

Amateur Tape Recording

VIDEO & HI-FI

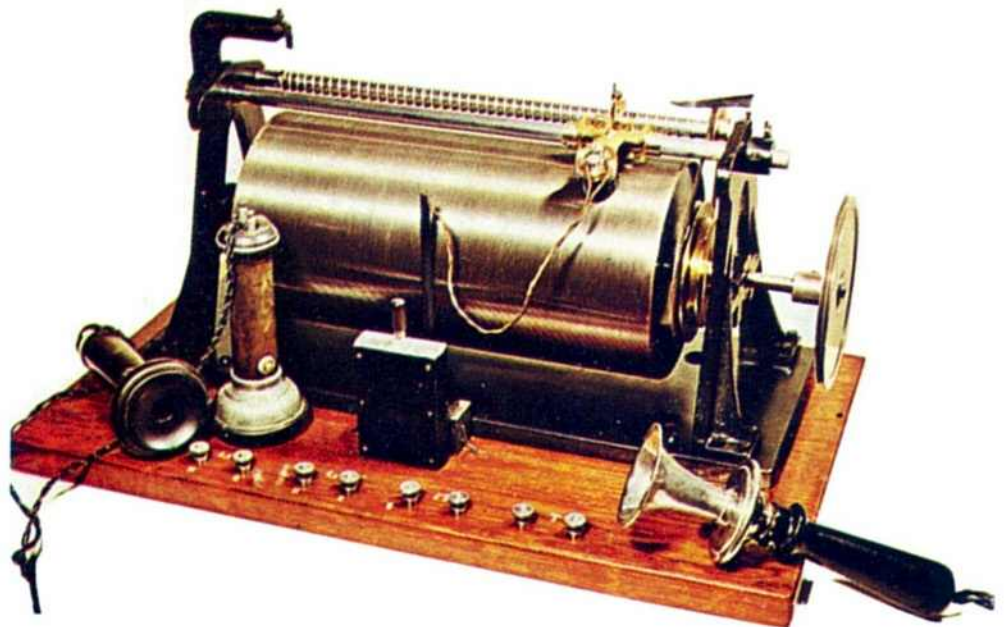
October 1966 Vol 8 No 3 2/6

HISTORY OF MAGNETIC RECORDING Page 8



TRUVOX R44 ON TEST Page 10

ANOTHER HI-FI SECTION Page 33



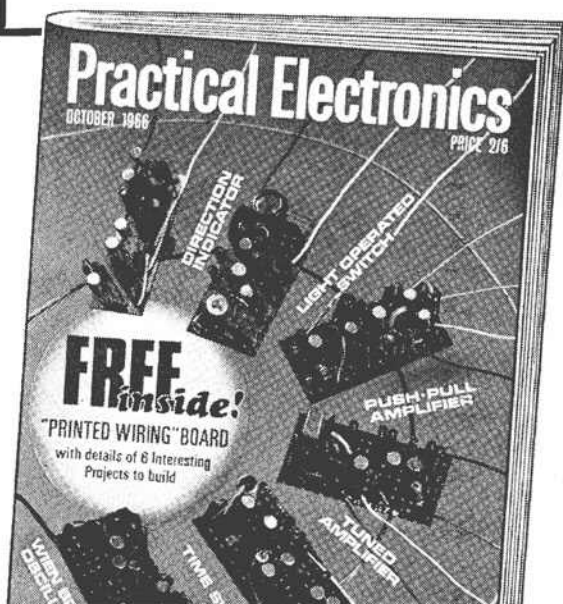
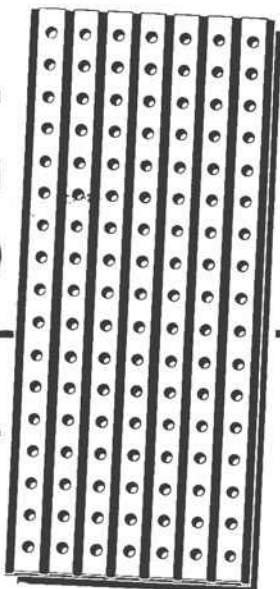
FREE inside **Practical Electronics**

UNIVERSAL WIRING BOARD

PLUS

THESE 6 SPECIAL WIRING BOARD PROJECTS

- LIGHT OPERATED SWITCH
- WIEN BRIDGE OSCILLATOR
- TUNED AMPLIFIER (1kc/s)
- DIRECTION INDICATOR FLASHER
- TIME SWITCH
- PUSH-PULL 200 mW AMPLIFIER



**OCTOBER
ISSUE
OUT
NOW
2/6**

**NEW IDEAS • NEW METHODS
LATEST CONSTRUCTIONAL KNOW-HOW**

RADIO SOCIETY OF GREAT BRITAIN

1966 International Radio Communications Exhibition



**SEYMOUR HALL, SEYMOUR PLACE
MARBLE ARCH, W.1**

**OCTOBER 26th to 29th
10 a.m. to 9 p.m.**

Radio Displays and Demonstrations by
ROYAL SIGNALS, ROYAL NAVY & POST OFFICE ENGINEERING

Competitions of Home Construction Sets
Latest Receiving & Transmitting Equipment
New TV & V.H.F. Aerials
Live Transmitting Station
Technical Bookshops Display
Mobile Equipment

Win £185 Eddystone E.A.12 Communication Receiver

Admission 3/-



NEW Size 15 SOLDER DISPENSER

For transistors, printed circuits, small components. 21 ft. coil of 60/40 alloy, 22 s.w.g. in dispenser for quick, easy soldering. **3/- each**



Bib PROFESSIONAL RECORDING TAPE SPLICER

Complete with razor cutter

A handy precision tool for quick and accurate editing—no wastage or post editing clicks. Pays for itself by using up all your odd lengths of tape. Chrome plated. **18/6 each**

Obtainable from High Fidelity electrical shops or write to:
MULTICORE SOLDERS LTD., HEMEL HEMPSTEAD, HERTS.



M30



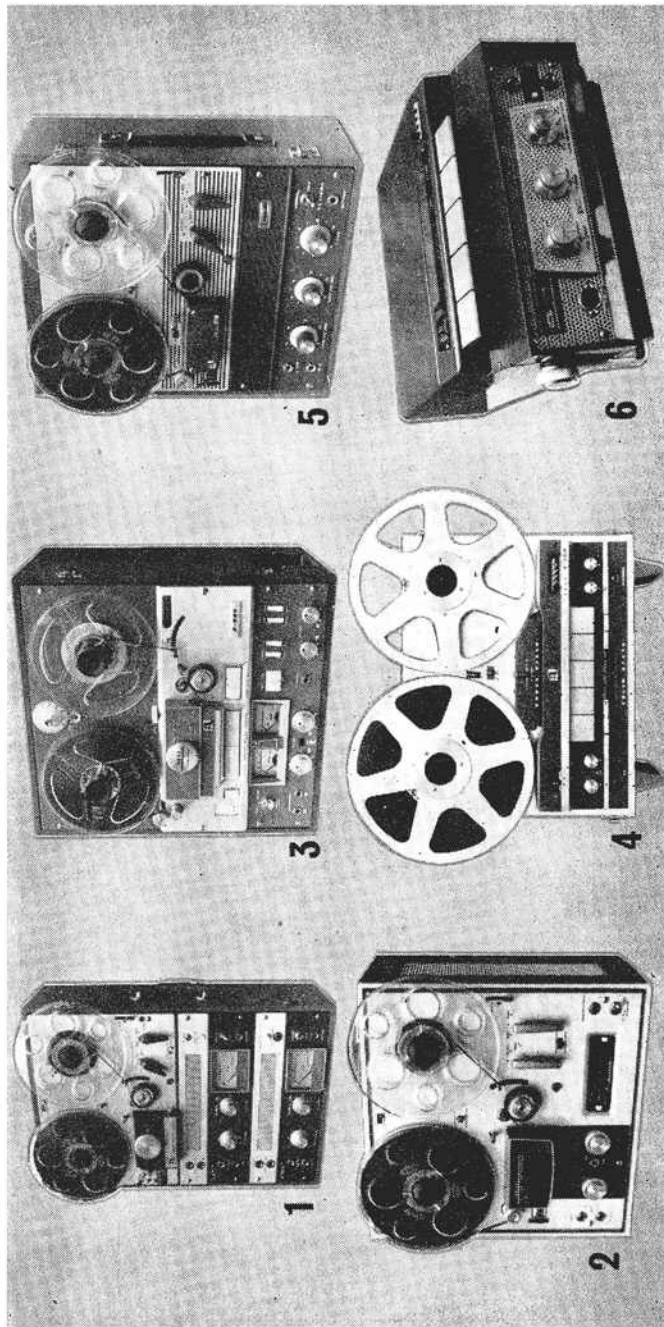
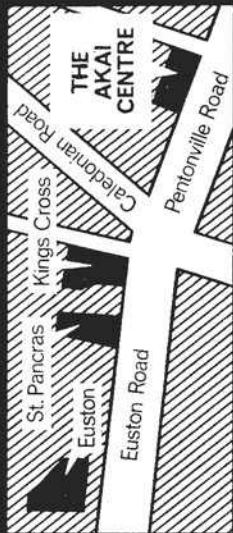
**LEARN WHILE
YOU SLEEP!** Languages, studies,
scripts, etc. by means
of tape recordings played at a
whisper through under pillow speaker
SLEEP-O-MATIC UNIT

including two-speed tape recorder complete with microphone, time-switch and under pillow speaker £27/10/- plus 6/- post (Batteries 5/-). Two models available, one for mains only and one for batteries which can be supplied with a mains power pack at 50/- extra. Both will take our special radio tuner at 42/-.

Publications on "Sleep Learning" and "Mental Power Through Sleep Suggestion". Full details on request.

RAPID RECORDING SERVICE
21 BISHOPS CLOSE, LONDON E.17

THE AKAI CENTRE



1. AKAI M 8

A high quality 4-speed, 4-track stereo/monorecorder with Crossfield head. Vertical or horizontal operation. 4 hours stereo recording on 1200 ft. standard tape. 2 stereo fill-in speakers. Sound-on-sound. 6 watts per channel. 136 gns.

2. AKAI 1700

A completely self-contained, 3-speed, 4-track stereo/mono recorder. Two 7in. x 5in. built-in speakers, 3 watts per channel. Attractive styling and AKAI precision finish. Takes 7in. reels. 79 gns.

4. AKAI X300

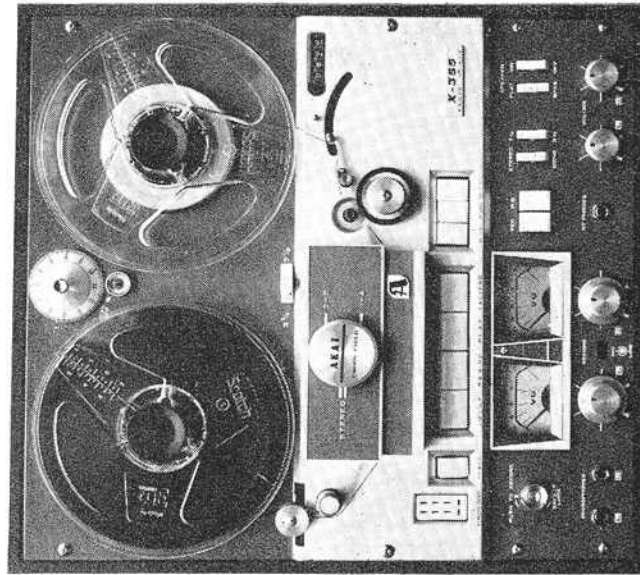
A studio-type, 3-speed, 4-track stereo/mono recorder of professional quality. Fully solid state 20 watts per channel amplifier; Crossfield heads; 3 hysteresis synchronous motors with direct-driven capstan. 10½ in. reels; keyboard controls, and many other features. 190 gns.

5. AKAI 910

A mono recorder available in four- or two-track form. Clean four- and functional styling; two Crossfield heads; superb low-speed frequency response. Built-in P.A. system and mixing facilities. 62 gns.

6. AKAI X4

A fully transistorised stereo/mono, battery/mains portable recorder. 4-track; 4-speeds. Crossfield heads; superb low-speed frequency response. Mains-rechargeable battery; 5 in. reels. Weighs only 11.2 lbs. 131 gns.



3. AKAI X355

A machine for the advanced amateur or professional, with 3 motors, 3 speeds, 4 heads (including Crossfield bias) and 20 watts per channel output. Fully solid-state, push-button solid-state controls, automatic reverse, repeat and shut-off functions. Built-in echo chamber effect, Full A.B. monitoring. Remote control facilities, etc., etc. 239 gns.

DEMONSTRATIONS. At "THE AKAI CENTRE" we have on display the complete AKAI range of superb tape recorders, from the amazing stereo AKAI X4 portable to the fantastic AKAI 355. Every model in the fabulous AKAI range is available for immediate demonstration and may be compared with any other make and model available today, for in addition to the complete AKAI range we carry the finest selection of recorders to be seen in this country.

Our expert staff all 100% AKAI enthusiasts are able not only to demonstrate these wonderful recorders but to give you expert advice and technical assistance based upon years of selling AKAI tape recorders. Remember if its AKAI you are interested in then there is only one place to go and that is "THE AKAI CENTRE".

Situated only 100 yards from well known and easy to get to Kings Cross and St. Pancras main line stations, "THE AKAI CENTRE" is one of the most accessible showrooms in London. (See diagram above).

FREE TRAVEL. This is a unique facility offered by "THE AKAI CENTRE". Complete coupon today and send to "THE AKAI CENTRE" for full details of how you can benefit by this unique offer.

THE AKAI CENTRE, 242/4, PENTONVILLE ROAD, LONDON, N.1. Telephone TERMINUS 8200

Open Monday to Saturday 9 a.m. to 6 p.m. (Half day Thursday)

Please send me by return a Free Travel Voucher together with full details on AKAI Models.....

Name

Address

Post to: **THE AKAI CENTRE**
242/4, Pentonville Rd, London, N.1.



UHER

a range of tape
recorders to satisfy
every amateur and
professional
enthusiast



4000 REPORT L

A battery portable that offers you virtually every facility of a mains-operated recorder—with many exceptional new features. Four tape speeds provide an infinite variety of recordings. Price (incl. microphone and tape) 103 GNS.



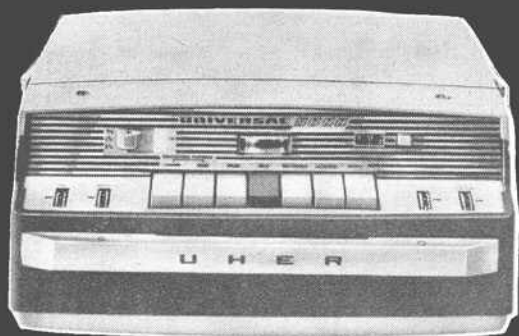
22/24 HI-FI SPECIAL

In many ways quite unique, this recorder meets the most exacting demands of a home sound studio. The Hi-Fi Recorder with a Test Certificate and Original Frequency Response Curve sheet for Hi-Fi systems. Price: 129 GNS.



724 L STEREO

A new, four track, all mains recorder priced at only 75 gns—and specially designed to meet the demand for an instrument particularly easy to understand and to operate.



UNIVERSAL 5000

An ideal dictation machine and recorder ensemble for professional and business use. Three tape speeds, exceptional handling comfort and high tonal quality. Price: 95 GNS.



784 ROYAL STEREO

One of the most versatile recorders in the world with a fascinating range of recording possibilities. A high-quality stereophonic model featuring a simple knob control with eleven different functions. Four track Price: 129 GNS.

Quality production of tape recorders is the sole manufacturing aim of the UHER works. Specialisation has led to outstanding developments. UHER was the first to apply printed circuit technique to tape recorders and among the first to transistorize its entire range. The simple obsession of UHER manufacture—tape recorders for all purposes and to meet every professional and amateur demand—has won universal recognition for the superb quality of these fine instruments. Write for full information.

BOSCH LIMITED

205 GT. PORTLAND ST.,
LONDON, W.1.

Phone: L ANgham 2672-5

EMI Musicassettes

**17 1/2 I.P.S. 4 TRACK
MONO-STEREO
COMPATIBLE
TAPES**



a ★
star
studded
first
issue



THE GREATEST RECORDING
ORGANISATION IN THE WORLD

Black & White Minstrels
"Magic of The Minstrels"

Semprini
"Magic Hour with Semprini"

Palm Court Orchestra/Leopold
"An Evening at The Palm Court"

Shirley Bassey
"Shirley Bassey"

Acker Bilk
"Stranger on the Shore"

Cliff Richard
"Love is Forever"

Eartha Kitt
"Love for Sale"

Joe Loss
"Go Latin with Loss"

Hawaiian Hula Boys
"Hi-Fi in Hawaiian"

Russ Conway
"My Concerto For You"

E.M.I. RECORDS (THE GRAMOPHONE CO. LTD.) E.M.I. HOUSE, 20 MANCHESTER SQUARE, LONDON W.1.

Shadows
"Sound Of The Shadows"

Manuel's Music of the Mountains "Exotica"

Pepe Jaramillo
"Mexican Fiesta"

Matt Monro
"I Have Dreamed"

Mrs. Mills
"Mrs. Mills' Party"

Silvester Strings
"More Great Show Tunes"

Garry Blake
"Sound Like Swingin' "

Big Ben Hawaiian Band
"Blue Hawaiian Skies"

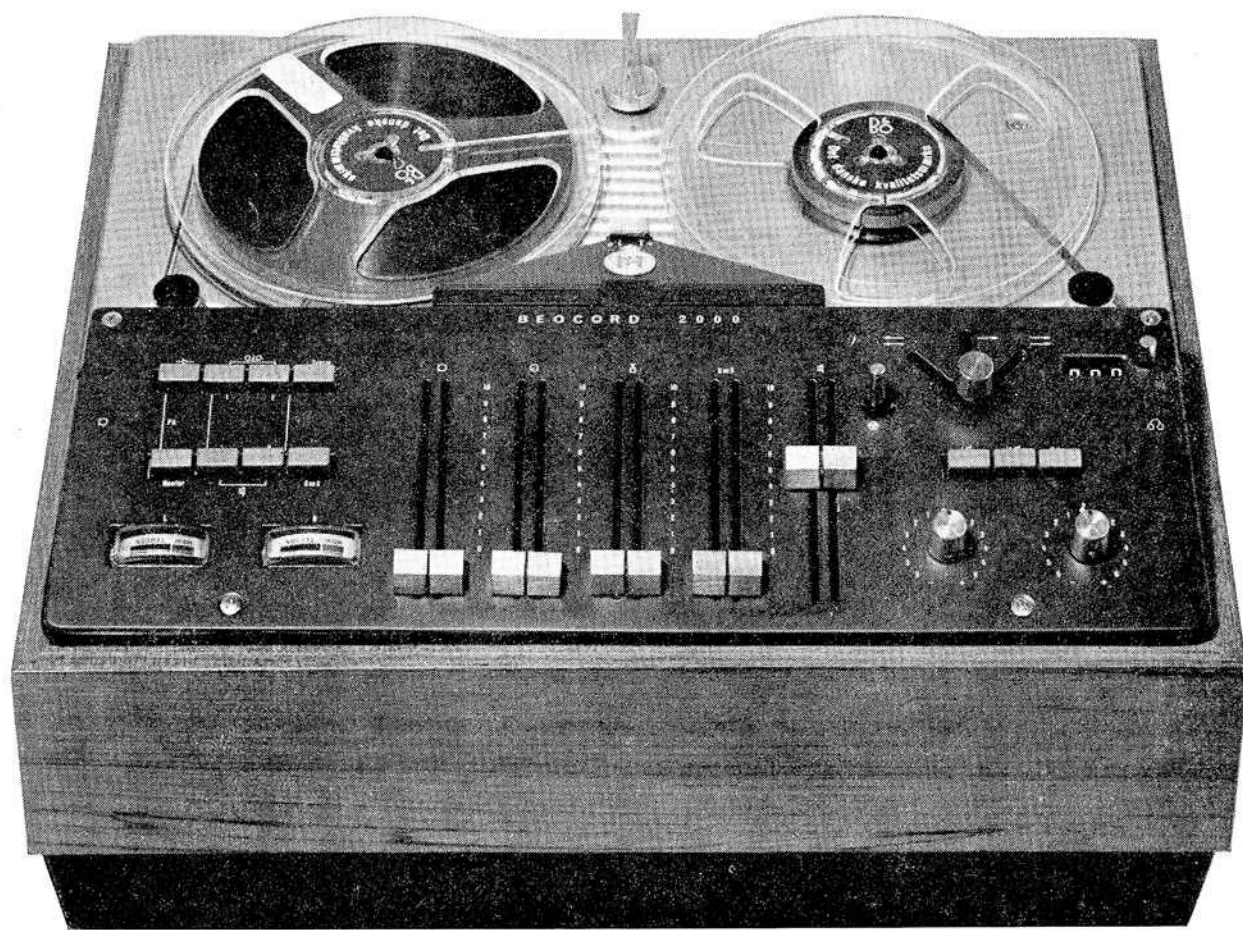
Norrie Paramor
"Shadows in Latin"

Melachrino
"World's Greatest Melodies"

Bang & Olufsen—
for those who value design
and quality



This new Beocord 2000 de luxe has everything!



