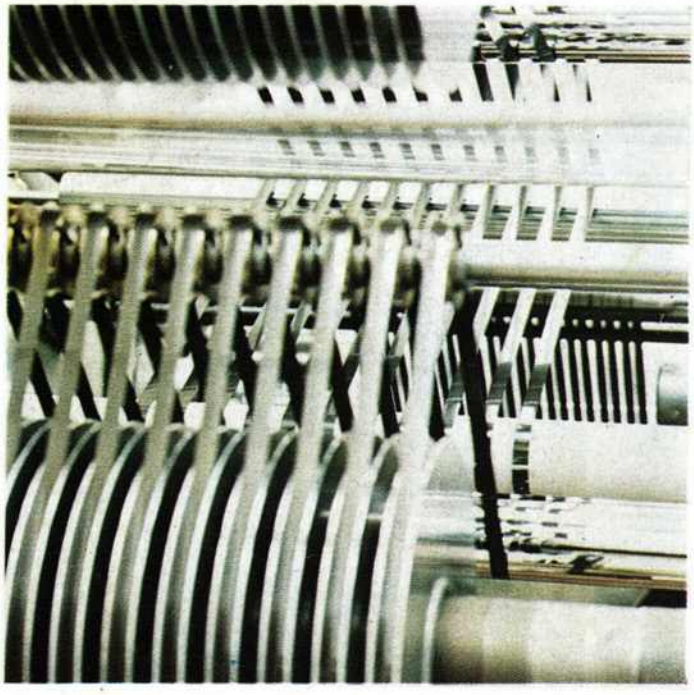
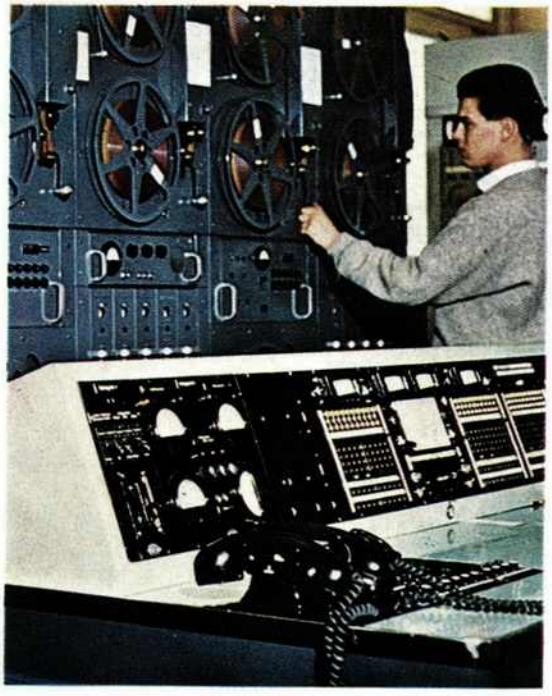
Amateur Tape Recording

AUDIO-VIDEO

October 1967 Vol 9 No 3 2/6





THE WORLD'S MOST MODERN TAPE FACTORY - BASF

REMEMBER . . .

Next month, *Amateur Tape Recording* will be merged with an exciting new hi-fi magazine to be produced by Haymarket Press. It will be called *Hi-Fi Sound*, and will bring you *all* the latest information on sound and tape equipment, with expert advice on best buys and the best ways of getting maximum enjoyment from both hi-fi and tape systems.

The first issue, dated November, will include all the most popular features from *ATR*, plus articles on unit stereo outfits, disc equipment for hi-fi, and tape-recorder fault-finding and maintenance, linked with all the news of current developments in the world of hi-fi. There will be test reports on a stereo radio tuner, a high-quality tape recorder, an amplifier and other top-class equipment.

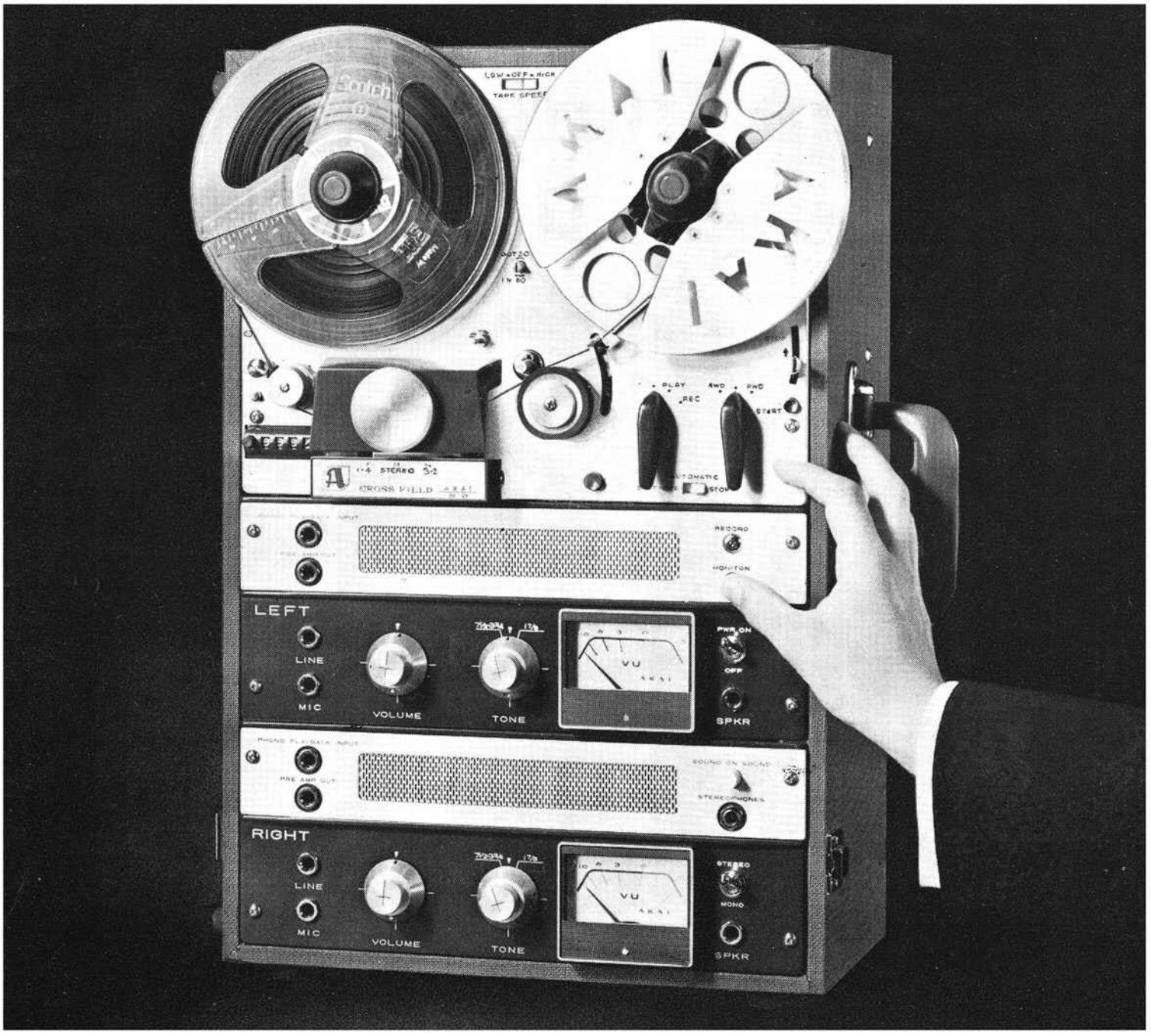
REMEMBER . . .

to order your new *Hi-Fi Sound* magazine now from your newsagent.

DON'T FORGET . . .

New *Hi-Fi Sound* – out
October 27 – price 3*s*.

In case of difficulty in getting your new magazine, contact David R. Hughes, Circulation Manager, Haymarket Press Limited, 9 Harrow Road, London W2.



The Akai M.8 has a head start on all other tape recorders.

See how much better performance you get when you buy an Akai M.8—the tape recorder with the unique Crossfield Head.

Competitive Recorders

18,000 Hz at 7½ ips
12,000 Hz at 3¾ ips
6,000 Hz at 1⅞ ips

the Akai M.8

21,000 Hz at 7½ ips
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The Akai M.8 offers you a choice of four speeds — 1⅞, 3¾, 7½ and 15 ips. The M.8 will give you 4 hours of true stereo high-fidelity music, up to 21,000 Hz at 7½ ips from standard 1200 ft. tape. Even at 1⅞ ips it provides a response up to 10,000 Hz.

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Now see what else comes in the Akai M.8. Vertical centre speakers. Sound on sound. Biased to receive FM Multiplex stereo broadcasts. Automatic shut off. High speed forward and rewind. Four speeds. Hysteresis synchronous motor. Vertical and horizontal operation. Tape cleaner. All this is available in the Akai M.8, which costs only 125 gns. For full specification post this coupon.

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Please send me details of the Akai M.8 and Akai X-100D.

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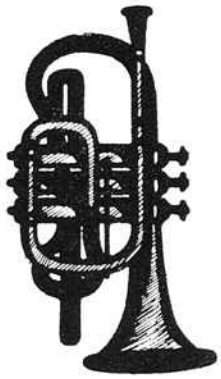

90 minutes of music -exactly as you wish.

Actual size of cassette C.90.

With the BASF Compact Cassette C.90 you can record 90 minutes of music—45 minutes on each track. Beat, Jazz, Pop—anything you like! You could, for example, make up a small tape library like this:-
5 BASF Compact Cassettes C.60=5 hours playing time. 5 BASF Compact Cassettes C.90=7½ hours.
You can then have 12½ hours of music filed together—Music as you like it. A cheap and practical tape library in the minimum space.
Ask your dealer about the new BASF Compact Cassettes C.60 and C.90. And remember, every cassette comes with a handy reference index which enables you to make a note of each recording—and quickly find it when you want to play it.

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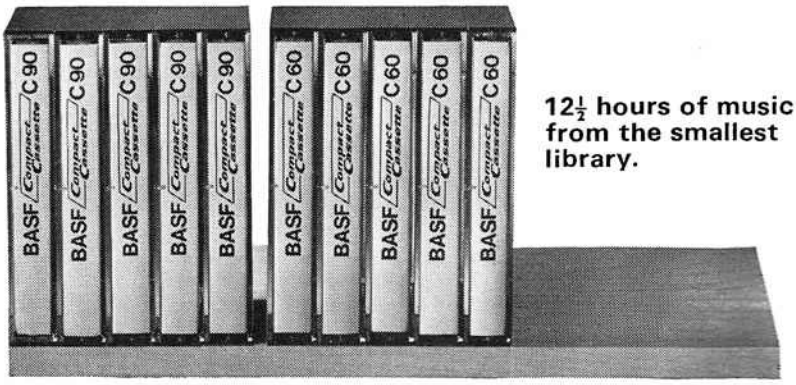
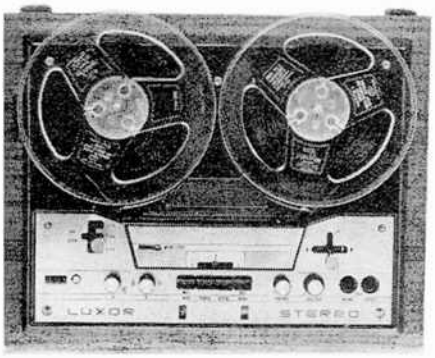


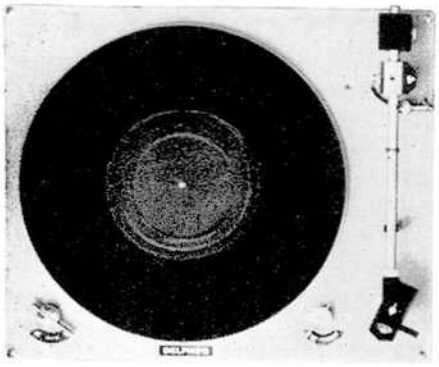
12½ hours of music—from the smallest library.

SSC Luxor

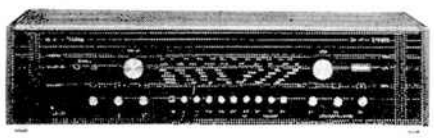
A new sound experience from Scandinavia

MALAR – Stereo Tape Recorder – 4 track, 3 speed. Frequency response: 7½ i.p.s. 50–19,000 c/s. 3¾ i.p.s. 50–12,000 c/s. 1⅞ i.p.s. 80–6,000 c/s. Output: 4 watts Mono, 2 × 2 watts Stereo. Automatic stop, three position speaker switch. Dual volume control. Four push buttons: recording (special lock prevents erasing) radio, gramophone and microphone. Three position channel selector. High speed rewind. Instant stop. Pause control. Built-in four channel mixer, multi playback, synchro playback. Combination head, fine laminated Fe-Ni-core, range 50 dB. Max. 7" reel. Available in teak or rosewood with transparent dust cover. Size 15½" × 12½" × 7" Price: 75 gns.

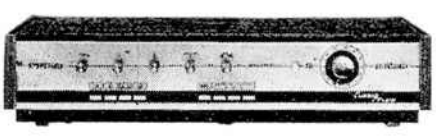




BALTICA – Transcription turntable by Danish precision craftsmen. Thick cast aluminium chassis – silkgrey finish with turned brass chromed knobs. Perfectly balanced anti-magnetic table. Speeds 45 and 33½ r.p.m. Less than 0·1% wow and flutter (peak value). Available as standard with Jobo AB arm or SME3009, 9" precision pick-up arm. Shure or Empire cartridge. Base: teak or rosewood, transparent dust cover. Size: 15½" × 11½" × 4". Price: 34 gns.



MOTALA – Stereo radio with FM/AM. Fully transistorized, (26 transistors, 11 diodes, 1 rectifier). Output: 2 × 20 watts with less than 2% distortion; at 2 × 15 watts less than 1%. 4 ohms impedance. Frequency range: 20–18,000 c/s. Controls: volume, bass, treble and balance. Automatic frequency control. Range: FM 87–101 Mc/s. LW 690–2,000 m. MW 185–577 m. SW 51·5–23·8 m. Push button selector for three FM stations. Prewired to install stereo decoder for stereo broadcasts. Sockets: Magnetic pick-up, crystal pick-up and tape recorder. In teak or rosewood. Size 23" × 9" × 6". Price: 86 gns.



MALMO – Solid state Hi-Fi Stereo amplifier, fully transistorized (28 transistors, 7 diodes, 2 rectifiers). Incorporated FM radio with instant station selector with AFC. Three filter selectors: (1) Bass cutting 11dB at 20 c/s. (2) Reduction of medium register at 1,000 c/s. (3) Treble cutting 8 dB at 20 Kc/s. Frequency range: 20–20,000 c/s ± 2 dB, 20–15,000 c/s ± 1 dB. Controls: volume, bass, treble and balance. FM tuner 87–101 Kc/s. Sockets: Magnetic pick-up, crystal pick-up, tape recorder and microphone. Less than 1% distortion at 15 watts. Can be coupled with Stereo decoder for Stereo broadcasts. In teak or rosewood. Size: 20" × 3¾" × 10". Price: 79 gns.

S.S.C. Luxor is the sound equipment from Scandinavia that is going to make its presence felt. S.S.C. Luxor sets new standards for design, performance and meticulous quality. S.S.C. Luxor is a new sound dimension that has to be heard to be believed. Just take a look at the technical specifications and judge for yourself that S.S.C. offers really superb equipment at a realistic price.

For full details of the Luxor range and name of your nearest stockist, send for our beautifully illustrated colour brochure by simply filling in the coupon below.

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ATRI

YES, I'M SMALL.
YES, I'M BATTERY POWERED.
NO, MY MUSIC IS NOT A LITTLE ♫ SOUND
IT'S A BIG ♫ ... SOUND!

If ever it was true that there's good stuff in little bundles, it's true of Philips 4200. Six 1.5 Volt batteries give 40 hours play – excellent play – anywhere! Reproduction is fantastic for so compact and lightweight a tape recorder – it's a beautiful 8 lb. example of Philips quality. And the price? Equally fantastic! With 3″ double play tape, 3″ empty spool, sensitive microphone, recording/playback lead – 26 gns. Another advantage: Philips High Fidelity Low-noise tape is available at no extra cost than ordinary tape in sizes to fit the 4200.

PHILIPS

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Amateur Tape Recording

AUDIO-VIDEO

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Vol 9 Number 3 October 1967

NEXT MONTH—A NEW MAGAZINE

Changes, exciting and far reaching, are in prospect. Beginning next month *Amateur Tape Recording* will be incorporated with a new magazine, *Hi-Fi Sound*.

This new publication will reflect all that is happening in high-quality audio, and it will deal with all sources of sound. If you are a newcomer to high fidelity you will find in *Hi-Fi Sound* expert guidance on the selection of systems and components – at all levels of cost – to meet your needs. Stereo sound systems of high quality, presented the modern way, have popular appeal; they are easy to use, compact and versatile. Above all, you need no special expertise to enjoy, in your own home, the delights of music reproduced with all the realism made possible by high fidelity sound equipment.

If you are more experienced in the art and science of sound reproduction you will find much to fascinate you in *Hi-Fi Sound*. Test reports, descriptions of new developments in stereo, articles on choosing and using audio equipment, aids to tape recording practice, news and views on the world of hi-fi, advice on technical problems—these are some of the features which *Hi-Fi Sound* will present as a service to the music-lover and enthusiast.

FRONT COVER

Upper left: The heart of the new BASF magnetic tape factory at Willstätt in southern Germany. In this huge and entirely automated machine the plastic carrier film is given its magnetic coating.

Upper right: High precision machines cut the coated film into individual tapes to an accuracy of a few hundredths of a millimetre. Photo shows the cutting unit for computer tapes.

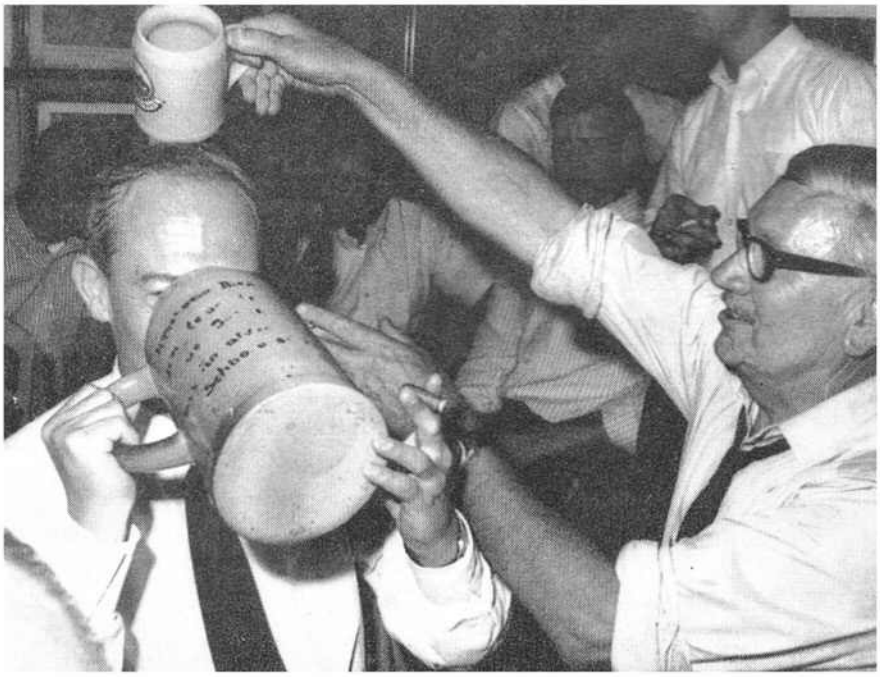
Lower left: BASF tape in use in airport control – one of the few applications of modern magnetic tape.

Lower right: Domestic video requires high grade tape such as that produced by BASF.

THE BIRTHPLACE OF TAPE

by Bob Danvers-Walker

Bob Danvers-Walker taping a conversation with Herr Hans Cabus who accompanied the delegates throughout the well-planned and thoroughly enjoyable tour. Heidelberg Castle can be seen on the opposite bank of the River Neckar.



An unconventional moment during the Convention. Off-duty in Heidelberg, the visitors were taken to the historic student's pub 'The Seppl' where Editor Denys Killick disappeared into one of the giant beer mugs.

Living creatures or inanimate objects can have their origins in strange places. Environments don't always shape futures and birthplaces are not necessarily indicative of what an infant will become. Were this to be so, all babies born in hospitals would emerge as doctors or nurses. Jazz came out of the back streets of New Orleans; from an accidental mould came penicillin; Nuffield's bicycle workshop conceived the Morris Motor industry and the first magnetic tape using cellulose acetate as a carrier base was born where the sole objective of BASF scientists 102 years ago was to 'dye'.

