to be named and more to come. We invite amateurs in areas where there is any move to establish Local Broadcasting to contact us at once with their ideas of the best way to establish and maintain this valuable liaison with Local Broadcasting.

This is the exciting challenge to amateur tape recording enthusiasts in these areas. If good quality items of local interest can be made available as package deals there is every wish on the part of the BBC for these to be used by the Station Managers. Given that those sent in are of good quality and content, they will be welcomed by them.

The opportunity so many of us have been asking for so long is quite suddenly upon us. It would be a miserable turnout if we cannot meet the requirements. It will probably be a small and slow start but it could lead to much more. The amateur tape recording movement's claim to be creative, as well as entertaining, may well stand or fall by the response made to this sudden opening of the door.

The Federation and the National Tape Recording Magazines will do all in their power to help and advise – the rest is up to you!

John Bradley,
PRO, Federation of British
Tape Recording Clubs

Wallington, Surrey

Problems of London Soundhunting

I have just read Bob Danvers-Walker's interesting article *Sounds of London*. It is my experience, however, that amateurs do not always receive an enthusiastic welcome when they attempt 'on location' recordings. For example, prior to an organized visit to the Tower of London to view the famous Ceremony of the Keys, my club was informed in writing that recording is prohibited and this warning was repeated verbally when we arrived.

As for Speakers' Corner, while attempting to record general atmosphere sounds, I was threatened with physical violence by a militant group who refused to believe my explanation that I was an amateur and that I was *not* intending to edit the tape in order to distort the views they were expounding. Other interesting places in London are also 'difficult'—no recording is permitted at London Airport or in Regent's Park Zoo. Not only tape recorders but cameras are taboo in Southend's Kursaal Pleasure Gardens and while a marvellous steam organ at Woburn Abbey is not out of tune, it is most certainly 'out of bounds'.

I sometimes feel that the German word for recording tape—*Magnetophonband*—should perhaps be more correctly spelt *Magnetophonbanned*!

K. J. Perks

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A TO Z IN AUDIO AND VIDEO

Bass Correction

This term implies an equalizing circuit for correcting the bass response shortcomings of a circuit or amplifier. For instance, if the bass response is falling at, say, 6dB/octave from 200Hz, correction is possible by arranging for a circuit to provide a lift of 6dB/octave from 200Hz downwards. The bass signals will then be given greater amplification than signals above 200Hz and an overall 'flat' output will result.

This represents the fundamental technique of equalization in tape recorders, for instance, where the signal emf (voltage) delivered by the replay head rises at a rate of 6dB/octave to the turnover frequency.

Beats

When two or more sounds or frequencies are combined so-called beat notes are created. When these are produced in pickups, loudspeakers and so forth they are referred to as intermodulation distortion. The prime beat notes are equal to the sum of and difference between two sounds or frequencies. For example, a frequency of 50Hz will beat with a frequency of, say, 40Hz to produce sum and difference frequencies of 90Hz and 10Hz respectively. In electrical circuits and amplifiers such beat notes (i.e., intermodulation distortion) are aggravated by non-linearity.

Black Level

This is the level of a video signal between the tops of the sync pulses and the start of the picture signal proper, as shown in Fig. 4. The top of the picture signal waveform is called peak white level and the bottom of the sync pulses blacker-than-black, as shown in the diagram.

Bias Adjustment

This refers to a preset control which can be used to regulate the amplitude of the hf signal from the recorder's oscillator applied to the recording head. Adjustment is made to suit the nature of the recording tape, the amplitude of the recording signal at the head, the frequency response of the record/replay amplifier and the signal/noise performance.

Bias Frequency

This is the frequency of the hf oscillator signal used both for recording bias and tape erase. The frequency should be as high as possible, but a limit is usually imposed by the losses in the recording and erase heads. The best recorders, though, use a frequency not less than four times the highest audio frequency to be recorded. If the bias frequency is too low, a form of intermodulation may occur which can produce a warb-

