

Amateur Tape Recording

AUDIO-VIDEO

May 1967 Vol 8 No 10 2/6

**SPECIAL
SECTION FOR
BEGINNERS
INCLUDING:**

**INTRODUCTION
TO TAPE
RECORDING**

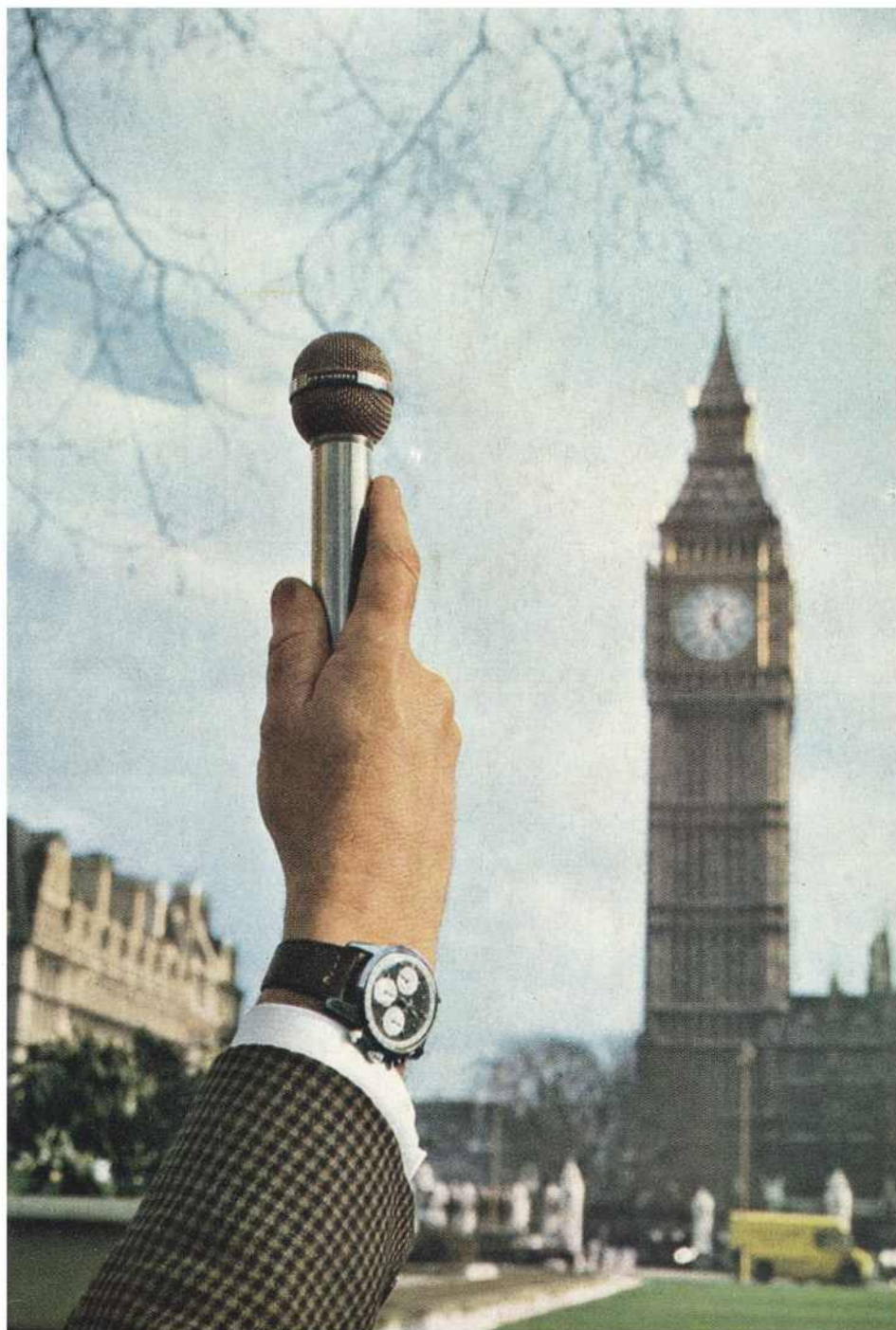
**ACTUALITY
INTERVIEWING**

**TWO TEST
REPORTS AND
OTHER
FEATURES FOR
THE NEWCOMER**

**SOUNDS OF
LONDON**

**1967 AUDIO
FESTIVAL
AND FAIR
REVIEW**

**DYNAMIC
TESTING IN
AUDIO
EQUIPMENT**



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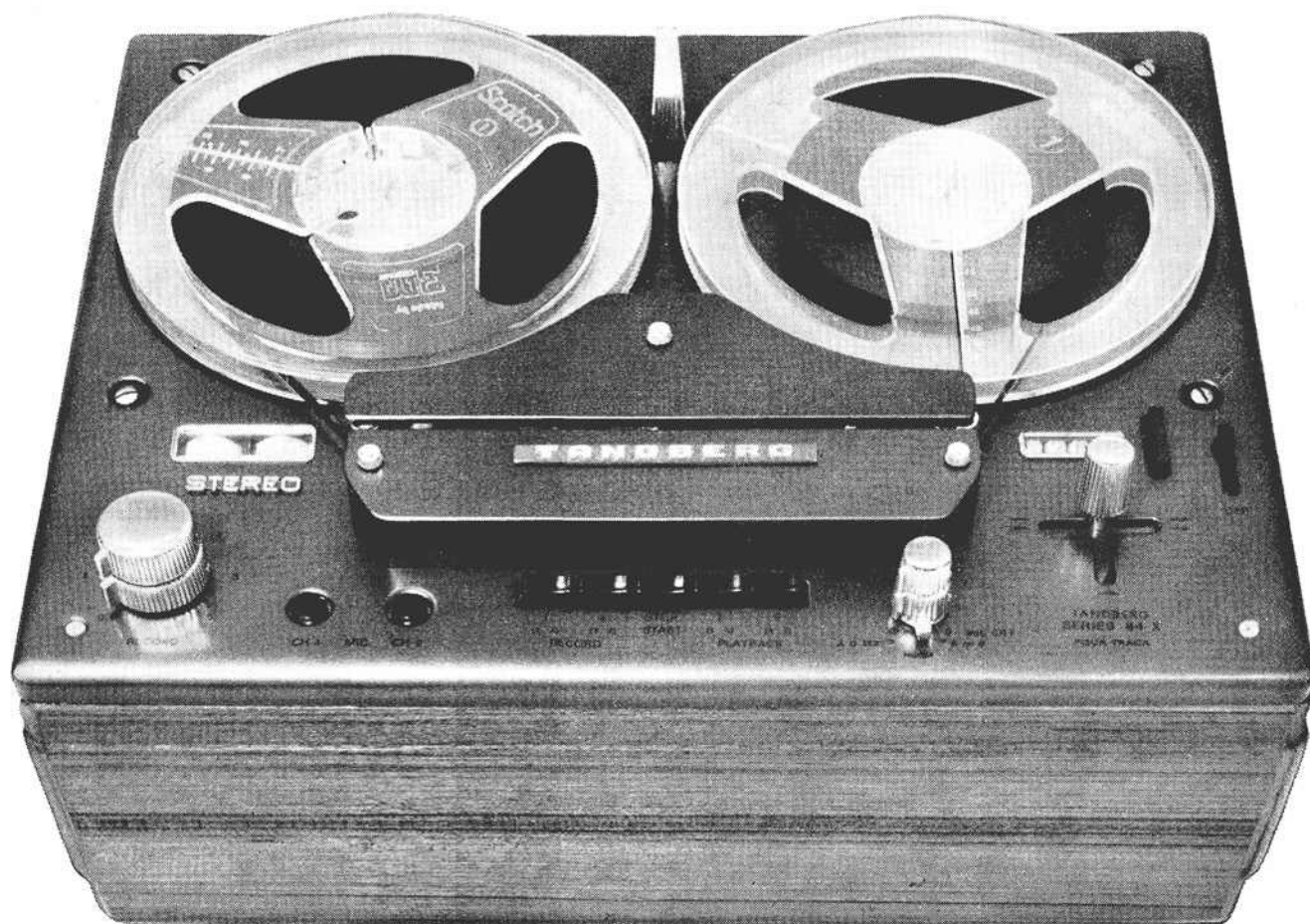


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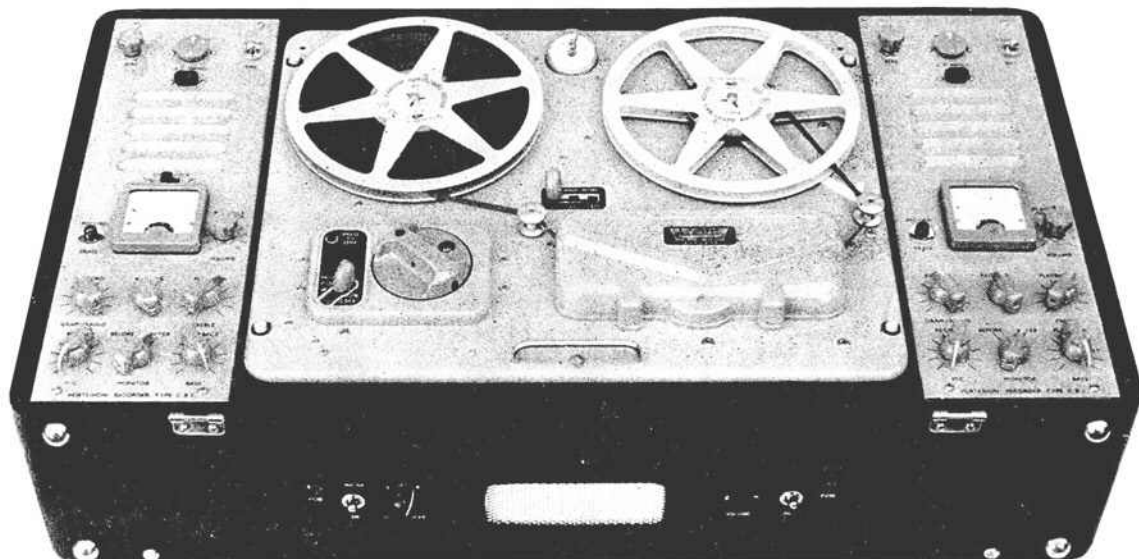
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AUDIO FESTIVAL AND FAIR
STAND NO. 17
DEMONSTRATION ROOM 212

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—Vortexion
quality equipment

TYPE C.B.L. TAPE RECORDER



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IT CAN record monaurally or stereophonically with its own mixed inputs from Gram., Radio or other sources and from high grade low impedance balanced line microphones. With good microphones, etc., the result is a suitable master for disc manufacturers. "Before and After" monitoring is provided together with adjustable metered bias for perfection.

IT CAN also make a recording on one track and then transfer it to the other track while measuring and listening to it and adding one or two more signals also metered. A special PPM type meter is now used.

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Speeds $1\frac{7}{8}/3\frac{3}{4}/7\frac{1}{2}$ i.p.s. Price: £172 0 0
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The **Vortexion W.V.B.** is a high quality monaural machine with "Before and After" monitoring. The recording inputs are a high sensitivity socket for moving coil or ribbon microphone and a high impedance socket for radio, etc., either of which can be selected by a switch. Superimposing and echo work can be done, and the playback has reserve gain for abnormal requirements. This model cannot be converted for stereo playback, but it is a thoroughly reliable machine for the engineer specialising on monaural work.

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All tape recorders have adjustable bias controls, low impedance mic. inputs for unlimited lengths of cable, highly accurate position indicators and meters to measure recording level and bias.

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

Telephone: LIBerty 2814 and 6242-3-4

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Amateur Tape Recording

AUDIO-VIDEO

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EDITORIAL COMMENT

First, many thanks to all those readers who were kind enough to fill up and return the questionnaire published in the February issue of *ATR*. Our analysis has told us a lot more than we knew about our readers and equally what the majority of readers expect of *ATR*. One thing is certain – our efforts to produce an informative and up-to-date magazine about your hobby have not been in vain, but there is always room for improvement. The analysis of the questionnaire and the letters which accompanied many of them are now our guide to meeting your own special requirements.

To Those New to Tape Recording
We draw particular attention to this issue of *ATR*, much of which is devoted to those

who are new to tape recording and those about to take up the hobby. For instance, there is Part 1 of a new series of articles by Gordon J. King devoted entirely to the absolute beginner. There are also articles dealing with two very practical aspects of tape recording, namely interviewing and tapesponding, and, last but not least, a brief survey and two test reports on tape recorders that can be recommended to the novice. Each of the articles for the newcomer are shown above marked *. Now read on!

The British Amateur Tape Recording Contest

The newcomer to tape recording has not been forgotten in the 1967 *British Amateur Tape Recording Contest*. This year there is

a new category called 'Set Subject' and the subject for recording is a *tape message to a friend or relative overseas*. This calls for no more than a little imagination, any tape recorder and a microphone. More details of the various other categories are included in this issue on page 23.

FRONT COVER

The microphone shown on the front cover is the new Fi-Cord 1200T transistorized condenser microphone used by Bob Danvers-Walker for his *Sounds [of London]* documentary. He provides a 'story board' layout for this on page 24.



Fig. 1. The Armstrong Audio 'new look' model 426 integrated tuner/amplifier.

1967 AUDIO FESTIVAL AND FAIR

Review of new hi-fi equipment, tape recorders and accessories

At least one British manufacturer has an eye on the Common Market potentialities, if and when Britain does have to compete. This is Armstrong Audio, with an entirely new styling to their amplifiers and tuners. Aside from the new look, they have adopted a kind of international code for the controls (see Fig. 1) of their equipment. They have also gone 'transistor' (at last) and Fig. 1 shows their new 426 tuner/amplifier available with or without stereo decoder. This was only one of the new Armstrong Audio 400 series of units shown for the first time and which are designed for bookshelf mounting. Incidentally, this provides the answer to a query from one of our readers who asked whether Armstrong 'had gone transistor' yet. Judging by the demonstrations in room 538, the 'transistors' were also producing some very nice hi-fi sound and 15 watts of it too.

Whitely Electrical

Two new loudspeakers from Whiteley Electrical Ltd looked promising, one of which is known as type LC93 and has been developed as a bookshelf unit. It is shown in Fig. 2 and is available in teak or rosewood finish. It has a completely enclosed cabinet and incorporates a 9 inch speaker with a graded Melamine paper cone. The upper frequency response sounded exceptionally good and, according to Whitely, is due to a special siliconized cambric suspension. It will handle 10 watts of power output and measures only 19 x 12½ x 8½ inches. The other Whitely speaker on show was their type LC94 which has an acoustic labyrinth enclosure and, although

larger in front area (29½ x 23½ inches), measures only 6½ inches in back to front depth. It, too, will handle 10 watts and is available in teak or rosewood finish.

H. J. Leak & Co Ltd

Leak introduced two new items this year – a new Mini Sandwich loudspeaker and a new stereo pick-up. We've chosen to show the pick-up as in Fig. 3, since it looks more interesting than a loudspeaker with a box. To obtain optimum results the arm and the cartridge have been designed as a lightweight integrated unit to avoid the concentrated mass at the head which is inherent in all universal arm and cartridge designs. It retails at £23 plus 4 guineas purchase tax, and does have an excellent performance, covering the frequency range 30 to 20,000Hz.

Rogers Developments Ltd

In addition to the impeccable sound in the Rogers demonstration room was the spaciousness of stereo reproduction via stereo FM radio and the Rogers Mk 2 multiplex decoder. This is new on their list and built to the same rigid specification as all Rogers' hi-fi equipment. It is all contained on a printed circuit board as shown in Fig. 4. It has been designed primarily for Rogers' own FM tuners but will operate with those of other manufacturers.

Celestion

An extra-smooth bass reproduction was the theme for the Celestion demonstrations in which their new Ditton 15 compact loud-

speaker was featured. It is shown in Fig. 5 nestling among some books, but, despite its small size, it will handle 15 watts of audio. It incorporates a new type of ultra-low-frequency unit known as an *auxiliary bass radiator* which produces a smoother and cleaner sound over the range 30-60Hz. Two other units cover the middle and high frequency range.

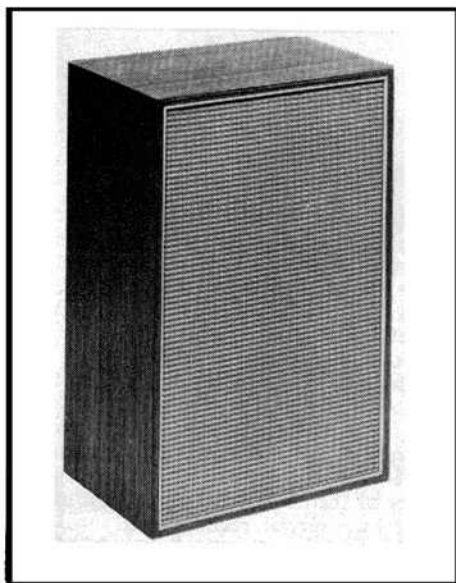


Fig. 2. The new Whiteley LC93 bookshelf loudspeaker handles 10 watts of audio.

Design Furniture Ltd

Four new equipment cabinets by Design Furniture Ltd made their debut this year. One of these was the EQC20 cabinet with storage space for records and which is shown in Fig. 6. It has room in the top section for an amplifier and tuner and for a tape recorder and/or record transcription unit placed on top. The record storage space is enclosed by tambour doors. Design Furniture manufacture quite a range of cabinets for hi-fi and recording equipment and their catalogues are well worth writing for.

Goodmans Industries

Shortly to be the subject of an ATR test report is the new Goodmans Stereomax AM/FM tuner shown in Fig. 7, which features a tuning meter, manual tuning and push-button control on afc. The price complete with stereo decoder we now know is £71 18s 3d including purchase tax. The Stereomax matches the Goodmans Maxamp stereo amplifier in size and finish and, like the Maxamp and Goodmans Maxim loudspeaker, is designed for bookshelf mounting.

Radionette

A new name in this country; they are manufacturers from Norway who were showing a number of hi-fi and recording units including the Fidela Model 715 tape recorder shown in Fig. 8. This is a solid-state stereo recorder which operates in the vertical or horizontal position. It has a VU type record level meter, takes 7 inch tape spools and has two operating speeds. Frequency range 40-15,000Hz. They also showed a new tape record/replay unit known as Model 707, also for stereo and four-track operation. We liked the look of Radionette products and suggest that their catalogue is worth having a look at if you are contemplating a complete hi-fi and recording outfit.

Grampian

Although not completely new, we thought that mention of the Grampian six-channel mixer-pre-amplifier shown in Fig. 9 would be of interest to recording enthusiasts who may not know of its existence. These units have six independently controlled microphone inputs, each with an on/off key switch, which permits the gain control for each microphone to be pre-set. A master gain control and built-in sound level meter is also included. The standard models are available for mains or battery operation and for a wide variety of microphone input impedances and sensitivities. Grampian were also showing a four-channel mixer with bass and treble controls and a master gain control.

Akai

Aside from their complete range of tape recorders, from which we selected an X300 for review, Akai were showing for the first time a new solid-state AM/FM stereo tuner/amplifier with an output of 40 watts per channel! It retails at 140 guineas. It is known as the AA-7000 tuner/amplifier and is shown in Fig. 10. It features channel balance control, bass and treble controls, loudness control, muting switch, a tuning sensitivity dial, movable bar antenna and stereo headphone socket. Frequency range covers normal UK FM band and medium-wave band.

BSR

We thought the new BSR TD20 tape deck

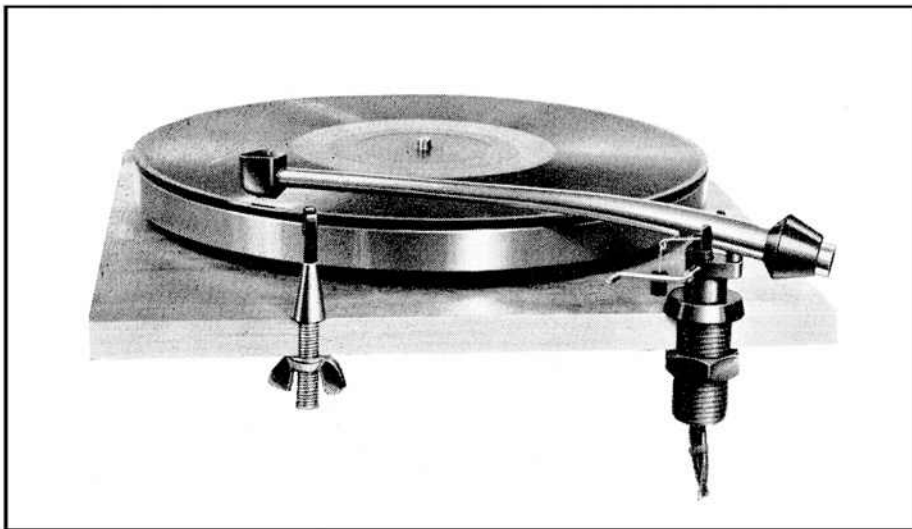


Fig. 3. The new Leak stereo pick-up features integration of arm and cartridge.

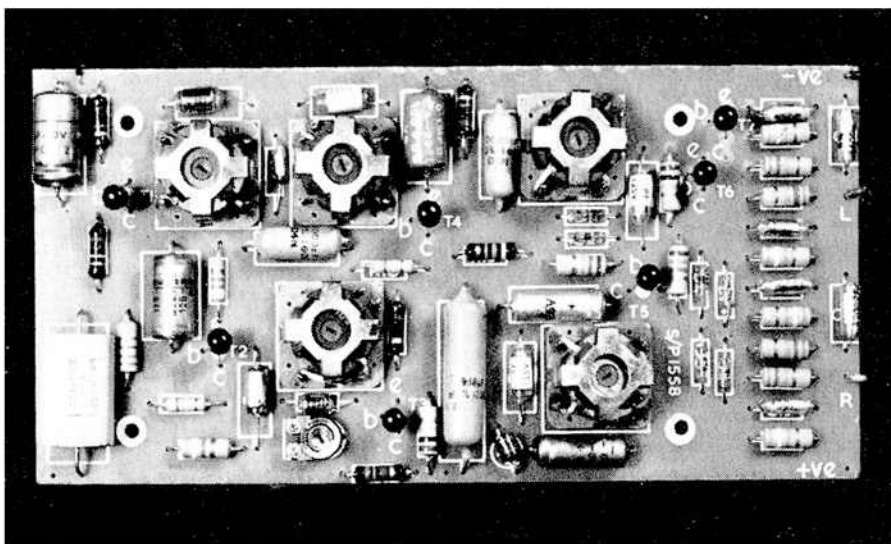


Fig. 4. Printed-circuit technique is used in the Rogers stereo decoder Mk. 2.