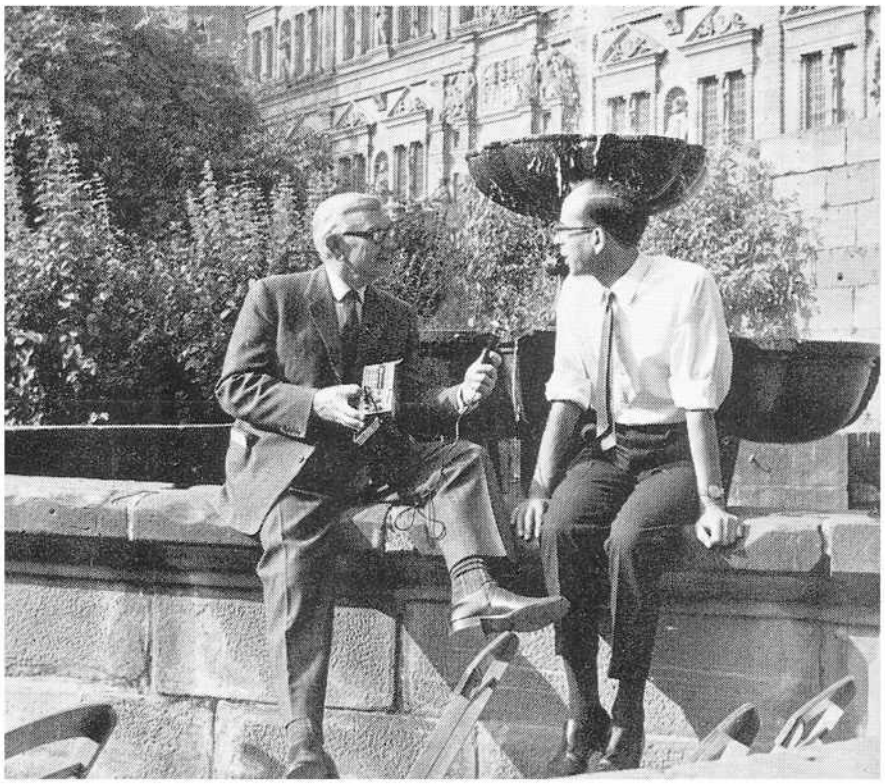
It was in 1865 that BASF (Badische Anilin und Soda-Fabrik) laid the foundation of the chemistry of synthetic coal tar dyestuffs and in the process became parent to today's largest chemical works in the world at Ludwigshafen. It was here, some seventy years later that the first magnetized plastic foil-based tape first saw the light of day.

Coinciding with the twentieth anniversary of the emergence onto the domestic market of the tape recorder I, together wih Fred Judd *ATR*, Don Aldous *Audio and Record Review*, Denys Killick *Tape Recording*, David Kirk *Tape Recorder* and the BASF London Manager Bruce Nicolls were guests of the Directors of BASF in Ludwigshafen, a vast complex of factories and chemical works occupying nine tenths of the industrial region across the Rhine from Mannheim.

Two full days were programmed to give us a comprehensive tour of as much of the six square mile 'chemical colossus' as time would permit. Frankly, the area is so vast that one has the feeling of doing the sights of a city, which is what it is since Lugwigshaven *is* BASF – the road signs signpost it as such.

Our escort Herr Hans Cabus and other executives met at various stages on the tour, saw to it that we visited plants where plastics, dyes, fibres, fertilizers, metallurgical and chemical products help to swell the might of Germany's economy. A chemically blue haze envelopes the whole of Lugwigshaven. Apart from the overall smell of chlorine and ammonia, other perfumes of petro-chemical compounds and coal-tar derivatives traced our journey by car and foot about the labyrinth of roads, among computerized factories and through automated chemical reactors. Five thousand chemical products are contained in the BASF range of products. They all seem to fill the air with their pungent fumes.

It was when we arrived in the factory where every year enough PVC carrier film is made to give (when coated) continuous playback at 7½ ips for 2,000 years that my statistically bombarded mind turned to thoughts of tape.



Using the dual sound Uher 4200 as a monophonic recorder to tape Mr Bruce Nicolls, BASF London Manager, in the courtyard of Heidelberg Castle.

I use two AKGD11 D-HL stereo twin microphones adjustable for cardioid, supercardioid and hpyercardioid characteristics while travelling down the autobahn by coach to Willstätt. The Uher Stereo/Mono battery portable is an exciting new development in portable recorders.

Judd and Aldous, Killick and Kirk were talking technicalities; I was marvelling at the genius which makes it possible for a plastics film a mere few hundredths of a millimetre in thickness, coated with magnetisable iron oxide, virtually to preserve sound for all time ... sound born never to die – or should it be dye! Reflect upon the words of Professor Carl Wurster, spoken seven years ago: 'Let us stop a moment and take a look at the preservation of sound' he said, 'an age-old dream of capturing the fleeting sound of the voice, a dream which was realized about 90 years ago. This occurred when, on 12th August 1877, the nursery rhyme *Mary had a little lamb* was reproduced on Edison's talking machine by means of a needle. The recording was done originally on a cylinder covered with tinfoil, then on one coated with wax. Next came the record of shellac with rock dust and carbon black as fillers. Then chemistry synthetically produced the homogeneous, unstructured record made of various copolymers. Background noise diminished, the grooves grew finer, the revolutions per minute fewer and consequently the playing time longer. Today the old shellac record is of historical interest only. The first three decades of the present century brought with them something fundamentally new in this sphere, namely the development of recording on steel wire and steel tape. It was chemistry that produced recording tape of acetyl cellulose, later to be replaced by rigid polyvinyl chloride and polyesters. The properties of these tapes are familier: they are easy to wind, cut and join; they have a smooth surface, weigh little and are flexible and resistant to corrosion and tearing. Steel wire is only used now in a few special cases. Chemistry's contribution was the magnetisable material in the form of finely divided iron oxides which could only be obtained by chemical conversion. Thus, chemistry paved the way for the high fidelity sound reproduction of modern tape recorders. Recording tape and improved records also provided the prerequisites for stereophonic sound reproduction which today enables us to hear recordings in three dimensional form'.

This quotation had further interest for me because I had brought with me a brand new Uher 4200 Report Stereo recorder equipped with dual AKG microphones for the visiting Editors to use during the tour. This entirely new model from Uher is a full stereo recorder, completely portable and ideal for outdoor recording in stereo. (See *Sound Scene*, page 10). On our first night in Germany the five of us tried it out to good effect in Mannheim where a Police Band was playing to an open air audience at the foot of the massive Wasserturm (watertower) as coloured floodlights illuminated the many fountains cooling the night air.

Elsewhere in this issue Fred Judd reports on the new BASF Works in Willstätt where the entire output of magnetic tape is now made in the most modern recording tape factory in the world. What a contrast this is to Ludwigshaven. Clean air in a pastoral region, completely dust free zones within the works (since dust is the mortal enemy of any magnetic tape) and an almost clinical cleanliness throughout. The entire field of magnetic tape technology is passing through a period of unparalled development, the ultimate end of which is impossible to predict at this juncture.

SOUND SCENE

Fig. 1. The new Grundig TK320 automatic stereophonic tape recorder.

Automatic Stereo from Grundig
A two-track version of the TK340 is now available from Grundig (GB) Limited and is known as the TK320 (Fig. 1). It is a three-speed, fully stereophonic tape recorder and reproducer incorporating separate recording and playback heads, separate recording/playback amplifiers, facilities for multiple synchronization, monitoring via tape and the introduction of echoes and remote control. It has a press button position indicator, tape cleaner, recording input selector, temporary stop key and will take 7 inch spools. There are two fully transistorized output stages with separate built-in bass loudspeakers. The recorder is supplied with 1800 ft of double-play tape on a 5¾ inch spool, a multi-purpose stereo record/playback lead and spare tape cleaning felts. The TK30 is housed in a smart case finished in charcoal and ivory with silver grille and the suggested price is 119 guineas. Further details from Grundig (GB) Limited, Newlands Park, London, SE26.

Local Broadcasting
The BBC announces that Station Engineers have been appointed for the first six experimental local broadcasting stations as follows:

Brighton	Mr E. R. H. Castle
Leicester	Mr J. B. Hawley
Merseyside	Mr C. G. Wright
Nottingham	Mr M. R. A. Edis
Sheffield	Mr J. K. Beard
Stoke on Trent	Mr B. G. Lock

The station engineers will be responsible for installing, testing and commissioning the equipment for the local stations and for its subsequent operation and maintenance, under the direction of the BBC's Chief Engineer, Sound Broadcasting, Mr A. P. Monson.

One-Spool Tape Recorder
Radionette of Norway claim that their multi-corder is the world's first portable to employ a single tape spool. As the tape must go somewhere after being played we suspect it winds on to a spool of some kind underneath. However, the idea makes for a compact portable as shown in Fig. 2, but with reasonably long playing tape time. It takes a 5 inch diameter spool of tape. It operates from mains or batteries and several accessories including a neat carrying case with shoulder strap are available. Recording speeds are 1⅞ and 3¾ ips, and facilities include input sockets for microphone and radio, fast forward and reverse re-wind, tape position indicator, recorder level meter etc. Track designation is standard quarter-track on quarter inch wide tape. The price of the Multicorder is 38 guineas. Extras include a microphone at 2 guineas, carrying case 4 guineas and mains unit at 5 guineas. Further details from local dealers or Denham & Morley Limited, Denmore House, 173/5 Cleveland Street, London, W1.

Mastertape Magnetic Drums
Magnetic drums coated by Mastertape (Magnetic) Limited form the heart of the

Fig. 2. The Radionette single spool portable tape recorder.

popular Arbiter range of echo and reverberation units which are selling widely in both home and overseas markets. Breaking away from the troublesome tape loop principle, Arbiter specified drums with a dimensional accuracy approaching that needed for computer drum stores. This enables recording and pick-up heads to work out of contact with the magnetic coating, so eliminating wear on either. On to the edges of these drums Mastertape coat a magnetic paint to a thickness of half a thousandth of an inch, with a uniformity better than ±5% within drums.

In use the drum is surrounded by a number of magnetic heads including an erasing head, a recording head and one or more playback heads whose working gaps are spaced from the coating surface by controlled amounts (Fig. 3).

The delayed signals picked up by the playback heads can be used individually, or mixed and controlled to produce a variety of reverberating, flutter and echo effects. The delay time of each echo is set by the peripheral speed of the drum and the spacing of each playback head from the recording head. The track width permits the use of either single half-track heads for mono working or twin quarter-track heads for stereo (as in one of the Arbiter units). At a peripheral speed of 20 inches per second, the units provide delays between 80 and 240 milli-seconds and have a useful frequency range up to 5KHz. Details concerning Mastertape Magnetic tape drums are available from Mastertape Limited, Poyle Trading Estate, Colnbrook, Bucks. Details of the Arbiter Echo Units from Arbiter Electronics Limited, 33 Woodthorpe Road, Ashford, Middlesex.

Fig. 3. The Arbiter reverberation unit employs a number of magnetic heads and is used with the Mastertape magnetic drums.

Philips 85 Pocket Memo

The Philips 85 Pocket Memo shown in Fig. 4 is smaller than the average portable transistor radio and measures $4\frac{3}{4} \times 2\frac{5}{8} \times 1\frac{3}{8}$ inches. This enables it to fit conveniently into most pockets. It has a built-in hypercardioid microphone with extraneous noise cancelling properties and automatic volume control provides a constant recording level. The microphone capsule also functions as the playback loudspeaker. It is a simple matter – one-handed – to record, rewind, playback, control the volume and manipulate the safety locking device. The 85 pocket Memo employs a specially designed Philips micro-cassette system which weighs only a quarter ounce. It snaps into position for easy use, has twin tracks which provide ten minutes recording on each. A 9 volt dry battery gives approximately 10 hours of life with intermittent use. Accessories available for the Philips 85 pocket Memo include a stethoscope headphone for private listening and a dubbing lead for transferring the recorded message on to a Philips 84 automatic (or Philips 82 Dictation machine). This enables transcription by an audio typist. Details from Philips Electrical Limited, Century House, Shaftesbury Avenue, London, WC2.

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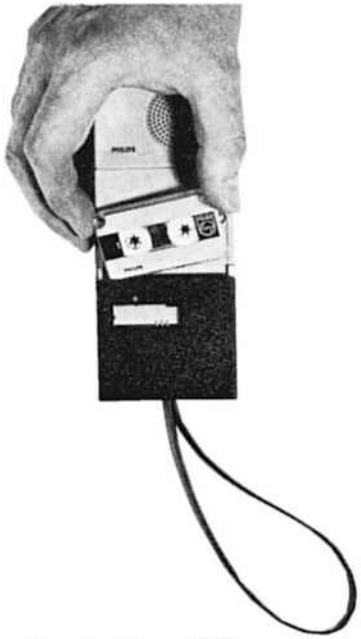
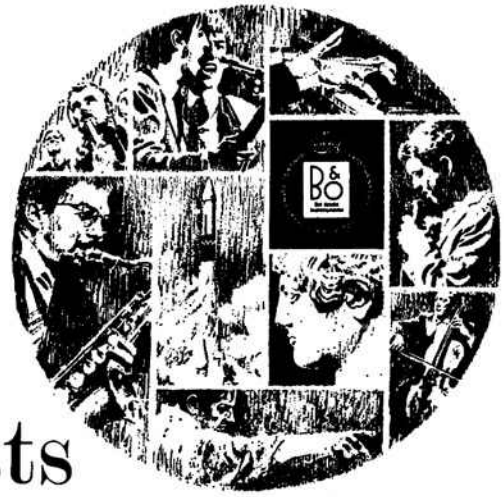


Fig. 4. New Philips miniature pocket recorder.

Fig. 5. The well-known Uher 4000 Report L is now available for stereo operation and is known as the 4200.



This year only 465 music enthusiasts will have their greatest wish fulfilled–the perfect High Fidelity system. The most thrilling system ever– and made by Bang and Olufsen.

1 **BEOLAB 5000.** 2 x 60 watts R.M.S. silicon transistor amplifier. Power available to reproduce full original volume at all frequencies in association with loudspeakers of normal efficiency (1–2%). Cursor type controls in place of knobs for slide-rule accuracy in setting. Comprehensive variable inputs and duplicated phono & Din outputs. Elegant long low free-standing cabinet in solid Teak or Rosewood.

2 **BEOMASTER 5000.** Stereo F.M. Tuner with usable sensitivity of 1.5μV. Automatic Mono/stereo switching, 4 stage gang tuned R.F. section, 5 I.F. stages and A.F.C. Large radicator calibrated relative to signal strength. Cursor type tuning control with vernier adjustment. Variable muting and stereo levels. Aerial inputs for 75 ohm, 300 ohm and local. Identical in size and cabinet finish to match Beolab 5000.

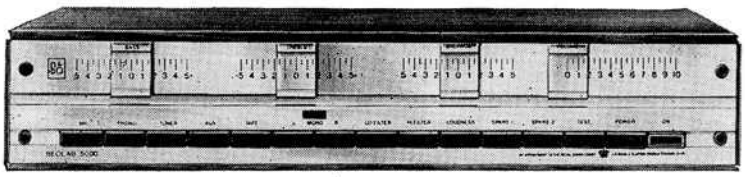
3 **BEOVOX 3000.** Pressure chamber loudspeaker with separate bass, mid and high (x 2) frequency units. Variable attenuators to the mid and high frequency units. Provision for the connection of a separate high frequency diffuser unit (Beovox 2500). Maximum power handling capacity 50 watts music power, impedance 4 ohms. Solid Teak or Rosewood finish.

4 **BEOVOX 5000.** Pressure chamber loudspeaker with 1 x bass 2 x mid frequency and four high frequency units. Variable attenuators to mid and high frequency units. Provision for the connection of high frequency diffuser unit. Distortion at maximum power 2.2%. Maximum power handling 50 watts music power, impedance 4 ohms. Solid Teak or Rosewood finish, free standing on elegant stainless steel legs.

5 **BEOGRAM 3000.** Transcription turntable unit fitted with the world famous B & O STL/15° tone arm, lowering device and a B & O SP7 stereo magnetic cartridge. Illuminated and magnified strobe. Mounted on solid Teak or Rosewood plinth and complete with plexiglass cover.

6 **BEOVOX 2500.** High frequency sound diffuser unit. Six loudspeakers mounted one to each face of a cube for the omnidirectional distribution of the high frequencies. Mounted on a stainless steel base or may be suspended. Power handling 50 watts music power over 2kHz.

Bang & Olufsen



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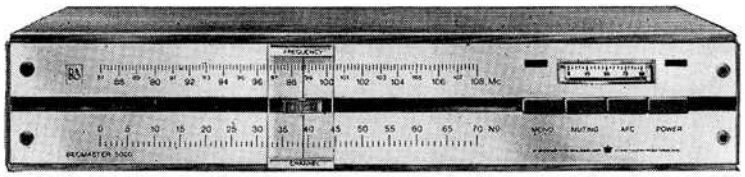

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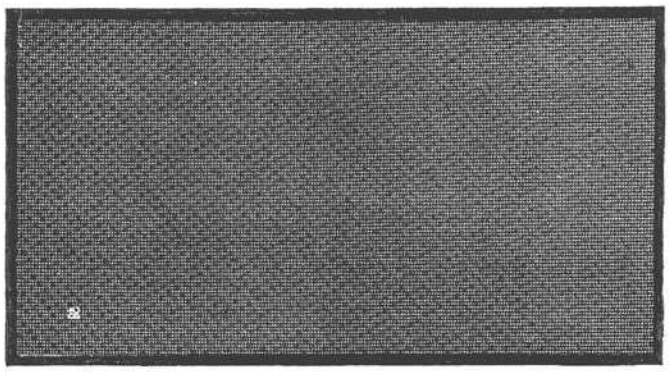

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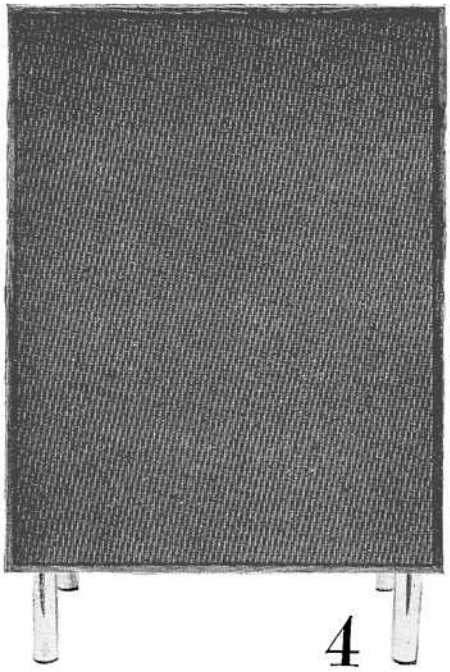

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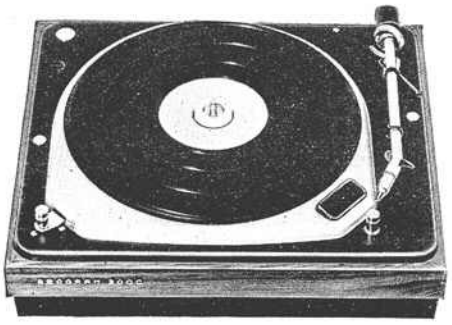

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6

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Beolab Series

INTRODUCTION TO TAPE RECORDING
PART 6 Impedance matching simply explained

by Gordon J. King

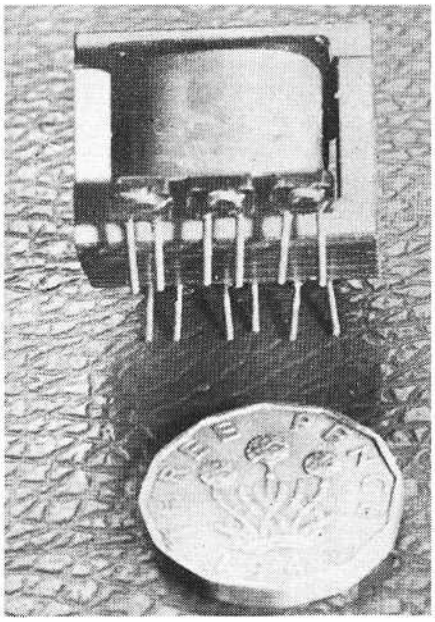

Fig. 1. Small microphone matching transformer.

