

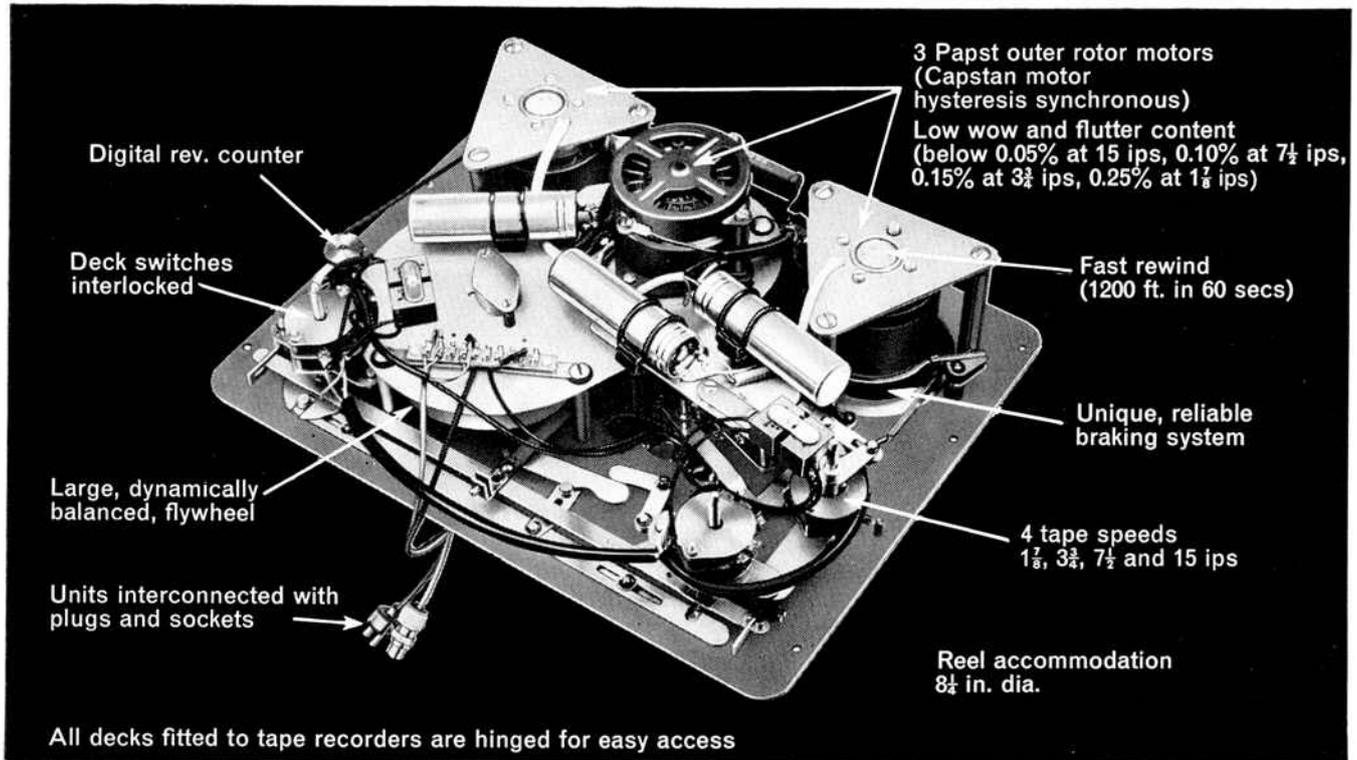
Amateur Tape Recording

VIDEO & HI-FI

June 1966 Vol 7 No 11 2/6

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EDITORIAL COMMENT

First thing this month is a reminder that the closing date for the British Amateur Tape Recording Contest is 31 July. Have you planned or made the tape you are going to enter for the contest? Judging by the publicity we've seen, there should be a large increase in entries this year, which means that only the well-produced tapes are likely to make the short list for prizes. This does not mean tapes made on expensive tape recorders with the help of a studio full of mixers, etc. It means what it says – *well-produced tapes* and this entails careful planning, scripting, and above all, editing. Make sure those clicks and rough passages are cut out and that the balance of the recording is good.

ATR Editorial

Whilst we receive a great number of letters from ATR readers on all kinds of subjects – technical queries, requests for advice about buying tape recorders and accessories, or the best kind of tape to use, etc – few readers ever say what they would like to see featured in ATR articles. We hope, of course, that everyone is satisfied, although from time to time we do receive a protest about something someone doesn't like, to which, incidentally, we pay the

greatest attention. So why not send us a letter or even a postcard, saying what you would like to see featured in ATR about your own particular interests, and we will do our best. You might also win a prize if your letter is published in 'The Things You Say'.

The Future

We think there is little likelihood of domestic TV tape recording yet, although rumours continue to circulate. In fact, until some manufacturer comes along and gives a convincing demonstration of a domestic video tape recorder at a reasonable price, we shall continue to regard as rumours all the current reports and prophecies. So, back to sound – for we haven't exhausted all the possibilities here, nor are we likely to do so for a long time to come. But do present-day tape recorders cater properly for real recording? How many enthusiasts use *full-track* recording for instance? Yes, full-track which is the only track system that will give maximum signal, lowest noise and, provided the electronics of the tape recorder are well designed, high quality as well. If you should have the opportunity of comparing quarter or even half-track with full-track you will soon hear the dif-

ference. How many enthusiasts, who really go all out to make a first-class, well-edited recording, use the other half of the tape on half-track recording? (Except for stereo, of course.) So, why not full-track with a greatly improved signal-to-noise ratio? All we need, then, is some enterprising manufacturer to produce a full-track 7½ ips recorder with additional replay head, monitoring and mixing, etc, but at a price attractive to the enthusiast. It need not have an output stage, since one would expect to replay the recordings through hi-fi amplifiers and loudspeakers. This would put the amateur on a par with the professional with his 15 ips full-track equipment.

FRONT COVER

A Guards band on the move makes a fine subject for stereo recording, if you have a portable tape recorder. But even in mono with a Grundig TK6, as our front cover this month shows, there are many outdoor sounds worth recording. Incidentally, Grundig have recently introduced a new cassette portable known as the C100 which is also ideal for outdoor work.

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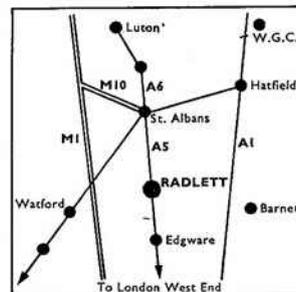
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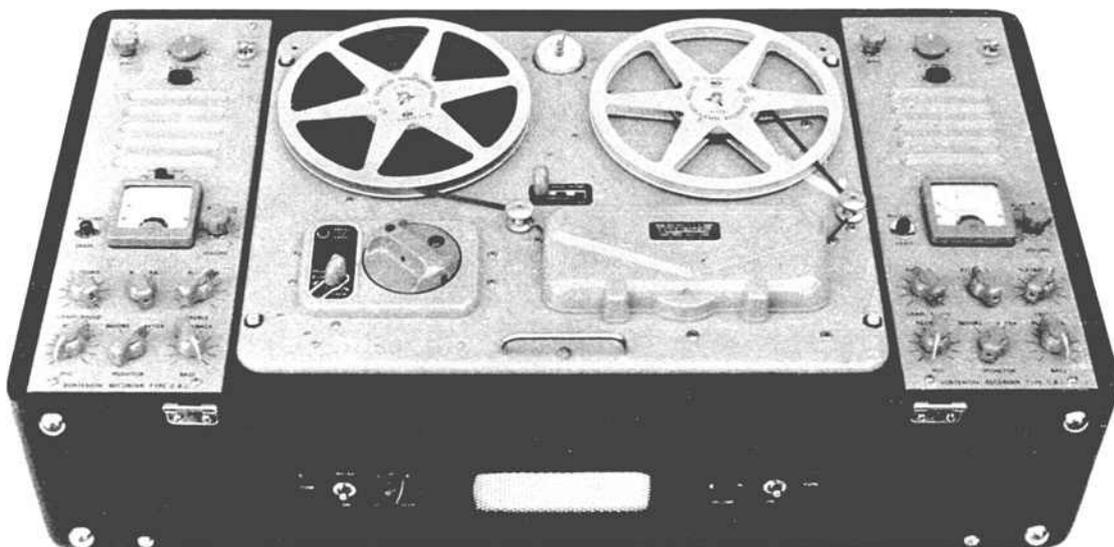
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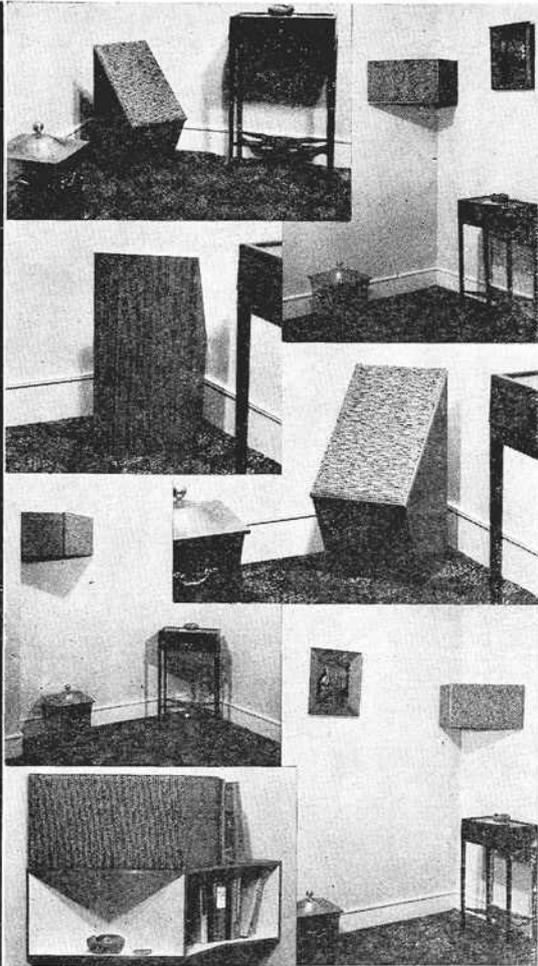
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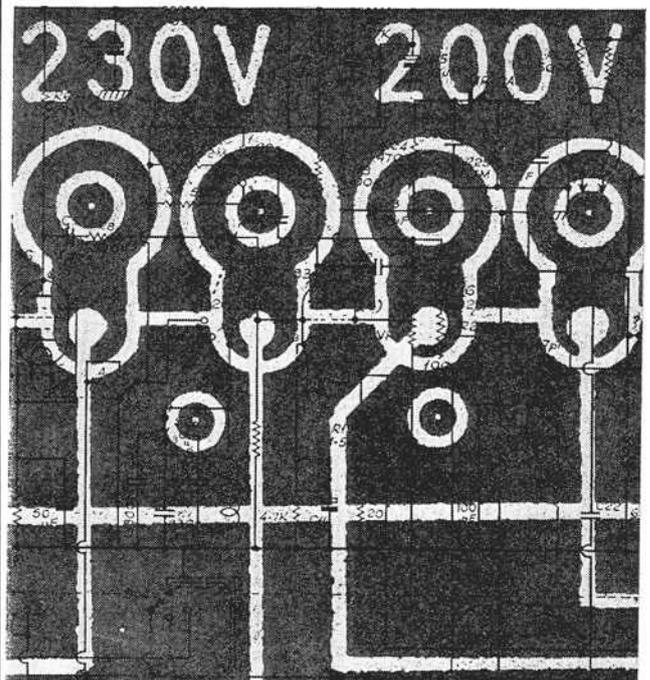
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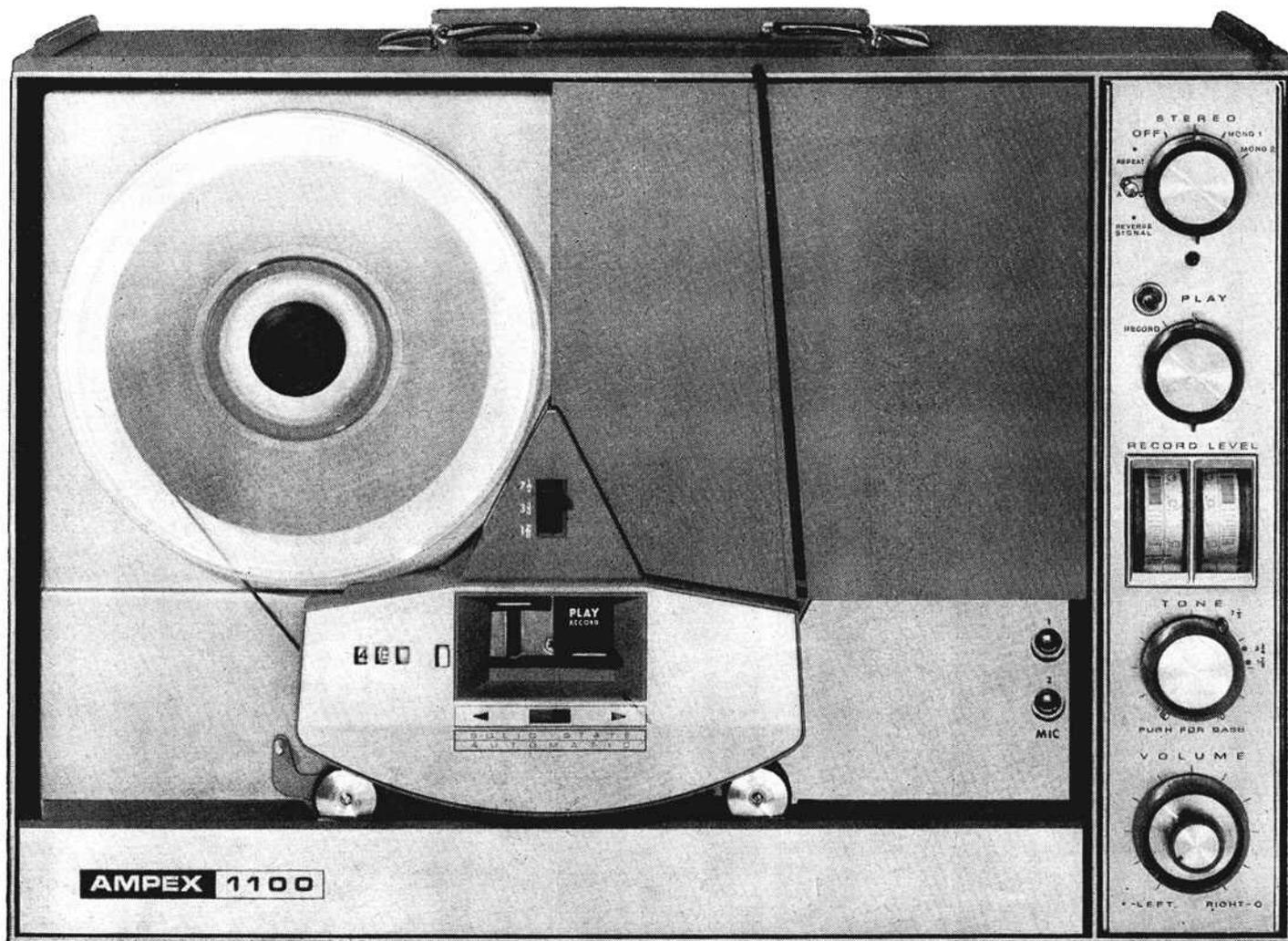
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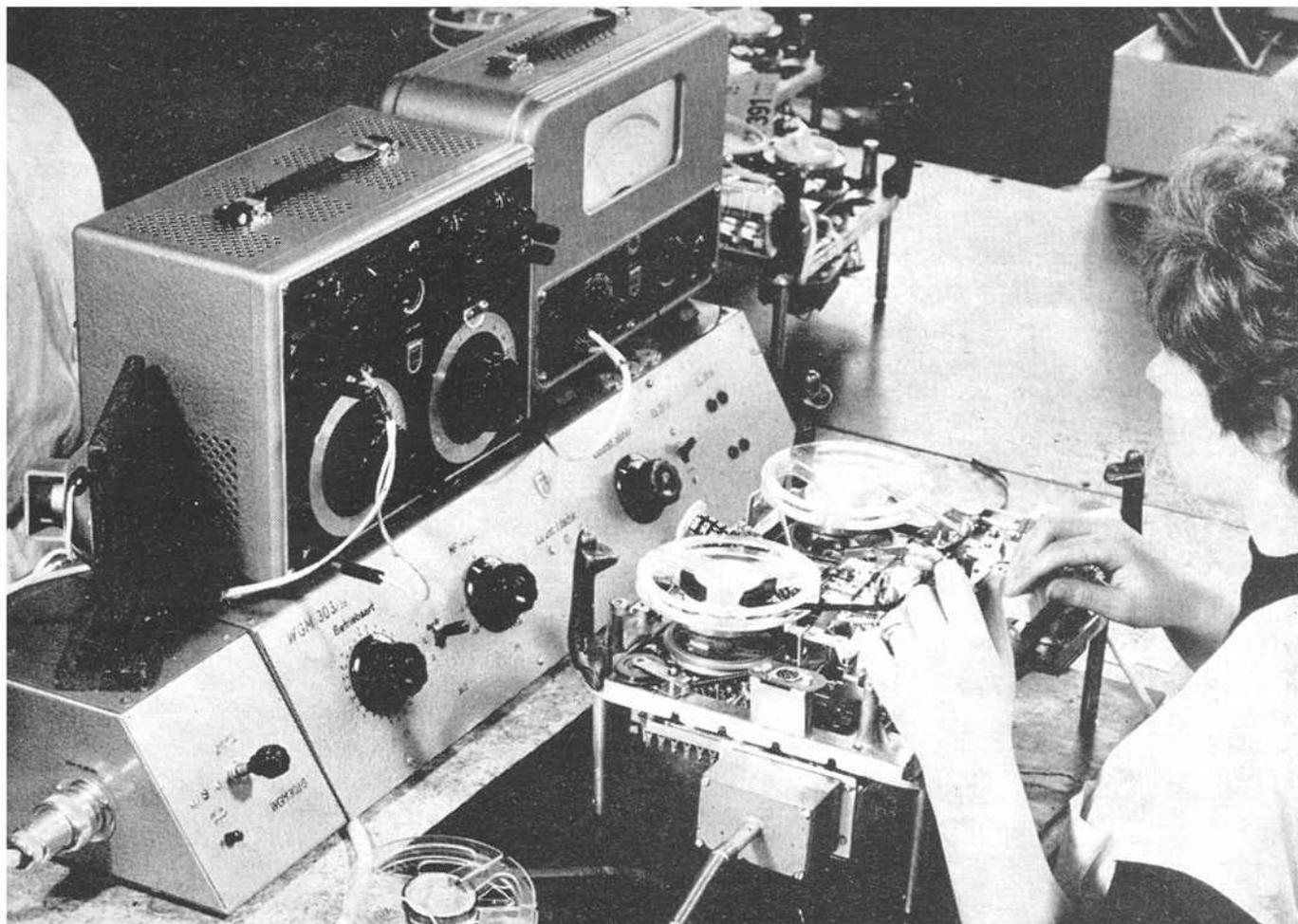
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TAPE RECORDER SERVICING

Part VII of the series by Gordon J. King



Although they sometimes give a little trouble, tape recorders are very thoroughly tested before despatch by the manufacturer. This photograph shows the final alignment test being carried out on a Philips tape recorder.

Recording Normal – No Playback

This is another fairly common symptom which is discovered by running through a tape record or a tape previously recorded on a different machine. The fact that the recording functions are fully active indicates that the mains input is correct and that the general ht and lt supplies are being delivered by the power section.

With machines employing a common recording/playback head and common early amplifier circuits, the normal recording action shows, at least, that the major parts of the common items are active. Of course, the trouble, again, could lie in the *record/playback* changeover switching, and it often does. The first thing to do, then, is to establish whether the early stages are taking the head signal along to the playback output amplifier. If they are, we can be pretty certain that the trouble is in the playback output circuits or components.

