

SEPTEMBER 1966

TAPE

RECORDING MAGAZINE

2/-

IN THIS ISSUE

RECORDING IN STEREO

Special feature

ALSO

- FOCUS on the new BBC stereo system
- Tape recording techniques
- New products; Test Bench; tape record reviews; club news

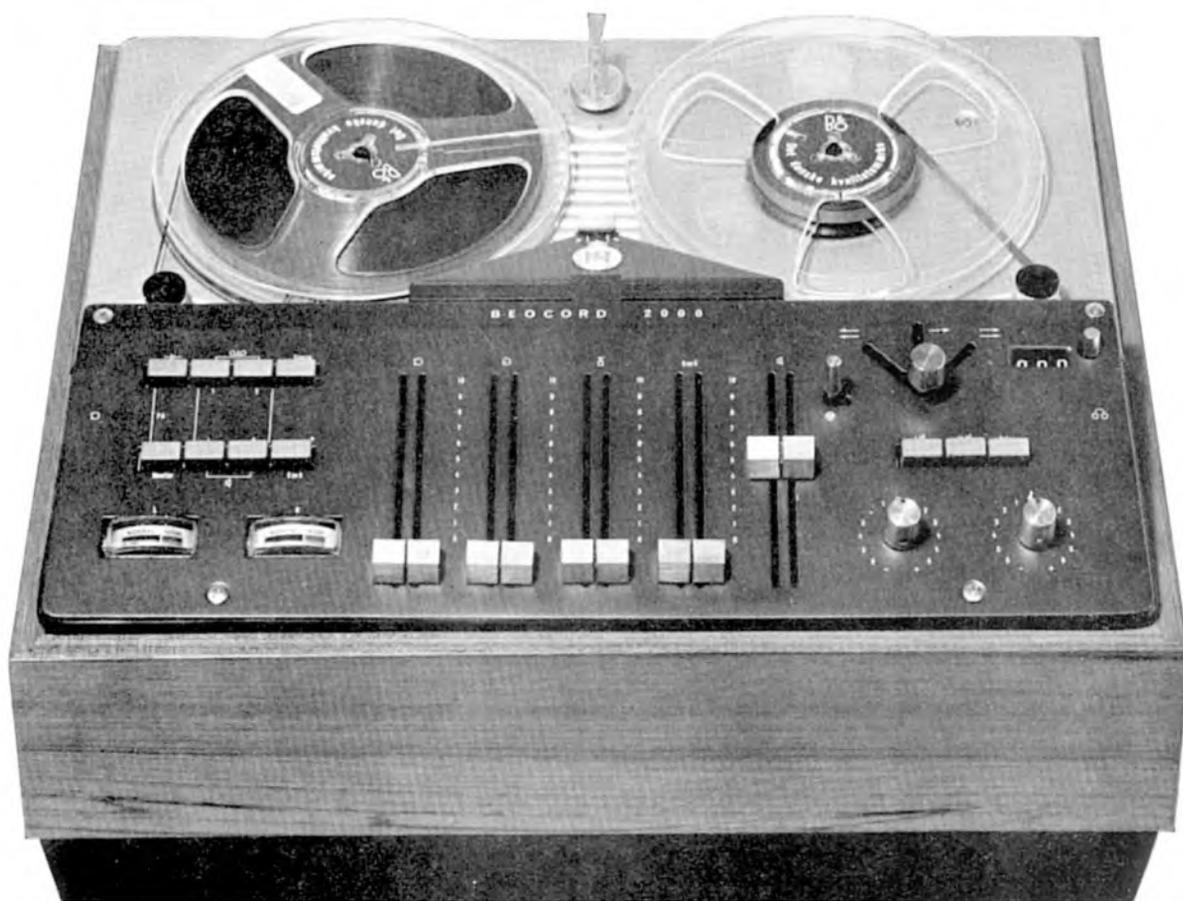
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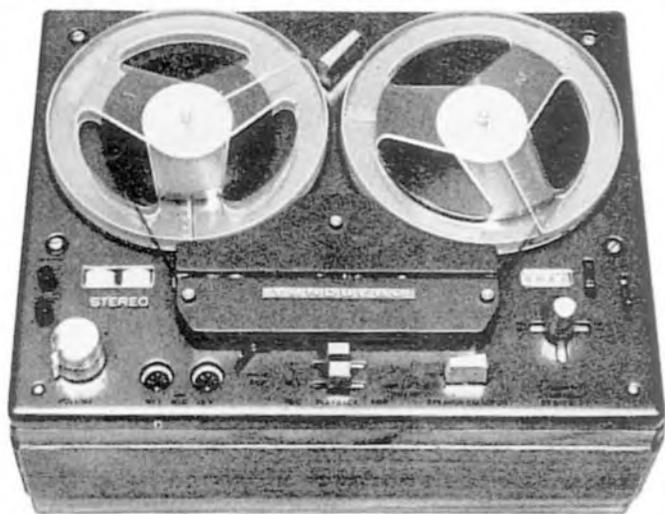
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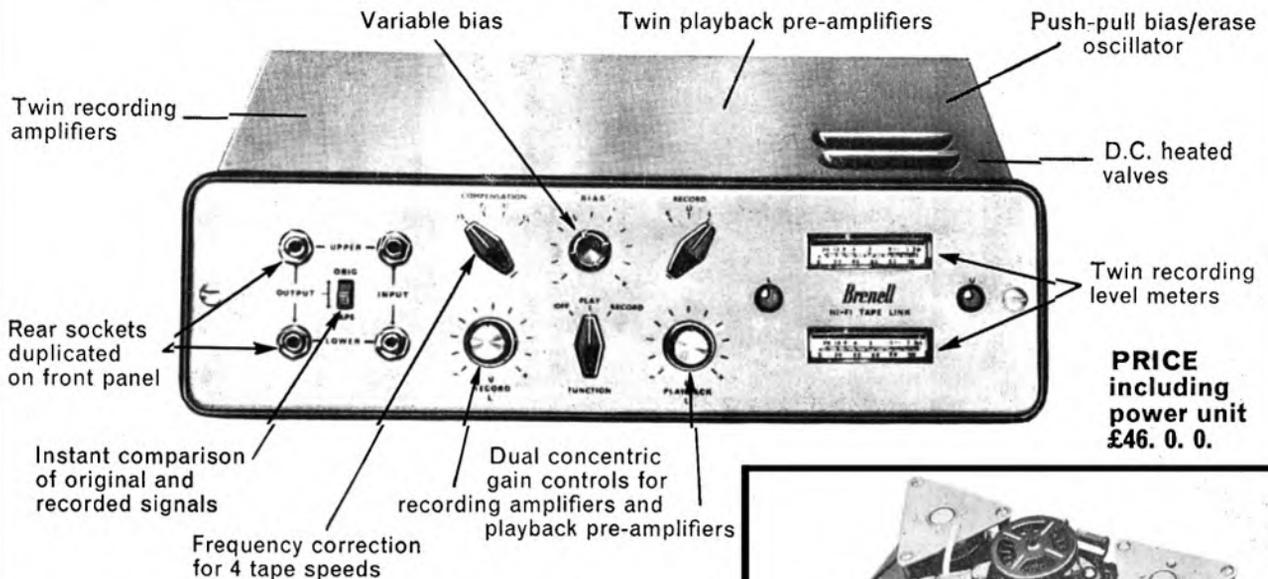
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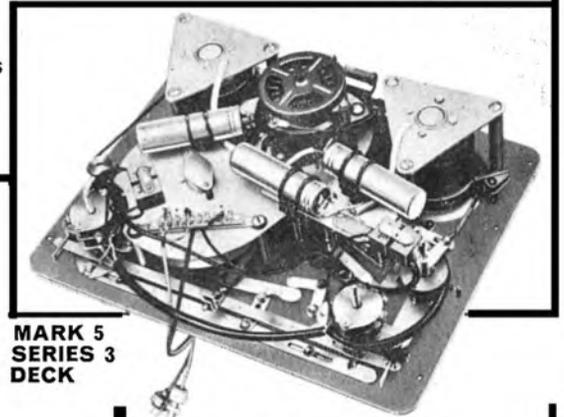
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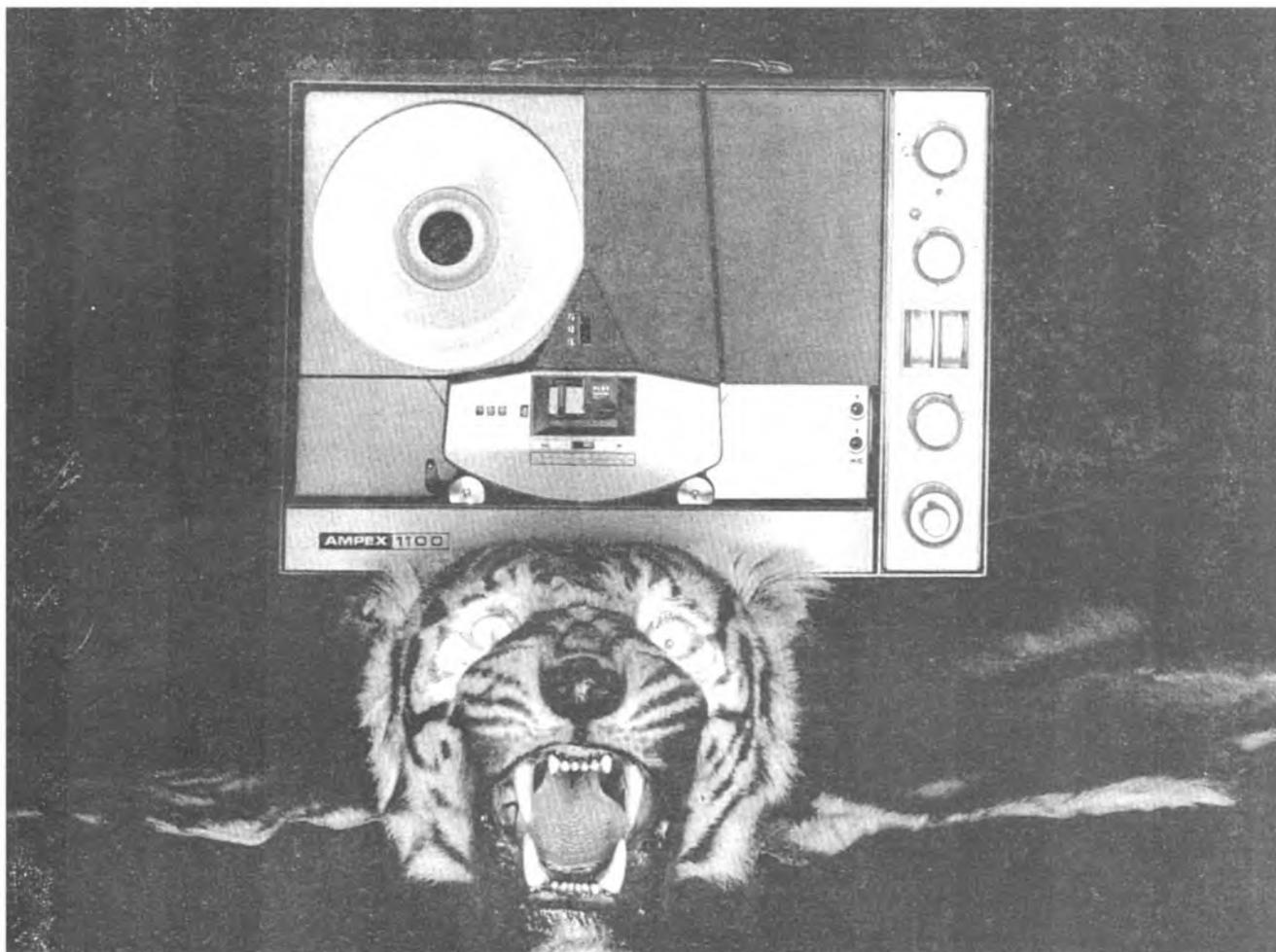


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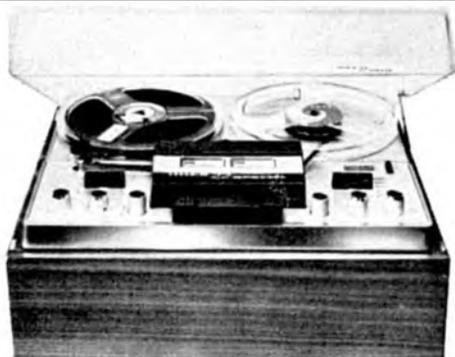
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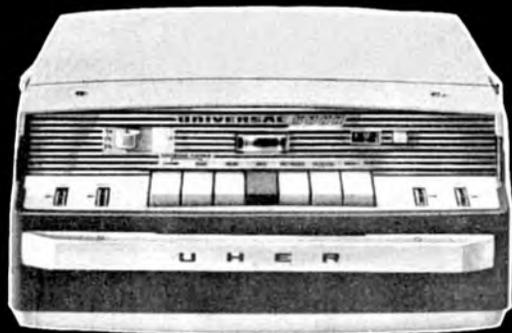
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TAPE

RECORDING
MAGAZINE

Vol. 10 No. 9 September 1966

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COVER PHOTOGRAPH: Our illustration, taken at the Decca recording session of "Peter Grimes," gives an indication of the way in which such a work is recorded stereophonically. In this Court scene Peter Pears is in the "box" on the left; Justice Swallow (Owen Brannigan) presides; and the chorus is herded into the "public gallery" by chorus-master Douglas Robinson. The markings on the stage of Walthamstow Town Hall were used in conjunction with detailed stage directions to give the full sense of realism and movement. Photo by Hans Wild.

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EDITORIAL

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ADVERTISING

LUDgate 9088

Assistant Editor,
FRED CHANDLER

Tape trends and tape talk

By the Editor

A PARTICULARLY attractive picture postcard which dropped on my desk a few weeks ago brought greetings from the first Czechoslovakian amateur tape recording contest, held in Kavlovy Vary. It was signed by ten of those participating. I should like, through this column, to reciprocate their good wishes and I hope they will send me a full account of the success of this first (so far as I know) amateur contest in Eastern Europe. Among the signatories on the postcard was Wilhelm Gluckert, of Mainz, a familiar figure at CIMES each year and presumably attending the Czechoslovakian event as an observer. I should like to see a regular exchange of observers between CIMES and similar events in Eastern Europe in future years.

Our Dutch friends have now issued preliminary details of the International Recording Contest (CIMES) to be held in Amsterdam and Hilversum in October. The judging will take place, as in 1960, in the VARA radio studios. The Dutch electronics industry and the Dutch Radio Broadcasting Associations are co-operating.

The organisers report a number of inquiries this year from countries not organised in the International Federation of Sound Hunters and they say they expect a very large number of entries. For the first time there is likely to be a full British panel of judges this time; we are entitled to four.

A number of readers have inquired for more information about CIMES 1966. To date, no official entry forms are available, but it will be sufficient for those who have sent entries in the British Contest to write a letter to CIMES, 7, Tudor Street, London, E.C.4, identifying clearly the title of their tape and asking that, after the British event has been judged, it should be considered as an entry for the International. We will then see that the tape is collected and considered.

Any readers who wish to submit for CIMES a tape which has not been entered for the British Contest should send it direct to the Tudor Street address, accompanied by the following information: Name and address, age and profession; title of tape, duration, speed, and make of recorder; details of tracks used (i.e. full track, half track or quarter track and mono or stereo); class in which entered; names of any collaborators; and information about any music or other material used.

The classes in the International Contest are: Compositions (up to 15 minutes), Documentaries (10 minutes), Music (4 minutes), Actuality (4 minutes), Technical experiment (4 minutes) and Schools (10 minutes).