To conclude this first section of the beginners' series, we shall investigate the various problems that crop up when attempts are made to employ a microphone other than that supplied with the machine; when the recorder is arranged to supply recording and replay signals for feeding into a second machine (for dubbing, superimposition, etc); and when programmes from, say, radio, television and record player are recorded. The second section of this series – still for beginners – dealing with sound itself and the basic aspects of hi-fi, will start next month.

The microphone supplied with a domestic tape recorder is chosen by the maker – indeed, often designed by him – to match exactly into the machine. This ensures optimum signal transfer from the microphone. Thus, if a different type of microphone is plugged in, it is pretty much of a gamble whether the match will be as good. If it is not, the results are likely to be poorer, and this is a frustrating state of affairs, especially if a fair amount of hard-earned cash has been invested in its acquisition in the hope of obtaining better recordings.

Apart from matching, which is explained shortly, some microphones deliver more signal voltage than others and, curiously, from the non-technical view-point, the more expensive versions often have a low output compared with the relatively inexpensive ones, often supplied with the recorder.

Sensitivity

The sensitivity of a microphone is expressed in terms of how much signal it delivers for a given sound pressure (or intensity) input. To the beginner, the expression may seem rather technical in the literature, but it is not, really. Let us investigate such a specification. We may see something like the following in a microphone leaflet: Sensitivity −55dB/volt/dyne/cm². This simply means that relative to 1 volt, the signal output is −55dB when the sound input is equal to a pressure of 1 dyne/cm². Decibel tables (see the June, 1967, issue of *ATR*) show that 55dB is equivalent to a voltage ratio of about 562 : 1. Thus, relative to 1 volt, this is something under 2mV.

The signal voltage, of course, will vary as the sound pressure varies, but the example given is from a microphone with a good sensitivity. Some are far less sensitive, down to −80dB, equal to a voltage ratio of 10,000:1, giving an output of only 0·1mV at the pressure of 1 dyne/cm².

One can see, therefore, that if the recorder microphone channel is designed to produce a signal for maximum recording level at an input of, say, 2mV, a microphone delivering a signal of only one-twentieth of this level will barely give any response at all. The effect is that one turns up the recording level control to full, and while this gives a greater boost to the microphone signal, it also boosts noise, hum and background noises in the amplifier; the result is then a noisy recording, still possibly below full modulation.

One solution is to use a microphone booster amplifier between the microphone and the input of the recorder. Some microphone firms supply such amplifiers.

The first thing to find out, therefore, before buying a second microphone for the re-

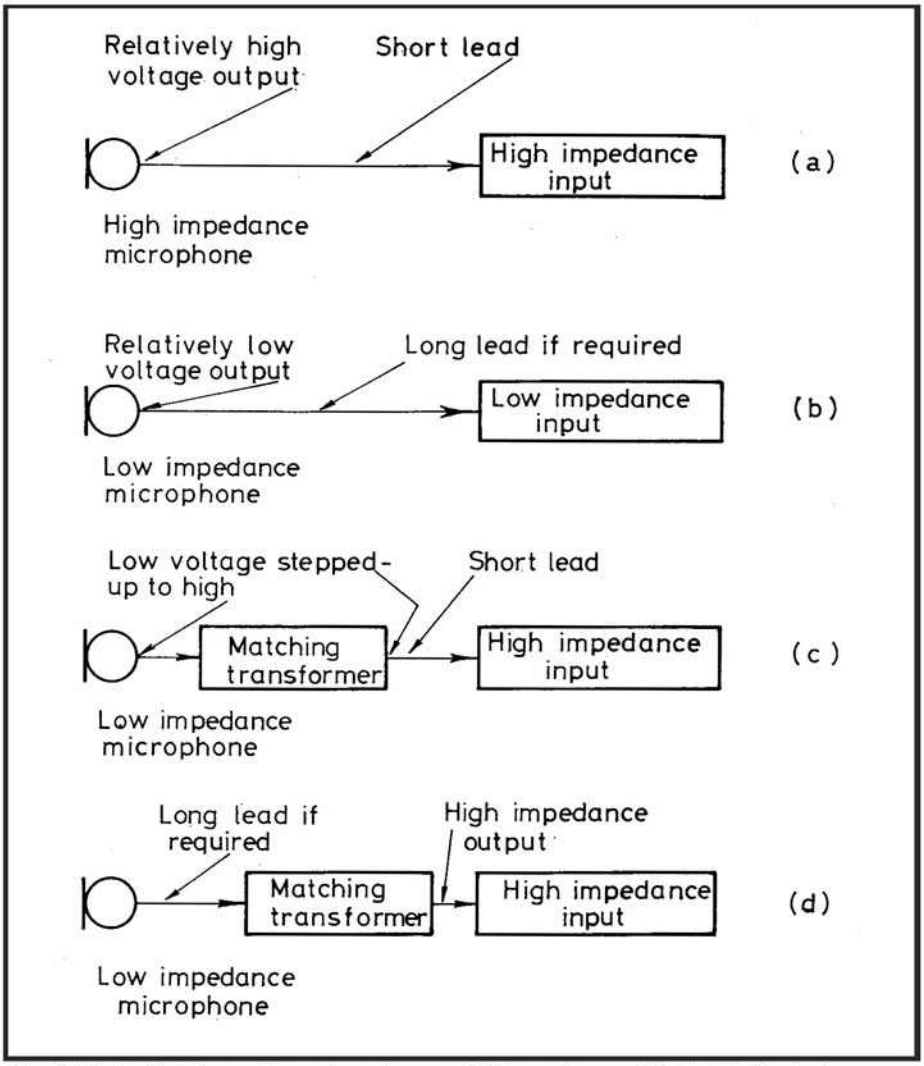

Fig. 2. Illustrating the various microphone matching schemes detailed in the text.

corder is to ensure that its output is not much below that of the original. Now we must look at the matching aspect.

Matching

For maximum signal transfer from one item of equipment to another, it is necessary for the impedance of the source (as resistance) to equal the load impedance of the input. Thus, if the recorder's microphone input is given as, say, 1 megohm, then the microphone should also have a like impedance. Ceramic and crystal microphones mostly have this high impedance, for they are inherently high resistance devices.

Dynamic microphones, taking in moving-coil and ribbon types, on the other hand, are inherently low impedance – just a few ohms. Many of them incorporate internal matching transformers to step-up the low value to a medium impedance of about 600 ohms. Some, though, have transformers giving a high output impedance. The STC 4114 microphone, for example, embodies such a transformer, stepping-up the basic 250 ohms of the unit to 80,000 ohms. Fig. 1 shows a miniature matching transformer of this kind. Such a matching artifice makes it possible to use an inherently low impedance microphone with a recorder having a high impedance input originally designed for crystal or ceramic microphones.

An important point to remember is that the apparent sensitivity of a high impedance microphone (or a low impedance one converted to high impedance) is greater than its low impedance counterpart. The prime reason for this is because the sensitivity is expressed as a *voltage* ratio (in decibels), as we have seen, and as well as the impedance, the voltage is also automatically stepped-up by the matching device (the power is not increased, of course). The STC microphone just mentioned has a movement sensitivity of —80dB across its 250 ohms, but when made high impedance by the transformer the sensitivity is increased to —55dB.

To recapitulate, therefore, sensitivity comparisons must be made at similar impedances. It is pointless to compare the sensitivity of a low impedance microphone with a high impedance one when a choice for a second microphone is being made. Thus, it is essential to take into acount both sensitivity *and impedance.*

Many domestic recorders are designed for – and sold with – crystal or ceramic microphones. These are very good for amateur use and have the advantage over most other types of a higher sensitivity (greater signal output voltage). Very poor results would be obtained, therefore, by connecting a low impedance moving-coil or ribbon microphone direct to a high impedance input. The recording level control would need to be turned full on, and even then the modulation would be very low. Hum and noise would also be high.

However, good results are usually obtained by employing a matching transformer and the STC 4114 microphone which has a built-in transformer designed for use with recorders with a high impedance mic input. It is best to have the transformer in the microphone housing where possible, provided the microphone lead is kept to a reasonable length. Where a long or extended microphone lead is essential, the coupling transformer should be at the tape recorder end to avoid the pick-up of hum and noise. This, in effect, steps-down the recorder's impedance, allows a low impedance lead and then facilitates direct connection of a low impedance microphone at the far end. The general schemes are illustrated in Fig. 2.

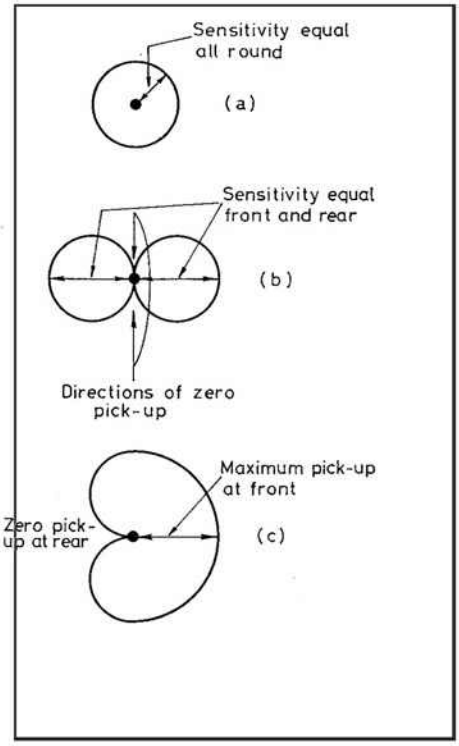

Fig. 3. Polar response characteristics of microphones. The nature of the diagram is a direct measure of the sensitivity (or sound pick-up) at all angles round the microphone, as explained in the text.

Polar Response

In addition to sensitivity and impedance, microphones are endowed with other characterisics, a main one being directivity. Microphone literature thus displays rather complex-looking diagrams, something after the style of graphs within a surrounding pattern. These are called polar diagrams and they simply indicate the relative sensitivity of the microphone to signals arriving from all directions round it.

A microphone which is equally sensitive to sound arriving in all directions has a so-called omni-directional polar response, as shown at (a) in Fig. 3. Pressure-operated microphones are essentially of this kind. Pressure-gradient microphones, on the other hand, have a figure-of-eight response, shown at (b). Ribbon microphones are often of this kind. Microphones which combine pressure operated, such as the moving-coil and ceramic (and crystal), and pressure gradient functions exhibit a cardioid (heart-shaped) response, shown at (c). The nature of polar response (or polar diagram) must be taken into account when choosing a microphone for a specific function. For instance, for use on a stage, a cardioid response is ideal, for it responds mostly to sounds arriving at the front, severely attenuating those arriving from the rear (i.e., from the audience). More will be said about this in the new 'sound' series referred to earlier.

Connecting other Signals

So much, then, for microphone matching, now let us see what is involved in applying other signals and extracting signals from the 'monitor' socket for application to a second recorder or hi-fi system. First, applying other signals.

These signals are generally given at the 'recorder' output of a radio set or record player and, as with microphones, the two main parameters are signal strength and matching. If, say, the 'radio' or 'aux' input of the recorder has an input sensitivity of 100mV at 100,000 ohms, the best and absolute matching is achieved when the signal source (radio or record player) delivers this nominal level of signal across a matching resistance. It is then simply necessary to connect the output of the source to the input of the recorder. Via a screened lead of course.

Sadly, it rarely happens that the two signal levels and their respective impedances match. However, provided the source delivers a *greater* level of signal than required by the recorder, the impedance problem can usually be overcome without much trouble, by the use of a resistive matching pad. Let us suppose that the source delivers 500mV of signal across 10,000 ohms while our recorder requires 100mV across 2,000 ohms (this is not typical, incidentally). Here we have five times more signal than we require, so we can afford to attenuate in the resistive coupling and matching arrangement. At this juncture, it should be clearly understood that any resistive arrangement used for matching automatically introduces sig-

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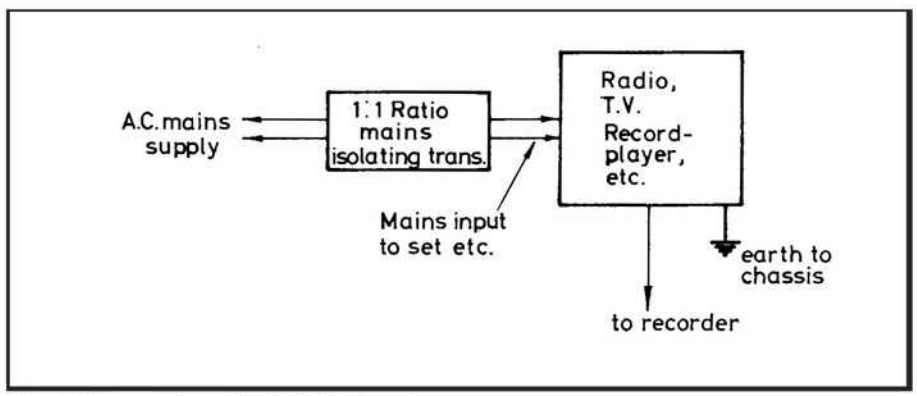

Fig. 4. The use of a mains isolating transformer.

INTRODUCTION TO TAPE RECORDING

continued

nal attentuation, whether we like it or not. It is only possible, therefore, to obtain correct matching when there is more signal at the source than we need for the recorder. It is not generally possible to match resistively the other way round. In any case, if the source fails to produce the signal level required by the recorder no amount of matching will help matters and only make them worse.

Even if the source delivers the same voltage as required by the recorder, not all this voltage will arrive at the recorder if matching is necessary. Let us suppose the source delivers 100mV across 10,000 ohms and our recorder also needs this level of signal but across 100,000 ohms. An attenuator matching the source 10,000 ohms to the recorder 100,000 ohms will attenuate the signal and the recorder would only get about 10mV. The same might well apply the other way round; that is, a 100,000 ohm source and a 10,000 ohm recorder input.

Sometimes, though, it is possible to ignore the matching aspect, provided there is not too great a difference, and couple the source direct to the recorder even though the impedances may differ substantially within a range of impedances. This means within the ranges of low (50 to 600 ohms) medium (600 to 1,000 ohms) and high (above about 5,000 ohms). Just how well this will operate will depend on the nature of the source and recorder input circuits. No hard and fast rules can be given here. It is necessary to try it and see what happens!

Provided the signal is strong enough, it is often possible to get away with this when the source impedance is *below* the recorder impedance. More problems generally occur when the source impedance is well above the recorder impedance. This is why fair results have been obtained when the extension speaker socket of a radio set is coupled direct to the recorder input. Here is a typical example of low impedance to high impedance direct coupling.

It is not possible in this article to delve into resistive matching networks. This is a technical subject which will be looked at in later issues. When the above stipulations can be justified, a radio dealer (one selling tape and hi-fi equipment, preferably) will suggest a suitable coupling and impedance matching pad.

Matching from the 'monitor' socket of a recorder to a second recorder or external amplifier is under the control of similar signal level and matching laws, and that already expounded applies equally to this sort of coupling. If the signal level aspect is satisfied, but not the impedance aspect, direct coupling without matching can affect the frequency response characteristics of the coupled and partnered equipment. There could be an abnormal boost of bass or treble frequencies, depending upon the exact nature of the mismatch.

A Lethal State

A major aspect of coupling into external radio, record player or TV equipment is safety. Many domestic radio and TV sets (and record players) have a so-called 'live' chassis. This means that the metal chassis and the HT negative line is connected (or earthed) direct to the mains supply and any external equipment connected will automatically become 'live' to the mains also. This is highly dangerous and could easily make the equipment lethal or at least capable of imparting severe electric shock.

The only satisfactory solution here is to 'isolate' any live chassis radio, TV, etc from the mains supply by a 1 : 1 ratio mains isolating transformer of wattage rating to match the powered equipment and connect the chassis to a good earth. The signals can then be taken from across the volume control, for example, in the usual way. The method is shown in Fig. 4.

On no account ever connect directly to earth any equipment with a live chassis design, even though the chassis is known to be in connection with the mains neutral. Not only is this against the law, but is highly dangerous. If in doubt, consult a service engineer.

The Tandberg Series 12
A hi-fi, fully transistorised stereo record & playback system

Features:
*20 WATTS OUTPUT (10 watts per channel) makes additional Hi-Fi unnecessary.
*BASS & TREBLE Tone Controls.
*F.M. MULTIPLEX filters fitted (a *MUST* for recording Stereo Radio).
*INTERNATIONAL CONNECTORS i.e. Phono and DIN and Standard Jack Sockets.
*CENTRE CHANNEL OUTPUT.
*PRE-AMP OUTPUTS.
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Specification:
Power requirements: 220 Volts 50 c/s AC
Power Consumption: 58-100 Watts
Recording System: 4 or 2 track stereo
Tape Speeds: 7½ ips, 3¾ ips, 1⅞ ips.
Speed Tolerance: Better than 1.5%
Reels: 7" Max.
Internal Loudspeakers: Two 7" x 4" Goodmans 2x3 Watts
Frequency Response:
7½ ips: 30-20,000 c/s (±2dB 40-16,000 c/s)
3¾ ips: 40-12,000 c/s (±2dB 60-10,000 c/s)
1⅞ ips: 40-7,000 c/s (±2dB 80-5,000 c/s)
Wow% R.M.S.:
7½ ips: Better than .15%
3¾ ips: Better than .2%
1⅞ ips: Better than .3%
Signal/noise Ratio:
4 track 55 dB
2 track 58 dB
Distortion:
At max. recording level
Recording Amp: 0.5%
Playback Amp: 2 x 10 Watts 0.5%
Outputs:
Power Amp. 10 Watts per channel, continuous power.
Pre Amp: 5 K ohm/0.75V
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Input Impedance & Sensitivity (Max. Volume):
Mike: 2 x 200 ohm/0.15V
2 phono contacts per channel:
High level: 1 M ohm/75mV.
Low level: 0.1 M ohm/7.5mV.
2 x 5 pin DIN contact:
High level (Phono)
Low level (Radio)
Dimensions and Weight:
Cabinet model: 15⅜" x 7⅛" x 11⅝" 23lbs.
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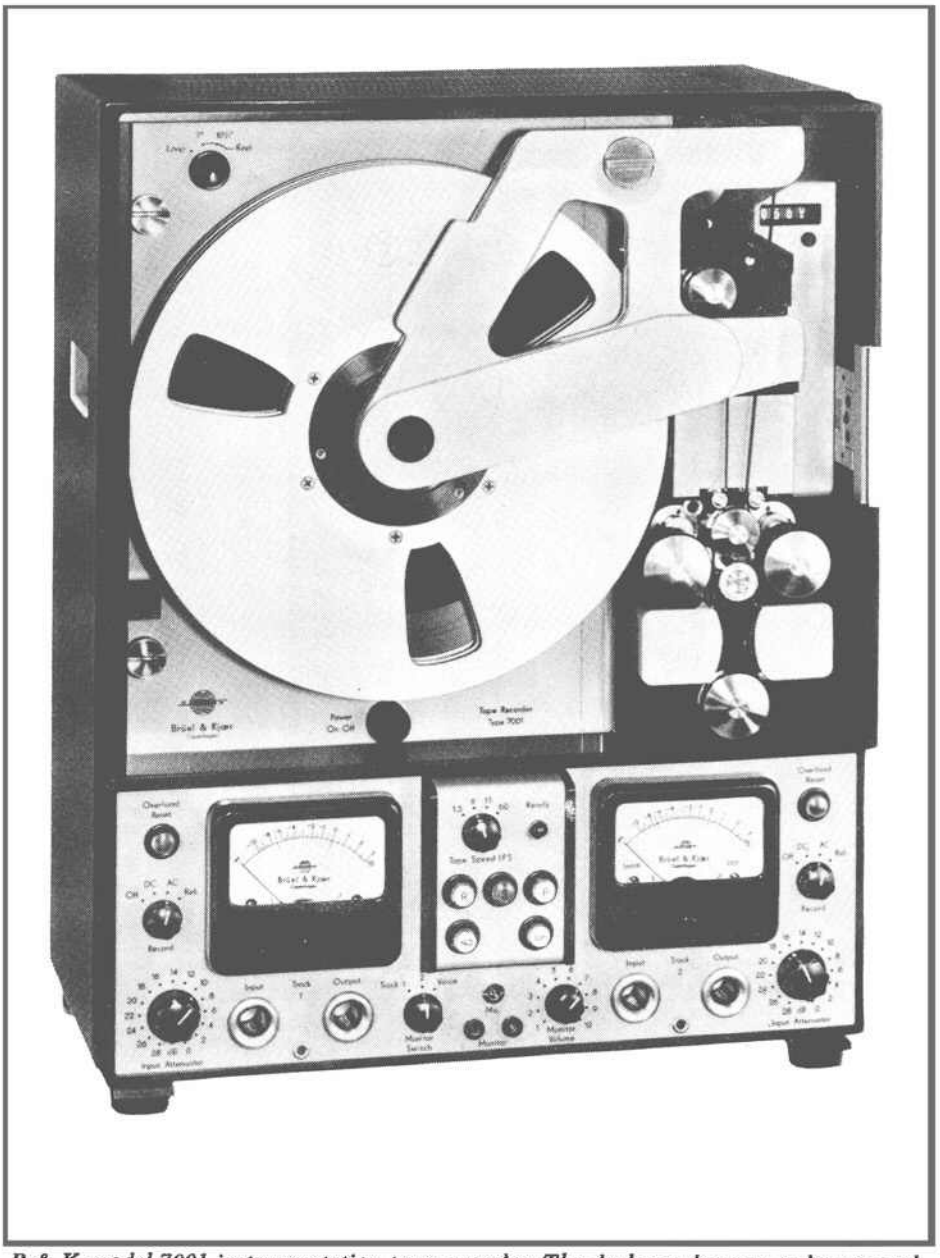
AN UNUSUAL TAPE RECORDER

The B & K model 7001

by G. Beaumont



B & K model 7001 instrumentation tape recorder. The deck can be seen to be unusual since it uses two concentric spools in order to conserve space. The remote control unit is situated between the signal level meters.