Many models with common stages feature a signal monitoring output or a medium-to-high output for feeding into an external amplifier for playback. This output follows directly the

voltage amplifier stages, thereby delivering the signal which is received by the input of the recorder's playback output section. This is shown in Fig. 1.

Clearly, then, if the playback 'monitor' signal is present at the appropriate output socket, one can be sure that the *record/playback* switching, the early stages in the playback position and the circuit to the monitor output socket are in order. Since the record function is normal, it would also follow that the switching at the output of the early stages (shown by S2 in Fig. 1) is highly likely to be in correct order.

The trouble would then almost certainly exist in the playback output section. Sometimes the internal speaker is switched so that it may be muted when an external speaker is employed for better quality playback. This switch which may be integral with the external speaker socket, is a weak point and it can cause trouble either through lack of use or excessive use. However, this is readily tested by connecting an external speaker to the appropriate socket. If this brings the playback channel back to life (through the

external speaker), the internal speaker, its switching and connections to the playback output stage should carefully be examined.

In recent popular models it has been the practice to employ a triode-pentode valve in the playback output channel, the pentode acting as the output valve on playback and as the bias and erase oscillator on record, with the triode serving as the voltage playback drive to the pentode. This means, then, that the pentode output section may be in order, as the internal speaker, while the fault lies in the triode voltage drive section. On some models it is possible for a fault in the triode section to affect playback only, leaving the recording channel fully active. Other models employ a separate output pentode, such as a Mullard EL84, this being driven from the common stages when switched to playback. As before, the valve is converted into a bias and erase oscillator on record.

Some idea as to whether the actual output stage and speaker are working can be gleaned by switching the machine to playback and holding an ear close to the internal loudspeaker. Very

few machines of the type under discussion have hi-fi standards of hum suppression and nearly all of them generate a little residual hum. Thus, if traces of hum can be heard in the speaker, the signification is that the output pentode is passing current and that the speaker itself is active.

If this happens, the fault should be looked for in the stage directly in front of the output pentode on playback. It is possible, of course, that the switching towards the output of the earlier stages possesses a back contact on the playback position. Looking at Fig. 1 again, it is possible that the playback signal would be present at the monitor output socket and yet fail to arrive at the input to the playback output section. Such a problem would arise should the playback contact on S2 fail to give continuity to the wiper or slider. At all times the switching should be under suspicion, for this is highly vulnerable in machines with switched common stages.

Let us suppose now that there is no signal on playback at the monitor or signal output socket. Since the recording function is correct, and assuming that the early stages are, in fact, common to both recording and playback, this symptom would point to trouble in the head switching. Since the head is common to both functions, it must be all right itself, otherwise the machine would also fail to record.

S1 in Fig. 1 shows the basic head switching. Here the slider or wiper is in contact with the head circuit (or should be). It is possible, however, that something may have happened to the contact on the head circuit making continuity from the head to the input of the early stages impossible. The contact connected to the microphone circuits (which is used only in the record position) may be perfectly sound, thereby permitting the machine to record but not playback.

Playback Output Stage

Now let us investigate a typical playback output stage with switching to change it to an hf oscillator. Such a circuit, belonging to the Elizabethan Auto 2 and 4, is shown in Fig. 2. The playback output valve and oscillator is the pentode section of the high efficiency ECL86 audio valve by Mullard. The triode section of this valve is, in fact, in this model the voltage driver for the pentode on playback and the output valve on record.

The output stage features three switches, S1, S2 and S3, which could in various ways put it out of action in the event of contact trouble. S1 directs the playback signal to the control grid of the pentode through C1, while S2 short-circuits the oscillator to chassis in the playback position. S3 connects the pentode anode either to the primary of the speaker transformer in the

playback position or to the oscillator transformer winding in the record position. Clearly, then, contact trouble in either S1 or S3 could put a fault on the playback channel, while probably not affecting record.

Functioned for playback, therefore, the pentode behaves in the ordinary output valve manner. The internal speaker is coupled to the secondary of the speaker transformer, via the switch in the external speaker jack socket. This, in fact, is the type of speaker switch referred to earlier. If this fails to maintain good contact, the internal speaker would become disconnected, while an external speaker would restore playback when plugged into the jack socket.

The pentode is biased by the cathode resistor R1 and tone control is given by the variable frequency-selective negative feedback from the secondary of the speaker transformer back to the cathode circuit, through the tone control R2 and its associated reactive element, C2. This circuit, incidentally, couples back to the cathode circuit of the triode section of the valve through another record/playback switch. In the record position of that switch, the feedback loop is removed from the triode cathode and its place is taken by a 0.022 μ F cathode bypass capacitor. This gives increased gain to the triode section on record, which is necessary to push adequate recording signal current through the head.

The screen grid of the pentode is connected to a source of positive ht potential of value below that supplied to the anode. The resistance-capacitance series network in parallel with the primary of the speaker transformer serves to minimize the effect of harmonic distortion on playback. This stage, then, is reasonably straightforward and it is not difficult to understand how it operates in the playback output position. It will also be seen that the playback signal is fed to the monitor socket through R3 at the start of the stage. Thus, if signal is present here, yet playback is defunct, the circuit reveals that the pentode section must in some way be responsible.

Let us now have a quick look at the circuit in the record position. The switches change over, S1 coupling the control grid to the oscillator transformer while disconnecting the signal input path, S2 removing the chassis short from the oscillator and coupling the head circuit to R4 (more about this in a moment) and S3 changing the anode from the output or speaker transformer to the oscillator transformer.

This action completely changes the action of the pentode. It no longer deals with signal amplification. Instead, the oscillator transformer gives a coupling from the anode of the valve back to the control grid. This coupling is 'in phase' and as a consequence the valve oscillates at a frequency governed by the tuned winding

on the oscillator transformer (that across which the 2,000 μ F capacitor is connected). The oscillator frequency in this circuit is adjustable over limits imposed by an iron-dust core in the tuned transformer winding. This is handy because the frequency can be altered a little if for any reason the signal tends to cause beat note whistles when a recording is being taken from a radio receiver or tuner. The oscillator frequency in the Elizabethan, by the way, is nominally 55 kc/s.

The oscillator signal is passed through C3 to the head and injected at this junction is also the recording signal applied through R4 (mentioned earlier). R4, in fact, is the 'constant current' feed from the record output stage (the triode) to the head. Thus, the feed shown on Fig. 2 to the head carries both the recording signal and the bias signal. Note also that the monitor socket now receives the recording signal through C1.

It is interesting to observe that if there were any radical trouble in the pentode section of Fig. 2 as a whole, the hf oscillator as well as the playback output stage would be inactive. This would lead to a recording devoid of bias. A badly distorted recording would thus be produced, a check of this being possible by replaying a tape recorded on the defective machine on a different machine whose playback channel is working correctly.

Such a proof would signify pretty conclusively that the playback/oscillator system as a whole was faulty. The opening symptom of this article (no playback) would then be accompanied by the added symptoms of severe recording distortion and failure of the erase system. This would lead to a recording devoid of bias. A badly distorted recording would thus be produced, a check of this being possible by replaying a tape recorded on the defective machine on a different machine whose playback channel is working correctly.

Such a proof would signify pretty conclusively that the playback/oscillator system as a whole was faulty. The opening symptom of this article (no playback) would then be accompanied by the added symptoms of severe recording distortion and failure of the erase system. We have not yet dealt with this composite effect in any detail, but it is to be the subject of a later article in this series. It was necessary to bring it up at this time owing to its direct relationship with the output/oscillator section of the simple type of recorder.

Thus, to recapitulate, we can be sure that a machine which fails to playback and yet which records successfully, and which has a playback output valve that doubles as the bias/erase oscillator, has trouble either in its switching circuits or internal speaker arrangements, including the speaker transformer itself.

continued on page 36

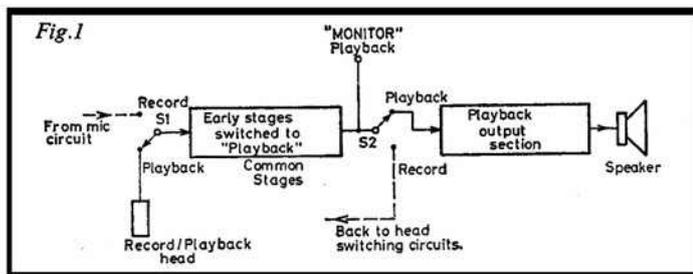


Fig. 1. Block diagram of playback circuit, showing vulnerable change-over switches.

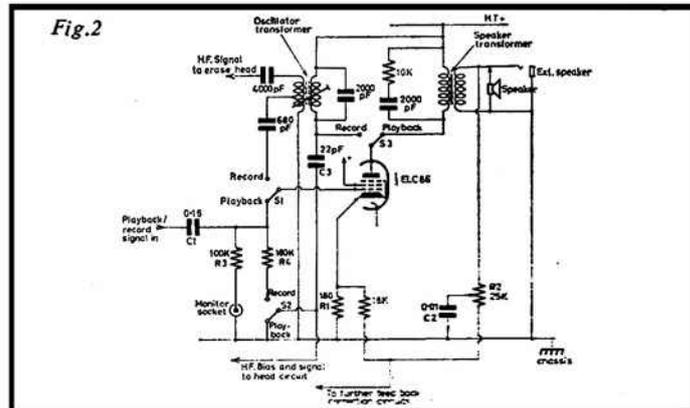


Fig. 2.

Fig. 2. The playback output stage/bias-erase oscillator belonging to the Elizabethan Auto 2 and 4.

THE PROFESSIONALS

This series would not be complete without film, radio and television commentator Bob Danvers-Walker, whose recording assignments have taken him to every part of the world. Bob has already related many of his adventures with tape in his contributions to 'ATR'

Few people in broadcasting can equal such a fantastic record or match the world-wide experience in the profession as Bob Danvers-Walker, who can look back on forty years in radio, over ten in television and twenty-six as the Pathé newsreel commentator. The newsreel clips used in ITV's present series *All Our Yesterdays* were voiced by this veteran of the microphone. I asked Bob how he feels when he hears his own voice coming back to him twenty-five years later. 'The style of presentation, the obvious propaganda injected into the commentaries to help boost national morale, the corny humour, the limited library of pit-orchestra-type backing music used over and over again may make me squirm a bit now,' he said, 'but the new generation seems to love it and my own age group almost wallow in nostalgia. The pitch of my voice is a little higher because of the slight variation between recording speeds for cinema and television projection, but compare it with today's tracks and there is very little difference. Newsreels then (there were five) were the only motion pictures one could have of the news and people purposely went to the cinemas (bombing permitting) to see them.' But let's look even further back into the professional life of BDW. It all started in the

mid-20s in Australia when he became an announcer on the 'wireless' at the Melbourne commercial radio station 3DB. Within a matter of months he was working with the Australian broadcasting company and was later appointed talks manager and announcer for stations 3LO and 3AR Melbourne. This led the way to outside broadcasts and he made the first air-to-ground broadcast in Australia, interviewed a diver submerged in Port Philip Bay, gave a commentary from the cow-catcher of a railway engine, described a hunt for a man-eating shark and took a microphone into the Chinese quarter of the city. All this was long before any form of programme recording was being used in radio.

His favourite assignments were and still are those which involve travel and adventure. By 1932 he had left Australia to become chief announcer for the International Broadcasting Company and to pioneer the first commercial radio in Europe for British listeners. He established and presented programmes from Radio Normandy (Fécamp), Radio Toulouse, Poste Parisien (Paris), Radio Ljubljana (Yugoslavia), Radio Lyons, Union Radio Madrid (and on short wave over EAQ Madrid), San Sebastian, Barcelona and Valencia. 'Then,' he told me, 'Hitler started messing

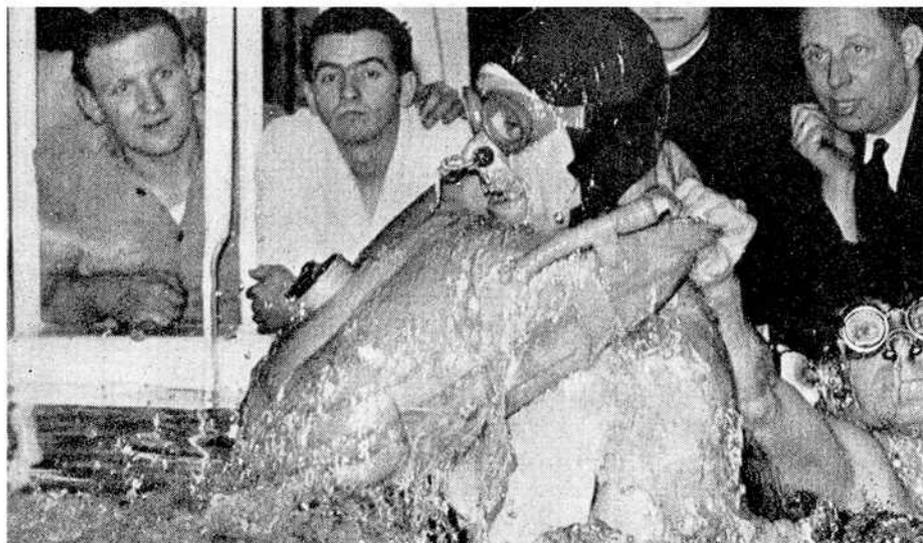


about with Europe.' Almost overnight Radio Normandy became Radio International, transmitting troop entertainment interspersed with propaganda and operating under the French Ministry of Information. The anti-Dr Goebbels broadcasts made by Bob earned him a place on the Gestapo black list for eventual liquidation! Bob became a war correspondent and joined Pathé, soon to be appointed wartime editor and commentator.

In September 1955 he was invited to be guest announcer to open London's first commercial television weekend service. For six weeks he presented the Saturday and Sunday transmissions from his announcer's cubicle in the basement of Foley Street. The same year he contracted with BBC-TV to engage in the most daring operations ever undertaken by any commentator for television. Among these were the death-defying assignments which first appeared in the *Saturday Night Out* series when he walked behind a professional high wire walker on to the roof of the Earls Court Exhibition building and became a human target for a circus knife thrower! In these and many other stunts he gave a running commentary, frequently using an ultra-short-wave radio microphone.

This led to the development of what he calls the 'participating commentator technique' - participation in an operation, describing the sensations by personal experience rather than by commenting to a TV monitor screen. Among these events were a Royal Marine commando exercise at the training ground at Jennycliff, a trip at sea aboard a fishing trawler in the North Sea in the depths of winter, to the most demanding operation of all - a submarine escape. This involved a crash training course for the *free ascent* method employed by submariners of the Royal Navy. The very spectacular television programme showed Bob emerging from the escape chamber of a submarine and ascending from a depth of 100 ft without breathing apparatus. An Air Sea rescue operation from a helicopter also came into this dramatic series called *Now*, which was actuality TV at its best.

Then followed a BBC sound programme called *Wired for Sound*, where Bob began to use his Fi-Cord portables. For instance, after being cast adrift in a dinghy in the North Sea with a Fi-Cord 202 he recorded the rescue operation as he was winched up into an RAF helicopter out of Manston. Another dangle

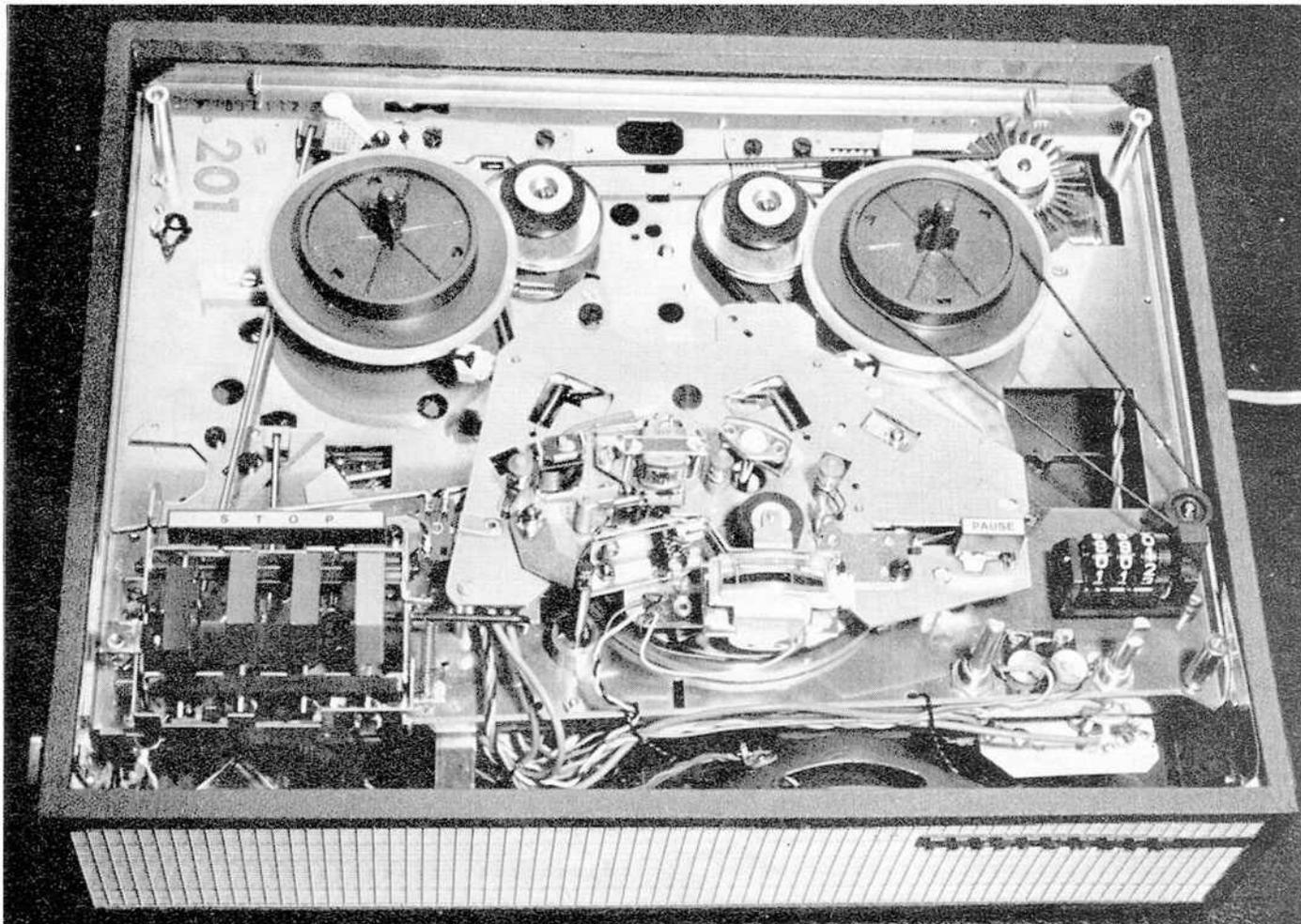
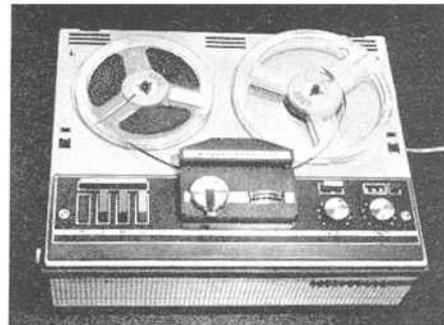


Bob undergoing a crash training course in submarine escape techniques.

continued on page 34 11

ON TEST-TELEFUNKEN MAGNETEPHONE 201

by Peter Knight



View with top plate removed, showing clean layout of deck.

The model 201 tape recorder by Telefunken is one of the 'new-generation' mains powered, all transistor, tape recorders. It is not designed for use with batteries. It is often asked: 'What is the point of an all-transistor instrument when the design is for ac mains operation only?' Well, the answer is that transistors are definitely more reliable than thermionic valves, for one thing. Another is that they run at quite low temperatures – compared with valves – which means that very compact designs are possible without all the trouble of providing the highly efficient ventilation demanded by valve equipment.