It is vital that entries intended for the International event should be accompanied by full scripts, preferably in English, French and German.

Philips, who this month announce in Britain their tape records in cassettes, have now under way a big push in the United States for stereo tape records in cartridges. Expect stereo tapes here, too, before long. Half a dozen of the biggest manufacturers of recorders in America say they are planning to build around this cassette.

LAUGH WITH JEEVES



"Hello, Fred. Would you mind bringing round your de-fluxer, I seem to have got my head magnetised."

THE *Journal of the Society of Film and Television Arts* has just produced an issue on the theme *Tape or Film?* And the advance of magnetic tape as a video recording medium is boldly challenged by some of the expert contributors.

One of their complaints concerns the problems of editing with tape. The other problem is that it is easier to sell film to overseas networks, and these sales are important to the economics of the TV industry today.

Also in the last few weeks we have renewed reports that video discs may stage some sort of break-through.

I still think, however, that the amateur enthusiast is going to have an exciting future with video tape recorders, when the price has been reduced some more. And for that reason we have been collecting basic information about video recording which will give amateurs, for the first time, a clear idea of what they can expect to achieve, and what is likely to be beyond them.

In our next issue we shall publish a big feature on the making of "the first amateur sound-and-picture tape recording." Yes, we've made it!

AN INCREASED DEMAND for *TAPE Recording Magazine* and an adjustment in our distribution arrangements may cause some temporary difficulties in some parts of the country in picking up a copy casually from your nearest bookstall. So, if you want to be sure of your copy, place a regular order with your newsagent, please.

BROADCASTING IN STEREO

On July 30th the BBC began transmitting daily stereo programmes following years of experiments to find the most suitable system. Below H. BURRELL HADDEN relates the history of these experiments and describes the system now being used.

THE first experiments made by the BBC in stereophony took place many years ago, in 1926 to be precise, only a very few years after sound broadcasting of any kind had become possible. Various experiments were made during the late 1920s by radio organisations in America, Germany and by the BBC. The broadcasts were made on two separate AM transmitters, and the programmes included orchestral concerts from Savoy Hill, and an outside broadcast from the Old Vic of one of Dame Nellie Melba's farewell concerts. At this performance she sang, among other items, the "Willow Song," from Verdi's "Othello."

These experiments were given very little publicity, but according to people who still remember them, the results were very successful. As a member of the London Control Room staff said to me when the present-day revival of stereophonic broadcasting began some years ago: "We have done all this before!"

The present experiments began in January 1958, when, late at night, after normal close-down, the Third Programme transmitter at Wrotham and the Crystal Palace television sound transmitter were used for the left- and right-hand channels in an unannounced broadcast of some commercially-made stereophonic tapes. Following the success of this first attempt, it was repeated the following night, when I had the privilege of announcing some of the items. Later in the year, in May, the experiment was extended via land-lines to include the rest of the country, the broadcasts still being made on Third Programme and Television Sound transmitters.

Following the success of these late-night experiments the BBC decided to start regular transmissions of stereophony on Saturday mornings, still using the two-transmitter system. It was always known that this system was a very uneconomic one, and more important, was not "compatible," that is, the programme could not be received in a satisfactory manner by listeners with only monophonic equipment. Before a full service of stereophony could become possible, some system of overcoming these difficulties had to be found.

In the meantime, the BBC started on a full-scale series of experiments to determine how the studio techniques for stereophony differed from those from the normal monophonic transmissions, and also to find out whether it was a feasible proposition to expect that a satisfactory monophonic signal could be made from the addition of the two stereophonic channels. Many of the results of these experiments were broadcast in the Saturday morning programme.

The studio experiments ranged through all the possible types of microphone technique, from the classic spaced omni-directional microphones to the single coincident pair, with the object of discovering the methods most suited to a broadcasting medium. A two-channel system was essential, since it would be difficult enough to transmit this over a radio link economically, and a greater number of channels would only increase the complexity. It was therefore necessary to discover the microphone technique which would give the best stereophonic results with a two-channel system. This work was to some extent helped by the fact that the average audience in any one place does not exceed three people, and so the floor area at the receiving end over which a good stereophonic effect must be obtained is not particularly large.

After a number of careful experiments, it was decided to concentrate on a system based on the coincident microphones

described by A. D. Blumlein in his classic patent of the early thirties. This system can give the clearest directional information, and it is obviously necessary for a broadcasting organisation to make accurate positional information an important criterion, since it will be necessary to apply the techniques to the production of drama as well as music. Whilst in music it may be possible to tolerate vague positional information, in drama it may be important that a particular character or sound-effect should be heard from a specific point in the reproduced sound picture.

Much of the early work in all the various types of programme was done using only one coincident microphone pair, usually a single stereophonic microphone of the electrostatic type, having two capsules in the same case. For much serious music this was found to be all that was required, and certainly this method gives the best stereophony from this type of programme. However for popular and light music, because of the conventions that have grown up in the monophonic field, it was necessary to add a number of reinforcing microphones in order to achieve the desired balance between the various forces involved. With suitable care, this can be done without spoiling the positional information too much, so long as it can be assumed that the listeners will not be sitting too far from the centre line, and, as was said earlier, the audience is small enough for this to be possible.

It was, of course, necessary to design and manufacture special mixing desks for the stereophonic experiments, and several of these were made. Because it was necessary to work in different types of studio, and also on outside broadcast programmes, these desks were made transportable, with their amplifiers on trolley-mounted units, connected to the desk itself by means of multicore cables. These desks have been taken all over the country, and have been used in all the BBC Regions, and in some of the famous concert halls and opera houses during the development of the technique.

By 1962, when the first experimental transmissions of compatible stereophony were made in this country, the technique was well advanced. These transmissions were on the now well-known Zenith-General Electric multiplex system, now internationally known as the "PILOT TONE" system, and it is this system that has been chosen for the new service. In this system, the VHF transmitter is frequency-modulated with a complex waveform containing both stereophonic channels. The sum signal, the addition of the left and right signals, is fed to the transmitter in the normal way, and acts as the compatible monophonic signal for listeners with ordinary receivers. A difference signal, obtained by subtraction of the left and right signals, is amplitude modulated on to a sub-carrier of 38,000 cps, the sub-carrier itself is suppressed, and the sidebands are also frequency modulated on the main carrier. In order to enable the stereophonic receiver to decode the left- and right-hand signals, a pilot sub-carrier, unmodulated, at 19,000 cps, is also frequency modulated on the main carrier. This may sound a very complex system, and indeed it is, but it can be looked at in another way. It is as if the left- and right-hand signals were modulated alternately on the main carrier, a switch alternating the two signals 38,000 times every second.

One of the major problems facing the BBC in the development of a stereophonic service is the distribution of the programmes throughout the country, and this arises from the fact that it is necessary for any line links to be very accurately matched. If the lines differ by even a small amount, either in frequency response or in the time it takes for the sound to travel along them, then the quality of the stereophonic signal will be degraded, and, possibly more important, so will the quality of the monophonic compatible signal. If the time delay difference is more than a few microseconds the monophonic signal will be seriously distorted, even though the stereophonic signal can stand up to about 250 microseconds without serious degradation. Difficult though this

(Continued on page 312)

stereo recording



By H. Burrell Hadden

THE major advantage of tape recording as a medium for stereophonic reproduction is the simplicity with which two or more tracks can be recorded in synchronism. The tracks are simply laid side by side on the tape with suitable guard spaces between them to prevent crosstalk and reduce the effects of vertical tape movement due to imperfections in the transport mechanism.

For monophonic recording, it has become established practice to record on quarter-inch tape, and three methods of doing this have become common. Professional practice is to use the full width of the tape and to record a single track only thus presenting the maximum possible signal to the replay head and enabling the best possible signal-to-noise ratio to be achieved.

For domestic use it has become practice to economise in tape by recording two, or even four, tracks on the quarter-inch tape (Fig. 1), and with stereophony a similar state of affairs applies. The advantage, and the only advantage, of the four-track system is that it doubles the playing time for a given reel of tape. In all other respects, the two-track system will give better results, especially in terms of signal-to-noise ratio. But of course it is only possible to record in one direction, since the programme is spread over the full width of tape. This may all seem elementary, but the advantages of having the widest possible track recorded on the tape make the two-track method a must for serious recording. Indeed, many professional

organisations, in order to get the best possible quality, have gone to half-inch or even one-inch wide tape, with all the complications of bigger and bulkier tape machines.

It may be pertinent here to refer to the tape itself, and the handling of it. On reproduction, the stereophonic image is made by sounds coming from two loudspeakers, and if the input to one of these loudspeakers is interrupted for even a fraction of a second, the whole sound stage seems to collapse, and the source flies rapidly to the other loudspeaker, only to spread out again as the second channel returns.

This can be very distracting indeed, and is caused chiefly by one of two things. Firstly, if the tape is coated unevenly across its width drop-out will occur. This may be more serious on one track than the other, and will produce an incorrect balance. It will immediately become evident that this is more likely to be serious on the narrower tracks of a four-track machine. Manufacturers do their best to avoid drop-out, but nonetheless it does occur.

The same effect, of the image collapsing to one side, can occur if the tape becomes buckled, so that it does not lie smoothly over the twin gaps on the tape head. This can happen if the tape is badly handled, for example, if the reel is picked up with the fingers gripping the tape itself, particularly if the tape has been badly wound. Incidentally, with any tape, monophonic or stereophonic, a slow, even, tight wind is very much better on the grounds of good quality than a rapid, uneven one. Handling damage to the tape, causing poor stereophony, is much more likely to occur if the thinner tapes are being used, and so more care must be exercised when this is the case. In fact, for the best quality, standard thickness tape on a two-track machine would seem to be a must.

So much for the tape, now for the machine. Most domestic stereophonic recorders have separate record gain controls for each channel, frequently ganged replay volume controls, and if tone controls are fitted, these are also ganged. Personally, I think it is a pity that the record gain controls are not usually ganged, since for all normal stereophonic use they must always be set so that the two channels have the same gain, if a "natural" spatial reproduction of the original sound is to be obtained. If this gain balance

STEREO BROADCASTING

(Continued from page 311)

may seem, it is a problem which is soluble, but at some cost, and of course will take some time to achieve. An alternative method of distributing the programme would be to use radio links. In the meantime, the pair of lines to the Wrotham transmitter is very well matched, and there is virtually no difference between the transmitted signal and the received one, providing the receiving equipment fulfils its function correctly.

What of the present developments? The stereophonic control room developed for the experimental transmissions will be carrying much of the load of the first regular broadcasts, while the Third Network Continuity suite is being modified for stereophonic working. One of the Gramophone studios is rapidly being converted for the playing of stereophonic discs, and more transportable mixing desks are being built. The first major series of transmissions will be from the Promenade Concerts, and one of the mixing desks is being installed in the Royal Albert Hall, alongside the existing monophonic one. It is hoped that this desk can be used for all the Prom transmissions, both monophonic and stereophonic, thus saving on equipment and rigging time. There seems to be no reason why this should not be quite satisfactory.

Many more exciting transmissions will undoubtedly follow, and we must congratulate the small band of technicians and producers at the BBC for the successful way in which they have developed their technique, and wish them every success for the future.

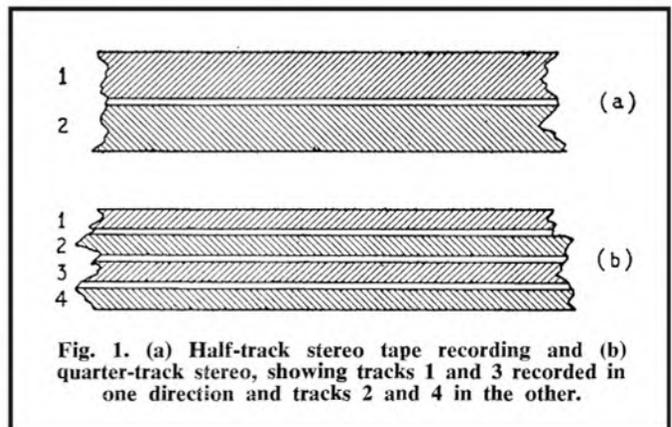


Fig. 1. (a) Half-track stereo tape recording and (b) quarter-track stereo, showing tracks 1 and 3 recorded in one direction and tracks 2 and 4 in the other.

changes, the picture will be displaced laterally, and if it is necessary to change the level settings during recording, as it almost certainly will be, then there is the likelihood that the picture will move from side to side if the controls are not kept exactly in step. The record level indicators will not help us here, since they will vary with the position of the sound in the reproduced picture, just as much as with the loudness of that sound. Their function is to tell us when the level is too high or too low, and if one of them, for instance,

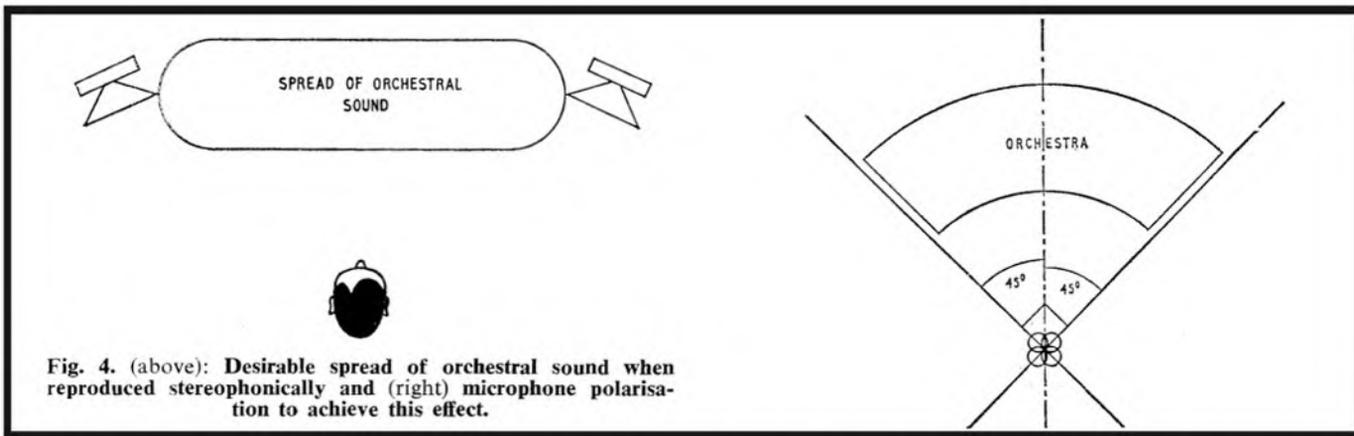


Fig. 4. (above): Desirable spread of orchestral sound when reproduced stereophonically and (right) microphone polarisation to achieve this effect.

goes too high, then *both* controls must be turned down by the same amount. If only the high one is adjusted, the sound will be moved from its correct position. This is so much easier to achieve if the controls are ganged.

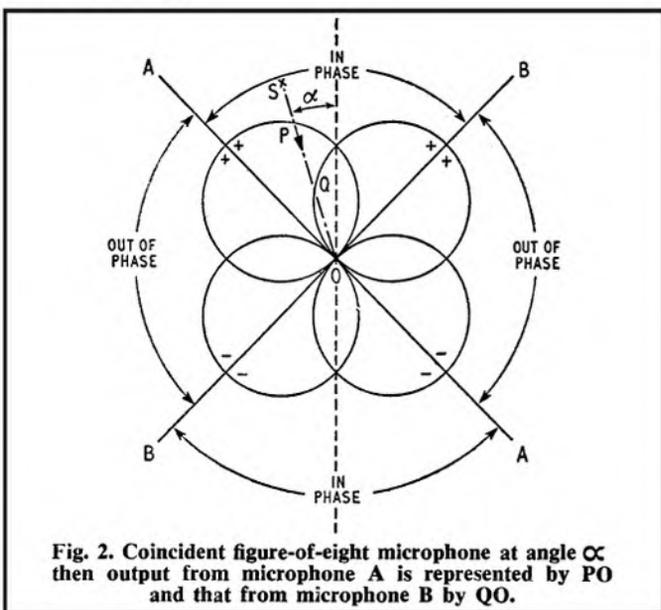


Fig. 2. Coincident figure-of-eight microphone at angle α then output from microphone A is represented by PO and that from microphone B by QO.