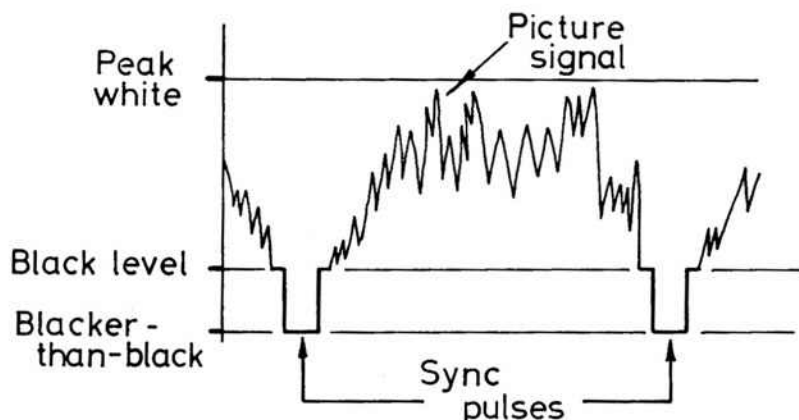


Fig. 1

ling background noise together with an 'edgy' effect on the replayed recording. Professional machines employ a bias oscillator running as high as 250KHz, while some less exacting domestic machines may run at about 30KHz.

Binaural System

This refers to the basic stereo arrangement, but where the A and B (left and right) signals are channelled into, say, two separate ear pieces or head pieces of headphones instead of into two separate loudspeaker systems arranged in stereo formation. Lack of acoustics coming into play in the binaural system detracts from the true stereo effect, and for this reason stereo headphone listeners sometimes provide for a small degree of mixing of the A and B signals.

Brightness Control

This is the control on the video tape monitor which regulates the overall brightness of the reproduced picture with respect to the black parts of the scene. It has its counterpart in the ordinary television set, and is used for correcting the contrast (black-to-white) ratio of the picture in conjunction with the contrast control. Too much brightness and too little contrast gives the picture a flat appearance, while too little brightness and too much contrast gives a so-called 'soot-and-white-wash' effect.

Bulk Erasure

When making a recording, the tape first passes the erase head in the recorder and thereby all previous recordings are deleted. However, it is sometimes necessary – albeit, desirable – to erase all previous material

from a tape before actually using it for recording. In this way it is sometimes possible to obtain a slight improvement in the signal/noise ratio. The device which makes this possible is called a *bulk eraser*.

It consists of a fairly large coil of wire wound over a soft-iron pole piece. The coil is connected to an ac mains supply. When energized, rapidly changing magnetic fields of tremendous strength are created around the pole piece and when a spool of tape is held close to this the oxide on the tape is taken through rapid stages of alternating magnetic saturation on positive and negative half-cycles. This clears all residual magnetism, i.e. recording, and to avoid the tape retaining a specific level of magnetism when the device is switched off, the spool of tape is gradually removed from the influence of the field as the coil remains energized. The erasure is not switched off until the tape is well outside the influence of the magnetic field.

Cartridge

This term applies to pick-up inserts and tape recorder tape cassettes. A pick-up cartridge may be magnetic, ceramic or crystal, the latter two working on the piezo-electric principle, and the former on the electro-magnet principle.

Cassette

This arrangement takes the form of a plastic case containing both the supply and take-up reels, the former holding a supply of tape. The design is such that the cassette as a whole can be easily inserted or removed from the tape deck of a recorder, thereby avoiding the problems of tape threading.

The latest cassettes are loaded with tape which is narrower than standard width tape and designed for use with special 'cassette' recorders only. Some early cassettes catered for standard tape and facilitated auto tape-changing and track switching in background music machines. Some background music machines incorporate an 'endless cassette', in which the tape comes from one end of the spool and rewinds continuously on to the other end.

Channel Separation

This term refers to the isolation between the two channels of a stereo tape recorder or stereo amplifier system. The isolation is often given in decibels of cross-talk between the two channels. A separation of 20dB (10:1 voltage ratio) is reasonable while a separation of 40 dB (100:1 voltage ratio) is excellent.

Class Amplification

The type of output stage used in audio amplifiers and tape recorders is signified by the capital letter A and/or B. Class A means that the output stage biasing is towards the centre of the characteristic curve of the output valves, so that the signal at the control grid never causes anode current cut-off on any part of the signal cycle. Because the positive and negative half-cycles of drive signal cause corresponding and equal increases and decreases in anode current, the average anode current remains constant up to full drive. If a current meter connected in the anode feed circuit of such a stage shows current fluctuations when the stage is under drive, either the biasing is incorrect or the drive signal is overloading the valves. The latter could cause the valves to reach anode current saturation or anode current cut-off on the positive and negative drive half-cycles respectively.