- Split mixer controls ■ Two track record and playback plus four track playback
- High/low input impedance selectors ■ Three channel interchangeable mixer unit
- Variable echo facility

Plus all the highly developed and proved mechanical and electronic specifications featured in the Beocord 2000. Price: 135 gns. Portable version 139 gns.

For comprehensive information and the name of your nearest Bang & Olufsen Dealer, write to Geoffrey Smith, Bang & Olufsen U.K. Sales Division, Mercia Road, Gloucester. Tel: Gloucester 26841, or see the 2000 De Luxe at our London Showroom, 70-71 Welbeck Street, London, W.1. Tel: HUNter 2143.

Amateur Tape Recording

Editor: F. C. Judd, A.Inst.E. Assistant Editor: Moira Shippard. Advertisement Director: Lindsay Masters. Advertisement Manager: E. McKeown. Circulation Manager: David Hughes. Editorial, Advertising and Subscriptions: Amateur Tape Recording, Haymarket Press Ltd, 9 Harrow Road, London W2, Ambassador 3200. Amateur Tape Recording is published by Haymarket Press Ltd. © 1966 Printed by The Sidney Press Ltd, Bedford. Title registered at Stationers' Hall. Subscription Rates throughout the world 30s. post paid for twelve issues.

Vol 8 Number 3 October 1966

Feature	Author	Page
History of Magnetic Recording	F. C. Judd	8
On Test—The Truvox R44	Peter Knight	10
Book Review	ATR	12
Things You Say	ATR Readers	13
Tape Recorder Servicing	Gordon J. King	14
A Brief History of Worldwide Tapetalk	Bernard Ashfold	16
Making an Endless Loop Cassette	B. E. Wilkinson	18
Tape Reviews	Russ Allen	21
Reviews	ATR	22
Sound Scene	ATR	24
The Fastest Gun in the West	Bob Danvers-Walker	26
Tape Club News	Kim Cook	28
<i>ATR Hi-Fi Supplement:</i>		
Introduction to Stereo	Peter Knight	33
Quality Sound Reproduction by Truvox	Peter Knight	36
Test Report—The Tripletone FM Tuner	Gordon J. King	39
Disc Corner	ATR	41
Audioview	ATR	43

EDITORIAL COMMENT

Sound Hunting

By the time this issue of *ATR* is in circulation I hope to be on a two-day 'Sound Hunt' in Amsterdam together with a large number of Dutch tape recording enthusiasts. This has been organized by the *Nederlandse Vereniging Voor Geluid en Beeldregistratie* (Dutch Sound Society) through their magazine *Bandopname*. The sound hunt, or *Nationale Slipjacht* as it is called, is arranged for members of the NVG who meet in Amsterdam and then split up into small groups for a one-day tour of the city in search of interesting sounds. I am hoping to return not only with some useful recordings but also with thoughts of organizing a similar project through *ATR*. This is just an idea at the moment, but your own thoughts about it would be more than welcome. Supposing we arranged a similar sound hunt in London, for example, with a prize for the best collection of recordings, or an edited version of the event. Would you (a) be interested in taking part; (b) do you think it should run for one day only or two days, bearing in mind that those from the provinces would have travelling and hotel expenses; and (c) should

it be rounded off with a prize for a best tape as mentioned above? I will try to get my report on the Dutch event into print as soon as possible, as this may well give us a better idea of how successful (or unsuccessful) a sound hunt of this kind could be. I believe many tape clubs do, from time to time, organize similar events so their observations would of course also be most welcome.

Stereo

At the time of writing the BBC stereo broadcasts are well under way, but the programme material is not particularly interesting. All the stereo programmes seem to be devoted to classical music. Very nice if you happen to be an enthusiast for the classics, but there are many other kinds of music programme material quite suitable for stereo. The BBC also announced the possibility of plays in stereo, but what about outdoor events where the real spatial atmosphere can be brought into the home?

The Modern Tape Recorder

Technical development in tape recorders during,

say, the last two years has resulted in some quite interesting machines from both British and foreign manufacturers. The Ampex 1100, for instance, which we shall be reviewing shortly, some of the Akai and Sony models, also on the review list and the Ferrograph Model 633. I shall be reviewing this new Ferrograph next month and the actual tape recorder sent to me for review has already been given some preliminary tests. It is truly a recorder for the enthusiast, with a very high standard of performance backed up with a test certificate which includes pen-recorded frequency response and speed check graphs issued with each machine.

FCJ

FRONT COVER

The two pictures shown on our front cover this month illustrate *History of Magnetic Recording*, page 8. The upper picture shows the *Magnetophon* tape recorder, designed by AEG in the nineteen thirties for studio use. The lower picture shows an even earlier model, the *Telegraphon*, designed in 1900 by Valdemar Poulsen.



An aerial picture of the BASF factory at Ludwigshafen

THE HISTORY OF MAGNETIC RECORDING

and the development of magnetic tape

By F. C. Judd

The first article on magnetic sound recording was published in 1888 by Oberlin Smith, an American who, it appears, was the first to tackle the problem of recording sound magnetically. He thought it could be done by using a form of microphone to transform sound waves into electric currents, these in turn being fed to an electro-magnet (the recording head), the magnetic fields from this being superimposed on to a 'sound carrier'. For the sound carrier, Smith suggested steel wires or tapes or threads of cotton or silk containing steel filings. The playback of the recording from the sound carrier was to have been by a similar system, i.e. the magnetization on the sound carrier would induce currents in the electro-magnet which would be converted into sound again via a device akin to a telephone. However, despite the fact that the principle was almost identical with that of modern tape recording, it was never developed. There were other technical difficulties that could not be overcome.

The first successful recorder

In 1900 an apparatus called the *Telegraphon* caused great excitement at the World Exhibition in Paris. This was a device designed by Valdemar Poulsen, a Danish physicist, and which is shown on our front cover (lower picture). The *Telegraphon* consisted of a brass cylinder around which a thin steel wire was wound spirally with a space between each turn. An electro-magnet was made to travel along the cylinder which at the same time was rotated,

Electrical currents in the electro-magnet magnetized the wire in the way that a tape head does with magnetic tape. The remanent magnetism in the steel wire could at any time be transformed again into electric currents by means of another but similar electro-magnet made to traverse the coil of steel wire, the resulting signals then being fed to a telephone receiver. The cylinder was approximately 16 inches long and 5 inches in diameter and contained 380 turns of steel wire. However, as a recorder it was not very successful and in fact didn't compete even with the early American dictaphone apparatus which operated with wax cylinders, as per the Edison principle.

The Blattnerphon

Until the development of valve amplifiers around 1912, little was done with magnetic recording, but about this time the Berliner Fernsprechund Telegraphonwerk AG (Ferdinand Schuchand) attempted improvement on the quality of magnetically recorded sound. Their intention was to apply the technique to 'cinema films with sound' and the result was the *Blattnerphon* developed in the 'twenties in co-operation with an English company. The *Blattnerphon* was a large machine with two spools of 11½ inches in diameter and although the recordings were noisy they proved superior to gramophone discs hitherto used for films with sound. One of the difficulties with the *Blattnerphon*, which used steel tape, was that if the tape broke, it could only be joined by *welding*! This resulted in an annoying audible 'crack'

every time a join went through the sound head. At about the same time the optical sound track system for films was developed and the *Blattnerphon* was soon forgotten. (In English *Blattnerphon* is usually spelt *Blattnerphone*.)

A new sound carrier

In 1928 an engineer, Fritz Pfeleumer from Dresden in Germany, demonstrated a magnetic recording machine of his own design which used a paper tape coated with magnetic material composed of fine iron filings. This idea had already been announced in 1917 in a technical journal but was not developed. Pfeleumer, however, pointed out that his 'magnetic tapes' could at least be repaired quite easily by 'splicing' as opposed to welding. In 1932 the Allgemeine Elektrizitätsgesellschaft (AEG) decided to take up the idea and, moreover, investigated the possibility of improving sound quality and reducing the background noise which had been inherent in previous magnetic recording systems. First a very fine iron powder was needed for coating the tape. AEG asked the Badische Anilin und Soda-fabrik (BASF) at Ludwigshafen in Southern Germany to manufacture an iron powder of utmost homogeneity which they were eventually able to supply. The problem of the 'sound carrier' or tape remained, however, since Pfeleumer's paper tapes tore very easily and gave rise to other disturbing variations. Paper was obviously not a very good form of carrier for the magnetic coating.

BASF then came forward with the idea of

using cellulose acetate tape instead of paper and tests carried out in the laboratory proved this material to be very satisfactory. In August 1934 BASF manufactured some 164,000 feet of magnetic tape for AEG for use at the Radio Exhibition in Berlin. In the meantime AEG had designed a suitable tape recorder originally called the *Ferrottron* (similar to that shown on our front cover) but later re-named the *Magnetophon*, as BASF had called their tape *Magnetophonband*. By 1935 BASF had discovered that a magnetizable iron oxide was far better for the magnetic coating than the iron powder hitherto used, as it could be coated on to the tape by a process similar to that employed in coating photographic film.

A new magnetic coating

The use of the original black iron oxide was soon abandoned in favour of the far superior brown gamma iron oxide Fe_2O_3 . This was developed to a marketable tape known as type 'C' derived from the trade name of *Cellit* and which was a quarter inch-wide as standard tape is today.

The use of new magnetic coating had resulted in a tremendous improvement in sound quality and in 1936 the London Philharmonic Orchestra conducted by Sir Thomas Beecham was recorded on tape at the BASF Festival Hall in Ludwigshafen. The entire performance was recorded on 'Magnetophonband' and is, incidentally, still in existence. The first real users of magnetic recording were broadcasting stations and studios and in 1939 around 4,000,000 feet of Magnetophonband was produced and sold.

High-frequency bias improves quality

Whilst the broadcasters and studios were happy with the facilities that magnetic recording provides, such as recorded and readily available sound effects, control during recording, ease of storage, editing and so on, they were not quite content with the quality of the reproduction. They were also concerned about the rather high noise level which had come to be associated with magnetic recording.

Whilst carrying out some tests in the AEG laboratory, it was noticed that the secondary noise suddenly disappeared and then later returned. On investigation it showed that the recording amplifier was defective and was in fact producing a high-frequency oscillation of its own and that the real audio signals had been recorded whilst superimposed on the high frequency signal. Further investigation revealed that practically distortionless and noise-free recording could be made by using a high frequency 'bias' signal. This discovery eventually led to the use of high frequency currents for erasing the tape. In July 1941 AEG demonstrated a recorder using the high frequency bias and erase system and showed that the entire frequency range and dynamics of speech and music could be faithfully recorded free of noise. It had taken 40 years to reach this degree of perfection which then placed magnetic recording far above any other known method of recording.

New plastic material for tape

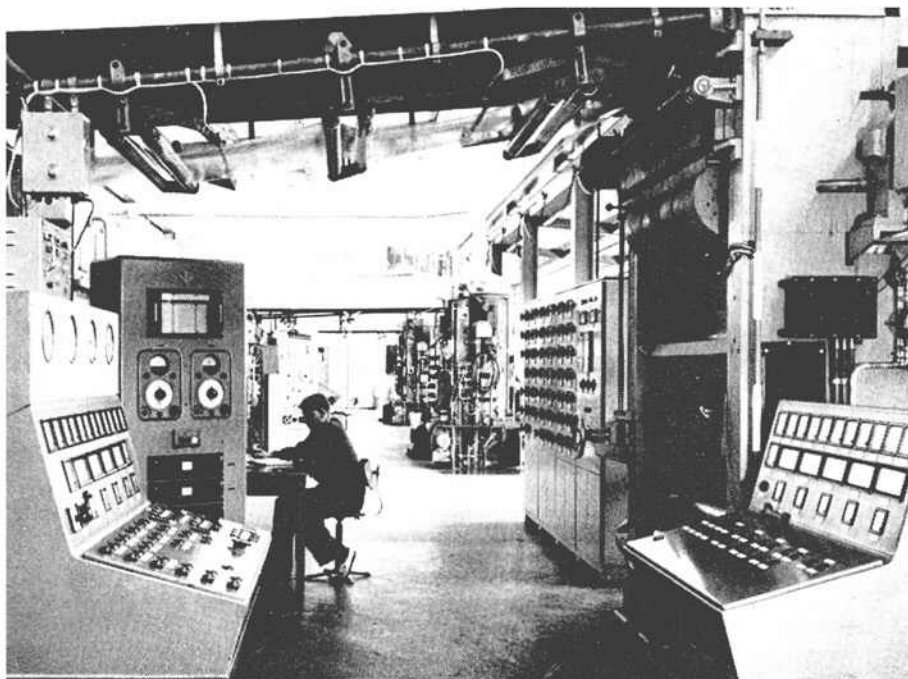
In 1943 the BASF factory was completely destroyed by bombing but research on plastic tape went on and resulted in a tape called *Luvitherm*. The iron oxide was dispersed within the tape and not coated on the surface, but because of the low amount of iron oxide which the tape could absorb the idea was abandoned.

The finished tape was too insensitive. It is interesting to note that a similar tape, manufactured in England shortly after the war, had the same characteristics.

By this time many other countries had begun to recognize the superiority of magnetic recording and had begun to manufacture tape. From around 1948 domestic tape recorder manufacturers mushroomed everywhere and a new hobby came into being – tape recording for the amateur. From there on the development of magnetic tape ran parallel with that of tape recorders. In 1950 BASF introduced pre-stretched Luvitherm tape for amateur use. This was a coated tape with an excellent

frequency response and suitable for use at slower tape speeds which had up to then been as high as 30 ips. Since then we have had long-play tape, double- and triple-play tape and always some improvement quality-wise. Now, of course, it is used for the even more exacting demands of video recording which before long may provide another interest for the recording amateur. And it all stems from the first practical magnetic recording tape made 30 years ago by BASF at Ludwigshafen.

(Next month I shall be dealing with the manufacturing process of modern recording tape used at the BASF factory in Germany.)



Automated equipment produces many miles of Luvitherm, the base material for BASF magnetic recording tape.



No recording tape leaves the BASF factory without being thoroughly tested for magnetic properties, etc. Here a pen recorder automatically logs the results of the many tests the tape is subjected to.

ON TEST-THE TRUVOX R44

by Peter Knight



Fig. 1. General appearance of R44, four-track version.

The Truvox R44 is a four-track, mains-powered, fully solid-state tape recorder in the popular price bracket. Moreover, it is a British-made machine that compares both in price and performance with imported models of similar specifications. It is the kind of recorder with a 'rugged' look, implying that it could be literally thrown into the back of the car and still work well on arrival at its destination.

The case is in plastic fabric covered wood, while the front speaker grill adopts a square-hole formation made of off-white plastic that looks as though it would break easily but

will not (I have tried it!). The deck mechanics are solid metal, but the deck top (that which shows on top of the cabinet) consists of moulded plastic sections, which are probably the least substantial. The machine weighs 22 lb and is transportable by means of a handle at the side of the cabinet. There is also a detachable lid that completely encloses the deck.

A useful characteristic is the ability to cater for spools up to 7 inches in diameter. The deck runs at $7\frac{1}{2}$, $3\frac{3}{4}$ and $1\frac{7}{8}$ ips and the wow and flutter at these speeds respectively are 0.15%, 0.25% and 0.35% minimum. Equaliza-

tion is to the new CCIR standard ($70\mu\text{S}$ at $7\frac{1}{2}$ ips and $140\mu\text{S}$ at $3\frac{3}{4}$ ips) and the mains input is adjustable over 100/120V and 200/250V at 50c/s. 60c/s models are available to special order. The machine consumes about 75 watts of electricity (about the same as an average electric light bulb).

Fig. 1 shows the general appearance of the machine. The four control knobs correspond to recording signal input level, tone/monitor, record/playback and tape speed. The first is a dual control, one section dealing with the microphone signal and the other section handling an auxiliary signal which may be

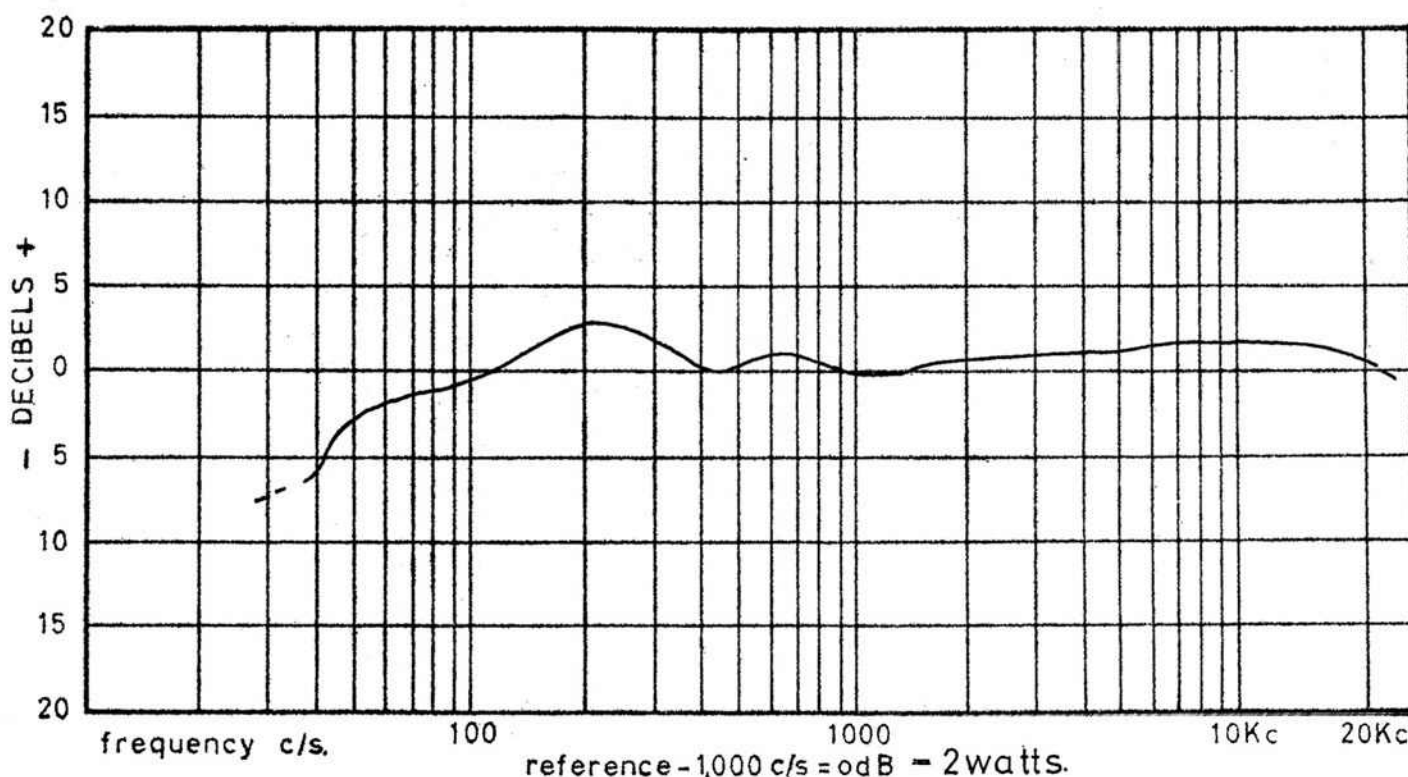


Fig. 2. Overall record/replay response at $7\frac{1}{2}$ ips (0dB referred to 2W).

fed into the 'radio' input jack. Recording signal mixing facilities are thus provided by this dual control. The microphone control also serves as the replay volume control. The motor system is controlled by three large toggle-type switches (looking like large push buttons) giving the two rewind conditions and replay or record 'start', depending on the setting of the 'record/play' control knob. The recording level indicator is a conventional pointer movement, with a red section on the scale denoting over-modulation. A three-digit counter is used for the tape which is zeroed by an edge-operated knob, as distinct from a press-button. Tape pause is worked by a small lever protruding through the plastic on the deck top. This is very sensitive and operates at the slightest movement. The four-track model (there is also a two-track model R42) features a couple of small push-buttons near to the counter, one which parallels the two head sections, giving *duoplay*, and the other for track selection, giving tracks 1 and 4 in the 'up' position and tracks 2 and 3 in the 'down' position.

Duoplay Facility

The duoplay facility makes it possible to record music on one track for instance, and partnering commentary on a complementary track so that on playback with the duoplay button depressed both recordings are heard simultaneously. This composite recording could then, if required, be recorded on to just one track by the use of a second recorder, this picking up the composite signal from the R44 'monitor' output socket.

The electronics section embodies 11 transistors and 2 rectifiers and the playback amplifier pushes up to a maximum of three watts of audio into a 15 ohm output. This is provided by a complementary class B output stage using one AC176 (n-p-n) transistor and one AC128 (p-n-p) transistor driven by an AC128. There is no output transformer in this type of circuit, the speaker being coupled directly to the output transistors through a capacitor. One of the prime distortion-producing components of the popularly-priced valved tape recorder is thus deleted and the power output is maintained remarkably well at low and high frequencies.