The microphone is placed in front of the sound source in such a way that the source lies within the right angle formed by the two axes of the capsules, and this is almost all that needs to be done. But not quite. The distance of the microphone from the sound source will control not only the ratio of direct to reverberant sound, as in the monophonic case, but also the width of the reproduced picture. If the microphone is placed too close, say to a single speaker, then his mouth will extend across the whole width (Fig. 3), whereas if it is placed too far away from an orchestra, then the orchestra will appear in the middle with very little spread at all. For orchestral sound, I have always felt that the ideal position should be such that the left hand edge of the sound starts just to the right of the left loudspeaker, and the right hand edge finishes just to the left of the right loudspeaker (Fig. 4). In this way the loudspeakers seem to vanish altogether, and a very natural sound is possible.

If it should be necessary to mix in other microphones, to improve the balance, or for special effects, then some form of mixer will be needed. Various manufacturers are now supplying these, but the serious recordist should be careful in the decision as to which to buy. Some of them are scarcely any more than two monophonic mixers, perhaps with a ganged master gain control, and whilst these can obviously be used, the job is very much easier if there is a means of ganging the pairs of faders on each mixing channel. It is also desirable that some form of balancing arrangement is provided to equalise the gain of the two sides of each channel, and this can conveniently be done by providing pre-set gain controls, that are not ganged, before each fader.

It is also a good idea to have some channels which can accept a single monophonic microphone, and then split its output between the two channels, in a variable manner so that the position of the sound from this microphone can be varied over the sound stage. Such a control is known as a "Panpot" (Fig. 5) by the professionals, and can be very useful indeed.

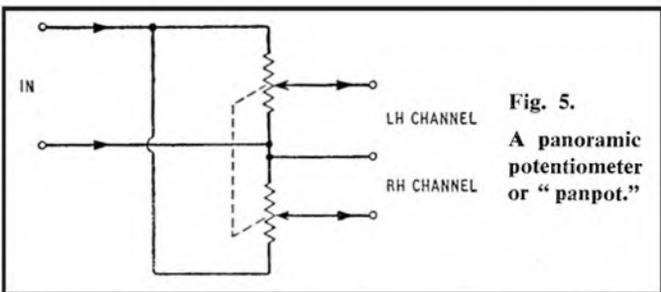


Fig. 5. A panoramic potentiometer or "panpot."

The third important factor is, of course, microphones and their use. The simplest method for the beginner is to use a "stereophonic microphone," that is, two directional capsules mounted at right angles in one case (Fig. 2). These microphones are usually either moving coil cardioids, or ribbons, at least so far as those available at amateur prices are concerned. The ones used by the professionals are more frequently electrostatic types, often with variable polar response, but these can cost several hundreds of pounds.

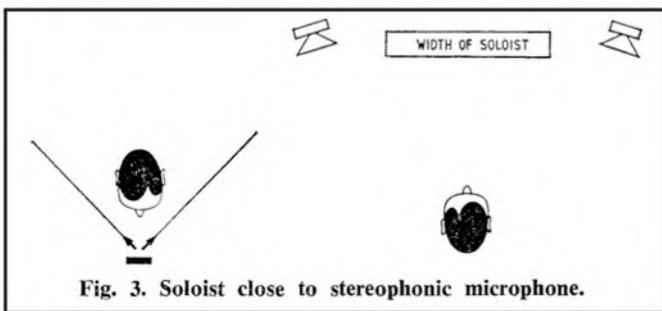


Fig. 3. Soloist close to stereophonic microphone.

If such a microphone is not possible, two-ribbon microphones, or two cardioids, mounted very close together side by side, with their axes at right angles will give the same result. The microphones should be of similar type, otherwise their frequency and polar responses may not match, and movement of the image will result.

One last word; and this concerns recording the new BBC transmissions. The copyright restrictions on recording from the radio or other commercial sources should be widely known, but if these can be satisfied there is still a possible snag. A technical one this time. The trouble is due to the presence of the 19,000 cps pilot tone in the stereophonic transmission. If nothing is done to remove this from the audio output of the decoding equipment there is a strong chance of unwanted noises appearing on the tape. These are due to the pilot tone beating with the harmonics of the recording machine's bias oscillator and producing an output in the audible range. The remedy is a sharp filter between the output of the stereophonic receiver and the input to the recorder, and many manufacturers are now providing these. If you should experience trouble in this way, the best course is to get in touch with the manufacturer.

INTRODUCING

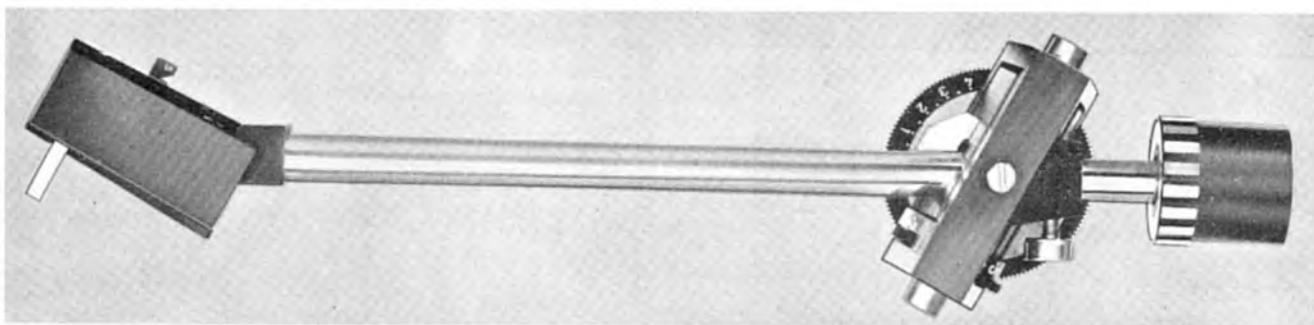
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AROUND THE MANUFACTURERS

DENIS GILBERT REPORTS ON THE ATTITUDES OF THE STEREO EQUIPMENT MANUFACTURERS

HAS the announcement of multiplex transmissions by the BBC burst upon the trade with the force of an atomic explosion, or has it been something of a damp squib? Whatever the effect, the inauguration of the service is an historic event.

One manufacturer said to me, "In advanced countries like Thailand they've had multiplex for years". The silly thing is I don't know to this day if he was joking or if he was serious. The BBC have been putting out experimental transmissions in stereophonic sound since the late fifties with one channel on the television wavelength and the other on the Third Programme. These were followed, quietly, by multiplex. Now a brief paragraph tucked away in the middle of the daily paper announces the beginning of a regular multiplex service.

Stereophonic sound requires specialised equipment. This has been made for many years, although it has been used principally for the reproduction of stereo discs and pre-recorded tapes. Manufacturing advances have been inhibited through the lack of definite information as to when broadcasting proper would start. Whether they have multiplex in Thailand or not they've had it in America for years; and whither America goes today we would inevitably seem to follow tomorrow.

The reason for stereophony existing at all is quite simple. If we record an orchestra in mono the sound reproduced in the speaker lacks one essential quality. The orchestra was probably positioned over a large stage; the sound issuing from a mono speaker comes from a single point source. We could use two speakers, appropriately spaced, and feed them from our mono signal. This would give no information as to the relative positions of, say, the timpani to the piccolo; all it would do would be to duplicate our single point source of sound. Oddly enough, this may well improve its apparent quality, but it will *never*, under any circumstances, be stereo.

Try covering up one eye with your hand and then pick an object up from the table. You will find this difficult because you cannot accurately locate the object in space. The reason we have two eyes is to enable us to subconsciously measure the angle at which an object is seen and so place our hand directly upon it. Ears operate as direction finders in a similar way. If you hear a scream you would automatically turn your head to the direction from which it came; if we recorded that scream and played it back we should simply turn towards the loudspeaker. This is a weakness in monophonic recording. It is overcome in stereo because, by using not one channel but two in the record/playback chain, the location in space can be determined by the listener.

Two-channel stereo

When we speak of stereo we invariably mean "two channel" stereophony. It should be remembered that stereo may be two, three, four or however many channels we like so long as they are greater in number than one. The larger the number of channels the more positive will be the directional information of the signal. Fortunately directional properties can be conveyed to a sufficient extent on two channels only, and this is the system employed on stereophonic records and in the BBC multiplex broadcasts.

Because two channels are used, and they *must* be separate channels—one right-hand and the other left—it follows that there must

be two microphones, two parallel recording tracks on the tape, two playback amplifiers and two speakers. Mere duplication is not enough; each "pair" at every stage must be properly matched. An ingenious method is used in broadcasting to transmit the two channels on a single carrier wave, and this is all "multiplex" means. It's not dissimilar, roughly speaking to the manner in which a single stylus can pick up two channels from a stereo disc. But what does it mean by way of equipment? Can the manufacturers supply it, and, the sixty-four dollar question, will the public want to buy it? The answer to that last question provides the key to the uncertainty and hesitation that one finds around the trade.

Not that manufacturers are depressed—far from it. They've been making stereo equipment for years, standardised now with the "stacked" record/playback head. Not only has this equipment been available, it's been sold in ever increasing numbers. But just what proportion of stereo to mono recorders are made by any one firm is a closely guarded secret. My guess is that up to half our present output (in cash values) of home produced machines are stereophonic. I have qualified this by saying in cash values because owing to their greater complexity they must be more costly. Several cheap, simple mono machines might be bought for the price of one, good quality stereo outfit.

The lack of a suitable sound source influenced early design and a few years ago we had a number of machines that would play back, but not record, stereophonically. These were intended for use with pre-recorded tapes. But a full stereo recorder is very useful for sophisticated mono applications, such as dubbing across from track to track. Amateurs were quick to appreciate this and many stereo machines must have been sold for no other reason. The inception of the BBC multiplex service spells extinction to the "playback only" stereo machine; all future stereo recording equipment *must* be able to both record and play back.

Multiplex decoders

An ordinary VHF tuning unit has not been designed to sort out the two channels of a stereo broadcast. To do this it needs the addition of a "decoder." This gadget does just what its name implies. It decodes the multiplex message into its two separate channels. Suitable units are, or will be, available for all good quality tuners such as Leak, Pye, Quad, etc., but this still leaves the problem of the amplifier.

One company who has taken the bull by the horns is Armstrong Audio Ltd. They have produced a most interesting range of integrated stereo amplifiers combined with tuners. At present their multiplex decoder must be purchased at an extra cost of £14 10s. to convert to full stereo reception. They have taken full advantage of the latest transistor techniques so that in one compact container we can have both the tuner and the amplifier for as little as £37 10s. or for more powerful versions up to £61 10s. Armstrong are obviously gambling on the demand for this equipment being stimulated by the new transmissions, and the equipment they have designed would seem to adequately provide the facilities needed at reasonable cost.

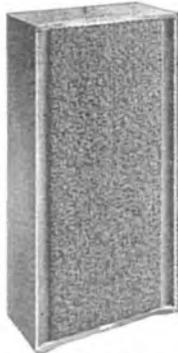
The purpose of the amplifier is, of course, to drive a pair of loudspeakers. Many people have been listening to stereophonic sound on pairs of matched loudspeakers for years. Again this demand had strongly influenced the type and cost of equipment available. Goodmans make no secret of the fact that their Maxim loudspeaker was designed with stereo in mind.

Most of us have to think of two very important things when buying a pair of loudspeakers. Cost is bound to be the first consideration, but in this age of small living rooms, space runs it a

(Continued on page 317)

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AROUND THE MANUFACTURERS

(Continued from page 315)

close second. One big, expensive loudspeaker we might just manage. But two . . . The trend has been for loudspeakers to shrink dramatically both in size and in cost, although the performance of the miniatures does not pretend to be equal to that of the larger units.

I was chatting to Mr. Watts of Jordan-Watts Ltd. They have produced a loudspeaker with a diaphragm only four inches in diameter. Its claimed frequency response is from 70 cps to beyond the audible range. The size is no more than $16\frac{1}{2} \times 8 \times 3\frac{1}{2}$ inches and power handling capacity is 12 watts. His partner, Mr. Jordan has written a book about these units under the title "Loudspeakers" (published by Focal Press at 42s.).

Another firm in the miniature speaker business is Richard Allan of Leeds. Their "Minette" enclosure is $11\frac{1}{2} \times 7 \times 6\frac{1}{2}$ inches and costs just £15 plus tax. Alternatively the speaker module assembly can be purchased complete, without the enclosure, for as little as £8 plus tax.

Apart from radio another sound source is disc—assuming, of course, that the laws of copyright are strictly observed. Stereo disc reproducers have been available commercially since 1958 and today almost all modern turntables can be converted to stereo by changing the cartridge and linking to suitable amplifiers and speakers. Famous names are Garrard, Thorens, etc. A new one in this country is Dual who produce a transcription unit with a combined micro-lift. This feature enables the stylus to be lowered or raised precisely at any desired groove on a disc, thus making dubbing or cueing a simple task.

Live recording

So much for "off-the-air" and copying from disc. How about live recording, which, after all, is our prime interest? A machine capable of recording and playing back stereophonically is naturally required. Brenell offer not only their STB machines, but also the newly developed "Tape Link." This separates the electronics from the deck and provides a compact pair of record amplifiers and playback pre-amplifiers. Their Tape Link was specially designed with the owner of existing hi-fi equipment in mind and is well worth investigating.

The Ferragraph stereo machines maintain the high standards of quality that we always associate with the name of Wright & Weaire Ltd. Resisting the temptation to rush into the market with a full stereo recorder too soon they concentrated on perfecting design. The result is impressive.

Under completely different conditions Mr. S. Brown of Vortexion had a wonderful excuse to indulge in his private passion for research, so the versatile Vortexion CBL has been a favourite for several years. With its many facilities this machine is ideal for the mono enthusiast as well as the stereo convert.

But we were talking about live recording, so we pass naturally to microphones. Because this is two channel work we shall need not one, but two. Many, many firms make microphones, and some of them have produced stereo models. At first glance these might appear to be single instruments, but in fact they comprise two separate units mounted at an angle in a single casing. If the units are omnidirectional they will not be so effective in their stereo application as cardioid or figure-of-eight patterns. Amongst the firms who make these compound microphones are AKG, Lustraphone and Sennheiser.

Someone who should know better remarked the other day that no professional studio would dream of using one of these combination stereo microphones, quite overlooking the fact that AKG have been making and successfully selling their C24 professional stereo condenser microphone, at a cost of £230, for many years. By comparison, their D66 amateur dynamic stereo microphone costs £11 10s.

Successful stereo recordings can either be made with a single stereo microphone or with two or more ordinary microphones suitably mixed on each channel. The technique to be used depends upon the circumstances of the recording. The advantage of the combination stereo microphone is that it ensures two properly matched units. One must, however, be realistic when considering cost. If a good mono microphone were to cost, say, £30, it would be unrealistic to expect its stereo equivalent to cost much less than £60. Further, two separate but identical mono microphones might prove more versatile than a single stereo one. Because of this fact manufacturers have tended to restrict the production of stereo microphones either to the lower, or frankly amateur price bracket on the one hand, or to the equally professional, such as the C24, on the other.