Class B means that the biasing is adjusted for almost complete anode current cut-off under conditions of quiescence (i.e., zero signal drive). Then as the drive is increased so the anode current increases, since each push-pull valve conducts alternately on positive half-cycles of drive signal. This type of biasing is common in transistor amplifiers for it reduces the average dissipation of the transistor output pair. With class A, of course, the anode or collector dissipation remains at high level even when there is no drive signal.

Class AB is that in which the values of bias and drive signal applied to the grids of the valves or bases of the transistors cause anode or collector current to flow in each element for appreciably more than half, but less than a whole, cycle of drive signal. This class of operation is more efficient than class A and is often used in valved hi-fi amplifiers. The least distortion is given by class A amplification, but higher feedback in valved class AB amplifiers can bring the inherent distortion down to well below 1%. The even greater feedback possible in transistor amplifiers, owing to the general lacking of coupling impedances and output transformer, keeps the distortion generated by this equipment also well below the 1% level.

Comparator Switch

This is sometimes called an 'AB switch', the purpose of which is to quickly allow direct subjective comparisons between two signal sources. For instance, such a switch in one

position may give reproduction of the input signal going into a tape recorder and in the other position the reproduction of the same signal after having been recorded and played back from the tape.

A quick check of in-to-out quality can be very useful for estimating the operation of filters, tone controls, equalizers and so forth. Many ordinary tape recorders allow the signals applied to the recording head, while the machine is actually recording, to be compared with those applied to the input of the recording amplifier; but only the more expensive models have true AB switching where the signal actually applied to the recorder can immediately be compared with that recorded on the tape while the recording is taking place. This requires a separate playback head and amplifier system for the tape monitoring.

Common-base Circuit

This is a type of circuit in which a transistor is employed, the base element being common to both the input and output signals. A fundamental common-base circuit is shown in Fig. 2, where it will be seen that the input

signal is applied to the emitter and the output taken from the collector. Since the base of this circuit is invariably 'earthed', it is often called the 'earthed base circuit'.

The impedance looking into the circuit is very low and very high looking out from the collector and for this reason is often used in audio applications as an impedance converter. For example, it could be used to accept the signal from a low impedance (moving-coil or ribbon) microphone so that this can be fed efficiently to the high impedance input of a tape recorder. That is, one normally designed for use with a crystal or ceramic microphone.

The power gain is fairly high, as also is the voltage gain, but the current gain is less than unity. Remember, that the power gain is the product of the voltage and current gains. The circuit does not introduce phase shift, so that the phase of the output signal is the same as that of the input signal over its working frequency spectrum. This tends to cause degenerative rather than regenerative feedback and for this reason the amplifier stage is very stable.

To be continued

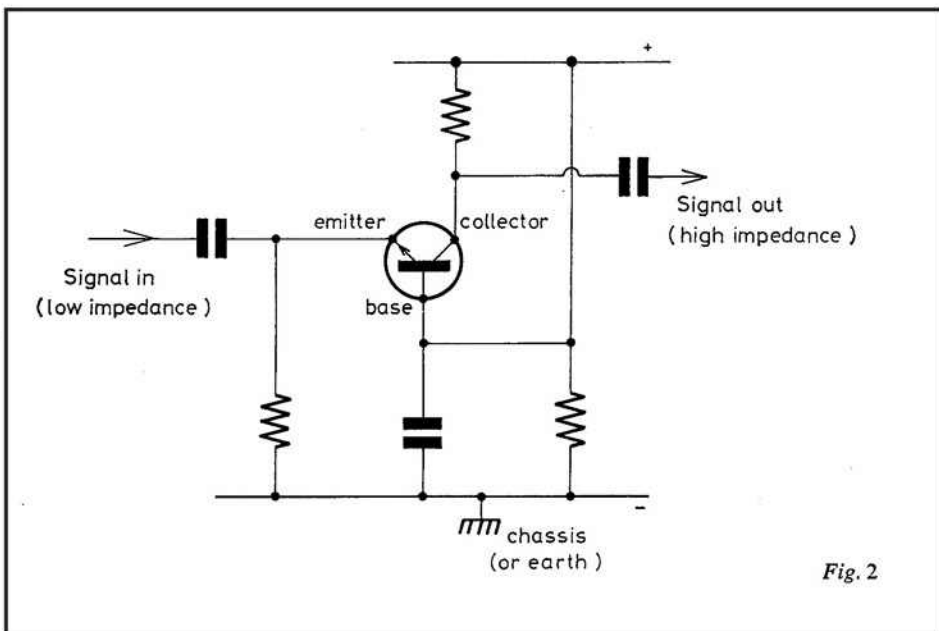


Fig. 2

TAPE AND DISC REVIEWS

continued from page 31

Dukas' *The Sorcerer's Apprentice*, the story from a poem by Goethe of the wayward magician's assistant who tries out his master's spells to try to make life easier for himself only to lose control and then forget the anti-spells. Luckily the magician returns in time and all is eventually well. The story is magnificently told in the music and I love it right from the subtle slightly mysterious intro through to the finale *fff* crash. A delightful coupling and extremely good value.