Fig. 5. This Celestion Ditton 15 is bookshelf size but handles 15 watts of audio. It features an auxiliary bass radiator for smooth response in the region 30 to 60Hz.

1967 AUDIO FESTIVAL AND FAIR

continued

with three operating speeds and a choice of stereo or mono tape heads was of major interest to constructional enthusiasts. Operating speeds are $7\frac{1}{2}$, $3\frac{1}{2}$ and $1\frac{1}{2}$ ips and the deck takes $5\frac{1}{2}$ inch spools. It is shown in Fig. 11. Also new in the BSR range of tape decks and record player units was the UA65 automatic record turntable with several unique features such as a stylus pressure control, built-in cueing device and an anti-skating device to prevent the pick-up from sliding across a record with the usual consequent damage to the record.

A last look around

It is naturally impossible for us to include photographs and mention of everything shown for the first time at this year's Audio



Fig. 6. One of the new cabinets by Design Furniture Limited has plenty of space for records. This is the EQC20 for tape recorder or record player and amplifiers, etc.



Fig. 7. Left: The Goodmans Stereomax AM/FM stereo tuner matches the rest of the Goodmans bookshelf hi-fi units.

Fig. 8. Above: The Fidela 4-track tape recorder by Radionette. A new product from Norway.

Festival and Fair, but our report would not be complete without mention of the following well-known names in audio and new items being introduced by them for the first time.

The 3-M Company (Scotch Tape)

Shown for the first time was a new tape cassette known as the Scotch C60, loaded with Superlife coated tape. This fits all tape recorders using the Philips cassette system.

Sennheiser

Two new microphones: the MD411 supercardioid and the MD420N 'beat group' microphone with steep attenuation at the sides and rear to cut down feedback. Another

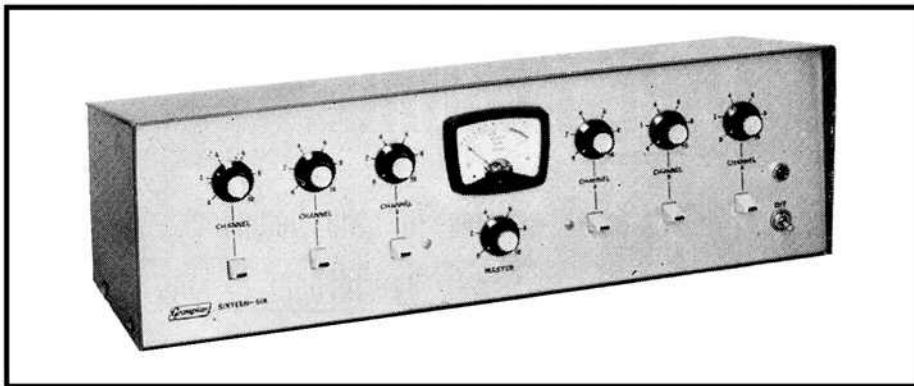


Fig. 9. For tape recording enthusiasts. The Grampian six-channel mixer features a built-in sound level meter.



Fig. 10. New from Akai. An all-transistor integrated tuner amplifier with 40 watts output per channel.

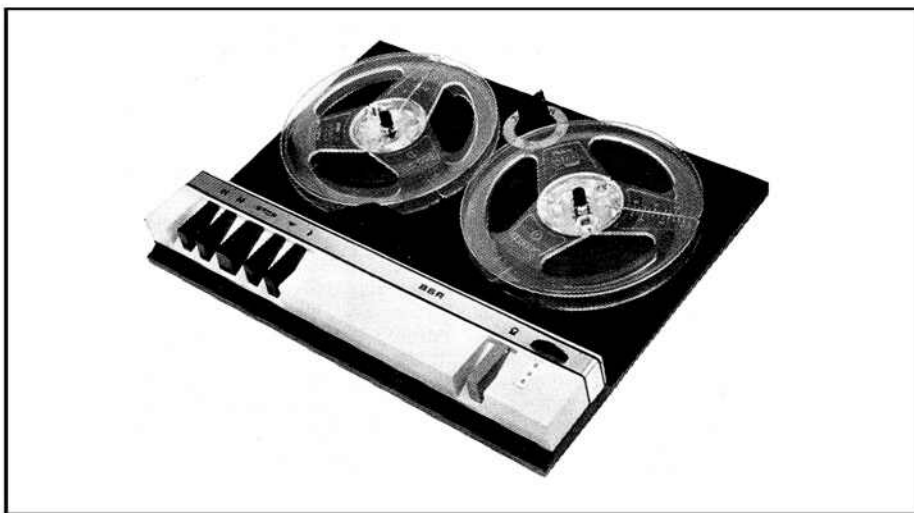


Fig. 11. The BSR TD20 tape deck; for those who would like to construct a tape recorder.

feature of this microphone (shown in Fig. 12) is its insensitivity to 'popping' when used for close singing and speech.

Decca

A new range of the famous track 4 ffs cartridges, with increased frequency response, higher compliances and better channel separation. The C4E retails at 20 guineas and is a cartridge for use in head shells. The H4E with the same specification is for use with Decca arms. This also retails at 20 guineas. The other two, the SC4E and

SH4E, are for professional use.

Philips

A new look from Philips on four of their tape recorders and the appearance of the Philips mains-operated cassette recorders for the first time (one shortly to be reviewed in *ATR*). One completely new recorder on show – the EL3302, a battery-operated cassette machine.

Rectavox

In addition to the 'Omni' and 'Ambi' loud-



Fig. 12. If you record 'beat groups', this special Sennheiser microphone is the answer to close singing.

speakers, they were also showing a 'Soft-line Omni' with a new styling. Other new items included a bass corrector to equalize the effects of excessive corner gain and a matching transformer enabling Rectavox speakers to be used with transistor amplifiers without danger to the output transistors.

Agfa Gevaert

They have now introduced Agfa Magnetophon tape in cassettes for the Philips system and the DC International system. These are the C60 and DC90 respectively. Also shown for the first time were their Novodur plastic tape library boxes. Available for 7, 5½ and 4½ inch spools.

For further literature:

Armstrong Audio Ltd, Wartlers Road, Holloway, London N1.

Whiteley Electrical, Radio Works, Victoria Street, Mansfield, Notts.

H. J. Leak & Co Ltd, Brunel Road, Westway Factory Estate, London W3.

Rogers Developments Ltd, 4-14 Barmeston Road, Catford, London SE6.

Celestion, Rola-Celestion Ltd, Ferry Works, Thames Ditton, Surrey.

Design Furniture Ltd, Calthorpe Manor, Banbury, Oxon.

Goodmans Industries Ltd, Axiom Works, Wembley, Middlesex.

Radionette, Denham & Morley Ltd, Denmore House, 173/5 Cleveland Street, London W1.

Grampian Ltd, Grampian Reproducers Ltd, Hanworth Trading Estate, Feltham, Middlesex.

Akai, Pullin Photographic Ltd, 11 Aintree Road, Perivale, Middlesex.

BSR, Monarch Works, Old Hill, Staffs.

Scotch Tape, 3-M Company Ltd, 3-M House, Wigmore Street, London W1.

Sennheiser, Audio Engineering Ltd, 33-35 Endell Street, Shaftesbury Avenue, London WC2.

Decca, Decca Special Products, 9 Albert Embankment, London SE1.

Philips, Philips Electrical Ltd, Century House, Shaftesbury Avenue, London WC1.

Rectavox Ltd, Central Buildings, Wallsend, Northumberland.

Agfa, Agfa-Gevaert Ltd, 27 Regent Street, London W1.

INTRODUCTION TO TAPE RECORDING PART I

A new series of instructional articles for the beginner

by Gordon J. King

First Things First

Here in front of us, just removed from the packing box, is our very first tape recorder. Let us check that all the items are present and correct. We shall find (i) the tape recorder itself probably with its deck (that which carries the spools and the tape controls) hidden beneath a plastic cover, (ii) a spool of tape, (iii) an empty spool, (iv) a microphone with its cable connected to a plug and (v) possibly an interconnecting cable with a plug termination at one or both ends. This is for taking recordings from the radio or radiogram. Since this is our very first recorder, it will almost certainly be a mains-powered model using either valves or transistors. Mains-powered means that it must be connected to a standard mains supply. It will not therefore operate from batteries. Thus, it will have a mains lead which may be rolled up in a small compartment at the rear or beneath the machine. Note: There are a few tape recorders now available that operate on both batteries or mains supplies.

All good machines come complete with an instruction booklet, and it is essential that this is read and studied before any attempt is made to put the recorder into operation. Some manufacturers, however, realize that purchasers will be impatient to try out the recorder with the least possible delay, and to this end commence the booklet with information on how to make the first recording without bringing in any technicalities or information not needed for the first, simple exercise. Subsequent text then gives more technical and detailed information on the machine's attributes. This is a good idea, for it gets the owner recording and playing back before getting bogged down with semi-technical terms that he has probably never heard before. Even if an instruction booklet is not designed in this desirable manner, it may pay to extract initially from the text only that information necessary for making and playing a microphone recording. The machine can then be *handled*, and skill comes only with *practical* experience: the more subtle aspects of the art are slowly evolved through experience, and this includes creative recording itself.

Check the Mains Adjustment

Now to get back to our new acquisition. After having removed all packing paper, cardboard, clamping screws (if fitted) and extracted the mains lead, the first problem is to get power into the machine. All machines intended for use in the UK oper-

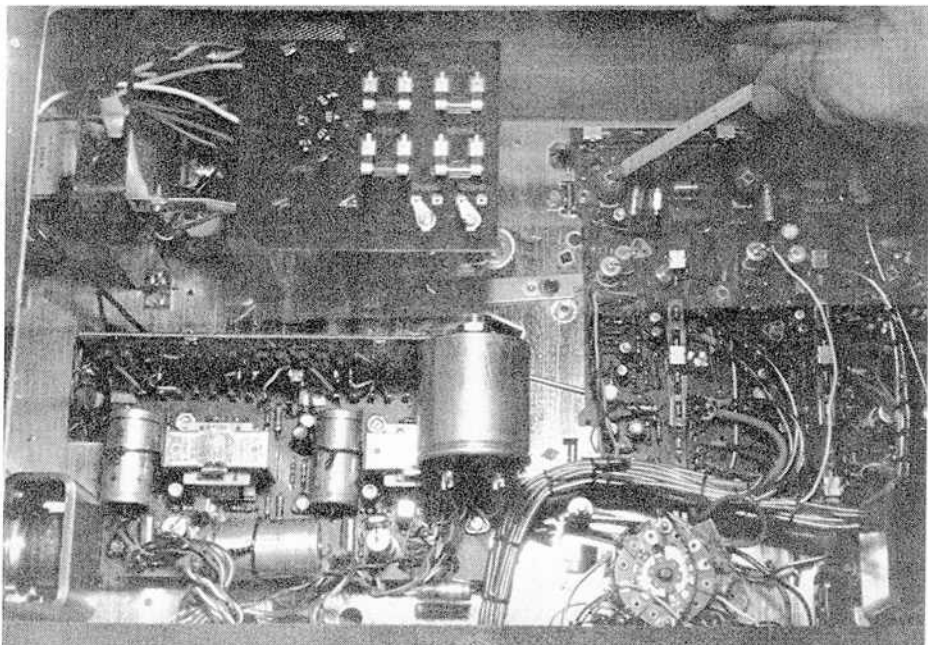


Fig. 1a. Mains voltage adjustments – the disc type of adjustment (seen on the fuse panel in the top left-hand corner of this picture).

ate from ac mains supplies of between 200 volts and 250 volts. However, it is usually necessary to adjust the mains input tapping on the machine for the best performance on a specific mains voltage.

The standard of mains voltage being aimed at in Great Britain is 240, and already there are many areas in which the domestic supply is at this pressure. A higher pressure is rarely encountered apart, possibly, at a location very close to a transformer sub-station, but lower pressures are unfortunately still commonplace.

The recorder will be received with the mains tapping set to the highest voltage (that is, unless an audio dealer delivered the machine and himself adjusted the tapping to match the local mains supply voltage), and at this tapping it will work in some manner even on the lowest of mains pressures. The machine will only perform to its specifications when the mains voltage applied to it corresponds closely to that selected by the mains voltage tapping. If the mains supply is, say, 220 volts and the machine is adjusted for an input of 240 volts, the electronics sections, including the drive motor(s), will be under-run. In valved models this is as bad as over-running (when the supply voltage is in excess of that selected by the tapping), for then the valves are not fully heated and there is a tendency for *cathode*

stripping. This simply means that the valves lose efficiency more rapidly than they would under correct conditions of operation.

Moreover, under-running can substantially impair the power output of the playback section (meaning that a 4 watt output stage may deliver only up to, say, 3 watts). It can also increase the distortion on recording and playback and aggravate wow, flutter and other mechanical effects owing to the loss in motor drive power. Over-running, on the other hand, will cause overheating in the electronics sections and the motors, thereby precipitating failure and wear. The importance of adjusting for the applied mains voltage cannot be overstressed, for many domestic electrical appliances up and down the country are failing to give their best simply because they are not correctly matched to the mains voltage!

The instruction booklet will tell where the mains voltage adjustment is located. In some models it will consist of a small panel containing four hole positions, indicated in voltages, into which can be screwed a small, black knob at the required voltage position. This must be screwed in fairly tight to avoid arcing and interference effects. Other models have a disc-type selector with four voltage ranges marked round the edge. This contains a

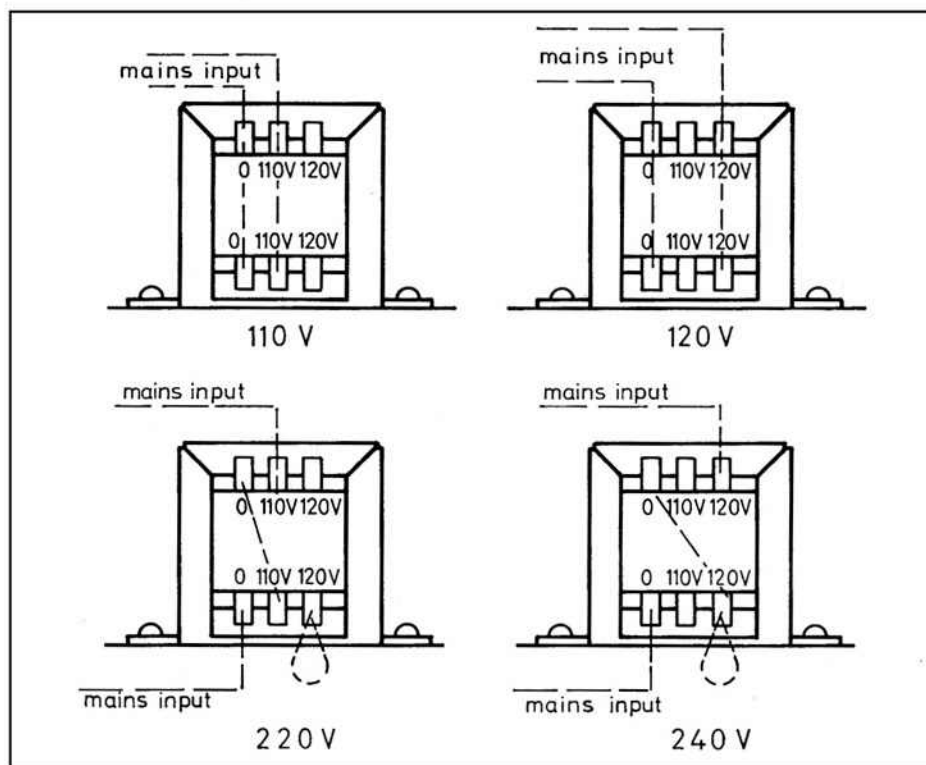


Fig. 1b. The adjustment that requires the soldering of wires on to tags on the mains transformer.

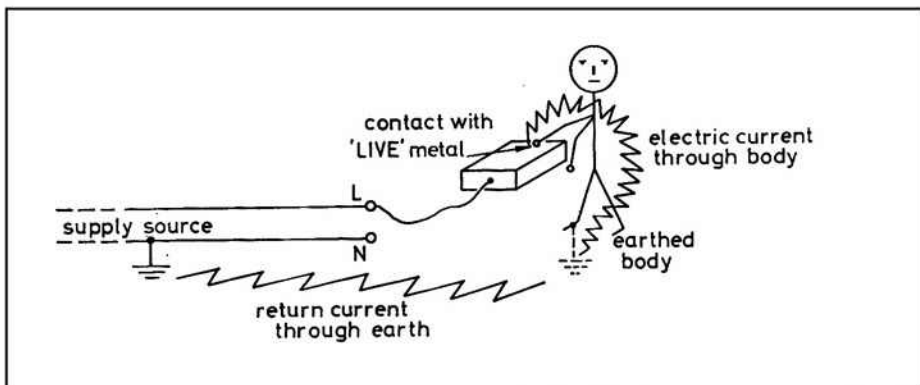


Fig. 2. If an 'earthed' person touches a metal object connected to the live side of the mains supply, electric current flows through the body from live to earth, as this diagram shows.

multiplicity of thin pins which must be positioned in corresponding sockets – according to the required mains voltage – located on the mains control panel, often next to a group of glass fuses (see Fig. 1a). A less convenient arrangement consists of a pair of wires and an interconnecting lead which need to be soldered at the corresponding voltage positions on tags of the mains transfer (see Fig. 1b). Sometimes it is necessary to gain access to the electronics sections inside the case or cabinet to make the adjustment, as in Fig. 1b, but the more conventional selectors are generally located to facilitate external adjustment, often located near to the point where the mains lead emerges or where the mains socket is fitted, depending on the style of the machine. It is essential that the tapping giving the closest voltage to the house voltage is selected. In cases of doubt it pays to consult the electricity board or local dealer.

Connecting the Mains Plug

Having set the mains selector, a plug must be fitted to the mains cable to suit the available household sockets. Tape enthusiasts without electrical knowledge sometimes need guidance on this aspect of power connection. Of course, the mains socket available for connecting to the recorder will dictate the type of plug that will have to be fitted to the mains cable, but confusion can arise when the mains cable carries three conductors and a two-pin plug is necessary or, conversely, when there are two mains conductors and the plug needs to be three-pin.

The recorder is powered through two conductors only, and if there are three conductors the third one is *earth*. The mains conductors proper are generally coloured *black* and *red*, while the earth conductor is coloured *green*. It must be very carefully noted, however, that this colour coding is not always adopted on imported

machines, and incorrect connection between the wires and the mains plug could not only damage the equipment but also give rise to lethal conditions.

The earth conductor, where fitted, connects to the metal parts of the recorder and this connection might well be extended to the microphone or other equipment plugged into the recorder. Clearly, if this conductor is inadvertently connected to the 'live' pin on the plug, all the metal of the recorder and external connections could assume a potential of 240 volts above earth. A very serious electric shock would thus be experienced by a person touching these metal parts while he is earthed. A mains current would flow through the body of the person so unfortunately connected, and this could have serious consequences. This would happen because the 'neutral' conductor of the mains system is itself connected to real earth at the power source, and the conditions would be those illustrated in Fig. 2.

While the earth conductor is usually coloured green (in Britain, anyway), the *live* conductor is red and the neutral black, and the way that these must be connected to a three-pin plug is shown in Fig. 3. Unfortunately, some imported equipment has arrived in this country with red earthing cores, but more recent arrivals have green-yellow earth cores (some green to match British standard), while the mains supply conductors proper may be coloured blue for 'live' and black or brown for 'neutral'. If there is any doubt whatsoever over these connections a dealer or electrician *must* be consulted. The next question is 'what do we do if the recorder has a three-conductor cable and the supply is two-pin?' Generally speaking, there is no great harm or undue danger in running a modern recorder without an earth connection. In this case, however, the green conductor must be cut well back so that there is absolutely no possibility of it making contact with either of the mains contacts on the plug.

Earthing is, of course, *always desirable* since not only does it tend to increase the safety factor but it also cuts down the possibilities of mains hum. Some machines are specially designed to be run without the third earth wire, and the new range of Philips recorders are of this kind. The design is such that the whole machine is fully encased in a non-conducting plastic (or wood and plastic), thereby making it impossible for a user to suffer electric shock. Any exposed metal parts are also adequately isolated from the internal parts of the recorder carrying mains currents. Thus, with machines of this kind it is perfectly correct to connect the two conductors to the 'live' and 'neutral' points on a three-pin plug, making sure that the earth pin is free from any connection.

Connecting the Mic and Threading the Tape

By now, then, we have *correctly* connected the recorder to the mains. The next thing to do is to plug in the microphone and to thread on the tape. The instruction booklet will tell which is the 'microphone' socket and this will probably be either of the *DIN* type or the *phono* type (these were illustrated in the January 1967 issue of

INTRODUCTION TO TAPE RECORDING PART I

continued...

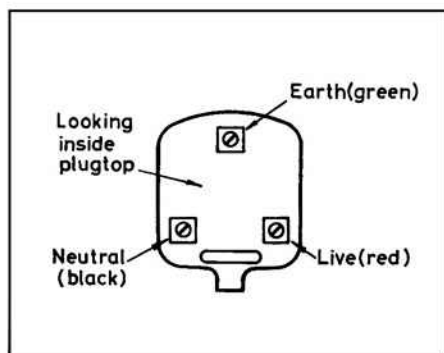


Fig. 3. The correct way of connecting a three-pin-plug top.

ATR). Make sure that the microphone lead is straightened out as much as possible to avoid kinking when the microphone is moved around in use. Since the cable is plastic-covered (mostly, anyway), warming it slightly will help delete the waves 'permed' into it while it was rolled up tight. Push the microphone plug firmly, but carefully, into the socket, making sure that the pins line up with the holes of the socket before pushing home a DIN plug. These can be easily damaged by bad handling. Next the tape. The full spool, called the **supply spool**, must be located on the left-hand spindle and rotated relative to the spindle until the keyway locks. This is indicated by the spool dropping a little way down the spindle. The direction of the tape when recording and playing back is from left to right, as shown in Fig. 4. This is the international standard adopted by all machines.