Because ribbon microphones in general offer exceptionally good quality at low price, the Lustraphone ribbon stereo is well worth consideration. Alternatively a pair of Film Industries M.8's could be an interesting, and very satisfactory arrangement. Sennheiser are about to introduce a new moving coil stereo microphone, but at a sensible price. At the time of writing none is available, but I shall look forward to trying it in due course. And what about the London Microphone Company? No news of stereo microphones in the future from this new name in the business, but I forecast the arrival of high quality directional moving coil instruments at prices that will be truly down to earth. A pair of these would be excellent for stereo.

Mixing equipment is at least as useful in stereo applications as in mono, but again for best results mixers like all other components should be matched, one to each channel. A single stereo mixer provides the necessary duplication in one unit. Down at Wimbledon Vortexion are in the midst of a new building programme, and they have my sympathy for the chaos that involves. Because of production limitations (which are related to their careful testing routine, by the way) they haven't bothered to advertise the fact that they have been making full stereo mixers for some time. The range is comprehensive, including two, three, four and five-way per channel complete with master fade control. The cost is from £47 to £98, depending on model. Sensitivities and impedances may be to special order, so any desired combination can be achieved. As is usual with this firm, versatility and quality go hand in hand.

Manufacturer's reactions

Finally, the manufacturers' reaction to stereo. Predictably, they are in favour of it. It involves a duplication of equipment and therefore more business. But equally predictably the manufacturer is only going to make the goods he thinks the public will buy. Their hesitation in the past is very understandable—but now that stereo is definitely here they will offer us the means to use it. If we, the amateurs, demand stereo equipment the manufacturers will provide it at varying levels of cost, all strictly related to quality. This is a highly competitive business where you get what you pay for and no-one makes a fortune out of it.

Broadly speaking the public today do not buy radiograms any more—they buy "stereograms". How much stereophonic effect they get out of them is open to question. But they still buy them. By using proper equipment we are at least sure to get the kind of sound it is designed to reproduce. Perhaps one day the purchase of a recorder will mean, by common understanding, a stereophonic recorder. That day has not dawned yet—but it might—tomorrow.

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STARTING TO RECORD

As a tape recorder is designed to record and to play back sound, facilities are provided for both feeding sound—or signals—into the machine and for passing them from the machine to other auxiliary equipment. When we start to record our signal might originate from any one of a number of sources. We might be recording live, in which case a microphone is required to convert actual sound vibrations into electrical impulses; on the other hand we might be using some other sound source such as radio, disc or even another tape recorder.

The electrical impulses passed from the microphone are weak and are said to be at “low level.” The impulses passed from radio or gramophone equipment are likely to be very much stronger and are therefore said to be at “high level.” So we have at once two basic differences between these two kinds of sound sources.

The signals must all be passed into the recording amplifier at roughly the same level, otherwise they cannot be dealt with adequately. As our sound sources may be at either high or low level they can only be successfully accommodated if suitable input connections are provided on the recorder. Consequently it is usual to have at least two input sockets on every machine. One of these will be labelled “microphone.” Because the microphone signal is at *low level* it requires a *very sensitive* input.

The second input might be marked “radio” or “gram”. As this is intended to accept a relatively *high level* signal it will be *less sensitive* than the microphone socket. Sometimes a third input socket is provided, in which case it will probably be labelled “diode.” Where this is present it usually offers a sensitivity roughly midway between the other two sockets.

In earlier articles of this series we discussed recording speeds and it was pointed out that the choice of any one of the speeds available relates directly to the standard of quality required in the recording, bearing in mind the length of programme time and the amount of tape on hand. The appropriate speed is selected before recording starts; the switch is not then touched whilst recording is in progress.

THE RECORD LEVEL CONTROL

However complicated the control panel on a tape recorder might appear to be, there is only one variable control that will affect the recording whilst it is being taken. This is the *record level control*. Illustrated is the control panel of the Vortexion WVB machine. All the other knobs are either intended to be pre-set before recording starts, or are for use during playback.

Intimately related to the record level control is the *record level indicator*. This may take any one of a number of different forms; some record level indicators are meters, others are so-called “magic eyes.” The purpose of the indicator is to show the operator visually when the signal being fed into the equipment is so great as to threaten overload. The effect of overload is *distortion*. Most sounds are made up of loud and soft components, and the difference between them is known as the *dynamic range*. The most powerful passages of sound, which in speech and music are transient (they build up and then fade away), are known as *peaks*. The danger of distortion through overloading occurs when these peaks are being recorded. The magic eye type of indicator will show by the positioning of a fluorescent beam when this point is reached; with a meter the needle is deflected beyond a certain figure on a numeric scale.

The function of the record level control might be likened to the turning on and off of a stop-cock. It permits more, or less, of the signal to be fed to the recording amplifier. The further clockwise it is rotated the more sound is “allowed through.” Turning clockwise is referred to as *increasing the gain*, and the further we increase the gain the more readily will the peaks register as approaching the point of distortion on the record level indicator. Under most circumstances (although there are important exceptions that we will discuss in a later article) it is desirable to record so that the peaks fall just short of the distortion point. When this is accomplished the tape is said to be fully loaded or fully modulated.

If from any given sound source we have too little gain at the

TAPE RECORDING TECHNIQUES

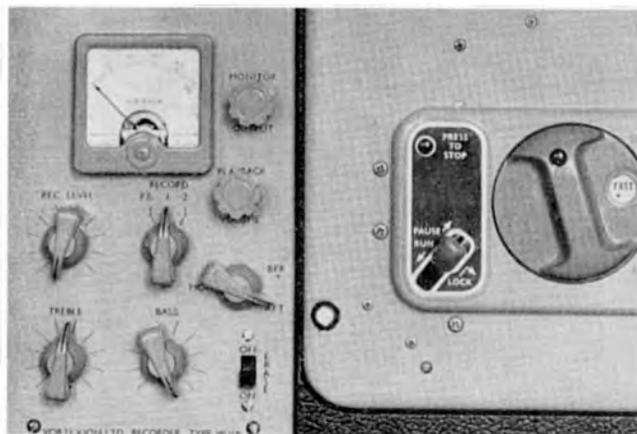
So far in this series, DENYS KILLICK has dealt with the nature of sound itself, given a short history of recording, a description of the deck, or tape transport system, and the electronic side of the equipment, and, in the simplest terms, how it works.

This month he turns to the more practical side of the hobby.

record level control the record level indicator will show practically no movement and the recording registered on the tape will be so faint as to require an undue amount of amplification in order to hear its playback. On the other hand, if too great a gain is present the recording on the tape will be distorted, perhaps to such a degree as to make listening unendurable. We have, therefore, to set an optimum level of the gain control for each and every recording we take.

The act of increasing or decreasing the gain to find the right level is known as “modulating.” When recording live, peaks of varying intensity are likely to be let loose on us at unpredictable or unforeseen times. It is then essential to modulate the entire recording by watching the record level indicator very carefully and by taking appropriate action with the gain control. Live recording is going to be dealt with later in this series after we have discussed microphones and their properties, so at this stage I would like to confine my attention to recording from the other sound sources.

When working from radio, disc or other pre-recorded sound sources the optimum level, once it has been found, should remain constant throughout the length of the recording. The reason is because all of these sources must, in the first place, have originated from microphone signals. In the case of gramophone records this would be in the commercial recording studio, with a broadcast it would be the BBC studio. Whatever the location the sound engineer would have precisely the same job to do that you would have to do if you were to record that same programme live. As the sounds are picked up by his microphones he would have to modulate the signal to iron out the peaks so as to avoid distortion—and this he would do merely by operating his gain controls. As the sound engineer has done this job once there is no need for us to do it a second time. Provided we can find the setting of the gain control



The controls of the Vortexion WVB 6. In spite of their apparent complexity, the single variable control is clearly marked REC. LEVEL. Note the recording level indicator with which it is associated, in this case in the form of a meter.

on our own equipment that will cause the peaks to fall just short of distortion point there should be no need for further manipulation.

RECORDING FROM RADIO

Let us assume we wish to record from radio. To attempt to do this by merely placing a microphone in front of the radio speaker is quite hopeless; not only would it introduce all the acoustic inefficiencies of the loudspeaker, the microphone and the room itself, but the microphone will also collect any stray, ambient noise such as doors banging, telephones ringing, traffic passing, etc. One should never consider recording from the radio or any pre-recorded

TAPE RECORDING TECHNIQUES

sound source other than by direct electrical link fed into either the radio or the diode socket of the machine. As the problem is only one of matching sensitivities, the output at the radio and the voltage requirement of the input socket on the machine will be the deciding factors. Let's see how we do it.

The easiest way to make a direct connection with radio equipment is to utilise the "tape outlet socket" on the radio itself, if one is available. It is necessary only to make up a connecting lead of screened, co-axial cable with suitable plugs at each end, one to fit the radio socket, the other the recorder. Harry Mack's recent article (*July issue*) provided adequate wiring diagrams for the connection. With co-axial cable there are only two conductors, the outer screen and the central core. If your lead works properly when it is made up, then it is wired correctly. The only possible error is a reversal of polarities, which will cause a loud hum. Reverse the connections in one of the plugs and the trouble should be cured. Persistent hum can be caused by a whisker of wire from the screening shorting across to the central conductor, or vice versa. Always examine joints carefully to make sure this has not happened.

Older radio equipment is usually not provided with a tape outlet socket, although many sets do have extension speaker sockets. A link between the machine and the radio can certainly be made at this point, but it is likely to be less efficient for a number of reasons. Any deficiencies in the final audio stage of the radio amplifier (and the circuitry in most simple receivers is primitive) will be passed on to the tape recorder. The level of output at the extension speaker socket is governed by the main volume control on the radio itself; in order to pass an adequate level to the recorder it is usually necessary to turn up the volume in the radio so that the programme is audible through its own internal loudspeaker. Another snag with this arrangement is that if the radio is provided with tone controls these will affect the signal at the extension speaker socket. The tone control on most simple radios consists of a single knob which is merely a top cut. If this is so it should be positioned for maximum treble response as otherwise the sound will already lack its high frequency content before it is passed to the machine and the resulting recording will be of poor quality.

Another possibility is the insertion of a tape recording outlet in the radio circuitry if one is not already present. This is a very simple job for any radio mechanic to do and should cost only a few shillings. Its position in the circuit is such that the level of output is unaffected by either the volume level on the radio or the setting of the tone control. These are obvious advantages, but the disadvantage is the possibility of introducing hum unless properly screened cable is used in the wiring, and the probable loss of high frequencies due to the capacitance of the cable itself. Whenever such a tape recording outlet is used the connecting link to the recorder should be kept as short as is practicable.

USING A RADIO TUNER

The best of all methods of dubbing from radio is to use a proper tuning unit instead of a domestic set. The BBC VHF transmissions provide a very high standard of quality, comparable to the best records. Tuning units comprise advanced circuitry designed specially to bring in the radio signal with a minimum of distortion or interference. They usually do not have a final audio stage and therefore have to be used in conjunction with other equipment. A tape recording of music dubbed from radio will be nothing but a constant irritation if it contains imperfections. These will stick out like a sore thumb every time the tape is played: the irritation increasing until in desperation the recording is erased.

The only cure is to use equipment as likely to provide perfect radio signals as possible. Don't be misled by advertising which refers to VHF transmissions as "interference free." They are—until an unsuppressed car passes the house, or worse, an aircraft flies overhead. As ignition troubles from cars decrease so the aircraft menace increases. Perhaps life on a desert island is the final solution . . .

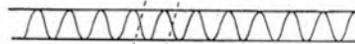
Whatever method is used a link lead will be required for connection to the recorder. If there should be a choice of input sockets, choose the least sensitive, usually marked "radio." *Before making any connection turn the record gain control to zero.* The connection can now be safely made and a signal will be passed to the machine. If you are using the extension loudspeaker socket in the radio, don't forget the radio volume must be turned up.

If the record gain control is at zero there should be no movement in the record level indicator. Increase the gain by *slowly* rotating the gain control in a clockwise direction. Movement should begin to appear in the record level indicator, and if the sensitivity of the radio output is matched to the input, programme peaks might be expected to appear anywhere from one-quarter to three-quarters of the possible travel of the control knob. Carefully note the position of the knob at which the peaks fall just short of distortion level. Return the gain control to zero, start the spools rotating and only then bring the gain control up to the pre-determined recording level. Recording is now in progress and it should not be necessary to adjust the gain control other than very fractionally until the end of the programme. When this point is reached the gain control is brought slowly back to zero, the tape allowed to run for ten or twenty seconds and not until then are the spools brought to a halt.

SEQUENCE OF OPERATIONS

You will note that the above follows a definite and logical sequence of operations, which I will now repeat:

1. Determine recording level by operating gain control and watching record level indicator. Note correct level at which recording will be taken.
2. Return gain control to zero.
3. Start spools rotating.
4. Slowly bring gain control up to pre-determined recording level.
5. Record programme without materially altering level.
6. At end of programme slowly fade gain control down to zero.
7. Allow spools to rotate freely for ten or twenty seconds.
8. Stop machine.



GREMLINS manipulated the artist's pen last month when he was drawing Figure 2 of this series. Above is the corrected version showing schematically a recorded signal. The space between the dotted lines is one full cycle.

This is a discipline, or habit, which one should try very hard to develop. A recording taken in the sequence of operations listed will, on playback, sound as follows: starting with silence, there will be a steady increase of background noise to a fixed level, the desired programme will be heard in full, at the end of which the background noise will steadily fade and will be followed by silence.

If this procedure is not adopted programmes will go crashing into each other—the end of a recently recorded work could come abruptly in the middle of a double forte passage of an earlier recording. This will never happen if the rules are followed. There is a psychological impulse which causes most people to stop their recorders dead the instant the required programme has finished. This impulse must be overcome; always remember to fade down to zero and let the spools rotate before stopping the machine. In my class students will readily admit the need for such a discipline, but nine times out of ten they forget to impose it on themselves when they come to record.

There are snags, of course. How can we set the level properly before we start to record if the item we want is the only one being transmitted? The answer, surely is that it never is. Radio programmes are on the air all day and every day. Levels should be *pre-set*. It's no use waiting for the programme to start—set your level first. There is a fairly constant variation in levels between the three BBC services, Home, Light and Third, and those variations will depend on your geographic location in relation to the transmitters. When one is really familiar with one's own equipment it is quite feasible to pre-set a level by experience rather than by observation; fine adjustment may be made, if necessary, during recording.

There are dangers in setting recording levels by observation. It may be that the signal being passed from the radio is pianissimo and contains no peaks. If the level on the recorder were to be adjusted accordingly without taking this into account distortion would be inevitable when a peak did occur. For this reason experience is the best guide in the world.

(Continued on page 321)



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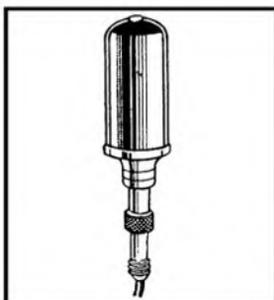
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The aesthetics of stereo

By Lawrence Graham

IT was said in this magazine the other month that the human ear is a "very funny animal." The stereophonic effect takes full advantage of this peculiarity. In the reproduction of music there should be no more than an academic interest in the ability to position in space the instrumental components that go to make up the performance of a symphonic work. The orchestra performs in a concert hall or studio; when the sound is reproduced domestically the significance of the original positioning could be lost in absurdities.