A high-quality magnetic tape recorder for instrumentation use has recently been announced by the well-known Danish firm B & K. The tape recorder has been designed to fulfil the numerous requirements of a high quality instrumentation recorder intended for all kinds of shock, sound and vibration measurement in the laboratory, and this has resulted in various unusual design features. The machine can be used for the recording, storing and analysis of two independent phenomena since two identical channels are provided for measurements.

In common with other high-performance tape recording machines the recorder uses frequency modulation to give improved performance over conventional methods. Four carrier frequencies are used, 2·7KHz, 10·8KHz, 27KHz, and 108KHz and the particular frequency chosen for modulation depends on which of the four tape speeds are being used ie 1·5, 6, 15, and 60 ips. The technique results in a frequency response extending from dc to 500Hz, 2KHz, 5KHz or 20KHz depending on the tape speed and a signal-to-noise ratio of about 45dB for the low speed and about 50dB for the higher speeds.

The four different tape speeds make it possible to bring either very low frequency signals up into the analysis range of modern analogue (continuous) frequency analysers, or to bring high-frequency signals down to the range of slow-speed graphic pen recorders. To allow detailed analysis of special parts of a recording, a loop adaptor is used and this is placed on the machine instead of the normal tape transport mechanism. Normal is perhaps the wrong word to use because the tape deck is far from conventional. Instead of the normal two separate tape reels with heads situated between the two, only one tape reel is visible the other being concentrically situated so that a considerable saving of space results. (The spools are 10½ inches in diameter.) For ease of handling and maintenance,

the heads are situated at the bottom right of the spool, the tape being fed to the capstan by a set of pulleys.

The tape transport system consists of a capstan motor, a take-up spool drive, a rewind motor and safeguarding circuits which control the operation of the three motors. The tape speed and pinch roller are both electronically controlled. To ensure low flutter (tape speed variation) both mechanical layout and electronic circuitry have been very carefully designed. All mechanical components are produced to very close tolerances and to keep the unsupported section of the tape as small as possible a closed loop drive is used. Outside the closed loop system the tape tension is controlled by an electro-mechanical servo system.

A further special feature of the tape deck is the facility of being able to use a separate drive for the capstan motor. To allow convenient operation of the tape transport mechanism, the controls (i.e. record-playback, stop-rewind, forward, and speed change) are all located in a small control box which can either be inserted in the front of the instrument or can be taken out of the recorder and remotely operated.

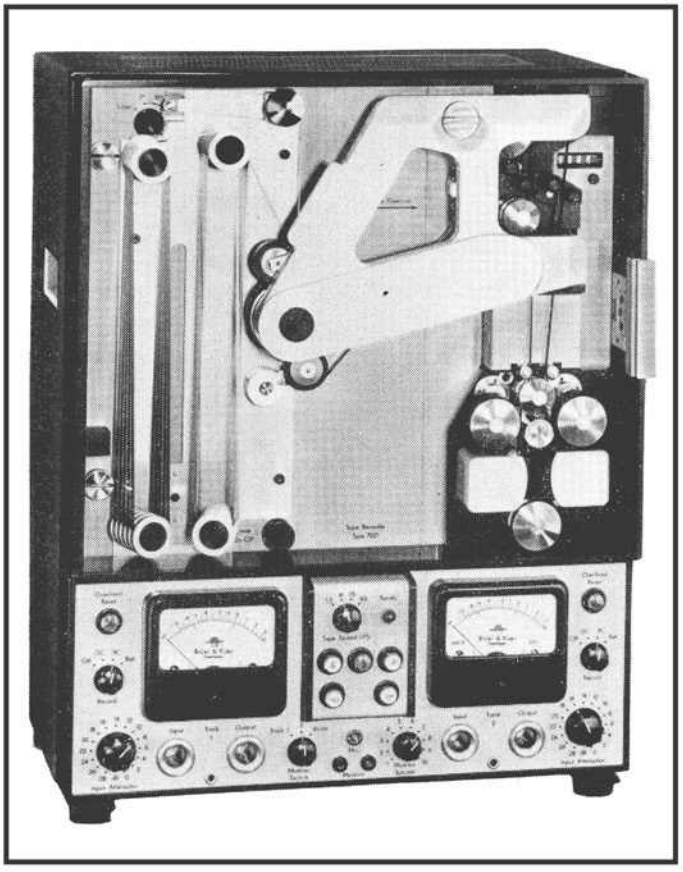
Some of the other features of the instrument are:

(a) ferrite record and playback heads to give long life,

(b) photo-electric control for automatic stop at tape end or if the tape should break,

(c) four-digit reset counter giving tape length in feet.

Both of the main channels are equipped with peak programme meters for signal level control and special overload indicators are triggered if the maximum recording level has been exceeded. In place of the normal volume controls accurate input attenuators are used and these allow the tape to be calibrated at any desired signal level.



Tape loop adaptor for analysing sections of tape. The heads and capstan are situated at the bottom right of the deck.

ATR visits BASF WILLSTÄTT

The world's newest and most modern tape factory

by F. C. Judd

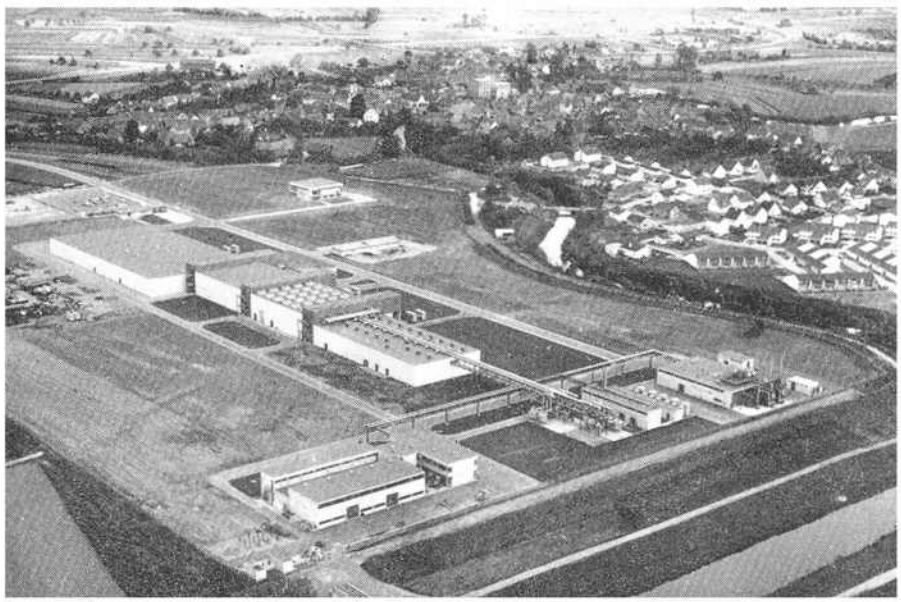


Fig. 1. The new BASF magnetic tape factory at Willstätt in Southern Germany.

With the fabulous and almost entirely automated factory at Wilstätt near Kehl-on-Rhine, BASF now have four manufacturing plants for magnetic tape. Two are in Western Germany, one at Ludwigshafen and the new plant at Willstätt. The third is at Gien in France and the fourth in the USA near Boston, Mass.

The tremendous increase in the demand for magnetic tape for recording and industrial purposes had made it necessary for BASF to erect the new plant at Willstätt, which is about 120 miles south of Ludwigshafen and can be safely described as the most modern in the world. The factory was designed and built in 18 months and virtually floats on the marshy ground in that part of the Rhine valley.

This location for the factory was chosen for several reasons such as adequate water supply, disposal of waste water, access by road and rail and of course availability of labour. Perhaps the most important is the fullest possible elimination of dust which is easier to achieve in the rural atmosphere of Willstätt.

Raw Materials Inspection

The Willstätt factory is a purely manufacturing plant and the raw materials for tape – plastic film, iron oxide, lacquer and solvents – originate mainly from the giant BASF fac-

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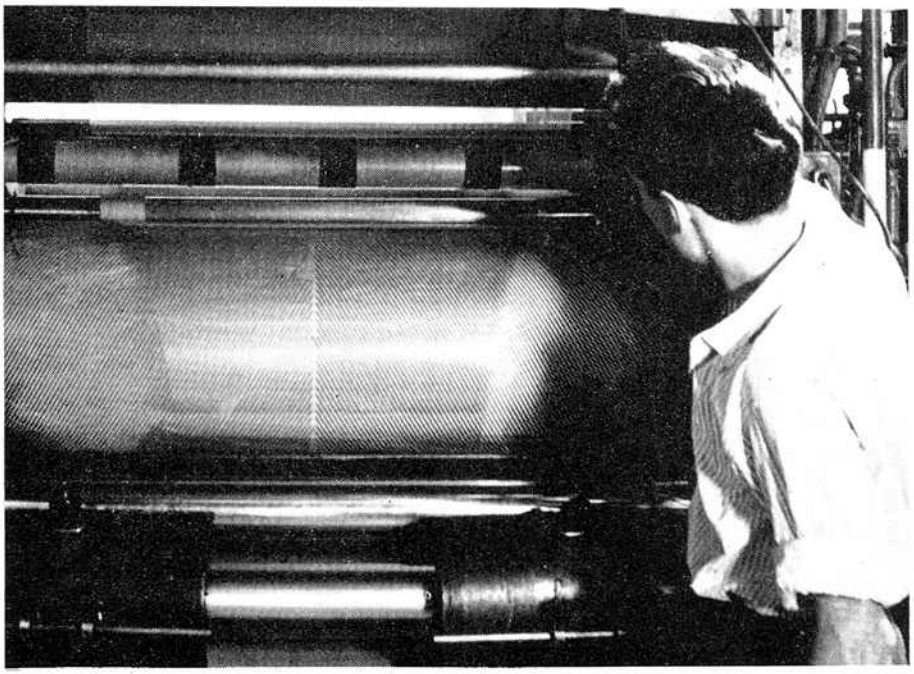


Fig. 2. The fully transparent wafer-thin film, the tape base, is shown here being stretched on a fixed wrinkle *roller. This stretching imparts the required stability to the film for the mechanical stresses which it will be subjected to. The film base is made at BASF in Ludwigshafen.*

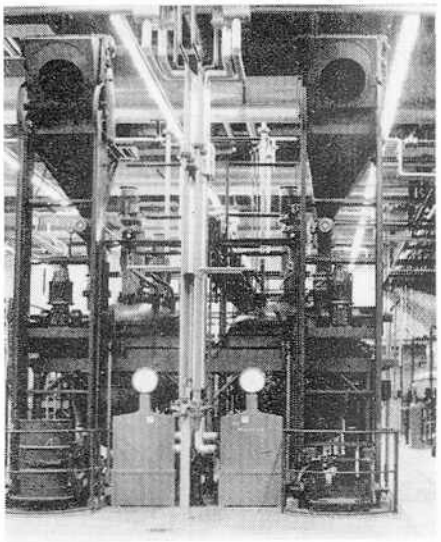
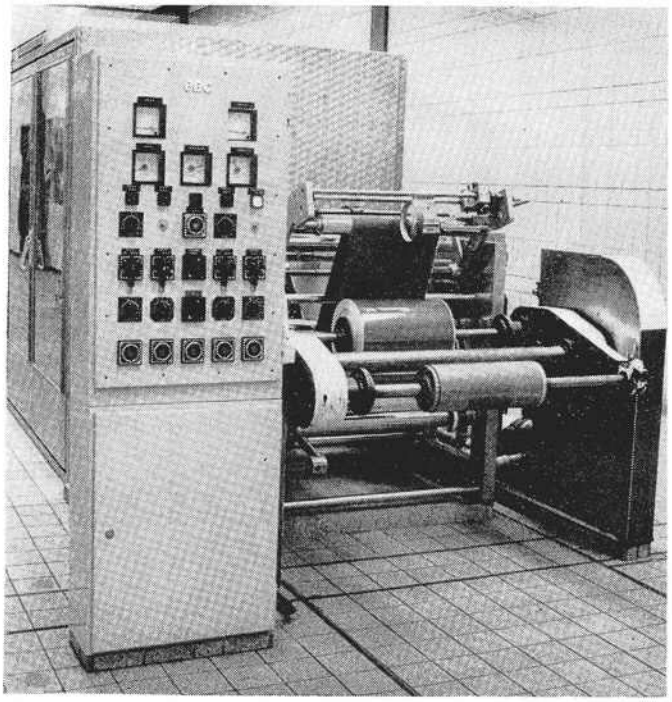


Fig. 3. This plant produces the dispersion, the brown liquid compound of oxide, lacquer and solvents which become the magnetic coating on the finished tape.



Fig, 4. After being passed through a drying tunnel the iron oxide magnetic coating is bonded with the plastic film and wound into the wide rolls or 'blocks'.

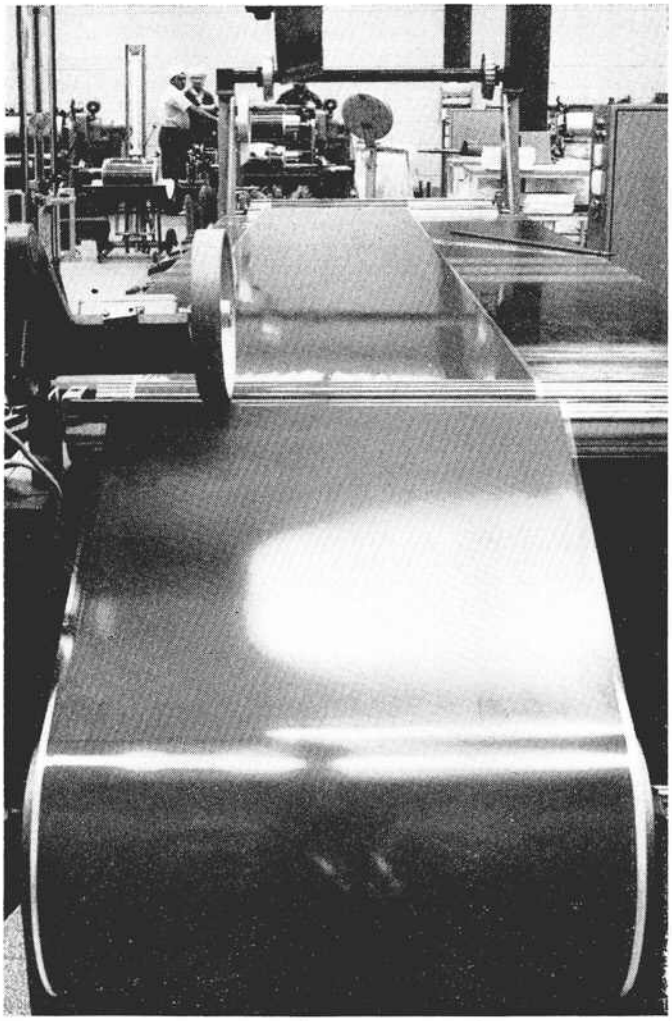


Fig. 5. After coating and drying the magnetic film is cut into individual tapes (see also front cover photos).

Fig. 6. At Willstätt, BASF also make computer tapes. These must be even more perfect than domestic and professional recording tape and the testing is entirely automatic. The testing machine stops instantly if it 'senses' the tiniest flaw in the magnetic coating.

ATR visits BASF WILLSTÄTT

continued

tory at Ludwigshafen. Despite the fact that a rigid inspection of all materials is carried out before they leave the parent factory everything undergoes an 'entry inspection' on receipt at Willstätt. For example, chemically produced iron oxide from which the tape coating is produced must display certain specific magnetic characteristics. The tape base, or film, either PVC or polyester, is in some cases only just over one hundredth of a millimeter thick. Every roll of film base is checked for uniformity in thickness over its entire length.

Automated Processes

At Willstätt the raw materials enter the factory at one end and appear as boxed tapes at the other practically untouched by hand at any stage of manufacture. The first stage is that of dispersion, i.e., the mixing of the iron oxide and lacquer which eventually becomes the magnetic coating of the tape. This is an entirely automated process and is quite uncanny to see the huge mixing tanks and all the associated equipment operating entirely on its own in an apparently almost deserted plant.

The next stage is the application of the magnetic emulsion to the base film which takes place in what is known as the 'white zone'. This factory within a factory has airlocks at all entries, a micro-filtered air supply and fully automated air conditioning to ensure constant temperature and humidity. Access to the 'white zone' can only be made through the airlocks which remove the dust from the special clothing worn by all employees.

At the 'feed' end of this long and entirely automated section of the factory the film is washed and dried after which the dispersion, as the oxide coating is called, is applied. Then follows another inspection check, this time on the overall thickness of film plus coating. The final and one of the most important stages is that of magnetically aligning the oxide needle particles within the emulsion before it is completely dried. This is carried out by passing the coated film through a magnetic field, a process which improves the accoustical qualities of the finished recording tape.

The Finished Tape

The freshly coated and magnetically aligned tape which comes off in rolls about 18 inches wide is then completely dried and undergoes yet another test for coating thickness. After this the 'rolls' are cut into the familiar quarter-inch wide tapes, each tape in turn being wound off on to 12 inch spools. A sample tape from every new roll is submitted to magnetic and mechanical characteristic tests and only after these have proved satisfactory, can the finished tapes be wound on to the selling spools ready for packing and despatch. Even the packing is mostly automated and the finished tape, having been almost untouched by hand throughout manufacture, eventually finds its way to someone's tape recorder. There are three things which impress the visitor to BASF Willstätt. One is the smooth integrated production process, the second being the most comprehensive protective measures taken to ensure that the tape is always to the high BASF standard. Last but not least are the precautions to prevent dust getting on to the tape at any stage of manufacture. As they say at Willstätt 'dust just doesn't stand a chance'. One final point therefore, do you, as a tape user, take as much care about dust? It *can* affect the recording and replay performance and even eventually cause head wear. FCJ

Fig. 7. A sample tape from every roll is tested from end to end. The results are pen recorded and a single small fault can result in having the entire batch tested and even rejected.

Fig. 8. Practically untouched by hand at any stage of manufacture the finished and spooled tapes come off the conveyor and are packed ready for despatch.

TAPE CLUB NEWS

If you have read the announcements in this and last month's *ATR*, you will know that from next month *ATR* will be incorporated in a new magazine *Hi-Fi Sound*. This, unfortunately means that Tape Club News will be discontinued as a monthly feature but we do hope to publish details of any very special plans or projects that you may be undertaking.
Reporting your news for the past eight months has been a pleasure and I would like to thank the clubs who have kept me supplied with the information that has kept Tape Club News alive and interesting.