The tape is then carefully guided into the slot where it falls into line with the heads and negotiates the tape guides. The mech-

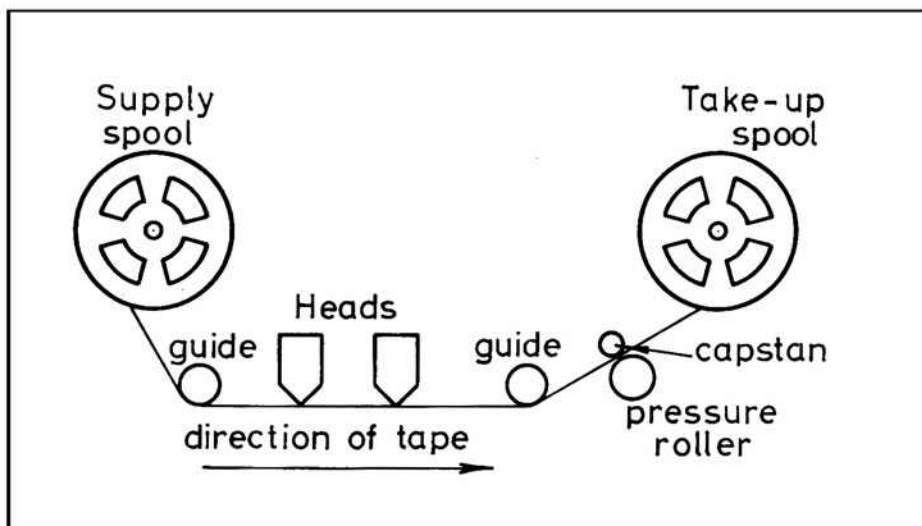


Fig. 4. Showing the standard direction of tape travel. Note that the oxide side of the tape must pass the heads.

anical design of modern machines is such that this process is almost automatic. The empty spool, called the **take-up spool**, is placed on the right-hand spindle and keyed as before. The tape is locked on to the take-up spool by winding a half-turn counter-clockwise round the spool hub and then bringing the end through the slot across the radius of the spool. While the end of the tape is still held tightly between the forefinger and thumb, down the slot and against the hub, the spool is slowly turned several revolutions counter-clockwise to lock the end of the tape on the hub. When this is being done care should be taken to prevent the tape twisting. This all sounds rather complicated, but it is an action which one quickly learns by experience.

A spool of tape usually starts with a green plastic tape. This is called **leader tape** and it contains no iron oxide upon which the recording is made as on the real tape. Following this green leader is often a length of metal foil tape whose purpose is to operate any contact-type auto switching mechanism the machine may feature (this will be dealt with more fully in a later article). Then comes the real tape. One side is highly polished and the other side, upon which the oxide is coated, is less polished. This side must pass against the heads as shown in Fig. 4. If for some reason or other the tape is reversed, very poor results will be obtained, for the magnetic patterns then have to penetrate the plastic tape and this greatly reduces the magnetic field and high-frequency definition of the recording. Normally, however, it is virtually impossible to get the tape reversed in this way.

Before the machine is switched on the tape can be wound on to the take-up spool by hand to the point at which the recording is to commence. At this point the tape position indicator should be set to zero so that after a recording is made the tape can be rewound accurately to the point where it started. Having done this, we are now all set to make our first recording. The press-key and/or control knobs on the tape deck should be set to neutral, and this is performed simply by pressing the 'stop' key or turning the 'stop' knob. All the con-

trol knobs on the recorder proper should be turned to zero and the machine then switched on. If all is well, the capstan motor will be heard starting up, but this will fail to transport the tape until the 'play' control is operated. If there is an on/off indicator light this will come on immediately, and when the amplifiers have warmed up the fluorescent strip of the recording level indicator – if this type is used – will also glow. These are the signs that the recorder is working correctly.

On some machines the recording function is possible while the tape is stationary by operating the 'record' control. If this is possible, the microphone recording level control can be gradually advanced while speaking into the microphone. The correct level of recording is shown by the recording level indicator peaking to a red mark (or other 'peak' point) on the scale (meter type) or by two strips of fluorescence meeting each other in the centre of a glass tube (fluorescent type). The position of the level control should be noted when this peak indication is obtained.

On other machines the **play** and **record** controls have to be operated simultaneously to secure the recording function. In this case the tape will be transported, but to avoid this happening while level adjustments are being performed the **pause** control can be operated. A recording of about three minutes can be made at maximum recording level through the microphone and then the deck can be de-programmed by operating the 'stop' control. The **fast-rewind** control will then run the tape back to its starting point, as shown on the tape position indicator (zeros), and if 'auto' will switch off by the foil tape. Otherwise the **stop** control will have to be operated a digit or two before the zeros come up on the indicator.

To play back, the **play** control is operated (this time without linking it with the **record** control) and the tape will once more run from left to right, but this time with the machine responding to the information recorded. The recording will be heard through the loudspeaker when the playback volume control is turned clockwise. Thus, we have made our very first recording.

REVIEW ROBUK REGAL

by F. C. Judd



The newcomer to tape recording is usually concerned about the kind of tape recorder he should buy and whether, in view of this being the first venture into recording, the machine should be a cheap one. The answer to the latter point is: buy the best you can afford because later, if you find you have acquired a real interest in the hobby, you will not have wasted money on something that just cannot do justice to your own experience and requirements. On the other hand, the newcomer may, quite naturally, be reluctant to spend a large amount on one of the more exalted makes of tape recorder just in case he finds that the hobby eventually has no interest for him.

Is there a compromise, a tape recorder that is not too expensive but yet has all the facilities and the kind of performance that will satisfy the owner as he gains experience in sound recording? To this end we have chosen, and can recommend, the Robuk Regal which is available for half-track or quarter-track operation, has three operating speeds and some really useful facilities including *mixing* (combining the signals from microphone and a music source such as the radio). It will accommodate large (7 inch) spools, so allowing for lengthy recordings of music, etc., and is capable of making very satisfactory recordings which can be reproduced at good quality over the internal loudspeaker or up to hi-fi standard via an external amplifier and loudspeaker system.

The price is 44 guineas for the half-track version, model RK5, and 47 guineas for the quarter-track version, model RK54. Incidentally, half-track means that recording can be made on two tracks with standard quarter-inch wide tape, i.e. one track on the top half of the tape and one on the lower half when the tape is reversed. Quarter-track means a total of four tracks, whereby standard tape is divided into four by recording track 1 in one direction, track 2 in the opposite direction, track 3 in the original direction (tape head switched appropriately) and track 4 finally in the reverse direction again.

Other Facilities

The Robuk Regal models both feature push-

button operation for playing, recording and re-winding the tape. An interlock system on the buttons reminds one that a recording may have already been made and also prevents the machine being set to the record mode when operating the buttons for playing or re-winding. The tape deck has three separate motors, one for reverse re-wind, one for tape transport and one for forward re-wind. The deck also carries a tape position indicator and the speed control switch. Just in front of the deck is the main control panel which contains the microphone and radio input sockets (signals from these can be mixed), the recording level and playback volume controls, tone control, equalization switch for the different tape speeds and the monitor control. Two output sockets are also provided on this panel for feeding an external amplifier or loudspeaker. A pause control (temporary stop) is also incorporated as well as a superimposing button allowing one recording to be superimposed on another. The tape spools can be locked on and will not fall off when the recorder is carried about in an upright position. Monitoring of input signals is provided (via the internal loudspeaker) and the amplifier and speaker can be used separately (tape drive off) for amplifying signals from the microphone, a record pick-up or radio tuner, etc. Either model is supplied complete with a crystal microphone, a 7 inch spool of tape, spare spool and connecting lead for external equipment.

Another rather special feature about the Regal is that two little compartments are provided, one either end, for storing tapes, microphone and leads, etc. The recorder has a nice appearance, is not unduly heavy or large and, with an 8 inch internal elliptical loudspeaker, is capable of pleasing reproduction with quite considerable power. The power output is 5 watts. Incidentally, I should have mentioned that a bar-type magic eye recording level indicator is provided and is located on the right-hand side of the deck.

Performance

The important points of the specification are as follows:

Tape speeds: $7\frac{1}{2}$, $3\frac{3}{4}$ and $1\frac{7}{8}$ ips.

Mains supply: AC 200-250V 50Hz.

Wow and flutter: Less than 0.2% at $7\frac{1}{2}$ ips and 0.3% at $3\frac{3}{4}$ ips.

Rewind (either direction): 1 minute for 7 inch spool of standard tape.

Inputs 1: Microphone high impedance 1.8mV.

Inputs 2: Radiogram/radio 250Kohm at 350mV.

Outputs 1: External LS 15 ohms.

Outputs 2: External amplifier, 1V at high impedance.

Signal to noise ratio: Better than 45dB fully modulated tape.

Amplifier frequency response: 40-18,000Hz \pm 2dB

Frequency response (from tape): $7\frac{1}{2}$ ips 40-15,000Hz \pm 3dB; $3\frac{3}{4}$ ips 50-9,000Hz \pm 3dB; $1\frac{7}{8}$ ips 50-4,000Hz.

The model loaned for review (RK5 half-track) performed well up to specification and prior to being tested for review had been used for continuous recording in the training of new telephone switchboard operators at a busy London office. It had indeed suffered some three months of quite rough handling by somewhat inexperienced operators and came out of this with no more than a damaged press button on which someone had used considerable force.

However, apart from this, tests showed quite normal operation and that, properly handled, the Robuk Regal is a machine very capable of making excellent recordings. One comment, however, and this concerns the microphone. It is an inexpensive crystal type and although quite adequate for speech it cannot do justice to live music recording which the recorder itself can. We would recommend the purchase of a better microphone, thereby providing oneself with a recording outfit both versatile and having many possibilities in the more creative side of the art. One final point - Robuk tape recorders are British made and the manufacturers do provide an excellent after-sales service. Further details about the Robuk Regal recorders and/or other models made by Robuk can be obtained from Robuk Electrical Industries Limited, 559/561 Holloway Road, London N19. FCJ 13

ON TEST PHILIPS STEREO EL3555

A 4-track recorder for the new-comer who wants to start off with full stereo facilities
by Peter Knight



Fig. 1. View of recorder, showing retractable handle on left.

This recent edition from Philips is a four-track, mono/stereo machine with a three-speed tape transport, giving operation at $7\frac{1}{2}$, $3\frac{3}{4}$ and $1\frac{1}{2}$ ips. It is mains-operated and designed to work on 100 to 135 volts and 200 to 250 volts at 50Hz (and can be adjusted if required for 60Hz power supplies). It records and plays back stereo. One channel terminates at the ordinary cabinet loudspeaker, while the other stereo channel is catered for on replay by a second matching loudspeaker. This second loudspeaker is built into the lid which is detachable from the top of the machine. Fig. 1 shows the machine with the lid removed and Fig. 2 shows the lid-mounted speaker by the side of the recorder.

A Hybrid

The circuits employ valves and transistors in a hybrid arrangement, with the transistors in the low-level sections where they have an advantage over valves from the noise point of view. The valves are used in the output stages. Each channel features an ECL82 playback output valve giving about $2\frac{1}{2}$ watts of audio to the speakers, and the design is such that the playback stages can be arranged as a straight-through amplifier for stereo reproduction of programme signals other than those derived from the tape.

The machine is *complete for stereo*, nothing else to buy, not even a microphone, as a very effective stereo microphone (also suitable for mono) is a part of the equipment. There is also a 7 inch spool of tape and take-up spool. All that is needed to get going is a mains outlet and a matching mains plug. Recording from other sources is also possible, and a lead is provided for this purpose. The complete outfit comes out at £78 15s 0d.

As shown in Fig. 1, all the control knobs are conveniently grouped together on a panel to the right of the internal loudspeaker grill, while the deck mechanism is under the command of push-keys directly above the group of knobs. The speed-

change control lies between the two spools, at the rear of the deck, and edge-type control knobs provide mains on/off, track selection and duo- or multi-play. Tape position is monitored by a four-digit counter with press-to-zero button, and the signal input and output sockets are conveniently grouped together in a cut-out at the rear of the cabinet. There is also a socket to accept a foot-switch control, useful for some commercial (and other) applications. External design is certainly towards convenience of operation and to make the recorder look attractive the major part of the cabinet is made of teak. The deck top, speaker grill and speaker-mounted lid are all in grey plastic. Nevertheless, the use of timber for the cabinet proper effectively dilutes the 'plastic effect', now so much a feature of domestic electronics. The grey plastic is aesthetically set-off against a silver-coloured control panel, knobs and areas along the top of the deck section, and the dimensions of the system as a whole are geared to the latest idea of locating all the domestic entertainment equipment together on wall or shelf units. For a full-stereo outfit one would expect quite a bit of weight, but the EL3555 only turns the scales at about 28 lb. To facilitate transportation, a spring-loaded retractable handle is located on the left of the cabinet, as can be seen in Fig. 1. Weight reduction, of course, is due in part to the use of hybrid circuitry which in turn calls for a smaller mains transformer and power supply circuit, ventilation, space and so on. It is rather curious, however, why the designer decided to employ a triode-pentode valve as the replay output in each channel when there is now an abundance of transistors well able to deliver 2 to 3 watts of low distortion audio. Competitive economics probably represent a factor here, for to fully transistorize would demand, at least, an extra six transistors, possibly eight to avoid the use of coupling and speaker transformers. These, against two relatively inexpensive valves, could put

quite a lot extra on the price. At present-day standards, the EL3555 with its extras is excellent value at 75gns.

The press-keys of the deck provide *fast-forward* and *-rewind*, *replay* or *record start*, *stop* (cancelling all previous programming), *record* (this is a red key distinguishing it from the other white ones) and *pause*. This latter key can be pressed to lock the 'pause' condition and then pressed again for cancellation. The red *record* key can be pressed without tape running, thereby allowing the replay section to operate as a straight-through amplifier which also makes it possible to set the recording level prior to starting the tape. An alternative way of handling this is to press the *pause* key first and then to press the *start* and *record* keys together. This allows the recording level to be adjusted, after which the *pause* control can be unlocked by a second pressing to start the recording on the tape. The keys are easy to operate, but they do need an appreciable amount of downward pressure to lock them on.

DIN Sockets

The rear sockets are all DIN type and they provide outputs for extension right- and left-hand speakers (the internal speakers are disconnected when the extensions are plugged in), input for pick-up, output from headphones, input for signal from radio, amplifier or second recorder (for dubbing, as an example) and output for feeding to a second recorder, input for microphone and input for foot switch. All the appropriate DIN sockets cater for the two stereo channels in accordance with the International Standard (see *Matching - Plugs and Sockets* in the January 1967 issue).

These inputs are controlled by the front controls, which give *recording level* for microphone, radio or second recorder, *recording level* for pick-up, stereo *balance*, *main volume* and *tone*. The two level controls can thus be employed for controlling

two separate inputs, thereby providing a built-in mixing facility assuming that the signals for mixing are of the correct level and are from suitable impedance sources. This is where it is useful to know the input sensitivities and output signal levels and the source impedances of a new recorder. Wherever possible, these test reports will include this important information, having in mind that a potential purchaser may wish to integrate the recorder into an existing audio system.

The microphone input is 0.25mV across 2Kohms, the pick-up input being 200mV across 500Kohms (this means that a low-level pick-up could not be connected here direct, though it is possible to load the input from a high-output crystal or ceramic pick-up). In this case some bass loss would occur due to the 500Kohm input, remembering that such pick-ups require a 1 or 2Mohm loading for correct response. Moreover, there is no equalization built in, so this socket is really for accepting signals from a record player, already equalized and amplified from its pick-up, a radio or other recorder or amplifier. These inputs are, of course, duplicated right and left stereo-wise.

The outputs are two at 1V across 50Kohms, two at 200mV across 1.5Kohms (for the headphones) and two at 2.3W across 3 to 7 ohms (loudspeakers). The socket for the foot switch is designed to take the Philips switch EL3984/15A, and when connected this acts in the same manner as the pause control key. It is useful for editing, dictation and for trick recordings. Each channel uses four transistors in an equalized record/replay circuit, and in the *replay* position the fourth transistor drives the triode-pentode valve. A common transistor hf oscillator synchronizes the bias frequency over the two channels to avoid beat-note troubles. A fluorescent-ribbon recording level indicator (thermionic type) monitors the recording signal simultaneously in both channels on stereo, and as the display from this device is quite bright, it is also useful for indicating when the recorder is switched on. Ht and transistor potentials are obtained from a bridge rectifier fed from a fully isolated winding on the mains transformer. Very elaborate smoothing and filtering cut the hum and ripple output to a very low level.

The circuit design enables the signal being recorded to be monitored in the replay output stages, via the loudspeakers or headphones. The ordinary volume control permits adjustment to the level of the monitored signal, and when loudspeakers are employed acoustic feedback can be troublesome if the microphone is too close to the speakers and the volume control advanced. This effect, of course, is quite normal.

The tone control is a simple treble-cut arrangement which operates by bringing in a shunt capacitor in the replay channel progressively as the control is rotated. To secure full treble output (see Fig. 3) the control needs to be regulated for minimum top cut. The deck accommodates spools from 3 inch to 7 inch diameter, and the maximum playing time, using a 7 inch spool of double-play tape, is four times 4 hours, 16 minutes. The mechanism runs smoothly and without a great deal of noise, and fast winds of 1,800 ft of tape can be



Fig. 2. Showing the lid-mounted loudspeaker by the side of the main recorder.

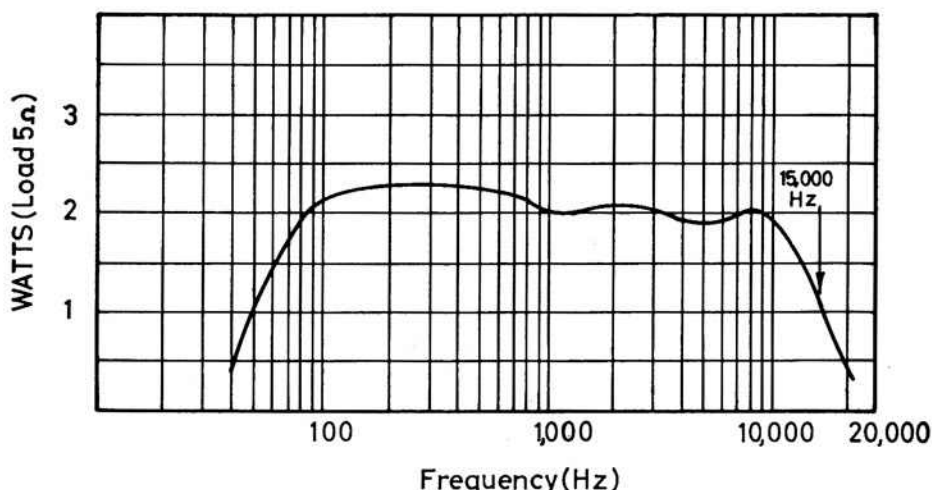


Fig. 3. Overall power response curve with input applied to 'diode' socket for recording and output taken from across 5 ohms on replay.

achieved in a little over 3 minutes.

The Stereo Mic

The microphone supplied with the recorder is interesting (Model EL3757/00) in that it is a single-unit stereo model employing two inserts set up at right-angles to each other within the plastic casing. Three little splayed-out legs with contemporary terminations give it a very stable footing on any flat surface. The inserts are medium-to-low impedance dynamic, and they are located in correct orientation by ensuring that the label 'stereo' on the microphone casing is pointing at the centre between the sound sources. On mono, the lower of the two inserts is used, and for this application correct orientation is attained by rotating the microphone 45 degrees in the clockwise direction. There is no difficulty in securing full modulation during a recording on one or both microphone inputs, and speaking about 12 inches from the microphone requires an approximate three-quarter setting of the microphone recording

level control to give maximum deflection of the fluorescent indicator, at normal speech level. Signal quality is extremely good.

The machine was subjected to a diversity of domestic applications under normal conditions. It was used for ordinary microphone recordings, mono and stereo. Stereo is quite spectacular, especially when replay is by way of a pair of hi-fi loudspeakers or when the output is fed into a stereo hi-fi reproducing system. The internal and lid-mounted speakers reduce the potential to some extent, and the nature of the output stages on replay are not conducive to good quality; but the quality is there (from external amplifier output) if one wants to make use of it. The replay distortion can rise to about 10% towards full replay amplifier output – that is, when the output valves are used. This is not uncommon for this type of single-ended valve output stage. The distortion drops considerably at lower outputs around 0.5W, for instance).

HOW NOT TO BE A GOOD TAPESPENDENT

by Wilfred Duffy

To some recordists it comes naturally. They sit back, relax, describe the equipment and even the décor of their studio and make it sound like a lush Hollywood setting. Others less fortunate – or less imaginative – just say: 'Of course, the studio's not all it's cracked up to be.'

To be a good, natural tapespondent is as simple as being, say, a Picasso or Salvador Dali. The difficulty lies in being the *reverse*. No doubt some such genius springs to mind involuntarily. Here is how to do it. (Or not to do it. Ed.)

To open with a little introductory music from your tape library, prepare your dubbing equipment. Having switched off the internal speaker of your recorder, so as not to deafen yourself and those unfortunate to live with you, set both dubbing and recording machines at *full* volume. Entirely ignore the input signal indicator as it will only confuse the issue. The result is guaranteed to *shatter* your tapespondent.

Having tested the critical state of his hearing, do not hesitate to plunge right in without formality. Hold the recipient spellbound to the very last, even if it is only to find out who sent the darn thing without putting his name and address on it *somewhere*!

Assuming you have been eccentric and actually told him your name and address, it is just possible you may go the whole hog and tell him the date too. Not that this helps much if you have a lengthy delay in recording the second, third or fourth track or finally despatch it to him and fail to put his correct and full address on the package. Sometimes you've got to decide whether or

not household and other extraneous noises are desirable: sizzling, crackling 'bangers' and bacon; screaming, hollering children, or the dog that takes a liking to the microphone. If you decide such natural noises might diminish the quality of your tape, turn down the microphone input control to *nil*. Your tapespondent will probably have the only half hour of peace in his whole week! Interval music is all very well when you dry up and search your mind for another topic, but why not just let the tape run while you think it out! There is nothing more satisfying to your tapespondent than to perch with pencil or pen and paper ready to make notes and find he is allowed a breathing space between music with a series of coughs and hums.

Of course, background music is a different thing entirely and, as only the genius who really knows how not to be a good tapespondent can do, ensure that you get the balance incorrect.

Another gimmick of genius is to let your tapespondent join you in the hunt and rectification of that elusive squeak. Sometimes this will take up a whole track and will ensure an enthusiastic reply at a future date.

Finally, if you really want your friend to enjoy your tape, to praise your genius, try recording on the wrong track at a speed which he doesn't have on his machine. He will not only bless you; he will request the last rights be administered.

Good tapesponding.

(Please note: the author has informed me that he has now gone to live in Australia! Ed.)

ON TEST PHILIPS STEREO EL3555

continued

The machine was given to non-technical users for a while, and some interesting tapes of stereo disc dubbing were produced with no apparent problems and from tuition solely from the instruction booklet! The machine was subjected to average domestic usage for a couple of weeks and then tested again in the laboratory.