Probably the intrinsic answer is that valves are on the way out and that we are now well in the transistor era. One does not have to crystal-gaze too deeply to see that in a few years any domestic electronic equipment using valves will be archaic. In spite of what

valve lovers say, transistor circuits can be made equally as good nowadays, and better in some respects!

The 201 uses six transistors and a contact-coiled metal bridge type h.t. rectifier. It is a single-channel instrument designed for four-track operation. It is not super high quality – it does not profess to be. Nevertheless, it is capable of remarkably good reproduction, especially when coupled to a nicely enclosed external loudspeaker system.

The 201 statistics

It is a complete recorder in itself and is fitted with a reasonable-size elliptical loudspeaker. It runs at the one speed of $3\frac{3}{8}$ ips, and its dimensions are $15\frac{1}{8}$ in \times $12\frac{1}{2}$ in \times $6\frac{1}{8}$ in. It weighs about 21 lb. A handy aspect is that it accommodates reels up to 7 in diameter. The machine is housed in a hard-plastic case

with a part-metal and part-plastic top, and there is a plastic lid that clips over the whole of the tape deck and control panel. An attractive, solid handle pivots from the side and permits easy transportation in a vertical plane. Out of use, the handle rests nicely at the front base of the housing.

Four press buttons on the top control panel operate the *record*, *fast forward wind*, *record/playback* and *fast rewind* functions. A 'stop' bar cancels these functions and returns the button or buttons to the neutral position after use. There is also a *pause* button which releases the pressure roller from the tape and capstan. This can be locked permanently on if required. The volume and tone controls are ordinary knobs, the former controlling the on/off switch and the level of the recording. A three-digit counter is coupled to the spool carriage and this can be cancelled to all

zeros by the press of a button. An easy-to-read $1\frac{1}{2}$ in recording level meter is placed almost in the centre of the control panel. It is well damped and responds to the integrated levels of the programme signal. A vividly marked red zone reveals recording levels approaching tape saturation.

The quarter-track head is switched over its two windings by a large, plated control knob close to the recording level meter. Recording is per international standard, head one being selected for the first recording, the tape then being reversed for track two; track three is obtained by selecting head two, the tape again being reversed for track four.

Heads in parallel

A third position on the head or winding selector knob is marked *P*. In this position both head windings are connected in parallel. This makes it possible to record or playback two tracks simultaneously through the one record/playback channel. It is nothing to do with stereo. One trick that can be done with this facility is, for instance, the recording of one track using, say, head number one, winding back to the start and then recording another track using head number two. By winding back to the start again and switching the head selector to position *P*, playback will now produce the two tracks simultaneously. By the use of monitoring 'phones or an ear-piece, it is possible to synchronize the second recording to that on the previously recorded track.

This is far better than ordinary superimposition in that the quality of the reproduction is better and the gain by running the two heads in parallel is not very much reduced. The second track could also be used to carry pulses to control some external equipment in synchronism with the material on the first track, a synchronous slide-change unit being a case in point. The facility would also be very useful for the direct and simultaneous translation of languages. The master language could be recorded by number one head and the translation by number two head in synchronism. The two tracks could then be played back simultaneously. There must surely be many other applications for parallel head operation.

A panel at the side of the cabinet carries three DIN sockets of the multipin variety, a socket for an external loudspeaker (4 to 5 ohms), a switch for cutting out the internal loudspeaker and a switch for altering the sensitivity voltage of the amplifier in the *record* position, allowing the use of a low-level signal source, such as a microphone, or a second recorder playback channel, radio, etc. One DIN socket is for monitor phones, or earpiece, the second for a high-level signal such as radio or pick-up, and the third for a microphone. These switches and sockets make the machine remarkably versatile for its type.

About the electronics

The first-stage transistor is a special low-noise type AC150, which is followed by three AC122s, the third of this group acting as the driver in the *playback* position and as recording amplifier in the *record* position. For playback output a pair of AC124 transistors are used in a transformer-coupled push-pull circuit which, in the *record* position, is switched to form a bias and erase oscillator. There are several interesting points in the circuit. For example, each record/playback

head is frequency compensated by a capacitor network which, in conjunction with the inductance of the winding, produces a kind of resonant circuit. A capacitor in the network is adjustable, thereby making it possible to 'trim' the playback circuit for the best overall response, particularly towards the treble end of the spectrum.

The recording signal is fed to the selected head winding through a pot-core type inductor tuned with a parallel capacitor. This, again, provides frequency compensation on playback, and the two circuits together give the machine a very good frequency range for its speed of $3\frac{3}{4}$ ips.

The microphone low-level input circuit takes in all the transistor pre-amplifiers, while for high-level applications the signal is fed direct to the base of the recording amplifier transistor (that is, the driver transistor in the *playback* position, as already mentioned). A switch selects whichever input is required.

The power supply uses a completely isolated mains transformer which forms the drive motor windings, adjustable over mains inputs of 110, 127, 220 and 240 volts ac 50 c/s (convertible to 60 c/s if required). Both mains input lines are fused, and in the off position a double-pole switch isolates the machine completely from the mains supply.

The transformer secondary feeds a selenium bridge rectifier, and this circuit is also separately fused. Mains smoothing is provided by large value electrolytic capacitors, the reservoir being 2,500 μ F and the main ht line capacitors being 1,000 μ F, 250 μ F and 50 μ F. Indeed, there is very little ripple let through from the ht supply line.

The drive motor is an induction type – the windings used as the mains transformer, as mentioned – and it is mechanically coupled to a decent size flywheel and thence to the capstan in the usual way. Wow and flutter is said to be in the order of 0.2%, which is not bad for a machine of this type, running at $3\frac{3}{4}$ ips.

Easy to service

The deck mechanics are neat and simple. Nothing highly sophisticated and it would appear quite easy to service. Indeed, from the servicing point of view – which is quite an important consideration – the recorder as a whole is a darling! The top plate over the deck and control panel can be lifted off to expose the top mechanics of the deck and some of the switching, simply by removing four corner screws and pulling off three control knobs.

The removal of three screws allows a plastic plate underneath the recorder to be lifted off, thereby exposing the mains voltage adjustment, the motor, the major mechanics of the deck and the small, printed-circuit board amplifiers. In spite of the small size of the recorder, there is plenty of room in the housing which, of course, represents another attribute of transistor circuits.

Good quality components are employed in the circuits, and it is plain to see that the usual Telefunken quality control was exercised on the machine examined. There is no doubt that a good deal of design thought has been injected into this recorder, and full marks should go to the backroom boys who assisted with its creation.

Tests proved that the machine is highly suitable for the essential market for which it was designed. It is remarkably simple to use and, apart from the parallel track function, is

a recorder of modern design minus frills.

The reproduction from its own internal speaker fails to do justice to the potential of the playback channel. The machine tested seemed to lack sparkle even with the tone control set for minimum treble cut. In excess of about 500 mW output bad resonances and mechanical rattles appeared, but such things are virtually impossible to eliminate where the speaker is so intimate with the deck mechanics and where the cabinet is of insufficient size to allow the speaker unit proper acoustic loading and isolation from the other things in the cabinet. However, by coupling even a relatively inexpensive speaker to the machine a considerable improvement in reproduction was observed. With a hi-fi speaker system coupled in the reproduction was even better, but then other shortcomings of this type of machine were highlighted.

As said at the start of this article, the machine does not profess to be super high quality. Objectively, the reproduction from the internal speaker is equivalent to that obtainable from a good quality transistor radio set with a speaker unit of equal size. With a good quality external speaker, the reproduction is below hi-fi standard but approaching that expected from a reasonable quality radio-gram.

The background noise is low, and the signal/noise ratio given in the specification – in the order of 200 times (46 dB) – was well maintained on the test machine. This is by no means dead silent, but is very quiet. The motor can be heard running, and although the level of noise seemed a little high it is by no means objectional. Maximum output on playback is a little over 2 watts, which is adequate for the internal speaker. It is possible to run the machine in conjunction with a hi-fi amplifier by picking up signals from the *radio or phone* DIN socket.

All in all, the machine comes in the category of a medium quality recorder of really up-to-date design, and represents the type of recorder that the less exacting beginner would probably choose. However, it could be used as a good 'second' machine and is well worthy of serious consideration. There is little to go wrong, and its ease of operation should appeal to a great market comprising radio and slide-to-tape dubbbers and tape-sponders. It is an ideal machine with which to learn the basic arts of tape recording.

The retail price of the Telefunken 201 is 44 gns.

MANUFACTURER'S DATA

Power supply: 110/127/220/240V ac 50 c/s (convertible to 60 c/s), 25 watts

Tape speed: $3\frac{3}{4}$ ips.

Wow and flutter: $\pm 0.2\%$

Spool diameter: Maximum 7 in

Amplifier frequency Range: 60 to 13,000 c/s

Tracks: Four – International standard

Tape end stop: With metal foil

Maximum output: 2.5 watts

Programme inputs: Microphone, radio/pick-up

Counter: Three-digit type, press button to zero

Signal/noise ratio: 46 dB

Programme outputs: Radio, magnetic 'phones, speaker.

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-with cardioid or
 omni-directional
 characteristics
**AT THE CLICK
 OF A SWITCH!**

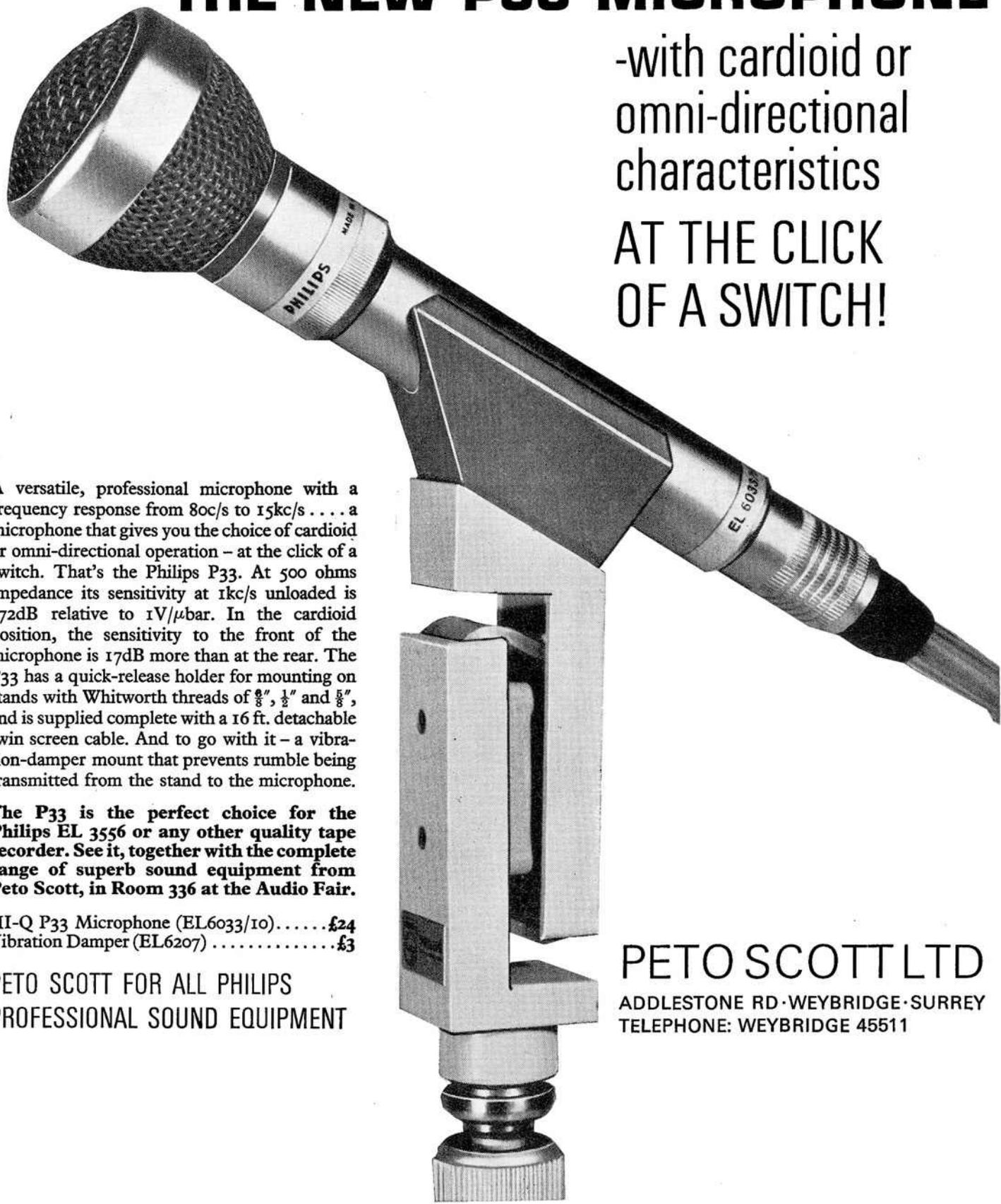
A versatile, professional microphone with a frequency response from 80c/s to 15kc/s a microphone that gives you the choice of cardioid or omni-directional operation - at the click of a switch. That's the Philips P33. At 500 ohms impedance its sensitivity at 1kc/s unloaded is -72dB relative to 1V/ μ bar. In the cardioid position, the sensitivity to the front of the microphone is 17dB more than at the rear. The P33 has a quick-release holder for mounting on stands with Whitworth threads of $\frac{3}{8}$ ", $\frac{1}{2}$ " and $\frac{5}{8}$ ", and is supplied complete with a 16 ft. detachable twin screen cable. And to go with it - a vibration-damper mount that prevents rumble being transmitted from the stand to the microphone.

The P33 is the perfect choice for the Philips EL 3556 or any other quality tape recorder. See it, together with the complete range of superb sound equipment from Peto Scott, in Room 336 at the Audio Fair.

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TAPE REVIEWS

by Russ Allen

Organ . . . jazz . . . ballad . . . symphonic . . . some of the latest tape releases

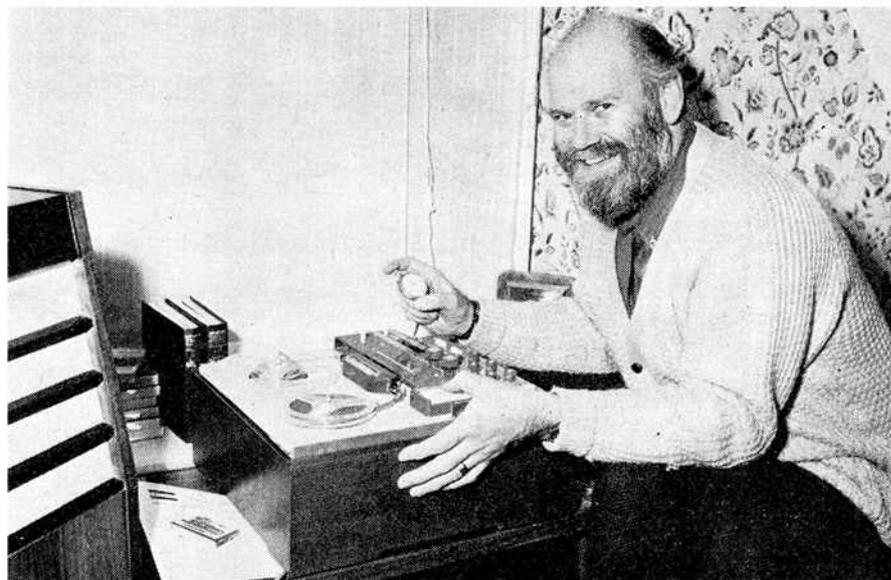
The Majesty of the Luneberg Organ played by Professor Michael Schneider. Johann Sebastian Bach's works for organ, *Toccata and Fugue in D minor, Toccata and Fugue in F major, Toccata and Fugue in C major*. Audio Spectrum AST-303. Four-track Stereo, 7½ ips.

These are very fine performances and appropriately played on an organ with which Bach himself was familiar. It is located in St Johannis Church, Luneberg, Germany, the small town where at one period of his life Bach was a choirboy and where it is said he commenced to write music. Henrich Niehoff, a master organ builder, constructed this Luneberg organ in 1551. Small modifications were made in 1712 and in 1850. Sleeve notes give details of the organ's specification. Naturally it has been kept in excellent order. In only one passage was there a slight discrepancy of tuning and this was in the upper registers. Otherwise it is a wonderful sounding instrument. Helped by the splendid acoustics of the church, the stereo recording is superb and is an object lesson in how an organ should sound. A truly wonderful musical treat.

George Feyer and His Piano (with rhythm accompaniment). Selections from *The King and I* and *Carousel*. Recotape 224 4 track, 3¾ ips.

This is the sort of thing that leaves me completely cold. It's pub/club background music – a man playing corny piano. Sleeve notes state that Mr Feyer started out as a classical pianist. He may have done, but something has gone wrong. He should never have changed over to playing this kind of stuff because he doesn't appear to know the idiom. He is cornily florid and the accompanying rhythm section of bass, guitar and drums don't help one bit with their dreary dullness.

There must be a market for this sort of thing, and judging by the popularity of those blokes who belted the lives out of 'NAAFI' pianos during the war this could go down well.



Nancy Wilson – Gentle is my love. Orchestra arranged and conducted by Sid Feller. Capitol TA-T2351, 2-track mono, 3¾ ips.

Miss Wilson has all the emotional impact and pathos of a Sarah Bernhardt with an oddly attractive voice that alternates between a husky whisper to a shrill pipe. She treats each song like a personal experience and here they are all emotionally connected with men. Some kind and understanding and some not so. Of one thing I am certain, Miss Wilson really cares about love and she makes it all sound very gorgeous.

Arrangements are gentle and pleasing and the choice of titles fine for romantic listening. *Who can I turn to? If love is good to me, Time after time* and some lovely tunes I hadn't heard before. Recording was fine and I loved it all.

The Best of the Modern Jazz Quartet. Stateside TA-SL 10141, 2 track mono, 3¾ ips.

Most people will have heard of this group, as they and Dave Brubeck are the average man's idea of modern jazz. Perhaps the average man doesn't care who they are and EMI don't intend that he should find out, for, as usual, there are none of the notes from the original LP. Just in case you should buy the tape (and it's a good example of latter-day MJQ), the group consists of John Lewis piano, Milt Jackson vibraphone, Percy Heath bass, and Kenny Clarke drums. (It could be that Connie Kay plays drums on some tracks.)

As there are no clues supplied, I assume that some of these recordings are from 1953, i.e. *The Queen's Fancy, Delauney's Dilemma* and so on. In fact, the quartet's style has changed a little with the passing years. Their music is soft, gentle, often with a Bach influence. It is quite delightful, though I never find it very exciting. Tasty, easy-to-listen-to jazz and well recorded.

Holiday for percussion. *The New York Percussion Ensemble.* Arnold Goldberg, Ronald Gould, Dave Shapiro (various instruments) and Murray Solomons (bass). Recotape 4 track Stereo.

Stereo recording has brought a new approach to arranging. Musical ideas are not enough and you have to make it gimmicky, 3D wise, so that ears work like the eyes would when watching a tennis tournament. Ray Wright, who did the

arranging for this epic, has used all the available talent to the full by dubbing techniques.

Instrumentally, this is really good stuff and I'm sure that most people will find it tip-top entertainment and very interesting stereo. It's a good show piece to demonstrate the width of the stereo band to the uninitiated.

Musical content is jolly – light standards such as *Turkey in the Straw*, which starts the proceedings with string bass played with drumsticks (sort of spiccato), *Easter Parade, Sleigh Ride, Jingle Bells*, etc.

Apart from string bass, I managed to identify piano (not difficult I agree), marimba, vibraphone, xylophone, bells (tubular and strap), temple blocks, slap stick, cymbals, snare drum, bass drum, tap block, tunable tympani, glockenspiel, plus Latin American rhythm instruments and odd sounds like a siren.

Incidentally, I tried both the 3¾ and 7½ ips of this and the latter was a vast improvement.