The first two signal stages are dc coupled, these as a whole comprising the microphone amplifier on record and the head amplifier on playback. Negative feedback equalization is used on playback, this being switched automatically to suit the tape speed selected. The preamplifier, as it were, is followed by three more transistors, the latter feeding current into the head on record. The head current is passed through a corrective circuit comprising an inductor in parallel with a capacitor. Further switched correction on record is given by a 1mH inductor in conjunction with a capacitor, the value of which is adjusted to suit the tape speed. A further two transistors in a dc coupled arrangement are switched in on playback. This picks up its signal from the third stage and delivers it to the driver of the playback output stage, thereby bypassing the recording compensating circuits.

Separate Oscillator

A desirable feature in the circuit is the use of a separate hf oscillator, as distinct from switching the audio amplifier to act as an

oscillator, as is quite common in popularly-priced machines. The separate oscillator reduces the switching complexity and makes it possible to produce a relatively pure waveform (conducive of a good signal/noise ratio). The oscillator comprises just a single transistor and tests show that adequate power is delivered by this fully to erase a heavily recorded tape. Normally, especially on battery-powered models, a push-pull oscillator is demanded to supply sufficient hf power.

The transistor used here is an OC81Z and one reason for the high hf power is that the oscillator is fed from its own winding on the mains transformer and own bridge rectifier delivering some 28 volts when the oscillator is drawing current. Feedback is from collector back to base, via an oscillator transformer with a separate winding adjusted impedance-

wise to push the maximum possible power through the erase head. Incidentally, the bias oscillator supply line also feeds the recording output stage, allowing the head to be supplied through a 10Kohms resistor, towards constant current working.

The second supply section (also with its own mains transformer bridge rectifier, smoothing capacitors, etc.) delivers 24 volts to the remainder of the circuit. Negative feedback is applied to the recording amplifier, but there is no apparent feedback in the playback output stage.

Signal Sockets

There are two inputs, one for microphone and the other for radio or pick-up, etc., and two outputs, one for monitor or quality feed to an external amplifier. There is also a *continued overleaf*

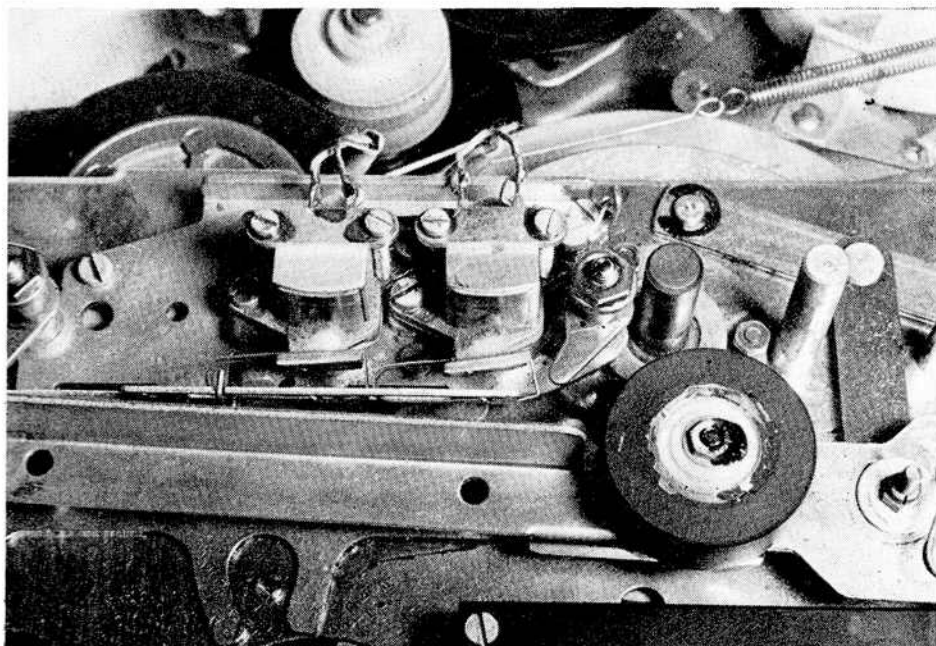


Fig. 3. Capstan and head area.

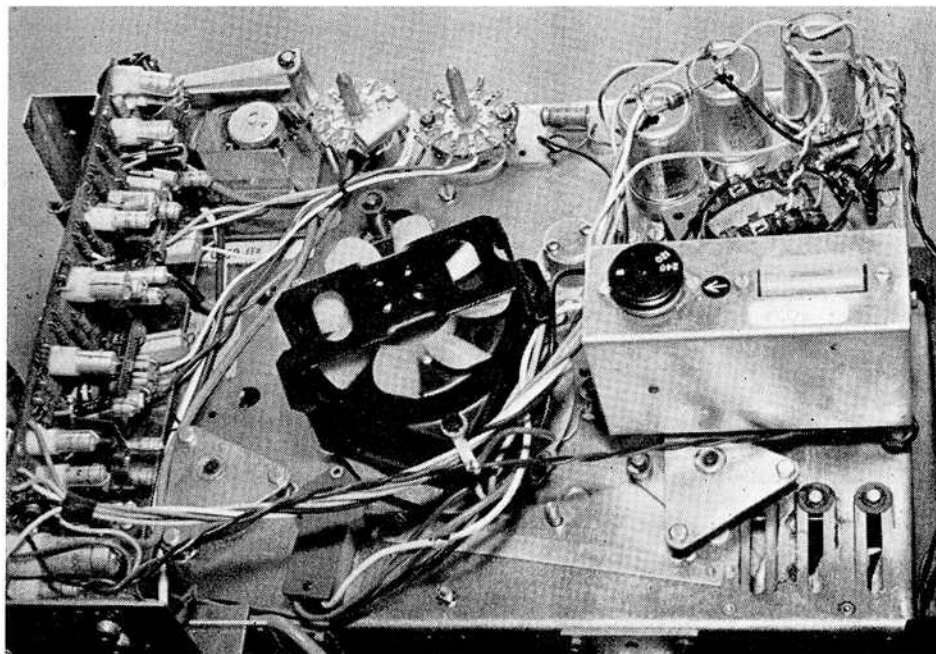


Fig. 4. Inside view.

THE TRUVOX R44

continued

socket for an extension loudspeaker which automatically cuts out the internal speaker when the plug is inserted.

The signal being recorded can be monitored either on 'phones or through the internal speaker, the level being controllable by the tone/monitor knob. The instructions say that the electronics can be used as an independent amplifier if required. However, this involves running the machine in the 'record' position with the motor working. Moreover, it was discovered during tests made on the machine that a 4 volt peak-to-peak hf signal appears across the loudspeaker load under this condition of operation. This works out to about 1.4 volts rms when the tone/monitor control is fully advanced. This may or may not affect the performance when using the system purely as an amplifier, depending on the nature of the signals carried and on any associated equipment. The hf signal, by the way, is 60Kc/s.

The frequency response of the recording section of the circuit, including the level indicator, extends usefully up to 35Kc/s but, of course, this frequency could never be used. Anyway, it goes to show what transistors can do even in a relatively inexpensive tape recorder.

Overall Power Response

The replay amplifier response is flat to within ± 3 dB from 40 to 16,000c/s and the overall record/playback characteristics are shown in Fig. 2. A sine-wave input signal was applied to the radio input socket across 47Kohms and the recording was made to a level of approximately -12dB below tape saturation. Frequency bands and identifications were thus recorded and the tape was played back on the recorder.

The output was then monitored on a watt-meter across 10 ohms with the volume control adjusted to give an output of 2 watts at 1,000c/s. This is truly a remarkably good overall characteristic from a machine costing

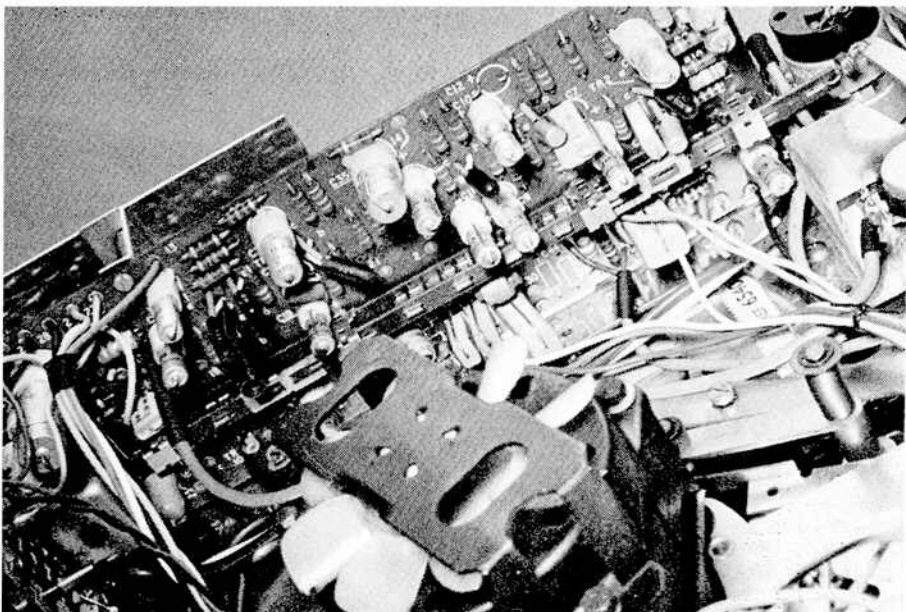


Fig. 5. The electronics.

only 44 gns. The speed of this test was at $7\frac{1}{2}$ ips. Wow and flutter appear to be within the maker's specifications and it was found that rewind on the sample machine took 128 seconds, which is close enough to the specification which quotes 120 seconds. The net noise level below a tape recorded to peak as indicated on the level meter was a little over 40dB unweighted.

The internal speaker is an 8 x 5 inch elliptical model rated at 15 ohms impedance, and sounds reasonable but not good. Much improved reproduction was obtained by plugging in one of the Truvox mini speakers, the 19 gns LS120 model. Indeed, such a speaker would be a well-worth-while extra. The signal at the monitor socket does justice to any hi-fi amplifier, especially at $7\frac{1}{2}$ ips. The deck works from just one motor, this being coupled to the heavily weighted capstan through an idler wheel. The spool braking and control is very straightforward and mechanically sound. Fig. 3 shows the capstan area and head assembly, while Fig. 4 gives

an inside impression of the recorder as a whole. The solid-state electronics are built upon a printed circuit board, and the neat layout of this is shown in Fig. 5.

The Truvox R44 is a machine that one could be proud of and one for which spares when required will always be available. At 44 gns the four-track model can be thoroughly recommended and is suitable for almost all domestic applications.

Summary of Maker's Specification

Spools: Maximum 7 inch. **Speeds:** $7\frac{1}{2}$, $3\frac{3}{4}$ and $1\frac{1}{2}$ ips. **Wow and Flutter Respectively:** Better than 0.15%, 0.25% and 0.35%. **Winding Time:** 2 minutes for 1,200 ft of tape. **Hum and Noise:** Better than 42dB. **Signal/Noise Ratio:** Better than 46dB. **Inputs:** Microphone at 50 μ V across 25Kohms and Radio/PU 100mV across 100Kohms. **Power Output:** 3W into 15 ohms. **AF Output:** Variable up to 1V across 10Kohms. **Prices:** 44 gns complete with microphone and screened terminated lead.

BOOK REVIEW

Your Book of Tape Recording by Ken Peters. Published by Faber & Faber at 12s 6d. 14 chapters and 87 pages.

This very interesting little book is written for the beginner or practical tape recordist, as distinct from the technically interested enthusiast or service technician. It is the kind of book that would quickly foster an interest in domestic tape recording, for it reveals the many capabilities of the ordinary domestic machine and shows that there is much more potential in tape recording than mundane voice recording and music dubbing activities.

It is nicely produced and well written. Mr Peters is certainly well versed in the creative arts of tape recording and much of his enthusiasm rubs off on to the reader.

We learn first about recording history and then about the tape recorder as an instrument, together with some of the terms heard in tape clubs. An explanation of tape recorder controls is also included.

Subsequent chapters deal with such items as microphone techniques, editing and dubbing, music improvisation, including an 'egg-box' studio, examples of the use of the tape recorder, how the tape recorder can be used to make hobbies more interesting and so forth. There is a short, though useful chapter on accessories, and we are shown

how to experiment with sound and how the tape recorder can be employed as a controlling medium.

Finally, Mr Peters looks into the future of tape recording, touching on such things as video tape and tape dreams!

This is a book that can be very strongly recommended to the beginner and to the owner of a tape recorder whose ideas are beginning to wane. It well deserves a place on the bookshelf at home or at the tape club (or both). It is the kind of book that tape recorder sellers should supply free with each tape recorder they sell, for ultimately it would bring more business in terms of tapes, microphones and accessories.

GJK

THE THINGS YOU SAY

Each month the writers of the most interesting letters selected for publication on this page will receive a useful accessory to tape recording. Letters for this page should be addressed to *Things You Say, ATR, 9 Harrow Road, London W2.*

Sound Tapes for the Blind

ATR reader Dave Beswick has started a 'sound' magazine for blind tape recording enthusiasts, which will be circulated once a month on a 'round robin' basis. Mr Beswick says:

'If any reader knows of a blind friend who would like to go on the list I would be pleased to receive particulars and will in return send full details of the sound magazine service. I would also be grateful for subscriptions of tapes. The magazine is sent out at the end of each month. I would also appreciate having recorded material which may be of interest to blind persons, which will promptly be returned after dubbing. I can copy at 1½, 3½ or 7½ ips. The type of material most needed is interviews, short stories, sound effects, club news, etc.'

63 Ashton Road, Luton David Beswick

Good Service Again

Through *Things You Say*, readers have expressed their delight, or dissatisfaction, with dealers and manufacturers when they have dealt with them. I am sure that many readers are influenced by these comments and I would therefore like to hand out a bouquet.

It is to Messrs K.J. Enterprises of Harrow, Middlesex, with whom I have just completed a purchase. For reasons beyond their control, the purchase was not straightforward and involved a change of mind on my part, but their speed and eagerness to give satisfaction could not be faulted. My experience also says much of ATR's choice when accepting advertisers. Thank you K.J. Enterprises and thank you ATR.

A. Dudley-Chadwick

Sprocketed Tape

We would refer to your reader Mr J. A. Kerr's letter in the July issue of ATR and the Editor's reply thereto. We feel that we must point out that the 'unrealistic' price of sprocketed tape is virtually out of our hands. The tape has to be imported from France and we have no control over the manufacturers' charges. It is true that prices have recently risen drastically, but the fact still remains that we make no profit on this tape. We supply it as a service to our many Synchrondek users and we are happy to do so.

With reference to the mention of our machine for sprocketing tape, this machine is being manufactured for us by a sub-contractor and in spite of many technical difficulties which have delayed its progress we hope to have it ready for testing within a few weeks. After proof of satisfactory operation, we shall be able to sell sprocketed tape at a much reduced cost, and we shall also be able to perforate customers' own tape.

Rochdale Road, Bracknell, Berks.

J. H. Bixley
Works Manager,
Synchrondek (1964) Ltd

Lecture Service

There has been correspondence lately in your magazine on the subject of lecture services for tape recording clubs. The suggestions made are commendable and it is hoped that they will bear fruit. But the purport of this letter is to express surprise that your correspondents

seem unaware of what the Federation of British Tape Recording Clubs is doing to this end. This lecture service was mooted in the Federation Bulletin months ago and we are now in the process of compiling a catalogue much on the lines of that available to camera clubs affiliated, through regionals, to the Royal Photographic Society.

The catalogue, when ready, will be streamed to all member clubs, associates and other clubs that identify themselves to the Federation. It will then be an appendage to the Federation's tape library service. The scheme more than covers any suggestions already made by your correspondents. We could hardly detail the whole scheme in this letter but enquiries would be welcomed. But then perhaps the correspondents are either unaware of the Federation or, if aware of it, treat it lightly. With regard to unawareness this is rather surprising because quite recently, copies of the Federation Bulletin were sent to all known clubs, irrespective of membership. If, on the other hand, it is treated with a certain scepticism, then of course a tragic misconception must exist of the innate character of a national Federation.

A lecture service must necessarily be of overall national application, divided into regionals because of physical and geographical reasons. A reversal of this process can only result in the better placed clubs getting most of the cream and keeping it. Hence the only logical place for a national lecture service is with the elected central authority, the Federation. Well, where do we go from here? The answer surely is that all progressive hobbyists and professionals who have ideas or ready material and are prepared to promote the hobby in the country at large, should immediately get in touch with the Federation. Amateur tape recording could then align itself with amateur photography under the RPS scheme. There is an absolute parallel and a precedent here and it would seem quite pointless for clubs and regionals to pilot an independent scheme. As said before, enquiries and comments are welcomed.

Hayes, Middlesex

Arnold Highcazony,
Secretary, FBTRC

We have asked the Federation of British Tape Recording Clubs to provide us with information concerning membership which we understand is open to individuals. (Editor).

Stereo Radio Manufacturer Protests

During our discussion the other day you expressed your views on the culpability of manufacturers in being insufficiently prepared for stereo radio and further that you would be saying this in your next issue. At the time, I disagreed with you most strongly and you were good enough to suggest that I might like to write to you for publication putting our point of view. I am glad to do so because it enables me to say a word on behalf of the maligned manufacturer.

Lack of foresight was, I believe, the phrase you used and in the case of my own Company I would firmly contest this. We have been producing Stereo Decoders for our current range of tuners and tuner-amplifiers for almost two years, largely for export but partly for the

small band of enthusiasts in this country willing to buy a decoder for the odd experimental broadcast which, until last week, was all they had.

We applaud the BBC for starting this new series of stereo broadcasts but what we cannot endorse is the manner of their starting, with a couple of weeks advance notice. It is one thing to have a decoder developed and in production for small quantities but it is quite another to have to lay on an increased production of several hundred per cent virtually overnight. The special components we require are, in some cases, on 12 weeks' delivery. The printed circuit boards, previously hand drilled, need to be tooled and these tools will take us 8 weeks to obtain. The cases, previously hand-made, must also be tooled with similar tool-making time required.

I could go on but I hope this illustrates the time factors involved and it also brings me to the crucial point. That is, whether manufacturers who had, in many cases, already spent thousands of pounds on development and equipment in anticipation of a service which was by no means definite could reasonably be expected to have laid out several thousands more to produce decoders, in advance of the BBC's announcement, in any substantial quantities. In making a judgment on this please bear in mind that any manufacturer who had done so would have had to have borne with some fortitude the thought that these may have been left to moulder on the shelf for a very considerable time or even, in the light of the information previously available to us, for ever.

Holloway, London N7

Alex Grant
Armstrong Audio Ltd

Contributions to ATR

The Editor is always pleased to consider articles for publication in ATR, dealing with the technical and creative aspects of tape recording.

Articles submitted should preferably be typed with double spacing between lines. Photographs accompanying articles must be sharp and not less than half-plate size (approx. 5 x 4 in). Sketches and circuits etc. for line reproduction need only be clear pencil drawings.

Payments are made at magazine rates for all articles accepted for publication.

TAPE RECORDER SERVICING

PART XI



This month Gordon J. King deals with the bias oscillator

The level of the hf signal applied as bias is predetermined during the design of the tape recorder and finally adjusted for the least distortion and the most favourable frequency response relative to the general nature and quality of the machine. For instance, greater consideration is given to the bias signal level in expensive, professional quality machines than in less-exacting domestic machines. This also applies to the frequency of the bias signal.

Bias Considerations

In the inexpensive variety of machine the bias level might well be adjusted to facilitate extended treble response, but for minimum distortion this level may be too low. However, the equalizing and pre-emphasis circuits would be tailored to meet this compromise level of bias, meaning that the treble response may suffer as a consequence of the level being increased in an endeavour to enhance the recording quality.

A large amount of treble emphasis may thus be employed on playback to lift the diminishing treble, recorded on the tape, which can result from the use of too much bias. To be critical, the absolute bias level for the best results is also influenced by the nature of the tape used. Few amateur recordists ever alter the hf bias level, the level established by the manufacturer being used throughout the life of the machine, irrespective of the tape used. Indeed, it is not easily possible to vary the bias on some machines of the domestic kind, but a bias level present is often a feature of semi-professional and professional machines.

The basic theory of arranging for an abnormally high treble emphasis on playback to counter the abnormally falling treble recorded on the tape is perfectly sound, but in practice excessive treble lift is accompanied by a rather high background noise level, resulting from the greater gain of the playback amplifier at treble frequencies and the reduced level of these signals at the amplifier input. The signal/noise ratio thus tends to fall badly with increase in frequency; this is not good because much of the troublesome subjective noise has component frequencies well up the audio spectrum. The bias level also affects the level of the recording. The curve in Fig. 1 shows this. It will be seen that as the bias current increases so does the recorded signal until a peak is reached, after which the recorded signal gradually decreases. In fixed bias machines, the bias level is often adjusted towards minimum distortion and this has a tendency to

occur when the bias is of a level just a little beyond that for maximum recorded signal. Fig. 2 relates the recorded signal with distortion over a range of bias current (not particularly typical, as the head characteristics have a bearing on the actual bias current). This shows that the distortion is pretty low at a relatively low value of bias, but at which point the recorded signal is about 60% below maximum. The chosen operating point in this illustration is a little further down the recorded signal curve, where the distortion is also low, though not minimal.