Power Performance

The 2mV inputs were used for accepting signal from a sine-wave generator matched through a pad, and the extension speaker sockets were loaded accurately to 5 ohms. The machine was set-up for straight-through amplification and the output signal across the 5 ohm loads was monitored on an oscilloscope while at the same time the voltage (rms) was read off an accurate valve-voltmeter, the frequency being at 1,000Hz. The maximum output that could be obtained up to the onset of waveform clipping was 2 watts both channels pretty well equal). This was checked on an Avo audio watt-meter – still 2 watts across 5 ohms. Other load values were tried, but 5 ohms appeared to yield the most power.

The machine was then programmed for taking a 7½ ips recording from the sine-wave generator (inputs as before). Lengths

of recording at frequency intervals over the spectrum were made at a maintained constant input signal level, and the recording level control was set for full deflection of the indicator at the frequency over the spectrum giving maximum deflection (this was in the region of 19KHz). The sine-wave recordings so produced were played back while the extension speaker outlets were monitored with a watt-meter and oscilloscope as before. Again maximum output 2 watts at 1,000Hz. At that same power in the 100Hz region the waveform was severely distorted, distortion gradually reducing towards about 500Hz, with a small amount of distortion at 1,000Hz.

The power output under these conditions was then plotted over the spectrum, and the curve shown in Fig. 3 was obtained. This was almost identical on the other channel. This is, nevertheless, quite a reasonable overall power response curve, and although the oscilloscope indicated high distortion at low frequencies this was not unduly discernible under normal conditions of working; in any case, the machine would never partner a hi-fi outfit with the output valves in circuit. The far better quality from the 'diode' outputs, for instance, would be exploited.

On the whole, this new Philips stereo

model is a very interesting machine, and it is the kind of recorder that will appeal to the enthusiast bent on changing from mono to stereo or to the tape beginner desirous of launching straight into stereo with the least possible outlay. Its versatility makes it of particular value to the enthusiast already in possession of a quality stereo radio and disc reproducing outfit now desirous of adding tape in such a way that the recorder can be used independently on both mono and stereo. At 75gns it is good value for money.

Maker's Specification

Four-track mono/stereo with facilities for duo- and multi-play. Three speeds, 7½, 3½ and 1½ ips. Frequency response: 60Hz to 10KHz at 1½ ips and to 15KHz at 3½ ips. 40Hz to 18KHz at 7½ ips all within 6dB). *Spool sizes:* 3 inch to 7 inch. *Maximum audio power output per channel:* 2.3 watts across 5-6 ohms. *Power input:* Approximately 75W. *Inputs:* For radio, record player, second tape recorder, microphone, etc. Two mixing controls featured. *Outputs:* External speakers, headphones and high-level across 50K ohms. *Dimensions:* 17½ x 13½ x 8½ inches. *Weight:* Approximately 28 lb.

Philips Stereo Tape Recorder offers everything you need -including a reasonable price

Think what you want from a Stereo Tape Recorder : excellent stereo recording and playback ; facilities for mixing, monitoring and personal listening, automatic stop at end of suitably adapted tapes ; Magic ribbon type recording level indicator ; four tracks and three speeds ($1\frac{7}{8}$, $3\frac{3}{4}$, $7\frac{1}{2}$ ips) ; Duoplay enabling you to synchronise two separate recordings ; Multiplay—the ability to make composite recordings on one track ; excellent frequency response ; all necessary connection sockets ; simple controls ; reliability and long life ; and a price that's not out of this world. All this and more you get with Philips Stereo Tape Recorder, described fully in the editorial columns of this issue of Amateur Tape Recording. It represents unsurpassed value for money. Your Philips Audio Specialist will be pleased to demonstrate it for you. See him today.

Model EL 3555 with moving coil stereo microphone, 7" L.P. Tape, empty spool and direct recording/playback leads.

75 GNS



PHILIPS

ACTUALITY INTERVIEWING

Advice for the novice on the art of interviewing

by Brian Vaughton

Most tape recorder owners will, sooner or later, try their hand at interviewing – and many such efforts will begin and end at home. But to the more serious enthusiast – one who joins a tape club, or attempts freelance programme work – interviewing can become a means to an end. Almost all embryo interviewers begin with the 'question and answer' technique. The result often ends up with the interviewer doing 85% of the talking, and the speaker the remaining 15%. You know the sort of thing,

Q. 'I understand, Mr Jones, that you've just ridden on horseback from Land's End to John o' Groats. I imagine it must have been a journey packed full of excitement and interest?'

A. 'Yes – it was.'

Pause.

Q. 'Er – um, I suppose both you and the horse both had to rough it a good deal?'

A. 'Yes – we did.'

And so on – hardly encouraging when it is the speaker the listener wants to hear! But because topical programmes invariably have to be produced 'against the clock' this type of interview often has to be accepted. The main trouble is that it only rarely reveals the true feelings and identity of the speaker properly. To do this not only demands a more sophisticated interviewing technique, but a lot more time, tape, and editing. The extra effort needed is considerable, but, to anyone interested in the documentary field, the results can prove eminently satisfying. So if you, or your club, decide to compile a feature programme, you might well try the technique of 'actuality-interviewing'.

The main difference between the two interviewing methods is that in the 'question and answer' type programme you hear both interviewer and speaker, whilst in an 'actuality' programme you hear the speaker only – the interviewer's questions being edited out. The freedom this fact alone gives the interviewer is considerable, for he can concentrate on more important matters than religiously watching his own language!

The aim of actuality-interviewing is to extract facts based on experience, coupled to obtaining, when applicable, an actual reliving of that experience – so that a listener can say, with real justification, 'so this is

what it is like' – and be transported into the speaker's own particular world at that moment of time. And this comes about by gently 'persuading' the speaker to express, in his own particular vernacular, his deepest feelings. The rhythm and intonation of his speech, the accent and descriptive phrases, the pauses, the stutters, the very breaths – all combine to create a living image of the speaker and his story. On occasions the results can reach the heights of evocative description,

'We had some hard times – it hit me as hard as if you'd dropped a nail through me. I didn't want to mix up with poverty. I've seen young children with poverty in the face – hunger.' (Extract from the Birmingham Jewellery Quarter.)

The question is how best to obtain recordings of people talking frankly and freely. First, you must allow yourself ample time to undertake the interview properly. Instead of 5 minutes, it's more likely to take 55 minutes – for this is interviewing at length, and in depth. Secondly, it is essential you do considerable research into the subject of your programme before you even think of starting recording. Prior to collecting material for any documentary, I read every relevant book and paper on the subject and make copious notes. This groundwork proves invaluable in a number of ways. It enables you to put your speakers at ease, since they discover you are not completely ignorant about their trade or way of life, and it also provides a good guide to the line of questioning you should take. To convince your speaker of your sincere interest in his subject is a major step in winning over his confidence – and without this you will have little success.

It is advisable to inform your speaker (a) what you are doing the recordings for, and (b) why you are especially asking for his help. Depending upon the individual concerned, you may also explain that this is not going to be a normal 'Q and A' interview. Everybody always expects to have to answer terribly formal questions when faced with a microphone. No! What you want is the speaker to 'talk about' the subject being covered, rather than just saying 'yes' or 'no' to specific questions. But don't press this point unduly – some people never

understand what you are driving at, and you just have to manoeuvre the interview accordingly.

From the technical standpoint endeavour to choose a room that is fairly dead acoustically – a normal sitting room is usually satisfactory. Above all, ensure that you won't be disturbed, and that there is no background noise. When the editing stage is eventually reached on an actuality programme you will be joining taped interviews together. If one speaker has heavy background noise behind him and the others not, it will stand out a mile and spoil the overall effect. Remember – you can always add background effects afterwards if required, but you can never take them away once they are on the original tape. Sit near to your speaker, so that you can hold the microphone at close range to obtain a tight, acoustical balance. A close position also helps to encourage a 'cosy-chat' atmosphere. Your recorder should be placed out of the direct line of sight of the speaker, for spinning tape spools and flickering level meters are hardly conducive to relaxation. Also, when changing to a fresh reel of tape try to stall the conversation, otherwise you'll find wonderful material coming out whilst you are fiddling about threading tape – and once a thing's been said you'll never get it repeated in quite the same way again.

John Seymour, writer, broadcaster and mountain farmer, gave me a good tip on questioning which I've not forgotten. Instead of asking a direct question, 'Did the women on the old narrow boats do any work?', to which you might well just get the answer, 'Yes, they did', use the prefix 'Tell me'. This then almost implies that you don't want a direct answer, but a more lengthy statement. 'Tell me now about the women on the old narrow boats. Did they work?' And you might get: 'Ah! the women. The women on the boats worked a damned sight harder than the men. And fight – you should have seen them fight at the locks. They used to...' and out flows the real stuff of actuality.

The secret is to plant seeds of ideas in the mind of your speaker, and to foster with care those that fall on good ground. From then on it's a matter of probing gently, deeper and deeper, until you really get down to the roots of the speaker's thoughts. And

with luck, and perseverance, innermost emotions come bubbling up to the surface to be caught by the long-forgotten microphone. One of the best ways to encourage 'actuality' is to obtain 'reaction'—not by sheer intimidation, but by encouraging your speaker to really say what he thinks – and not merely what he feels you probably want to hear. As he warms to a particular point press him further with: "Tell me more – why? – go on!" – not provocation, but rather persuasion. When being interviewed some people feel they should be on their best behaviour – some even try to 'speak proper'. Snap them out of it! Show them that it's possible to be perfectly normal in front of a microphone. Add a few swear words to your conversation, blaspheme a bit even, if you must – but, above all, ensure you get down to the real person, whether the eventual result is pleasing to you or not.

Another method of obtaining reaction is to deliberately say something that you know yourself to be wrong – and this is where prior knowledge of the programme subject pays handsome dividends.

Q. 'I suppose the canal boatmen had a very easy life, really—'

A. 'Easy! Easy life did you say? They certainly did not.'

Q. 'Who didn't?'

A. 'The boatman, poor devils, they didn't have an easy life at all – used to have keep going day and night, whatever the weather, snow, rain, the lot...'

And, in the programme, you'd probably use the last reply, editing out the preceding sentences, viz: 'The boatmen, poor devils...' The reason behind the almost interrupting question, 'Who didn't?' is that, up to then, with your initial question cut out, the speaker has not said who he is talking about. Without giving it a second thought, he comes back with 'the boatmen' – and you've got what you want. Throughout the interview you must continually be thinking: 'Is this possible usable material?' If so, is it in such a form that it can be used after the questions have been cut? It's a continual process of talking your speaker into giving you the material in the form you want it.

The fact that your questions will eventually disappear also makes it essential you don't talk, laugh, grunt, or make any other sound at the same time as your speaker is doing these things. This is far harder to achieve than you might think. But just listen to any ordinary conversation, and it is continually punctuated with 'Um's, Ah's, Of course's,' etc, from the person listening. Now this very necessary, but somewhat unnatural silence can be partially overcome by 'silent responses'. Look into your speaker's eyes whilst he is talking, and use your own to convey your reaction to what he is saying. Understanding, surprise, horror, fear and amusement can all be shown by the eyes. Nod, or shake your head, smile, grimace, gesticulate – but whatever you do don't utter a sound whilst your speaker is holding forth. Sometimes I almost make my lip bleed by biting it to contain myself. Anticipation is important too – to stop talking, in mid-sentence if need be, as soon as your speaker takes a breath to speak himself. But a clash of voices will inevitably occur sometimes,



The EMI LA portable is used by professionals and amateurs for interviewing and outside recording of all kinds.

and if it is during possible usable material, interrupt immediately saying, 'Sorry, you were saying', and the chances are that the speaker will repeat his same words – with you holding your tongue!

Needless to say, the written word is a poor substitute for the spoken one. But the following extract from the closing sequence of a documentary about canals will, I hope, serve to show the potentialities of actuality work. Four ordinary people talk about the waterways as they see them – and to my way of thinking it's pure poetry. Mind you, I'm probably biased!

Lomas: Canals are in your blood; you really can't get it out of your system.

Thomas: I can tell you this, I couldn't live without it. It's magic to you.

Lomas: I think you come in contact with nature at its best. There's the old heron and the kingfisher, there's the blackbird, there's the thrush, and you feel you're one of them.

Thomas: I think it's lovely to be up in the spring, and you get the dawn song, and see the day peeping – it's beautiful. So many people haven't seen that, you know, they really haven't lived.

Lomas: You see the little flowers just poking their heads, buttercups, cowslips, primroses – I never fail taking my wife a bunch of primroses in the spring. On the canals we live with nature, and nature lives with us – and we love it.

James: And every time I look at the canal it all means something. It reminds me I owe them something in a way, don't I?

Mary Ward: Of course, it's part of the English heritage. It's never alike two days, but it's full of character, kindness and beauty.

Thomas: And I couldn't live away from the canal now – I couldn't live away from it, I'd die, I'm sure I'd die.
(Extract from 'Cry from the Cut'.)

Several of the articles in this month's ATR have been specially written to help the beginner in tape recording.

If you have a friend who is a newcomer to this hobby, and you would like him to receive a complimentary copy of this issue, write to ATR (Beginners), 9 Harrow Road, London W2, giving your name and address

and your friend's name and address. To help us plan future articles for beginners, tell us what kind of tape recorder he owns and roughly how long he has had it.

SOUND SCENE

TAPE RECORDERS FOR THE BEGINNER

including some of the new models introduced at the 1967 Audio Festival and Fair



Fig. 1. The Ferguson 3214, an ideal recorder for the newcomer.



Fig. 2. The Sony TC250A offers possibilities for hi-fi reproduction and creative recording.

It is a fallacy to believe that a cheap and perhaps nondescript tape recorder will do in order to take up the hobby of tape recording, and for this reason we do not recommend buying cheap or bargain-priced recorders or even second-hand machines. It does not follow either that low-priced recorders, even those of dependable make and performance, will be entirely satisfactory. People who take up cine film for the first time are often advised to invest in the kind of equipment used by the more advanced amateur so that, when they too gain experience, they will already be in possession of equipment with facilities for putting that experience into practice. This applies equally to tape recording, and whilst a few low-priced recorders will be included in this brief survey we hope not to see raised eyebrows because some of the expensive ones are included as well. For those whose finances are limited, and this probably applies to most of us these days, we will begin with some lower-priced recorders.

First choice is the Ferguson 3214 at £46 4s 0d and which is shown in Fig. 1. This machine was favourably reviewed in the

February 1967 issue of *ATR* by our reviewer, Gordon J. King (back copies are available). It is a three-speed recorder – $7\frac{1}{2}$, $3\frac{1}{2}$ and $1\frac{1}{2}$ ips – with quarter-track mode of recording. It takes up to a 7 inch spool of tape and is supplied with a reel of tape and spare spool, etc. Facilities include mixing of microphone and radio signals, remote control, stop-start, tape inching for editing, monitoring and superimposing. It can also be adapted for stereo playback with an external extra amplifier and loudspeaker. Also recommended in the lower price bracket at 47 guineas are the Truvox series 40 tape recorders. You can get full details of these from Truvox Limited, Neasden Lane, London NW10. The Truvox R44 was reviewed in the October 1966 issue of *ATR* and back copies containing the review are available. The R44 is a complete tape recorder supplied with tape, spare spool, microphone and connecting leads. It features duo play, which means simultaneous recording on two tracks if required. The R44 is a quarter-track machine but a half-way track version, the R42, is available.

From Sony comes the TC250A at 57 guineas, though this will

be of greater interest to the hi-fi enthusiast who already has amplifiers and loudspeakers but wishes to venture into sound recording. The TC250 is a tape record/replay unit having full recording facilities (stereo or mono) but which requires external amplifiers and loudspeakers for full replay. It is shown in Fig. 2 and was reviewed in the March 1966 issue of *ATR*.

Here are some manufacturers to write to for details of recorders in the lower price bracket and which we can recommend:

Wyndor Recording Co Limited, 2 Bellevue Road, London N11.

Sony (UK Sales Division), Eastbrook Road, Gloucester, Glos.

Grundig (GB) Limited, Newlands Park, Sydenham, London SE26.

Philips Electrical Limited, Century House, Shaftesbury Avenue, London WC2.

Telefunken AEG Limited, 27 Chancery Lane, London WC2.

Uher-Bosch Limited, 205 Great Portland Street, London W1.

In the higher price bracket, around £60 to £100, will be found many of the recorders favoured by the more experienced amateurs. Such names as Truvox, Brenell, Ferrograph, Uher, Sony and so on will be heard at the tape clubs, and if you look at the *ATR* list of back copies containing reviews you will find them again. First then a few manufacturers to write to for brochures.

Brenell Engineering, 231/5 Liverpool Road, London N1.

Ferrograph, 84 Blackfriars Road, London SE1.

Tandberg (Elstone Electronics), Hereford House, North Court, Vicar Lane, Leeds 2.

See previous list of addresses for Uher, Sony, Philips and Telefunken, who also have models in the higher price bracket. From these we illustrate first the latest from Telefunken, which is their Magnetophon Model 204 just released at the '67 Audio Festival. It is shown in Fig. 3 and is a quarter-track stereo tape recorder with operating speeds of $7\frac{1}{2}$ and $3\frac{1}{2}$ ips. It retails at 106 guineas. Expensive perhaps, but the ultimate in tape recorders. It features multi-play and is rated as a semi-professional recorder. Also fairly new is the Akai Model 1710, also for mono or stereo operation and which retails at 79 guineas. This is a four-speed machine, $\frac{1}{2}$, $1\frac{1}{2}$, $3\frac{1}{2}$ and $7\frac{1}{2}$ ips. It features twin Vu recording level meters and multiplex filters and has two built-in loudspeakers for stereo replay.

From Tandberg comes their new series 12 which are complete with twin 10 watt amplifiers and twin loudspeakers. Operation is for mono or stereo at three speeds, $1\frac{1}{2}$, $3\frac{1}{2}$ and $7\frac{1}{2}$ ips, and there are pre-amplifier outlets with built-in multiplex filters. These are to prevent breakthrough of stereo radio multiplex carrier signals. The Tandberg 12, as shown in Fig. 5, also incorporates bass and treble controls and is an ideal recorder for creative work as well as hi-fi for its own sake.

Last but not least, we should mention Grundig, a name synonymous with tape recording. Many of their recorders have been reviewed by *ATR*, but at the recent Audio Festival they introduced three new machines: the TK245, which is an automatic stereo model, the TK220, a half-track mono recorder with two speeds, $3\frac{1}{2}$ and $7\frac{1}{2}$ ips, and a new mains cassette recorder known as the C110. Full details and prices of these recorders can be obtained from Grundig (GB) Limited, Newlands Park, Sydenham, London SE26. For test reports of tape recorders suitable for the newcomer, see the *ATR* Test Report index in the March 1967 issue. Note that the January 1966 issue contains a *Guide to Buying a Tape Recorder*. Back copies are available. You will also find two reviews in this issue of *ATR* of tape recorders that can be recommended to the newcomer. These are the new Robuk Regal, a half-track or quarter-track recorder at 44 gns and 47 gns respectively, and the new Philips EL3555 stereo recorder at £78 15s 0d.



Fig. 3. The latest from Telefunken, the Magnetophon Model 204, a top-performance stereo recorder.

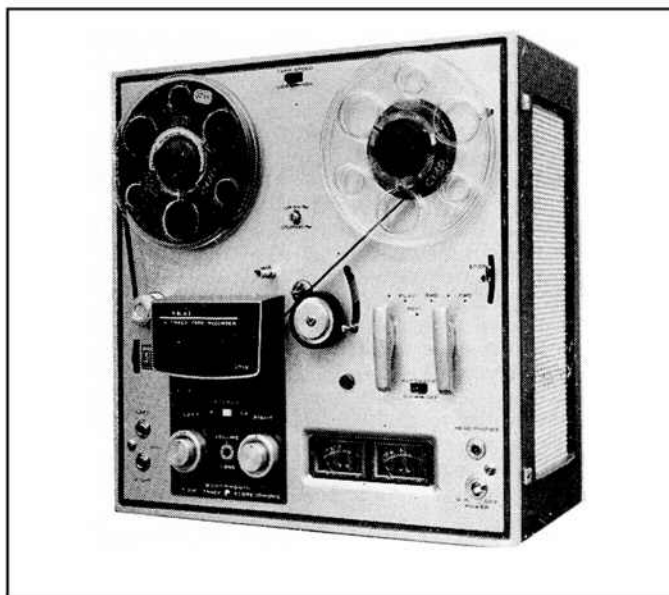


Fig. 4. The Akai Model 1710 designed for quarter-track stereo operation.

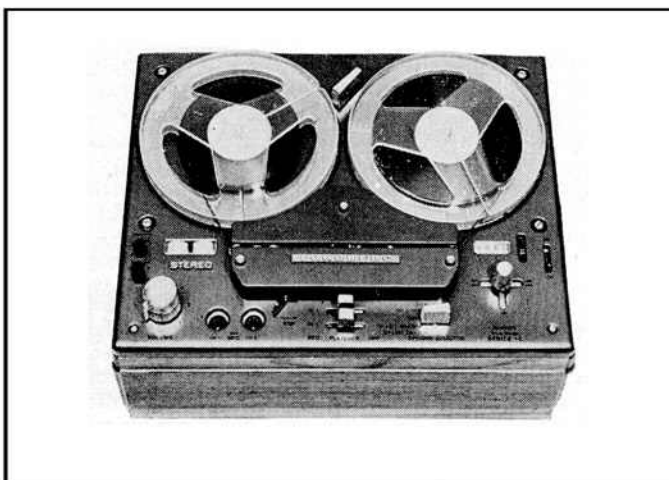


Fig. 5. The new Tandberg series 12 with twin 10 watt output stages and twin built-in loudspeakers.

THE THINGS YOU SAY

A Reader Comments

The questionnaire in the February issue of *ATR* is something which could be copied by other magazines. On the whole, *ATR* is the best magazine for amateurs and changes as new techniques and equipment are introduced. *Planning for Video* was another interesting feature, but until video recording equipment is available at a much lower cost than at present, these articles are only of nominal value.

The review of stereo tapes gives rise to another complaint – about prices. Why is a stereo tape, containing the equivalent of one LP stereo disc, at present on sale at 75s, which is 40s more than a mono tape? Stereo discs are only a few shillings more than mono discs. British recording companies say there is no demand for stereo tapes in this country. At these prices – no wonder!