ISABELLE TOURNOR

Evening Ramble
Members of the **South Devon TRC** thoroughly enjoyed a walk of about four miles through the lanes from Scott's Bridge and on to Kingskerswell Woods. Afterwards, the party drove to the secretary's home for coffee. This event was voted a success and Reg and Joan Baggaley arranged another outing of this kind.
Brian Mudge, Peter Wills and Gordon Furneaux recently visited the Paul Corin Musical Collection at Liskeard where a permanent and unusual exhibition of mechanical musical instruments from various parts of the world may be viewed and heard. The club reports that Mr Corin doesn't mind recordings being made and he is always willing to demonstrate and talk about the various items. The exhibition is open daily during the summer months from 10.30 am and week-end concerts are given during winter months.
Hon. Secretary of the Club is **Gordon Furneaux, 45 Kenwyn Road, Ellacombe, Torquay.**

Club's Second Birthday
In celebration of this anniversary, **Barrow Soundtrackers** spent an evening sitting back and listening to some of the club library tapes. A firm favourite is *The Brewers-up* which satirizes Middleton Club's award winning entry of a few years ago entitled *The Knockers-up*. The latter is a straight documentary describing the Northern phenomenon of early morning risers who, with a special pole for high windows, 'knocked-up' fellow mill workers and were paid 2*d*. a week for their services. *The Brewers-up*, written by Brian Rayner, closely follows Middleton's pattern and tells the tale of tea-makers and how very essential they are to tape club life. Middleton Club in their latest tape letter to Barrow have voted it a successful parody.
Mrs J. Rayner, the club's Press Officer will be glad to supply further details of club activities and she can be contacted at **123 Abbey Road, Barrow-in-Furness, Lancs.**

Newcastle TRC
Thanks to *ATR*, the **Newcastle TRC** now have a female member and they hope to be seeing more of them in the future.
Technical experiments were carried out recently with an electronic organ constructed by Alistair Milne and Malcolm Watt. With a range of 30 to 4,000cps, it has proved suitable for the creation of electronic music on tape. Experiments so far have been with the use of ecko and tape loops and these, combined with speed fluctuations, have proved that this home-built unit with the aid of tape is capable of good quality music.
More details of the club from **Mr D. Seward, Newcastle TRC, Church Institute, 6 Windsor Terrace, Jesmond, Newcastle-upon-Tyne.**

Brains Trust
During an interesting exercise known as the *Brains Trust*, four members of the **Derby TRC** sat in the hot seat and answered questions from the rest of the members and practised some on-the-spot fault-finding on one member's tape recorder.
Nicholas Potter gave the club a miscellaneous programme in which he demonstrated his new Labyrinth loudspeaker and Malcolm Nichols presented a fascinating collection of snapshots in sound, all collected on his Philips cassette recorder. Alan Towne, a new member, produced a fifteen minute programme which very humorously described the mental torture involved in making the tape.
More information about the club is available from **A. F. Stanway, 8 Midland Road, Derby.**

Doncaster and District TRC
The past months at the **Doncaster and District TRC** have been very busy with the new hospital broadcast but this has not disrupted the club's programme. Highlights of the past months have been a demonstration of two Sony 250A stereo tape hi-fi units by studio manager R. Brackenbury and a demonstration of Braun hi-fi equipment.
Rounding off the present programme were two meetings which included a film show by Mr G. Alsop and a tape competition entitled *Dawn Chorus* which was won by the club's two youngest members.
More details of the club's activities from the Hon. Secretary, **C. K. Young, 28 Chelmsford Drive, Doncaster.**

Leicester TRC
Members of a local choir visited the **Leicester TRC,** bringing with them some of their instruments. As there was a wide range in the ages of the members of the choir, the club enjoyed a variety of music from 'pop' to classical, including an excellent violin solo by a young schoolboy. Available for the concert was the Leicester Museum's Art Gallery which has very good acoustics and is often used for lunch time concerts in the city.
Several members visited the Boston Soundhunters recently to see their studio. The sixty mile journey each way was considered well worth it and members returned full of ideas of 'what to do with that spare room'.
Another outside event was a visit to the Newarke Houses Museum in Leicester to hear some of the instruments of bygone days. The club found these very interesting and, considering their age, in excellent working condition.
Hon. Secretary of the Club is **Mr John Moule, 55 Kitchener Road, Leicester.**

Visit from Mayor and Mayoress
A recent meeting of the **Rugby TRC** was entirely devoted to listening to Mr and Mrs Stan Carter who were Mayor and Mayoress of Rugby last year. The evening was highly successful because, apart from having an interesting speaker who can converse on any subject, the members had an opportunity of putting their own questions to their guests. Naturally, many questions concerned politics in local government and the events of last year.
At another meeting, members listened to a playback of tapes brought by members. A tape sent by Brian Woodcock, now on holiday, included recordings of aircraft such as the Spitfire and

De Havilland Tiger Moth as well as the Avro Anson which is apparently the oldest British aircraft of the Second World War still in flight.
Hon. Secretary of the club is **Janet Clarke, 11 Craven Road, Rugby.**

Coventry TRC
A return visit was made by P. Warden, K. Preston and T. Sprung of the **Coventry TRC** to Mr Harry Treadgold, Coventry's oldest Freeman. The purpose of the visit was to play back the interview with him made by Ken Preston and Peter Warden. After listening to it intently, Mr Treadgold was invited to don headphones and to listen to further extracts, and Mr Preston comments that if you have never seen the expression on a 97-year-old face when listening through this medium then you have missed something. To add to his enjoyment he listened to a stereo musical tape but apparently when he came to Ella Fitzgerald, he wasn't quite with it!
A pleasant evening was enjoyed when L. Jones showed the club films of his holidays and G. Taylor presented an interesting film on narrow gauge railways.
Secretary of the Coventry club is **Mr K. W. Preston, 42 Four Pounds Avenue, Coventry, Warks.**

Great Lakes Tape Club
Bruce Sherman, Director of the **Great Lakes Tape Club,** has been exchanging tapes with Mr Woodward in England and it has been agreed that the GLTC will send him plays for replay over Radio Tynemouth Hospital Broadcasting for 500 patients. Production of the first volume of the stereo round robin has been completed. All participants were pleased with the recording and plan to continue the project. Two interested members, Jim Miller and Rick Albright, have informed the club that they are in the process of producing a stereo round robin for club distribution.
Members have begun to circulate tapes independent of the monthly round robin. Hobert Fleischer will be distributing a tape of *Oldies but Goodies* upon request, and Bruce Sherman will be circulating *The Very Best of the Ventures, Vol. I.* This could develop into a very interesting activity.
The club is considering lowering the English membership fee from 30s. to 20s. in an attempt to boost their overseas membership. More details of membership are available from **Bruce Sherman, Director, Great Lakes Tape Club, 13346 Sherwood, Huntington Woods, Michigan 48070, USA.**

National Tape Club
Expansion is still uppermost in the minds of **NTC** members. The respective secretaries of NTC and the Irish Tape Recording Society are in contact with a view to exchanging ideas and pooling their resources in charitable services.
The former County Organizer, George Greenhough, has now taken on responsibility for co-ordination and promotion of club activities. Many extensions to existing projects are in preparation including the collection of contrasting dialects and accents as represented by the regions and countries which make up NTC membership. The tape will be entitled *Regional Round-Up.*
At the time of going to press, members were anticipating the 1967 Club Convention in Northumberland where members will enjoy an extended week-end of social and business activities. Recent additions to the membership list include Bruce Sherman of the Great Lakes Tape Club, USA and Bruce Murray of the New Zealand TRC (Hamilton Branch). Both are leading members of their respective clubs.
Further enquiries to the club should be made to the **General Secretary, A. Lomas, 2 Hamer Hill, Chapel Lane, Blackley, Manchester 9.**

The casual approach.

IS PERFECTION GOOD ENOUGH?

Give that extra bit of thought to producing a worthwhile tape says Graham Harris

To hear some people talk, to see the way some people go about planning things like minor epics, perfection is the last thing to be considered.

It is a quality in tape recording that is usually placed so far at the end of the consideration list that it can hardly be seen through the haze for the chaos. Quite often the attitude, 'It'll do!' is the measure of things to come, and the art of tape recording takes another plunge into the second-rate pit of indifference, which, in this era of gadget-governed art, is not far short of disaster.

This gloom-ridden attack is not without reason. The development in the electronics and the mechanics of tape recorders is leaping ahead with, almost, unleashed abandon – and a good thing too. However, whilst technical know-how surges forward, creative initiative, in some circles, marks time with ever decreasing energy in a quagmire of inertia. Of course, I expect to have that well oiled cliché, 'We're not all perfect' slopped into my face. Well, neither am I. But it is no reason why valid attempts can't be made to reach this end.

The other day I listened to a taped programme edited by a man who I knew ten years ago. Even in those early days, he was considered to be a master editor (he could cut the 's' off a sigh and you would never know the difference!). However, his latest tape was so full of blibs, clicks and hacks, I began to wonder if the tape was being dragged and yanked through the machine via a rusty sprocket wheel!

Had that been the unlikely cause of the noise, then the blame could have been fastened to the tape recorder. But in this case it was not the fault of the tape recorder. Naturally the efficiency of a tape recorder has a lot to do with the quality of reproduced sound. A modest machine will not equal the output of one costing a fortune more. However, that ambiguous term, 'high fidelity' is not the concern here. The complaint is that perfection is being ignored, the questions are, why and what is this thing fearsomely called *perfection*? Perfection, in tape recording, is a term incorporating quality, clarity, originality, and reality.

Since the birth of tape recording societies, there has been a steady and fascinating decline in the use of the word 'amateur'. Why? Does the word have a stigma, or is it due to an evolved promotion scheme, whereby the dropping of the title suggests entrance into the professional world? Perhaps it means that the tapists are no longer initiates, but full-blown audio specialists.

In themselves, 'amateur' and 'professional' are only words and the use of each is merely preferential. The significant point, however, is that since 'amateur' has become a unique term, so have 'originality' and 'perfection'. A commercial film producer recently confessed to me that he preferred working with amateurs, because the professional man does his work for money and time is all important to him. The quicker the job is done, the quicker he will receive his money. 'The amateur tapists', he said, 'are usually devoted to their work and I am assured of real, top quality in both subject matter and sound reproduction!'

Striving towards perfection – with or without the amateur status – is not an impossible job. It just means that a little more time is needed, along with more attention and thought to details, when producing a show. For example, take the case of a pair of feet. Supposing you have, on tape, two men talking to each other in the open air. To give it a dash of realism, it might prove better if you superimpose footsteps, as though the two men are strolling along and chatting.

Footfalls can be acquired in various ways, from the assimilated version of two fingers tramping through a box of matches, to a recording of footfalls on a gravel surface. With which ever version used, the dialogue will start to live.

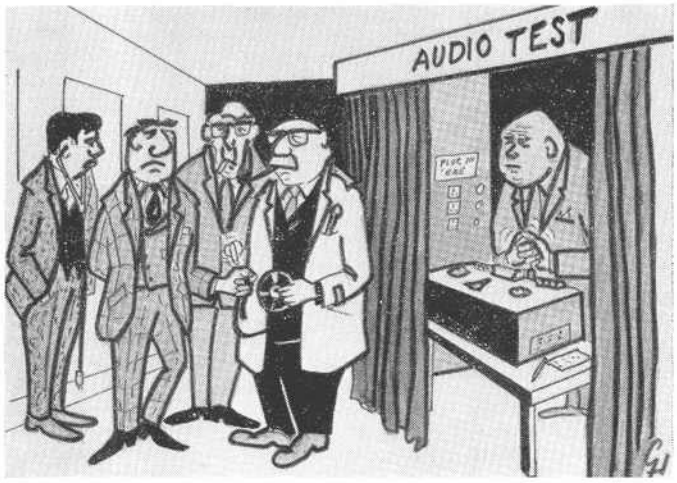
Now, this is the time for that extra piece of thought. If you go out and record the footfalls, it is essential that two pairs of feet are used. (Unless the dialogue happens to be between two one-legged men.) It is also essential that the footfalls are uneven and *not* together. In reality two men walking along together will, inevitably, walk in step with each other, but two men strolling along and talking to each other will not walk in step. One man tramping through a heap of gravel can sound like a troop of soldiers on a route march. Two men tramping gravel can sound like a massed division of soldiers. The thing is, for the sound of casual strolling, the footfalls must be uneven and the shoes should scrape across and shuffle through the stones.

Perfection to a fault? Perhaps, but far better this than the sound of two men casually chatting to each other over the sound of a high powered route march! And if anyone says to me 'You've obviously never been in the army, mate, or you would know that chatting is impossible on a route march!' I'll reply, 'I have been in the army. I have been on route marches and I have indulged in illicit chatting!' But unless you happen to be recording this particular, criminal act, it sounds incongruous!

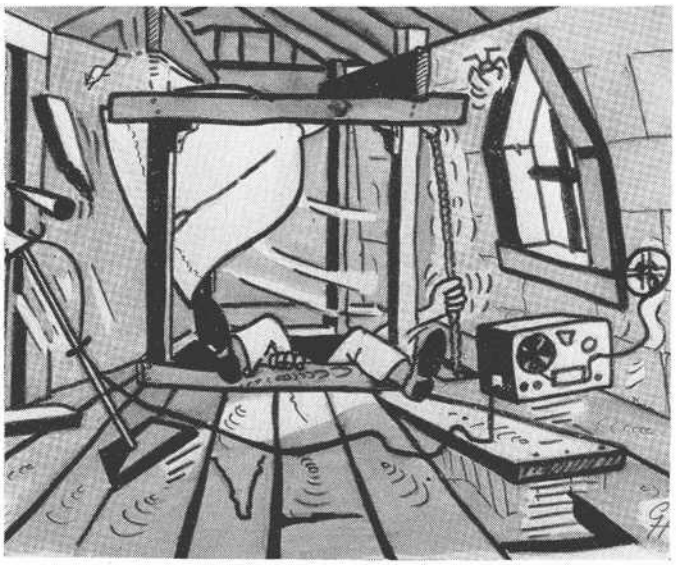
'Does it matter?' is not the question. More to the point, does it hurt to take just that little more trouble, give that extra bit of thought, to producing a worthwhile tape? When I've argued this point, another question has been, 'Why try to compete against the BBC?' Strange as it may seem to some people, the thought of competing against and even comparing with the BBC has never occurred to me. After all, when an 'amateur' paints a picture is he necessarily competing with Picasso and Rembrandt?

Creative tape recording is an art and any good work that is produced can only add to the field – whether it is done by the BBC or through an amateur's effort. The potential of the tape recorder is still to be appreciated and used. Take another case. That of a doomed church bell. Supposing this bell has been a familiar sound to the locality and suddenly the decision to scrap it is made. Here is the golden opportunity for the tapist to record the sound before it disappears into

continued overleaf



'The Audiospecialists.'



'Recording it is a simple enough operation!'

'Footfalls can be acquired in various ways.'

IS PERFECTION GOOD ENOUGH?

continued

oblivion – or wherever it is these sounds go. Recording it is a simple enough and straightforward operation. What is done with the sound afterwards is another thing.

To play it back in its entirety is okay, but is it enough? Ten minutes of a clanging bell is not the most inspiring of sounds. The audience rating will be extremely low and even those people to whom the sound will suggest happy memories, will soon be reduced to a seething mass of indifference! If you've taken the trouble to record history, surely there is only a little more trouble to clothe this sound with a story?

So. instead of ten clanging minutes, your listeners could hear a short history of the church, the reason for the retirement of the bell and some information regarding the future sound to be emitted from the tower. A few words from the vicar, a parishioner and the people who actually remove the bell, backed with the sounds of the bell, the church organ in the distance and the 'men at work', will colour the short story. It goes without saying that even those people who are generally indifferent to bells will increase your audience rating, for a sound report done in this way. The interest that is gained from projects like this makes tape recording an almost encyclopædic pastime.

A friend of mine had spent a couple of years photographing bridges all over England. He now has a fascinating collection of colour slides dealing with the subject. He put it to the tape society that he wanted a narrated sound track to back the collection. The society took the job on.

Creative slide shows have been laboured before, but there is no harm done by continuing with the labour. Looking at bridges is all right for architects and historians, but the potential audience was going to be far more catholic in its taste. The problem then was to fashion this visual discourse into something that would have a general appeal. Given the job of writing the script I was faced with this problem. Bridges might have picturesque value, but the question was, 'What can be said about them?'

George *Investigate – Don't Procrastinate* Wilkinson has already advised *ATR* readers against leaping headlong into projects without the benefit of research. This was a case in point. I researched! The result was a pile of fascinating notes on the history of bridge building. Choice pieces were selected, moulded into a dialogue between two voice characters, a historian and a civil engineer. The romance of the bridge story was conveyed through the voice of a poet. The script was then written. Footfalls, wind, cartwheels, birds, cattle and experimental weird noises were all blended into the sound track, and a minor epic was born.

The largest cost in a project like this is time. Time for the research, the script, the rehearsal and the recording of the voices, the collection of the *right* sounds, blending them together and into a worthwhile sound track, sorting the slides into sequence, and in the hours taken to edit the whole thing. Perfection to a fault? No one in the team has yet complained, 'It's never worth it!' and each week the audience rating is increased.

Striving towards perfection is not so rigorous as it may sound. Perfection in creative tape recording is basically an attempt to re-create reality. When dealing with the narration, which can be put over in a number of ways, the casual approach is the nearest sound to reality. The responsibility of this does not always lie with the scriptwriter, nor even with the actors who have to convey the words. More often than not the best efforts are obtained from the use of unscripted interviews. This, of course, depends on the interviewee, the interviewer and the editor.

A short while ago, in preparation for an audiovision show yet to be produced, a spontaneous interview was recorded by the team as a whole. The interviewee was a local historian. I arranged beforehand that he would come and visit the team and that we would all relax and just chat away about his subject. The tape recorder was left unattended. The only restriction that was made was that we would all try not to talk when someone else was chatting. This obviated the possibility of garbled conversation. With unanimous agreement, in its raw, unedited state, the tape is a 'perfect' specimen of information given in an entertaining way. Our guest gave a short, eloquent and most descriptive account of the local dungeon. On replay, when even snug in the draughts of central heating, you cannot help shivering as the atmosphere of the tape drips cold, damp spots down your chilled back! It is a successful tape and it was a very entertaining evening.

Editing must play the final and important part in the perfection of a programme. Sound must be smooth and transitional for the comfort of the listeners' ears. Good scripts, classical material, unique presentation can all be ruined by callous editing. Even if the cutting and splicing of tape is a dreaded operation, the volume control on the tape recorder can be used to a fine degree, fading one sound to allow a comfortable and smooth entrance on another. Of course there will always be room for improvement, but so long as the next tape is better than the last one, perfection will come nearer.

Let's face it. Amateur tapists have had ten years now to develop their art. Beginners are able to learn from the mistakes of others and *ATR*, for the last eight years, has freely published advice from 'experts'. The tape market is large, influential and widespread, so really, there is no reason why perfection shouldn't be good enough.

THE THINGS YOU SAY

Railway Recording

I am a newcomer to the hobby of tape recording and have been having some trouble with one or two points. As a railway enthusiast, my first attempts were trying to record railway locomotives. Some of the recordings I made of steam engines came out all right but diesel electric locomotives seem to cause interference and sound distortion – probably due to the locomotive's electrical machinery. Also the slightest breeze blowing causes a howling noise in the background.

I was wondering if any reader who has experience in this field could offer me a few tips? I would be very grateful if anyone could help. My recorder is a Philips battery-operated portable.

I. Harris

Cleethorpes,
Lincs.

Proposed Sound Hunt

As Britain's foremost tape recording magazine the burden rests very heavily on you for promoting the hobby and getting new people interested in it and sustaining this interest. As yet, tape recording is strong enough to support three magazines (or the magazines support the hobby – depending on how you look at it) but at the moment it seems to be stagnant or even, some say, on the verge of losing popularity. Although I would not go that far, I would agree with those who say tape recording has, as yet, to get well and truly off the ground.

Sound hunting may, I think, get the hobby moving. I visualize some sort of annual competition held in London – the sound hunter's paradise. A competition held for one day, perhaps on a Saturday, with an entrance fee of about 10*s* or so to cover a few small prizes. (Though it should be for the general interest and not for prizes.)

I feel a very successful competition may well be run along the lines of *Geluidsslipjacht* as described in the December 1966 issue of *ATR*. When one thinks of the readership of the three tape magazines (allowing for cross-readership) the total ownership of portable machines must be quite considerable; surely these people could support a sound hunt? Perhaps a national newspaper or the BBC would sponsor such a venture.