It may be wondered why the adjustment is not made for the very minimum distortion, even though this means losing a little recorded signal. Well, the answer concerns the frequency response, as intimated earlier, for if the bias level is turned up more, the treble response will suffer, as also will the signal/noise ratio. Incidentally, if the bias level were set for the lower level corresponding to minimum distortion in Fig. 2, the treble response would be less affected, but the signal/noise ratio would be impaired. The optimum biasing operating point often implies a setting for the best signal/noise ratio.

Thus, to sum up this bias business we find that by increasing the bias level we get less distortion but more noise and less treble. By decreasing it we get better treble, but more noise and more distortion. It should be mentioned also that the bias level has a bearing on the strength of the recorded signal that can be applied to the recording head for a specific level of recorded signal on the tape. This, of course, is related to the distortion characteristics and audio output as explained in the foregoing text.

Brand-new Single Head System

A new bias arrangement adopted (and recently patented) by *Aga Aktiebolag* of Sweden is well worth a few words at this stage. This employs a single head for erasure, recording and playback. Although this in itself is not new, previous similar systems suffered the disadvantage of excessive treble attenuation because the large hf signal level required for successful erasure also removed the higher audio frequencies. Thus a compromise signal amplitude/frequency parameter was necessary. The new arrangement avoids this earlier shortcoming by an automatic control of the hf signal frequency applied to the head corresponding to the nature of the recording signal. The resulting effect is that as the recording signal amplitude increases, so the

frequency of the hf signal is decreased. The new circuit is integrated with a volume compression system whereby excessive levels of recording signals at the head are limited. The signal level indicator, instead of being connected to the audio circuits in the conventional manner, is connected to the hf oscillator circuit to monitor the change in bias conditions which, as we have seen, is directly related to the level of the audio signal.

As it is likely to be some time before this circuit comes our way, let us quickly revert to considerations of manual or preset control of bias level and frequency. So far we have considered amplitude of signal only, but frequency is also important.

Bias Frequency

Ideally, the bias frequency should be as high as possible, but the top limit is governed by the efficiency of the heads. Since the one hf oscillator usually supplies current to both the erase head and the recording head, the frequency often needs to be adjusted for maximum current in the former. This is because several watts of hf signal are required across the erase head to reduce the recorded signal by as much as 60dB or more, thereby providing a good erase, and such power can only be obtained when the erase head is matched to the hf oscillator, both in terms of frequency and impedance. The impedance aspect of this was explained in part IX (August issue).

Preferably, the bias frequency should be at least four times the highest audio signal to be recorded, and this is always attained in good class, semi-professional and professional models, some having a frequency as high as 250Kc/s. On the other hand, some domestic machines run at a much lower frequency, some down as low as 35Kc/s. If the bias frequency is too low, however, a shrillness of reproduction results on heavily recorded sections of the tape. Even though the level of the bias signal may be fixed in less exacting models, it is, nevertheless, often possible to shift the frequency a little up or down, either by a variable capacitor (preset) across the oscillator tank coil or by a dust-iron core which can be screwed up or down inside the coil former.

In both cases the tuned frequency is altered, the first with a fixed inductance and a variable capacitor and the second with a fixed capacitor and a variable inductance. In the latter case, it is worth remembering that the inductance is reduced as the core is screwed out of the coil former. This causes the bias frequency to

increase. The same effect is achieved by reducing the value of the capacitance across the coil, i.e. unscrewing a preset capacitor. Fig. 3 shows the two arrangements at (a) and (b).

It is not an easy matter for the enthusiast, who is keen to set up his recorder for the very best results, to know exactly the frequency at which the oscillator is working. There are, of course, various methods of checking hf signal, but in any case, a direct-reading frequency-meter or oscilloscope will be required. A calibrated oscilloscope can display frequency by a time measurement of a complete cycle of waveform, while less professional instruments call for the assistance of an audio generator as a means of comparing the frequency of the oscillator with the frequency set by the generator.

Only the very fortunate enthusiast has instruments of this kind at his disposal. However, the approximate frequency can be discovered on many of the domestic type of recorders by monitoring the erase head current on a meter and then adjusting the inductance or capacitance element of the oscillator for maximum reading. This technique is based on the fact that the optimum frequency is that which pushes maximum current through the erase head for the reasons expounded earlier.

Sometimes, though, optimum erase head current does not correspond to the designed-for frequency. When this is the case the service manual often gives the erase head current which is obtained at the designed-for frequency. The idea then is to adjust the oscillator frequency until the stipulated erase head current is obtained. There are times when the frequency may have to be altered a little to prevent interference to a nearby radio receiver.

This happens mostly on AM radio during a radio-to-tape recording session. The hf oscillator signal may beat with the carrier signal of the radio programme and produce a warbling noise similar to that caused by television sets on AM radio reception.

This can sometimes be cured simply by altering the frequency of the hf oscillator a little, while listening to the effect that the adjustment has on the reception. Care must be taken when tackling this adjustment since it is necessary to undertake it with both the tape recorder and radio set switched on. Although the voltage in a tape recorder may not be exactly lethal they can give rise to nasty electric shocks and severely disturb a person not conversant with such experiences!

Incidentally, some of the very inexpensive recorders may have no means at all for frequency adjustment of the oscillator, and since recorders of this nature produce a fairly high level of oscillator harmonics, interference may be experienced on any radio nearby or even next door. It may therefore be imperative to alter the frequency a little by some other means. One way of effecting this is to add a little extra capacitance across the oscillator coil. This will decrease the oscillator frequency, but no more than the very smallest amount of capacitance consistent with shifting the interfering signal should be used. If there is room, it is a good idea to fix a small preset capacitor (trimmer) across the fixed capacitor in the oscillator circuit. This can then be increased in value just enough to kill the interference effect.

Next month we shall investigate a method of checking the hf signal current and also look in on the cross-field biasing system.

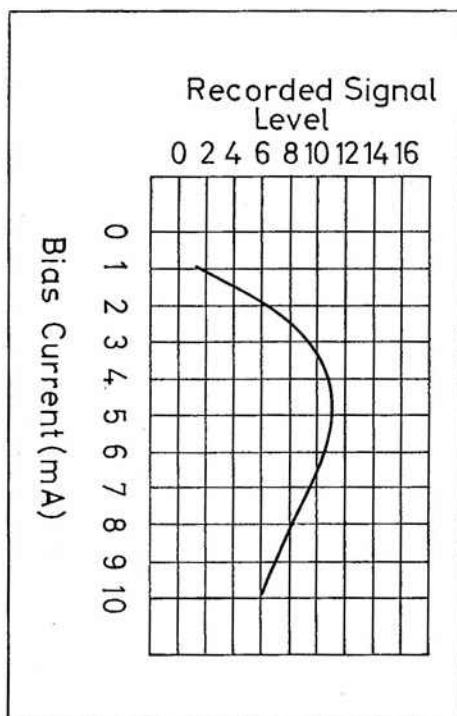


Fig. 1. This curve shows how the recorded signal level falls as the bias current is increased.

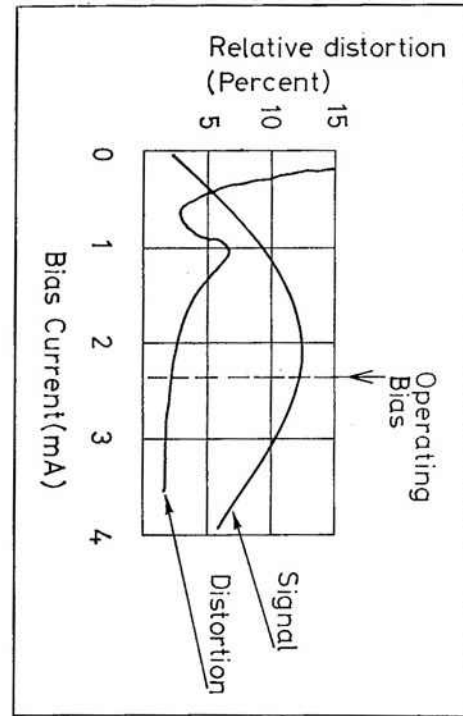


Fig. 2. Here is shown how the distortion alters with hf bias in relation to the recorded signal level.

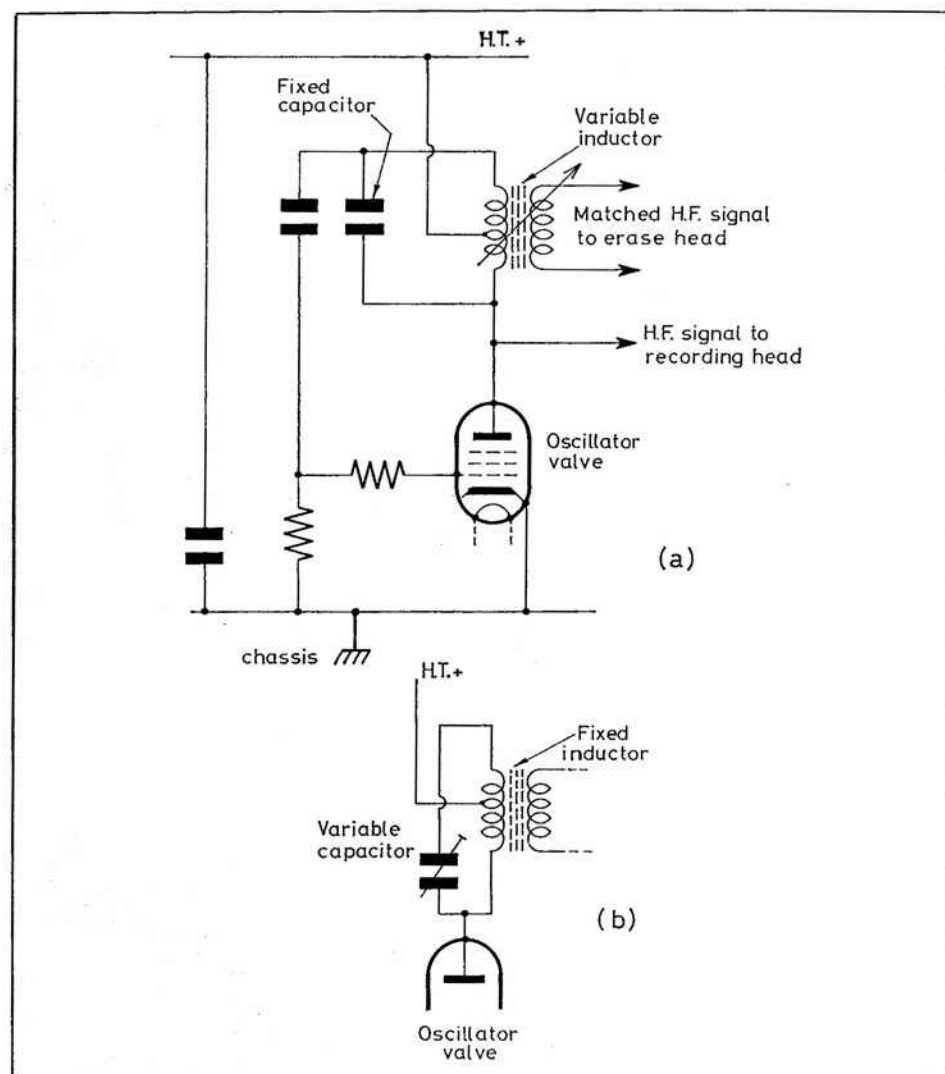


Fig. 3. (a) In this oscillator the frequency can be altered by adjusting a dust-iron core in the oscillator tank coil; (b) Here the inductance of the oscillator coil is fixed but the oscillator frequency can be adjusted by the variable capacitor in parallel with the coil.

A BRIEF HISTORY OF WORLDWIDE TAPETALK

by B. Ashfold*

**WWTT is one of the world's most
successful tape clubs**

It was back in 1961 that Chas Towers first realized that the tape recorder could be a new medium for his interest in communication over distances. Having bought a recorder, he then wrote to a tape recording magazine, which he freely admits was the first one he saw on the bookstall, to ask if the Editor could advise him as to the location of a club which would supply addresses of people everywhere who wanted to correspond on tape. The reply was to the effect that the Editor knew of no such club, so why didn't Mr Towers start one of his own.

Much to the dismay of his wife, who had visions of becoming a tape widow, that was precisely what Mr Towers proceeded to do. So in May of the same year Worldwide Tapetalk (later to become Britain's largest and friendliest tapetalk club) was born. How to get the ball rolling with a minimum of expense was the first problem, and this was solved by writing to some sixty provincial newspapers in Great Britain, setting out the aims of the club. The response was magnificent and the first 100 members were enrolled as a direct result of those letters.

Those early members were asked to pay 7s 6d for little more than a piece of pasteboard and a promise—a promise that contact lists would be published as soon as possible. Pay up they did and cheerfully they waited, but not for long. Very soon the first lists appeared. These were typed laboriously with only six copies at a time. With membership shooting up to 300 in the first nine months it was impossible to carry on in this way. Fortunately, proper duplicating services were offered by Mr Eric Price (now WWTT's President). This, however, was only a short-term measure and as the membership made further rapid expansion and its own magazine *Sound Advice* made the first of its regular appearances, a second-hand duplicator was purchased to produce it.

Shortly after its fifth anniversary, in May this year, WWTT installed not only up-to-date duplicating machinery but also a fully equipped printing plant, so the Club is operationally self-sufficient in all the printed matter it requires. This naturally helps to keep down costs, although the membership fees had to be increased to 12s 6d to cover increased postal and paper charges.

The story of WWTT has been one of quiet but steady progress with much 'behind-the-

scenes' hard work. Since WWTT is a members' club run according to members' requirements, little can be said of the future except that every attempt will be made to get the message of friendship and understanding to a wider audience than ever before, especially overseas. Throughout the years, however, one puzzle has remained. Why is it that women who have a reputation for gossip are reluctant to take up the only hobby where talking plays a major part? WWTT membership has remained predominantly male, much to their dismay, but nevertheless three marriages have already come about between members and more may be in the offing. Someone recently suggested this may be the true meaning of 'tape-splicing'! Full information about membership of Worldwide Tapetalk may be obtained from The Secretary, Mr C. Towers, 35 The Gardens, Harrow, Middlesex.

* Mr B. Ashfold is the public relations officer for WWTT.



Above, Chas Towers, Secretary to WWTT is well known to members throughout the world.

Below, the WWTT librarian Fred Ford with Eric Stillwell and Bernard Ashfold. Eric Stillwell is representative for SE England.



99

Emitape 99—the long play tape formulated for 4-track recorders

Emitape 99 has been created by E.M.I., the original and largest British manufacturers of magnetic recording tape, in co-operation with I.C.I. who have produced a special 'Melinex' film base material for this new production.

Emitape 99 has greater strength—perfect tracking at all speeds—and outstanding hi-fi performance has been achieved by the most up-to-date coating techniques.

Three other high quality grades are in the Emitape range:

Standard Play 88 for use at professional tape speeds ; **Double Play 100** for more recording time ; **Triple Play 300** for maximum playing time on battery portables.

Emitape is supplied in a free transparent two-piece library case originally designed for computer tapes. It gives compact dust-free storage and easy indexing.

Emitape is used nine times out of ten by the B.B.C. All the best dealers are Emitape stockists.



EMITAPE

THE MOST ADVANCED MAGNETIC RECORDING TAPE IN THE WORLD



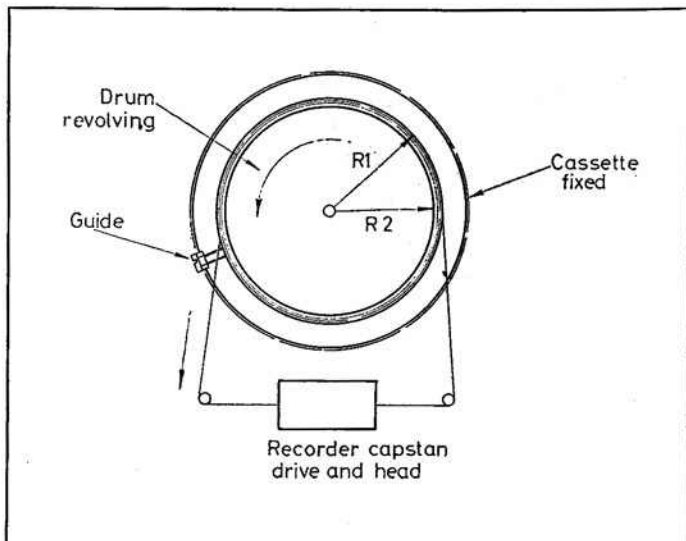
AN E.M.I. GROUP PRODUCT
E.M.I. TAPE LIMITED,
HAYES, MIDDLESEX

MAKING AN ENDLESS LOOP CASSETTE

Generally speaking, endless tape loops can be divided into two classes – short and long. Short loops are prone to mechanical fatigue and ultimate failure, due to excessive wear and resorting to such an arrangement is usually unavoidable. The recording time is also limited. The tape is threaded through the head assembly, and passes around the guides, to control its path, returning to the other side of the head assembly. In practice, two empty spools placed on the recorder spool platforms may serve as excellent guides to control the path of a short loop.

Where the size of loop is not limited by the length of recorded material available, or where a longer recording is required, the tape can be coiled in a special container, the principle being shown in Fig. 1. The basis of the system is a drum, free to rotate in a flat, cylindrical case. Tape is wound on to the drum in the same way as on to the hub of a standard spool, except that the inner end is brought out from the drum circumference, passed over a guide and out through a slot in the edge of the case. A certain length of tape is free outside the case and passes through the capstan and head assembly, to re-enter the case through a second slot, and join the outer layers on the drum. Thus, a loop is formed. When tape is drawn from the inner layers by the capstan drive of the recorder, friction between the inner layer and the drum causes the latter to rotate. The complete spiral of tape revolves and so tape is drawn back into the cassette, to be wound on to the outer layers.

It seems simple enough, but there is a problem. Due to the thickness of the packed tape, R_1 is greater than R_2 , so that while one revolution of the drum will give up a length of $2\pi R_2$, the rotating spiral tries to take on $2\pi R_1$. If this happened, the length of slack tape outside the cassette would very soon draw tight and the arrangement would jam up. Actually, as tape is drawn from the inner layer, its place is taken by tape from the next layer, and so on. There is, in fact, a continuous movement towards the centre and each layer in turn becomes the inner layer. Interlayer slipping thus takes place, so that the speed of tape at the outer layer is reduced. Due to a balance between the tape tension and friction between the layers, the slipping auto-



18 Fig.1 The endless loop cassette principle.

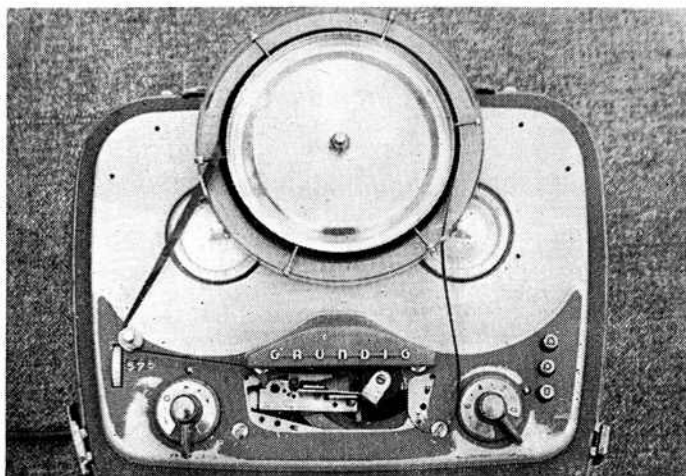


Fig.2 The finished cassette mounted on a Grundig tape recorder.

matically adjusts itself until tape is entering and leaving the cassette at the same speed. The friction, however, limits the total amount of tape that can be accommodated. The most efficient arrangement is a large diameter spiral because:

(a) the spiral thickness can be kept small, so that R_1 is comparable with R_2 . The more closely the R_1/R_2 ratio approaches 1, the less the slipping and thus the friction.

(b) the length of tape that can be carried is proportional to the spiral diameter, i.e. double the diameter, twice the tape, and so on.

The photograph (Fig. 2) shows a completed cassette, made from a plastic case intended for the storage of a 7 inch spool. The drum is the 5.6 inch diameter lid, taken from a tin which once contained confectionery. The advantage of this type of lid is its rigidity due to 'dishing' at the centre and the beading at the edge. The first step then, in making an endless loop cassette, is to obtain a suitable lid and case; clearly these need not be identical to those shown. The cavity between drum and case may seem unnecessarily large, but in fact it gives the withdrawn tape space in which to curve gently towards the exit slot, thereby making for smoother flow. The centre of the drum is now found. This aspect is dealt with in some detail because it is important to find the centre accurately. The centre-finding tool shown in Fig. 3 is based on the principle that the perpendicular bisector of a chord is a diameter. The intersection of two such bisectors must therefore be the centre. T-shaped, and made from stiff card, the tool must conform to the following requirements:

(a) the overall size must be such so as to allow it to sit inside the lid.

(b) the distances AB and BC must be equal.

(c) the angle DBC must be a right angle.