The article *Is the Law an Ass*, which dealt with copyright, did little to help amateur enthusiasts other than to remind them they may be breaking the law. I would be willing to pay a small fee for a licence to copy commercial discs records on to tape for personal use. This is already done by many recording enthusiasts, so it would be in the interest of the record companies to devise a copying licence for the amateur to make copies on tape for personal purposes.

Aberdeen

C. S. Kennedy

Pressure Pads

I would appreciate your help with my small problem. A few months ago I purchased a Magnetophon 204E and the single pressure pad which this machine employs quickly wore out. I wish to replace it myself. Could you please tell me if these pads are of special material or will ordinary hat felt do?

Barnsley

L. Hawcroft

Ordinary hat felt would be too thin and probably too soft. A harder yet resilient type of felt should be used and small pieces cut to the same size and thickness as the original. Make sure that any adhesive, if used, does not get on the head faces or tape guides. (Ed.)

Good Service

One hears so many complaints these days of bad service and neglect in repairing tape recorders, and most complaints I find are about the service given by distributors of foreign-made machines.

Recently I had a fault in my Robuk 4 (a British-made tape recorder), and as it was under guarantee I returned it direct to the

manufacturers and told them I would pick it up when ready. It was, however, delayed by the road transport service and, knowing that I was leaving London within two days Robuk set-to and delivered the machine in working order at midnight prior to the morning of my departure for Devon. Now I call that service with a capital 'S'.

Newton Abbot, Devon P. A. Bousfield

Copyright of Tape and Discs

I have only just had the opportunity of reading Mr L. G. Young's letter in the November issue of *ATR*, and hasten to correct him on certain errors of fact. He quotes my Society (from what source I do not know) as 'giving the right to copy discs in the house, in amateur tape recording and cine competitions'. The correct wording from our licence is as follows:

'You may record musical works owned by Members of this Society which have been previously released on gramophone records on condition that the recordings so made are privately used only:

1. in the home;
2. in amateur tape recording and cine clubs;
3. by judges in amateur recording and cine competitions.'

So far as I am aware, the FBTRC licence does not cover the copying of discs for any purpose – I know of no exceptions. The only party who can sanction the copying of a disc is the manufacturer, who is granted a copyright in his record which is quite separate from the copyright in the musical works reproduced upon it. Understandably, the manufacturer is suspicious of anyone wishing to copy his records, as such copying may well result in diminished sales of his product, which is sold for the purpose of providing entertainment through being played on the normal domestic record player. What may not be done with the record is clearly marked on most labels.

In reply to Mr Young's point about taping, I would refer him once again to the wording of our licence, which says 'privately used... in the home'. I think he must agree that there is no mention of the licensee's home, and, therefore, private use in his 'tapespondent's' home – or any other home – would be covered. It goes without saying, however, that if his tape is to receive a similar reply, a licence is also needed at the other end.

I have also been browsing through the March issue of *ATR*, in which I find much of interest. I was particularly pleased with

Dr Dance's article on recording from the radio, and commend him for his very clear exposition of the problems of copyright, which should be of great help to your readers.

Imagine my surprise on turning over two pages to find your own report on the 'Wal-thamstow Experiment' openly reporting video recordings of music from both live and pre-recorded sources – and not a whisper of an application for a licence! I turned over two more pages and there was Daphne Ayles' article advocating 'propping the machine in front of the wireless or television, or plugging it into a record player' – still no mention of a licence. One more page, and the club news – a bumper crop here indeed! Leeds making slides with stereo sound tracks and video demonstrations; South Devon making choral recordings; and Great Yarmouth asking for music on tape to be imported from abroad.

I form the impression that the attitude of many of the recording public to copyright is similar to that of many of the globe-trotting public to Customs and Excise – the successful evasion of duty on a bottle of scent, or a more potent spirit, is often a subject for amusing conversation. It is, nevertheless, a violation of the laws of the country, as is the recording of copyright music without licence. Nowadays, with so much being written about copyright in the specialist journals, it is unlikely that ignorance of the law can be claimed, even if ignorance could be used in defence of illegal acts – which it cannot.

If the opportunities for obtaining a licence to record music were non-existent, or in the least difficult or expensive, this attitude might be understandable, but now that MCPS offers licences to amateurs at ten shillings a year for individuals to record for use at home or in the amateur club, or two guineas for clubs (which includes hospital, blind persons and old people's club services), it cannot be claimed any longer that it is difficult or expensive. Members of FBTRC and AMTRC can also obtain similar facilities through those organizations. These licences give your readers access to probably as many as one million musical works, which I cannot help but consider to be one of the best bargains of all time. Even so, about half a million tape recorders a year are sold in this country, whereas the applications for licences can be counted in hundreds.

R. A. Sweetman,
Licensing Manager

Mechanical Copyright
Protection Society Ltd

THE 1967 BRITISH AMATEUR TAPE RECORDING CONTEST

Entry forms complete with the rules and recording categories for the 1967 BATR Contest are already available from the offices of the sponsor magazines and the BATR Contest office at 42 Manchester Street, London W1. We shall be including the full entry form and rules in the next (June) issue of *ATR*.

This year the contest will be run on slightly different lines and includes a new category that will enable even the absolute beginner to take part. This category will be known as *Set Subject or Theme* which, this year, is the making of a maximum four-minute tape to a friend or relative overseas. In other words, it is a tape-sponding type of recording to an imaginary person living in another country and need call for no special facilities other than a tape recorder and a microphone.

The remainder of the categories are as follows:

1. **Speech and Drama.** This includes sketches, playlets, prose and poetry reading, fantasy and monologue. Maximum recording time 10 minutes.
2. **Documentary.** Sound stories based on fact, informative, imaginative and/or entertaining travelogues. Maximum recording time 10 minutes.
3. **Music.** Live vocal or instrumental performances. Maximum recording time 10 minutes.
4. **Reportage.** Interesting sounds, interviews and on-the-spot reports on events. Maximum recording time 4 minutes.
5. **Technical Experiment.** Sound composition, electronic music, *musique concrète*, trick recording (voices, etc.) and multi-track music. Maximum recording time 4 minutes.
6. **Schools.** Recording on any subject, produced mainly by the pupils. Three classes – infants up to 7 years, juniors – 7-12 years and senior – over 12 years.

Note: The categories so listed above may not carry the same numbers and may have been subject to slight alteration during the time taken to prepare for publication in this issue of *ATR*. In addition, there will be a classification for stereo recording and humour with appropriate prizes. The 'Tape of the Year' will be the best of any category or classification. Aside from the various trophies for each category, there will be monetary awards and prizes of useful equipment and accessories for winners and runners-up.

Don't forget that full and finalized details of the categories and rules, together with a contest entry form, will be published in *ATR* next month. If you want them sooner, write to us and they will be sent to you by post.

Remember, you have until the end of the year (31 December) to make your tape. The judging will take place during January and February 1968 and the trophies and prizes will be presented at the 1968 Audio Festival and Fair.

Brenell policy is successfully simple—to provide recorders and units matching the needs of the most critical enthusiast, yet within the price range of the private pocket. Continuous steady development and improvement in all details, both mechanical and electronic, has produced a range of units that in versatility, reliability and high grade audio performance represent not only outstanding value for money but superb listening by any standards.

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Mono; half-track; two heads; magic eye.
Price: £77.14.0.

Mark 5 Type M Series 3

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Price: £97.13.0.

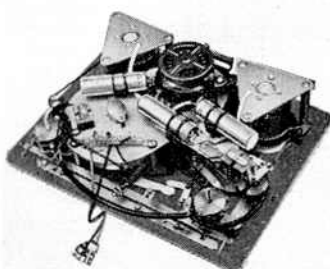
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G0710

SOUNDS OF LONDON

'When a man is tired of London, he is tired of life; for there is in London all that life can afford.'
(Dr. Johnson)

Suggested locations for recording typical sounds and background information for scripting a taped documentary

by Bob Danvers-Walker

TOWER BRIDGE AND THE POOL OF LONDON

This most famous bridge across the Thames was completed in 1894. The opening of the two bascules to permit the passage of large ships is preceded by a bell which rings to halt traffic on either side before the two sections of roadway rise



THE HORSE GUARDS, WHITEHALL

Headquarters of the Household Brigade, or Horse Guards (Life Guards), these barracks were built in 1753 on the site of the Tilt Yard of Old Whitehall Palace, once the residence of Wolsey, Archbishop of York. Whitehall was then known as York Place. But in Shakespeare's 'Henry VIII' the change in name is recorded:

'You must no more call it York Place - that is past;

For since the Cardinal fell that title's lost;

'Tis now the King's and call'd Whitehall.'

Mounted Lifeguardsmen are on sentry duty during the day, the ceremony of changing the guard taking place at 11 am. On Sundays, a better day because there is less traffic, it is at 10 am. The chimes from the Old Admiralty and barracks clocks nearby blend with the more distant booms of Big Ben, providing excellent preliminary atmosphere to the movements of the horses and the shouted commands. This is a focal point adjacent to Horse Guards Parade where the annual Trooping the Colour ceremony takes place on Her Majesty the Queen's official birthday (10 June). This is a magnificent spectacle adding band music to the documentary.

up. The overhead pedestrian-way spanning the two towers used to be reached by stairs. This higher stage is no longer open to foot passengers. Sounds abound on Old Father Thames: the ships and pleasure craft, the tugs and barges, seagulls and sirens. Most rewarding excursions may be made by any of the many river boats which take one on sight-seeing trips. Potted histories may be taped from the guide's running commentary over the PA system.

To the growling exhaust note of the boat's engines, history-saturated London flows past you on either side. What would you say is the most ancient structure in London? Would it be that 180 ton Egyptian obelisk which over 3,500 years ago stood in front of the Temple of the Sun at Heliopolis. Cleopatra's Needle was towed to England from Egypt and ended its memorable sea journey on a bank of the Thames. In the Tower Bridge photo you see St Paul's Cathedral. Its bells could background a reference to the coming of the Apostle himself to London to preach near Ludgate Circus, itself named after the mythical King of Britain who built the walls round the City. The roar of traffic around the Mansion House might symbolize the battle din of Boadicea's warriors clashing with the Roman soldiers as the Queen of the Iceni burned London, only to be defeated in a battle at King's Cross. She committed suicide. A tumulus on Hampstead Heath is said to be her grave. The waters of our ancient river bore the war galleys of invading Vikings, the ships of William the Conqueror, and reflected the glow of the Great Fire in 1666. The slapping wavelets against ancient baulks of timber in London's dockland might be the faint backwash of our dirty, muddy river churned up by Hitler's bombs. Old Father Thames counts history in millennia. Themes for story composition are limitless, ingredients boundless.



SPEAKERS' CORNER AND TOWER HILL

London's two famous public forums are at Hyde Park Corner and on Tower Hill. Five hundred years ago in 1465 on the prominence alongside the Tower the first permanent scaffold was set up. Two hundred years later in 1665 the Plague swept through London. On 2nd September the following year the Great Fire consumed 436 acres of London, burning for five days. On 19 December 1666 Samuel Pepys wrote: 'Today upon Tower Hill, saw about three or four thousand seamen get together. And one, standing upon a pile of bricks, called all the rest to him. And several shouts they gave. This made me afear'd; so I got home as fast as I could.' For your documentary, consider spoken extracts from the famous Pepys diaries interposed with contemporary voices of Tower Hill speakers and hecklers.



CHANGING THE GUARD, BUCKINGHAM PALACE

When the Queen is in residence (indicated by the flying of the Royal Standard over the Palace) the Changing of the Guard takes place here at 10.30 am instead of at St James's Palace. The Guardsmen march to and from Chelsea or Wellington Barracks with a band which plays in the Palace forecourt during the ceremony. To tape as much of 'the Queen's men' as possible one should remember the Wellington Barracks of the Brigade of Guards in Birdcage Walk to the South of the Palace where it is not uncommon to see and hear parade-ground drill being executed. On one occasion I recorded six foreign languages spoken by visitors watching this most compulsive spectacle which draws sightseers from all over the world. Used over a sequence of the band music the French, Italian, Spanish, German, American and Indian comments emphasized the truism that there's nothing quite like a military band to stir the blood of people of every race.

COVENT GARDEN MARKET

Here is a world which works by night and rests by day. At midnight the lorries begin to come in, crates, sacks and nets are unloaded by artificial light until by five or six o'clock the market is in full swing with fruit and vegetables selling by the ton: the sounds of buying and selling, porters' barrows trundling to and fro, a few crisp phrases when boxes and cartons obstruct the way and not a man there who hasn't got a ready cockney wit. Point to remember: the Market is under sentence of death - London will one day have a new one somewhere else. So a tape made here now will be worth keeping.



THE TOWER OF LONDON

Built in part by William the Conqueror as a fortress in 1078, it has also served as a palace, a prison, a barracks and even a menagerie until Regent's Park Zoo was built in 1834. The site was previously occupied by at least three forts, a British, followed by a Roman and then a Saxon. It is one of the oldest fortresses in Europe. Legend has it that the Tower will fall if it loses its ravens. There are six of these glossy black birds guarded and cared for by a Yeoman Warder whose title is Raven Master. One such Beefeater might well be amenable to taping a comment about the weekly allowance of 2s 4d worth of horseflesh each raven gets. And what a story he could tell you about the best known of them named James Crow, a resident for 44 years. The raven's quarters are in the Lanthorn Tower, but they hop about the lawns freely and, if you're lucky, noisily. The Tower is open from 10 am to 4.30 pm on weekdays and, between May and early October, on Sundays from 2 pm to 5 pm. There is no ban on the use of portable tape recorders being used during escorted tours of the Tower. Discretion should be exercised however.



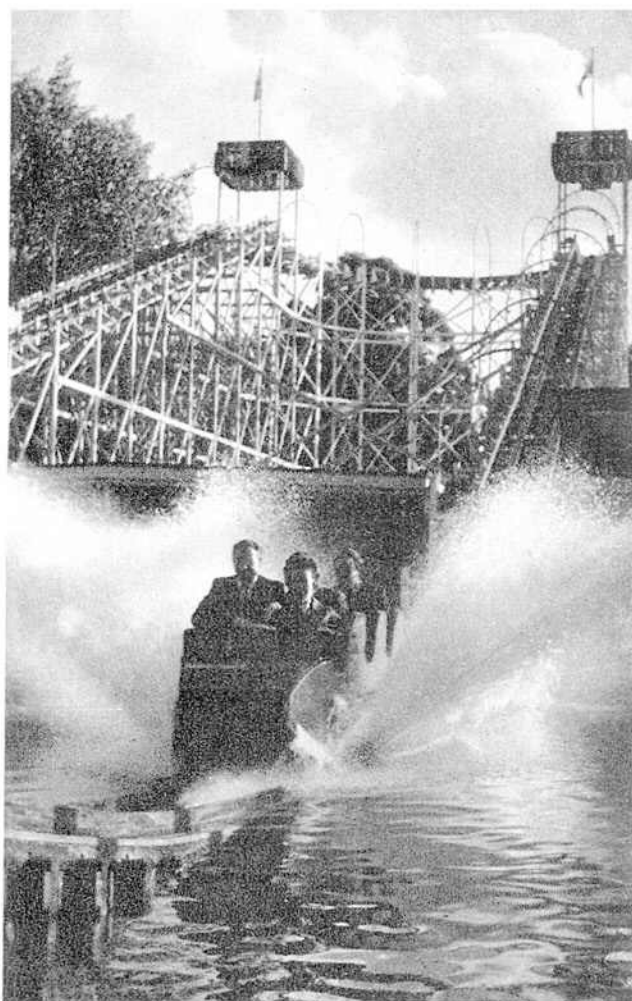
SOUNDS OF LONDON

continued



PORTOBELLO ROAD MARKET, NOTTING HILL

London's first Second-hand Boutique 'I Was Lord Kitchener's Valet' is where John Paul the Proprietor (seen here) who also likes to be known as the Governor General, sells 'kinky', period and military gear. Guardsmen's scarlet tunics sell for between £2 and £8, while policemen's capes fetch £2 or more according to demand. For instant humour, good-natured bargaining and rugged back-chat no other street market can better this 'antique alley' home of bargains in bric-a-brac, junk, tat and throw-outs from every attic in the land. On a Saturday morning particularly it is packed solid with people on the look-out for a snip. Any one barrow will display a staggering variety of merchandise; old gramophone records, an ostrich egg, a tray of 'jewellery' and cut-glass door handles. Victoriana and a tin hat from World War I may jostle with 'A Stag at Bay' and a selection of tatty evening shoes. But if you want some good pieces of silver at attractive prices and 'the very thing you've been after for a long while' then Portobello Road is the place. Have one of the barrow men play that tin-horned Edison Bell phonograph for you. Ask another to let you record the banjo and the penny whistle he has for sale. The instruments may not sound much, but his comments will.



BATTERSEA FUNFAIR

The home of London's pleasure gardens where roundabouts, water-chutes, big wheels, big dippers, merry-go-rounds, tunnels-of-love, side shows and open-throated mechanical music turn the South bank of the Thames at Battersea into a second Blackpool during the summer. Only caution I can think of is to be cautious with the Dodgems. A possible magnetic field could wipe your tape if you recorded in one of the cars. So much material here; the booth markers, coconut shies, rifle ranges, fortune tellers, test-your-strength machines, Bingo booths and pin tables to name a few, that the ingredients are sufficient to make a programme all on its own.

BIG BEN, WESTMINSTER (Front Cover)

No other sound is more representative of London than the deep boom of the most famous bell (not clock) in the world. Weighing 13½ tons, the hour bell Big Ben was named after Sir Benjamin Hall, First Commissioner of Works when it was cast in 1858. The microphone is the new Fi-Cord 1200T.

FOOTNOTE

The microphone used by Bob Danvers-Walker for his 'Sounds of London' documentary is the new Fi-Cord 1200T transistorized condenser microphone with a built-in power supply. The microphone can be operated as a cardioid or omni-directional instrument over a frequency range of 30 to 18,000Hz ± 2.5 dB and has been specially developed for high quality outside broadcasting or recording work. Further details are available from Fi-Cord International, East Grinstead, Sussex. The recorder used was an E.M.I.-L4 portable.



Donald Aldous

*Technical Editor of
'Audio/Record Review'*

came to see how we make the incomparable Ferrograph

These are some of the things he wrote:*

Acknowledged quality and reliability. Quality and reliability are terms that can—as time has shown—be not unreasonably applied to Ferrograph machines . . .

. . . At last, I thought, I shall find the secret of the perennial success of these recorders leading to this rare reputation . . .

Enthusiasm and high standards. . . . one soon appreciated that tradition and pride of workmanship motivated this organisation. Coupled with the enthusiasm of the various heads of departments I spoke to, and the keen efforts of the workers to maintain high standards, it was readily apparent why Ferrograph has achieved its notable success over the years.

Service and stamina. Purchasers of Ferrograph recorders certainly buy them for keeps, as a glance in the Service Department showed a batch of early machines (2A models for example) returned for checking and to have their performance restored—where necessary—to its original level. Some of the cases had obviously received a fair bashing but the units all worked and would soon be restored to their pristine glory.

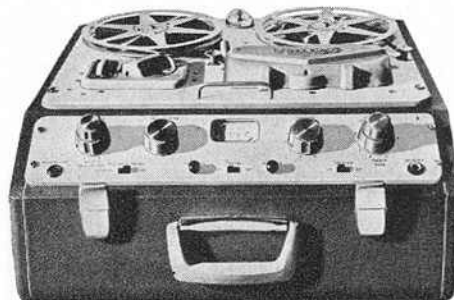
No useless gimmicks. The special models built for the Services have undoubtedly influenced the design of the domestic recorder from this organisation. Dependability and no useless gimmicks in the designs are characteristics that have emerged from this Forces' association.

Made on the spot. Self-sufficiency—in the sense that they manufacture the bulk of their own components—is another important feature . . . for me one of the highlights was the production of Ferrograph tape heads—a task not often undertaken by recorder manufacturers . . .

Quality control. Another contributory factor in the Ferrograph success story is the great attention paid to quality control or test procedures—from individual checks to further tests on the assembled equipment. Mechanical and electrical test methods are most extensive, with a case history sheet attached to each unit, providing information on frequency response, distortion, hum level and wow/flutter figures. This information is filed for reference . . . A speed micrograph . . . of the instantaneous velocity variation of the tape transport system, is also prepared. Incidentally it is the RMS value of this variation, as checked on a wow/flutter meter, which is the figure usually given for spec. purposes. In the Ferrograph Series 6 sample we saw, this figure came out at 0.14% at 7½ ins. p.s.

Certificate of Test. Certain Ferrograph recorders (and probably all models shortly) are despatched with a Certificate of Test, signed by the Chief Inspector, which summarises the performance data and includes the B & K pen-recorded frequency response curve and the speed micrograph chart. A reassuring document for any customer to receive with his machine. . . .

** Donald Aldous also had many other interesting observations about the Ferrograph, published in the September 1966 issue of 'Audio/Record Review'. If you would like to receive a complete reprint, with Ferrograph leaflets, please send us your name and address.*



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Ferrograph

THE INCOMPARABLE TAPE RECORDER

PLANNING FOR VIDEO PROPS

by F. C. Judd

'Props' is short for *properties* which, in television jargon, means an article used for a production. In our first practical video presentation - *A Video Show* - produced by members of the Walthamstow Tape Recording Society (March *ATR*), the 'props' were few indeed, amounting mainly to cartoons, applause boards, an old hat and coat, a piano and a couple of chairs and a blank cartridge starting pistol. The cartoons, two of which are shown as Figs. 1 and 2, were used to begin and end a small cartoon show within the main programme, each one being a pictorial or visual aid to a series of jokes which were pre-recorded. This section of the programme was used in lieu of an interval so as not to break the audience enthusiasm and reaction, but at the same time give the artists a brief rest. The cartoons were drawn on sheets of stiff paper about 14 x 10 inches. However, the point of mentioning the few props used for the *Video Show* project is that they were really needed, as props will undoubtedly be, for amateur video recording of anything that can be classed as creative. Incidentally, the South Devon Tape Club should by now have seen the video recording made by the Walthamstow Club. Perhaps some mention of their reaction to the programme may find

its way into Tape Club News.