The Sound of Wagner. Erich Leinsdorf conducting the Concert Arts Symphony Orchestra. Capitol Full Dimensional Stereo. 4 track stereo, 7½ ips.

Prelude to Act 3, Lohengrin, Overture Tannhäuser, Siegfried's Funeral Music: Götterdämmerung, Dance of the Apprentices and procession of the Mastersingers: Die Meistersinger, Ride of the Walkyries and Magic Fire Music Die Walkure.

Music in the grand manner. Wagner, born in Leipzig in 1813, lived a life dedicated to the production of his operas with frequent interruptions for a tempestuous love life. His passion for life lives on in his music. He used the orchestra to the full, writing for each instrument as they had never been before and starting a whole new era in the art of orchestration.

Erich Leinsdorf is a noted conductor of Wagnerian opera in America and his choice of moods here is to give a demonstration of both his and the composer's talents. The recording is absolutely superb with full stereo value and complete tonal coverage of the large orchestra. *Ride of the Walkyries* is to my mind one of the most exciting pieces of descriptive music ever written and as a complete contrast there is the sombre tone of *The Funeral Music from Götterdämmerung*.

A wonderful album in every respect.

ON TEST SONY-O-MATIC TC 900

by Peter Knight



This is a solid-state battery- or mains-powered medium quality machine with automatic recording level control. It comes in an easily transportable case with fold-under handle. Its dimensions are $8\frac{3}{4}$ in \times $4\frac{1}{2}$ \times $8\frac{1}{2}$ in and it weighs just under $4\frac{1}{2}$ lb, so is quite handy for those of us who require something simple, small and light. A detachable lid encloses the spools, but a transparent window allows one to be sure that the spools are rotating when switched on and, in the absence of a tape indicator, to see approximately how much tape is left on the supply spool. The photograph (above) gives an overall general impression of the machine with the lid off.

The head fitted is for half-track operation and two tape speeds are available, $3\frac{3}{4}$ ips and $1\frac{7}{8}$ ips, the latter attained by removing a screw-on bush from the capstan spindle. This bush or capstan can be kept in a holder near the head assembly during the time that the machine is operated at the higher speed.

High Marks

The machine was dismantled and examined for quality of workmanship and, having in mind the price of the model (32 guineas), it is in this respect worthy of fairly high marks. The electronics are built upon a small printed circuit board which is secured to the underneath of the tape deck. The mains transformer may seem rather small but it is adequate for the power demands of the machine and does not warm up too much even after a long period of mains running. To change the mains input voltage of the machine various connections have to be altered on the tags of the mains transformer; but once this job is done it rarely has to be repeated – only if the machine is used in a different mains voltage area.

The tape deck proper is a substantial piece of mechanism for the type of machine, the top view of which (with the top plate of the machine removed) is shown in Fig. 1. Quite a large flywheel controls the capstan and belts and friction drives operate the spools. A close-up view of the capstan and head area of the

deck is given in Fig.2.

On batteries, the machine is powered from four 1.5 volt standard flashlight cells. These are nicely accommodated in a small compartment beneath the bottom cover plate of the recorder. Four special Sony leakproof cells are supplied with the machine. When operating from the mains supply, the batteries remain in the machine and a plug-terminated mains lead is inserted into a socket labelled 'ac input' at the side of the case. This action would appear to bypass the battery circuits completely.

Circuit Absence

Your reviewer favours the possession of a circuit or service manual of a machine under attention, but unfortunately, in this instance, such literature was not available at the distributors (Debenhams Electrical & Radio Co Ltd of Gloucester). It is, of course, virtually impossible to trace a printed circuit lead by lead. So it is possible that one or two circuit novelties are not included in this review. Nevertheless, the electronics section features seven transistors of Japanese origin, and some of these are employed in the automatic recording level control circuits. There are two main control knobs, both for playback (the recording level looking after itself, of course), namely the playback volume control and a tone control. In action, the latter appears to be more of a treble-cut control, and on test this was found to be best left in the 'high tone' position. The deck is controlled by the *function selector* switch which selects rewinds, playback or record, and stop. To get the machine to record, however, a little switch on the left of the control panel has to be set forward. Provided the programme signal is applied at the correct level within the scope of the control circuits, a recording of below tape saturation, of the best signal/noise ratio and of least distortion is produced.

The automatic recording level control functions by the programme signal (which is to be recorded) producing a bias potential, the strength of which controls the gain of the record-

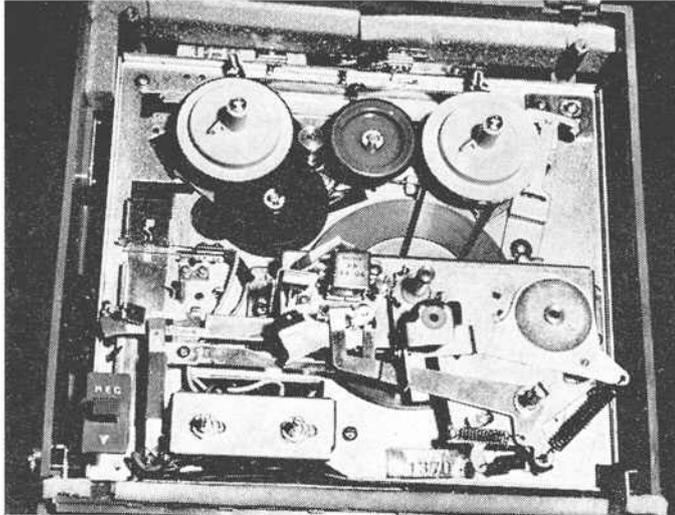


Fig.1. View of tape deck with cover removed.

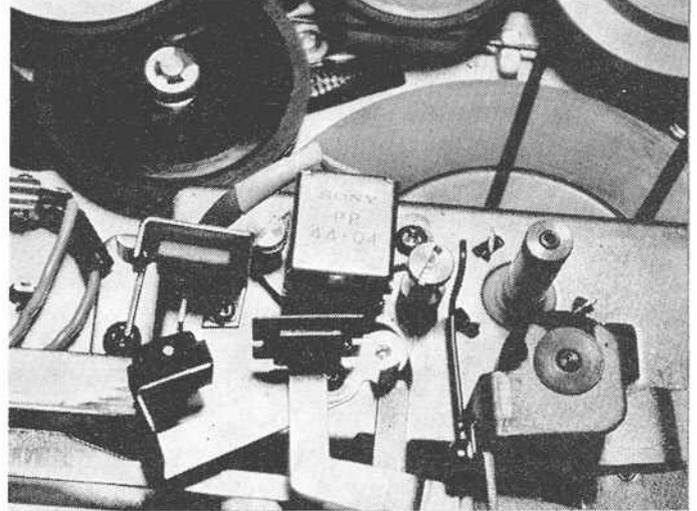


Fig.2. Close-up view of head and capstan assembly.

ing channel. The stronger the programme signal, the greater the control potential, an action that reduces the gain of the recording channel. At low signals level there is virtually no control bias produced so that the channel gain remains at maximum (or nearly so). At high signal levels the gain is pulled right back. There is always a danger with this sort of circuit of overloading the first stages, for in spite of the gain reduction control – and the gain being at very minimum – a signal of too high a level will tend to overload the first stages. Moreover, too much control potential aggravates a rise in distortion on the recording, even though this does not result from tape saturation. The microphone signal, however, cannot rise to a level that can over-ride the control circuit tolerances, and tests made over a wide range of sound pressures at the microphone supplied with this recorder revealed conclusively that the control feature is very well engineered on this machine. Severe overloading, though, could be incited by feeding a too strong signal in from the record outlet of a hi-fi amplifier. There is no manual recording level control nor any kind of recording level indicator. With the level adjusted accordingly, however, quite good quality recordings were made from the hi-fi set-up mentioned above.

There are three jack sockets on the side of the machine, one which delivers a monitor signal, another for signal input from a microphone or other signal source and the third for a remote control switch. The microphone supplied with the recorder has a dual plug arrangement that accommodates both the microphone socket and the remote control socket. A small slider type switch on the side of the microphone can thus be used to start and stop the machine as required without the need to operate the main function selector switch.

The monitor socket can feed signals into a small earpiece for monitoring the actual record signal applied to the head. The signal at this outlet can, if required, be fed to the radio or tape input of a hi-fi amplifier for improved quality playback channel – to another recorder, for example, for dubbing purposes. The

small speaker embodied in the cabinet ($2\frac{3}{4}$ in \times 4 in elliptical unit) cannot, of course, be expected, to provide very good quality reproduction. Nevertheless, the quality is well up to the standard of that obtained from one of the better quality transistor radios, but at the full 1-watt output a few disturbing resonances can sometimes be heard inside the cabinet, depending on the nature of the programme material.

The machine is ideally suited for field use, and at $3\frac{3}{4}$ ips the recording quality is reasonable, as can be proved by playing back on a high quality reproducing channel; under this condition, however, the general signal/noise performance is below that expected from more expensive machines. The TC-900 is very easy to operate and the mains powering facility is useful when using the machine at home and for dubbing exercises. One would feel that the machine would have maximum appeal to the newcomer to tape recording and, probably, to the tape collector of disc material.

The Sony-O-Matic Tc 900 costs 32 gns.

Maker's Specifications

Power requirements: dc 6 V by four 1.5 V flashlight cells, ac 110 V, 120 V, 220 V, or 240 V 50 or 60 c/s (consumption 3 W) **Tape speed:** $3\frac{3}{4}$ ips or $1\frac{7}{8}$ ips by unscrewing capstan bush. **Track:** Two-way (half track). **Spools:** Maximum 3 in. **Bias frequency:** Approximately 30 kc/s. **Input:** Microphone jack (plus remote control jack). **Output:** 1 W maximum into $2\frac{3}{4}$ in \times 4 in elliptical PM speaker or at high impedance at monitor outlet. **Recording time:** 30 minutes maximum at $3\frac{3}{4}$ ips; one hour at reduced speed. **Battery life:** 20 hours continuous recording (with batteries supplied). **Accessories supplied:** four 1.5 V cells, dynamic microphone, recording tape, empty spool, ac power supply cable

THE ATR MONO/STEREO SPEAKER SYSTEM

Designed by Gordon J. King

The exercise was to create a single speaker enclosure of moderate dimensions suitable for the reproduction of both mono *and* stereo programmes. Of course, any stereo speaker system can be made to work on a mono signal simply by connecting the two units of the stereo pair in parallel across the output of a single channel amplifier.

Usually, a stereo speaker system comprises two separate full-range speaker units and enclosures, one for the right-hand channel and the other for the left-hand channel, spaced from each other in one of the accepted ways for the best stereo effect. Each speaker system – for left and right – can be either a full-range single-unit reproducer, a bass and treble combination or a bass, middle and treble combination. Whatever arrangement is adopted, each system should be matched – one to the other – for the best performance. Each side is thus both electrically and acoustically isolated (in terms of enclosure) from the other, and each system is energized from the appropriate terminals of the stereo amplifier, as shown in *Fig.1*. For mono operation, the pair is connected as shown in *Fig.2*, ensuring that the two systems are correctly phased. A single enclosure design for stereo has been produced, but to keep the speakers sufficiently separated for a reasonable stereo effect the cabinet has to be rather long, as shown in *Fig.3*. In practice, the middle section of such a cabinet would house the electronic equipment and probably the programme source if of basically domestic design. This cannot always be accepted in the average house due to limited space.

An idea proposed by Gilbert Briggs in one of his well-known books on loudspeakers reveals that good stereo results are possible by the use of two bass speaker units in a common enclosure – one unit for each channel – and two much smaller enclosed right and left-hand treble speakers mounted appropriately either side of the bass enclosure.

Single base unit

Mr Briggs further indicates that little loss of stereo effect results from the use of just one bass speaker unit energized with signals from both the right and left-hand channels of a stereo amplifier. Such a set-up, of course, could prove useful where floor-space is none too plentiful, since the treble enclosures could easily stand on a shelf or table or hang on the wall, the bass being adequately handled by the more massive enclosure which could be in the corner of the room, for instance, with the treble enclosures either side. The general idea is shown in *Fig.4*.

It has been discovered that the stereo effect is given mostly by sounds at frequencies above about 400 c/s. Thus, the crossover network between the bass speaker handling the two channel signals and the separate treble speakers should operate at a frequency in the order of 400 c/s.

To avoid dc connection between the two channels of the stereo amplifier system, some form of isolation is desirable between the two bass circuits feeding into the bass speaker unit. The author has found that while a common dc connection between, say, two mono amplifiers arranged to form a stereo pair, does not usually affect the performance of either amplifier, such a connection between the outputs of an integrated stereo amplifier, particularly one employing transistors, can upset the negative feedback and give rise to common impedance effects. Generally speaking, therefore, the two speaker feeds should be isolated from the dc point of view even though both amplifiers eventually terminate, via the crossover filter, at the common bass speaker unit.

Stereo mixer transformer

This isolation can be achieved by the use of a 1 to 1 ratio isolating transformer of suitable frequency response and power capabilities to match the amplifier and speaker system. An ideal transformer for this purpose is the Stereo Mixer Transformer type SM1, made by Wharfedale, probably a creation of Mr Briggs, allowing the practical application of his experiments previously referred to.

Fig.5 shows how this transformer can be arranged in conjunction with a simple crossover filter system to the two treble units, one from each amplifier, and to the bass unit, from both amplifiers, while maintaining complete dc isolation between the two amplifiers. This arrangement is detailed in Mr Briggs' book and for 15 ohm speaker units the capacitors should each be 30 μ F. It will be seen that the right-hand channel feeds the right-hand treble speaker through C1 which passes treble and cuts bass and that the left-hand channel similarly feeds the left-hand treble speaker through C2. The bass speaker is fed simultaneously and direct from the left-hand channel and from the right-hand channel, via the isolating transformer. The capacitor C3 across the bass unit attenuates the treble here and allows the passage of only the bass frequencies.

Now, another method of minimizing the dimensions of the stereo reproducer makes use of the reflecting properties of the wall. Here two full-range speaker systems are placed one either side of the enclosure and arranged in conjunction with the walls of the room so that the sound is reflected towards the listener. This idea is shown in *Fig.6*, where at (a) the enclosure is located midway along

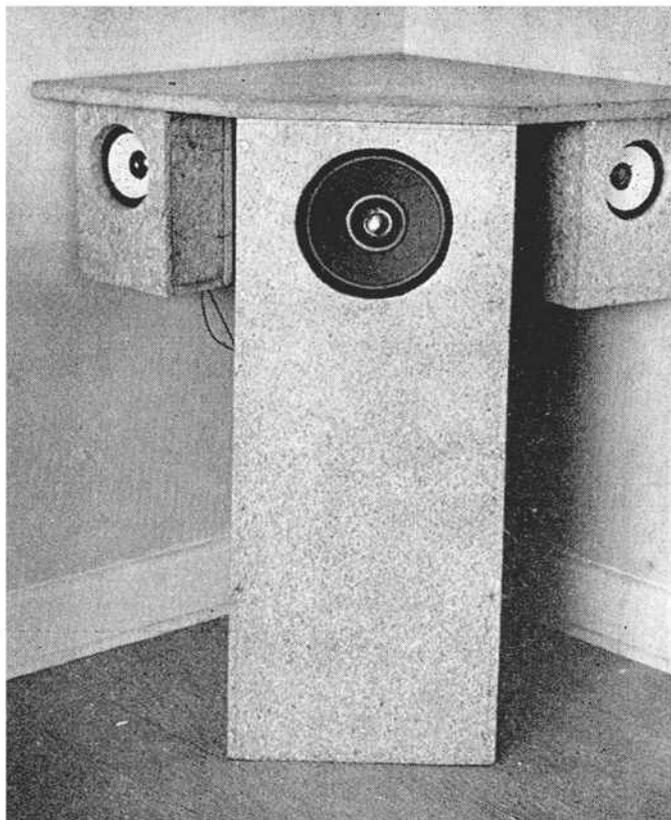


Fig.9. The enclosure in embryo state, showing the treble enclosures.

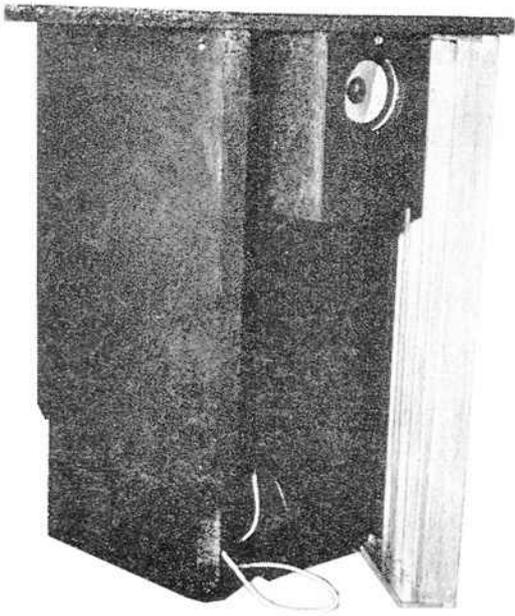


Fig. 10. Showing the fitting of one of the treble enclosures.

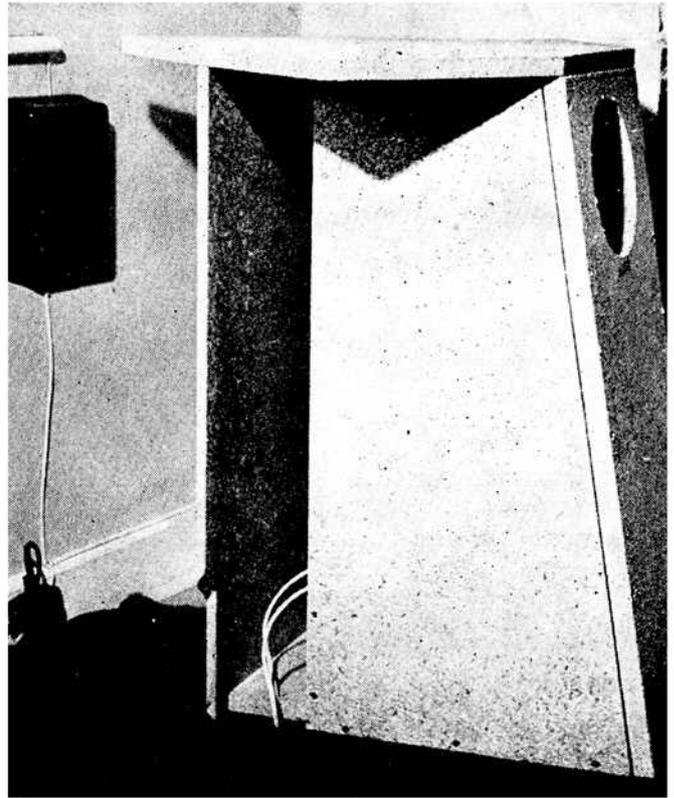


Fig. 11. Side view of the horn assembly.

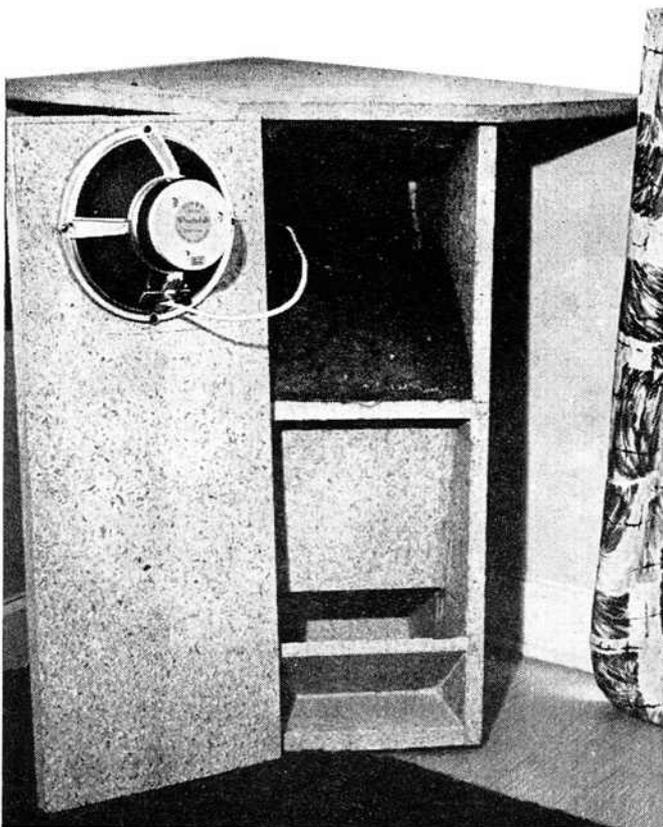


Fig. 12. Rear of horn enclosure.