If stereo means that we can bring the concert hall into the home, is this what we really want to do? Is it proper for the sounding brass to be lurking vaguely around Auntie's straight-backed chair? You can't wonder that the cat shot across the room as if all the devils of hell were after him—there just wasn't room for the double basses as well in the basket. But this could be stereo.

There's another side to the coin. The sounds we hear from a speaker are *not* the sounds of the instruments, they are the sounds of the speaker itself imitating the original sound. When reproduced stereophonically the imitation is nearer to the original than it would have been monophonically. Why? Presumably due to the "funniness" of the ear.

There is no logical explanation for this phenomenon. If we set up play back equipment of precisely matching quality, one mono and the other stereo, there is no doubt that the stereo will sound better than the mono. But in order to achieve this improvement in quality we have also to accept directional information which we may not want.

The true purpose of stereo is an improvement of quality; this improvement comes about as a by-product of the illusion of depth or perspective in space. But if the rendering of the perspective becomes more important than the intelligence of the programme itself, then the result is not only stereo, it's also sterile. The classic example was the stereophonic recording of a game of table tennis.

Our new multiplex broadcasts will offer us stereophonic music. If our enjoyment is increased by the techniques of the new system they will be aesthetically satisfying. But a new technical toy is a tempting plaything. For how long will transmissions be confined to music? Shall we have stereophonic drama, stereophonic fea-

tures? Will Mrs. Dale pour her interminable cups of tea at our table; will Dan Archer lead his pigs around our living room?

The art of sound radio is the art of recorded sound, and our broadcasting authorities have, in the past, set a high standard in which we can rightly feel some national pride. Many sins are committed in the name of progress, and stereo for the sake of stereo is not only worthless but positively harmful.

Under the monophonic system the mind is free to position its mental images at will without the constraint of an imposed directional pattern. In dramatic productions this freedom of mental action is an essential part of the human ability to convert the



"Me have four heads . . . staggered!"

imitations of sounds from the speaker into a personal, individualistic interpretation of the dramatic action. The imposition of directional instructions in the sound can only make the listener's impressions less personal, less individual. Indeed, it may invalidate a clearly formed mental image completely, replacing listener satisfaction with listener frustration.

Let us hope that our programme producers will think deeply on these things. Let us hope that moderation will prevail—if it doesn't stereo could be the most retrograde step the BBC has ever taken.

TAPE RECORDING TECHNIQUES

Continued from page 319)

When quiet passages are being passed into the equipment the movement on the record level indicator will either be minimal or perhaps not even be present at all. The temptation at such a time is to increase the gain, just to be sure that the recording is being satisfactorily made. At all costs this temptation must be resisted. To bring up the gain at such a time is the equivalent of trying to record a whisper as a shout. Manipulation of the gain control during recording will not only upset the dynamic range of the work, giving it false values, but it will also affect the background noise levels which will vary in proportion to the amount of gain that is applied. So having found the right recording level leave the control strictly alone.

Recording from radio is really so simple as not to require any further explanation. The instruction booklet given with the recorder should deal with any differences peculiar to that particular machine, but these comments of mine can be taken to apply generally.

I have referred to the need to avoid loss of quality due to incorrect setting of tone controls on the radio. The same thing applies when dubbing from disc or another tape. For such work we need, ideally a flat response from the playback equipment. By a flat response we mean without loss or emphasis of either treble or bass. Every owner of auxiliary equipment should determine for himself at precisely which setting of the controls this flat response is achieved. Deviations from flat may then be deliberately introduced to correct deficiencies in the sound source, thus giving a copy that is "better" (at least in that respect) than the original.

In terms of pure quality we can *never* improve a sound by recording it. Amateurs are often fooled in this respect. When dubbing from radio it is natural to listen to the sound from the radio's loud-

speaker as it is being recorded. At the end of the programme the tape is wound back to the beginning and a comparison is then made. But when the tape recorder is played the volume is turned right up and the sound goes belting all round the room. "There we are, it sounds better!"

Don't be misled. For comparisons of this kind you *must* not only maintain the same relative volume levels but also use the same loudspeaker and amplifier both for the radio and the tape playback. The fundamental quality of the sound, as such, is never improved. To the contrary, when we record we add spurious noise that inevitably originated in the tape recorder. We can improve the quality only by improving the sound source.

An unskilled person should not try to make direct connection to an AC/DC radio where the chassis is live, or to a television set where very high voltages are present. Never attempt to make such a connection unless you are quite certain you know what you are doing—I'd hate to lose a reader prematurely.

There can be a danger to the machine itself if a connection were to be made with the gain control in an advanced position. Connection to input sockets should always be made with the gain control at its zero setting. This is a safety precaution you won't have to think about if you get into the habit of following the listed sequence of operations.

The kind of recording I have been describing is so easy as to be almost boring. It calls for no skill and little ability. It is useful in providing exercises in basic recording routines which should be followed meticulously and repeatedly until they become as automatic as the sequence of operations through which you go when you drive your car. Live recording is a very different kettle of fish, and we'll start to think about that next month.

IT STAYS PUT!



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TALK

By Audies

I HAD an interesting query from a reader the other day. He wanted some help in demonstrating to a dramatic group the validity of recorded sound as an art form. This is not quite so difficult as it might seem. One has to remember that in any medium, including the traditional ones of painting, drawing and sculpture, the artistic merit of the work depends, not on the medium, but the artist. Just because my scribbles with a lead pencil on a sheet of paper are not art does not lead us to conclude that drawing is not an art form. Commonsense tells us it is, but only when the draughtsman is an artist.

So it is with recording. The artistic merit of programme material will depend on several factors, the most important of which is the skill of the recordist and the least important is the complexity or cost of his equipment. If I buy a better pencil I shall not necessarily draw any better. On the other hand an accomplished artist will work better with good materials than poor. But, whatever materials he has available *he will still work*. Lack of equipment is no excuse for lack of work.

The best programmes begin as ideas. Ideas are things that come to one as the result of thought. Thought is something that costs not a single penny, only effort. But an idea is of no use until it has taken on tangible form, so it has to be written down. Even more effort is required at this stage. A proper script is prepared, and all the recorded sequences are *imagined*. I can remember the late Lawrence Gilliam, head of BBC features for many years, saying to me, "Recording in the mind saves miles and miles of recording tape." Of course it does, and it doesn't need any equipment either.

The owner of an excellent script, brilliantly devised and written should always be able to lay his hands on the equipment for the mere technical job of recording. The tragedy is that too many people own the means but lack the ideas.

* * *

AS a change from microphones I've been spending some time working on a comparison of speakers. We lined up three instruments, my own Goodman infinite baffle unit, an amateur assembled Heathkit Cotswold and a non-proprietary enclosure containing a tweeter and a good quality ten-inch cone. For our tests we played back tapes of known quality to a listening panel which included the composer of the recorded items. The results were very interesting.

It was immediately obvious that the unit of uncertain origin was quite hopeless when compared with the other two. This emphasises the need for proper acoustic mounting of speakers. These, although of good quality, had just been screwed into a smart-looking box. The sound lacked both bottom and top response. The only thing it had

that the others didn't was shocking cabinet resonance. This trouble is very obvious when playing back voice recordings—it sounds as if the broadcaster is in an echo chamber and it can be so unpleasant as to be almost painful to the ears. This loudspeaker was so bad there was no point in including it in any further tests, so it was eliminated with a very black mark.

My Goodman is their old I.B.3 model which has not now been produced for many years. It was, I believe, comparatively expensive. The Heathkit Cotswold is reasonably priced at less than £30 in kit form. We had carefully arranged the demonstration so that we could fade from one loudspeaker to another—and then back again—at any desired point in the programme. This arrangement proved very necessary because the differences were so slight they could only be detected by immediate comparison of selected instrumental phrases. The Goodman proved to have rather more edge or brilliance to its sound but this was so marginal that our musician had the greatest difficulty in identifying which speaker was operating unless we offered comparison by switching from one to the other.

Our conclusion was that both loudspeakers were very good indeed. I frankly didn't expect the home-made Cotswold, at less than half the price of the Goodman, to stand up very well to such a stringent test. Which only goes to show that one shouldn't jump to conclusions. The owner, by the way, was very complimentary about both the service he had from Daystrom and the clarity of the do-it-yourself instructions.

* * *

I have just bought myself a new desk: a startling news item of no interest to anyone. But I mention it because my private papers were always in a muddle. The confusion became unbearable. Breaking point was reached and passed. I am now broke, tidy again and in possession of a beautiful, new piece of furniture. In the ghastly sorting out process I came across more horrors than I care to mention, one of which was an unpaid renewal notice dated two years ago for the insurance policy on my recording equipment.

Some readers might not be aware that insurance policies to cover loss, theft and even accidental breakage are available at very low premiums. The sensible man not only has a policy but remembers to pay the premium! If you're not insured it would be advisable to inquire of your usual insurance company. Some do not offer this kind of cover, so if there is any difficulty drop me a line or fill in the inquiry voucher at the back of this magazine and you will be put in touch with a reputable firm who will be pleased to help you. A few shillings spent could save many pounds—and much heartache.

* * *

Having mentioned Lawrence Gilliam I'll close with a yarn of his. He had been sent to Greece to report on an earthquake, and he took with him an E.M.I. L2 portable recorder. At the scene of the 'quake conditions were desperate, with crumbling buildings and outbreaks of fire. Out comes the machine and microphone, but to his horror the spools won't turn. Having no tools he searched the ruins for a mechanic and finally found one who couldn't speak a word of English. Sheltering in a cellar he indicated what was wrong by sign language and the mechanic unscrewed the deck. "What d'you think we found?" he would ask with an enormous laugh. "The elastic band had broken . . . !"

ON THE FRINGE

A new monthly round-up of news from the world of hi-fi

LET us all rejoice at the exciting news of daily BBC stereo transmissions. But our joy is not unconfined. The stereo transmissions will be available at first only to listeners within the service area of Third Network VHF transmitters at Wrotham and Dover (South East England) but it is planned to extend them to the Sutton Coldfield VHF transmitter (Midlands) in about 12 months and then to the Holme Moss VHF transmitter (North of England) in approximately 15 months.

Here's the rub. If you live anywhere else in the UK, no one will predict how long you may have to wait for FM multiplex stereo. Extensions of the service—after the 15 months' period—both in relation to coverage and to the number and type of programmes transmitted, will be considered, to use the BBC's phrase, "in the light of public reaction and of the economic resources available."

It appears that the availability of suitable landlines by the GPO has made possible this new BBC stereo service, but many radio engineers today think that high-grade radio links could well replace some landlines and avoid many of the distortion problems. There are technical factors involved in using direct re-broadcasting between FM transmitters, including fading and co-channel interference snags where long distances are involved, which in turn might mean reduced signal-to-noise ratio in the stereo mode.

But such a method of distribution could reduce costs and surely the enthusiasts would be willing to erect a better aerial—a multi-element array—than the ordinary dipole to give a better signal pick-up in fringe areas?

So far it seems that only a few well-known names such as Quad, have made available stereo decoders for use with their radio tuners/receivers. But various models are promised from such British manufacturers as Rogers Developments, Armstrong and Radford Electronics.

Pye has a suitable radio receiver for FM-multiplex reception, and, of course, such Continental names as Bang & Olufsen, Telefunken, Arena and Braun, offer equipment suitable for stereo radio reception. Tape recordists with stereo machines now have programme material to experiment with, and all stereo programmes, or stereo items within programmes, will be marked by a special 's' sign in the relevant editions of "Radio Times."

The demands of colour television and extension of the BBC 2 service all present problems for the BBC's limited finances, but we entreat every reader concerned with quality sound recording/reproduction to badger the BBC for an expansion of FM stereo as quickly and as widely as possible—even if we have to pay for it by an increased licence fee. Once you've heard a good stereo radio programme you'll think it worth the trouble and expense—at both ends of the chain.



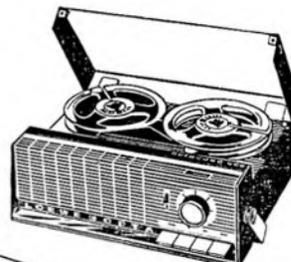
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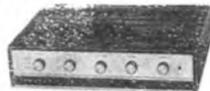
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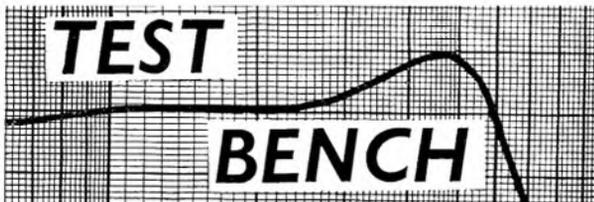
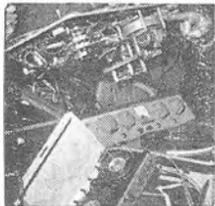
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SONY TC-260

By H. Burrell Hadden

THE Sony TC-260 stereophonic tape recorder is a fully transistorised, mains-operated, portable machine, built to high-quality standards. It operates on the four-track system, and has two available tape speeds, $7\frac{1}{2}$ and $3\frac{3}{4}$ ips. Elegantly styled in a wooden case finished in imitation leathercloth, it has satin aluminium trim, and black expanded metal loudspeaker grilles. The machine can be operated in either the vertical or the horizontal position. The weight of the TC-260 is about $34\frac{1}{4}$ lb., and the dimensions are $21\frac{5}{16}$ x $15\frac{7}{16}$ x $7\frac{7}{8}$ inches.

Fast forward and rewind are provided, the rewind time for a 1,200 ft. reel of standard-play tape being just over three minutes on the model supplied. This may seem rather slow, but the wind was very even indeed, a necessity with stereophonic tapes if the tape is not to become buckled by handling afterwards. Any damage to the tape in this way can cause deterioration of the stereophonic information.

The controls on the machine are simple. The tape transport is controlled by a single switch, having a large, easily-gripped handle, which controls all tape movements, rewind, stop, forward (play), pause and fast forward. The "record" function is selected by means of a push-button operated in conjunction with the "play" position. Depressing this button lights red lights in the two VU-type level indicating meters and enables the recording levels to be set before setting the tape in motion. This "record" button, together with the record gain controls of the two channels, is situated in a small covered compartment on the left-hand side of the tape deck. The two gain controls each have ganged switches so that only the tracks actually switched on will record, enabling the machine to be used as a four-track monophonic recorder. A press-button mains

on/off switch, the tape speed control, and a digital-type tape position indicator are also found on the deck plate. All the other controls are on a panel on the right-hand side of the machine. At the bottom of this panel are the volume control for playback. These are concentrically mounted, and normally turn together, but can be



moved relative to each other to act as a stereophonic balance control. Above the volume controls are the bass and treble tone controls, ganged for the two channels. These only operate on the internal loudspeaker amplifiers and are of the lift and cut type, with a centre marked "flat" position. Above these controls again is the loudspeaker switch, for use when recording by microphone or when replaying through external equipment.

Apart from the microphone input sockets, which are in the compartment with the record gain controls, all the input and output sockets are in compartments on the rear edge of the machine. The larger of these compartments also serves to store the microphones and recording and mains leads. The line input and line output sockets are of the phono type, the input socket having a sensitivity of 0.1 volt at an impedance of 200 K ohms, and the line outputs giving 0 dB (0.775 v) at a low impedance, requiring a load of not less than 5 K ohms. The microphone sockets, incidentally, have a sensitivity of 0.3 mV, very high indeed, at an impedance which will accommodate any microphone from 250 ohms to 1 K ohm. The now universal DIN socket for single lead connection to external equipment is provided, as also are standard-size jack sockets for external loudspeakers.

The recording level meters are calibrated to the NAB standards and in addition to their normal function they indicate the level being sent to the line output sockets on replay. The output level when measured was found to be accurate to within 0.5 dB.