Nevertheless, any such sound hunt depends on you and I, the tape recordists of Britain (and other countries) and, of course, *ATR*. Let's get something organized for next summer. The future of tape recording as a hobby may depend on such a venture – tape recording may thrive or wither, it all depends on

continued on page 43

THE BIG SOUND

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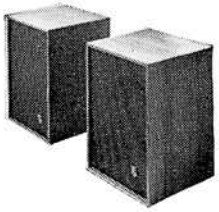

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REVIEW SANYO MR150

by F. C. Judd

If ever a tape recorder was subjected to extensive 'field trials' then this one was. Used in the car and on boats, carried around, operated from mains and batteries, used for tapesponding, recording sound effects for a cinefilm, for playing pre-recorded background music, the Sanyo MR150 has given an excellent account of itself. It is most economical on batteries – in fact I lost count of the number of hours it ran on one set of six U2 cells. This was during a week's holiday when aside from being employed for interviewing etc, the machine was also used for playing pre-recorded music tapes whilst on the move in a motor cruiser. One special feature of the MR150 is that the mains power supply is built in so that there is nothing 'external' except the microphone. A small satchel is provided for the mains lead and microphone both of which are of course included as well as a spool of tape, spare spool and splicing tape. My only criticism about accessories is that no miniature jack plugs are provided for connecting into the 'radio' input or external loudspeaker socket. These miniature jack plugs are difficult to buy unless one has a well stocked radio components shop nearby. For what they actually cost I suggest the distributors include a couple with the accessories.

Automatic Recording Control

Another feature of the Sanyo MR150 is that the recording level is controlled automatically and for this reason the machine does not have a record level indicator. The function of the automatic level control circuitry is very efficient. It operates instantaneously on large signals i.e., with the volume control at maximum and loud sounds entering the microphone. It takes about two seconds to return to a suitable 'gain' setting for low level signals. On 'radio' input the auto-level control system responded quite adequately to signals varying from 100mV (minimum) up to over 1 volt. Another test carried out with the auto-level control showed that speech could be maintained at constant 'recorded' level whilst the volume control was advanced gradually or even instantaneously from about one third to its maximum setting.

Test Results

The Sanyo MR150 is transistorized and employs a printed circuit board for all except large components. The erase system is dc which does put rather more noise on a tape than an ac erase system but it is as well to keep in mind that this is not an expensive high fidelity recorder and it cannot of course be compared with one. The frequency response is also restricted but not to the extent of making recording or replay unacceptable. An upper limit of 7000 to 8000KHz is adequate for most purposes. A frequency response test covering record through to playback showed a fairly level response from 50 to 7000Hz with a fall off to −3dB at 8000Hz. The makers quote 100 to 7000Hz. The erase function leaves the tape completely cleaned of previous recording but with slight dc noise. Reproduction over the internal miniature eliptical loudspeaker is adequate for general listening and is comparable with that from a good transistor radio with an equally small speaker. Tapes recorded on the MR150 gave a very good reproduction when played on high grade equipment.

Some Technical Details

The recording system is half-track and normal hf biasing is employed. Tape speeds are 3¾ and 1⅞ ips and the change of speed is effected by changing the capstan sleeve. Maximum output from the amplifier (on replay) is 750mW which is quite sufficient for the internal speaker and indeed a small external hi-fi speaker. Tape spools up to 5 inches in diameter can be accommodated and deck controls include record, playback, fast forward and reverse rewind which are all push buttons. A battery voltage meter is also included.

The recorder can be stopped temporarily during record or playback by means of a switch on the microphone which is in lieu of a pause control on the deck. It can also be controlled from a foot switch for which a jack socket is mounted at the side. Monitoring can be carried out by headphones on an earphone but is of course direct signal monitoring and not from the tape.

The Sanyo MR150 is quite light in weight and although it is supplied with a carrying handle there is no reason why a suitable case with shoulder strap could not be made up from plastic or stout canvas. The recorder has spool locks and will therefore operate in an upright position. Tape movement can be seen through a window in the lid. The microphone supplied is adequate for speech and sound effects, but there is no doubt that a higher grade microphone would help if that extra sound quality should be required. The recorder would definitely do justice to a better microphone. The makers do not quote any speed variation percentage but tests revealed nothing that one could criticize. On pure tone recording slight wow was noticeable on either speed. Again I must emphasize that this is not a high priced machine so one can hardly expect absolute perfection and I can only say quite simply that for its price of 39 guineas it is one of the best little portables I've handled. It is compact and well made and although contained in a plastic case I found that the assembly of the 'electronics' was indeed quite robust for a recorder of this nature.

The Sanyo MR150 is manufactured by Sanyo Electric Co Ltd, in Japan and distributed by Sanyo Service and Sales, Marubeni House, 164 Clapham Park Road, London, SW4. It retails at 39 guineas complete with microphone and tape etc. The UK distributors will send further details on request.

FCJ

INSTANT FRIEND

More advice (?) for the tapespondent

by J. F. Sheehan

You, too, can have an *Instant Friend* with your breakfast. When the postman calls instead of that silly old rustle of letters, you can hear the exciting thump of a reel of tape dropping on to your mat. If you are a real enthusiast, your machine is already warmed up, and in a few seconds your expert fingers will have threaded the tape. Press the 'start' button, and there he is – your *Instant Friend*! Whether he gives you indigestion or not depends, of course, on the sort of correspondent he is. If he is the warm, spontaneous, witty fellow we always hope for but rarely get, your meal will be a joy. Every inflection of his voice, every engaging chuckle, every tantalizing pause will have you so enraptured that you won't notice that the bacon has gone cold, and you have put salt in your coffee. When it is over you will toy with the idea of hearing it again, and risk missing your train, or saving it until evening when you can repeat the rapturous experience at leisure.

On the other hand, he may be the kind of correspondent who begins his tape with a long breathy interval, clears his throat three times, drops the microphone, and then disappears to let the dog in. He usually follows up with – 'This is' . . . (here he gives his full name and address including postal code if any) . . . 'sending a tape recorded message to' . . . (here he gives your full name and address) . . . 'Hello.'

If you are wise you will switch him off there and then. If not, you will have to listen to him shuffling through endless notes, and telling his dog to 'Stop it!' (He doesn't even tell you what his dog is *doing*, which might be interesting.)

'Did I tell you about . . .?' generally means that he *did*, but it certainly means he is *going* to. So if you can guess that it's about that puncture he got on the North Circular Road, you can press the 'fast run' button, and leave him standing by the kerb. Having skipped enough tape to cover the doleful incident, you can listen to what comes next. Most likely it is the tail end of the puncture story. Either that, or some startling announcement such as – 'and so I won twenty thousand pounds.' It then takes you about three minutes juggling with the switches to establish the fact that he has been playing Monopoly again.

The rest of the tape will be devoted to what tapespondents call 'chit-chat'. You will hear how he turned the bath round, but not *why*. The profits from the Church Fete will give you a glow of satisfaction, perhaps. Too late you remember that this is the man who never warns you to turn the tape over, and the loose end threshes wildly as you shield your face and battle for control. If you decide to listen to the other side it will be the same gentle gossip, and I do mean the *same*, because he recorded the other track two days before and has forgotten what he has said. This sort of character is very difficult to cope with. He's obviously a nice chap who loves his dog, and is kind to his mother, and you wouldn't hurt him for the world. But sooner or later you have to tell him to 'belt up', otherwise you will find that the style is catching and your tapes will begin to sound like his, and somebody will be telling *you* to 'belt up'.

A much easier proposition is the music-lover. He sends you chunks of Stravinsky and Brubeck, punctuated with things like – 'Now that's what I call smooth/contrapuntal/kinky/majestic, but just listen to this.' It saves you buying the discs, so long as you don't mind being booted straight into the finale of *Das Rheingold* with Satchmo poised in the wings.

He has probably obtained, at enormous expense, some original waxes of Dame Sarah Plunge's farewell concert in 1909. Behind a surface noise like Niagara Falls you will hear an occasional fruity trill and – if you listen very hard – the actual sound of her swooning into the orchestra pit. Invite your friends round to hear it; it's a great excuse for a party.

The sound-effects man can be a bit of a drag. When you've heard one fly walking, you've heard the lot, even if it is captured through a super-cardioid-double-baffle-compensated-phase-converter. Yes, you meet a lot of that stuff if you don't watch out. 'Getting a nasty Schnitzelheimer effect on my cross-feed. Run your meter over my bias for me, will you?' Don't be tempted to do any such thing! Unless, of course, you have some sort of understanding.

Be careful with married correspondents. I'm not talking about divorce proceedings. I mean their families. They tend to have jolly, talkative families who snatch the mic from each other, and then dissolve into helpless mirth for minutes on end. It's nice to know they're happy, but last week's laughter can be as depressing as yesterday's rice pudding, especially when you know that you have yet to hear from Baby. 'Now come, Clint, say "Mama" . . . "Mama" . . . Oh, come on Clint!' There follows a series of slobbery burps of such magnitude that you know exactly what it is like to be one of Clint's two front teeth. Then Uncle Ben rounds the whole thing off with five choruses of *Old Father Thames*. Nothing downhearted about this lot, but what on earth can you say in your reply?

'*Say 'Mama*"

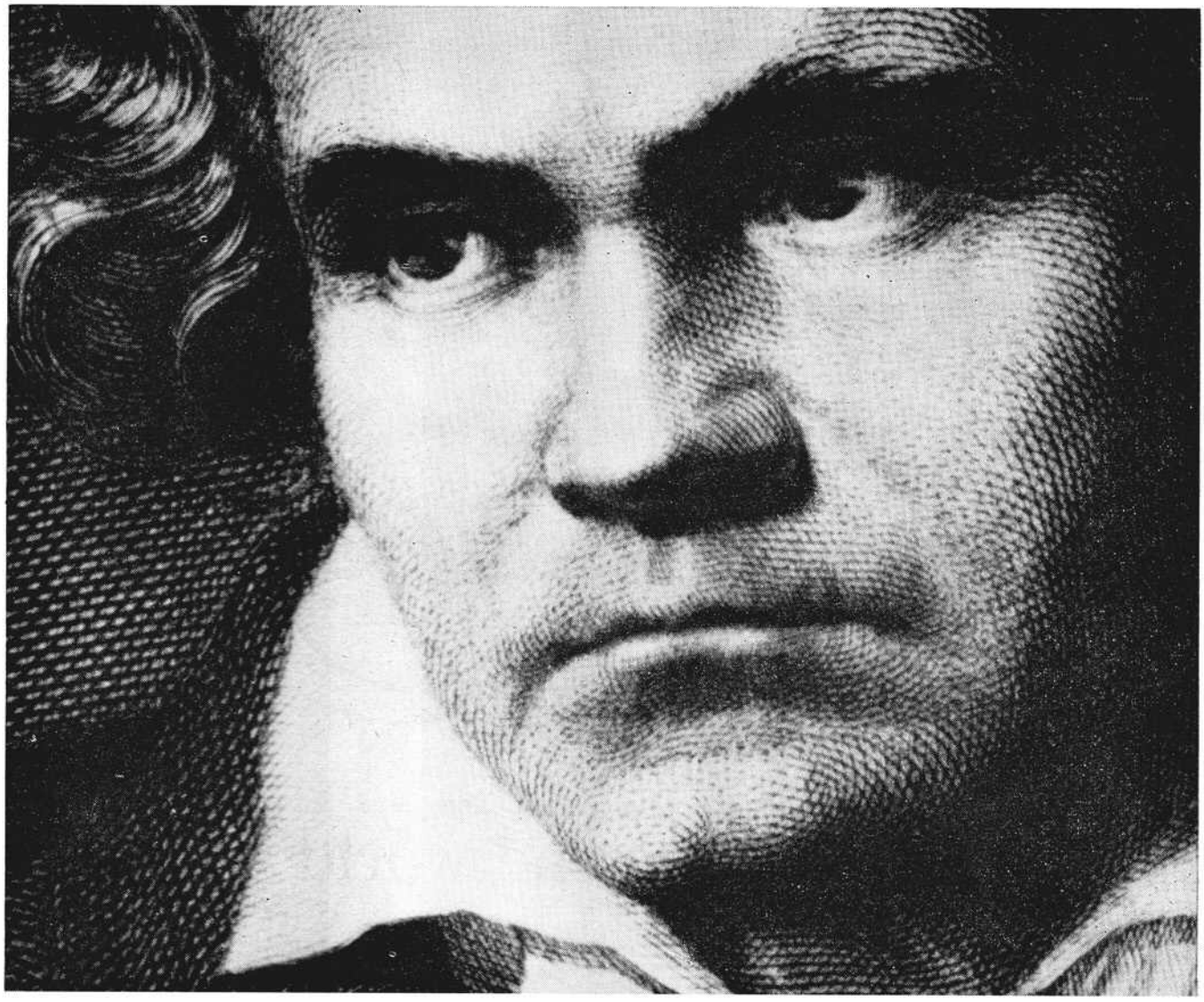
It is clear that tape is a boon to all amateur comedians. Strings of gags pinched from *Round the Horne* come pouring out of the speaker so fast you are too stunned to switch off. Even worse is the fact that poets have now latched on to this captive audience with a vengeance:

> 'Motor Bikes askew
> In the scream of the moon;
> Parsnips are grieving' . . . etc.

and if you give them one word of encouragement, you will receive an Opus by every post, with fourpence excess to pay.

Yes, you really have to be very careful. But don't be put off, there are lots of wonderfully entertaining people to talk to – if you can find them.

'. . . *some original waxes*'



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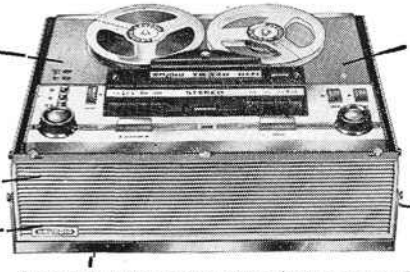

The TK 340 has two output stages and built-in loudspeakers giving a total output of no less than 16 watts! This makes it the ideal choice for use as a public address system, and for this purpose the TK 340 has a P.A. button fitted as standard.

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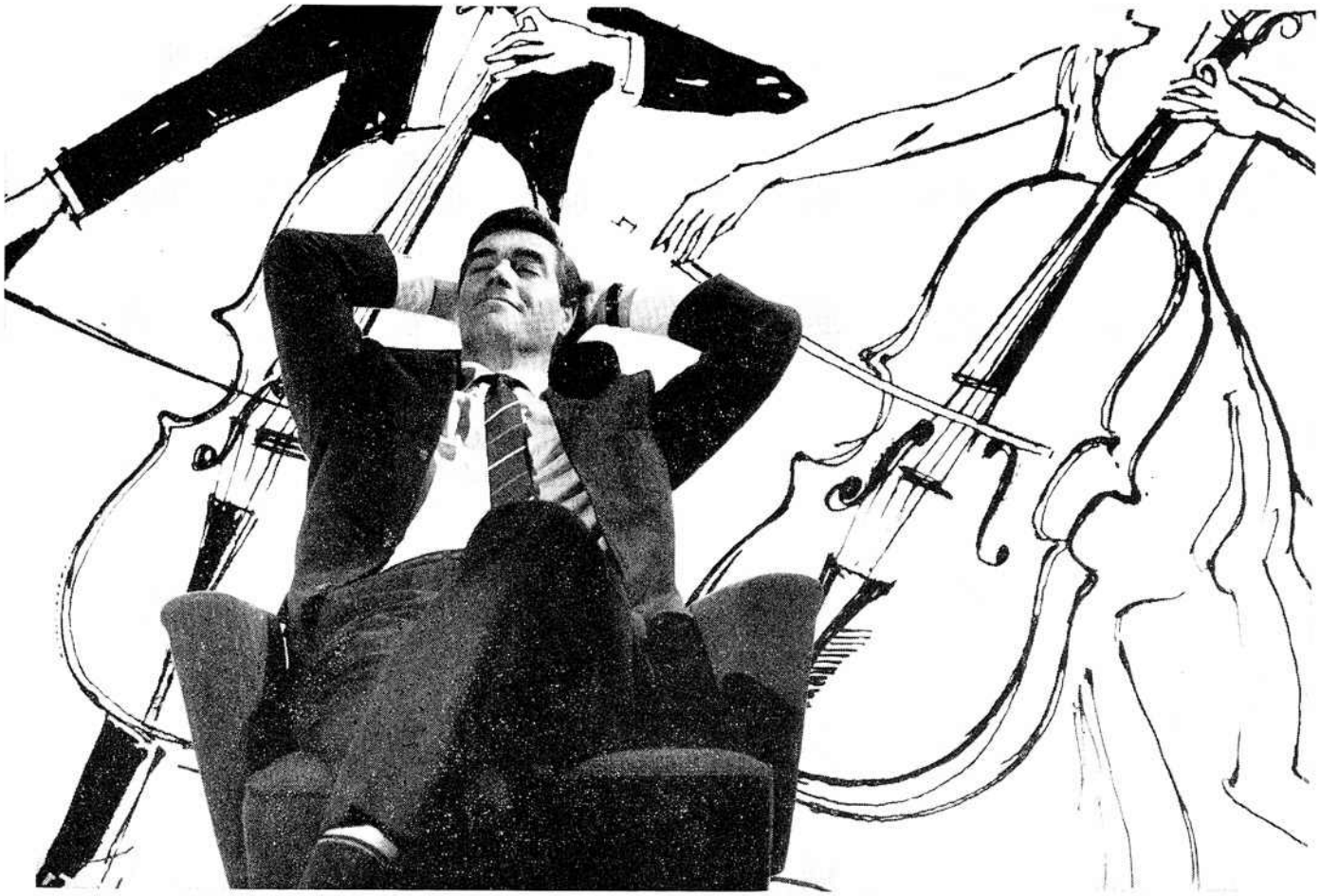

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Specification: Mains / battery Stereo Tape Recorder. 4 tracks. Record/playback. Three speeds. Sound on sound. Sound with sound. Automatic shut-off, push button operation, including two microphones, spool of tape, empty spool. *Recording system:* AC bias 1/4 track. *Tape speed and recording time:* 100-10,000 c/s at 3¾ ips, 100-5,000 c/s at 1⅞ ips, 100-2,500 c/s at 15/16 ips ± 3dB. *Output power:* Max. 800mW per channel. Undistorted 750 mW per channel. *Accessories:* Microphone x 2. 5" full tape x 1. Empty reel x 1. Patch cord x 2. Splicing tape x 1. Microphone stand x 2. Power cord x 1.

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See Sanyo at any authorised dealer. For further information write to: J. W. Cowley, Sales Manager, Electronic Equipment Division, Marubeni-Iida Co. Ltd., 164 Clapham Park Road, London, S.W.4.

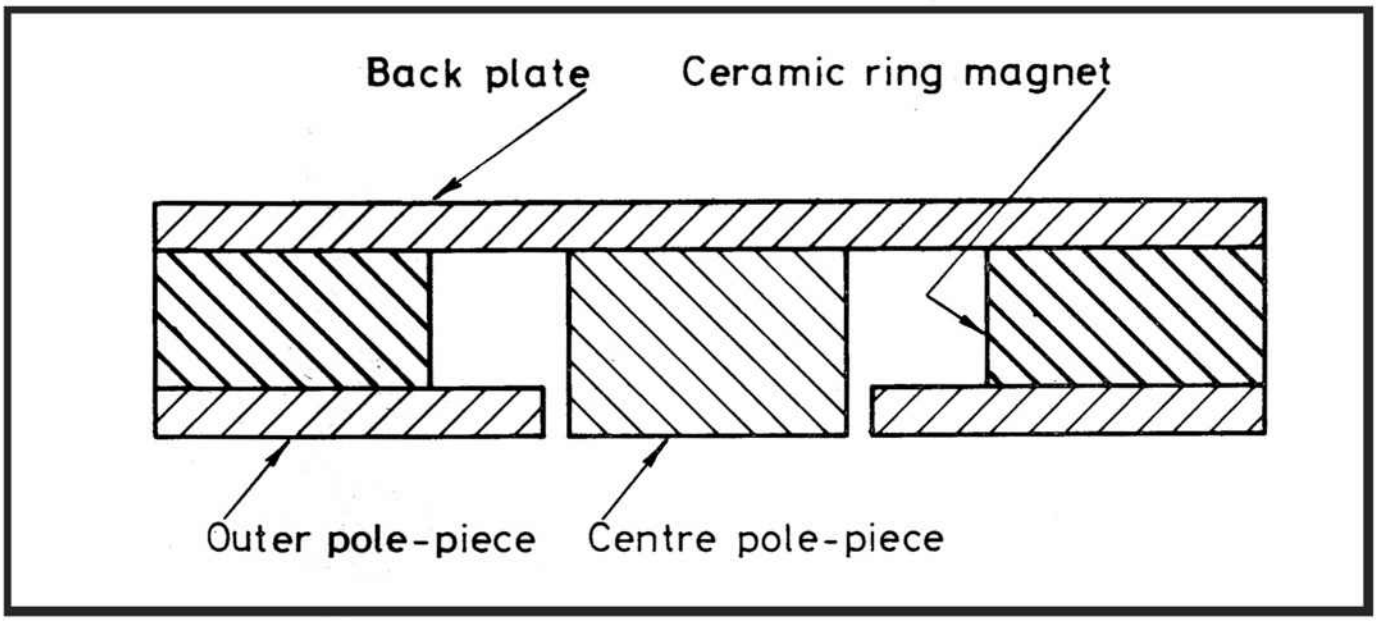

*Fig. 1. This shows how a **ceramic magnet** is employed in a speaker unit as a flat ring, with metal poles to complete the magnetic circuit.*

CERAMICS IN HI-FI

What has pottery to do with audio?

asks Gordon J. King

Most of us know that the science of ceramics is directly related to pottery, and so we may be wondering what on earth this could have to do with hi-fi. We will then suddenly realize that we are hearing the word used quite a lot in connection with pick-up cartridges and loudspeakers, and so assume that hi-fi and pottery must have some subtle relationship after all!