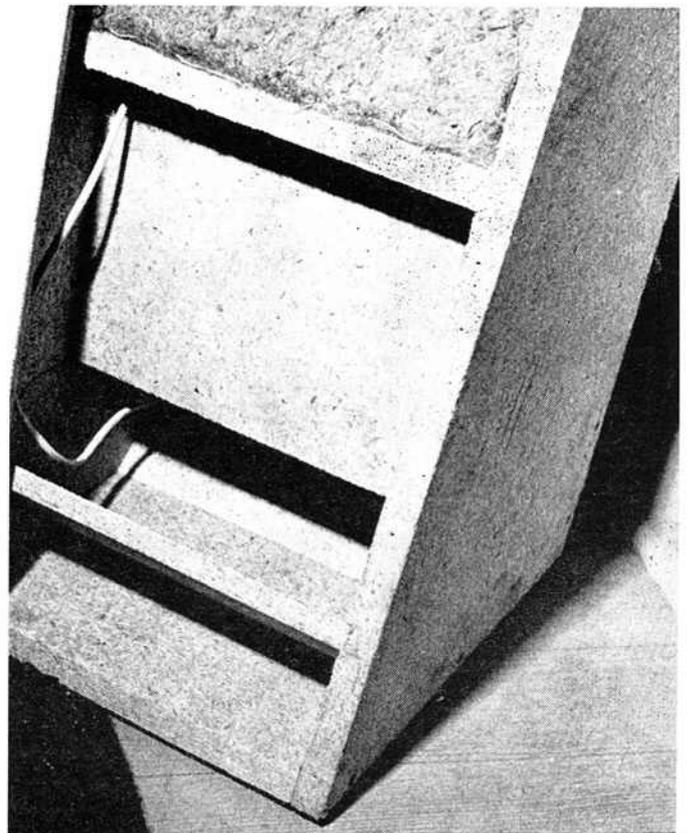


Fig. 13. Bottom of horn enclosure.

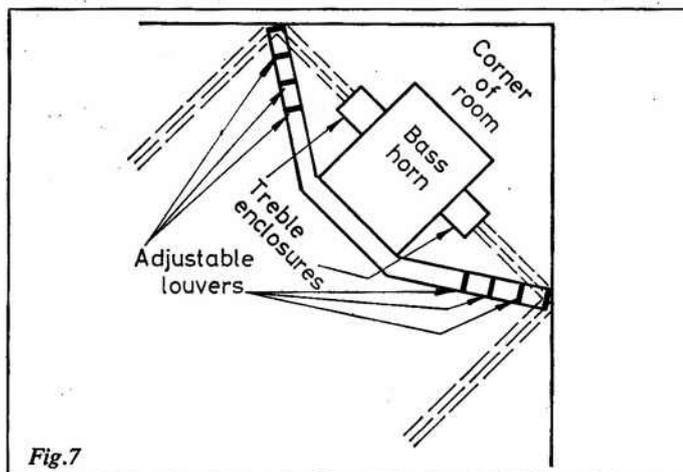
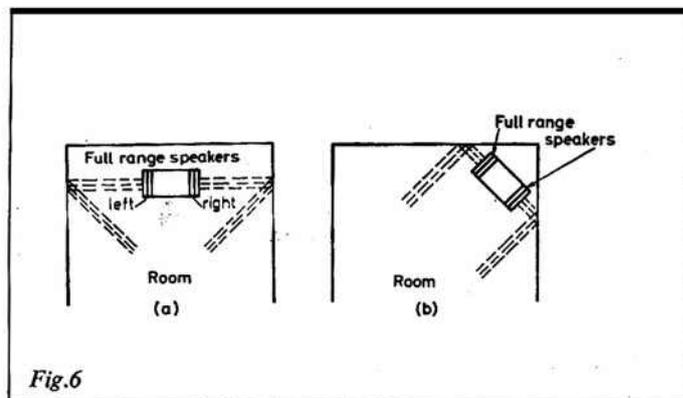
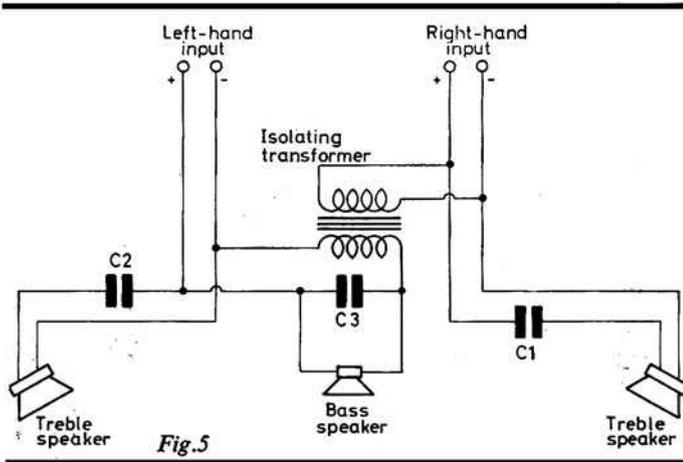
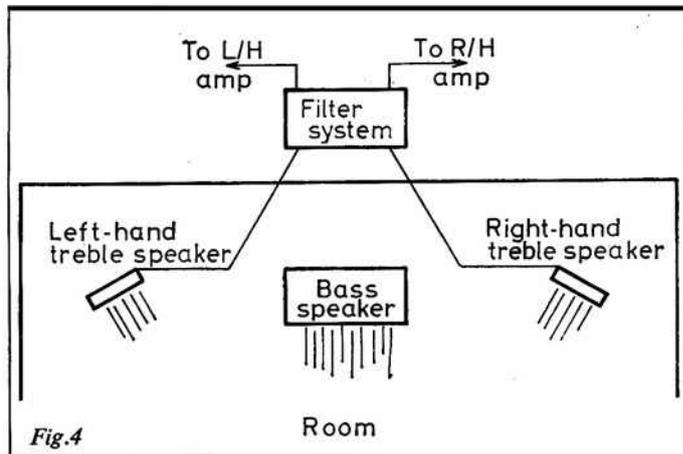
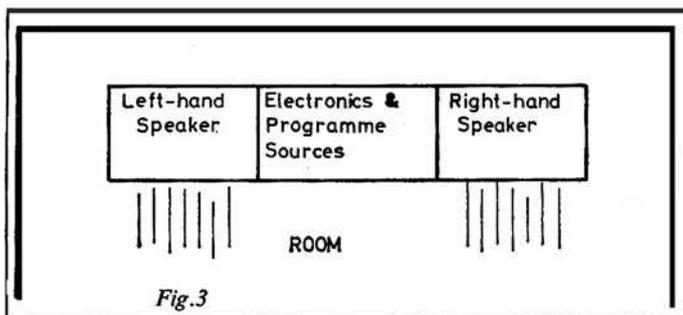
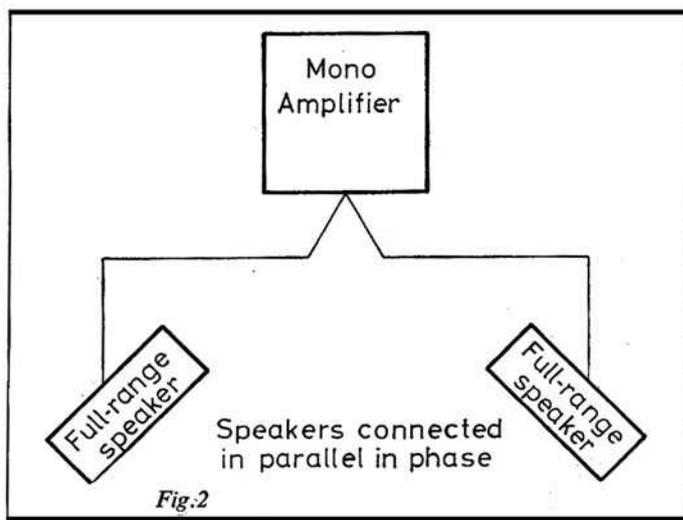
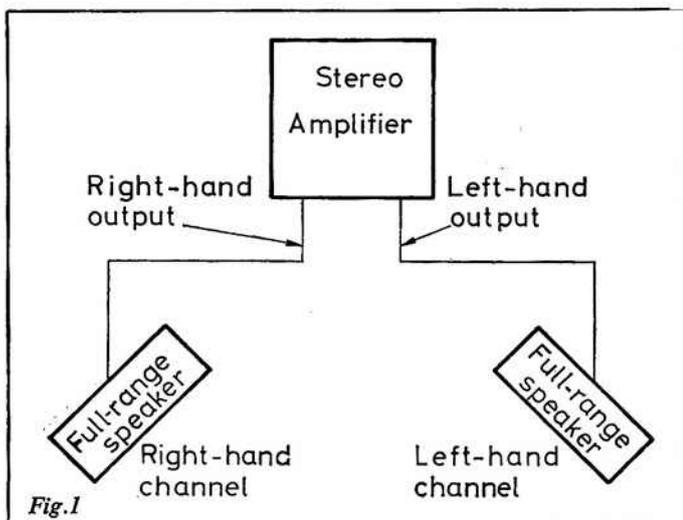


Fig. 1. Elementary stereo set-up.
 Fig. 2. Two-speaker stereo system connected to a mono amplifier.
 Fig. 3. A single cabinet stereo speaker is possible by separating the two speaker systems either side of a long enclosure, as shown.
 Fig. 4. Less space is used by a bass speaker handling both stereo channels while the treble in each channel is isolated and fed to separate treble speakers, as this diagram shows.
 Fig. 5. A simple 'stereo' crossover and filter system by Gilbert Briggs.
 Fig. 6. Space can also be saved by using an enclosure with speaker systems at each side and the walls as reflectors. (a) shows mid-wall location and (b) corner of room orientation.
 Fig. 7. The basic principles of the mono/stereo speaker system described.

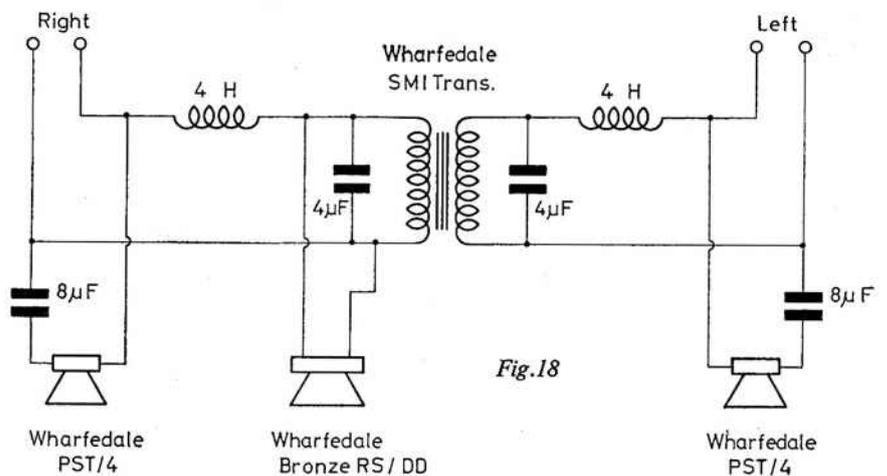
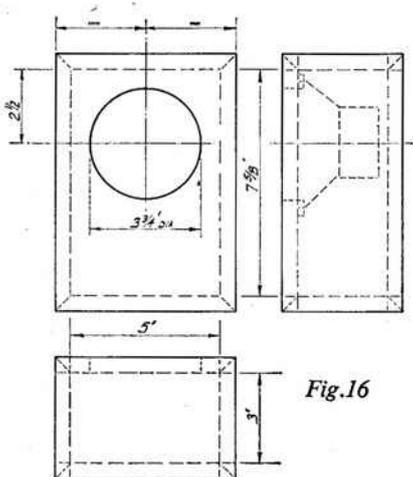
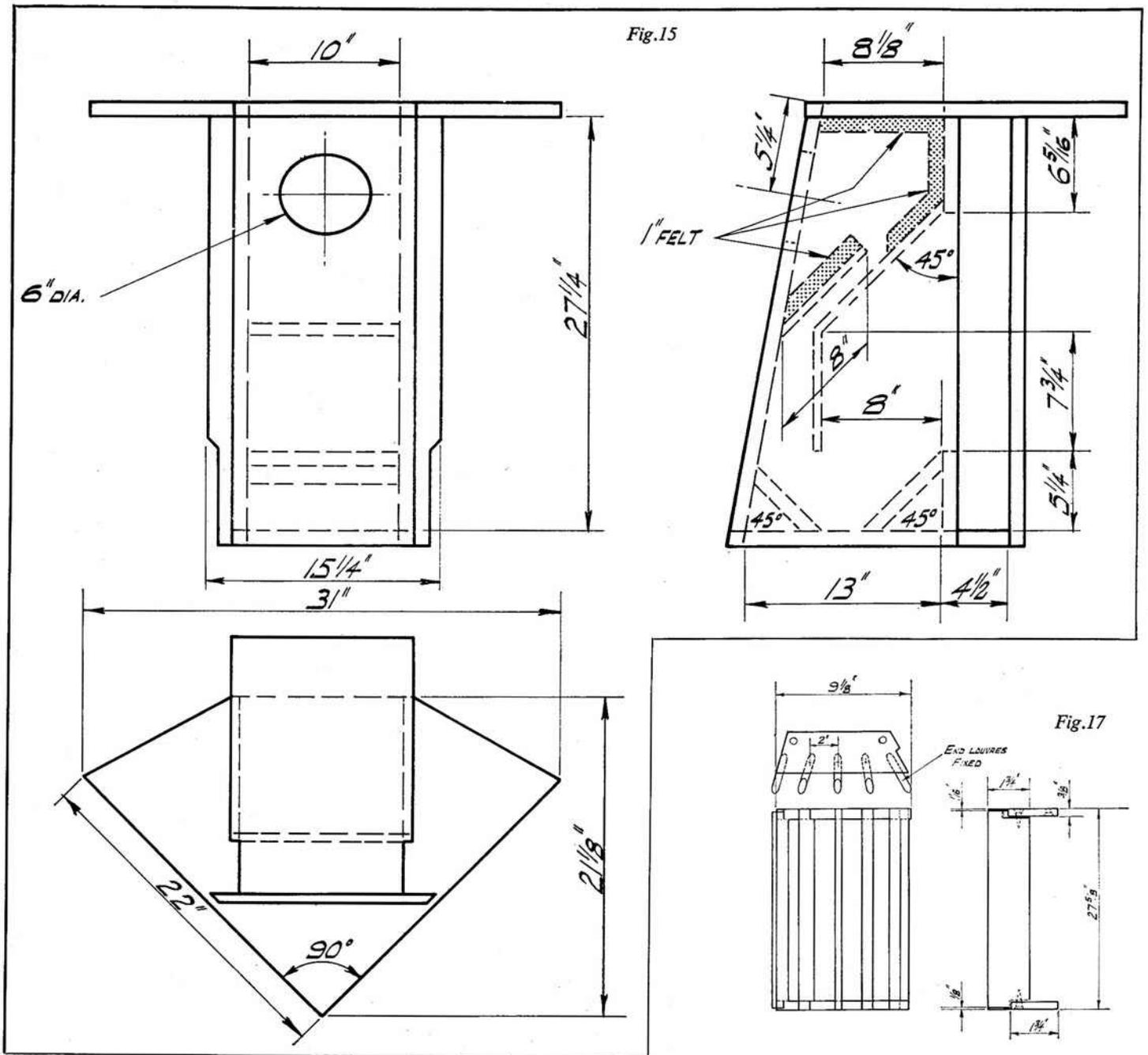


Fig. 15. Constructional details of the corner horn woodwork.
 Fig. 16. Constructional details of the treble enclosure, of which there are two.

Fig. 17. Details of the side louvers.
 Fig. 18. The isolating and crossover filter system at present in use by the author.

continued

one wall, using the adjacent side walls as reflectors and at (b) the enclosure is placed in the corner of the room, the walls at right-angles then serving as reflectors.

This set-up is in fact adopted commercially as for example in the Pye Achoic system, featured in the January 1966 issue of *Amateur Tape Recording*. Whilst the reproduction from this system is all-embracing, it would seem that if only the treble frequencies were to undergo wall reflection an improvement may result. However, this would call for a common bass speaker system looking out into the room which would detract from the merit of the Pye reproducer, for instance.

Intergrated design

Nevertheless, it is possible to utilize this system, coupled with the ideas of Mr Briggs, in the design of a mono/stereo enclosure for corner-of-the-room loading. These two features in fact are represented in the design of the speaker system now to be described. The bass speaker is loaded into a corner horn enclosure, while the two treble units are loaded into small enclosures carefully positioned either side of the walls of the horn. Thus, the corner of the room serves two purposes: it loads the bass unit down to very low frequencies and the right-angle walls reflect the treble frequencies back into the room. We therefore use the right-hand wall for the right-hand channel and the the left-hand wall for the left-hand channel.

Either side of the horn openings, formed by the walls on one side, adjustable louvres are fitted. Behind these two sets of louvres are placed the two treble enclosures so that the treble frequencies, after being reflected by the walls, can be 'guided' as required into the room to give the best sound cover and stereo effect. The technique is illustrated in *Fig.7*. Here is shown a view of the chief elements of the system looking down from the top.

A better impression can be gleaned by now looking at the picture of the completed speaker system in *Fig.8*. This clearly shows the

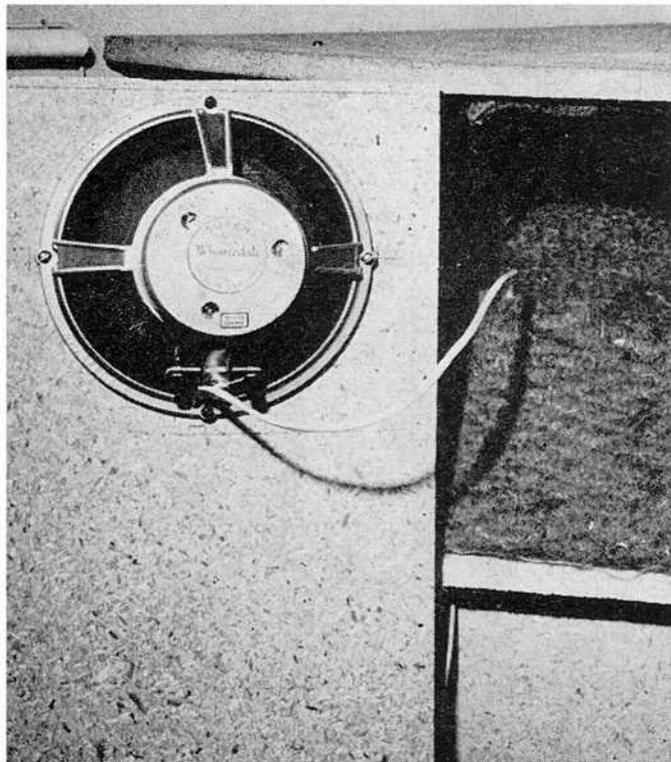


Fig.14. Padded inside of the horn mouth and the bass speaker unit, the rear of which fits into the mouth.



Fig.8. This is how your completed loudspeaker system should look.

middle horn part of the cabinet and the openings either side enclosed by the louvres, behind which are the treble enclosures.