The amplifiers contain a total of twenty-one transistors, and the power output fed to the internal loudspeakers is five watts per channel. The internal loudspeakers, mounted in the ends of the cabinet, are 8 x 4-inch ellipticals, and can give a very good account of themselves.

The machine was given the usual practical and technical tests and performed very well indeed. The pre-recorded demonstration tape sent with the machine was very well reproduced, as were other favourite test tapes. Wow and flutter were negligible at either speed. The record/play frequency response is as shown in the diagram, and the balance between the two channels was very good. The signal-to-noise ratio was very good indeed at -53 dB.

The machine is supplied complete with two dynamic microphones, recording leads, and an excellent instruction manual, which, incidentally contains full circuit diagrams. This is a machine I would very much like to own, and a very good buy at 95 guineas.

MANUFACTURER'S SPECIFICATION

Speeds: $7\frac{1}{2}$ and $3\frac{3}{4}$ ips.
Recording system: Four-track, mono or stereo.

Maximum spool size: Seven inches.
Frequency response: 30-18,000 cps (50-15,000 \pm 3 dB) at $7\frac{1}{2}$ ips; 30-13,000 cps at $3\frac{3}{4}$ ips.

Wow and flutter: Less than 0.19 per cent at $7\frac{1}{2}$ ips; less than 0.25 per cent at $3\frac{3}{4}$ ips.

Signal-to-noise ratio: Better than 50 dB (at peak recording level).

Harmonic distortion: Three per cent at 0 dB line output.

Inputs: Microphones (low impedance: 250-1 K ohm/0.3 mV); auxiliary inputs (high impedance: 0.12 volts).

Outputs: Line (low impedance 0.775 volts); external loudspeaker (8 ohms); integrated record/playback connector; and binaural monitor output (0.775 volts).

Loudspeaker: Two 8 x 4-inch dynamic elliptical.

Power output: Five watts per channel.

Transistors: Six 2SB381, two 2SB382, two 2SB383, one 2SC297, four 2SC298 and six 2SD64.

Power requirements: 55 watts, 100, 110, 117, 125, 220 or 240 volts, 50/60 cycles.

Weight: Approximately 34 lb. 3 oz.
Dimensions: $21\frac{5}{16}$ x $15\frac{7}{16}$ x $7\frac{7}{8}$ inches.

Manufacturers: Sony U.K. Sales Division, Mercia Road, Gloucester.

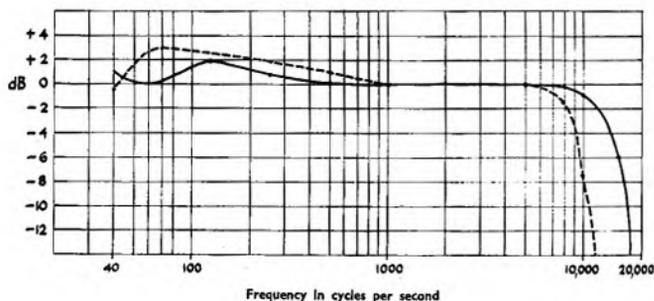
NEWS IN BRIEF

GARRARD ENGINEERING have issued a special tape recorded "audio catalogue" for the blind giving the latest details of their products and services. The tape, which features a 3,000-word description of the Garrard range of turntables and record units, together with details of their operations, accessories and spares, is available to registered blind people through the Tape Circle, 32, Paton House, Stockwell Road, London, S.W.9.

TO bring the company name into line with its product range, Standard Telephones and Cables (Transistors) Ltd. has been changed to S.T.C. Semiconductors Ltd.

RADFORD Audio announce that direct to dealer sales of their amplifiers, tuners and loudspeakers have been discontinued.

Their products are now available to the trade from A. C. Farnell Ltd., of 81 Kirkstall Road, Leeds 3, and Kenyon Street, Sheffield 1, and from Lugton & Co. Ltd., P.O. Box 44, 209-211 Tottenham Court Road, London, W.1.



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**Tape records
reviewed**

CLASSICS



**By Edward
Greenfield**

**Range of
stereo
tapes
from
America**

“RECORDED in England; Manufactured in U.S.A.,” say two of the four-track stereo tapes I have had for review. The first point must be whether such a curious interchange, in which the finished tapes are imported by EMI from America, is worth it. The question of value for money is rather for the individual collector to decide, but on quality my initial report is very favourable indeed. EMI at Hayes has been using its own master-tapes to provide tape records for almost ten years, but I do think from my limited experience so far that these American products are even better.

There is an extra brilliance and clarity about the sound not always evident in the EMI product whether on disc or tape, and the great EMI merit of warmth and richness is in no way undermined. Whatever the blurb's claim to a “New Biononic Process” means in practice, there is obviously some gain. So far I have heard only samples of the 7½ ips tapes, and I shall be very interested to find whether the improvement extends to the 3½ ips tapes too.

The packaging is fairly conventional. The spools are of buff plastic and have a solid segment where a paper label is stuck on. The only minor disadvantage I found was that at a distance from the machine it is hard to tell how far the tape has to run at any point. As so often with tape records the information given about the music is paltry. In the opera record (“Madame Butterfly” highlights) the full text and translation are given in a leaflet originally produced for the disc version. It would be sensible if the sleeve-notes for the disc versions could similarly be provided for all the tapes.

WALTON. Music from Shakespearean Films—Richard III, Hamlet and Henry V. Philharmonia Orchestra conducted by Sir William Walton. Angel (ZS 36198), 7½ ips, four-track stereo, £3 15s.

The music which Walton composed for Sir Laurence Olivier's three Shakespearean films is arguably the most successful film music ever written. Some might say that at certain salient moments it calls attention to itself more than film music ideally should, but there is no question that the effectiveness of such scenes as the Agincourt scene in Henry V or the final cortège of Hamlet was not merely enhanced by the music, but set

a new standard in the imaginative linking of film and music. True, for practical reasons the final funeral march of Hamlet is usually cut in the showing of the film nowadays, but the inclusion of that fine march music on this tape shows how even on its own the music stands as a highly effective and interesting piece.

The Agincourt battle music is splendid too, though this comparatively recent recording does not include the terrifying arrow noise that they managed to include on an earlier recording. With Sir Laurence himself reciting extracts of the play, that old version contained more than the orchestral suite given here.

The Richard III music is rather more conventional in its exploitation of mediaeval atmosphere music, but nonetheless the result is highly colourful and enjoyable. The composer as always proves a highly effective conductor of his own music, and with excellent playing from the Philharmonia Orchestra the tape makes far more than a pleasant reminder of three excellent films.

PUCCINI. Madam Butterfly Highlights. Victoria de los Angeles, Jussi Bjoerling, Miriam Pirazzini and Mario Sereni. Angel (ZS 35821), 7½ ips, four-track stereo, £3 15s.

There are depths in the character of Puccini's geisha-girl heroine that were for long unsuspected by those who listen to Puccini on the surface, and Victoria de los Angeles is one of the singers who consistently finds those depths. This is an intensely beautiful and moving performance, and the selection for this single tape has been well made.

The first extract has the duet between Pinkerton and the Consul Sharpless when hints of Pinkerton's cavalier attitude to his Japanese marriage-to-be are already given. This leads into the entrance of Butterfly—the voice as so often in Puccini first heard in the distance off-stage. Then the Act I love duet with the late Jussi Bjoerling as well as de los Angeles singing radiantly. The most famous of all soprano arias in Puccini, “Un bel di” follows, as well as the same scene's culmination, the Flower Duet in which Butterfly and Suzuki prepare the house for Pinkerton's arrival. This leads into the humming chorus, and the last two items are Pinkerton's brief aria from the final scene “Addio fiorito asil” and Butterfly's suicide aria and death scene.

The recording made in Rome, some years ago is not quite so full as that in my other Angel stereo tapes, but the voices are well caught, and with such a performance one hardly wants to cavil on the degree of high fidelity.

**Here is
the
cream
of
the cream**

POPULAR



**By Don
Wedge**

OUR recent diet of British-made pop tapes has been limited almost exclusively to 3½ ips, mono. For the really keen connoisseur there are some 7½ ips stereo tapes available. But they come from specialist importing firms.

Now EMI Records is importing some of the tapes put on the American market by its US subsidiary Capitol Records. It means that there is a magnificent library of big name pop music available to the tape connoisseur from most EMI dealers.

In addition to the current 3½ ips releases, I have been listening to some of the Capitol 7½ ips four-track stereo tapes. Because popular music is not really designed for hi-fi enthusiasts, I used equipment with average response.

Even so, listening again to "Latin Ala Lee!" in comparison with the original 3½ ips mono version which EMI produced and issued here, there is an enormous improvement. Fullness of sound and the added intimacy of performance is greatly enhanced.

Records available in this expensive form tend to be the cream of the cream. They have to really justify the enormous expense of the record after it has been imported from America.

Nevertheless, I feel that every tape recorder enthusiast with access to suitable playback equipment should strive to include something from the 7½ ips stereo repertoire in his collection.

NAT KING COLE SINGS/THE GEORGE SHEARING QUINTET PLAYS. With String Choir conducted by Ralph Carmichael. Capitol (ZW 1675), 7½ ips, four-track, stereo, £3 15s.

This now famous record brought together for the first time Nat Cole and the George Shearing Quintet. Both had earned high places in the popular music world, completely justifiably as far as I'm concerned.

Cole, a pianist himself, left the arranging to George Shearing who sketched things out and left Ralph Carmichael to orchestrate for the accompanying strings.

Producers Lee Gillette and Rom Morgan selected a dozen worthwhile songs. Among them are *September Song*, *I Got It Bad*, *There's A Lull In My Life* and the wonderful *Azure-te*.

The result is one of the finest albums either Cole or Shearing ever made.

COME SWING WITH ME! Frank Sinatra with orchestra conducted by Billy May. Capitol (ZW 1594), 7½ ips, four-track, stereo, £3 15s.

Compared with the other records Sinatra was making a decade or so ago, this cannot be called one of his greats. The word though is purely relative. Many singers would have given their right arm to have made a record anything like so good.

Somehow the choice of song on this record was not Sinatra's best. His technical perfection is there, but somehow the irresistible qualities of "Come Fly With Me" and "Songs For Swinging Lovers" is missing.

Included in this album are *American Beauty Rose*, *Old Black Magic*, *Sentimental Journey* and *Five Minutes More*.

Highly acceptable, of course, but this record is not one I would have chosen as a sample of Sinatra at his ultimate best.

LATIN A LA LEE. Peggy Lee with orchestra directed by Jack Marshall. Capitol (ZT 1290), 7½ ips, four-track, stereo, £3 15s.

This must rank with "Black Coffee" as the best album Peggy Lee ever made. The songs are all great hit numbers from the most successful musicals of the late 40s and 50s.

Peggy Lee's beautiful soft beaty singing (her economy is also a great factor contributing to her success) is accompanied by

some pulsating Latin background accompaniment.

The combination of Peggy Lee's tender blondness and the rugged beat makes this a potent package. The cover note talks of being "Peggy Lee in a dazzling new setting." Perhaps it was at the time, but now the treatment is familiar. It detracts not at all from its impact.

OLE! BOSSA NOVA. Laurindo Almeida and the Bossa Nova All Stars. Capitol (ZT 1872), 7½ ips, four-track, stereo, £3 15s.

Laurindo Almeida must have been the most famous recording guitarist before the Beatles came on the scene. Brazilian-born, it was no wonder that he adapted his western jazz and classical techniques to the bossa nova when it came along.

Capitol gave him some of America's finest modern jazzmen—Bob Cooper, Shelly Manne and Don Fagerquist among them—for this record. It is an album that suits my tastes in jazz and provides a wonderful listening and background sound.

Numbers vary from *Recado Bossa Nova*, authentic in origin, to adapted versions of *I Left My Heart In San Francisco*, *What Kind Of Fool Am I* and *Days Of Wine And Roses*.

Even if it does include yet another version of *Fly Me To The Moon*, it is none-the-less welcome because of it.

Another tape for organ lovers

ORGAN



By Grahame
B. Walsh

STANLEY WHITTINGTON AT THE WURLITZER ORGAN. Recorded at Buckingham Town Hall. Global (6592), 3½ ips, mono, 2s.

Many pitfalls await the player of purely orchestral music on an organ. In this tape, however, Stanley Whittington overcomes each of them in a most exuberant manner.

His *Gold and Silver Waltz*, for instance, is particularly buoyant and lively, although occasionally marred by unwanted audience participation. Recorded at one of the Sunday afternoon recitals at Buckingham Town Hall, the programme is often interrupted by coughing and feet shuffling. Acceptable, but only just, on an initial playback, the anticipated cough on subsequent playback detracts from the music. A studio recording of this programme would be appreciated.

The other tracks include a selection from *Gypsy Love*, and a medley containing such favourites as *Sentimental Journey*, *Always*, *Wrap up your troubles*, *Riding on a rainbow*, *You are my lucky star*, *Falling in love*, *Sleepy time down South* and *Shanty in old shanty town*.

The tapes reviewed this month are issued by the following companies:

"Angel," "Capitol": E.M.I. Records Ltd., 20, Manchester Square, London, W.1.

"Global": Global Products, 14, Underwood Road, Rothwell, Northamptonshire.

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NEW PRODUCTS

**PHILIPS ANNOUNCE
TAPE
MUSICASSETTES**

COMPATIBLE Musicassettes, tape records in cassettes for mono and stereo playback are announced by Philips Electrical Ltd. Available next month, the cassettes are recorded at $1\frac{1}{2}$ ips and will retail at £2.

Although Musicassettes have been selling on the Continent for some time, Britain will be among the first countries to market compatible cassettes, a new technique in recording having been developed to make this possible on $\frac{1}{2}$ -inch wide tape.

Designed for use with their cassette-loaded battery recorders and with their new mains-operated cassette model (illustrated right), the tapes feature stereo recordings on tracks 1 and 2 or 4 and 3 instead of the more usual 1/3 and 4/2 system. This means that the tapes can be played monaurally on half-track models (scanning the upper half of the tape) or stereophonically on quarter-track models.

The cassettes measure approx. $4 \times 2\frac{1}{2} \times 4/10$ inches and contain the same amount of material as an lp disc, playing for thirty minutes per side. Initial titles, mono only, will include jazz and pop music only. Classical issues in stereo form will appear early next year.

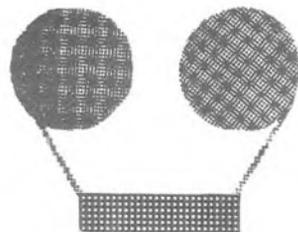
All material initially released by Philips Records Ltd. and E.M.I. Ltd. on Musicassettes will be made from existing lp discs. Among the artists featured in the first release will be Susan Maugham, Jerry Lee Lewis, Spencer Davis, Band of the Scots Guards, Woody Herman, Cleo Laine and Johnny Dankworth, Oscar Peterson and Horst Jankowski's Orchestra on the Philips label, and Black and White Minstrels, Semprini, Shirley Bassey, Acker Bilk, Cliff Richard, Eartha Kitt and Joe Loss from the E.M.I. repertoire.

*Philips Electrical Ltd., Century House,
Shaftesbury Avenue, London, W.C.2.*

**NEW ROBUK MODEL
HAS
FOUR SPEEDS**

THE first four-speed tape recorder selling at less than 30 guineas has been introduced by Robuk. Their new Statesman model, recording at $7\frac{1}{2}$, $3\frac{1}{2}$, $1\frac{1}{2}$ and 15/16 ips, is available in two and four-track version for 29 and 32 guineas respectively.