The sleeve is attractive and the notes thereon interesting, giving the stories of both items.

INTRODUCTION TO TAPE RECORDING PART 3

continued from page 5

can then be turned over, using first the top and bottom gaps again in succession, giving tracks 4 and 2. Alternatively, tracks 1 and 4 can be laid with the top gap by turning the tape over after track 1, and then tracks 3 and 2 by the same process but using the bottom gap.

Next month we shall investigate the advantages and disadvantages associated with half- and quarter-track recording in an endeavour to discover which is the best for domestic use.

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Classified advertisements in 'Amateur Tape Recording' cost 1s per word, minimum 10s. Box Nos. 1s 6d extra. Advertisements and remittances should be sent to Classified Advertisement Department, ATR, 9 Harrow Road, London W2.

PERSONAL

Major breakthrough in sleep-learning economics. At last we are able to offer a machine which is not only ideal for Sleep-Learning and Therapy and gives excellent results on music, but is at the same time at a sensationally low price — only 25 gns. Send now for our latest catalogue of Separate Accessories and Complete Kits for Sleep-Learning together with latest Press Reports, etc., on this Vital New Subject. Dept. ATR, The Institute of Sleep-Learning, 153 Fellows Road, Swiss Cottage, NW3. Telephone: 01-722 3314. (12/67)

Highest cash prices offered for good quality Tape Recorders. Hi-Fi Equipment and LP Records. REW Earlsfield Ltd, 266/8 Upper Tooting Road, London SW17. Tel BAL 9174. (TC)

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Tape to Disc Recording. Finest professional quality: 12 in LP. 42s; 12 in LP, 48s; 7 in EP, 21s; 40 ft recording studio; 48 hour postal return service. Any speed tapes. SAE for leaflet. Dero Sound Service, High Bank, Hawk Street, Carnforth, Lancs. (8/67)

Rapid Recording Service. Records made from your own tapes (48-hour service). Master Discs and pressings. Recording Studio — Demo Discs. Mobile recordings, any distance. Brochure from 21 Bishops Close, E17. (TC)

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EQUIPMENT FOR SALE

15%-20% discount on most new, guaranteed, tape recorders and Hi-Fi. Cash only. SAE details. Hi-Fi Club, 70A Liverpool Road, Liverpool 23. (12/67)

Unbiased guide. Our latest 65-page, photographically illustrated hi-fi catalogue (5s). Advisory service, preferential terms to members. You'll be glad to have consulted Audio Supply Association, 18 Blenheim Road, London W4. (8/67)

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20% cash discount on most famous makes of tape recorders, Hi-Fi equipment, cameras and typewriters. Join England's largest Mail Order Club now and enjoy the advantages of bulk buying. Send 5s for membership card, catalogues, price lists or SAE for free quotations and leaflets. CBA (Dept AS), 370 St Albans Road, Watford, Herts. (8/67)

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Tape Club members wishing to avail themselves of the special Club Subscription rate of 30s per annum should apply to their local Club Secretary. All Club orders must bear the Club Secretary's signature and be sent to the Subscription Department.

PRE-RECORDED TAPES

Mike Howell thinks there is room for improvement

'Pre-recorded, pre-packed, pre-judged' – this is the attitude of the discerning music-lover towards the tape record. Justified or not, such material has been available for some time now and, although today's product is a vast improvement on that of yesteryear, the commercial impact has not been as great as was anticipated by the pundits. Certainly, titles are not as readily available as they are on disc, as dealers, with the possible exception of the big store, are unwilling to invest in an item which may not sell fast enough. A particular tape will probably have to be ordered, and if required immediately a visit to a large stockist may be the only way of obtaining the desired recording. Lack of availability is the first disadvantage, one of the most serious drawbacks to music on tape because of the problematic undertones which are washed ashore by disc waves, forcing away the possibility of any strong competition from tape.