Props in Professional Television

Meantime let's pay another visit to Rediffusion, London Television. At Rediffusion, there are two sections concerned with props - production buying and property stores. When the 'props required' list comes in for a show from a director, the buyer and property master examine it. Such things as an old Teddy bear, an enamel bread bin, an Adam fireplace, a dozen daffodils, six dahlias, a pogo stick, a chintz settee, a fish tank, a bust of Shakespeare and a dozen brief cases would not worry them, for they are all in stock. But what about those 24 dead rats, a dead coyote, Pontefract cakes, a Victorian barrel-organ, an upright piano transformed into a gas stove, the Crown jewels or even a couple of London buses (see Fig. 3). These are not so easy, but at one time or another they all have been produced by Rediffusion's property department - who are equally ready whether the items are period, present or futuristic. It is the senior production buyer who decides whether he or one of his buyers will do the buying or hiring. Then props lists are sent out - one to the buyer assigned to the programme and one to the property store keeper. After dis-



Fig. 1. Cartoon used for visual backing to pre-recorded jokes.

cussion with the designer, the buyer and store keeper go through the list to see what is already in stock and what needs to be bought or hired.

In the huge props store room at Wembley, a special bay is allocated to the programme



Fig. 2. Actually used in the *ATR Walthamstow Tape Club Video Show*.



Fig. 3. Even a couple of London buses may be required as props for a TV production.

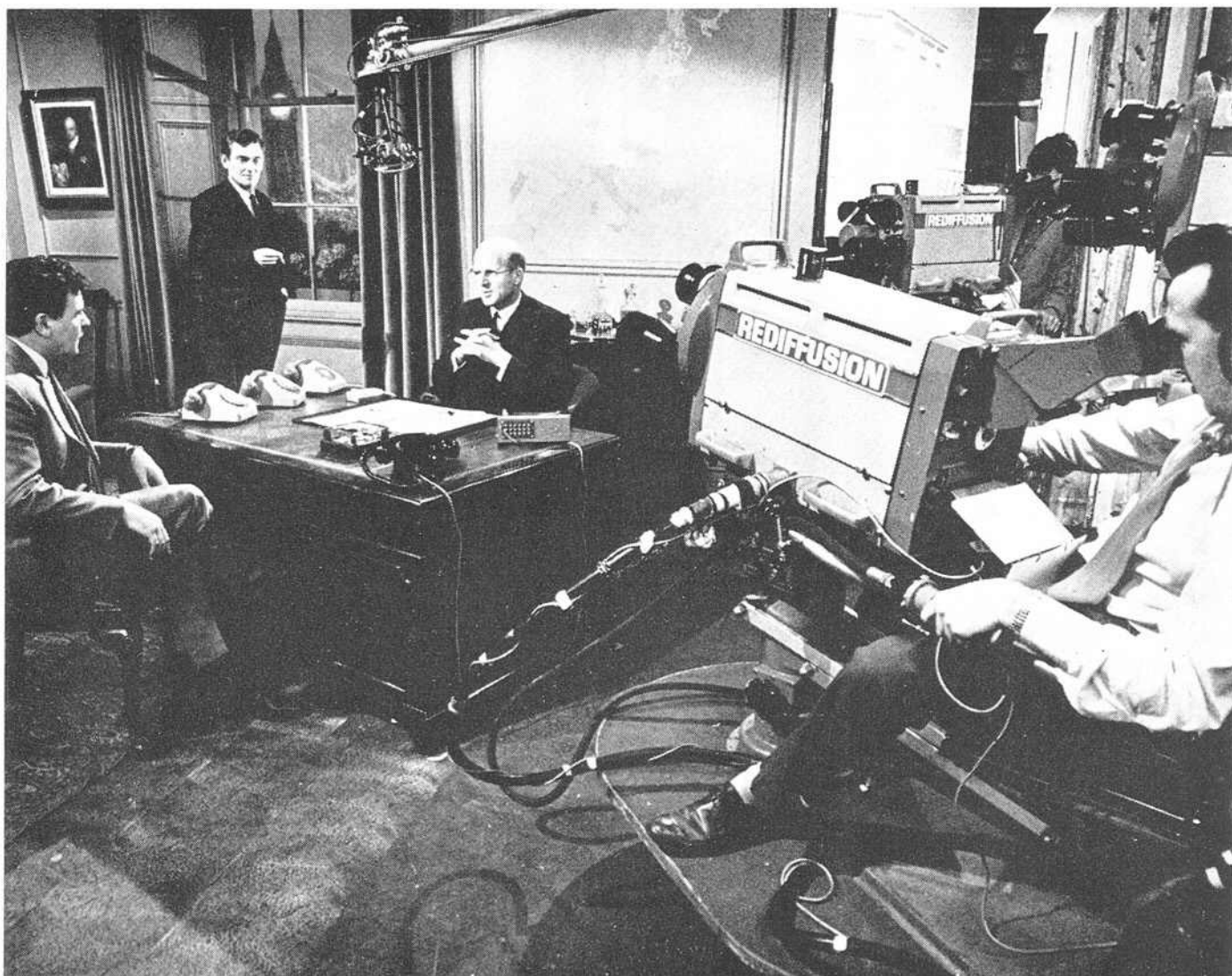


Fig. 4. Scene from the *Rat Catchers*. Props include office desks, telephones, wall maps, pictures on the wall, chairs, carpet, etc. – see how many more you can spot. (We make it another seven items.)

and anything that is already in stock is put there ready to go to the studio. Some items, particularly ones that have to be handled by actors, may have to be organized specially. For example, when Rediffusion produced *The Hidden Truth* a working laboratory was needed and hospitals gave a great deal of help in supplying equipment and pointing out technical requirements in the design and use of the equipment. The buyer must usually forget his own taste when buying for a production – only the mood and style of the play must count although there may have to be compromises. If a certain style of sideboard is wanted, but the genuine article is too big, then a reproduction one six inches shorter which will fit in with the design may have to do. The buying is done systematically to reduce travelling and the points of collection, and eventually all the props are brought to the property store room, checked off and united with the rest of the material in the programme bay. When the production starts, the property department then organizes the setting of the studio. After it is over, everything is returned to the store room bay. Then the system goes into reverse, stock is returned to its place while all the hired material is checked for damage and

returned. Meanwhile, another production is already under way.

Props Made to Order

Rediffusion also has in the property department a *property maker*, who does repairs and makes special requirements. If one character has to hit another over the head with a chair, an ordinary chair is unlikely to smash spectacularly and someone is liable to get hurt. So the property maker will make one out of balsa wood to the specified design which will break easily and cause no harm. Special articles are often purchased and kept in a permanent bay for a series. There is, for example, a bay at Wembley for *The Rat Catchers* which includes the contents of the offices of Brigadier Davidson and Peregrine Smith (Fig 4) plus the props they always use, such as Peregrine's umbrella. The guns are locked up in a safe for security. The buyers sometimes pick up odd bits of useful information. Once a buyer was looking for a sharp fish-gutting knife. In the story, the actor was about to go to sea and had to slash down the washing line as he left. The buyer was told of the superstition of fishermen's wives who never do the washing the day their menfolk sail – the water

running down the drain symbolizes a life running out. Buyers also have to keep up to date too. The prisons in this country recently changed their style of cutlery, so the stock of prison cutlery had to be changed as well. Animals sometimes come under props too, although if they have to perform – a begging dog – then they are dealt with by casting. But non-performers such as goldfish come under props. If a musical instrument is to be played, the music section finds it, but if it is merely ornamental then it is the job of props. All drinks and food are also supplied by props – including hot joints to be carved in a scene and custard pies for throwing at people. Technical problems too can often be solved by helpful outsiders. Sometimes these can be tricky for details such as what sort of execution blocks were used for cutting off a king's head come under the property department. The props buying section is small and specialized with rarely a vacancy – Rediffusion hasn't had a vacancy for five years. Qualifications to become a property buyer? It is hard to list these, but an insatiable curiosity and the ability to suddenly start again from scratch, a sense of humour, plus a knowledge of London make a good start.

TRENDS IN JAPANESE PORTABLE RECORDERS

by Vivian Capel

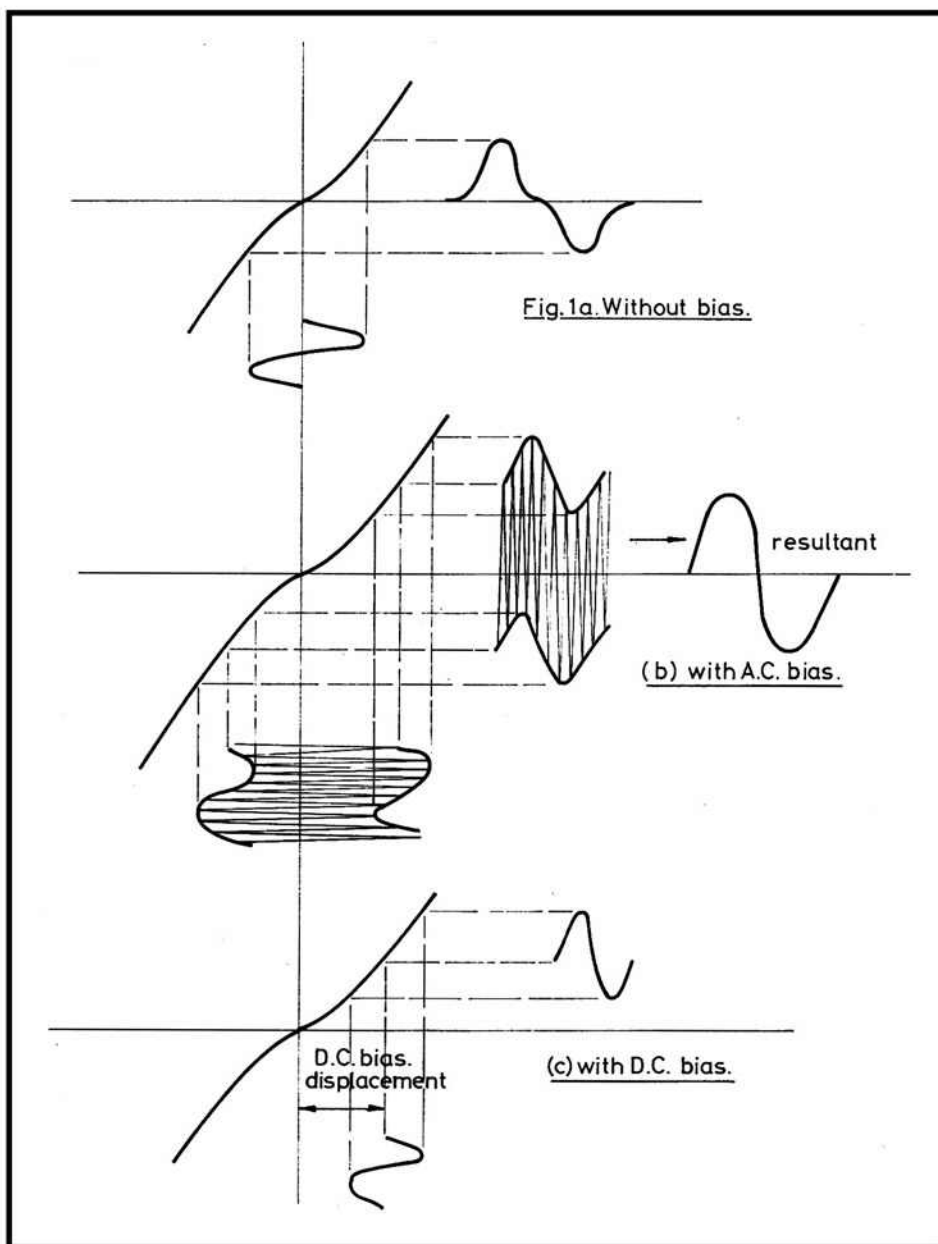


Fig. 1. Bias characteristics of dc and ac biasing systems.

Of the large number of portable tape recorders that are now on the market, the greatest majority of them will be found to be of Japanese origin. Many of these are sold under their Japanese names, but still others bear the names of the well-known British firms who distribute them. For example, two recorders were recently released by Dansette that were made in Japan. Although, as would be expected, there are differences in the models made by different firms, there are also quite a number of similarities. Many features are identical and these could be said to have become established Japanese practice. We will now take a look at some of these features.

Most recorders employ hubs with three keys on the spool platforms, over which the three keyways of the standard spool are made to fit. Few, however, have any provision for retaining these spools when the recorder is in any position other than vertical. Those that do usually employ some locking screw arrangement which must be unfastened and

fastened each time a spool is changed. Nearly all of the Japanese recorders use a very simple, yet very effective, means of retaining the spools. A wire spring takes the place of one of these three keys on the hub, so that when the tape spool is placed over it, it bears against the inside of the spool. The pressure is sufficient to retain the spool in position even if the recorder is held upside down. Loading and unloading is no more difficult than with a hub with no locking arrangements at all. This is certainly a feature that British manufacturers could copy.

Dual-speed recorders are quite commonplace even on the cheapest Japanese models. However, in order to provide this facility and still keep the price competitive, the speed change is made very simple. The stepped motor capstan and multi-position idler wheel are dispensed with and instead a simple sleeve is provided that can be fitted over the tape drive capstan. When fitted, it increases the tape speed and is held

in position by means of a thumb screw. A small pillar is usually provided somewhere on the deck to store the sleeve when it is not in use. This arrangement is rather more fiddly to use than the conventional systems, but speed changes are not made very frequently. Most users stick to the one speed that best suits their purpose, and only change if a special circumstance arises. The main drawback with this method is that there is no amplifier switching to enable a change of equalizing to take place for the alternative speed.

Erase Systems

A further practice found in these small Japanese recorders is the use of dc for the erase current. There can be very little saving in cost by using dc, because an erase head with its associated switching must still be fitted and also an oscillator to provide the recording bias. If price were the factor here, a much greater saving could be achieved by using a permanent magnet – as in fact some recorders have done. It is true that the oscillator need only give a smaller output as the requirements for recording bias are much less than those for erasing. Dc is quite effective for erasure, but its drawback is that it raises the tape background noise level. A resistor, usually around 1,000 ohms, is used to feed the current to the head via the record/playback switch.

Some of the cheaper recorders use dc for recording bias as well. This means that the oscillator is completely eliminated and hence a saving in cost is gained. As with the erase head, a feed resistor is taken from the negative battery line through the record/playback switch, but in this case it is of a much higher value, 18,000 ohms being a common one. The use of dc for recording bias had two effects on the performance of the instrument. First, it adds still further to the background noise level. Secondly, it reduces the maximum signal level that can be recorded on the tape without distortion. To see why this is so, we must consider the tape transfer characteristics as shown in the illustration. When no bias is used, the signal is applied across the curve centre portion of the characteristic as shown in Fig. 1a; the result is a distorted output. In Fig. 1b we see what happens when an ac record bias is applied, upon which the signal is effectively modulated. Result is that it is applied to both straight portions of the curve while missing the non-linear centre portion. The use of dc bias merely shifts the signal away from the curved part of the characteristic on to one of the straight sections. This means that a much smaller part of the characteristic is being used; hence the modulation must be kept to a much lower level so as not to encroach upon the curved portions and cause distortion.

Spools or Cassettes

A rather unfortunate tendency with most of these recorders seems to be to omit the fast-forward facility. This is, no doubt, governed by question of cost, but it can make things awkward if one is hunting for a particular passage in the middle of a reel. Of the various tape spool sizes in common use, the 3 inch size seems to be the most popular. Some recorders will accommodate 5 inch spools while other miniature types

are using a new smaller size, a 2 inch spool. These small spools contain 300 feet of tape and will run for half-an-hour per track at $1\frac{1}{2}$ ips. These enable the size of recorder to be reduced and yet score over the cassettes in that they can be replayed on a larger machine if desired. As 2 inch spools do not seem to be available everywhere as yet, the main thing to check before purchasing one of these recorders is that tapes can be obtained in your locality. Cassettes are also used in a number of Japanese recorders and they seem to be gaining popularity. Of the various types being made, the Philips is the one which seems to be the more popular. Normally these cassettes run for half-an-hour per track, but one has recently been introduced that will play for three-quarters-of-an-hour.

Facilities

For the modulation indicator the small edge-type meter seems to have universal approval. This also indicates the battery voltage when the machine is switched to playback. A few cheaper models, though, use another method, that of an incandescent lamp. With this the recording volume is adjusted so that the lamp just glows on the peaks of sound. This is not such a good idea, as in quiet sections there is no indication as to whether the instrument is recording at all, but again is a concession to price.

Remote control is a feature which seems to be appearing on nearly all models, thereby becoming an almost standard item. The control switch appears on the microphone and interrupts the battery supply to the motor and amplifier. Termination of the microphone cable is by means of what appears to be a two-pin plug. On closer examination, however, it can be seen that one pin

is merely a miniature jack plug that is used for the microphone connections and the other is a two-segment connector similar to the jack plug but thinner. It is this that is used for the connection to the remote control. A pair of contacts that close when the plug is removed is provided on the remote control socket. Thus, when the microphone is not in use, the recorder behaves normally. Automatic volume control, once found only on the more elaborate mains recorders, is now quite commonly incorporated in these small battery machines. These enable the recording level to be controlled by the actual sound itself. Hence an interview or conversation where one person may be nearer the microphone than the other can be well recorded as the level will adjust for the volume of each voice. Normally a modulation lever indicator is not fitted where automatic volume control is provided as an indicator would of course be unnecessary. There are, however, some instruments that give a choice of automatic or manual control, in which case an indicator is fitted.

Many of these recorders have built-in power supplies so that they can be operated either from batteries or from the electricity supply mains (Fig. 2). With those that do not, nearly all provide a socket for the connection of an external power converter. Plugging in the converter automatically disconnects the internal batteries.

These, then, are some of the main features which seem to have become standardized on these imported recorders. In general the mechanics are very good and they are well constructed. The performance of the electrical circuit, on the other hand, is not always what one would desire. Nonetheless, there are many first-class little machines that can be chosen from the large array now offered.



Fig. 2. The new Sony 800, made in Japan, features automatic or manual recording level control and operates from batteries or ac mains.

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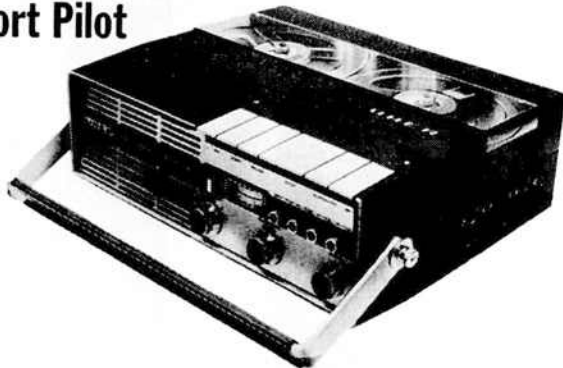
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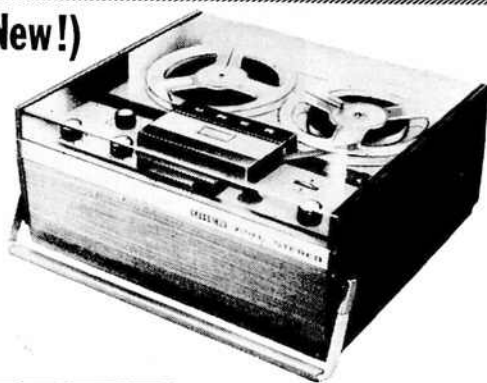
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TAPE CLUB NEWS

THE BBC is again running a tape recording competition this year, and winning entries will be featured in a broadcast in the autumn. The theme is *On the Move* and more details can be obtained from BBC Recording Competition, BBC, Piccadilly, Manchester. Now's the time to get busy!

ISABELLE TOURNOR

First Open Night a Resounding Success

A hall packed to capacity with standing room only is a sure indication of a successful evening and this was the case at the first Open Night held by the Derby TRC. The club gave two performances of a 40-minute programme which opened with a talk by Dennis Land outlining some of the regular features at the club and giving examples of past productions. Peter Milner demonstrated multi-track recording, adding sound effects one at a time to build a picture in sound. Ernie Flecknoe played extracts of some of the club's live recordings of local choirs, operas, pop groups and plays. Using the voices of some of his own taperspondents as examples, Derek Hill spoke about tapersponding and Malcolm Nichols gave a colour slide show demonstrating how the addition of taped commentary and music improves slides. Doug Flecknoe then showed how a sound track benefited an 8mm cine film. To conclude the performance, Alf Stanway, compère of the show, demonstrated five steps to better quality sound reproduction with examples of stereophonic sound. Visitors were able to see a display of the club's equipment and a demonstration of the Sony video tape recorder by Messrs Victor Buckland of Derby. Quite an evening! And so encouraged were members that they report that an Open Night will almost certainly become an annual event.

Tapes from Abroad

An innovation at the Bournemouth TRC which has proved highly entertaining is *Tapes from Abroad*. Amongst these was a tape from former Secretary Joyce Lawson, now in New Zealand, recounting her son's 21st birthday celebrations. Stuart Cottle provided a commentary about a ship entering and berthing in Hong Kong harbour; Roy and Ann Dunn played their collection of original recordings from various European countries; and Rowland Hawksworth added an interview with a Canadian family. Entries submitted to the club's Annual Competition were of a high standard and were judged by a panel which included John Robinson, Bournemouth's Publicity Officer; Ken Bailey, international athlete and journalist; and Mrs Hyett of the Pembroke Hotel. This year the entries were subsequently sent to the Coventry TRC for a technical appraisal and their comments were recorded for the club. Secretary of the Bournemouth TRC is D. G. Hayter, 68 Leybourne Avenue, Bournemouth.

Guest Speaker

Mr Alex Smith recently spoke to the Newcastle and District TRC about interviewing and the work of the hospital broadcasting service from the Dryburn Hospital in Durham. His talk included a description of the hospital studio and the various functions they perform.

The following week, *Sound-About*, the club's sound magazine, was given a hearing. This was followed by a tape/slide show called *Between Tyne and Tweedy* and on this evening members brought along their own slides of the local countryside. Malcolm Watt was given the job of compiling a slide show and many thanks are due to Malcolm for his hard work in providing such an enjoyable evening.

Recording Rhythm and Blues

Two sizeable vans arrived at the Friern Barnet TRC recently and unloaded *The Blues City Shake Down*, a group with a vast array of amplifiers and speakers, drums, guitars and a tympani. They produced an immense sound in R&B style and club members taped them with the aid of fifteen microphones and eight tape recorders. Subsequent playback of the best recordings

at a full 12 watts on each channel shook even the noise-conditioned Shake Downs!

With their own Borough of Barnet running a Tape Drama Competition, the club is naturally active. They are offering their expertise in recording to the Drama Club rather than competing in the unfamiliar field of acting.

Member Kay Franklin has been busy completing a recording of *Constitutions and Constitutionalism* for a blind student under the auspices of the Talking Books Service for the Blind.

Secretary of the Friern Barnet Club is R. A. Longhurst, 72 Grosvenor Avenue, Barnet, Herts.