Featuring its own K12 tape deck, the Statesman, illustrated right, incorporates a single two-pole twin coil motor. The quoted frequency response is 60-14,000 cps \pm 3 dB at $7\frac{1}{2}$ ips, 60-8,000 cps \pm 3 dB at $3\frac{1}{2}$ ips, and 60-4,000 cps at $1\frac{1}{2}$ ips. The slowest speed is described as for speech frequency coverage. Signal-to-noise ratio is given as



better than 37 dB, and wow and flutter figures as better than 0.17, 0.2 and 0.35 per cent at the three top speeds.

With accommodation for $5\frac{1}{4}$ -inch spools, the Statesman provides a playing time of 48 minutes per track using standard-play tape (900 ft.) at $3\frac{1}{2}$ ips. Rewind for such a length being achieved within $2\frac{1}{2}$ minutes.

Among the features are facilities for superimposition, mixing, monitoring through loudspeaker or headphones, parallel-track playback (four-track version only), plus additional features including pause control, tone control, safety erase lock to prevent accidental erasure, automatic interlock to prevent tape spillage, digital rev. counter with zero reset, magic eye recording level indicator, push button operation and a $7 \times 3\frac{1}{2}$ inch loudspeaker handling the power output of $1\frac{1}{2}$ watts.

Inputs are provided for a high impedance microphone (1.8 mV) and radio (200-250 mV), and outputs for extension loudspeaker (3 ohms) and external amplifier (one volt).



The valve line-up includes an ECL82, ECC83, EL84, EM84 plus silicon rectifier and diode; power consumption being approx. 80 watts. Power supply is 200-250 volts, AC 50 cycles (variants to order).

The Statesman measures $13\frac{1}{2} \times 12\frac{1}{2} \times 7\frac{1}{2}$ inches, and weighs 18 lb. It is housed in an all wood cabinet with bright lustre fittings and trim; the colour scheme is black/grey/teak.

Manufacturers: Robuk Electrical Industries Limited, 559-561 Holloway Road, London, N.19.

BSR INTRODUCE THEIR LATEST TAPE DECK

AN increase in their range of tape decks is announced by BSR Ltd. The latest unit, illustrated below, is the TD20 featuring direct action, push-button controls.

The deck will accommodate reels up to 5½-inches in diameter and operates at tape speeds of 7½, 3½ and 1½ ips.

The TD20 can be supplied with any of the wide range of BSR tape heads for two or four-track mono or stereo operation and,



if required, a three-digit counter with either wheel or push-button reset can be fitted. A two-track version costs £14, and the four-track will sell at 15 guineas.

The TD20, which will be complementary to the existing TD2 and TD 10 decks, measures 12½ inches long x 10 wide (front to back) x 4 5/16 inches deep overall.

BSR Limited, Monarch Works, Old Hill, Staffordshire.

TWO AUTOMATIC MODELS FROM SANYO

SANYO have announced two automatic level control tape recorders. First of the new models is the MR-701 "Brigadier" unit, illustrated below, which is a two-speed, mains-operated transistorised recorder operating at 3½ and 1½ ips.

Quoted frequency response is 100-8,000 cps at 3½ ips, and 100-4,000 cps at 1½ ips. The signal-to-noise ratio is given as better than 40dB. With accommodation for seven-inch reels, the Brigadier provides a playing time of 64 minutes for each of its two tracks using standard-play tape (1,200 ft.) at 3½ ips. Rewind being accomplished within three minutes.

Among the features are facilities for monitoring, tone control, meter recording

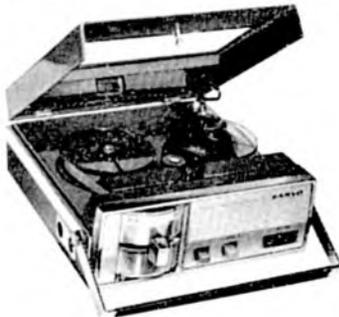


level indicator, three-digit rev. counter with zero rest button, and a built-in 6¼ x 3½ inch elliptical loudspeaker handling the power output of 2½ watts. A socket is provided for an extension loudspeaker.

The power supply required is 110-117 or 220-240 volts, AC, 50/60 cycles. Measuring 12½ x 10 x 5½ inches it weighs 12 lb. and retails at 39 guineas.

Their second model is the battery-operated transistorised MR-225 "Boy Blue," illustrated below, a single speed (1½ ips) half-track recorder.

Quoted frequency response is 200-3,000 cps ± 6 dB. With accommodation for three-inch reels it will provide a playing time of 16 minutes per track using standard-play tape (150 ft.). Rewind being achieved within two minutes. Among the features are facilities for earphone monitoring, remote control operation from the microphone, a built-in 3½ x 2-inch elliptical loudspeaker handling the power output of 450 mW. and a socket for extension loudspeaker (8 ohms).



Power is obtained from six U-7s supplying nine volts DC. Measuring 6½ x 6 x 2 inches, the Boy Blue weighs 2 lb. and cost 16 guineas.

Sanyo Service and Sales, 23, Savage Gardens, Trinity Square, London, E.C.3.

NEWS IN BRIEF

CONCURRENT with the BBC decision to introduce daily stereo broadcasts, Daystrom Ltd. have introduced a new Heathkit transistorised stereo decoder.

The new unit, Model SD-1, has a quoted frequency response of 50-15,000 cps ± 2 dB, channel separation of 30 dB (1,000 cps) and hum and noise level rated as -55 dB. Output impedance for each channel is 20 K ohms and output voltage for each channel is 250 mV. The input signal voltage is 0.4 volts min. from discriminator output of FM tuner.

Measuring 9 x 3¼ x 3¼ inches it incorporates seven 2N2712 transistors, and is available for £8 10s. (kit) or £12 5s. (assembled). The decoder is suitable for use with Heathkit tuners, models FM-4U and AFM-1, and, because it is self-powered, may also be used with most other makes of FM tuner.

Daystrom Limited, Gloucester.

CONVERSIONS of tape recorders for lip-synch. filming is being carried out by Beaulieu Cameras Ltd., importers of the Beaulieu 8 mm and 16 mm cine cameras.

The conversion involves mounting a separate pilotone head on the sound head assembly without altering the normal facilities of the recorder. A Star Indicator is also mounted on the control panel to indicate the pulse signal from 8 mm and 16 mm cine cameras.

The conversion cost depends on the tape recorder model. Specific instances include £12-£15 for the Fi-Cord 202a and Uher models.

Beaulieu Cinema Limited, 234 Baker Street, London, N.W.1.

"HINTS on Soldering" is the title of a booklet just issued by Multicore Solders Ltd. (winners of the Queen's Award to Industry). Short, factual and easy to read, the booklet is designed to demonstrate to the layman that soldering is straightforward and not a difficult operation providing a few simple basic rules are followed. The booklet will be distributed to the public through the trade.

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A first-class book of reference for the subject.
4. **Audio and Acoustics** by Gilbert A. Briggs (1963). 168 pages, 140 illustrations. **12s. 6d.**
Acoustical Consultant James Moir as sub-editor. A revised but basically original work from the well known "Sound Reproduction."
5. **Audio Biographies** by Gilbert A. Briggs and 64 collaborations (1961). 344 pages, 112 photographs and illustrations. **19s. 6d.**
7. **Cabinet Handbook** by Gilbert A. Briggs (1963). 112 pages, 90 illustrations. **7s. 6d.**
Intended for the do-it-yourself man, and contains vital information on design and acoustic principles particularly in relation to compact enclosures which are now so popular for stereo.
8. **Direct Current and Magnetism.** Edited by Edgar J. Black (1964). 120 pages, 92 illustrations. **10s. 6d.**
Gives a very simple account of basic electrical theory.
10. **High Fidelity Pocket Book** by W. E. Pannett. 304 pages. **40s.**
Clear explanations of each item in the chain of a high fidelity installation are accompanied by practical hints for the enthusiast.
11. **High Fidelity Sound Engineering** by Norman Crowhurst. 336 pages, 262 illustrations. **50s.**
Comprehensive coverage on the engineering of modern single-channel and stereophonic sound equipment.
27. **Stereo and Hi-Fi as a Pastime** by Douglas Gardner (1959). 148 pages. **15s.**
15. **Loudspeakers (Fifth edition)** by Gilbert A. Briggs (1963). 336 pages, 230 illustrations. **25s.**
All aspects of the design and performance of loudspeakers and enclosures are dealt with in non-technical terms.
20. **More About Loudspeakers** by Gilbert A. Briggs (1963). 136 pages, 112 illustrations. **8s. 6d.**
Deals with the latest trends in non-technical terms, and takes a new look at questions such as response and impedance, load matching, adding a speaker, listening tests, stereo.
36. **The Grundig Book** by Frederick Purves. Comprehensive 1964 edition. **15s. 6d.**
Includes working instructions and data sheets for individual Grundig models.
37. **Tape Recording for Pleasure** by Wallace Sharps. 128 pages. **3s. 6d.**
38. **Ribbons of Sound** by Karl Barleben. A U.S.A. publication and guide. **8s. 6d.**
40. **Simple Radio Circuits** by A. T. Collins, editor of Practical Wireless. **3s. 6d.**
41. **Hi-Fi and Audio** by A. T. Collins. Useful introductory paperback. **3s. 6d.**
29. **Tape Recording and Hi-Fi** by Douglas Brown (1961). 160 pages. **5s.**
Now as a paperback this interesting book by the Editor of "TAPE Recording Magazine" is very good value.
33. **You and Your Tape Recorder** by Norman Paul (1962). **4s.**
Very good value by a past winner of the British Amateur Tape Recording Contest.
12. **High Fidelity Sound Reproduction (Second edition).** Edited by E. Molloy. 212 pages. **20s.**
Contains a mass of valuable data for the serious amateur, and the maintenance engineer, and covers the expensive and complex equipment now on the market. Chapters on amplifiers and preamplifiers, dynamic loudspeakers.
25. **Sound Recording Works Like This** by Clement Brown. Illustrated. **10s. 6d.**
Part of "Science Works Like This" Series the book is intended for the younger members of the family.
39. **Tape Recorder Manual** by Wallace Sharps. (New cheap edition). **10s. 6d.**
Sections on its uses in business, education and pleasure, how it works, etc.
2. **Alternating Current and Acoustics.** Edited by Edgar J. Black (1964). 116 pages, 86 illustrations. **10s. 6d.**
Deals in simple terms with the origin and generation of alternating current, construction of coils and capacitors. The second part deals with the nature of acoustics and construction and operation of devices used for sound recording and reproduction.
21. **Practical Hi-Fi Handbook** by Gordon J. King. 224 pages. **25s.**
A guide to choice, installation and servicing of equipment, for dealer, engineer, and amateur enthusiast.
22. **Practical Stereophony** by H. Burrell Hadden (1964). 159 pages. **37s. 6d.**
The author, an instructor at the BBC, has been actively engaged for many years in research in this field, as a result the book is mainly directed towards those who make this art their profession, but there is much for the amateur enthusiast.
35. **Tape Recording Yearbook 1965.** 7s. 6d.
The 1965 edition contains all the well-known facts and figures of earlier editions, revised to date, as well as important contents vital to all interested in this field. Compiled by the staff of "TAPE Recording Magazine" this Yearbook is a must.

TAPE HANDBOOKS

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Advice on Buying a Tape Recorder by J. F. Ling.

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BARNEHURST

A tape club has been formed in the Barnehurst area of Kent. Ricky Dee is one of the instigators, and he welcomes letters from prospective members at 291, Parkside Avenue, Barnehurst, Kent.

BRIGHTON

A production team, showing the work of the Brighton tape club, has been set up from members and their equipment. The "team" descended upon Southwick Community centre recently to show members of the Albany Production Film Unit their equipment including six recorders, a multi-channel mixer, two slide projectors, two Goodman's loudspeakers and yards of cable. The Albany group are to return the visit to present some of their films.

Most recent of the club's activities included production of sound effects for "The Long and the Short and the Tall" production of the Brighton Youth Theatre. On July 13 members visited the De La Warr Pavilion to record at the Festival of Music presented by Bexhill Corporation.

Secretary: Keith Upton, 47, Kingsley Road, Brighton, Sussex 5.

FERROGRAPH OWNERS

TAPE contributor Richard Margoschis was a guest at the recent AGM held by the British Ferrograph Owners' Club. Twenty-five members were in attendance to hear Mr. Margoschis demonstrate his modified Fi-Cord 1a battery portable and describe his interest in birdsong recording.

Also present was Mr. Metcalfe, Sales Manager for the Ferrograph company, who spoke of future marketing plans. A demonstration tape, made for the company by member George West and Leon Tipler, was presented to Mr. Metcalfe for promotion use.

It is proposed to issue a Challenge Cup for the "Tape of the Year" as a memorial to member Stan Cloughton, whose recent tragic death shocked members. Recording their deepest sympathy to his family, the members felt the honour would be a fitting tribute to a keen member.

Secretary: R. D. Littler, 9, Red Hall Gardens, Leeds 17, Yorkshire.

JOHANNESBURG

One of the most recent reported meetings of the Johannesburg tape society included the screening of films showing the theory and application of transistors in electronics.

Following this, members were to introduce stereo amplifier construction sessions as a main feature of the club's activities. Transistorised kits of the Proctor-Sinclair X 20 unit are available to the society at reasonable cost. The first of their June meetings featured a demonstration of this equipment when details concerning this venture were discussed, and the following meeting saw members viewing kits of the Z12 designed for home construction.

Secretary: Anita Stuart, P.O. Box 11326, Johannesburg, South Africa.

LEICESTER

An evening for beginners was one of the most recently reported meetings of the Leicester tape society. The

basic design and operation of tuners and amplifiers was discussed and demonstrated, with some members showing their home-constructed units.

This was followed by a practical recording session with a wild array of equipment being taken to the nearby Museum Art Gallery. A club member and some of his friends formed a wind quintet and played ancient musical instruments including an Old English hornpipe whilst other members set up their equipment.

Extensive publicity was obtained through the local newspapers as a result of the club's participation in the "Leisure 66" exhibition held in Leicester some weeks ago. Their stand included various makes of recorders and equipment, and a demonstration of tape editing was given continuously by chairman Howard Dutton. Elsewhere, John Buckler, Bernard Britain and Alan Haywood manned a room and presented films of the clubs activities and hi-fi equipment, while other members manned the stand on a rota system to answer the many questions. In the following week some new members turned up as a direct result of the exhibition.

Secretary: P. Warrington, 20, Langham Drive, Narborough, Leicestershire.

LONDON

Microphone technique and amateur broadcasting were the two main subjects for the latest meeting of the London tape club.

Douglas Morris presented a programme showing various techniques of microphone handling, including the correct use of scripts. Later in the evening Bob Trotman demonstrated how seven hours of recorded material could be condensed into a 55-minute programme. Of particular interest was his technique of editing out the interviewer leaving the subject to tell his own story.

At the previous meeting judging for their annual competition took place. Five entries were received and the McManus Cup was eventually presented to Ron Tucker for his recording of a choir singing their own version of "You'll Never Walk Alone." Past "Tape of the Year" producer in the British Amateur Tape Recording Contest, Mike Avel was awarded second highest points for his documentary feature comparing piano-roll music with "live" piano recordings. As there were no "novice" entries, Mike was awarded the Novice Cup for his tape.

Earlier meetings have included a talk and demonstration on radiophysics and electronic music by Barry Mitchell, and a programme "The History of Stereo" presented by B.B.C. producer Richard Keen.

The members have received a request from L'Union Mondiale des Voix Francaises for a ten-minute recording of the Changing of the Guard at Buckingham Palace.