Fig.9 shows the enclosure in embryo state, with the treble satellite enclosures either side of the horn assembly. These satellite units were purposely displaced in angle so that the picture would reveal the cones of the treble units. In practice, of course, the axes of the cones are arranged to be at right-angles to the side walls of the horn. To assist the constructor, a series of photographs detailing the construction are given. Fig.10 shows one treble enclosure containing a unit properly fitted adjacent to the horn wall. The side of the horn assembly is shown in Fig.11, the rear and bottom of the horn enclosure are shown in Figs.12 and 13 respectively and Fig.14 shows the padded inside of the horn mouth and bass speaker unit. Full constructional details of the major part of the system are given in Fig.15. This is the bass corner horn assembly with a cut-out to accommodate the Wharfedale 8 in Bronze RS/DD speaker unit, which was found to work remarkably well in the system in spite of the material surrounding the cone. It is likely that there is a little leakage in the surround but this is small since the material used is neoprene. Speaker units employing cloth or foam surrounds are probably less likely to load into a horn enclosure. The material used for the woodwork is $\frac{3}{4}$ in Weyrock, and the only piece that needs to be faced is that used for the top of the cabinet which will probably eventually be polished.

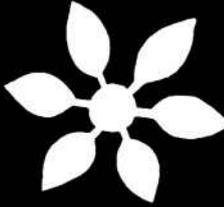
The treble enclosure shown in Fig.16 is designed to take the Wharfedale PST/4 HF Unit which has a cloth suspension and which has been found to perform very well indeed in the system. The material here is $\frac{1}{2}$ in Weyrock. There are two of these of course and they are best lined with felt. Details of the louvres and their fixing are given in Fig.17. Any reasonable quality wood can be employed, bearing in mind that polishing will probably be necessary. The main front wall of the horn carrying the bass unit can be nicely finished with a Tygan covering as Fig.8 shows.

The overall area of the horn mouth is approximately $4\frac{1}{2}$ sq ft, taking into account both openings. The horn has an overall length of about 55 in. The throat has an area of about 10 sq in, while the volume of the loading chamber (that directly following the rear of the bass speaker unit) is of the order of 700 cubic inches.

Quite good reproduction down to about 40 c/s is possible and the treble response is directly governed by the treble units employed. In spite of the treble enclosures being placed in the horn mouths, there is no sign at all of intermodulation effects and remarkably good stereo performance is obtained once the angle of the louvres has been established to suit the room. The author experimented with various crossover networks and one a little more elaborate than that shown in Fig.5 is at present being employed. This is shown in Fig.18. The various inductors and capacitors are readily available from Rank Wharfedale Ltd. It is however, well worth while experimenting with various combinations, as the requirements with regard to crossover frequency and power fed to the treble units are somewhat influenced by the type of amplifier used and the acoustic nature of the listening room.

The filter can be built up on a small wood base and fitted away behind the back wall of the horn, well out of sight. This method of construction makes it easy to change filter configuration and component values. When the speaker is used on a mono (single channel) amplifier, the left and right connecting leads are simply connected in parallel across the output terminals as shown in Fig.2 but with stereo correct phasing is much more important than when two separate speaker systems are employed. Incorrect phasing in fact results in a complete loss of bass and a startling reduction in acoustic power from the speaker system. This of course would be expected due to the almost perfect low frequency cancellation in the isolating transformer.

In conclusion, the author wishes to register thanks to Kenneth Summersford, formerly Chief Engineer of Transistor Devices Ltd, Brixham, Devon, for his help in producing the cabinet to a high standard of workmanship and for the engineering drawings of the cabinet construction. Thanks are also due to Gilbert Briggs for his encouragement while the system was being developed and for his assistance with regard to loudspeaker units for development of the prototype.



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Aluminium voice coil

Weight $1\frac{1}{2}$ lb £3 12 11



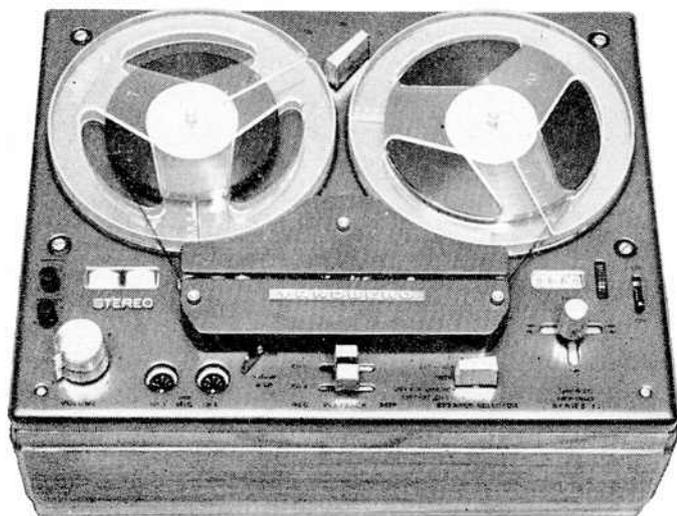
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To: The Tape Directory, ATR, Haymarket Press Ltd,
9 Harrow Road, London W2.

I would like you to include the following particulars in the Tape Directory, and agree to acknowledge all replies I receive in response to my entry. (USE BLOCK LETTERS)

Name

Age..... Occupation.....

Address

Special interests.....

Tastes in music

Tape recorder used

Maximum spool size.....Speeds.....

Countries you wish to contact.....

THE THINGS YOU SAY

Each month the writers of the most interesting letters selected from our post bag and published on this page will receive a useful accessory to tape recording. The awards this month are pre-recorded music tapes, one to each of those whose letters are published below. Letters for this page should be addressed to *Things You Say*, ATR, 9 Harrow Road, London W2. (Letters containing general technical queries, etc, should be addressed separately to the Editor. These do not, of course, qualify for prizes.)

Good Service

I have recently had a very comprehensive service done to my Ferrograph 4224 recorder. The service was carried out by the makers, Ferrograph, and was executed in the most efficient and friendly manner. The cost was most reasonable and attention prompt.

When we hear of so many complaints these days, isn't it a pleasure to purchase a first-class recorder and later (after much use) experience such first-class servicing?

Montrose, Angus

Bill Paton

Not So Good

I have a Philips portable tape recorder which I purchased in June 1965. The operation of this machine has never been too satisfactory and on 17 January 1966 I wrote to Philips asking for their assistance. A reply was received from Amalgamated Electric Services Ltd on 24 January explaining that I must return my recorder to a local appointed dealer and the names and addresses of these were given in their letter.

The first dealer I visited explained that he really knew very little about the workings of Philips recorders and always took repairs to a 'local chap down the road'. The second dealer was more helpful and offered to return the recorder to AES. This, of course, I could have done myself. However, the dealer, I understand, returned the machine on 8 February.

Having had no further news, I telephoned the dealer on 25 February and he promised to write to AES. Still hearing nothing, I myself telephoned AES at Croydon on 3 March, only to be told by an efficient but unhelpful young lady that it was impossible to attempt to trace my recorder unless I 'phoned them back with the serial and type numbers'. I explained all the past correspondence and told her the name and address of the dealer, which she said was of no help since they had *thousands* of recorders returned from this dealer. (I wondered at the time if this was a good sales point!)

Having turned up the appropriate numbers, I telephoned AES again within about half an hour and spoke to another young lady. Armed with these magic numbers, their system appeared to spring into action and she returned quickly to the telephone to tell me that my recorder had been traced to their depot in *Hamilton, Scotland*, where it had been sent on 15 February. She said perhaps they could urge its return. In sheer frustration I replaced the receiver.

I read with envy accounts from readers of excellent after-sales service from various manufacturers, and wonder if I could have made a better choice.

Datchet, Bucks

C. J. Street

Another Australian looks at British Tape-spondents

Having just finished reading the January 1966 issue of your magazine, I would like to add my

comments and support to the letter published and written by a countryman of mine, Mr R. H. Wilson. Some three or four years ago I had the misfortune to have my name listed in your *Tape Directory* and was subsequently besieged with letters from would-be tapespondents from a number of countries but mainly from the UK, promising all manner of delights should I care to tapepond with them and, I might add, in all cases asking for me to send the first tape. I selected two likely gentlemen (?) one from Birmingham and the other from Glasgow and whilst I shall spare them the obvious humility of including their full names and other details, I do hope they read this magazine and letter and suffer pangs of conscience if they are at all capable of this phenomena.

The person in Birmingham has kept my last tape, 1,800 ft on a Ferrograph metal reel (not a bad catch), and the canny Scot has some 1,200 ft on a 7 in plastic reel and I can assure both your readers and aspiring tapespondents that I have made my last gift of tape to the UK

and shall warn others of the dangers involved in sending tapes to Britain.

My tapespondents in the United States are all models of propriety when it comes to the acknowledgment and return of tapes, and if for any reason they wish to keep a tape because of interesting content, they will always replace it with a like amount of the same kind and quality after asking permission to do so, usually by air mail.

I would suggest to you that British tapespondents are in my experience wholly unreliable and dishonest and to say that the Union Jack is flying is the mis-statement of the year; in my humble opinion, it is apparently flying upside down.

Mona Vale, NSW,

Kenneth F. Williams

Editor's Note: In view of Mr Williams' unfortunate experience we are sending him two 7 in spools of BASF tape to replace those *stolen* by, we are sorry to say, dishonest ATR readers.

SOUND EFFECTS RECORDS Now available from Amateur Tape Recording

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S.S. Queen Mary siren Factory siren Telephone bell Door bell
Side 2—Clock chime Alarm clock Westminster chime Bow bells

B AFX/1—WILD ANIMALS Price 7/6

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

C BGX/1—BACKGROUND SOUND EFFECTS Price 7/6

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

D EFX/1—ELECTRONIC SOUNDS AND MUSIC Price 7/6

Side 1—Space ship—take off Space vehicle—imaginary take-off
Space vehicle—imaginary landing Ring modulation—tonal modulated tone glide (descending) Modulated tone glide (ascending)
Sibilation—white noise (pitch octave low)
Side 2—Sibilation—white noise (pitch) Sibilation—white noise (pitch octave high) Three-tone modulation Filtered tone Stridor (tonal) Ring modulation and sibilation

E EFX/2—ELECTRONIC THEMES AND MUSIC CONCRETE Price 7/6

Side 1—Delta F Study in Sinetones
Side 2—Sound object Montage

F HMX/1—HAUNTED HOUSE, MYSTERY SOUNDS AND MUSIC Price 7/6

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

G MFX/1—AUTHENTIC HIGH-FIDELITY SOUND EFFECTS Price 7/6

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

H MFX/2—AUTHENTIC HIGH-FIDELITY SOUND EFFECTS Price 7/6

Side 1—American police car with siren—arriving American police car with siren—departing American police car escort with sirens—passing American police motor-cycle patrol with siren—stopping Applause (hand clapping) Orchestra tuning up Car crash Glass breaking (repeat)

Side 2—City and Waterloo tube train—arriving City and Waterloo tube train—departing Footsteps (continuous track) In subway (mixed) In narrow streets (female) On pavement (mixed) Running in street (female) Running in street (male) Up and down (wooden stairs) Workmen hammering and sawing

I MPX/1—MILITARY PARADE AND WARFARE SOUNDS Price 7/6

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

J TFX/1—AUTHENTIC BRITISH TRAIN SOUNDS Price 7/6

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

K MFX/3—HORSES Price 7/6

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

L LFX/1—SOUNDS OF LONDON Price 7/6

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New BSR record player (Fig.1)

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One of these features is the calibrated stylus pressure control which ensures accurate low pressure tracking. The correct stylus pressure, depending on the type of stylus fitted, is set by turning the stylus pressure control, marked in grammes, to the prescribed figure. The finely stepped detent operated by the pressure control ensures precise location. The low mass precision pick-up is of lightweight tubular aluminium and is counterbalanced both vertically and laterally. A coarse and fine counterbalance adjustment facilitates balancing of the arm which is supported on horizontal ball bearing pivots making vertical friction virtually non-existent.

An interesting feature of the pick-up mechanism is the type of automatic lock, again exclusive to the UA70, which secures the arm to its rest after a record has been played - or after the last record has been played when the instrument is being operated automatically. The lightweight cartridge shell will accommodate all types of mono and stereo cartridges.

The 11 in diameter deep-rim turntable is driven from a dynamically balanced four-pole motor located on butyl rubber mountings which prevents mechanical vibration affecting the reproduction of the recording. Other features include interchangeable centre spindles for manual or automatic play, automatic disengagement of the idler wheel when the unit is shut off, four speeds, with manual selection of 7, 10, or 12 in diameter records and simple to operate, conveniently placed linear controls.

Philips microphone kit (Figs.2 and 3)

Now distributed by Peto Scott Ltd, this kit of parts, from which one can build the Philips EL7500 microphone, is sold at 7 guineas. The finished microphone is omnidirectional and can be mounted on a desk stand or used with a neck sling, etc. Further details from your dealer or Peto Scott Ltd, Weybridge, Surrey.

Fig.1



Fig.2



Fig.3

Hi-Fi Cabinet '66 Style

The Schubert Equipment Cabinet by Record Housing has been re-styled with a one-piece lid and pneumatic lid stay. The two upper sections each measure 19 in wide \times 18 $\frac{1}{2}$ in deep \times 10 in high and will each take a complete tape recorder in its case (eg, Ferrograph) or largest turntable and pick-up, either transcription or autochange. The lower left section measures 19 in wide by 13 in high (control panel is removable with an interior depth of 18 in). Thus it will house the largest tuners and amplifiers, eg, Leak and Quad stereo or Armstrong. The lower right section is partitioned off for 150 records or tapes or general storage. It measures 19 in wide by 13 in high. Overall size: 42 in long by 21 in deep by 25 in high plus 5 $\frac{1}{2}$ in legs. Available in teak, walnut or mahogany as shown in Fig.4.

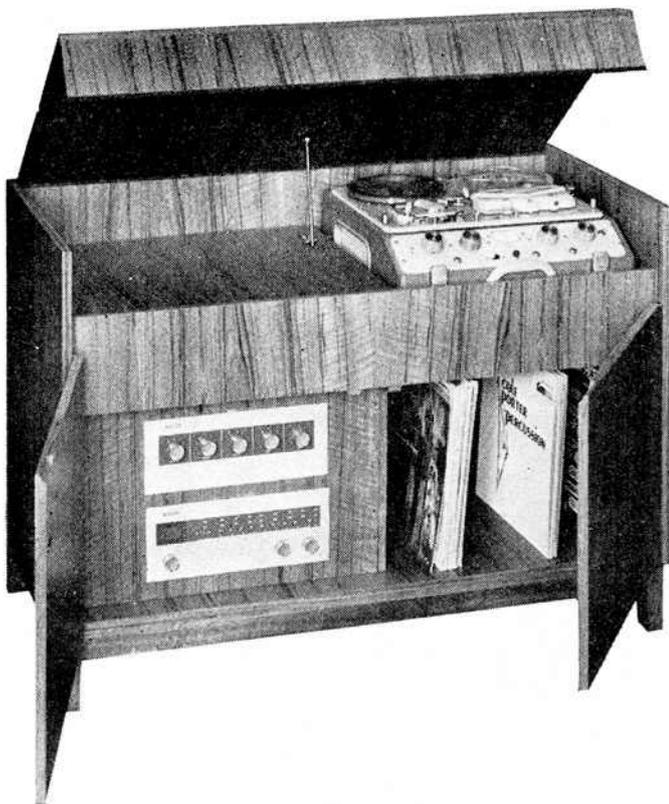


Fig.4

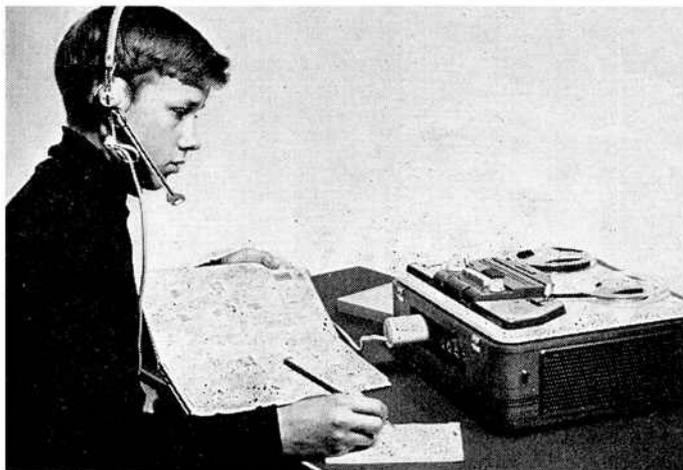


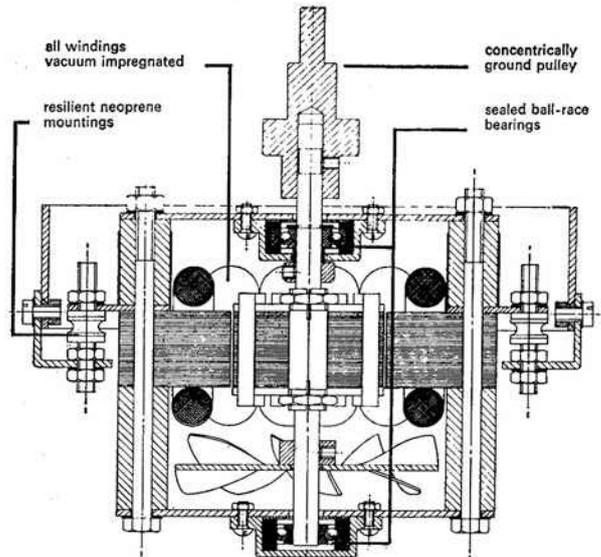
Fig.5

Mini-Lab Language Laboratory (Fig.5)

A new monaural hi-fi tape recorder has just been released by Luxor for distribution in the UK through Britimpex Ltd. The M283 (59½ gns) can be equipped as the Mini-Lab language laboratory as an optional extra, consisting of earphones, microphones and amplifier. For group teaching, facilities are offered for connecting up to five distribution boxes to the tape recorder, and each box has listening facilities via earphones for up to six pupils so that up to thirty pupils per tape recorder can participate in the language course simultaneously.

Another Cassette Tape Recorder

The cassettes used in this machine conform to the dc System International and can therefore be used in other recorders employing this system. The new recorder is known as the Magnetophon 401 and is a half-track machine for monaural recording and playback. The cassettes at present available provide playing times of 2 x 45 minutes or 2 x 60 minutes. The frequency range is 40-10,000 cps and the signal to noise ratio equal to or better than 45 dB. The motor used was developed and manufactured by AEG and is electronically speed governed with no brushes or commutator. The M401 is supplied complete with moving coil microphone, audio lead, and one DC90 (playing time 90 minutes) tape cassette. The price is 46 guineas.



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DEVIL'S KITCHEN

by Wilfred Duffy

It couldn't be true!

He'd dreamed of it often but to have happened to him, Joe Sproggit. He'd fought shy of entering the contest until this year then it was only because the Tape Club secretary had coaxed him to try. But Joe Sproggit, *Tape of the Year!*

'Get away wi yer, yer daft brush', said his wife when he told her, 'I've been married long enough to yer to know yer couldn't win nowt!' A cloud of flour rose from her ample waistline as she slapped her hands on her checked apron. She always baked her own bread, did Maggie, in the big black oven typical of the old colliery house they'd lived in for twenty years now. Theirs was the last row standing.

'But it's here in black and white, Maggie. I've won the Tape of the Year! Do you realize what that means?'

'A practical joker no less' she threw over her shoulder as she waddled out into the scullery, leaving him with his thoughts.

Naturally he was excited, couldn't wait to tell the club members. But he was nervous too and a bit apprehensive. There'd be the time off work for one thing. What would the Coal Board say? No, he couldn't really ask for time off, not because he'd won a prize for his hobby. Never heard of anybody at the colliery doing that – they'd not wear it!

'Maggie? Do you think they'd really let me?' 'Let yer what, Joe?' She had evidently forgotten his news already. On second thoughts maybe it was just as well. She began singing her ditties at the baking board.