This is perfectly true; indeed, ceramics in various forms are being used more and more in all aspects of electronics, from lighting gas fires (this is a fact!) to displaying vibrations in motor car engines on the screen of a cathode-ray tube and, in our world of audio, from pick-ups to loudspeaker magnets.

Most of us will know that the basic pottery process is quite simple, and that is the original compound, forming the body of the ceramic item, is powdered by a ball milling operation, after which a liquid binder is added to facilitate moulding. A special clay, of course, is used in domestic ceramics. While semi-moist, the material is extruded under hydraulic pressure and moulded into the required shape, and it is finally sintered in a kiln. This processing is common to both domestic ceramics and industrial ceramics; but the latter, as would be expected, adopts more sophisticated techniques.

Let us see first how ceramic material is used in pick-up cartridges. The ceramic is, in fact, in the form of a single element (mono) or a double element (stereo) and is mechanically-coupled to the stylus so that it is subjected to the vibrations imparted by the recorded groove of the record. This means that the type of ceramic employed must have the remarkable ability to generate electricity. The other class of pick-up cartridge works on the electromagnetic principle, whereby a magnetic field is created and used to induce current in a coil of wire in sympathy with the vibrations of the stylus. This is the 'dynamo' generating action.

The electricity generated by the ceramic element of the former type of cartridge is called *piezo-electricity*. Not all ceramics exhibit this piezo-electric property, and those that do have to be specially processed. The term 'piezo' relates to composition and pressure. Thus when piezo-electric material is subjected to mechanical *pressure* or stress an electric charge or voltage is produced across two selected faces. Conversely, when a charge or voltage is applied across the two faces of the material a mechanical movement takes place. This is called the *motor effect*.

Until recently the only materials showing the piezo-electric effect, and satisfying certain practical requirements, have been quartz and some other water-soluble crystals. Quartz crystals have been in use a long time for controlling the frequency of oscillators in transmitters and receivers and also in filter circuits. Water-soluble crystals, on the other hand, have had their main application in pick-up cartridges and microphones (hence the term *crystal* pick-ups and microphones). The development of ceramic piezo-electric materials, however, has made it possible to utilize the piezo-electric effect to considerable advantage in applications other than those mentioned.

With quartz crystal, the sections composing the crystal as a whole are arranged by nature in a definite pattern relating to a specific 'cut', and the direction of maximum piezo-electric activity is along a certain axis. The crystalline structure develops during the long-period growth of the crystal in the earth. With ceramic materials, which are essentially man-made so far as piezo-electric activity is concerned, the material first evolves in the form of randomly orientated crystal elements, and these must be brought into a specific pattern before the piezo-electric effect occurs.

The idea is to get the whole crystalline mass to act as a single-orientated crystal element; and this is achieved by the application of a strong electrostatic field to the ceramic while it is being processed. This field turns each crystal element, so to speak, in the same direction, and this produces a strong piezo-electric activity along the required axis. Once the ceramic has been polarized in this manner, the effect remains after the removal of the instigating electrostatic field.

Fig. 2. The manufacture of Magnadur (Mullard Ltd).

CERAMICS IN HI-FI

continued

Ceramics for electronic applications contain lead-zirconate-itanate, and because of their multicrystal make-up they are often referred to as *polycrystalline ceramics*.

One big advantage of ceramic over naturally grown piezo-electric crystals is that the piezo-electric effect along any required axis can be determined during manufacture. Ceramic element can thus be tailor-made and reproduced in any quantity.

Early crystal pick-ups and microphones often employed Rochelle-salt crystals as the active element; and while such crystals possess a large piezo-electric activity, they are somewhat fragile and easily damaged by excessive pressure on the stylus or diaphragm. They are also more adversely prone to temperature and humidity variations. Ceramic elements, which now take the place of many of these early crystals, can operate adequately under more violent changes in environment; they are thus far more reliable than the natural crystals.

As with any mechanical structure, if a piece of piezo-electric ceramic is cut to certain dimensions and shape it will be endowed with specific modes of vibration directly related to these parameters. A typical example is quartz, for to control the frequency of an oscillator such a crystal needs to be ground to extremely exacting limits so that it will vibrate or resonate at the required frequency.

Ceramics are essentially employed in transducers, like pick-ups and microphones (and other special electro-mechanical devices). A transducer is not particularly concerned with resonant frequency, not in the sense of controlling an oscillator. Our main interest lies in obtaining the maximum piezo-electric output for the minimum of mechanical stress without resonance at least within the audio spectrum.

Modern hi-fi ceramic cartridges produce much less electrical output when playing a record than some of the early cartridges using natural crystals. This is because natural crystals inherently have a greater piezo-electric potential, and also because of the nature of the stylus-to-ceramic coupling in recent cartridges. The idea is to keep the stylus tip-mass as small as possible to avoid groove wear and to allow the pick-up to track at small pressures. This is achieved by 'gearing-down', so to speak, the stylus to the ceramic. The net result of this is that the stress on the ceramic due to the groove modulation is also geared down by the same ratio, and since the piezo-electric output is proportional to mechanical stress, the signal output is also reduced.

Nevertheless, ceramic pick-ups still produce more signal voltage than hi-fi magnetic types. They can also be connected straight into an amplifier without equalization provided they are loaded across a high-value resistor, while magnetic ones, whose output is proportional to the *velocity* of the stylus, require an equalizing network in the pick-up circuit of the amplifier.

A shortcoming of the first ceramic cartridges was lack of stereo separation at high audio frequencies; but the latest hi-fi versions overcome this trouble and, indeed, some of them are almost up to the quality of magnetic pick-ups in this respect.

So much, then, for piezo-electric ceramics; now let us see how this basic material is used at the other end of the hi-fi system. Ceramic magnets have been employed in various applications for some little time, but it is only fairly recently that we have found such magnets in some of our hi-fi speaker units.

A curious thing about a ceramic magnet is that it is essentially non-metallic and therefore *an electrical insulator*. This may seem hard to grasp because magnets are normally hard iron or steel and are certainly most conductive.

When barium, iron and oxygen are brought together as compound $BaFe_{12}0_{19}$ the result is a hard, brittle ceramic – an insulator that

can be magnetized and which is lighter than a metal-alloy magnet of corresponding size. Advantages of the ceramic magnet are: it is less costly than alloy type of similar bulk; it can be moulded into almost any shape – using the sintering process of ordinary ceramics – by simple presses and moulds; it is an electrical insulator and thus cannot act as a short-circuit path to electricity or energy induced into it from an external circuit. It retains its magnetism tenaciously and once magnetized, ceramic is very hard to demagnetize, which means that we need bother no more about our speaker magnets losing power, which was an early consideration.

Although the ceramic magnet has been known for almost four decades, it was found to hold little magnetic strength, and to produce a field equivalent to that of an alloy speaker magnet it would need to have been about ten times as large! Recent grinding techniques, bringing the ceramic base to a fine powder and then moulding to shape in a very powerful magnetic field, has much improved the magnetic performance of the material. This sort of processing helps bring the particles into magnetic alignment and brings up the working flux density to a value more than half that of a powerful alloy magnet of similar size. This means that an equal magnetic performance can be secured with about twice as much ceramic than metal alloy – and the former is cheaper and less costly to process, shape and so forth.

While ceramic retains its magnetism well it means that it can be made in short North

Fig. 3. The Axiette 8, by Goodmans, features a high efficiency permanent magnet system using Feroba II antisotropic ceramic magnetic material, allowing a particularly shallow depth magnet assembly to be used.

to South pole dimensions without fear of self-demagnetization. Short, metal-alloy magnets quickly demagnetize themselves. Per centimetre length the magnetomotive force can be about twice that of an alloy. This adds up to the fact that, while a hi-fi speaker magnet has to be almost twice as large as one using metal alloy, the ceramic one can be made with reduced front to back dimensions. That is, the magnet can take the form of a large, flat ceramic ring with metal poles, as shown in Fig. 1, instead of the centre-pole slug design which is more economic with alloy magnets. Thus, it is a combination of technical and economic factors which has led to the appearance of the ceramic-magnet hi-fi speaker unit.

The ceramic material, known as barium-ferrite, has several trade names, such as Magnadur, Feroba, Oxit, Indox, Caslox, according to the firm making and selling it. Iron oxide and barium carbonate are mixed in the correct proportions.and then heated. The compound is powdered by a ballmilling operation and a binder is added for shaping. The material is then sintered in a kiln, as with any ceramic. Figure. 2 shows how Magnadur extrusions (Mullard Ltd) are tested for magnetic properties and mechanical dimensions prior to packing. Since they are hard to demagnetize, ceramic magnets have an exceptionally high coercivity – the measure of ability to resist demagnetization. The value for ceramic magnets is about 1,600 oersted, compared with 600 for alloy counterparts. High coercivity allows the magnets to be used in the presence of strong ac fields without impairment of the original flux density. It also means that the field is not weakened by rough handling or by keeping the magnet with its poles open.

Ceramic magnets are used for many more applications, other than speaker units so it is not surprising to learn that more than fifty-million are made each year in this country alone!

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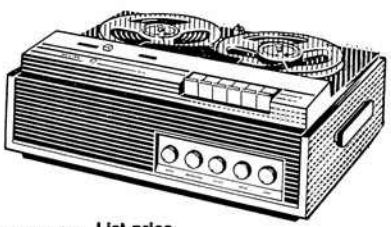

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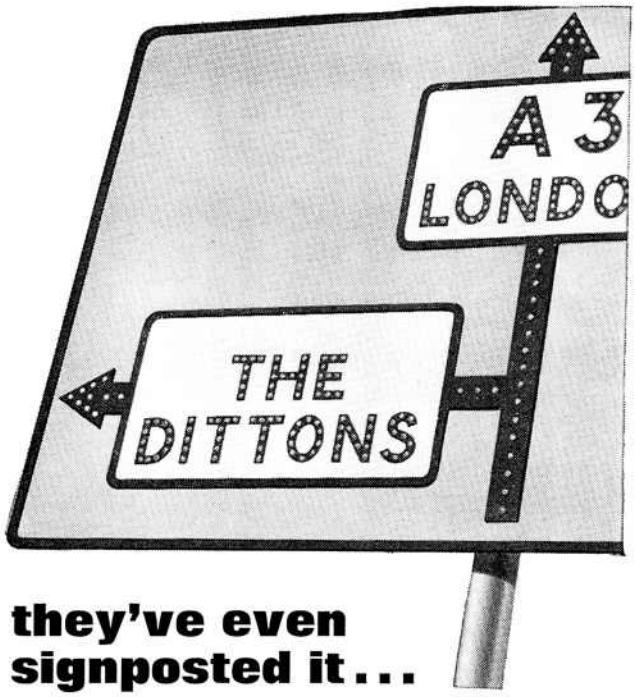

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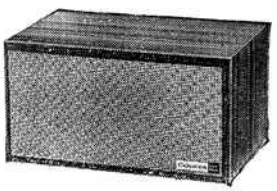

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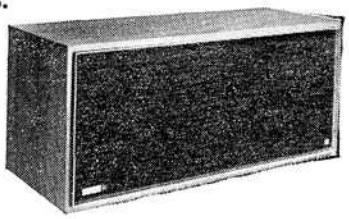

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Fig. 1. Part of the Ferguson Unit Audio equipment by British Radio Corporation, the stereo tuner/amplifier unit 205STA has a four waveband tuner (including stereo UHF).

AUDIOVIEW

New Ferguson Stereo Tuners

Two new additions to the Ferguson Unit Audio equipment have been released by British Radio Corporation. These are, the stereo tuner amplifier (Unit 205STA) and the stereo VHF amplifier (Unit 206STA) which both receive BBC stereo broadcasts. The stereo tuner/amplifier model 205STA shown in Fig. 1 used in conjunction with other Ferguson Unit Audio equipment, has an output of 7 watts per channel (speech and music rating) with less than 1% harmonic distortion. The four-waveband radio tuner covers long, medium, short and mono and stereo vhf broadcasts with outstanding reproduction.

This tuner is transistorized and has an audio output frequency range of 30Hz to 20KHz ±3dB. All functions are controlled by key switches but there are rotary controls for on-off volume, bass, treble and tuning and an edge type balance control on the back of the set. A tuning level meter provides accurate signal location and a red light is illuminated when stereo broadcasts are being received. Sockets are provided for loudspeaker connections, pick-up tape recording or replay. AM aerial and earth and FM dipole. There is an internal ferrite rod for MW/LW reception. The retail price of the 205STA unit is 50 guineas plus 14*s* 6*d* PT.

The stereo VHF tuner/amplifier Unit 206STA shown in Fig. 2 can also be used in conjunction with other Ferguson Unit Audio equipment. Integrated with the amplifier is a multiplex decoder for mono and stereo BBC vhf broadcasts on five channels. The channel selector buttons are adjustable for pre-set station tuning and optional automatic frequency control is provided. Rotary controls on the front include pick-up balance, on-off, treble, bass and volume. Performance figures of the unit 206STA include 7 watts output per channel (sine wave rating), an audio frequency range of 30Hz to 20KHz ±3dB and an FM rf sensitivity over 88-109MHz better than 1μV. Sockets are provided for loudspeaker connections, pick-up, and FM dipole etc. The retail price is 46 guineas plus 13*s* 4*d* pt.

Further details of both units from British Radio Corporation Limited, Thorn House, Upper St Martins Lane, London, WC2.

Fig. 2. The integrated stereo VHF tuner/amplifier unit 206STA gives 7 watts per channel. There is a built-in 5 channel stereo UHF tuner.

TAPE AND DISC REVIEW

by Russ Allen

Soft Sands – Oscar Peterson. Orchestra with *Piano Solos with Orchestra and Trio. World Record Club T 605.*
If you are listening for Oscar the Jazz then you are in for a disappointment; this is Oscar the Cocktail Bar man. Eight of the tracks have an under-recorded celestial choir and orchestra which is pleasant, though the arrangements are not particularly inspired, and the remaining tracks have Ray Brown on bass with occasionally, Herb Ellis joining in very quietly on guitar.
The tunes are all slow, dreamy and delicious. Peterson doesn't attack them but plays the melody with impeccable taste. He is such an accomplished pianist with such a tremendous technique that it comes as a most pleasing surprise to hear him in this subdued and simple form.
The Nearness Of You with just Brown's bass is the nearest he gets to his more familiar jazzy self and perhaps because of this it's my favourite groove.
Delightful piano versions of some gorgeous old pops.

Change of Setting – The Paul Gonsalves All Stars *featuring* **Tubby Hayes.** *World Record Club T 631 Stereo.*
An interesting session with Ray Nance, violin and trumpet, John Lambe, bass and Gonsalves, tenor from the Duke Ellington Band sitting among Tony Coe, alto, Ronny Scott, tenor, Tubby Hayes, tenor, flute and vibes, Jackie Sharp, baritone, Terry Shannon, piano, Ronnie Stephenson, drums – all of the London Jazz scene playing eight themes by British jazz writers, Tony Crombie, Harry South, Les Condon and Tubby Hayes. An experiment that goes a long way to proving that British jazz is better than most critics are prepared to admit.
British rhythm sections have, for a long time, been considered inferior to the US boys, yet I don't think that Stephenson's drumming and tonal sound could be that much improved upon. Terry Shannon's piano is just right with some intriguing and original comping and Lambe's bass fits in as befits a man of his calibre. Of the soloists I liked Hayes best of all on his own flute feature *Tubby's Theme* and next best when he played vibes. Gonsalves' taut dry tone is splendid and he blows so lyrically that one must listen closely to really appreciate all he has to say. Unfortunately Nance only solos once on trumpet, but this moment considerably perks up the scene. On the other hand his violin playing sounds unsure sometimes and is not always as accurate as could be wished.
As it should be, the most exciting track of all is the final one *Don't Fall Off The Bridge,* an uptempo Latin American rhythm by Hayes, in which Ronnie Scott proves himself to be not just a club owner but an exciting tenor player holding his own with the featured men.

Don Quixote. Richard Strauss. *Symphonic Poem. Op. 35. and Till Eulenspiegel's Merry Pranks. Op. 28. World Record Club T 609 Stereo.*
Paul Tortelier, cello, Giusto Cappone, viola, Siegfried Borries, violin with the Berlin Philharmonic Orchestra conducted by Rudolf Kempe.
An excellent array of talent which does full justice to Strauss's superb writing. *Fantastic Variations on a Theme of Knightly Character,* the story of poor Quixote's mad dream of Knight Errantry, told in an Introduction, Theme and Ten Variations with the superb full toned authoritative cello of Tortelier as the Knight with the Doleful Countenance.
Till Eulenspiegel is possibly the better known of the two works because of its catchy Horn theme which dominates the first short section and appears again later with variations. Both pieces are descriptive, and to follow them with the story adds much to the enjoyment. Malcolm Rayments' informative sleeve notes also tell you everything you need to know.
Recording and stereo are both good and the cover design is exceptionally good.

Symphony in D Minor. Cesar Franck. *The French National Radio Orchestra conducted by Sir Thomas Beecham Bart., CH. World Record Club T 596 Stereo.*
Success as a composer eluded Cesar Franck until he was sixty-eight. Only a month later he had the misfortune to be knocked down by a omnibus and receive injuries to which he later succumbed.
His Symphony has been much criticized, but despite the critics has gained a world-wide popularity with concertgoers. I must confess to being very fond of it myself.
The orchestration is very full with much use being made of massed cellos and basses. It is impressive vibrant music with great swirling orchestral passages particularly in the third movement with momentary respite for the repeat of the subtle cor anglais theme.
Big exciting writing and I can imagine the late Sir Thomas shouting the fortes from his podium as he did when conducting, a great and grande character.
Going through the WRC lists it would be a most awkward person indeed who could not find an offering each month to suit his peculiar taste. I find my difficulty is trying to decide what not to have.

Sgt. Pepper's Lonely Hearts Club Band. The Beatles. *Produced by George Martin. Parlophone TA-PMC 7027. 3¾ ips 2-Track Mono.*
They've done it again! It's another riot of fun, nonsense, philosophy and music. If you haven't already got it then go and get it now. It's got too much – the fabulous Learlike nonsense of *Lucy In The Sky With Diamonds,* quite delightfully mad.
Then there is their frighteningly true-to-life it-could happen-to-you, if you're a parent, *She's Leaving Home* which can wring a tear too easily. The arrangement of this is masterly. Final number on side one must have been inspired by an old playbill and its wry sense of humour plus some more fun music is splendid.
Side two opens with a George Harrison tour de force. I'm told he plays all the Indian instruments used via multi-tracking. The results are most fascinating and sound excruciatingly genuine though I haven't got around to deciphering the words as yet. I'm a bit suspicious of the hoots of laughter as the music finishes.
Very music hallish are the sad *When I'm Sixty-Four* and the ode to the lady parking meter attendant *Lovely Rita.* Who played the piano?
Someone tells me that the words of the songs are printed on the sleeve of the LP disc.
Note to Mr EMI: How about printing the LP sleeve notes on a little insert like you sometimes do with WRC tapes and give the tape buyers a break? Thanking you in anticipation. P.S. Many thanks for Sgt. Pepper's lot.

So This Is Broadway. *Tommy Steele with Geoff Love and his Orchestra. World Record Club TT 610 3¾ ips 2-Track Mono.*
Tommy Steele, like the Beatles, is a miracle of our time. From a Soho skiffle cellar he has climbed to stardom over the heads of his old teenage fans to a family following round the world.
Two films *The Happiest Millionaire* and *Half A Sixpence* are on their way, he's done stage shows, TV spectaculars, radio, records – you name it he's done it.
His Cockney charm is infectious and he gets better and better. Certainly a few years ago if anyone had told me I should enjoy Tommy singing ballads I'd have laughed in their face, but I have just thoroughly enjoyed that experience. What he does with the less ballady numbers like *Something's Coming* from *West Side Story* is super.
Geoff Love, one time jazz trombonist, has a similar success story to Tommy and his orchestral backing is just right to spur the artist to his best. Their combination says much for British talent.