When sitting in the drum as shown, AC is the chord and DB the bisector. It is simply necessary to inscribe the diameter using DB as a straight edge, rotate the tool through an angle, repeat and so on. If the tool is accurately made, all the lines drawn will pass through a common point (the centre), but any inaccuracy will result in the lines forming a small polygon at the centre. This is not significant, as the centre of the drum is at the centre of the polygon, and can easily be gauged by eye. The

Another constructional feature

by B. E. Wilkinson

best way to mark the centre is with a centre punch or a scribe. The hole should be drilled with a small drill to avoid wandering, and then opened with successively larger drills. For the final widening to $\frac{3}{8}$ inch, I used a triangular file rotated first one way and then the other. The hole is fitted with a threaded collar, taken from an old wafer switch or potentiometer, and bolted up tight with washers on each side of the drum metal (Fig. 4).

After this, the drum should be mounted on a $\frac{1}{4}$ inch shaft and rotated to check that the rim is true. It is not likely to be eccentric, but its plane may not be perpendicular to the shaft. Small pressure applied at the circumference in the appropriate place will correct this. Wound around the drum, the tape also rests on a circular platform fixed concentrically to the lower ridge. The platform must not foul the inside edge of the cassette, and in the unit shown is 7 inches in diameter. I made it from stiff card and stuck it firmly to the underside of the drum, the centre cut out to pass the shaft. The drum is now complete and should be set aside. Assembly is shown in Fig. 5.

The cassette is fitted with a $\frac{1}{4}$ inch shaft, projecting vertically from its internal centre. If the centre cannot be found from the concentric circles formed in the plastic, then the centre-finding tool should be used. For the shaft, an old wafer switch shaft with a short internally-threaded (4 BA) hole at one end is the best solution, but a short length of $\frac{1}{4}$ inch (outside diameter) tubing can be positioned at the centre and secured with a slightly longer 4 BA bolt and nut. At this stage, the drum should be mounted in the cassette, the collar fitting over the shaft. The 'dishing' of the drum will offset the length of the collar so that the platform may well rest on the bottom of the cassette. Washers should therefore be placed over the shaft, until the drum 'floats' on its bearing, the clearance between platform and case being sufficient to avoid contact.

Tape enters and leaves the cassette through slots cut in the side. The exit slot is horizontal and is $\frac{1}{2}$ inch long by about $\frac{1}{16}$ inch wide, though the dimensions are not critical. The level of the slot is above the level of the tape on the platform, that is greater than $\frac{1}{4}$ inch above the platform. One of the design requirements is that the tape path is as smooth as possible and without sudden turns which would increase the friction. The position of the entry and exit slots must be such that the entering and leaving tapes are more or less parallel. This condition is fulfilled if the angle between the slots is of the order of 120° . The entry slot is vertical and it is most important that its lower edge is above platform level. If not, tape may drop between platform and cassette and stop the system. Each slot is cut by drilling a row of small holes and by finishing the opening with a small flat file. Tape passing from the inner layer to the exit slot will make rubbing contact with the outer layers, unless a guide is provided. In the cassette shown, a 6 BA bolt is secured to the plastic case, and projects almost to the drum. The tape passes over the guide, oxide surface up, to be taken through the exit slot. To prevent the spiral of tape from falling off the drum if the cassette is inadvertently turned over, five further 6 BA bolts are fitted around the case. Since there are six in all, the angle between adjacent bolts is 60° .

It is difficult to be specific about the length of tape that can be accommodated on a given diameter of drum, as much depends on the friction that any particular drive can overcome. The cassette shown, however, is loaded with 140 ft of standard tape, giving a replay time of $7\frac{1}{2}$ minutes at $3\frac{3}{4}$ ips. With a speed of $1\frac{7}{8}$ ips,

the replay time would, of course, be doubled. The completed cassette should be loaded as follows:

(a) Pass the free end of a spool of standard tape through the entry slot and tack it to the drum with Sellotape, slightly above the level at which the spiral of tape will lie.

(b) Rotate the drum manually in an anti-clockwise direction so that tape is drawn on. When sufficient is wound on, cut the tape outside the cassette.

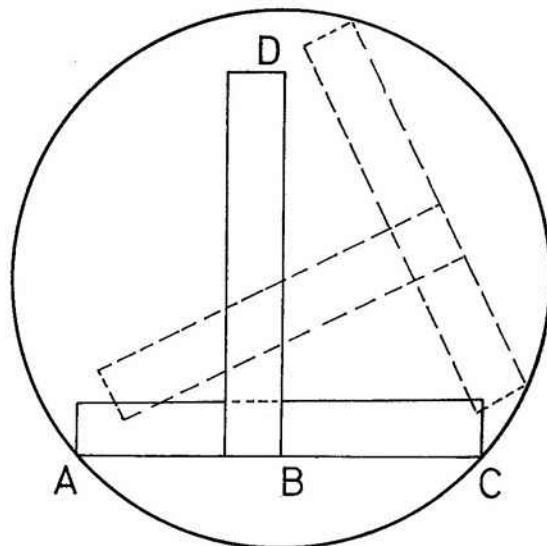


Fig.3 The centre-finding tool.

(c) Now leaving about a yard outside, find the inner end and pull it free, using a pair of tweezers. If the tape has been wound on loosely, the end will come out easily. Pull out some 6 to 12 inches and pass it over the guide and through the exit slot, with the oxide surface up.

(d) Join the two ends with Sellotape and withdraw tape carefully from the exit slot until the effort required becomes constant.

The cassette can now be positioned on the recorder, the requirement being that the tape path to and from the head is as smooth as possible. It will be observed that the cassette in the photograph is positioned between the spool platforms. When the tape drive is started, the right-hand platform tends to rotate,

(continued overleaf)

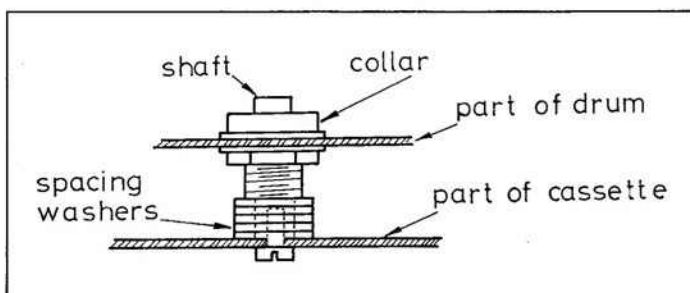
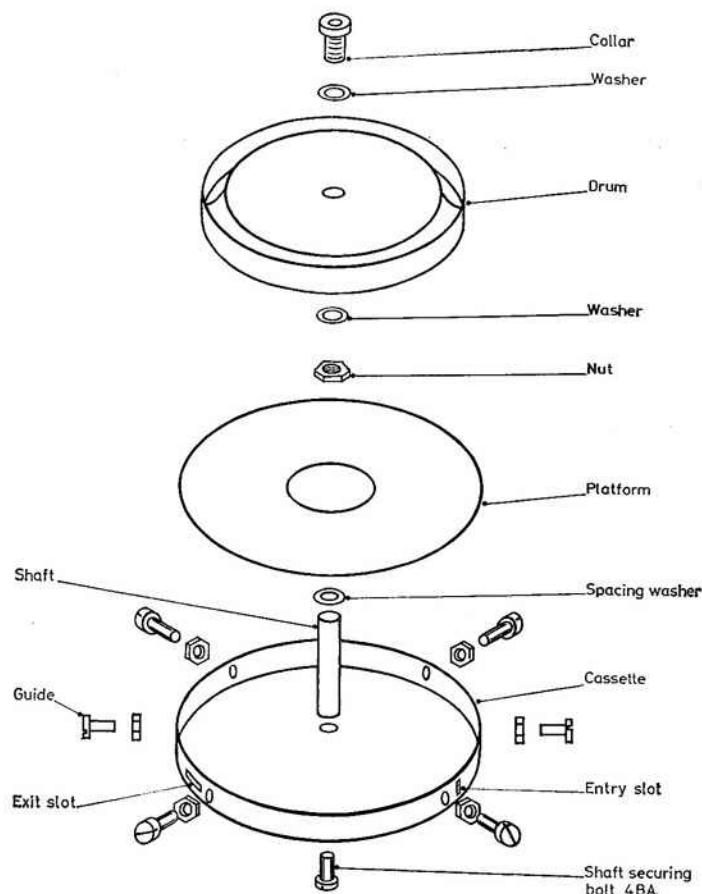


Fig.4 Drum bearing detail.

Making an endless loop cassette

continued from previous page

but the cassette remains positioned just clear of the spigots. The roller shown fitted to the recorder was added to reduce friction due to the tape angle at the left-hand guide, but is not actually necessary with the length of tape shown. Any excess of tape should lie over the right-hand side of the recorder between capstan and entry slot. As the tape is driven, the excess to the right will be taken up and the layers in the spiral will become more loosely packed. Once the arrangement has settled down, the tape should be stopped when the join appears again, and a permanent cemented, or spliced join effected. At this stage, any excess length outside the cassette can be cut off. Experiment has shown that a loaded cassette requires careful handling. On no account should the tape feed into the entry slot be stopped, as this will cause the outer layers to tighten and create folds in the inner layers, the result being to increase friction. If, for some reason, folds are formed, intermittent interruption of the tape feed may help to re-distribute the layers. Where the folding is considerable, tape should then be wound off on to a spool and then loaded on to the cassette again. To remove the tape, the join must be located, and if it is close to the drum, tape should be withdrawn until the junction is exposed. The join is then broken and the tape wound off through the entry slot. If it is difficult to locate or gain access to the join, the cassette should be dismantled and the tape taken off the drum. It can then be wound manually on to a spool for re-loading into the cassette.



20 Fig.5 Assembly order of parts for the endless loop cassette.

You can't put a in here!

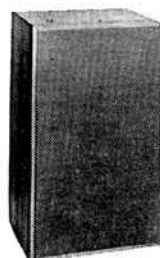
(You probably haven't one anyway)



We make a wide variety of
equipment cabinets suitable for most
of the equipment on the market.

This new compact model accepts numerous
combinations of popular equipment but is intended
for today's smaller rooms. If your wife thinks the
cabinet you want will look like 'the Queen
Mary in dry dock'—send her round
to see this one.

Available from stock. Registered Design applied for.



Large enough
for many speakers,
small enough to
tuck into the
corner. See the
new S33
speaker enclosure,
too.



EOC 18 CLOSED
shown above fully open



DESIGN FURNITURE LIMITED

CALTHORPE MANOR · BANBURY · OXON
Please send me illustrated brochure

Name _____

Address _____

TAPE REVIEWS

by Russ Allen

I Solisti Veneti. *Claudio Scimone, Musical Director.*

Four Concerti for Festive Occasions – Vivaldi. *Columbia Stereo Tape. 4-track 7½ ips MQ 781.* This is beautiful music magnificently performed by the string ensemble *The Soloists of Venice*, formed in 1959 with the gathering together of a group of musicians whose ambition was to play the Venetian music of the eighteenth century as it should really be interpreted.

Antonio Vivaldi was born in 1676 or thereabouts in Venice. His father was a violinist in the orchestra of St Marks' Cathedral and taught Vivaldi violin. It is believed he also studied composition under Giovanni Legrenzi, but it must have been for only a short period as Legrenzi died when Vivaldi was still only about fifteen.

In 1704 he began working for the Ospedale della Pietà, an orphanage for girls. He taught them violin and when he later became Concert Master one of his duties was to compose at least two concertos per month. In all, he wrote nearly seventy.

The four works here show well his versatility. All feature the solo violin of Piero Toso and in the B flat major the oboe of André Lardot. Perhaps I love the B flat best of all as it has such exciting scoring, particularly the Allegro which in some passages sounds far too modern to have emanated from two centuries past.

The musicianship of *I Solisti* is beyond reproach. If one says that they are dedicated experts, then this is truth. As perfect a package of beauty as you are likely to get for £3 15s 0d or for that matter £3,150.

Recording is full, clear and clean. Packaging excellent and top marks for sleeve notes. Over fifty minutes of playing time. A masterpiece!

At the Drop of Another Hat. *Michael Flanders and Donald Swann. Parlophone TA-PMC 1216.* Recorded during an actual performance at the Haymarket Theatre, London.

The first humorous record was probably an Edison Bell cylinder of the Laughing Policeman and I'm sure it was a best seller. Recordings of humour must still sell well as they are still flooding the market. Mostly I find them rather unfunny, though a spate of the Bob Newhart type of stuff from the States has made me laugh out loud and I'm delighted to say that Flanders and Swann have done the same. Even without the aid of the infectious audience laughter, I've fair split my sides over this tape. Flanders' patter between numbers is very funny and I adored his monologue *Les Olivados*, a fab fable of the ceremony of olive stuffing done on the lines of a bullfight.

Another favourite of mine is also a Flanders feature, *Ill Wind*, the Mozart E flat Horn concerto with words abetted by Swann's splendid piano. Their whimsy and gentle (but firm) debunking is my kind of audio comedy.

Heartily recommended to all who like their humour subtle but tart.

London in Love and London in Love Again. *Romantic listening music by the Strings and Orchestra of Norrie Paramor. Capitol Full Dimensional Stereo. Y2T 2196. 4-track 3¾ ips.* It's always a bit sad for me when I get something like this to review because Norrie, along with people like Geoff Love, Jack Parnell, Steve Race and far too many more, were just boys in the band when I was ditto and now there they are – M/Ds while I am but a lowly reviewer and sometime bassist. Lack-a-day and good luck to them what's got the brains. Anyway, Mr Paramor has done a grand lush job and must have had all the session boys tied up for about a week to get all this little lot taped so successfully. Twenty-three tunes and nearly an hour and a quarter's playing time. All the old favourite ballads are given the velvet touch, kicking off with the *Nearness of You* and on through *Stardust*, *Embraceable You*, *Deep Purple*, *Love Walked in*, *Time goes by*, *Foolish Things* and on to finish with *Body and Soul*. There are no sleeve notes, so I don't really know if the little bits of solo piano are Norrie or not but I do know, because it says so, that Patricia Clark is the voice. She has, poor dear, been used as a sort of singing announcer. Obviously she is a musician and not just a vocalist and if any of you think that's a funny remark I assure you that far too many singers are not musicians, as any one who has played the role of accompanist will agree. Miss Clark is at her best when she is being used by the arranger as another instrument when her voice blends perfectly with the orchestral sound as on *Deep Purple*, when she sings counter-melody to the solo piano.

Extremely well played, it is all on a somewhat even keel throughout without quite enough exciting bits to relieve the monotony of so much schmaltz. There are some bits of solo guitar, a gorgeous fat bit of subterranean strings on *I Can't Give You Anything but Love* and pizzicato strings on *Time Goes By*, and a brief excursion into 6/8 in *Foolish Things* which helped.

Good stuff and I'm wondering what his next title will be?

The Divine One. *Sarah Vaughan. World Record Club TT488 arranged and conducted by Jimmy Jones. 2-track 3¾ ips. Mono.*

Twelve fine tracks from the talented Miss Vaughan. Four are sung with just rhythm section and Sweets Edison on trumpet, four more have added woodwind and the rest a conventional small jazz group. Backing music is very tasteful. One song, *Gloomy Sunday*, has a superb tragic lyric and in its original form some twenty years ago, if I remember aright, it was banned in Hungary because so many suicides used it as their swan song. Sarah sings it well but failed to make me feel even the tiniest bit suicidal and I found the next track much more sad-making, *What do you see in Her?*

Generally the Divine One does only the nicest things to my feelings. She sings popular ballads as well as any of the top gal singers and a darned sight better than almost any of them.

A very pleasant way to spend 30s.

Sounds Tijuana. *Herb Alpert's Tijuana Brass. Stateside TA SL10176, Mono 2-track 3¾ ips.*

Regular Top Twenty contenders, the Alpert group take on a new dimension when you hear them tackle numbers like *Desafinado*. They

certainly try to be different and I enjoyed *The Great Monolete*, a catchy melody played over the crowd sounds of a bullfight. On some items they use the marimba, which is a lovely change of tone colour. The flute is introduced on *Numero Cinco*. *Surfing Senorita* has a string section and *Lonely Bull* mandolin and a choir of aaahing female voices.

They're an entertaining sound and it's a pity that the lead cornet should at times sound so unsure and off pitch as he does particularly on *Green Leaves of Summer* and one or two others. Perhaps it's to give the authentic Tijuana sound?

Authentic or not, Alpert's lot is a happy one.

Music in Motion! *Larry Elgart and his Orchestra. 21 Channel Sound. MGM Stereo Tape STC 4028. 4-track 7½ ips. Imported by EMI.*

This comes with a four-page explanatory blurb sheet which I read before playing the tape. It is a mouth-watering (or is it ear-watering?) experience. The way they tell it, it makes the system of recording the most shattering event in our lives. How it is all done is told interestingly and in reasonable detail, though the true technicians would surely want more. For most people the description of each track's contents, they tell you what to listen for, plus a seating plan of the musicians and the siting of their microphones should be enough. One point that did intrigue me was that the two guitarists each have two microphones, one for the instrument and one for the amplifier!

Need I say that after the colossal build-up I was prepared for the most awful let-down. Colourful promises seldom materialize.

First, the musical arrangements were made especially for the session and the use of 21 microphones. They're great, and though clever don't detract from the music nor do they interfere with the swing of the eighteen-piece dance group which of its kind is excellent. They are in tune and well rehearsed without being sensational.

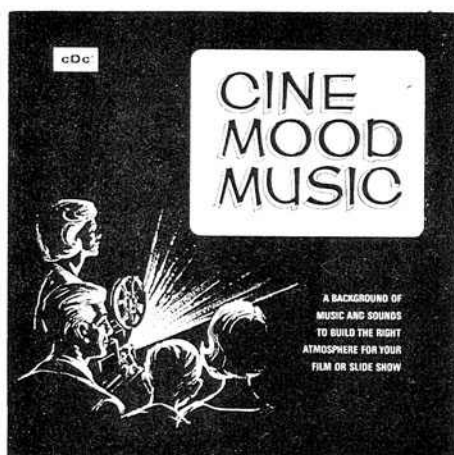
Recording is exceptionally good and you really can feel the position of each musician. Balance is superb and it all helps to make this the best big-band stereo I've heard.

Larry Elgart is a bandleader who not only plays alto and soprano saxophone but has become, as the blurb puts it, 'A creative audio engineer' with a professional standard coach-house studio at his home complete with an Ampex 300-3 three-track studio recorder, an Ampex 300-2 two-track and another Ampex 300 mono full-track recorder. He also has an eight-channel console with four 60 watt power amplifiers along with professional disc playback gear. All that plus a wife who is so competent that she produces his recording sessions. Just in case you're interested in the tune content as well, they are the usual type of standard, *Time After Time*, *Dancing in the Dark*, *Diane*, *Touch of Your Lips* and to finish with, twelve tunes in all, *The Party's Over*. Very, very exciting and well worth a spin.

Messrs Teletape of Shaftesbury Avenue and Edgware Road, who so kindly lend me tapes for review, have got some other 21 Channel titles and, encouraged by what I've just heard, I shall see what else they've got to see if I can find something to suit everybody's taste.

As a matter of interest to those who, like me, have a Truvox PD104, I used to find that with having it on for hours at a time the deck got a trifle warm. Just recently I have been using it in the upright position with tapes at the top, and it now remains cool even after several hours of reviewing.

REVIEWS



MOOD MUSIC RECORDS

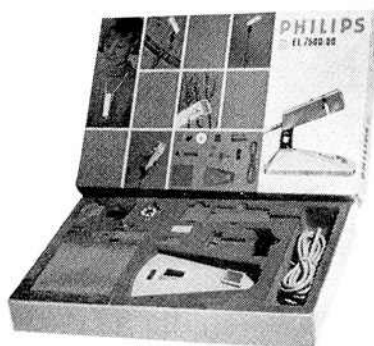
Background music of the right kind is essential to good tape, slide and cine-film production. Three new mood music records which well and truly cater for this and also include many sound effects are now available through *ATR* and *8mm Magazines*. The three records are **Cine Mood Music - MM1**, **Sound for a Picture Evening - MM2** and **Custom Music for 8mm - MM3**. They are 12 inch LPs (33 $\frac{1}{3}$) and the recording quality is excellent, being quite suitable for further dubbing on to tape or cine-film magnetic sound stripe. Moreover, they are free of copyright for amateur use. They cost £2 9s 6d plus 2s each record ordered for packing and postage. Each record is guaranteed unplayed and despatched in original sealed packing. The contents of the records are as follows:

MM1: Cine Mood Music

24 recordings of mood music and sound effects. Music openings include—Fanfare opening, piano prelude, grand opening. Themes include—Tragic, drama, suspense, nightclub, military, Scottish, Western, tranquil, pop, Latin, holiday, nautical, Christmas, comedy, etc. Closings include—Holiday ending, drama, grand, sad, etc. Effects include—Airport, jets, fireworks, train, etc. Instruction leaflet included. Tracks timed and separate.