Jumble Sale Success

The recent weeks have been very busy indeed for the Doncaster and District TRC as they held their first Jumble Sale which netted £14 in approximately three-quarters of an hour!

The AGM, which usually records the lowest attendance of the year, had a full turnout and the following officials were elected: E. Kibblewhite, Chairman; B. Gabbitts, Vice-Chairman; C. K. Young, Secretary/Treasurer; G. Allsopp, Assistant Secretary; R. W. Brackenbury, Press Secretary; J. Phillips, Committee Member.

The most important news to come to the club in years is that they have been granted permission to start a request programme for one of the local hospitals. They have been trying to obtain this permission since the formation of the club and members consider it quite a milestone.

Secretary C. K. Young's address is 28 Chelmsford Drive, Doncaster.

PPC Trophy Competition Results

For his tape/slide production, F. W. Richardson of the South Devon TRC was awarded the PPC Trophy, 1,200 feet of magnetic recording tape and a daylight colour film. His entry was entitled *Out and About with Colour* and consisted of 50 35mm slides accompanied by a poetic commentary and sound effects. Second place was awarded to A. R. Knight's entry, *Keep it Dark*, which featured colour by night in Torbay and third place was won by C. J. Block with *I Remember*. Judges of this competition were Joe Pengelly, BBC West Region Newscaster; Tom Molland, Plymouth photographer and lecturer; and Bob Roper, art master at Torquay Boys' Grammar School.

Gordon Furneaux is the Hon. Secretary of the South Devon Club and he can be contacted at 45 Kenwyn Road, Ellacombe, Torquay.

Additional Club Equipment

The London TRC has now purchased a second-hand Pye speaker and when in use at the last meeting, members put it through a pretty rigid test which it passed with flying colours!

Mr Denys Killick of *Tape Recording Magazine* recently visited the club with a few of his many fine recordings, mostly serious music but a few examples of lighter music were included. This was a really enjoyable evening shared with old friends from the Friern Barnet Club and a few special guests.

Meeting of the London TRC are now held at The Marquis of Granby, Chandos Place, London WC2. Details of membership are obtainable from the Secretary, David Campbell, 46 Aberdare Gardens, NW6.

Mersey-go-round

The Merseyside TRS reports that their half-hour magazine, *Mersey-go-round*, has been very warmly received in old folks' homes and hospitals. Two members made stereo recordings of a visiting Salvation Army band while students' rag-day souvenirs included an interview with a chef who had come to roast an ox on sedate St George's Plateau.

There was absolute silence (plus or minus two dB) at one meeting when members heard an edited sequence of nine two-minute entries for the club's *Mini-contest*, complete with the recorded reactions of the adjudicators. Terry Brown of the Middleton Group and George West of the British Ferrograph Owners' Club certainly

pulled no punches, but their criticisms were voted as being constructive, justified and extremely helpful. Deserving winner was Harold Wilde with a dryly funny demonstration of an amateur's problems.

Secretary of the Merseyside Club is Mr E. J. Elcock, 37 Rockbank Road, Stoneycroft, Liverpool 13.

Club Visits Newspaper

The Sun newspaper building was visited by members of the North London Tape and Hi-Fi Club and here they were shown the Big Room, the teleprinter agency room, the library and picture library and the teleprinter picture transmission room. In the composing room, members were presented with the club's name in slugs cast on the Linotype machine. After the paper had been 'put to bed', the presses started and each member was given a copy.

On the same evening, other members were being shown around Enfield Police Station by Police Inspector A. Thornton. Police Sergeant W. Cory described a typical day on duty at the station and outlined the many varied calls for help or advice that are received. Inspector Thornton explained the work of the police, including the CID and the Regional Crime Squad. Further details of club activities are available from the Secretary, John Wilson, 202a North End Road, London W14.

Great Yarmouth and District

One of the club's favourite evenings is *Members' Tape Night* when members are asked to produce a five-minute tape consisting of material that they think will be of interest to others. The club finds that after one of these evenings there is a great deal of dubbing to be done. The editing required for the tape for the Dartford Sound Link has kept members busy but an interesting half-hour was successfully condensed to five minutes.

An invitation was accepted from the local Recorded Music Circle to present an evening for their members; the result was a thoroughly pleasant evening for both societies.

Coventry

For the club's future meetings, Ken Preston and Peter Warden drafted ideas which were discussed and finalized by members themselves. Most of the programmes feature members giving them opportunities to carry out live recording sessions at meetings. Three programmes will feature *The Basic Principles of Tape Recording* for the benefit of newer members. Two competitions have been planned and the musical evenings at members' houses which proved so popular will continue.

Further details available from the Secretary, K. W. Preston, 42 Pounds Avenue, Coventry, Warks.

Another New Club

We have recently been advised of the formation of the South West Amateur Tape Society. At the inaugural meeting the following persons were elected: A. I. Wood, Chairman; W. J. B. Marshall, Secretary; R. Trenerry, Treasurer; A. E. Fielding, R. B. Cole, J. Phillips and J. W. Lister, Committee Members. Meetings are currently being held at 17 South Street, St Austell, Cornwall, on the fourth Monday of each month. Applications for membership should be addressed to the Secretary at 22 Mitchell Road, Sandy Hill, St Austell.

Attention all Clubs

A group of twelve taperspondents meeting monthly wish to contact a similar English-speaking group or tape club with a view to an exchange of tape recording ideas and the promotion of international understanding. Their main activities include feature tapes about their country and recordings of discussions on topical subjects of overseas interest. Those interested are asked to contact Pete Day, 38 Rogers Street, Christchurch 2, New Zealand. An acknowledgment is guaranteed.

Help!

Eric Woodward, a member of Radio Tynemouth Hospital Broadcasting which relays programmes to 500 patients, wonders if any club would be willing to lend tape-recorded plays for use in their programmes. Mr Woodward can be contacted at 'Deneholme', Beanley Crescent, Tynemouth.

Top Ten for April

- | | |
|---------------------------|-----------------|
| 1. National Tape Club | 5. Southall |
| 2. Newcastle and District | 6. New Zealand |
| 3. Derby | 7. London |
| 4. Doncaster | 8. Rugby |
| | 9. Brighton |
| | 10. South Devon |

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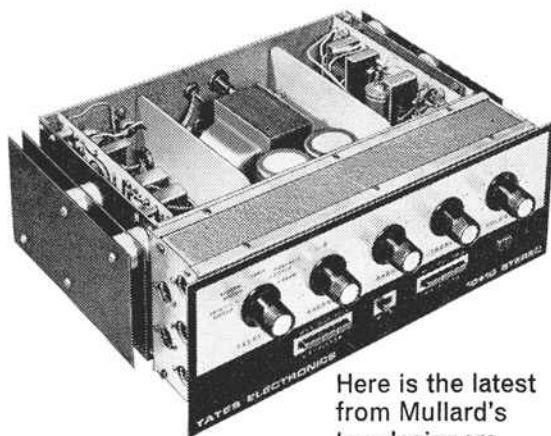
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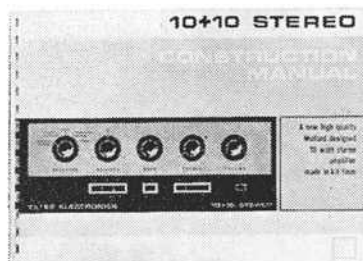
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TATES ELECTRONICS

DYNAMIC TESTING IN AUDIO EQUIPMENT

by Gordon J. King

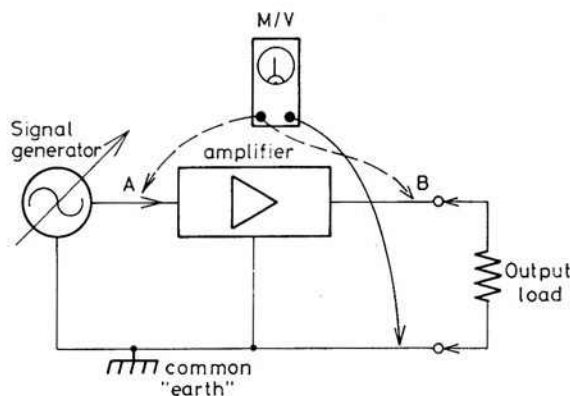


Fig. 1. Set-up for testing the gain of an amplifier stage.

Dynamic testing implies that the signal itself is used in the tests and that the stages are tested under working or *dynamic* conditions. This differs from static or dc testing, which can be undertaken with the channel quiescent from the signal point of view. Typical static tests are represented by measurements of anode, screen grid, cathode and heater potentials of valves or collector, emitter and base potentials of transistors, for instance, while dynamic testing demands an instrument which responds to the signal in the channel.

The two chief dynamic test instruments are the oscilloscope and the milli-voltmeter. The oscilloscope not only registers the amplitude of the signals, but it also displays their waveforms, while the millivoltmeter simply measures the signal amplitude. The actual read-off could be in peak-to-peak, average or root mean square (rms) values. This is determined by the calibration of the meter movement. The way that the instrument measures is governed by its design. It

is not possible in the compass of this article to delve into the theory of waveforms and their measurement, and readers wishing to know more about these aspects of the matter are referred to the author's book *Radio and Television Test Instruments*, published by Odhams Books Ltd.

This article describes the practical applications of dynamic testing and is of interest not only to the technician but also to the semi-technical enthusiast. While it is often useful to see the waveform of the signal displayed in front of us on the screen of an oscilloscope, there are many applications of dynamic testing in which the less sophisticated millivoltmeter can be used to provide all the required information, and it is this instrument which is featured essentially in this article. The partnering test report dealing with the Grundig MV20 millivoltmeter gives a fair idea of the nature of this kind of instrument, and it might be useful to read that article before continuing with this one.

To test dynamically, one needs a signal, and this can be provided for certain tests by any programme signal – from tape, pick-up or radio tuner. But for more serious tests a signal of known parameters is required, and this can be produced by a signal generator or test tape or disc recording. A signal generator, for instance, will provide a signal within the audio range (and often beyond) of known wave-shape, distortion, frequency and amplitude, and signals most used are sine- and square-waves. The generator signal is fed into the input of the amplifier system instead of the programme signal, and the signal can then be measured with the millivoltmeter at any stage within the amplifier system.

Testing Gain and Power Output

Let us suppose that we require to determine the gain of an amplifier, then the set-up as shown in Fig. 1 could be employed. Here the signal generator output is fed into the amplifier input and the signal measured

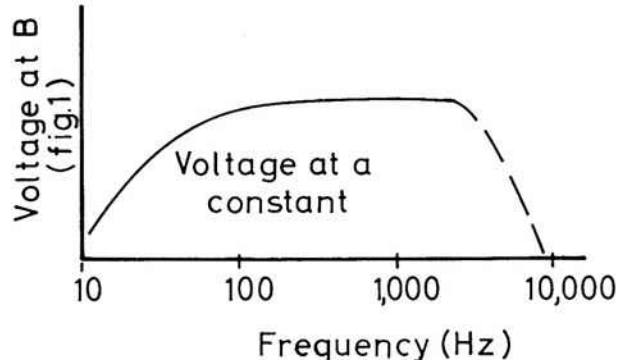


Fig. 2. Frequency response characteristic as may be obtained from the set-up in Fig. 1.

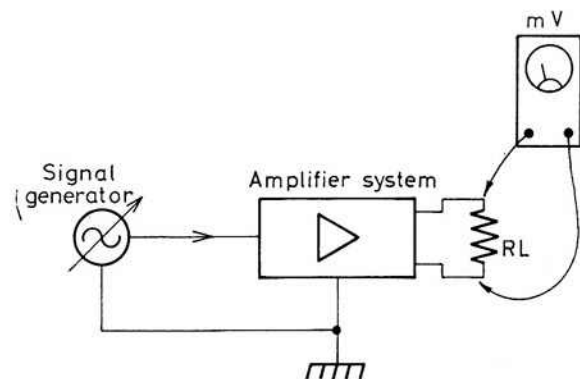


Fig. 3. Testing for power output.

DYNAMIC TESTING IN AUDIO EQUIPMENT

Continued

on the mV-meter by test A. With the gain control of the amplifier set as required (usually at maximum), the mV-meter is transferred to make test B, across the output load. Assuming that the input and output impedances are fairly close to each other, the voltage gain can be expressed in decibels, and the voltage ratio is equal to the voltage at test B divided by that at test A. If B is, say, 200mV and A 2mV, then the voltage ratio is 100:1, equal to 40dB. A gain test of this kind can be made at intervals over the frequency spectrum and the results plotted to give a frequency response curve (Fig. 2). Fig. 3 shows how the mV-meter can be used to measure the power output of an amplifier. Here we have the signal generator input as before, but instead of the amplifier being loaded by a loudspeaker, a load resistor R_L is used. The generator output is turned up with the amplifier volume control at maximum to the onset of distortion or waveform clipping (this can be monitored on an oscilloscope also connected across the load) and the signal voltage recorded by the mV-meter is noted. The power output is then equal to the square of the voltage across the load divided by the load resistance in ohms. If the mV-meter records, say, 3 volts rms and the load resistance is 3 ohms, then we have 3 squared divided by 3, which equals 3, and this is the power output in watts at that particular generator frequency. A power response curve can be made over the spectrum by plotting frequency against power output.

Pick-up and Equalizing Tests

Most millivoltmeters are sufficiently sensitive to record the signal voltage actually delivered by a pick-up. This means that the frequency characteristics of the pick-up can be plotted by using a frequency test record and the output can be translated into decibels (or read direct from some instruments) to give a frequency versus decibel curve. Test records are made to the RIAA recording characteristics (see Table 1), so with a velocity-type pick-up (i.e., magnetic type) playing such a test record the pick-up output should conform to Table 1.

This kind of pick-up requires an equalizing circuit, the inverse of the recording characteristics, to give a flat output, so by transferring the mV-meter to the output of the preamplifier the efficiency of the equalizing can be assessed. Fig. 4 shows at (a) the unequalized output from the pick-up when played on a frequency test record, at (b) the response characteristics of the equalizing (the inverse of (a)) and at (c) the flat output from the equalized amplifier.

The effect of changing the load across the pick-up can also be appraised, but a word of warning here. The mV-meter will probably have to be set to a low-level range to provide a usable deflection on the meter when the output straight from the pick-up is being measured. Any small 50Hz

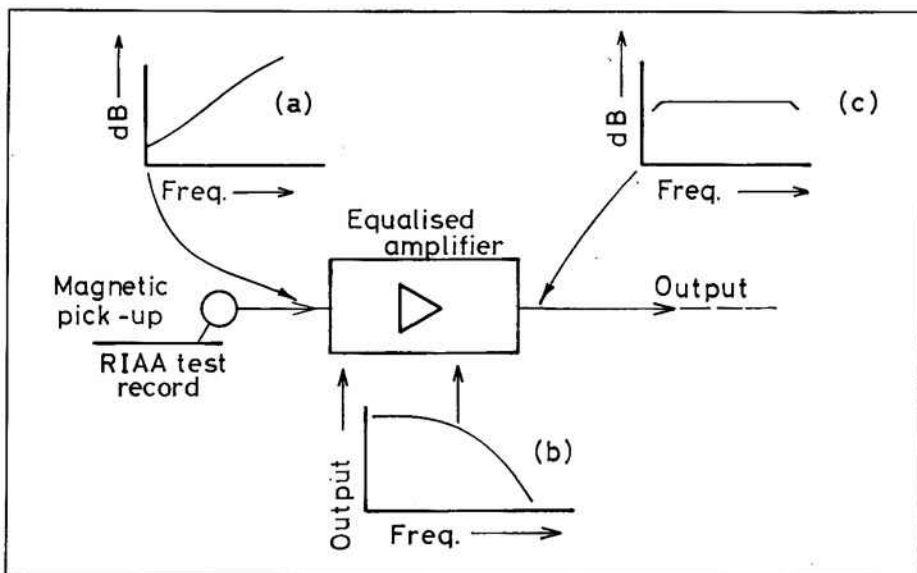


Fig. 4. Checking the equalizing of a pick-up amplifier.

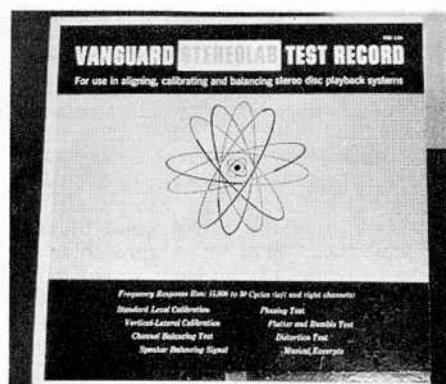


Fig. 5. Stereo test records. (a) Model 211 and (b) Stereolab VSD100. Both of these are available from Transatlantic Music Tapes (Distributors) Ltd.

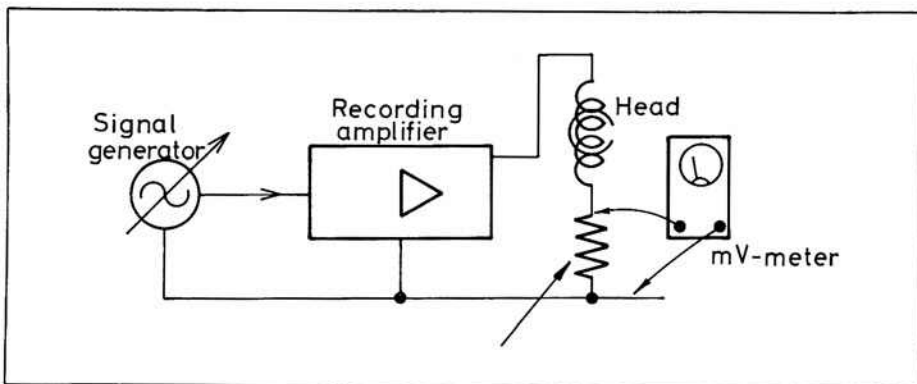


Fig. 6. Checking the recording characteristics of a tape recorder.

hum voltages from the mains supply will thus cause a substantial deflection on the meter, so extreme caution must be taken to avoid picking up hum and hum loops. The pick-up output must be fed to the mV-meter through screened cable and the tests should be made well away from mains wiring and mains transformers, and it is also very important thoroughly to screen the load resistor connected across the pick-up.

Many piezo pick-ups (i.e., crystal and ceramic) have a degree of built-in equalization when connected to a load of about

2M. This means that the output should be reasonably flat when playing an RIAA test recording. However, when this kind of pick-up is loaded to about 47Kohms, the output is similar to that from a magnetic (velocity) pick-up. Both of these considerations can be examined with the mV-meter and a test record. The load resistor most suitable for the amplifier equalization can also be determined by measuring the output from the preamplifier (first ensuring that the tone controls are set flat) and adjusting the load value across the pick-up for the flattest output.

Test Records

There are, of course, hosts of similar tests and measurements made possible by a sensitive millivoltmeter and a good test record. A very useful test record which has been on test by the writer is VSD100 in the Vanguard Stereolab series. This is distributed by Transatlantic Tapes (Distributors) Ltd of Bristol and West House, Salisbury. This record has tracks for aligning, calibrating and balancing stereo systems, and features frequency response runs from 15KHz to 30Hz, left and right channels, a standard level calibration, vertical-lateral calibration, a channel balancing test, a phasing test, flutter and rumble tests, distortion tests and musical excerpts for final testing of the system.

Another record by the same firm is Model 211 Stereo Test Record, which the writer has found extremely useful. This gives speaker phasing and channel identification tracks, channel balance tracks, frequency response tests using so-called 'warble tones' which facilitates checking for standing wave conditions in the listening room, cartridge evaluation tests, stereo separation tests, stereo spread appraisal track, hum test, rumble test and tests for flutter. The two records are illustrated in Fig. 5 at (a) Model 211 and (b) VSD100.

The mV-meter can also be used to measure the recording frequency response of a tape

recorder. The set-up required for this is given in Fig. 6. This shows the use of a low value resistor (about 50 ohms, depending on meter sensitivity and head impedance) connected in series with the 'earthy' side of the head. Recording current flowing through the resistor causes the development of signal voltage across it, and it is this voltage that is measured by the mV-meter. The recording current in the head can be discovered by dividing the voltage across the resistor by its value in ohms. If the voltage is, say, 10mV and the resistor 100 ohms, the current would be 0.1mA or 100μA.

It is not generally possible to measure the emf across the head direct on playback, but the accuracy of the replay equalization can be determined by playing a frequency test tape, recorded to the required characteristic (usually DIN/CCIR) and measuring the signal voltage at the output of the equalized stage. The output should be almost flat over the whole of the spectrum, depending, of course, on tape velocity.

There are many more tests and measurements that can be performed with the valve millivoltmeter. For instance, the recording bias at the head can be measured as in Fig. 6 without the input signal applied and with the mV-meter adjusted to its lowest range. The hf signal at the output of the

oscillator can be traced to the recording head and to the erase head, and adjustments to the signal level can be made for the best noise/frequency response characteristics.

The big advantages of the millivoltmeter are (i) the very high input impedance which offers virtually no shunting load to the signal source and (ii) the high sensitivity, making it possible to read signals as low as 100μV, assuming that such low-level signal can be fed to the instrument without spurious deflections being caused by stray hum fields and voltages.

Frequency (Hz)	Decibels
15,000	+ 17.17
12,000	+ 15.28
10,000	+ 13.75
8,000	+ 11.91
6,000	+ 9.62
4,000	+ 6.64
2,000	+ 2.61
1,000	0
700	- 1.23
400	- 3.81
200	- 8.22
100	- 13.11
50	- 16.96
30	- 18.61

TABLE 1. RIAA Recording Characteristics

TAPE AND DISC REVIEW

by Russ Allen

Starting this month with Stereo Discs, my first is **Stereo Spectacular - Demonstration and Sound Effects**. Audio Fidelity Stereodiscs DFS 7013. In fact I have reviewed this collection of sounds before in February '66 under the title **Panoramic Stereo Spectacular** by Recotape. I won't venture to say which, if either, is the better, but I will say that the disc recording was exceptionally clean and full, the stereo effect being truly splendid.

Side one has twenty-seven examples of *Spread* and it is difficult to single out any one item for special praise. There is of course the humorous *Russian Roulette* sequence and the *Submarine Submerging*. There are the typical tricks like the *Bowling Alley* and the *Jet Take-off*, but perhaps my favourite is *The Instrumental Trio* with commentator. You feel you could go over and make location chalk marks on the floor. Side two is a ten-item selection from the AF catalogue and gives a taste of most kinds of music.

An invaluable test record and just the thing to demonstrate your new outfit to incredulous friends and strangers.