The manufacturer's sin is perhaps the major cause of the dealer's worries about pre-recorded matter, for if a company is only prepared to enter a market half-heartedly, support for the venture cannot be expected. At one time reviewers spoke of tape ousting disc, but a few years of mediocre productions have made this idea laughable. Similarly, a company who issued all their work on both tape and disc, both being available locally, would be taking a gamble. Pre-recorded music popularity would increase with the co-operation of dealers and with a strong advertising campaign. Success in the equal tape/disc catalogue would have been more easily attained if companies had been prepared to take the big step forward at the start of the era. Initially, sales would not have been comparable with those of the disc, mainly because the record is something well known, a convention which will only fall if a better alternative is offered. The pre-recorded tape has been a very weak alternative, there being little need to oppose the accepted media. Indeed, many companies have not catalogued their goods as tape issues. The tape v disc fight is over, the threat to the disc's supremacy being speculative and wishful thinking by the reviewers – a war which cannot start in practice without radical changes in both choice and production. To cater for the real fan the manufacturers must either show a different face or forget the scheme altogether.

Improvement has been a slow process, British development of better recording equipment being poorer than that available on the Continent and in the States. The French product is supposed to have been even higher quality than the disc – a hefty boast and an almost impossible achievement unless the recording is made laboriously direct from the original master. The American effort has, however, been well

received in the short time that they have been imported. They present the pre-recorded tape in a much healthier light and the more realistic approach offers stereo recordings at 7½ ips, the tape speed which shows true quality. The home market offers little excitement, such tapes being an occasional alternative to the record purchase and they are nearly all at the price of, or more than, the ordinary long-player disc record. They are recorded at the speed which can be accepted by the 'standard' machine (without a more professional speed alternative being available) and they still show a lack of uniformity in manufacture. Although we have passed the days of serious drop-outs, the high noise level due to high-speed copying is still strongly inherent.

Presentation and cost are another department of the industry which call for comment. This could be the one case in which the size of the tape spool could be a distinct disadvantage. If information is to be presented on the box, the possibility of a dazzling picture of the artist(s) is impossible. Many have criticized the lack of printed details concerning the performers, recording date and other information which appears on the glossy long-player record sleeve. A little imagination could make the pre-recorded tape an eye-catching attraction. For example, why aren't they boxed in plastic containers. An enclosed leaflet could solve the sleeve note problem and another thing which seems to offend the would-be purchaser is the untidy, half-empty spool which generally contains something under twenty minutes' playing time per track. Even at today's price, the pre-recorded tape is a shoddy article both in presentation and standard, making the increased sales theme something of a paradox – a truly wholesome contradiction for the manufacturer who is prepared to launch a favourably-priced, well-recorded production and with a wide range of choice.

Yet the American scene may catch on in this country, for in some of the stereo issues there is the first really good listening material which has not already appeared on disc, an innovation which could increase popularity if a company could produce strictly pre-recorded issues with a new, high standard of performance. The most recent development in this industry has been pre-recorded music on cassettes. Like the normal tapes, these have all been taken from long-players, but it is hoped to present new matter on the cassette recordings in the near future. While pre-recorded tape cannot offer any challenge to the disc, within two years the present versions of tape records may well find serious competition from the cassette recording which, although handy to the user, are contrary to the uniform standards of present-day magnetic recording.

Prior to the appearance of the cassette, comment on British music tapes was mere observation. Nothing could have prevented the new introduction and once again our choice is being dominated by Continental dictates. Cassette recording is unlikely to show any improvement in reproduction quality over its forerunner, the standard quarter inch tape with half or even quarter-track recording. Finally we find that the various manufacturers of cassette tape records have seen fit to adopt non-compatible systems anyway. Perhaps in our bid for 'mini' recording equipment we shall be taking a step back in history, coming at last to the height of progress – pre-recorded wire!

BOOK REVIEW

Loudspeakers and Loudspeaker Cabinets, by P. W. Van Der Wal. Sole distributors outside Benelux countries: Iliffe Books Limited. A Philips book translated from the Dutch containing viii + 107 pages, 156 line drawings and 3 photographs. Price: 15s 0d (by post 15s 8d).