MM2: Sound for a Picture Evening

25 recordings of mood music and effects



THE PHILIPS EL7500/00 MICROPHONE KIT

It took me roughly an hour to build the Philips EL7500/00 microphone from the kit aided by an instruction book that deals with each step of building entirely by diagrams. The end product? A compact little dynamic microphone that can be used on its own table stand (Fig. 1) or on a neck cord (cord provided in kit). Moreover, it has provision for matching into high impedance or 200-500 ohm inputs. The EL7500/00 employs a ceramic dynamic microphone unit and matching transformer and the kit includes even special cement for the plastic parts of the case. It has been well designed with regard to acoustic properties and the microphone unit is protected against vibration and moisture. A check through a high-fidelity amplifier and tape recorder soon

proved that the EL7500/00 is sensitive and capable of excellent reproduction. Construction with the help of the special diagrams is simplicity itself and requires no more than a soldering iron and a small screwdriver. The kit is a worth-while investment if you are looking for an extra-high-quality microphone with a choice of high or medium impedance outputs. These kits will by now be available from most tape recorder shops and particularly Philips appointed dealers. Price 7 guineas. Further details from the distributors, Peto Scott Ltd, Addlestone Road, Weybridge, Surrey. ALR

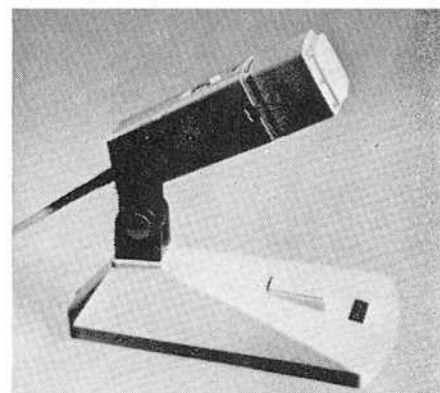


Fig. 1. The finished EL7500/00 Philips microphone

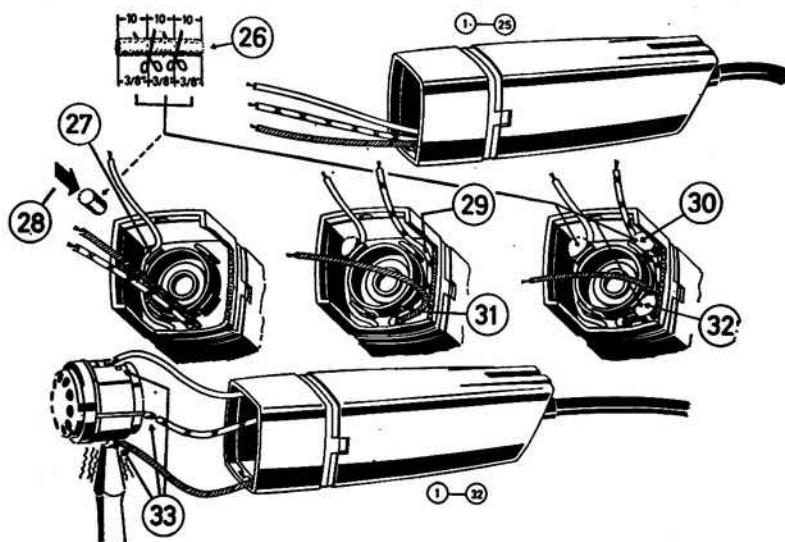
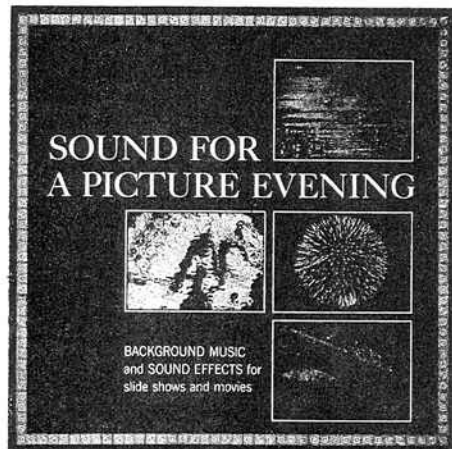


Fig. 2. One of the many assembly diagrams in the instruction book



Music openings include—Grandiose, gentle, dramatic. Closings include—Epic, finale, Hollywood style, gentle. Themes include—Happy, party, holiday, travel, birthday, parade, carousel, circus, playtime, Christmas, etc. Effects include—Sea, train, jet, baby cries, crowd, traffic, thunder, rain, etc. Timing included on sleeve. All tracks separate. Track selector included with instruction leaflet.

MM3: Custom Music for 8mm

38 recordings of mood music and effects. Film or tape openings include—Ceremonial, soft and mellow, drama and mystery. Closings include—Grand finale, movie-type finale, sweet and gentle. 14 themes include—Happy

and exhilarating, holidays in the sun, gay and lighthearted occasions, travelling, locomotion, birthday, pageantry, fairground, circus, sentimental, wedding, wedding march, bells, etc. Sound effects include—Train, baby crying, crowd, traffic, dog barking, thunderstorm, seaside and applause, etc.

The sleeves of these records give the location and timing of each of separately recorded track and much detail concerning the nature and suitability of the mood music. A leaflet is also included with hints on how best to use the sound tracks.

A special coupon for ordering will be found on page 41.

IT STAYS PUT!



The Ferrograph Series 6 Model 'T'

A teak sided tape-recorder designed particularly as one module of a hi-fi installation.

There was a time when a tape-recorder was something you moved from room to room, and stored in a cupboard when you weren't actually using it.

Ferrograph have developed an alternative.

They decided that now people build hi-fi equipment into existing cabinets, or make it a part of stylish shelf-fixtures, a well-designed non-portable was needed—a tape-recorder designed particularly as one module of a hi-fi installation.

Result: Ferrograph model 'T' with teak sides—a piece of furniture that will not only compliment your excellent taste, but give the quality recording for which Ferrograph are famous.

For those people who still want portability—all current models are also available as portables.

Ferrograph

the incomparable tape recorder

Model 631 'T'
Monophonic
95 gns.

Model 633 'T'
A monophonic
instrument for
the connoisseur
120 gns.

Model 632 'T'
Conventional
(2 track) Stereo
126 gns.

Model 634 'T'
4 Track
(2 x 2 track)
Stereo 132 gns.

Interested? Then complete and post this coupon to:

THE FERROGRAPH CO. LIMITED
84 Blackfriars Road, London, S.E.1.

- ☐ Please send me the FREE illustrated Ferrograph leaflet.
☐ Please send me the comprehensive 64-page Ferrograph Manual for which I enclose £1—refundable when I purchase my Ferrograph.

☐ Manual ☐ Mono ☐ Stereo (Tick items required).

Name _____

Address _____

ATS



SOUND SCENE

**This Month we take a look
at records for music practice,
Philips Musicassettes and
other new products**

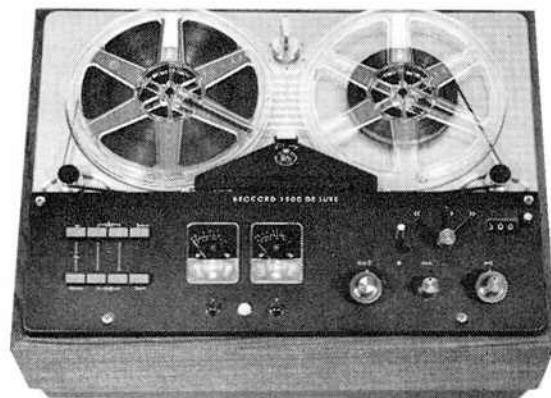


Fig. 1. The Bang and Olufsen Beocord 1500 De-Luxe tape recorder.

Music Minus One

As the name implies, these disc records are for music practice, and are designed to provide amateur and semi-pro musicians the experience of playing with professional musicians. The leading part is left out so as to be played, with the sheet music provided, with the record. In other words, you play the missing part. These records can be used in conjunction with a tape recorder where the backing from the record and your own part are simultaneously dubbed on to the tape. There is scope for improvisation of course, and in some cases written improvised choruses are included. The titles of the records available at present are:

For drums only

Eight Men in Search of a Drummer. The John LaPotta Octet and Quintet play eight originals specially scored for drummers.

Drummers Delight. The Sonny Truitt Octet and Quintet play some superb swing, Dixie, Latin and ballad treatments of arrangements by Jim Chaplin and Sonny Truitt.

Blue Drums. A cross-section of Blues in every style played by the Mal Waldron Trio.

For saxophones. (may also be used for trumpet and clarinet)

For Saxes only. Join an all-star band as lead alto or tenor in arrangements styled after the Basie and Ellington Bands. (B flat and E flat parts supplied.)

For guitar only

Classical Guitar Duets (Vol.1). Play the leading guitar accom-

panied by Ernest Bracco on a set of fifteen delightful duets arranged by Leonid Bolotine.

For all melody instruments

The Blues Minus You. The Mal Waldron Trio take you through ten swinging arrangements of the Blues.

For melody for all instruments

Evolution of the Blues. The Bob Wilber Quintet (with Clark Terry) take you through the history of the Blues from the earliest form to the modern jazz blues form.

For practice with rhythm or melody instruments and ideal for multi-track recording

Latin American Rhythms. On this record are 21 separate rhythm tracks against which you can play whole arrangements in Latin American style. Rhythms include, Bolero, Samba, Mambo, Tango, Afro-Cuban Rumba and Bosanova, fast and slow.

These records are ideal for multi-track recording as well as music practice and are 12 in long play at 33 $\frac{1}{3}$ rpm. Price including postage and packing £3 3s 0d from the School of Contemporary Music, 10 Corbicum, Leytonstone, London E11, who will send further details on request.

Radio Communications Exhibition

This will take place at the Seymour Hall, Seymour Place, London W1, from Wednesday, 26 October, to Saturday, 29 October, and will be open daily from 10 am to 9 pm. Admission 3s. The Radio

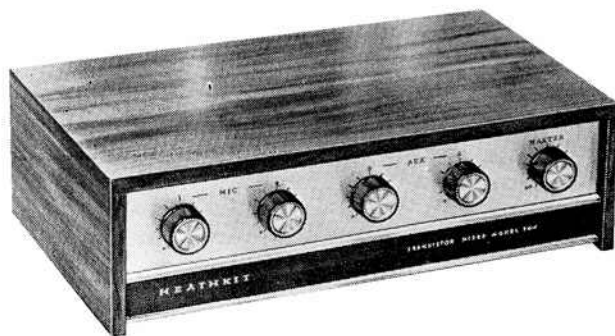


Fig. 2. Transistorised four-channel mixer kit by Heathkit-Daystrom.



Fig. 3. The new BSR three-speed tape deck.

Communications Exhibition is essentially for radio enthusiasts and transmitting radio amateurs and will feature closed-circuit television, a complete operational transmitting station, manufacturers' exhibits of transmitters, receivers, amplifiers, aerial arrays, etc. A communications receiver valued at £200 can be won by a lucky number ticket holder.

New B & O Tape Recorder

Bang & Olufsen UK Sales Division announce the release of a new de-luxe version of the Beocord 1500 tape unit to replace the 1500K. Electronically similar to the 2000 de luxe series, with the exception of the mixer unit, this new model incorporates the same additional facilities – two-track record/playback and four-track playback, high/low input impedance selectors for radio and gram, variable 'sound on sound' or echo effect and a re-designed fascia panel. The Beocord 1500 de luxe is shown in Fig. 1 and is available mounted on a teak or rosewood plinth complete with plexiglass dust cover. Price 105 guineas.

Transistor Mixer – by Heathkit

The Heathkit transistor mixer shown in Fig. 2 is designed for use with a wide variety of tape recorders and amplifiers. It will cater for microphone, gram and radio signals and features two input sockets for microphone and two for higher level signals. Each of the four channels can be controlled independently. Another feature of this mixer is a music/speech switch. In the 'music' position the frequency response of the mixer is linear (15 to 30,000c/s), but in the 'speech' position the response is modified to give a –3dB cut-off below 1500c/s. The mixer operates from an internal 9V dry battery. The mixer comes in kit form complete with a walnut case. Further details from Daystrom Ltd, Gloucester. The price of the kit is £11 16s 6d.

New BSR Tape Deck (Fig. 3)

The TD20 is a completely new BSR tape deck with mechanical, direct-action, push-button controls. The advanced design of the push-button linkage is such that fingertip pressure alone is sufficient to engage the direct-action keys – a feature not often associated with mechanisms of this type. The deck will accommodate spools up to 5½ inches diameter and records at speeds of 1½, 3½ or 7½ ips. The unit can be supplied with any of the wide range of BSR tape heads either two-track or four-track for stereo operation and, if required, a three-digit counter with either wheel or push-button re-set can be fitted. Particular attention has been given to the appearance of the TD20, for it is styled and engineered to enhance the appearance and performance of the most modern tape recording equipment. The TD20 measures approximately 12½ × 10 × 4½ inches. Further details and prices from BSR Ltd, Monarch Works, Old Hill, Staffordshire.

Two New Crown Recorders

Two new Crown portable tape recorders, model CTR5450 and model CTR3000, have been released by the Heddon-Smith Group Ltd. The model CTR5450, operates from four U2 batteries or AC mains, is twin-track, two-speed, 1½ and 3½ ips. Incorporating five transistors, it takes up to 5 inch spools and has an output of 700mW. Features are fast forward wind facility, record level indicator, tone control and a safety button device is provided to prevent accidental erasure of tape. Price complete with remote control dynamic microphone and magnetic earphone is 29½ guineas. The model CTR3000, is compact and contemporary styled and incorporates five transistors and one thermistor, takes up to 3½ inch spools, has an output of 800mW and operates from four U2 batteries. It is twin-track with two speeds, 1½ and 3½ ips, and weighs just over 5 lb. Price complete with remote control, dynamic microphone, magnetic earphone, 3 inch spool and a demonstration tape, is 19 guineas. Further details from Heddon-Smith Group Ltd, Heddonia House, 7-9 Williams Road, London NW1.



Fig. 4. A selection of the new Philips pre-recorded music cassettes.

Musicassettes Released

The tremendous success throughout the world of the Philips compact cassette system recorders has led to the introduction of a new development in recorded music which will probably have a bigger impact than anything since the disc took over from the cylinder. Pre-recorded cassettes for playing on any of the recorders using the compact cassette system are now on sale in Britain. Within two years of the first cassette recorder being issued – the battery operated model EL3300 – over a million recorders had been sold throughout the world. Already 39 tape recorder manufacturers from all parts of the world have adopted the Philips cassette system and negotiations are currently proceeding with other manufacturers. Musicassettes measure only 4 × 2½ × ½ inches, about the size of a pack of cigarettes and yet contain the same amount of material as an LP record. (Fig. 4.) Each Musicassette will retail at £2.

The first Musicassettes to be issued in Britain will be from the repertoires of Philips Records Ltd and EMI Records. Other major record companies are already negotiating to issue items from their repertoire on Musicassettes. Although initially all the material will be taken from existing LPs it is expected that in due course material will be recorded and/or specially prepared for the Musicassette market. This new method is the simplest means of reproducing recorded sound of any type anywhere, in any place and at any time – on the existing battery recorders on the beach, in the car in the form of a car recorder or on one of the two new mains machines (Fig. 5) being introduced for home use.

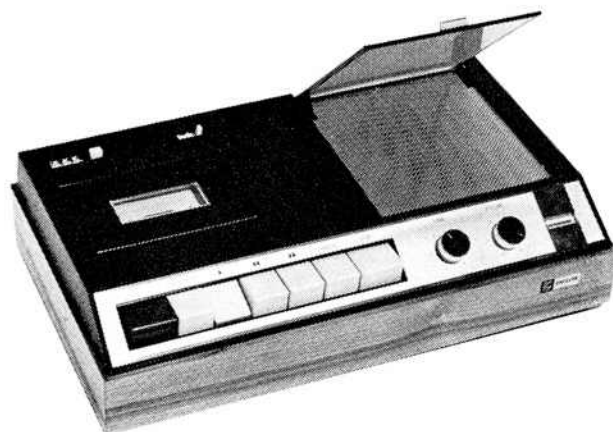


Fig. 5. An automatic or manual recording control is built into Philips' new mains operated cassette recorder, model, EL3310.

THE FASTEST GUN IN THE WEST

Bob Danvers-Walker goes shooting with a Sennheiser 'gun' microphone and records a Viking battle with his Uher 4000 Report-L

Special assignments in Cornwall and the Isle of Man have given me opportunities to try out some new and exciting equipment. To my 'armoury' of tape recorders and 'battery' of Beyer microphones has now been added the latest Uher 4000 Report-L portable (mains-operated when required) and a Sennheiser ultra-directional narrow-beam 'gun' microphone, the MKH 804 low-impedance model.

My Folklore contributions to BBC's *Countryside* series recently called for just such a piece of equipment to enable me to 'pick out' sound from a distance and separate it from neighbouring noises. At St John's on the Isle of Man I used the gun mic at the Tynwald Court (an open-air ceremony) during the legislative assembly gathering on the ancient Mount at St John's to promulgate the island's Acts of Parliament. Public address systems are my chief bugbear. So to capture the voices of the officials speaking in Manx, I aimed the bazooka-like instrument directly at the speakers and, because of its narrow-beam unidirectional characteristic, it picked them out carefully, at the same time reasonably successfully screening off much of the PA sound surging in from all sides. I did notice, however, that extraneous noises *behind* the speakers were inevitably brought into focus as well. As so often happens on functions such as this, microphonic feed-back howls from the PA horns spoilt my efforts to a large extent. The MKH 804 is a very specialized piece of equipment and when used out of doors calls for special consideration. I must

26 say I rather enjoy the handling of this gun mic



Above: Photographer Eric Rowell grips a 1917 Thornton-Pickard gun camera, a rare exhibit from Murray's Museum, Peel. Mounted on a Lewis machine gun butt, the camera was used by the Royal Flying Corps in World War 1. It weighs over 20lb. Bob Danvers-Walker holds the latest model Sennheiser long-range gun microphone (3½ lb) shrouded in its wind filter.

Below: scenes from the Manx Saga enacted during the Peel Viking Festival. Manx Radio announcers (garbed as Celts) on the right, Bob gathering material for his BBC series on British folk customs, on the left.



with its automatic pistol-type grip. I'm sure that more than one onlooker took me for a would-be assassin when I levelled it at the Lieutenant-Governor as he rose to address members of the House of Keys.

Another assignment where the Sennheiser will be most useful is the Archery competition by the Woodmen of Arden at their very exclusive Wardmote. By aiming over the shoulder of an archer I hope to record the sound of shot as he lets fly from his 6 ft yew bow, the flight of the arrow and the strike as it hits the target – a straight line sound

down the line of fire, so to speak. I also plan to use it on closed-circuit TV of the shooting competitions at Bisley.

The Peel Viking Festival

At the Peel Viking Festival use of the gun was out of the question. To record at all, I had to wear Viking costume and join the galley crews on board one of the longboats. From a mile out at sea, the *Sea Dragon*, *Sea Wolf*, *Sea Falcon* and *Sea Hawk* with a hundred warrior Norsemen pulling at the



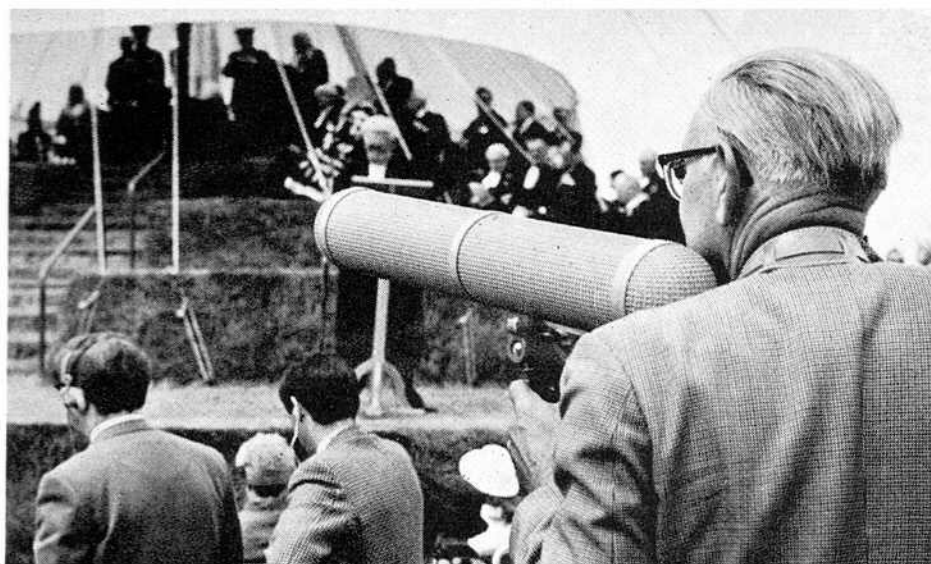
Upper left: Bob has the MKH 804 and Beyer M119 unidirectional microphones at the ready.



huge sweeps bore down on Peel to invade the town as did their forbears 1,168 years ago. Beneath my cloak was concealed my Uher 4000L. I was using a Beyer M119 unidirectional mic to capture the sound of chanting as the Manxmen-Vikings rowed for the beach. The longboats grounded and brandishing axes, swords, clubs and spears, with hairy-chested war-whoops the invaders leapt over the side and waded on to the beach to do battle with the unfortunate Celts ineffectually guarding their village. Clutching my recorder firmly (having first enveloped it in a



Upper right: silhouetted against the flames of a Viking chieftain's funeral pyre, Bob records effects for a backing track.



polythene bag), I dropped waist deep into the sea. How I blessed that 'pause' key on the control panel, which eliminates switching on and off when you're dashing around like the proverbial blue-tailed-fly.