Future programmes are to include a location recording session and a further talk on electronic music by Barry Mitchell (September meeting).

Secretary: David Campbell, 46, Aberdare Gardens, London, N.W.6.

NORTH LONDON

Members of the North London tape society are currently engaged on the construction of a mixer unit for club use. Keith Parker has the circuit diagram and is acquiring parts, the chassis being made by Nigel Hunter.

Among their recent activities has been a location recording session, results still to be judged, playback of the club's internal competition, and production of their entry in the British Amateur Tape Recording Contest.

Later scheduled programmes include visits to and by the Brevis Film Unit, an evening for serious music

lovers, visit to a B.B.C. studio, and a talk and demonstration on circuits.

Secretary: John Wilson, 202a, North End Road, Fulham, London, W.14.

RUGBY

Two members of the Rugby tape society's team making a feature tape for the Percival Guildhouse, a centre for adult education, recently interviewed an 80-year-old lady. Associated with the centre in its earliest days, she now lives in a Warwickshire village and spends her time teaching herself Welsh. (Now we know there's no hurry!)

Future programmes were discussed at a recent meeting and the schedule now includes compilation of extracts from the club's library tapes, a demonstration/talk on microphones by Mr. W. M. Tyson, a local dealer, and how to produce better quality tapes from a medium-priced recorder.

Other programmes are to include an evening hearing, seven-minute holiday highlight tapes by members, judging of a local camera club's competition, and a location recording session.

Invitations are also being sent to a local continental coach tour firm for a repeat showing of their colour slide programme, and to Graham Harris of the Warwick and Leamington club to

present a talk. An evening's outing by coach is planned for the autumn to see the "Sound of Music" at Leicester.

Secretary: Mike Brown, 219, Clifton Road, Rugby, Warwickshire.

SHEFFIELD

The formation of a tape club in Sheffield is proposed. Mr. Kenneth Holloway a tape enthusiast for many years, is mooting the point and would like to hear from other local enthusiasts. He can be contacted at 61, Marcus Drive, Burngreave, Sheffield 3, Yorkshire.

UXBRIDGE

A change of secretary with Roy Barnett replacing Reg. Bonney after some three years in office was made at the recent AGM of the Uxbridge tape society.

Among decisions taken during the meeting was one to produce tape/slide shows for Old People's Homes and Institutions in the area.

Members are currently active producing a stereo demonstration tape.

Secretary: Ray W. Barnett, 25, Livingstone Road, Southall, Middlesex.

TAPE EXCHANGES

TAPE recorder owners who wish to contact others with similar interests, to exchange news and views by tape are invited to fill in and return the form on page 332 giving their name, age, address, and special hobby or interest for this free service.

Details given here also include speeds available, spool size, name of recorder, and special area to be contacted.

Aland, David R. (22). 74, Thingwall Park, Fishponds, Bristol, Gloucestershire. Hi-fi, light classical, jazz and pop music. 7½, 3½, 1½ ips. 8½-inch spool. Ferrograph Series 6. Male contacts preferred, UK only.

Allen, Tom F. (30). 19, Crompton House, Hall Place, Paddington, London, W.2. Films and records. 7½, 3½, 1½ ips. 5½-inch spool. Grundig TK23, Philips EL3300, cassette battery portable, Spinnet, four-track.

Applegarth, Bill (26). 2, Stanley Terrace, Preston, Lancashire. 8mm. cine, stereo recording. 7½, 3½, 1½ ips. 8½-inch spool. Ferrograph Series 5 and Tandberg.

Appleyard, Harry David (32). 447, Huddersfield Road, Wyke, Bradford, Yorkshire, Photography, cinema, most music. 15, 7½, 3½, 1½ ips. 8½-inch spool. Brenell Mk. V, Series 3. UK.

Arnold, John (38). 29, The Grove, Uplands, Swansea, Glamorgan. 35mm photography, education. 3½, 1½ ips. 7-inch spool. Wyndors recorder.

France, Belgium, USA.
Arnold, Richard (28). 24, Cawdor Crescent, Hanwell, London, W.7. 35mm photography, travel, football, pop and c/w music. 15, 7½, 3½ ips. 7-inch spool. Wyndors Vanguard and Viscount. Male contacts preferred. USA, Europe, UK.

Atkins, Norman (39). 43, Second Avenue, Selly Park, Birmingham 29, Warwickshire. Photography, most music. 3½, 1½ ips. 5-inch spool. Paros recorder and Philips EL3301 cassette battery portable. Female contacts only; letters not required.

Aydon, P. D. (21). 11, Norwich Street, Fakenham, Norfolk. Folk, country and western music. 3½ ips. 7-inch spool. Philips EL3541, four-track. Australia, USA only.

Baker, J. C. (27). 31, Warwick Road, Enfield Lock, Middlesex. Cinema, sport, opera and pop music. 7½, 3½, 1½ ips. 7-inch spool. Truvox

PD82 and Philips EL3548. Female contacts only. England. Letters first please.

Barker, Colin R. (21). 152, Shaftesbury Avenue, Swindon, Wiltshire. Hi-fi. 7½, 3½ ips. 7-inch spool. Home-built recorder, Colloredo deck, Martin Recordakit amplifier. Great Britain.

Barker, Gerald (28). 8, Cambridge Road, Lowestoft, Suffolk. Photography, travel, pop music. 3½ ips. 5½-inch spool. Ferguson recorder.

Barker, Miss Janet (22). 8, Cambridge Road, Lowestoft, Suffolk. Motoring, pop and c/w music. 3½ ips. 5½-inch spool. Ferguson 3210. UK.

Bass, Sam (35). Coliseum Theatre, Rhyll, North Wales. Film sound tracks. 7½, 3½ ips. 7-inch spool. Ferrograph recorders.

Beaton, Brian L. (24). 199, Yoker-mill Road, Glasgow, W.3, Scotland. 8mm cine with sync. sound tracks, radio, mechanical gadgets, most music not pop or modern jazz. 3½, 1½ ips. 7-inch spool. Cossor CR1604. Overseas only.

Bird, David (26). 92, Gardiner Street, Gillingham, Kent. Photography, electronic organ. 3½ ips. 7-inch spool. Grundig TK8/3D, Unicorder battery portable. Male contacts preferred. UK, Germany.

Bottomley, Roland (38). 2, Stewart Street, Doncaster, Yorkshire. Stage, comedy, c & w and jazz music. 7½, 3½, 1½ ips. 7-inch spool. Tandberg 74b, Truvox RD82. UK, USA, Japan.

Broadhurst, Granville (33). 9, Sharples Street, Accrington, Lancashire. Vintage cars, Glen Miller, chess. 3½, 1½ ips. 5½-inch spool. Overseas only.

Brown, Norman (31). 21, Kingsley Road, Mablethorpe, Lincolnshire. Outdoor recording, instrumental, pop and light classical music. 7½, 3½, 1½, 15/16 ips. 7-inch spool. Optacord 408, Stella ST459, four-track. Letters not required.

Brown, Syd (42). "Dauphin," Frilsham, Hermitage, Newbury, Berkshire. Photography, most music. 7½, 3½ ips. 7-inch spool. Truvox 93, four-track stereo.

Buckingham, Stanley P. (35). 124, Hin Lane, Southampton, Hampshire. 3½, 1½ ips. 7-inch spool. Photography, psychology, occult, scouting. All music. 3½, 1½ ips. 7-inch spool. Philips EL3548, four-track and EL3301 cassette battery portable. Male contacts only, no letters.

(Continued on page 332)

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TAPE EXCHANGES

(Continued from page 331)

Buckminster, H. P. (22). 48c, Grand Parade, London, N.4. Cars, French organs, Bach. 7½, 3½ ips. 81-inch spool. Ferrograph 5A/N.

Cadier, Andre (22). 141, Cheriton Road, Folkestone, Kent. Broadcasting, motoring, hiking, camping, pop music. 3½, 1½ ips. 5½-inch spool. Grundig TK28 and Philips EL3586. Female contacts preferred.

Cole, W. A. (31). 64, Outram Street, London, N.1. 3½ ips. 5-inch spool. Spinney recorder.

Coles, John Eric (31). 580, Coldhams Lane, Cambridge. Short-wave radio, wild animals. 3½, 1½ ips. 5½-inch spool. Sound Riviera, Philips EL3586, battery portable. Holland, UK.

Coveney, Trevor (24). 49, York Road, Sidmore, Bromsgrove, Wor-

MISCELLANEOUS

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Gummer, Roy Peter (18). 24, Old Nazeing Road, Broxbourne, Hertfordshire, Philately, animals, reading, pop and folk music. 3½ ips. 5½-inch spool. Fidelity Playmaster, four-track. Female contacts (16-19 years) required. UK., USA, Canada, Australia.

Kay, Timothy David (19). 3, James Street, Hyde, Cheshire. Ham radio, pop music. 7½, 3½, 1½ ips. 5-inch spool. BSR TD10 deck with home-built amplifier. Female contacts required in UK, USA, Canada.

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OVERSEAS READERS

Beattie, Bert (50). 26, Molesworth Street, Coburg, Victoria, Australia. Current affairs. 7½, 3½ ips. 7-inch spool. Philips and National recorders. Letters not required.

Blake, Mrs. Gertie (59). P.S. 1029, Via Gypmie, Queensland, Australia. Current affairs. 3½ ips. 3-inch spool. National recorder. England and Continent.

Coley, Martin Paul (24). 522 Signal Troop, Att. I, Dwr, B.F.P.O. 36. Cine photography, sailing, French language. 3½, 1½ ips. 5½-inch spool. Grundig TK28, four-track.

Davis, Glenn (20). 6143 Rockwell, Chicago, Illinois, USA. Hi-fi, jazz music. 7½, 3½, 1½, 15/16 ips. 7-inch spool. Uher 8000E, two or four-track. Female contacts preferred.

DIMaggio, Joe A. (32). 84, W. Jackson Street, Wilkes-Barre, Pennsylvania 18702, U.S.A. Languages, 7½, 3½, 1½, 15/16 ips. 7-inch spool. Two Webcor recorders. France, Italy, England, USA. Letters first please.

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Howe, John (?). 84 Sproat, Detroit, Michigan, U.S.A. Music. 7½, 3½ ips. 7-inch spool. Wollensak, four-track.

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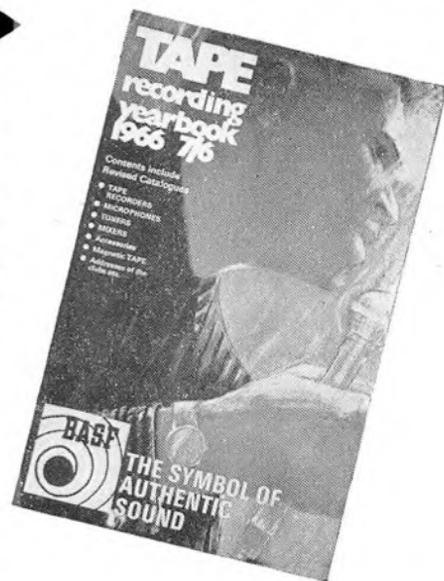
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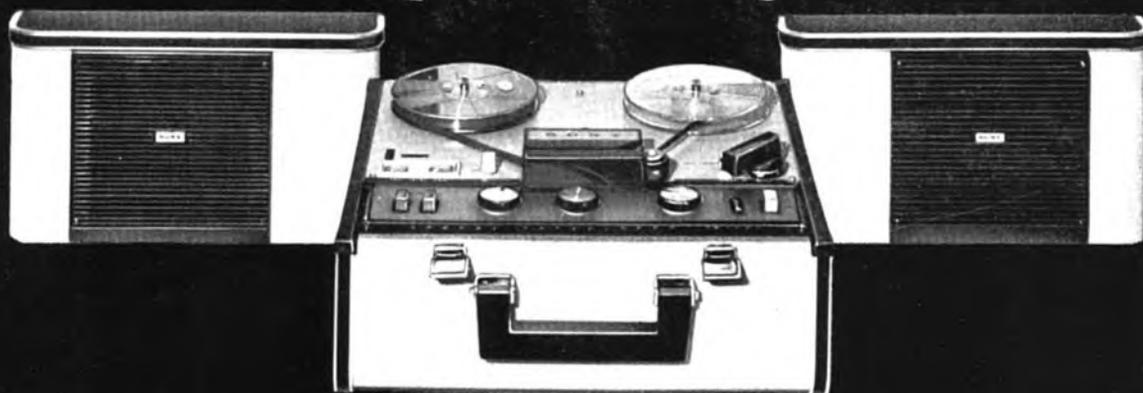
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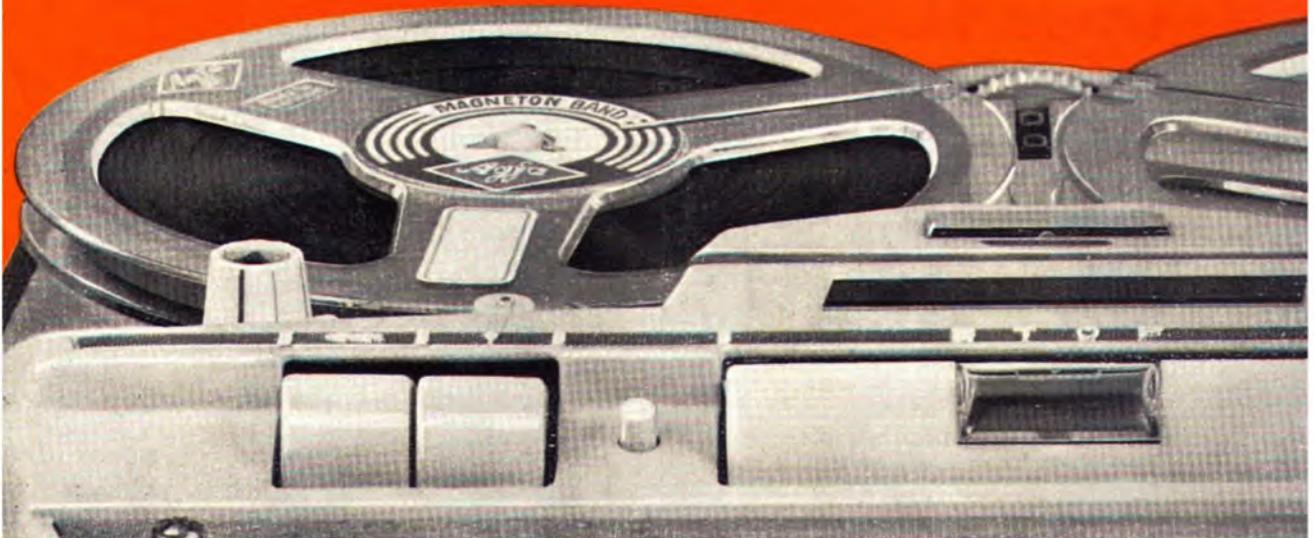
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Agfa-Gevaert famous for films and terrific on tape!



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The superior sound quality and extreme tensile strength of the Agfa-Gevaert range of magnetic recording tapes, is a result of the long and successful experience of Agfa-Gevaert in perfecting their tapes to meet the demands of amateurs and professionals alike. They give you perfectly balanced sound reproduction over the whole tonal range, and their pre-stressed Polyester base provides that

extra resistance to stretch and breakage. *Agfa-Gevaert tapes are manufactured in three basic types all on pre-stressed polyester base:*

Long Play with high tensile strength and high output.

Double Play recommended for use with both 4 track and 2 track recorders.

Triple Play developed specifically with portable recorders in mind, enabling three times as much recording than obtained with "standard" tape.

AGFA-GEVAERT



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