Edelweiss. *Vince Hill with the Eddie Lester Singers. Columbia TA-SX 6141. 3¾ ips 2-Track Mono.*
Unlike Tommy Steele, Vince is a recognized ballad singer but I have never reckoned him one of my favourites, he was just another band vocalist. That is, until I heard this album.
He sings a set of lovely songs with sincerity, tunefully and with a backing vocal group who added greatly to my enjoyment. Some of the tracks rate with the best I've heard from anyone. Each number is conducted by its arranger which is interesting and we have work by such notables as Tony Osborne, John Arthey, Arthur Greenslade and Harry Robinson.
The standard is so high that it's difficult to quote favourites though *I Love You Samantha,* arranged by Arthey, and *I Have*

Dreamed, by Greenslade, stand out, but I think perhaps *Maria* from *West Side Story* is the finest from the purely vocal point of view. Vince sings this magnificently.
Hill Tops!

Eydie In Dixieland. *Eydie Gorme arranged and produced by Don Costa. World Record Club TT 585. 3¾ ips 2-Track Mono.*
Don't know who the boys were that backed Eydie on this but they sure knew how to make the right kind of Dixie noises, as does the lady herself.
All the tunes are what we call good old ones and starting with *When The Saints Go Marching In* we go on through *Ja-Da, Basin Street, Bill Bailey, Way Down Yonder*, and finally finish with *Wang Wang Blues*.
Eydie has a voice for this kind of music and sound as if she enjoys it. Don Costa's arrangements also leave enough room for the boys to have a little blow as well and the atmosphere is relaxed and happy.
Very nice recording with excellent balance between band and singer in every way.

In Love. *Jack Jones with Orchestra conducted by Bobby Hammock. World Record Club TT 599. 3¾ ips 2-Track Mono.*
If you've not met Jack Jones before then you are in for a pleasurable surprise. He is of the Sinatra, Bennet school and is the son of that great vocalist of the thirties and forties, Allan Jones. Remember him?
OK kid, so maybe you can't, but a lot of us can and he was good, believe me. Anyway like father like son, he's a swinger!
The songs he uses are all written by singers, Nat Cole, Peggy Lee, Sinatra, Matt Dennis, Eddie Fisher, Steven Allan and some guy name of Jones. Incidently Jack wrote his number especially for the album and it's a fine song *What Would I Do Without You?*

Evolution. *The Hollies with additional accompaniment my Mike Vickers. Produced by Ron Richards. Parlophone TA-PMC 7022.*
With psemi-psychedelic cover this new Hollies set evolves very pleasantly. I like them. They sing well, their own playing is good and the arrangements and added backing are just fine. One can hear and understand the words on most tracks, which is as it should be of course, but not always so with pop records. A certain amount of recording trickery is used which adds to the record sound but must make life difficult for the boys when they go on tour. Or do they mime?
One track *Lullaby To Tim* has the vocal sung through a flutter which is quite odd. I can't really believe that it was meant to be. As it is rather a lovely little song it seems a waste of effect.
There's a good beat throughout and this makes it a grand set for dancing. *You Need Love* is a very splendid item with some super singing and a pulsing rhythm.
Side two is full of good things, a unique arrangement of *Rain On The Window*, some unusual tone colour in *Heading For a Fall* with the use of what sounds like bass harmonica.

Snoopy vs The Red Baron. *The Royal Guardsmen. Stateside TA-SL 10202. Produced by Phil A. Gernhard. 3¾ ips 2-Track Mono.*
Of the title tune I'd better not say too much for fear of being rude -- it's abysmal. Next number from Bert Bacharach's pen is a sort of cowboy ode and I don't care for that either. Item three is maybe for a 'listen with mother' type audience. Final track on this side is the only good one, a slowish ballad with organ backing.
I wonder who this lot was meant to entertain? It's the worst kind of American Comic (?) magazine humour set to music. Maybe it's an American disc. I'd like to believe it was, for it really is a stinker and if I'm missing something from what I presume are the 'funnies' then I'm glad my sense of humour is the way it is. Suggest EMI demobilize the Royal Guardsmen at once if they haven't already done so.

Mozart Operatic Arias. *Elizabeth Schwarzkopf with the Philharmonic Orchestra conducted by John Pritchard. World Record Club TT 583. 3¾ ips 2-Track Mono.*
The superb Schwarzkopf's suprano voice making magic with five arias from *The Marriage of Figaro*, three from *Don Giovanni* and one from *Idomeneo*.
Opera has never been greatly in favour with me, mainly because I'm seldom convinced by the visual side of it despite superb decor and lighting. The people just don't ring true. Perhaps I'm too much of a realist. The music of opera on the other hand has always thrilled me, Mozart as much as any.
Miss Schwarzkopf in particular can sing arias all day to me if she so wished, for I think her quite divine. There is nothing to fault in these performances, nor in their recording.

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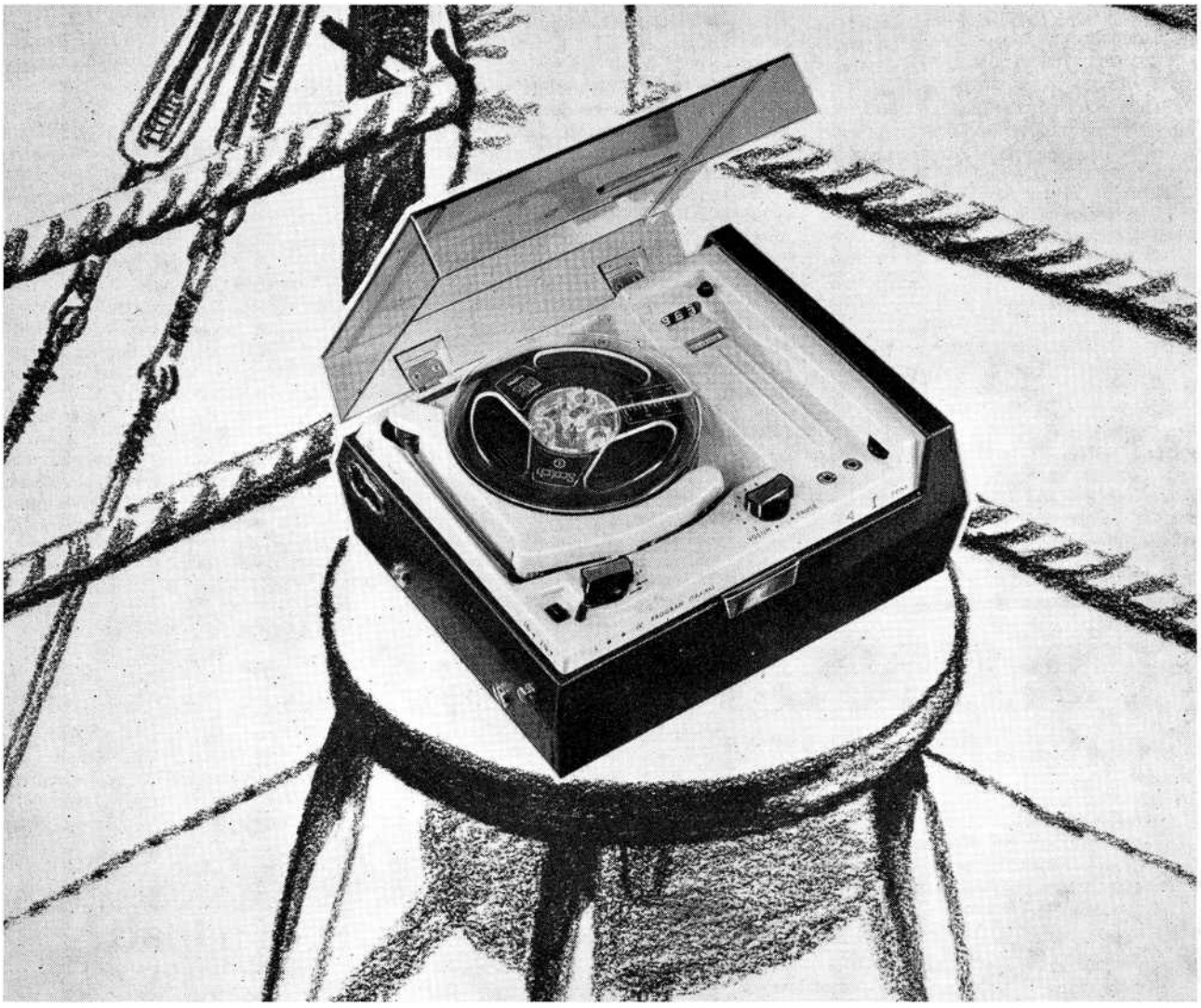

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Degausser
This is sometimes called a *demagnetizer* or *defluxer*. It generally takes the form of a steel core with a protruding polepiece around which are wound many turns of insulated wire. This is an electromagnet and is encased in a plastic housing, with a press-switch in series with the coil. It is designed for mains-powering, and produces a powerful ac mains field from the protruding polepiece. When this is held close to a recording head or other ferrous part on or close to the path of the tape, the part or head is taken through cycles of magnetization and demagnetization at a rate of 50Hz. Now, if the polepiece is gradually removed from the part or head any residual magnetism is effectively 'drawn out'.
Such demagnetization is necessary to avoid undue tape noise on replay. Even slight magnetization of the head or associated parts of the deck can add noise to a tape.
Some machines have auto head degaussing. Here the hf bias is gradually decreased in amplitude through the head windings each time the machine is switched off. This, of course, does not demagnetize the associated ferrous items of the deck; these must have treatment from a degausser.

Disembodied Treble
This is a subjective effect when two loudspeakers are used on a common audio channel and when one is connected antiphase with respect to the other. The effect is sometimes that of 'emptiness' and lack of bass or middle register, giving the impression that the treble is not coming from the same place as the other frequencies.
When the speakers are connected in phase this trouble is deleted, and 'in-phase' speakers mean that their cones move together in perfect unison under the control of the same signal. If one cone moves in while the other moves out, the speakers are then exactly 180 degrees out of phase (giving the antiphase condition just mentioned). Intermediate phase displacements can, and do, occur between these two extremes – often when certain types of crossover filters are used to channel the output signals into separate bass and treble units.
Many speakers have coded terminals – red and black dots or plus and minus signs – to facilitate in-phase connecting.
Antiphase connections of the two speaker systems of a stereo set-up greatly impair the stereo effect, causing the stereo image to dodge disconcertingly between the two speakers. Phasing in stereo starts at the signal input and continues right up to the two speakers. Thus, the phasing can be changed by reversing either the signal or the speaker of one channel.

Distortion
There is no such thing as a completely distortion-free amplifier or audio system. Distortion implies that the equipment adds to the programme signal spurious signals which may or may not be harmonically related. These spurious signals are the direct result on non-linearity in the transfer characteristics of any item of equipment – but mostly in the amplifier these days.
The distortion is given as a percentage relative to the real signal. For example, an amplifier producing 10% distortion at 10 watts output would deliver an output signal made up of 90% real programme signal (this, itself, might also contain distortion, of course) plus 10% spurious signals. Harmonic distortion alters the shape of the waveform of the real signal, in a manner depending on its number and intensity (and phase).
Fortunately, hi-fi amplifiers produce very little distortion, often as low as 0·1%. Distortion can be measured by applying a pure input signal and then filtering out and measuring the harmonics produced at the output. Tape recorders, especially the domestic type, produce a replay distortion around 5%, often more.

Doppler Effect
This when related to hi-fi reproduction boils down to another form of distortion. Briefly, the Doppler effect is that of an increase in frequency of a signal when the source of the signal is advancing in space and decrease when it is receding. It is illustrated by the change in pitch, for instance, of a fire engine bell when such a vehicle is dashing past an observer on its way to the scene of the fire. This is an example so far as sound waves are concerned. The effect is also present when electromagnetic (radio) waves are concerned, but this is outside our present line of interest.
So far as the hi-fi loudspeaker is concerned the movement of the cone at low frequencies can be quite substantial, especially with the latest type of small-cone, high compliance units. Thus, depending on the cone velocity bass, bass is being reproduced, the superimposed treble signals are subjected to Doppler effect. That is, some change in pitch occurs in the treble as the cone is deflected at low frequencies. This is avoided by good mechanical and electrical damping at the speaker (keeping the lf cone deflections low) and by the use of a separate speaker for bass, via a crossover filter.

THINGS YOU SAY

continued from page 28

you. What do you *want* to do? Please show *ATR* your support by letters etc, and let's arrange something – you've only yourself to blame if the hobby dies, but yourself to praise if it grows.

R. Else

Birstall,
Leicester

This idea was put to readers in an ATR *Editorial Comment and those interested requested to send in a postcard in confirmation. Only one* ATR *reader replied! (Ed.)*

Traction engines are worth recording
In answer to Mr H. J. Perks' letter regarding his lack of outside recording material – if he visited a traction engine rally he would find plenty of interest to record: engines with whistles blowing etc. At most rallies members of the Fair Organ Preservation Society bring their organs along to provide both old and modern music to suit everyone. The fair organ at Woburn Abbey, together with a very small number of other organs, are under contract to Decca Records who frequently issue fair organ records.
There are rallies being held all over the country, most of which are on Saturday or Sunday. If the editor thinks other readers would be interested, I will provide a list of forthcoming events, but regret my time does not permit me to send individual lists. On location I use a Standard 250 twin-track two-speed tape recorder, from which I get very good results. After seeing this tape recorder in my local radio shop during the winter, I looked through some back numbers of *ATR* and found in one copy a favourable review and this helped me to decide. The Standard 250 has many features found in tape recorders costing twice as much.

W. Dickenson

Stroud,
Glos.

Keeping the noise down
Having built a four-channel mixer I decided to try to cut down on the motor noise picked up by the microphone. To this end several long co-ax leads were made up, i.e., mixer output to recorder, tape playback unit to mixer, replay tape head pre-amplifier (on recorder) to mixer, and a long four core cable for HT and LT from power supply to mixer. The mixer is now used in the kitchen with the door shut. The motor noise was much reduced, but how could I see the cathode ray indicator? Headphones helped to set recording level but were rather hit or miss. The answer presented itself in *ATR*, March 1967. A parallel diode meter indicator circuit was shown in Fig. 1 of *Tape Recorder Servicing*. The circuit was built into the recorder amplifier (plenty of room, home-made) and the meter connections were wired to a co-ax socket on the panel. The meter feed resistor was changed to a preset and the full recording level set with reference to the cathode ray indicator already in the recorder. A 50 microampere meter with a 4½ inch scale was fitted in a wooden box and connected to a co-ax socket lead from the recorder to the meter completed the job. The level meter sits on top of the mixer in full view.
The cathode ray indicator is still in circuit and does not seem to upset the working of the recorder.

K. A. Le Lierre

Southampton,
Hants.

Protest against Stopfoil
Through your column, could I please ask why magnetic recording tape is still made with that horrible strip of *stopfoil?*
In this day and age most modern machines use micro switches. Is stopfoil needed? One shudders to think what it does to the tape recorder heads. Tape manufacturers go to a lot of trouble to produce a magnetic recording tape which reduces headwear, yet still include stopfoil. It is archaic, so let's have it done away with before you have to buy a new set of recording heads, replay heads and erase heads.
Tape without stopfoil would be a good selling point so HOW ABOUT IT?

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Philips Records Ltd have pointed out with regard to the mentioning of MUSICASSETTES (August and September issues) that the EP Musicassette, which sells at 14*s* 6*d* is but barely 2*s* 0*d* to 2*s* 6*d* over the cost of an EP disc. That is, a little under twice the cost of a single-play disc, though all EP Musicassettes in fact contain four top hits and are therefore very competitive in price in view of the fact that the consumer would have to purchase at least two single-play discs – four in most cases – to get the equivalent tunes on records. The Musicassette repertoire is now over 200 titles and includes titles from CBS, Polydor and Readers Digest, in addition to those of Philips, EMI and Pye.

SOUND SCENE

continued from page 11

New Uher 4200 Report Stereo

This recorder, shown in Fig. 5, offers all the advantages of the popular Uher 4000 Report – plus stereo. Now stereo sound in hi-fi quality can be recorded in the open air and while travelling. Surprising effects can be achieved with this technique – trains, cars, planes that really seem to move, music giving the illusion of sound coming from every singer and instrument from the correct direction. This stereo recorder also enables you to record music and sound effects on one channel and a commentary on the other. There is also a four-track version – the Uher 4400 Report Stereo, ideal for all those who are interested in maximum economy of tape. It goes without saying that a recorder as highly perfected as the Uher Report guarantees perfect sound reproduction even by the four-track technique. Prices and technical details can be obtained from Bosch Limited, 205 Gt Portland Street, London, W1.

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Erase head: In-line (stacked) quarter track, EF18–2902H.
Record/Playback head: In-line (stacked) quarter track PP30–4202.
Level indication: Two VU meters (calibrated to 0 VU at 12 db below saturation of tape).
Tone control: Two separate controls for bass and treble.
Input: Low impedance microphone inputs —transistorised (will accommodate any microphone from 250 ohm to 1 K ohm impedance). Sensitivity—68 db (0.3 mv) (2). High impedance auxiliary inputs. Sensitivity —16 db (0.12 v) (2).
Output: Low impedance line outputs (2). Output level 0 db (0.775 v). External Speaker jacks (8 ohms) (2). Integrated Record/Playback. Connector (1). Binaural monitor output (1). Output level 0 db (0.775 v)
Operating position: Either horizontal or vertical.
Speaker: 4″ x 8″ dynamic (2).
Power output: 5 watts x 2.
Transistors: 2SB381 (x6), 2SB382 (x2), 2SB383 (x2), 2SC297 (x1), 2SC298 (x4), 2SD64 (x6).
Weight: Approx. 34 lbs. 3 ozs.
Dimensions: 21 5/16″ (W) x 15 7/16″ (D) x 7 7/8″ (H).
Accessories: 5″ stereo recorded tape. Empty 7″ reel. Microphone Model F-96 (2). Connection cord. Capstan. Pinch roller. Reel cap. Head cleaning ribbon.

Recommended retail price **97 Gns.**

Sony offer the finest range of tape recorders from the battery portable TC 900 to the studio quality 777.
For further details see your Sony dealer or write to :
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Tel : Gloucester 21591.
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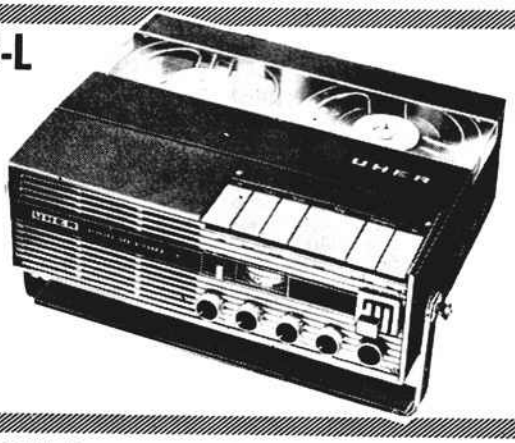
4000 Report-L

UHER



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1000 Report Pilot

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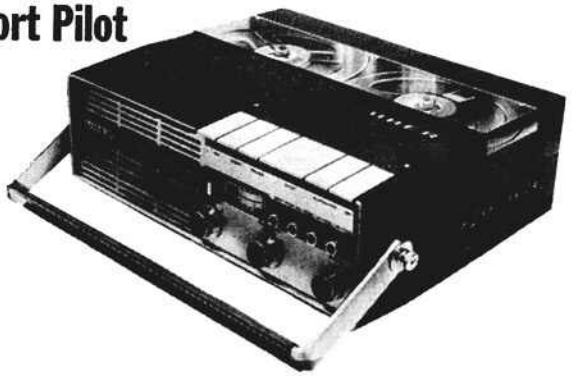

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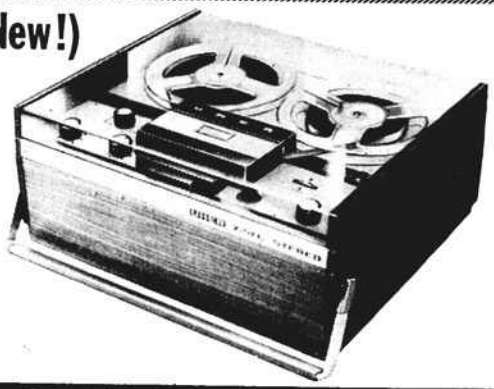

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