Whipping out my trusty microphone from the folds of the Viking costume, I made for the scene of carnage. A flick of the pause key and on to tape went the Battle of Peel, 1966. I came away from that friendly island with three good tapes, a barked shin and ten pairs of delicious, fat and juicy smoke-cured kippers.

Lower left: to record at sea aboard one of the Viking war galleys, Bob was required to become a crew member for the commemorative raid on Peel. He concealed the Uher 4000L beneath his cloak.

Lower right: the Sennheiser gun mic in use to record the reading of the Acts in Manx at the Tynwald ceremony at St John's, Isle of Man. 27

tape club news

Although there are now more flourishing tape clubs in this country than ever before, this does not necessarily mean that we can sit back satisfied with our efforts. A few people can – those few stalwarts on whom almost every club relies. All too often the same three or four members organize meetings and outings, form the hard core of production and are generally the backbone of a club. While these few are to be much congratulated on their consistent efforts, it is not always a good thing to rely too heavily on the same people all the time. Recently I have been hearing whispers (and all too frequently) that 'So-and-so is having to retire from the committee and I'm afraid the club won't last very long without him'. Though this may sometimes be simply pessimistic exaggeration, there are cases on record where tape clubs have collapsed immediately following the withdrawal of one or two stalwarts. So, all you non-committee members, think for a moment how much your club committee is doing for you and see if there is perhaps one small task that you could take off someone's shoulders and undertake yourself. After all, it's almost like an insurance policy to enable the club to continue working usefully and efficiently (and for your benefit) even after its mainstay retires from the scene.

KC

BRIGHTON

The first edition of Brighton TRC's new newsletter, *Acoustic*, was produced recently with secretary Keith Upton as editor and John Tugwell as reporter.

Sound effects for a play by the Brighton Youth Theatre, an entry for the British Amateur TR Contest and adding a sound track to a cine film in preparation for the club's visit to the Brighton and Hove Motor Club have kept all members very busy. The contest entry included live recordings made in and around Brighton, including sounds of the sea, Volks Miniature Railway, Brighton station, people in The Lanes, and a recording in the Star and Garter Hotel near closing time, which provided a good excuse for welcome liquid refreshment! Brighton's Director of Publicity and Entertainment was also interviewed for this contest entry, but in spite of all the sounds recorded the actual entry was only 5½ minutes in length.

The club has recently purchased a Grampian DP4 microphone, and members spent an evening comparing it with their own personal microphones.

Details of the club and their new magazine, *Acoustic*, can be obtained from the secretary, Keith Upton at 47 Kingsley Road, Brighton, 5.

DERBY

Members of the Derby TRC recently enjoyed their annual night out to a place of local interest. Armed with portable recorders, club members descended on the village of Tutbury on the Derbyshire border. Here they embarked on a tour

of local places of interest, delving into local history and traditions. On this occasion club member Mr D. Hill acted as guide to his fellow club members. A competition is being held for the best edited tape produced as a result of this excursion, and the winning tape will go into the club library of tapes of local places of interest.

DONCASTER

This month the activities of the Doncaster and District TRC have been concerned mainly with public address systems for local charity events. The first assignment was for the Wadsworth Hall barbecue. For this and other similar tasks the club used two 25 watt amplifiers, one of which can be run from 12 volt batteries with the aid of a converter. The following Saturday members assisted at the Warmworth Charity Gala. All the equipment for both occasions was carried in a car, and on arrival amplifiers, etc., were run from the car.

The main event in the club room was a comparison test between various portable models. The recorders tested ranged from machines like the Fi-cord 1a and Telefunken 300 to the Cossor and Stella battery portables and the Philips cassette model.

DUBLIN

At the second meeting of the Irish TRS, 42 members attended and a number of organizational matters were dealt with by the Chairman and Secretary. The annual subscription was fixed by popular vote at £1 per person. Co-opted to the committee as Treasurer was Mr Dermot O'Reilly, and as committee member Mr Dave Fitzgerald. The Society's library was officially started when the Secretary, Mr J. P. Logue, handed over copies of *ATR* and books by Mr F. C. Judd.

A tape of welcome from the secretary of the FBTRC was played by the club secretary on one of his recorders, and this was followed by the playback of a tape of a radio broadcast featuring Mr Logue being interviewed in connection with the launching of the society. This interview had been broadcast over the entire network of Irish radio. Suggestions were taken from those present for the programme planning of future meetings.

In spite of all the official business conducted, there was still time at this meeting for a comprehensive lecture lasting 1½ hours from guest speaker Mr P. Kavanagh. Coming from one of the city's foremost sound recording studios, Mr Kavanagh dealt with all aspects of 'How to make the most of your recorder and make better recordings'. All enquiries concerning the society should be sent to Mr J. P. Logue at 17 Shanboley Road, Santry, Dublin.

LEEDS

Folk singing has featured high in the list of recordings made recently by the Leeds and District TRC. The first session took place in a small, dimly-lit folk club before an invited audience, and folk club artists hope to use the recordings to issue a special LP record.

Exactly a week later, Mike Plant, Jasen Atkinson and Bill Rowe, plus Akai, Luxor and Tandberg, travelled to Beeston, where they recorded an R & B group called 'Mamma's Little Children'. This five-man group hails from Leeds and recently won a contest at the local Mecca ballroom. Copies of the recordings have been sent to the group's agents in London. The third folk recording session came the following day when Bill Rowe visited Ilkley to record 'The Seven Folk' – three girls and four boys who were recording for the Methodist Association of Youth Clubs' Congress Committee in London. The first meeting back in the clubroom also continued on the same theme with candid recordings by Geoff Wood. These recordings were made with microphones disguised in a variety of ways – as spotlights, flowers, firewood, a lollipop and even as a pint of beer! His folk recordings had been gathered from all over the mainland of England, Scotland and Wales, as well as from Ireland, the Orkneys and other places.

The monthly Yorkshire Federation Newsletter

was again recorded in a member's home, the host on this occasion being Mike Plant and the recorder his Akai. Other members present included Nigel Plant, Mrs Plant (a newcomer), John Priestley, Bill Rowe, Ron Crossley, Peter Smith, with Chris Eagle as recordist.

A later club meeting had as its topic *Unusual uses of a tape recorder*, and each member present was asked to rack his brains on the subject. Answers included every use from a guitar amplifier to a play line rehearser, and even a baby alarm.

LEICESTER

Membership of the Leicester TRC is rising steadily, and a full programme of outside recordings has been fixed for the remainder of the year, with plans already well in hand for next year. Recent recordings include the second International Carillon Festival from the famous Loughborough Peace Memorial Carillon, when carilloneurs from all over the world were playing. For this event club members split into two parties, covering the evening proceedings on two consecutive days. Parabolic reflectors were used, and by courtesy of the Town Council full use of an adjacent bowling green pavilion was put at the club's disposal.

Coinciding with this event, another group of members was busy recording the Lorraine Charity Club of Leicester cricket match in aid of the Guide Dog for the Blind Association. The full programme included marching and counter-marching by four different local bands (presenting a problem in keeping a fairly constant sound level) followed by a massed band display. Association President the Earl of Lonsborough was present, and a tape of the proceedings was presented to the Association for its own use.

Club nights have been well attended, and recent meetings included a showing of holiday films with tape sync by Bert Billsdon and a demonstration of musique concrete by David Anscombe and Howard Dutson, using such weird instruments as a nail file, a jug of cutlery, and a roll of paper used trumpet-fashion.

Unfortunately, Phil Warrington has had to relinquish the job of secretary because of heavy business commitments, and his place has now been taken by Peter MacFarlane of 33 Hylion Road, West Knighton, Leicester.

LONDON

A recent meeting of the London TRC featured a very interesting lecture and demonstration by member Douglas Morris. His subject was microphone presentation and members learned a great deal from him.

Bob Trotman's latest production had its premiere during the second part of the evening. 'CQ BCL' is a programme about amateur broadcasting and quite something to be heard. Bob had spent a great deal of time and patience cutting down seven hours of material into a 55 minute programme. Throughout the tape Bob managed to cut out the interviewer, letting the subject tell his own story.

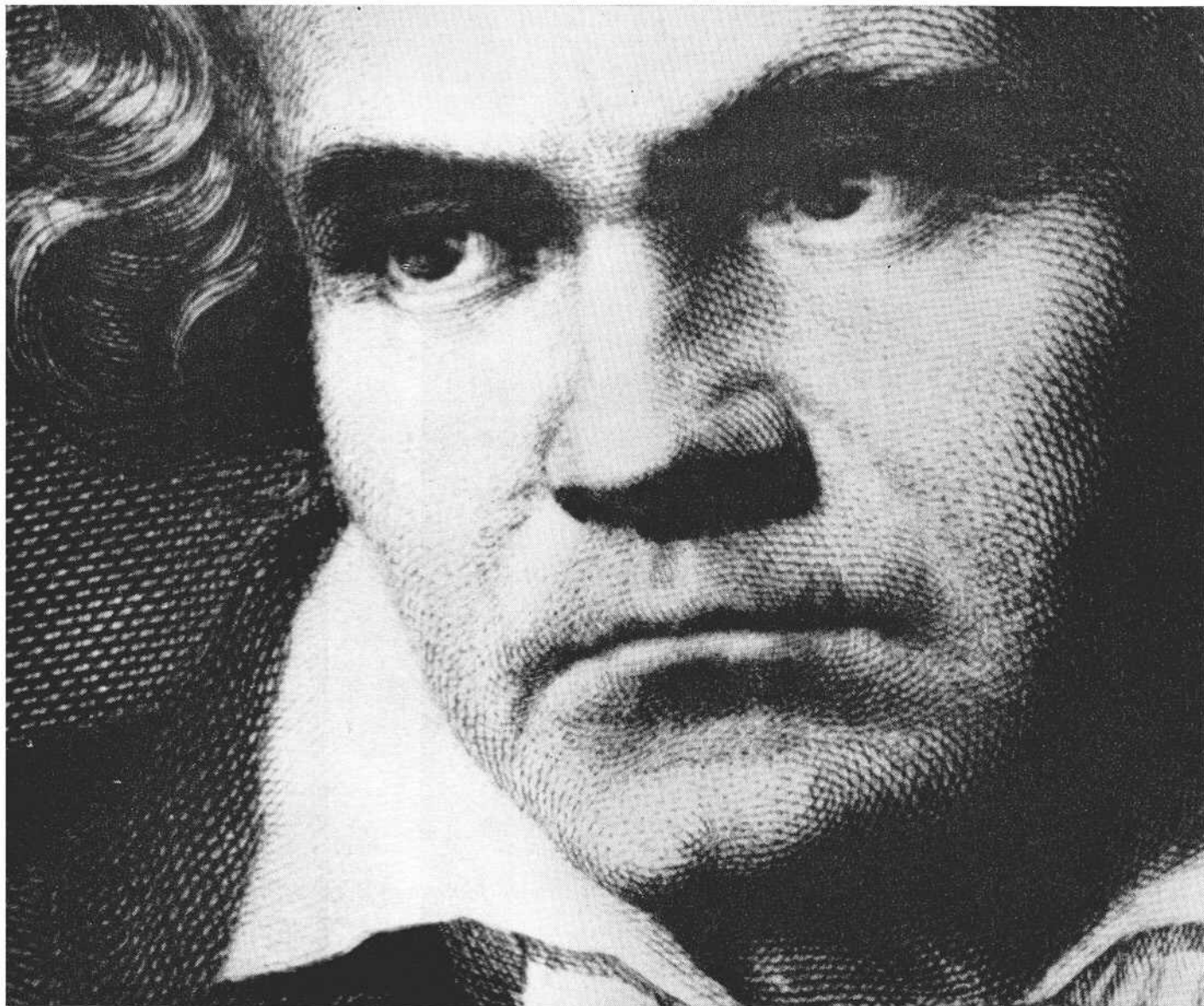
NORTH LONDON

Recent meetings of the North London Tape and Hi-fi Club have included a visit from the Brevi film unit, an evening of serious music and a recording competition. The rather unusual subject for the competition was to make a tape to a tapespondent you no longer wish to tape with, or to answer a similar tape you have received from one who no longer wishes to tapespond with you. Members were lucky enough to be able to visit a BBC studio to see and hear the recording of a programme. Ron and Den Goodwin are continuing their lectures, and the subject of a recent one was *Transistors, Diodes and Valves*. The help of a Heathkit oscilloscope was employed to demonstrate some of the points made in the lecture.

REDBRIDGE

Last month's mystery of the Audio Star is solved. This newsheet is produced by the Redbridge TRS, secretary of which is Dave Bolton, 36 Little

Continued on page 30



Beethoven, Bach and the gang are playing at our place tonight

The drama of a one-hundred piece orchestra apparently playing in your living-room has to be heard to be believed! And now you can create stereo effects for yourself. How?

With the wonderful new TK 340 Hi-Fi stereo tape recorder. Read on.

Separate recording and playback amplifiers mean that the horizons of the TK 340 owner are limitless.



GRUNDIG

3-speed, 4-track, full stereo/mono control. The sleek cabinet hides a polished steel chassis and main parts, fitted with 6 valves, 12 transistors, 3 diodes and 4 rectifiers (all for 145 gns).

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.

Like to know more? Post this coupon to **Grundig (GB) Ltd.**, London, S.E.26 for a 32-page colour catalogue showing all the new Grundig stereograms, tape recorders and radios.

Name _____
(Block letters, please).

Address _____

ATR

Continued from page 28

Iford Lane, London E12. Society members gave a warm welcome to 'The Revrons', who again provided members with excellent fare for recording.

The following meeting was taken up with a stereo concert given by Eddie Baker and Alan Gentle, the former using his Brenell and Alan using a professional Ampex machine.

Quiz champion of 1966 turned out to be Dave Bolton, who was awarded a 5 inch reel of LP tape. In another contest, Rose Bolton was given a forfeit - to provide a new member for the club. This forfeit has now been fulfilled, and the club welcomed Jim Watling.

The club has received a letter of appreciation from the Scoutmaster of the 2nd Dagenham Boy Scout group thanking members for their help in arranging the 'National Pack Meeting' to celebrate 50 years of cub scouting. Members had also recorded a message from the Chief Scout.

RADIO CLUB OF SCOTLAND

The committee of the Radio Club of Scotland has been encouraged in its policy of providing a full 52 week programme. An analysis of attendances during the summer months has shown little or no drop in tape section attendances, so that an excellent all-year-round programme can now be arranged for next year.

One of the programmes which attracted an appreciative audience was an unusual quiz in the form of a tape slide show. Each slide had two objects on it representing a place name in Scotland. For example, a bottle of gin and an 'L' plate indicated Elgin.

Another interesting event was provided by twins John and Peter Douglas, who gave a demonstration of various methods of recording from radio, and a breakdown on frequency response. A comprehensive range of microphones were tested for different characteristics, using the club recorder, and playback was followed by a lively discussion from the audience. Other recent programmes have included a playback of piano and violin recordings by Donald Anderson, on the screen slides of Yugoslavia in colour taken by Bill McQuarrie and a cine film of the Isles of Scotland provided by Albert Barnes.

RUGBY

One of longest committee meetings on record was held by the Rugby TRS at the home of assistant secretary Tom Reader. Much of the 2½-hour meeting was devoted to the consideration of suggestions by members in response to the appeal by John Bannister on his election as president. Most of the suggestions were for meeting programme topics and were found to be acceptable. These have been fitted into the club schedule, planned well into 1967, and this now includes a demonstration/talk on microphones, production of further tapes to 'responant' Ann Armstrong, a programme of extracts from club library tapes, the usual Ladies' night and President's night, as well as a number of competitions, holiday tape programmes and location recordings. It is also hoped to start a series on musical appreciation at the homes of members for the purpose of listening to music on disc and tape.

The management committee discussed and agreed to a suggestion made by member Ian Drinkwater, and as a result the society entered a float in the AEI Apprentices' Association Rag Procession. This year the theme was 'Pioneers', and proceeds from rag activities were given in aid of the St John Ambulance Brigade, the Midland Society for the Blind, and the League of Friends of the Rugby Hospitals. Two student members, Brian Woodcock and George Hunt, who recently returned to Gloucester for a holiday break, are to make a tape about their city, which will be played back at a meeting later in the club year.

Among the many recorders demonstrated by members were the Philips 4-track stereo and home-made cabinet speaker of Mike Walker, the 4-track Stellaphone of Ian Drinkwater, the Sony stereo of Mike Martin, Mr J. H. Purcell's Beocord 2000 stereo, Derek Sweetman's Grundig TK14, and a microphone boom made by Keith Fisher

for blind member Jack Willis.

Unfortunately a meeting planned to include a quiz contest was cancelled when members learned of the sudden death of 22-year-old Ron Barrett, the society's Treasurer. Ron had been a member since 1962, and was elected assistant secretary at the AGM in June 1963. In the following year he was re-elected, and in June 1965 became Treasurer. A wreath was sent to the funeral on behalf of the club, and a number of members attended the service. Ron will be sorely missed, not only in the Rugby TRS, but also among the club's many tape friends everywhere.

SOUTH DEVON

The second summer sound hunt outing of the South Devon TRC took place when members set out by their own transport in search of set sounds. Although the main points of the route were fixed, drivers were allowed to choose their own route in between points, to enable them to obtain the sounds they required.

A film unit from the BBC recently paid a visit to a local school to film a horn carving class run by club member Mr W. R. Owen. Mr Owen is one of the few remaining horn carvers in the country, and has already appeared in radio and television programmes dealing with his craft. Several committee members helped to provide PA facilities at a recent scooter gymkhana organized by the Torbay Scooter Club.

THORNTON HEATH

Following a recent appeal published in *ATR* from the Cultural Society for the Blind, members of the Thornton Heath TRC decided to extend their social service and responded. They have now taken on the responsibility for eight tape copies of *Which?* each month, and this is to be extended to other magazines in the near future. At the same time a request was made to the Croydon Association for the Blind for volunteers to read on to tape selected printed matter for Michael Adams, a young blind student of aeronautics. The enquiry was passed to the club and vice-chairman Morris Webb has already completed two major reading assignments, as well as sorting out spools of damaged tapes returned by well-meaning but rather clueless 'helpers'. Morris's latest task is to record the complete book *Unsafe at any speed* on to 7200 ft of triple-play tape.

Other club nights have been devoted to the technique of tape loops following a club discussion about the work of the BBC Radiophonic Workshop, and loops played back at various speeds were to be heard continuously throughout the meeting. With the BBC contest in mind, a recent club competition was on 'Summer'. This was won by David Kennard, who had returned from a year away from Oxford University spent in India and France. Appropriately enough, the next major club competition is on the subject of 'People Talking', this time with the Federation contest in mind. Alan Brown has been extremely busy helping with music and PA for summer fetes in the Mitcham area, and several members assisted at the Croydon Spiritualist Church's summer fete. The later date is fixed by the Church to coincide with the club's programme.

The club is currently proud of the fact that it has managed to keep all members busy - and presumably happy - with their recording since last autumn without any outside or manufacturers' demonstrations. Contest winner David Kennard is now back at Oxford on his final year, but he has a BBC radio play script in the pipeline and members are wishing him every success with this.

WEST MIDDLESEX

At a recent meeting of the West Middlesex TRC, teams of members went out with portables aiming to fulfil a set programme. This included interviewing three people on topical subjects and obtaining set sounds. Three of the interview questions were 'Do you know who Mr Ian Smith is?', 'Do you know who the Rolling Stones are?', and 'What are your views on London Transport?'. It shocked many members to find how few of the people interviewed knew

who Mr Smith is, and unfortunately remarks on the other subjects proved, in the main, to be unrepeatable! Of the sounds to obtain, aircraft were in abundance and birds (feathered variety) proved easy. Most teams chose cricket as their 'outside sport', a particularly good fake match being engineered by two enthusiastic members.

The recent Chairman's Trophy contest, judged by Angus McKenzie, Ken Smith of Truvox, and Frank Parrington of BASF, was won by Paul Joyce with his tape *Two Boys Going Fishing*. Phil Mead took second and third places with his two tapes, *Excerpts from Noyes Fludde* and *A Visit to a Salt Mine*. The winner was particularly commended for his excellent tape and recommended to enter it for the national contest and submit it to the BBC.

OVERSEAS CLUBS

Although we had believed the *Australian Tape Recordists Association* was the only large tape club in Australia, I have now heard from R. H. Wilson of 24 Chapel Street, Campbelltown 3, South Australia, who is secretary of the *Australian and Overseas Tape Club*. This has been in existence for five years, and has a membership of approximately 200, mainly in Australia, but also in other parts of the Commonwealth. With the problems of distance and communication in some of the remoter parts of the country, members of the large cities often find themselves answering queries about comparative makes of tape recorder, and then being asked by a prospective purchaser, on the strength of his comments, to order a particular machine to be sent out.

Having the friendship and sympathy of certain distributing and importing agents, the club is in the happy position of being able to try out whatever is on the market. In this way they are able to give honest reports on various makes and models to members who may not have the opportunity to try out for themselves.

From Alfred H. Williams, President of the *Stereo Tape Club* in Cape Town, I hear that tape enthusiasts in that part of the world are sympathizing with their British counterparts on the question of the bogey of performing rights. Apparently the South Africans have long recognized that demands for performing rights have only nuisance value when viewed in the proper perspective, and feel that taken to its logical conclusion the system would result in recorder manufacturers demanding a playing fee each time a recorder owner switches on, and demands by garages for a fee every time a car repaired by them returns to the service station!