'Oh, nothing Maggie.' But it still bothered him. Just going back to work after three months off with the leg injury. They'd probably sack him. It was as Maggie crushed between him and the sideboard with a trayful of scones that a thought struck him that made him feel decidedly weak. 'Here, Joe, what's up with yer, yer as white as our Tim's mice?' He could just see the concern in her eyes now turning to a flush of anger when she knew. They'd be bound to play it on the radio and then there'd be the reporters and all the talking about it. She would be bound to hear it.

'Oh, nothing Maggie. Just a bit excited like. I think I'll just nip round and see Stan Dawson about the club meeting for tomorrow night.' This would make a difference to the club. Not every club can boast a *Tape of the Year* winner. The coolness of the damp misty Thursday afternoon was hardly noticeable as he walked dazedly on. It happened so sudden. Just a screeching of brakes, the vague shape of a car, a dull thud then nothing. . .

'If only someone hadn't played a practical joke on him, Mr Webb, he'd have stayed in and watched the racing on the telly!' He could recognize Maggie's voice but it was coming and going. Suddenly the name was clear. Mr Webb! The colliery manager! There was some commotion around him, but as he opened his eyes he could just see a mass of blurred raincoated forms. Then gradually they came into focus.

'Steady now, Sproggit, you've had a fair crack. Man, I couldn't help hitting you, you just stepped right in front of my car. You seemed

in a daze.' Mr Webb was kneeling at his side, so too were Maggie and Stan Dawson. He could hear the distant ringing of the ambulance bell.

'You'll be all right in a day or two Joe,' it was Stan who spoke. 'You must have had this letter in your hand and I picked it up. Couldn't help seeing the good news – that ought to take the sting out of your bruises, eh?'

'But it's a practical joke, a rotten . . .' Maggie burst into tears.

'No, Maggie, it's their official letter all right and I knew he'd a good chance to win his section. It was a great tape you both made.' In spite of his pain, Joe could have jumped up at Stan then. Maggie knew nothing about it. She never took any interest in his taping activities and, in fact, she was afraid of the microphone and her own voice.

'It's true then?' Maggie said through her tears. The ambulance men moved the crowd aside and bent over him, but he strained to hear if anymore would be said.

'True?' encouraged Stan Dawson. 'With a title like Devil's Kitchen it couldn't fail – especially with your catchy little village ditties at the baking board.'

My . . . He heard Maggie gasp in bewilderment.

The ambulance door shut with a bang, drowning out her further words, then the second one banged shut after she'd been helped in and sat by him silently. She will need the treatment for shock, he thought.



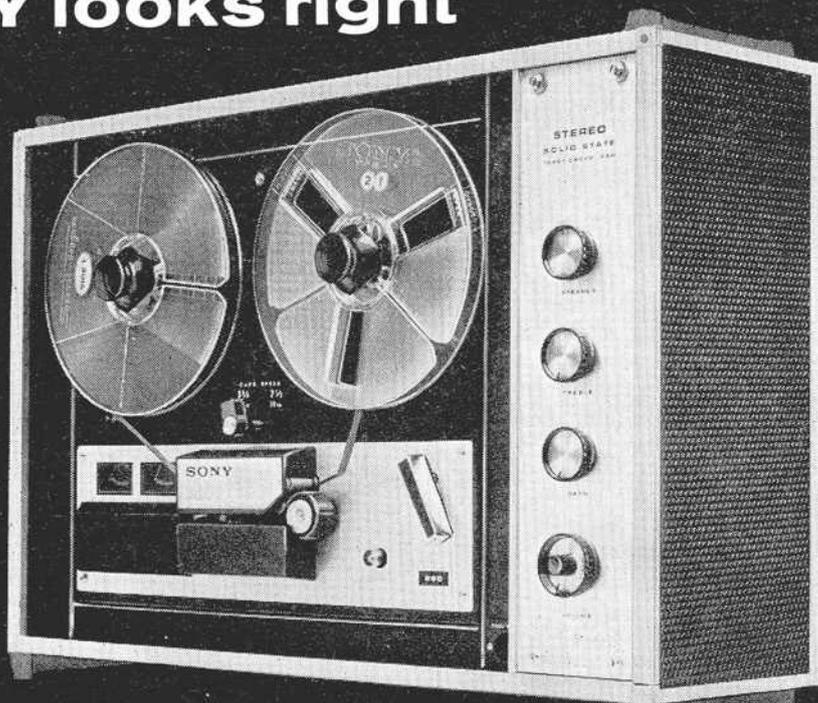
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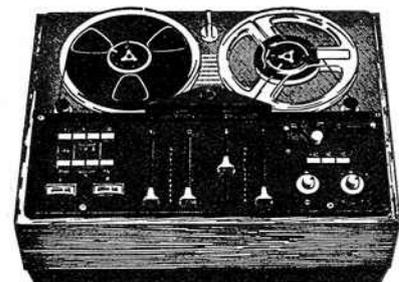
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Ferguson 3214	11	11 0	2	17 9	44
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WHAT'S TOP OF THE POPS, POP?

A review of what was new at the 1912 Audio Fair by David Lazell



Back in the days when 78 rpm records were in vogue. Phillip Ridgeway's *Young Ladies* in a BBC broadcast in 1930. (Note the huge box microphone on the right.)



30 'YES, SIR—IT GIVES AT LEAST 15% WOW AND FLUTTER!'



OF COURSE "I'M HOME FROM THE BATTLE, BERTHA" IS A HIT PARADE RECORD . . . WHY, IN 1918, IT WAS TENTH



There comes a time in every parent's life when the children begin to ask awkward questions, like 'Why do you talk posh when you make those tapes for Uncle Sid in Scunthorpe, Dad?' Or even 'Did they have a Hit Parade in your time, Dad?' Worse still, 'were records invented when you were a teenager?' The answer here is obvious - 'Records were invented, but teenagers weren't!' I was, after all, a Hit Parade addict myself once . . . just give me a reel of blank tape and I'll reel off a few verses of such lost gems as *There's a Pawnshop on the Corner of Pittsburg, Pennsylvania* (that went to number five), *Kiss of Fire*, otherwise known as *El Choclo*, and *Shrimp Boats* . . . to say nothing of *The Little White Cloud that Cried*, the song that brought Johnny Ray fame. Yes, I was the disc jockey for the local youth club in those pre-stereo and four-track days, when people still corresponded on old-time paper. That's the reason my arms are so long - I carried large, cumbersome boxes of heavy and highly breakable 78 rpm records from my home to the youth club, some two or three miles away. Younger readers of this column may wonder what a 78 rpm record is (or was). Well, a 78 rpm record looked almost the same as an LP, but the labels were often prettier with high-sounding names like *Regal Zonophone* and *Odeon Parlophone* (names not unknown today, of course) and even more important, 78 rpm records were breakable, a distinct advantage when one's younger brother returned home with a rather noisy disc which tended to produce instant migraine. Alternatively, you could make hideous ashtrays and vases out of the 78 records . . . this encouraging home handicrafts. The 78 rpm discs scratched easily, could be played at any speed from about 72 to 84 rpm so that you could speed up any bit of music that you didn't especially like (I did this very effectively at youth club dances, where the waltzes invariably ended in utter chaos), and the surface noise would have astonished anyone brought up on *ffrr* and *ffss*, to say nothing of Phase 4 and Studio 2 stereo. The 78 rpm disc is coming back into its own, of course . . . just watch those respectable city gents searching among the white elephants at any jumble sale. There's a reaction against the perfect sound produced by so many tape recorders and hi-fi assemblies. As one knowledgeable chap with side whiskers told me last week: 'The 78s had a more natural

sound . . . you *knew* when the singers went off-key, and when the first violins were out-of-tune.' In fact, the 78s are fast becoming something 'in'; tape recorder manufacturers, please note. There's a small fortune awaiting the company that produces tape that has a surface noise akin to that of a well-worn 78 record. And the prospects of a tape recorder that can be speeded up at will (spring-wound, of course) is enough to make an elderly 35-year-old has-been like myself buy a new thorn needle for his laboratory-tested waterproof pick-up.

The loudest 78 I ever bought was a delightful piece by a gent called *Eddie 'Piano' Miller*, a rousing piano and vocal bit entitled *Fifi*. It was a wonderful find, and everyone in the youth club learned the words, including the chorus which went 'And then they all shout, *Bring her out again . . . oooh la! la! oui! oui! Fifi!!!*' That went on to the baize-covered turntable at least five times every night. Eventually, I discovered that the kids requested it, not only because they enjoyed the piece, but because it annoyed the assistant warden, an austere gent who hummed Beethoven over his spaghetti. Very foolishly, I gave away my treasured 78s when I changed over to LP, the most ill-considered action since Napoleon swapped the state of Louisiana for a stream-driven juke box, way back . . .

They were days of great adventure, too. I recall a local bloke who purchased a tall and highly polished radiogram which played only 78s. As the autochange mechanism was faulty, Herbert had to kick the bottom of the radiogram whenever he wanted the next record to fall on to the turntable. Since the records lasted an average of some three minutes, this was comparatively often. Last time I

popped into his den to catch up on the new Guy Mitchell and Frankie Laine chart-toppers, I became rather alarmed as he kicked the now-sagging radiogram. It lurched to one side, made a groaning sound, then proceeded to drop the next seven records all together. Two were chipped, and the bottom one was never the same again. I made a hurried departure – fortunately for me as, only a few days later, Herbert did the usual foot bit, and the radiogram collapsed in a cloud of smoke and sparks. I think that he made some rather ugly ashtrays and vases out of his collection . . .

With the current shortage of old-time 78s, some tape-swoppers are going in for dubbings in a big way. I must say that it's a bit incongruous, listening to poorly-recorded music, surface noise, wow and flutter, etc., coming from a glistening expensive tape recorder – especially when the proud possessor of the 1912 dubbed recording of *Dame Agnes Fishpaist* singing *Come into the Garden*, *Fred* sighs 'Wasn't that wonderful?'. Any day now the record companies will start selling reconstituted 78 records in 'original, trumpet-in-the-wall recording with 1910 vintage surface noise'. I only hope they don't forget the Victorian style labels, which were often the best part of the record.

It's all very promising. Next time some bright-faced representative of the younger generation disturbs my tape-recording to ask me ridiculous questions, I'll remind him, sternly, that I was brought up the hard way. 'Yes, my boy,' I'll declare 'We had to turn a handle for our music in those days . . . and change a needle every three or four sides.' 'I'm glad you're mechanical,' he'll probably reply 'I've just knocked your tape recorder off the top of the wardrobe.'

RECORDING AN ORGAN—WITHOUT A MICROPHONE!

by J. L. Jackson

'Shhhh!'

I should have made a tape loop of that and played it back continuously, for it was the only sound I uttered for hours on end – or so it seemed. 'Proud' was not the word for it. I was one hundred per cent thrilled with my new tape recorder. For years my only want had been one of those almost magical boxes which produced sounds from a spool of tape. And now, after many moons of saving, I could afford the deposit of approximately £2 13s 0d!

This, my first model, was a Sobell 'Festival' costing 25 gns. As domestic tape recorders go, it was nothing extraordinary; there were the usual inputs for microphone, radio, record player and an extension speaker output. This output proved not a little inconvenient at first because a friend exchanged recordings with me regularly, but every time we plugged in to the output socket the internal speaker was automatically muted. One or two calculated guesses were called for, with the odd miss producing a piece of music without its ending! However, a little doctoring soon overcame the problem and now the speaker no longer mutes.

I was not, strictly speaking, a hi-fi enthusiast at this stage; I did take some care with recordings – to the extent of covering up my brother's exceptionally noisy budgerigar, and, sometimes, my exceptionally noisy brother – but as long as a recording was not over-modulated I was

reasonably satisfied. However, as the bug bit deeper, my eyes wandered over to the record player, and soon it became an invaluable part of my equipment, its 8 in circular speaker improving the reproduction quality of my recordings many times – even without an external amplifying system. A crystal microphone, which was provided with the tape recorder when I bought it, produced recordings of acceptable quality (acceptable to an outright beginner, at least), and it was with this somewhat unreliable piece of equipment that I ventured forth to record my favourite instrument – the pipe organ.

Looking back now, I suffer something akin to epileptic fits, thinking of all the difficulties I had to overcome or simply tolerate. I was plug-bound, with a high impedance, and therefore short-cabled, microphone! Being a beginner (and, let's face it, a dim one at that) the term 'extension mains lead' had not yet worked its way into my vocabulary, and so both tape recorder and microphone took their rest in the church pulpit – yes, that was the only place where I could find a suitable mains socket!

The recordings I produced brought to light aspects of organ playing which everyone but the organist notices, the most important point being speed. Many student organists are said to have the habit of playing faster and faster. I myself find it much easier to play slower and slower (being basically lazy) and have noticed this tendency in others (not a tendency towards laziness!).

I made my biggest taping error one Saturday morning, just before Christmas several years ago. On this particular occasion I decided to record some music for the Festive Season. As other people were to listen to the recording (I hoped), I felt that a little extra time spent practising would not be wasted. With this in mind I

placed the tape recorder in the pulpit and plugged the mains lead into the mains socket and also into the set (the lead is completely independent of the tape recorder with this model). Rather hastily I set the apparatus up, tested to see that the power was on, stood the microphone in its usual position and rushed away to practise.

After an hour of concentrated practice, instead of the thirty minutes intended, I headed for the tape recorder, needless to say in a state of rush. Quickly, I set the volume control (offering up the usual silent prayer for accuracy) and switched to the *record* position. An hour later, already late for lunch, I switched off and rewound a few feet of tape for a spot test. To my amazement and grief the tape was blank with only a hiss (a derisive hiss at that) coming through the 5 x 3 in speaker. *I had not plugged in the microphone lead!*

Heartbroken and cursing, I wended my way home, determined to make another attempt in the afternoon. And I did. Two hours later my somewhat dejected, but still hopeful, figure was to be seen crawling into church laden with cheap, but still heavy, equipment. Once again I set everything up and began playing, but after ten minutes I stopped to check the recording. A difficult piece had gone rather well (which was not usually the case) and I was not going to be twice bitten. My suspicions were well founded, for once again, on playback, a derisive hiss echoed around the church walls. This time the microphone was plugged in correctly, but the volume control was set for *minimum gain* and, hence, the tape was blank once more!

For a third (somewhat frenzied) time I attempted the recording – but carefully this time, and successfully recorded the Christmas music I had been practising all day.

(It happens to all of us! – Editor)

tape club news

Recent weeks have been busy ones for me, as for all audio enthusiasts, particularly with the 1966 Audio Fair well to the fore. But the real highlight for me was the presentation of the ATR Club Trophy to the 1965-66 winners, Thornton Heath TRC. Special guests for the evening were Tom Reader and Ron Barrett, both committee members of the Rugby TRS, the runners-up. The idea of inviting Rugby came from the Thornton Heath committee, and a fine gesture it was too. ATR also had its gesture to make. We couldn't let the Rugby visitors go away empty-handed after travelling so far, particularly as they had put up such a good fight in the Championship. So after the Challenge Cup had been duly handed over, each club was presented with two books - a Tape Recorder Servicing Manual and a copy of ATR's own handbook, 'Circuits for Audio and Tape Recording'. With the formal business of the evening completed, everyone adjourned for a friendly session of chat until the time came for Tom Reader and Ron Barrett to make their long journey home.

The Audio Fair left me with mixed feelings - I was really pleased to see so many club members at the fair, but was disappointed to learn that I had missed many too. Still I'm sure everyone enjoyed the Fair and made the most of every dem going. I wonder how many were signed up for future club meetings throughout the country? K.C.

Bournemouth

Changes in committee membership have been announced by the Bournemouth TRC. Secretary is D. G. Hayter, FRICS, of 68 Leybourne Avenue, Bournemouth, Chairman is A. C. Rees, while Mrs R. Hawksworth continues as Treasurer. The new Secretary has already donated to the club an old Editor recorder which has been fitted with a Telefunken head. The Chairman played his part by giving the machine a complete overhaul, and the recorder is now ready for the use of any members who require it for the creation of more ambitious recordings.

A recent meeting on sound effects was arranged, with the accent on the use of only one recorder, in the hope that it would encourage members entering for the club's annual competition. Tape comparison was the subject of another recent meeting. A composite tape was built up using 25-second lengths of some seventeen different brands of tape, each piece separated by a length of leader. A piece of music was selected and recorded on each brand, and initially the recordings were replayed with no indication of which section of tape was which brand. The discussion which followed further playbacks was centred mainly on the question

of bias, but it was generally accepted that the *Which?* report on tapes coincided with members' own views. Demonstrations by each member of his own loudspeaker completed the meeting.

A full programme right through till February 1967 has been arranged, including many outside visits and sound hunts. Meetings are held fortnightly on Tuesday evening at the Pembroke Hotel, Poole Road, Bournemouth, at 8 pm.

Brighton

Ten members of the Brighton Tape Recording Club worked in co-operation with the local Vardean Boys School to record the latter's recent concert. Full rehearsal night was followed by two performances of the classical programme, which included 'From the Bavarian Highlands' by Edward Elgar. Mono and stereo recordings of the 100-strong choir and 30-piece orchestra were made, using eight mics and four recorders.

Club membership has doubled since the last AGM, in September last year, and it is hoped that it will continue to increase during the remainder of the club's season. Certainly, if publicity has anything to do with it, the club should succeed, for secretary Ken Upton is arranging with the BBC Television Service to have the club featured in a local news programme. The local newspaper is also taking an interest in the club, which should help recruitment. Members' tape night was followed by a visit to the Brighton Police Headquarters. Secrets of the rifle range, radio and fingerprint rooms were unveiled, and as no criminal records were found of any members, club meetings will take place as usual at 14a St George's Place, Brighton, each Wednesday evening!

CTRI

Members of the Catholic Tape Recorders International groups are now well on the way to compiling a 'News Journal in Sound' for all blind members and for the Association for Blind Catholics. This will consist of items of interest from the Catholic press and periodicals, and will be read by different members of the club. Once a routine for this has been arranged, it is hoped that it will become a regular club activity.

A competition for the best holiday tape made by a club member is also being introduced. Two prizes of 7 in LP tapes have been offered. Discussion round-robins have been very popular with members, with laymen and priests both taking part.

The club is at present concentrating on making membership of greater interest to those in the UK and an interest library is being built up specially for their use. UK representative is A. Dudley Chadwick of 91 Manor Drive, Upton, Wirral, Cheshire.

Coventry

Exactly eight years after the club was first founded, the Coventry TRC has produced its first printed magazine. Edited by Stan Day, the first issue contained the first part of a series, 'Know your Club', a report on the club's tape competition, technical and news items, and a spotlight profile on founder member Peter Warden. The magazine will be issued quarterly. The club recently enjoyed an excellent show by the Coventry Radiator Cine and Tape Club which included films such as *The Magic Tape* by BASF and *Travelling Tune* by Philips. Club programmes have included hi-fi and stereo

demonstrations with Tandberg, Truvox and Bang Olufsen equipment and a twenty-minute tape and colour slide show.

Derby

Attendance at the Derby TRC is on the increase, with up to 36 members at recent meetings. In the regular 'All Your Own Spot' were P. Milner and K. Clump, who presented a short play about a know-all helping (?) a friend with some woodwork. The monthly competition 'A Conducted Tour' brought in a good number of entries, with D. Hill beating A. Stanway by one point. E. Flecknoe presented a programme dealing with getting signal on to tape without having equipment turned on full blast. Other problems were dealt with by a members' Brains Trust panel of technical members answering the queries of newcomers and less technical members.

Doncaster

Members of the Doncaster & District TRC were enthusiastic hosts for the recent meeting of the Federation of Yorkshire Tape Recording Clubs. The business side of the meeting was confined to two hours and then the real business of tape recording was undertaken. Among the many attractions was a demonstration by Akai, folk singing, and of course the club's own studio was open for all to see. Representatives of the British Federation and the Midland Federation were also present at the meeting.