Al Hirt Swingin' Dixie Vol 3. Audio Fidelity Stereodisc AFSD 5926. One of my complaints against traditional jazz has been a general lack of musical ability among its perpetrators. This complaint I do not make against Mr Hirt and his gentlemen; they are

indeed a most competent lot. As well as featuring tunes such as *Bill Bailey*, *High Society*, *Didn't He Ramble*, *Basin Street*, the group stay pretty much in their chosen idiom and give some really spirited playing, engendering a super atmosphere, aided and abetted by the excellent stereo.

Sweet Georgia Brown features a great deal of mighty fierce drumming and ends in a real rave-up. On the other hand they can come up with some real sweet sounds as on *Up a Lazy River* with some very Teagardenish trombone. The trombonist plays magnificently throughout, excelling particularly on *Basin Street*.

Just to show their versatility they also play a very up-tempoed untrad version of Shearing's *Lullaby of Birdland* where they all show that they appreciate the modern scene as well.

Pianist and clarinet have some exceedingly fine moments and I really mustn't forget to mention that Al himself is a most gifted performer on the trumpet.

Sleeve notes give a potted history of Dixieland jazz that makes interesting reading, plus a résumé of Al Hirt's career. A panel of technical data is included and it is with deep regret that I must mourn the lack of a personnel. So, who else plays beside Al?

Per-cus-sive Jazz. Audio Fidelity DFS 7002. Stereo 4-track 7½ ips. Subtitled *Doctored for Sound*, the recording is almost eerie in the

breadth of its stereo.

The musicians, under the leadership of Peter Appleyard on vibraphone, play twelve cunningly arranged beat themes all easily recognizable by moviegoers, starting with the theme tune from that horrific drug addiction story that featured Frank Sinatra, *Man With The Golden Arm*. A superb version of *Witchcraft* follows with some fascinating Latin rhythm percussion that has your ears darting back and forth like eyes on a table tennis match.

Finale of side one has arranger Sidney Cooper using a Hammond organ to simulate the sound of pizzicato strings and highly effective it is too.

On side two *Mack The Knife* has in the intro a scraper on the extreme right and a tambourine on the extreme left that were so far apart that I got worried for fear the scraper chap might fall out of my window. Technical data is copious and interesting and the sleeve notes OK, including the passage 'The result is an audiophile's dream - the happy blend of superlative jazz in the modern idiom with percussive treatments, brilliant virtuosity and engineering wizardry.' Wow! You may well say, or even Gosh! Honestly, I go along with most of that as a near Gospel statement. Some may carp that it's not strictly 'jazz in the modern idiom' but it's certainly jazzy and if it's not all that modern, who cares, for I consider

continued on page 39 37

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ATR

TAPE AND DISC REVIEW

Continued from page 37

this a great piece of swinging stereo. Like percussive man!

Reluctantly lowering the pneumatic lid of my record player I turn up the gas under my faithful Truvox and turn to **Machito at the Crescendo**. *Music Tapes Inc., MGM-58 4-Track Stereo 7½ ips.* If you like your Latin American music played with a shouting big brass section, five saxes, loads of percussion and yet still retaining an authentic feel, then this wildly exciting Kentonish outfit is a must.

Recorded live at the Crescendo, the high fidelity stereo has captured all the atmosphere of a crowd and a band enjoying themselves.

Vocals in Spanish come from Machito, the Trio and a young lady I feel must be a real doll, name of Graciella. They all sound madly authentic and doubtless they are.

The Machito band is much revered by jazzmen and it indeed contains several very good ones, particularly a tenor saxophonist, pianist and trumpet who all get solo spots. It's the fierce ensemble playing that makes the group so very exciting with, of course, that pulsing L.A. rhythm. Only three of the tunes were familiar to me: *Cuban Fantasy*, an old Kenton number, *Mangoes*, which everyone seems to have played, and the final item of the set an up-tempoed much Latinized *Varsity Drag* which goes like crazy. Very good recording, good stereo, good L.A. and super for those who want something that will literally make them get up and dance.

Mister Percussion. Terry Snyder and The All Stars.

Music Tapes MTR-22. 4-Track Stereo 7½ ips.

Perfect for exploiting the brilliance of both your hi-fi and stereo. The arrangements have little bursts of sound that pop up all over the stereo band. On the intro to *Get Out of Town* a drummer starts up on high-hat cymbals, cuts out, and another drummer starts up on the left and to the front. It's great and they indulge in a certain amount of by-play throughout.

Mind you, it's not all percussion; they give us the lot as well. The musical arrangements are incredibly well done, the recording clean, clear and with tremendous depth. Snyder's version of the dubious *Colonel Bogey* is a joy and I think the first time I've ever enjoyed it.

It has occurred to me that stereo recording must have given a great deal of work to players of rhythm instruments, shakers, bongos, asses' jaw-bones - yes, it is an instrument - and has certainly given a new lease of life to the xylophone, tubular bells, glockenspiel, marimba, etc, and in so doing has lifted quite a few arrangers out of a rut. Happily I've heard some extraordinarily ingenious arranging since stereo recording has grown up.

Sam 'The Man' Taylor Plays The Bad and The Beautiful.

Moodsville Stereo MPM-24. 4-Track 7½ ips. Taylor has chosen as titles for the session a string of famed movie birds, *Anna, Ruby, Susie Wong, Gloria, Laura, Anastasia* and *The Barefoot Contessa* and of course the title number sums them all up. To categorize this set I suppose you'd call it *near jazz*. The quartet backing Sam are well-known jazz-session men, Lloyd Mayes, piano, Wally Richardson, guitar, Art Davis, bass, Ed Shaughnessy, drums, but Sam sticks pretty near to the written melody in most of his solos. All in all it's a pleasing, relaxed album of nice tunes pleasantly jazz slanted. Well-recorded hi-fi stereo great for dancing to or just for listening. Mostly beautiful.

Doctor Zhivago. Soundtrack from the MGM film. MGM TA-MGM-C 8007. 2-Track Mono 3½ ips.

Metro Goldwyn Mayer Studios Orchestra conducted by Maurice Jarre who also composed the music.

Like the title says, music from the soundtrack and somehow this gives it a quality which is strictly cinematic.

The recording starts as is only reasonable with *Overture from Doctor Zhivago* and I could almost see the credits. It's really a bit much with an overdose of kettledrums rolling and rattling all over everything and little outbursts of Russian male voice choir.

Main Title from Dr Z follows and this has a charming tune with strings and balalaikas. Unfortunately, I've not seen this film. Yes, I know it's a pity, so you see I'm sure that I'm missing a lot from such music obviously

so molto romantica and sad to boot such as *Lara Leaves Yuri*, but I can see the gay, laughing crowd waltzing to *At The Student Cafe*, balalaikas again with a touch of Viennese. Now, what's this? That Lara's got a rendezvous with Komarovskiy which starts off like gay fun and then becomes somewhat sinister. Are they being spied upon? Some very good writing here, especially for the cellos and woodwind. Particularly clever too as it is so modern Russian in texture.

Lara's Theme opens side two and, as is often the case in background movie music, it is over-orchestrated. Maybe the Union have a ruling about how many guys have to actually play - there appears to be a full symphony orchestra plus every available naturalized balalaika player.

The Funeral on the other hand is quite beautifully done, wringing every tear drop of pathos from the subject and letting us hear some lovely singing.

Sventytski's Waltz is lovely in a Grand Hotel kind of way. *Yuri Escapes* doesn't tell me anything and *Tonya Arrives at Varykino* starts off like dawn breaking in a Western but goes into something better and the coda has some interesting pizzicato bass.

Yuri Writes a Poem for Lara takes us back to and out on the theme music. It's all quite magnificent and if you've seen the film then you will appreciate it even more than I did.

Note: Must read the *What's On* columns and find out if *Doctor Zhivago* is still showing anywhere. Trouble is I know from the music that there'll be lots of sad bits and my beard gets so soggy when I cry.

SUMMER TIME IS OUTDOOR RECORDING TIME

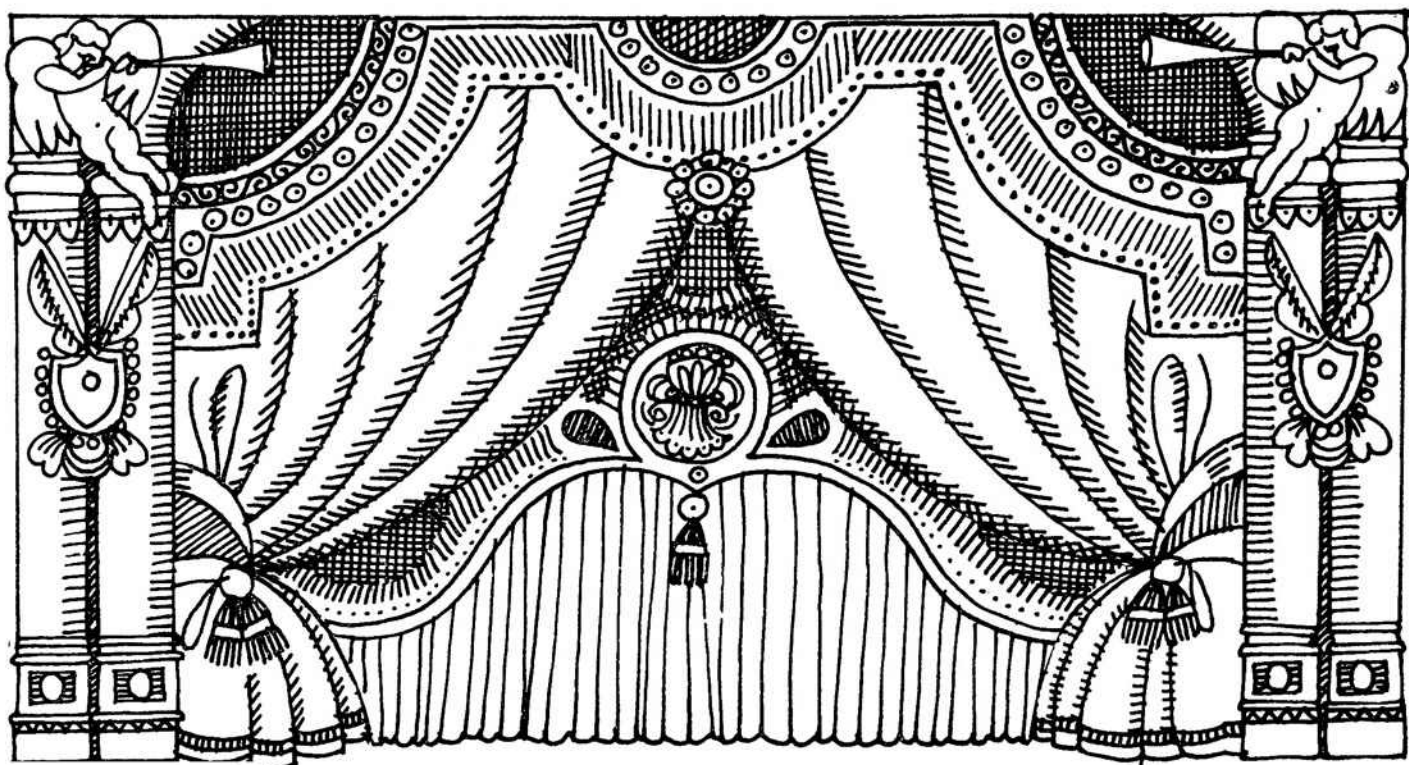
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GRUNDIG

TEST REPORT GRUNDIG MILLIVOLTMETER MODEL MV20

by Gordon J. King



To the audio enthusiast and technician the audio millivoltmeter has almost the same degree of usefulness as the multi-range testmeter has to the radio and television technician. Indeed, the audio generator and the audio millivoltmeter are invariably the first instrument purchases of the serious worker – for without them very little in the way of dynamic measurements can be made. An audio millivoltmeter is an instrument designed specifically for finding the root mean square (rms) values of signal voltages within the audio spectrum and beyond – from very low values to quite high values at good accuracy. Its high input impedance avoids damping or loading the signal source across which it is connected for the measurement.

The Grundig MV20 is an instrument of this kind, and its wide voltage range permits the measurement of signal voltages starting, say, from the output of a pick-up to the output of the final stage in any amplifier. Since it responds accurately to signals well above audio, it can also be used to measure the hf bias and erase voltages applied to the heads of a tape recorder.

The MV20 has eleven ranges selected by a twelve position rotary switch, with the twelfth position allowing for calibration. These ranges, full-scale on the 4 × 3 inch meter movement, are 3, 10, 30, 100 and 300mV and 1, 3, 10, 30, 100 and 300V. The frequency response within ± 0.2 dB is 10Hz to 1MHz and within -3 dB from 3.5Hz to 2MHz. Accuracy from 100Hz to 100KHz is $\pm 3\%$, and from 10Hz to 1MHz $\pm 5\%$ for a maximum of 10% mains voltage change.

Input impedance is 10M in parallel with 30pF (purely capacitors on the high ranges), and the instrument can handle maximum overloads on all the low ranges up to 1V of 220V and on all the higher ranges up to 350V. A millivoltmeter comprises an amplifier system of valves (or transistors) fed from a very accurate switched attenuator – giving the voltage ranges – and feeding into a rectifier system whose output works the meter movement. The MV20 uses three valves in its amplifier system (EF184, PF86 and PCF200) and the amplifier is capable of delivering a maximum of about 330mV. The noise contribution is less than 3mV.

The instrument works from ac mains supplies of between 110 and 220V, 40 to 60Hz, and the total consumption is 15 watts. The attractive case of steel finished in silver-grey has dimensions $7\frac{1}{2} \times 5\frac{1}{2} \times 4\frac{1}{2}$ inches and the weight is 2.5kg. The control on the left of the instrument is mains on/off, and the on position is revealed by a small, green pilot light at the top of the front panel lighting up. The instrument should then be allowed about ten minutes to stabilize fully. The scale on the movement has a calibration mark clearly indicated, and the

pointer should be adjusted to this position by the preset calibration control on the left of the front panel, near the on/off switch, when the range switch is in the *calibrate* setting.

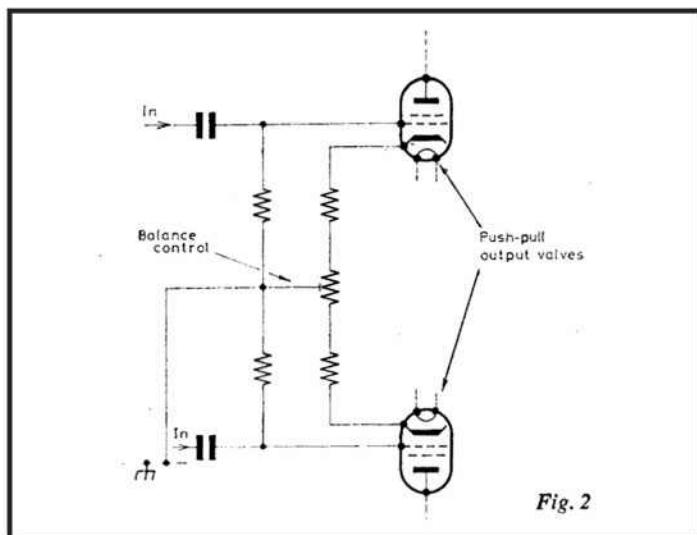
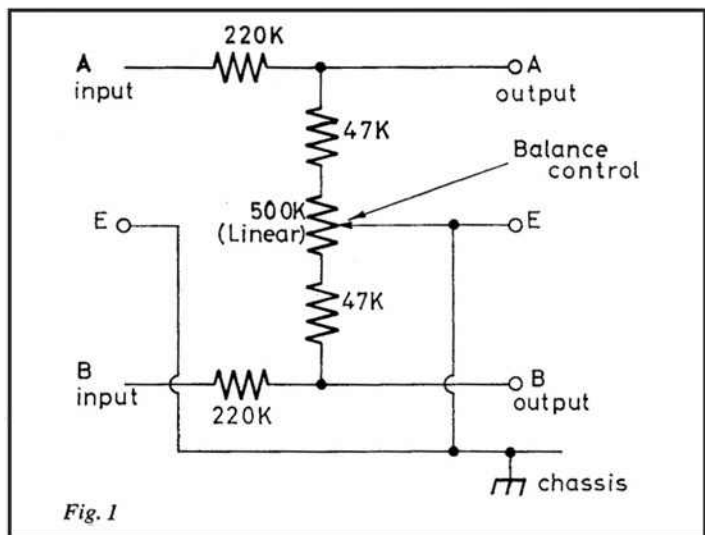
A co-axial signal input lead was supplied with the test instrument. This is terminated into a jack plug for connecting to the partnering socket on the front of the instrument and the other end comes out into a low-capacitance type of probe. There is also a separate *earth* socket on the instrument panel. A second jack socket, just below the on/off switch, terminates the output of the amplifier, and this can be used for directing the output signals from the amplifier when it is used for tests other than those related to the instrument itself. For instance, the output jack could be connected across a pair of headphones, and by using the input lead the signal passage through a low-level amplifier system could be monitored by using the amplifier/headphones combination as a 'signal tracer'. The amplifier can also be used to boost the sensitivity of the Y amplifier or input of an oscilloscope.

The scale of the meter movement is calibrated in black against a white background, and a thin pointer facilitates accurate read-offs. There are two voltage scales, 0 to 10 and 0 to 30, corresponding to the 10dB switched steps, and a decibel scale calibrated from -20 dB to $+2$ dB. Although the instrument is calibrated in rms values as mentioned earlier, it actually measures the arithmetic mean of the signal. It is necessary to have this in mind when the instrument is employed to measure signals other than sine-wave forms. This mean-level measurement function is given by the nature of the signal rectifier feeding the meter movement (which is $100\mu A$ fsd).

Long-term stability of the instrument is enhanced by the application of liberal negative feedback over the amplifier system and by the use of aged valves. For calibration the mains transformer delivers a stabilized test voltage switched to the amplifier input when the range switch is set to *calibrate*. Adjustment to the calibrate mark on the scale is achieved by a variable resistor regulating the feedback loop gain, and this works extremely well in practice.

The test instrument was found to be up to the maker's specifications, and once it was properly warmed up there was virtually no drift in sensitivity. The instrument was left running for long periods of time and no significant increase in temperature was observed.

This and other comparable testing instruments are manufactured by Grundig (GB) Ltd, 40 Newlands Park, Sydenham, London SE26. Further details and prices available from Grundig (GB) Ltd.



A TO Z IN AUDIO AND VIDEO

Balance Control

In stereo equipment this is the control used to balance the signal in the *A* channel against that in the *B* channel. The left and right amplifiers respectively are called *A* and *B* amplifiers or channels, and if a little more gain is required in one channel relative to the other, the balance control is shifted left or right of its centre position, which theoretically represents the 'balanced' setting. The balance control is thus a differential volume control, increasing or reducing the output of one channel only while keeping constant the output of the other channel. Some balance controls, however, work by increasing the output of one channel while reducing the output of the other channel.

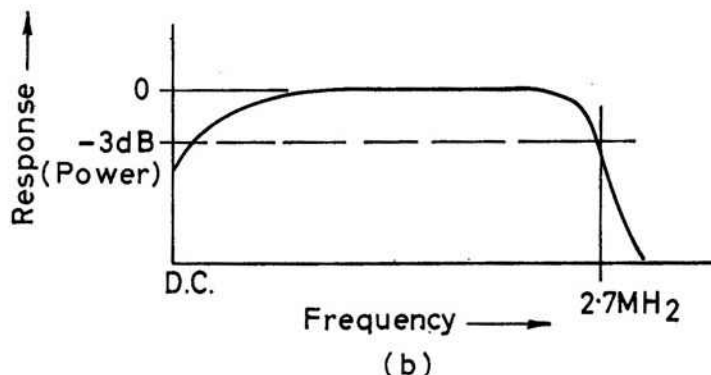
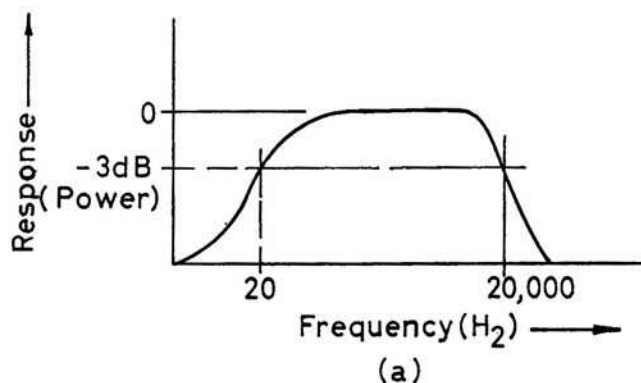
There is, of course, the main volume control which will regulate the sound up or down in both channels simultaneously. Sometimes the stereo programme signals are a little unbalanced between the *A* and *B* channels, or the gain of one channel may be a little different from that of the other. These unbalance effects can be countered by adjusting the balance control for the best stereo reproduction. A further need for balance adjustment is if the loudspeaker on one channel has a different sensitivity from that on the other channel or if the listening room upsets the acoustic balance of the sounds from the two speakers. The stereo image can be shifted between the two speakers, and the idea is to adjust the control for a centre image on a balancing signal.

Before stereo, the term balance control referred to a preset potentiometer in the push-pull output stage of a hi-fi amplifier, the control being used to balance one output valve against the other for the maximum cancellation of second-harmonic distortion. Fig. 1 shows a circuit of a simple stereo balance control and Fig. 2 a push-pull output stage balance control. It will be understood, of course, that the control in Fig. 2 establishes a dc balance in the output valves

Bandwidth

The bandwidth of a circuit is the frequency spectrum over which it passes or amplifies signals. The limits of the spectrum are often defined as *half-power points*, where the power is 3dB down from the main response. Fig. 3 (a) illustrates this in terms of audio bandwidth. Bandwidth for good

video reproduction is shown in Fig. 3(b). Notice that while good quality audio reproduction demands a bandwidth from about 20Hz to 20,000Hz, good quality video reproduction demands a bandwidth from dc up to 2.7MHz at least, depending on the number of lines making up the complete picture or frame.



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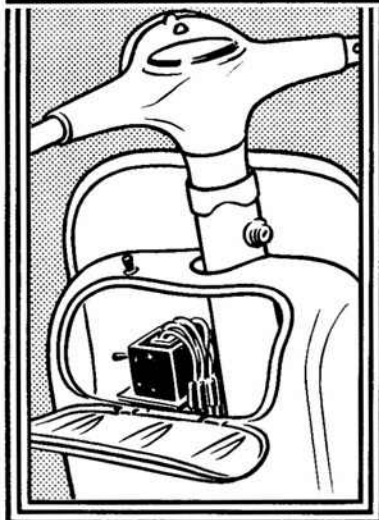
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