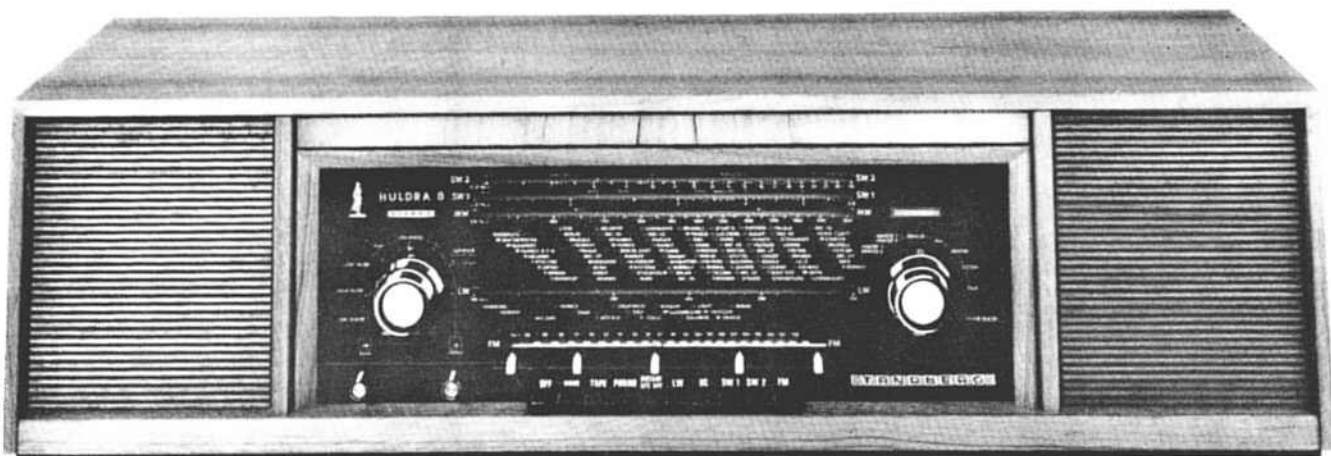
Although translated from the Dutch, this book retains much of its original value. It is rather a 'different' book on loudspeakers and cabinets ('boxes' as the book calls them). It aims not only to give the practical aspects of speakers and cabinets, but it also considers theoretical aspects on a non-mathematical plane, and it does this very well indeed. The design of speaker units, including cones, magnet systems, speech coils and so forth are described, and it sets out the technical data that the enthusiast often scratches his head over when reading a speaker maker's handout sheets. These are explained in a down-to-earth manner.

Much of the text, however, is concerned with speaker units of Philips design, and the 'boxes', whose construction is described, are designed for Philips units, though it is probable that the fundamental design would serve speakers of other makes equally as well. There is even a chapter dealing exclusively with the carpentry of cabinets – how to make timber joints, baffle apertures, kind of timber to employ, finishing the cabinet and so on. Few books present this data solely in terms of loudspeaker cabinets and enclosures.

Details are given on speakers in mono and stereo formation, on crossover filters, speakers in parallel and series, on matching to the output valves, on the choice of speaker and there is a very interesting chapter dealing with distortion with a few notes about noise.

The nine chapters in the book are *The Loudspeaker, Choosing a Loudspeaker, A Few Fundamentals, Distortion, Stereo and Mono Speaker Installations, Indoor Acoustics and Sound Reproduction in the Open, The Principles of Baffles and Loudspeaker Boxes, Building Loudspeaker Boxes, Drawings of Cabinets* and these are followed by six pages of technical data mostly of sound-pressure curves of Philips speaker units. In spite of the Philips bias, this book contains a great deal of very useful information of value not only to the do-it-yourself enthusiast but also to the audio dealer and technician. It is recommended at 15s 0d. GJK.

This is a Stereo radio



and a stereo/mono amplifier and speaker system for turntables and tape decks. And an intercom. And a baby sitter. It's the Huldra 8-56 by Tandberg

The biggest problem you face when you bring home your Huldra 8-56 is what to do with it first.

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For instance, if you're lucky enough to be in an FM stereo broadcast area, the FM tuner with provision for stereo multiplex reception brings it home in brilliant '3 dimensional' tones.

And if you're prone to an hour or two of Basie, Bach or Beatles in the evening (on

record or tape), the Huldra 8-56 has built-in pre-amps for magnetic, ceramic and crystal pickups. As well as a couple of potent speaker systems consisting of a woofer, tweeter and cross-over network apiece (yielding full bass reproduction down to 60 c/s).