The second most notable event in the club's activities was a practical demonstration showing how to overcome the mysteries of making up leads for use in recording work. This meeting was particularly appreciated by the newer members of the club. The demonstration was handled by Bob Brakenbury, the club's studio manager, and many discussions arose as to the different systems available for making connecting leads more interchangeable.

A lecture by a BBC engineer and a demonstration of electronic music have also been arranged for the club.

Friern Barnet

The new committee of the Friern Barnet TRC has really got to grips with matters, and in particular with the club's need for new members. Enquiries are invited from those interested in joining this small but active club, and who are able to attend regular twice-monthly meetings held in the Borough of Barnet. Anyone interested should, write or phone Club Secretary Mr R. Longhurst, at 72 Gravenor Road, Barnet, telephone BARnet 1085.

The club's members include keen members and also several professionals in the world of tape recording and of electronics. The club has a monthly news letter. Current programme list includes a lecture by a professional electronics expert on the tricky subject of matching outputs to inputs on the various club recorders. A recent survey showed that active members have 31 tape recorders between them, of which 12 are battery portables. Not unnaturally, there is an increased interest in the club's outside programmes, particularly sound hunts. On one such exercise recently, the club's most experienced interviewer, Joe Neal, collected an absolute gem from a natural, a designer and maker of stained glass windows.

ITACS

According to the ITACS club journal *Tape and Cine Reel*, cine film and tape recording seem to go along hand in hand very well.

The journal gives details of future events such as an annual get-together in September and the annual film competition. We congratulate ITACS on an informative little club magazine.

Leeds

Members of the Leeds and District TRC have also been out and about considerably in recent weeks – though not always with success. On one occasion two recording teams set out for a church in Shipley. One team eventually found the church after 45 minutes searching in wet, windy weather, but the second team searched in vain, and returned to base with clean tape and muddy shoes!

When Leeds members found that they had a member of Doncaster club regularly in the city, he was promptly invited to meet Bill Rowe, the club secretary. As neither had seen the other before, the meeting posed a problem of recognition, but this was solved by an arrangement whereby each carried, prominently, his copy of *ATR*. Since then meetings between the two have been numerous and have included a look (and listen) in to a hospital broadcast recording session.

The recent AGM was a particularly eventful occasion for Peter Smith. He was re-elected (unopposed) club Treasurer, and his wife made it a real occasion for celebration by presenting him with a son. Chief excitement at the AGM itself was the election of the chairman. Their were two nominations for this post, and secret ballot and vote counting (shades of 31 March?) caused tension to mount. Finally Mike Plant, who held the office last year, was re-elected. Also re-elected was Bill Lowe as club Secretary, while the committee was completed with the election of Chris Eagle and John Newton. Mike Plant has also been elected Secretary of the Yorkshire Federation at the meeting for which Doncaster were hosts.

Leicester

One of the most interesting meetings of recent sessions was a demonstration and discussion on microphones. Many different types were shown, and questions brought to light many difficulties encountered by members. Discussion on mic techniques was lively. This was followed by a talk on film/tape synchronization, given by Alan Heywood, who also presented an excellent cine film of his holidays in the Isle of Man (beautiful place) and in London, with, needless to say, sync commentary.

For beginners, a talk and demonstration on basic operating procedure and equipment was given by John Buckler and John Moule, followed by final details for manning the stand at the 'Leisure 66' exhibition held recently at the Granby Halls, Leicester.

Outside visits included representation at the recent AGM of the Association of Midland Tape Recording Clubs, a trip by a party of ten to London for the Audio Fair (what else), and a visit to a BBC exhibition in Leicester, at which clubs watched with interest the rehearsals and actual recording of the TV show 'Going for a Song'.

London

London's tape competition for the McManus Cup is to be arranged this year on the same lines as the BATR Contest, so that the winning tape can be entered for the national contest. A recent talk by Fred Else on the subjects of stereo and hi-fi was well received by club members, as was Harry Mitchell's talk on radio-phonics and electronic music.

Montrose

The Montrose and District TRC had one meeting off over the Easter period, but club activities did not slacken off in any way. The job of making copies of the local light opera production 'Showboat' from a master still continues. A shortened version of the show has been taken to old folks' homes for them to hear, since they were unable to attend the show itself. The club has also undertaken the job of making sound effects for the local drama club, and this has kept Jim McAlpine, Dave Murray and Angus Hardie very busy. Dave and Angus have also been busy preparing to record a wedding. Rehearsals before the ceremony ensured that all equipment was properly set up in the best possible position, and tests also helped to determine recording level beforehand. The recent competition on household sound effects produced some very original entries of a high standard. As well as these, members also heard outside sounds collected by Alec Allen. These included a very realistic recording of a storm at sea, which the club very gladly put into its library.

Perhaps the oddest recording was a large-scale session recording the Montrose curfew. This is the ringing of the steeple bell at 10 pm, a local custom dating from a time when the bell meant that all fires had to be put out and all people remain at home. One recording was taken in the church graveyard and another in the belfry of the 220 ft high steeple. Results were very good, although a certain amount of background noise was inevitable with the outside recording.

North London

The last competition of the North London Tape and Hi-fi Club was a new venture for the club. A short sketch using two voices was compiled, and members had to add their own sound effects. These had to be original and recorded with a microphone, not dubbed from any other source. The club's series of talks and comparisons on the recorders within certain price ranges continues. The 40-80 gns range brought forth David Barker and his Brenell Mk V Series 2, Mrs Mary Collinson and her Telefunken portable. Pat Allbutt and her six-year-old Grundig and Charles Davison and his Fi-Cord Ia.

Sixteen members of the New Circle TRC were entertained by the club recently and the joint programme for the evening, of tapes and talk, was enjoyed by all.

A visit by Mr Alan Price of Rank-Pullin, with the complete range of Akai recorders, much impressed club members, and a whole hearted vote of thanks was proposed by Ron Goodwin. Incidentally, is Ron the youngest tape club chairman? A week after the Akai visit he celebrated his 21st birthday.

Norwich

Another party of visitors to the Audio Fair was a group from the Norwich TRS. This visit followed hard on the heels of the AGM, at which it was declared that the past year was far and away the best for the club. Club meetings are now regularly covered by the local papers, and recordings for other local organizations are on the increase. Many sessions have been held for the local folksong club, and a roving report enquiring into the local library service and the reading habits of the population provided some interesting results. Club members are also helping Costessey Parish church in their 'Action 66' project to raise £1,000 for

church funds. The club makes a special recording for anyone in the parish who wants one, and the fee charged is then passed on to the church fund. Normally, of course, no fees are charged for this service. The local Roman Catholic church has not been left out either, for plans are under way for the provision of music and PA at the forthcoming fete.

A talk and demonstration entitled 'Sounds Interesting' has been prepared, ready to be delivered to any local organization which requires an evening's programme.

Reading

'Many amateurs get so bogged down with the technical difficulties when adding a sound track to a film that they lose sight of the aesthetic side.' So said Reading Cine and TRS Vice-Chairman James Helder at the start of his talk to the Society recently on 'Making a Sound Track'. In an ambitious lecture/demonstration, he covered both the artistic and technical problems of this vital part of film production. Various methods of adding sound were covered, with details of how to get the best results from each.

Rugby

Approximately fifty people attended the meeting of the Rugby TRS when a programme dealing with tape and cine was presented by Trevor Gilbert, of B-TRAC and the Midland Association.

A short film on the Norfolk Broads was then followed by a demonstration of recording the commentary for synchronization with the film. Afterwards Trevor showed his main film, *By Way of the Glockner*, which dealt with a holiday touring Austria and Italy and had a multi-channel stereo soundtrack.

The quiz tape by John Armsby was won jointly by Mike Brown and Mr W. P. S. Wood, Treasurer of the Rugby Photographic Society, who was visiting on this occasion.

A contingent of members and wives from the Warwick and Leamington TRS have also attended, and presented a session in Rugby's series of 'Knowhow' programmes. The subject on this occasion being tape/slide shows, Chairman Mr Greenfield introduced the programme by presenting slides with common faults of which the photographer should beware. W & L Secretary Graham Harris (well-known to *ATR* readers) talked about scripting and sound commentaries, Mr Darks explained his own system of synchronization, and Ted Austin demonstrated his power supply box. Finally George Wilkinson presented their 30-minute audio-vision show entitled '*The Spirit of Edgehill*' which deals with the history of the famous battle and the attitude of the present inhabitants to the reputed hauntings of the area.

Solent

Among the recent activities of members of the Solent Tape and Audio Club was a visit to the BBC studio centre at Southampton, where they were shown around both sound and television studios. It is in these studios that the 'South Today' programme is produced for BBC-1, and many regional contributions are made to the newly opened BBC-2 service. At another meeting members tried their hand at recording a local pop group and an electronic organ, and helped in the preparation of a tape for sync with a cine film. They also enjoyed a demonstration by Peter Gouch, the club's blind member, who showed how he makes 'links without leads' from one recorder to another.

A nightingale recording session and a beach picnic are two unusual items on the summer programme, weather permitting!

South Devon

Recordings of the Committee's choice were included in a recent programme of the South Devon Tape Recording Club. Featured were recordings of bell ringing at Brixham (by Arthur Knight); of a wedding at Buckfast Abbey (Brian Mudge); of an interview with the Mayor of Helston (David Pletts); and cinema organ recordings (by Peter Wills). These members then formed an informal Brains Trust to discuss members' recording problems.

The club's fourth annual Dinner and Dance was a great success. 78 members and friends attended, and were warmly welcomed by Don Aldous, the club Chairman. In his reply on behalf of the visitors, Joe Pengelly, a BBC West Region TV news reader, warned that giving an unprepared speech could be hazardous and recalled some of the boobs (often hilarious) made by announcers on the air. He also announced that he and his colleagues would be donating a trophy to the club for a competition, details of which have yet to be announced. Mr Jack Stockman formally presented the 'Stockman' cup to this year's team contest winners – Brian Mudge, J. C. Parkin, B. Peirce, P. Wills and Mrs Parkin.

Mrs Parkin also featured in the club's second Ladies' night, together with Doreen Scattergood, Mrs Boyd, Mrs Furneaux, Mrs Stockman, Miss Edmonds, Mrs Tryer, Mrs Holt and Mrs Bann. Other meetings included a talk by Don Aldous on the Testing of Professional and Amateur Recording Equipment, a joint meeting with the Torbay Natural History Society, at which three BBC films were shown, and a visit from Mastertape (Magnetic) Ltd.

Thornton Heath

Highlight of the Thornton Heath TRC's programme (so they flatter me!) was the presentation of the ATR Club Trophy by yours truly and the visit for the occasion of two members of the Rugby TRS. Certainly the spread provided was delicious and the hospitality most warm. Needless to say, THTRC had laid on a reporter from a local paper for the occasion, who was promptly converted. Within five days the reporter had acquired his first recorder, a Philips EL 3586, through the club, together with a supply of tape, and they'll make a member of him yet! One way of getting publicity! The presentation was shortly followed by the club's AGM. All the officers and committee were re-elected, with the addition of Mr R. Anderson who takes the job of Programme Organiser.

A number of members made the comparatively short journey to the Audio Fair, but sadly one familiar face was missing. Duggie Miles, one of the club's members who lost his sight in middle age and turned to tape recording, died a few days before the Audio Fair, after a long illness. Duggie was a great tapespondent, and will no doubt be missed in many parts of the world, as well as at THTRC.

Naturally the club will continue to help the local Guide Dogs for the Blind Association, the next task for them being the provision of music and PA at their Whitsun fete. The local church has also put its programme through to November in the club's hands.

Alan Brown, one of the younger members of THTRC, has just heard that he has gained his Duke of Edinburgh's Gold Award with 'Sound Appreciations' as one of the sections – a section in which he previously gained his Silver Award. He chose, among other demon-

strations of his facility with tape, to do a dramatic sound version of Act IV, Scene I, Macbeth – the witches scene.

He made two special capstans giving 11 ips and 13 ips on one of the two Brenells used and was thus able himself to produce all the nine voices required. Apart from being a first-class dramatic production, it is certainly a *tour de force* of tape recording, editing and multi-tracking. Mr Eckersley of the BBC was the adjudicator for this tape and now Alan awaits 11 July when he expects to go to Buckingham Palace to receive his award from the Duke of Edinburgh. Knowing HRH's recent reaction to thrusting microphones, we wonder whether Alan will be permitted to record this event! Seriously, though, we are sure that all ATR readers will join us in sending sincere congratulations to Alan on his fine achievement.

Warwick and Leamington

When I read the latest report from the Warwick and Leamington ATRS, I got the feeling I'd heard most of it before. Then I realized that much of it coincided with that from the Rugby club, which they recently visited.

Following the club's AGM, Councillor F. Vittle, the present Mayor of Warwick and an active member of the society, was made an honorary member. George Wilkinson retired from the chair so that he can devote more time to the direction of programmes, and John Greenfield was elected in his place. Les Broom and Graham Harris keep their positions as treasurer and secretary respectively, and Capt. E. E. (Ted) Austin was elected PRO.

Local history is well to the fore in the club's projects. Besides the Edgehill Story (see Rugby report), the Story of Warwick is being featured on a tape/slide show, and a filmed introduction to Leamington Spa is also being made.

The Professionals--

continued from page 11

he made with his tape recorder was from a giant crane when he was lowered by remote control from a height of 500 ft down through a manhole cover in Notting Hill Gate. 'For a long time,' Bob told me, 'I tried to arrange to be run over by an express train; I wanted to record the sound of its approach and the noise as it went over me lying in a pit between the rails. Railway officials quite naturally clamped down on the idea.'

As a travel broadcaster for the BBC he has scootered from London to Monte Carlo and toured the six counties of Ulster. He has taken his Fi-Cord 202 on to the roof of a cable *teleferique* up Mont Blanc and into the cramped capsule of a 'skeeter' whirlbirding through the Pyrenees. He has descended into the lowest place on the face of the earth (see ATR, January issue, where he describes recording in the Dead Sea), canoed up a river in Finnish Lapland to within 50 miles of the Arctic Ocean and has just returned from a big-game safari into the African bush. This latest adventure will be featured shortly in ATR.

F.C.I.



An example of what Bob calls the 'participating commentator technique' – he acts as a human target for a circus knife thrower!

SOUND SCENE

Traction Engine rally – Mallory expansion plans – More BBC VHF channels – More tape recorders in Design Centre – Fi-Cord to distribute Braun equipment in UK . . .

More BBC VHF channels

The BBC welcome the announcement by the Postmaster-General that he has approved in principle the fifth stage of the BBC's plans for extending and improving the coverage of the three sound services on VHF by building further low-power relay stations in various parts of the country. The stations in this fifth group will, provided suitable sites can be found be at the following places:

Relay stations for both television and VHF sound

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Relay stations for VHF sound only

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Ventnor
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Ballachulish

It is hoped that some of the stations in stage 5 will be completed by the end of 1967 and the remainder in 1968. The nominal coverage of BBC-1 Television will then be 99.5% of the population of the United Kingdom and that of the three programmes on VHF sound will be 99.0%. The BBC's relay station at Melvaig, Ross and Cromarty, is now providing a full three-programme VHF sound service. This followed the bringing into service of the relay station at Skriaig, Isle of Skye, the programmes from which are picked up at Melvaig for re-transmission.

The VHF sound transmissions from Melvaig are horizontally polarized on the following frequencies:

Scottish Home Service	93.5 Mc/s (as before)
Light Programme	89.1 M/cs
Third Network	91.3 Mc/s

The area served from Melvaig includes the Isle of Lewis, the north and north-east coastal areas of the Isle of Skye, and some coastal parts of Sutherland and Ross and Cromarty for distances of about thirty miles north and south of Melvaig.

The BBC's new television and VHF sound relay station at Penifiler, Isle of Skye, is also operating and is transmitting BBC-1 on channel 1 with horizontal polarization and the three sound programmes on VHF horizontally polarized, on the following frequencies:

Scottish Home Service	93.9 Mc/s
Light Programme	89.5 Mc/s
Third Network	91.7 Mc/s

Braun appoint Fi-Cord as UK distributors

Fi-Cord International have been appointed UK distributors for the complete range of hi-fi equipment manufactured by Braun AG, Frankfurt, Germany. The range includes telecommunications, Global receivers which are portable and either battery or mains operated, AM/FM hi-fi stereo control receivers, tape decks and stereo amplifiers, stereo turntables and pick-ups and a wide range of loudspeakers.

KB move in Scotland

The Scottish depot of KB has moved to 32 Milton Road, College Milton, East Kilbride (Tel East Kilbride 25101). The depot handles deliveries of all consumer products to Scottish dealers and is also the area service depot of Combined Radio and Television Service Ltd, the servicing company for KB and RGD. The move releases more manufacturing space at STC's East Kilbride plant, where crossbar telephone exchange equipment is to be made.

BASF reorganization

Badische Anilin und Soda-Fabrik AG, Ludwigshafen am Rhein, an-

nounce that with the reorganization of their distribution arrangements in the UK BASF Chemicals Ltd, York House, 199 Westminster Bridge Road, London SE1, has now been renamed BASF United Kingdom Ltd. Because of the reorganization, BASF United Kingdom Ltd have taken over the distribution of BASF products previously handled by Allied Colloids Ltd. In future, all enquiries referring to those products should be sent to BASF United Kingdom Ltd at Cleckheaton Road, Low Moor, Bradford, Yorkshire, or at any of the previous addresses of Allied Colloids Ltd. Correspondence relating to recording tape and accessories should go to BASF United Kingdom Ltd, 5a Gillespie Road, London N4.

Car stereo – status symbol

A dynamic marketing drive is being initiated by American electronics and automobile industries on behalf of the stereo tape cartridge. The tape cartridge, a continuous loop of $\frac{1}{4}$ in tape, long used in other fields of sound reproduction, has been successfully adapted for the automobile. Ford predict sales of 100,000 for their RCA Lear-Motorola tape cartridge unit. The Motorola-Lear unit is only one of several tape cartridges scrambling for a footing in what promises to be a flourishing market.

The tape cartridge is well on its way to becoming a new *automobile status symbol*. The entire country will soon be car-stereo-conscious thanks to significant marketing drives by Ford and RCA Victor who market the largest library of stereo tapes.

More tape recorders for the Design Centre

The famous Luxus range of tape recorders, the TK 14L, TK 18L, TK 17L and TK23L, all manufactured in the United Kingdom by Grundig (Great Britain) Ltd, have recently been selected for display in the Design Centre, London.

Traction Engine Rally

We hear that the Andover and District Model Engineering Society are holding a Steam Traction Engine Rally at Finkley Manor Farm, Andover, Hampshire, on Saturday, 18 June. The gates open at 12 noon, Grand Parade at 2 pm. There will be over thirty engines plus vintage and veteran cars and the organizers hope to have two fairground organs playing from about 3 pm onwards. This sounds like a good opportunity for sound hunters and cine enthusiasts.

Mallory expansion plan

A £1 million plan to expand output and exports by 250% within four years has been announced by Mallory Batteries Ltd, Gatwick Road, Crawley, Sussex. Canadian-born Mr John D. Buchanan, the company's newly-appointed Managing Director, stated that the plan, which represents an annual growth rate of over 30%, will make use of the very latest automated techniques and computer control systems.

This company currently has an annual turnover of £1,650,000, and exports from the Crawley factory to Europe, Africa and Asia already account for more than 60% of the total production. Now, in addition to the UK expansion programme, new manufacturing facilities have been planned in Belgium to supply the Common Market countries.

Mallory specialize in the production of alkaline and mercury batteries, which, they claim, are more powerful, size for size, than the commonly-used zinc-carbon batteries, giving longer-lasting performance in all types of portable equipment. Mr Buchanan predicts a boom in sales of such equipment during the next four years – particularly in transistor radios, tape recorders, record players, portable TV sets, cine cameras, clocks, etc. Mallory's expansion programme, which is self-financed, is being undertaken so that production facilities for batteries will keep in step with these developments.

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