By the way, before you settle down to an evening of fantastic sound, hook up the intercom to baby's room. It won't interfere with your listening enjoyment and it'll let you know, loudly and clearly, when baby's ready for bottle.

All this is just another way to tell you that the Tandberg Huldra 8-56 is an exclusive piece of precision engineering for discerning people . . . the height in stereo radios; and it's priced accordingly at 94 Gns.

For details and literature on the Huldra 8-56 and the many other Tandberg quality electronic products please fill in and return the coupon.

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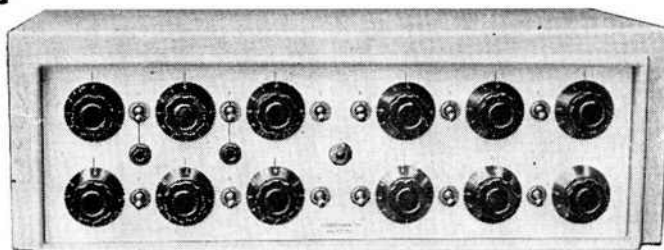
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Tandberg

Vortexion quality equipment

12-WAY ELECTRONIC MIXER



The 12-way electronic mixer has facilities for mixing 12 balanced line microphones. Each of the 12 lines has its own potted mumetal shielded microphone transformer and input valve, each control is hermetically sealed. Muting switches are normally fitted on each channel and the unit is fed from its own mumetal shielded mains transformer and metal rectifier.

FOUR-WAY ELECTRONIC MIXER

This unit provides for 4 independent channels electronically mixed without "spurious break through" microphony hum and background noise have been reduced to a minimum by careful selection of components. The standard 15-50 ohm shielded transformers on each input are arranged for balanced line, and have screened primaries to prevent H.F. transfer when used on long lines.

The standard 5 valve unit only consumes 18.5 watts. H.T. is provided by a selenium rectifier fed by low loss, low field, transformer in screening box. The ventilated case gives negligible temperature rise with this low consumption assuring continuance of low noise figures.

20,000 ohms is the standard output impedance, but the noise pick-up on the output lines is equivalent to approximately 2,000 ohms due to the large amount of negative feedback used.

For any output impedance between 20,000 ohms and infinity half a volt output is available. Special models can be supplied for 600 ohms at equivalent voltage by an additional transformer or 1 milliwatt 600 ohms by additional transformer and valve.

The white engraved front panel permits of temporary pencil notes being made, and these may easily be erased when required. The standard input is balanced line by means of 2 point jack sockets at the front, but alternative 3 point connectors may be obtained to order at the rear.

Mixer for 200-250 V AC Mains	£40 8 6
Extra for 600 ohm output model	£1 18 6
Extra for 600 ohm 1 milliwatt output	£3 0 6
Size 18½ in. wide × 11½ in. front to back (excluding plugs) × 6½ in. high.		
Weight 22 lb.		

THREE-WAY MIXER and peak programme meter, for recording and large sound installations, etc.

This is similar in dimensions to the 4-Way Mixer, but has an output meter indicating transient peaks by means of a valve voltmeter with a 1 second time constant in its grid circuit.

The meter is calibrated in dBs, zero dB being 1 milliwatt-600 ohm (0.775 V) and markings are provided for + 10 dB and - 26 dB. A switch is provided for checking the calibration. A valve is used for stabilising the gain of this unit. The output is 1 milliwatt on 600 ohms for zero level up to - 12 dB maximum. An internal switch connects the output for balance unbalance, or float. This output is given for an input of 40 microvolts on 15 ohm.

An additional input marked "Ext. Mxr." will accept the output of the 4-Way Mixer converting the unit into a 7-Way controlled unit. This input will also accept the output of a crystal pick-up, but no control of volume is available.

The standard input is balanced line by means of 3 point jack sockets at rear, but alternative 2 point connectors may be obtained to order at the front or rear as desired.

The 8 valves and selenium rectifier draw a total of 25 watts.

P.P.M. for 200-250 V AC Mains	Price on application.
Size 18½ in. wide × 11½ in. front to back (excluding plugs) × 6½ in. high.		
Weight 23 lb.		
10/15 watt Amplifier with built-in mixers.		
30/50 watt Amplifier with built-in mixers.		
2 × 5-way stereo mixers with outputs for echo chambers, etc.		

Full details and prices on request.

VORTEXION LTD, 257-263 The Broadway, Wimbledon, S.W.19

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Telegrams: "Vortexion London S.W.19"