In the practical field the club is producing a tape of wild animal mating calls. This project is not without hazard, for one member had the disturbing experience of being charged by a wild elephant! This new enterprise follows the club's recent successful *Animals of Africa* project, for which 500 applications were made for sets of the wild animal slides. However, this series has now been discontinued, and a new format has been designed to make the programme available under a new title, *The Carnival of Animals*, with accompanying stereo soundtrack. The club workshop reports successful progress in the fabrication of a 24 inch parabolic directional microphone being made to the club's own blueprint. The reverberation unit with which they are experimenting the technique of sound delay through a closed pipe shows much promise of success, and all members concerned have received individual instruction tapes and photostats to enable them to proceed with the project individually.

Top Ten for July

1. Merseyside. 2. Montrose. 3. Leicester. 4. B-TRAC. 5. Radio Scotland. 6. Furness. 7. Friern Barnet. 8. Gt. Yarmouth. 9. Thornton Heath. 10. Cultural Society for the Disabled.

Top Ten for August

1. Coventry. 2. Rugby. 3. Leicester. 4. Norwich. 5. Thornton Heath. 6. Leeds. 7. South Reach (Radio Erith). 8. Derby. 9. North London. 10. Southend.

Stereosuperb



TC250A Tape deck completes your system

FEATURES ■ Long life, solid state, all transistor circuit ■ Single lever control for all tape functions ■ Smooth and wide frequency response ■ Automatic end of tape switch, tape index counter ■ 57 Gns.

SPECIFICATIONS:

Power requirement	100, 110, 117, 125, 220 or 240 V. 40 watts, 50/60 cps.	Input	Low impedance microphone inputs –
Tape speed	Instantaneous selection, 7½ and 3½ ips. (19 and 9.5 cm/s).		Transistorised (will accommodate any Microphone from
Frequency response	30–18,000 cps at 7½ ips. ± 3 db 50–15,000 cps at 3½ ips.		250 ohm–1 K ohm impedance)
	30–13,000 cps at 3½ ips.		Sensitivity – 72 db (0.2 mv)
Signal-to-noise ratio	Better than 50 db		High impedance auxiliary inputs
Flutter and wow	Less than 0.19% at 19 cm/s		Sensitivity – 12 db (0.2 v)
	Less than 0.25% at 9.5 cm/s	Output	Low impedance line outputs
Harmonic distortion	1% at 0 db line output.		Auxiliary Record/Playback connector
Erase head	In-line (stacked) quarter track, EF17–2902H	Transistors	2SD64 (x6), 2SB382 (x2), 2SB383 (x2)
Record/Playback head	In-line (stacked) quarter track, PP30–420	Weight	Approx. 16.9 lbs.
Bias frequency	Approx. 55Kc	Dimensions	14.2 (W) x 6.3 (H) x 11.4 in (D) (360 x 158 x 287 mm)
Level indication	Two VU meters (calibrated to 0 VU at 12 db below saturation of tape)	Accessories	Connecting leads. Head cleaning ribbon. 60 c/s pinch wheel capstan

SONY®

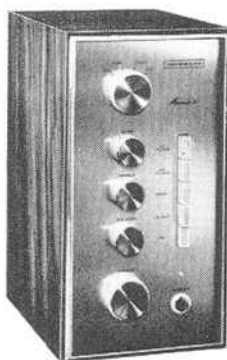
RESEARCH MAKES THE DIFFERENCE

See your local Sony dealer now or write to:

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

Tel: Gloucester 26841–London Showroom 70-71 Welbeck St, London, W.1.

GOODMANS HIGH FIDELITY



Meticulously finished in hand rubbed Teak or Walnut to order.

MAXAMP 30

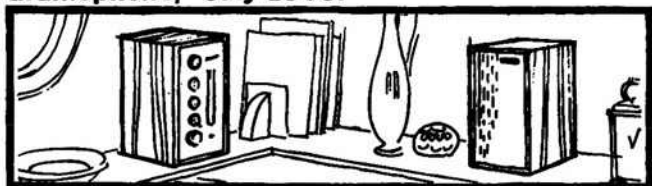
The **FIRST** British All-Silicon Transistorised Stereo Amplifier

"An excellent example of fundamental re-thinking in compact stereo amplifier design. Simple to set up and operate . . . there is no doubt that the Maxamp 30—with its high output in a small compass—is the best value-for-money product in this class which is yet available in the U.K." **David Phillips and Donald Aldous** "Audio and Record Review," April 1966.

" . . . the Maxamp 30 must rate par with the best valve circuits. The amplifier passed its test with flying colours . . . the arrangement of the facilities provided could not be better . . . The quality of workmanship in the amplifier is above criticism . . ." **N. Hulley** "HiFi News," July 1966.

"Clearly a real advance has been made . . . the standard is a high and creditable one; to the listener it means clear, firm and well contained reproduction . . . this neat little amplifier is very much a success—a significant contribution to modern solid-state equipment." **Clement Brown** "Records and Recording," May 1966.

"From the measurements taken it will be seen that the makers have been more than modest in their published specification. It is one of the quietest amplifiers I have used, has more than adequate reserve of power for all domestic conditions and a discreet elegance of design that reflect credit on all concerned." **John Gilbert** "The Gramophone," July 1966.



MAXAMP 30 can be used with any high quality loudspeaker, such as Goodman's MAXIM, MEZZO and MAGNUM-K. Combined with MAXIM it takes up next to no space.

Frequency response: 20 c/s to 20 Kc/s ± 1 db.

Total Harmonic Distortion: Less than 0.3% for 15 watts per channel into an 8 ohm load at 1000 c/s.

Loudspeaker Outputs: 4—8—15 ohms.

PRICE: £49.10.0.

Send the coupon for a free copy of 8 page colour booklet.

Please send MAXAMP 30 booklet and 1966 Hi-Fi Manual together with name and address of my nearest Goodman's dealer.

Name

Address

TR 10

GOODMANS INDUSTRIES · Axiom Works · Wembley · Middx Tel: WEM 1200
A Division of Radio Rentaset Products Ltd.

ON TEST

Here is a full list of the test reports on tape recorders and other equipment that have appeared in issues of *ATR* which are still available from the publishers. These issues may be ordered (price 3s each, post paid) by using the coupon below.

Akai 44 S stereo tape recorder	August 65
Akai X 4 stereo portable tape recorder	October 65
Armstrong 224 FM tuner and stereo decoder	June 65
Beocord 2000 T stereo tape recorder	February 66
Carol Cinesound film/tape synchronizer	March 66
Eumig Phonomatic projector for synchronizing with a tape recorder	March 66
Goodmans' Magnum K loudspeaker	April 66
Goodmans' Maxamp 30 amplifier	September 66
Grampian Reverberation Unit	May 66
Grundig TK 23 A automatic tape recorder	March 65
Philips EL 3301 cassette tape recorder	December 65
Pye Achoic Stereo hi-fi system	January 66
Pye HFS 30 T hi-fi stereo amplifier	September 65
Rectavox Omni Mk II loudspeaker	September 66
Saba TK 230 S 4-track stereo recorder	April 65
Scott 200B amplifier	July 65
Sony TC-250 A stereo record/replay unit	March 66
Sony-O-Matic TC-135	August 66
Sony-O-Matic TC-900 portable tape recorder	June 66
Tandberg Model 9 tape recorder	February 65
Telefunken 201 tape recorder	June 66
Topsonic converter - silent projector to stripe-sound unit	March 66
Truvox R 102 tape recorder	November 65
Uher 22 Hi-Fi Special	September 66
Uher 724-L stereo tape recorder	July 66
Wyndor Vanguard tape recorder	May 66

There are full test reports in every issue of *ATR*. Keep up to date with the latest equipment this easy way. Place a regular order for *ATR* by using the subscription coupon on page 49.

ATR Back Numbers, Haymarket Press, 9 Harrow Road, London W2

Please send me, post free, the following back numbers of *ATR* at 3s per copy.

I enclose cheque/postal order for..... to cover the cost.

MONTH	YEAR	MONTH	YEAR

Name

Address

INTRODUCTION TO STEREO

in which basic requirements for stereo are explained

by Peter Knight

Stereophonic (stereo) sound implies a system of reproduction via two electrically isolated reproducing channels. Monophonic (mono) systems reproduce all the characteristics of the original sound in one channel only, which they can do extremely well. Stereophonic reproduction is, however, made much more exciting by the sense of 'spaciousness' it creates. The sound of an orchestra, for example, appears to spread right across the room and the listener is often able to discern the relative positions of individual instrumentalists. If the original sound happens to be moving, from say left to right, then impressions of movement will also be reproduced. In short, stereo endows hi-fi sound with an extra dimensional characteristic which is completely lacking in reproduction via a single channel, i.e. monophonically (or monaurally). In order to produce the stereo effect the original sound must be picked up by two microphones, one being placed or orientated to respond mostly to the sounds emanating from the right-hand side, the other being made to respond mostly to sounds from the left-hand side. The basic idea is shown in Fig. 1, where two spaced

microphones are used and the pick-up angles adjusted accordingly. If the signals from just one of the microphones were passed through one amplifier and loudspeaker the sound of the orchestra would be reproduced, but the 'sound balance' would be disturbed. Sound balance could be restored by mixing the signals from both microphones through a single amplifier and loudspeaker, but this would not give us stereo. The effect would be simply that of a mono channel using two microphones.

Basic Stereo

Stereo is created by feeding the signals from each microphone through separate right- and left-hand amplifier channels right through to separate right- and left-hand loudspeakers as shown in Fig. 2. This right and left channel isolation must be preserved even when the signals are recorded on disc or tape or transmitted by radio signals. On a tape, two tracks are used simultaneously to carry the right and left channel signals, while on a disc a special

continued overleaf

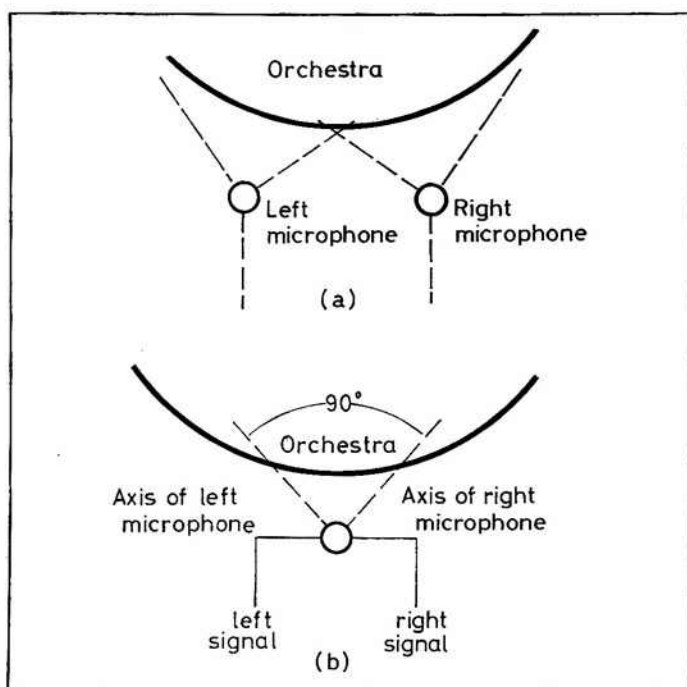


Fig. 1. Stereo microphone system (a) uses two separate, spaced microphones, (b) uses two microphones on a common axis but turned through 45° or at 90° to each other.

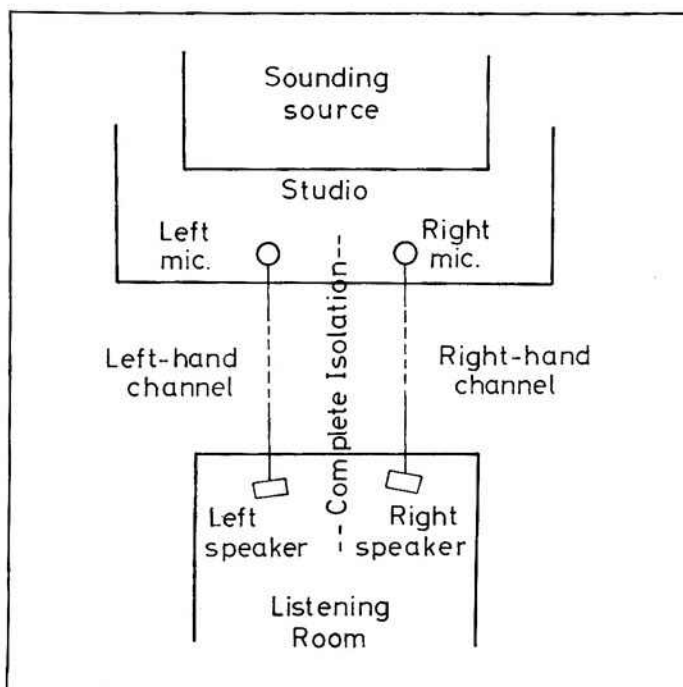


Fig. 2. The basic stereo system whereby the right- and left-hand channels are held in complete isolation from microphones to loudspeakers.

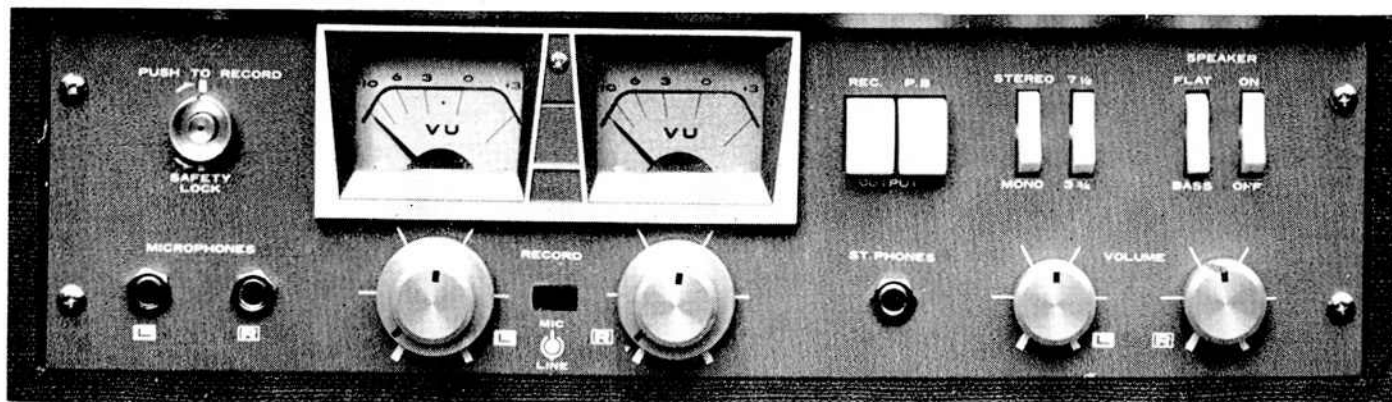


Fig. 3. The control panel of the Akai X355 stereo recorder.

Introduction to Stereo

continued from previous page

method of groove cutting is employed to preserve the channel isolation. A mono signal can, of course, still be obtained from a stereo tape or disc record simply by combining the two signals from the stereo tape head or pick-up so that they can be reproduced via a single amplifier and loudspeaker. This, in fact, provides some degree of compatibility, meaning that a stereo recording can be reproduced monophonically (or monaurally) as well. Stereo radio signals can also be combined and reproduced monophonically in the same way.

How the Stereo Effect is Created

The real object of stereo is to produce for the listener the 'sound' impressions that would have been experienced at the original performance. With a large orchestra, for example, the various instruments are spread out over a wide area in front of the listener, but he would not need to use his eyes to locate the position of the brass section for instance. He can locate it by sound alone. The brain compares the phasing and intensity of the sounds picked up by the two ears and from that information is able to operate as a kind of sound-locating system.

Using only two reproducing channels, i.e. two loudspeakers, a listener can be made to believe that sounds are coming from left, right or centre or any intermediate position merely by controlling the phasing and/or intensity of the signals present in the two channels. For example, if the sound from the left-hand loudspeaker is of greater intensity than the sound from the right-hand loudspeaker, the listener will be led to believe that the sound is originating from the left-hand side. An equal level of sound from both loudspeakers creates the impression of the sound coming from the centre and so on. Reproduction therefore assumes an entirely new characteristic. The different groups or even individual instruments of an orchestra stand out as though the listener were actually in the concert hall. Stereo can also create the effect of movement. Consider a singer moving across the stage in front of a stereo microphone system from right to left. At first the right-hand microphone will respond to most of the sound which will come from the right-hand loudspeaker. As the artiste continues moving, however, the sound intensity from the right-hand loudspeaker will decrease and progressively increase from the left-hand loudspeaker and the voice will apparently move from right to left. This illusion of movement of the reproduced image is frequently used with great success to demonstrate stereo sound.

Stereo Tape Recorders

There are now available many relatively inexpensive stereo tape recorders using either two half-tracks or two quarter-tracks on

the tape simultaneously. Remember, however, some models cannot directly reproduce stereo, although they can record it. For stereo playback from this type of machine the output from the second channel must be coupled to a separate amplifier. The tape recorder playback amplifier is therefore used for one stereo channel and the external amplifier and loudspeaker for the other. Complete stereo tape recorders do, of course, have the necessary duplicated controls (Fig. 3), two reproducing amplifier channels and loudspeakers. One loudspeaker is usually detachable for the necessary spacing. With a suitable microphone(s) one can also record in stereo and with a stereo FM tuner the now regular BBC stereo broadcasts can be recorded as well.

Stereo Amplifiers

Stereo amplifiers consist of two electrically isolated hi-fi channels right through from the programme input to the power output. To avoid duplication, controls such as volume, bass and treble, for the two channels, are ganged to a common control knob. This allows the volume or tone, etc., for both channels to be adjusted simultaneously. This duplication or 'ganging' of controls is sometimes incorporated in stereo tape recorders.

It is often necessary, however, for the volume level from one channel to be above or below that of the other in order to balance the stereo information acoustically. This may be necessary if the loudspeakers are not perfectly matched in sensitivity or to mask acoustic effects in the listening room, particularly if it is not possible to place the loudspeakers in the accepted stereo formation as in Fig. 3. This cannot be achieved, of course, with ganged volume controls, so the problem is solved by means of a 'balance control' which can be used to increase or decrease the output from the right- or left-hand channels accordingly. Two separate *mono* amplifiers could be employed for stereo but it would be necessary to carefully balance the volume and tone controls for the best stereo illusion.

Stereo from Disc Records

On a disc record the stereo signals are carried in the one groove. During recording the stylus of the cutting head cuts two modulation tracks into the groove at right angles to each other, the head being fed with two-channel information. For replay a special stereo pick-up is used, the stylus of which is able to vibrate both vertically and laterally to match the variations in the record groove. The stereo pick-up thus provides two outputs, one corresponding to the right-hand channel and the other to the left-hand channel. These two signals are reproduced simultaneously and are fed to the appropriate channels of the stereo amplifiers. A really good stereo pick-up is, incidentally, a fairly expensive item.

Stereo Radio

Two-channel stereo can be carried by radio transmission and the BBC are now broadcasting regularly in stereo via the vhf FM service for London and the south-east of England. They employ

a compatible system which provides the listener with stereo or mono signals. Broadcast stereophony utilizes two separate sound channels (left and right) from two microphones in the studio for reproduction via two loudspeakers in the listening room. At the transmitter the two channels are coded by a multiplexing process for transmission on a single vhf wavelength. The signals must then be decoded by a special vhf FM receiver in order to separate them for reproduction via the two loudspeakers.

The BBC, in common with other European broadcasting authorities, use the pilot-tone (Zenith-GE) system of stereophonic broadcasting. The system may be envisaged as a process of alternately switching the left and right channels on to a single vhf transmission. A similar switching process at the receiver performs the reverse operation and extracts the left and right signals for feeding to the respective loudspeakers. The switching is carried out electronically at the transmitter and at the receiver at a rate of 38,000 times per second and is kept in synchronism by the pilot-tone transmission. The system is fully compatible in that it allows ordinary vhf receivers to obtain satisfactory monophonic reception of stereophonic broadcasts. Moreover, it does not require separate transmitter wavelengths for the two channels. To hear these programmes stereophonically, special vhf FM receivers or tuners are required.

Microphones and Loudspeakers

The use of widely spaced microphones as shown in Fig. 1a is not always favoured for stereophonic reproduction and creates an effect known as the hole-in-the-middle, i.e. the sounds may become concentrated on one side or the other and therefore weak at the centre. Moving sounds may appear to jump disconcertingly across the room and musical instruments such as a piano may appear to be unusually wide (soundwise that is). The co-axial stereo microphone, such as in Fig. 1b, overcomes this problem and consists of a pair of pressure gradient microphones orientated so that their directions of maximum sound response are at right angles to each other.

The subject of loudspeaker positioning for the best stereo illusion is a controversial one. Basically, however, the listener should locate himself centrally in front of the two spaced loudspeakers as shown in Fig. 4. This normally provides the best stereo effect under average domestic conditions. In practice, however, it is possible to place the speakers in a diversity of positions and still retain some stereo illusion. The loudspeaker should be closely matched both electrically and acoustically.

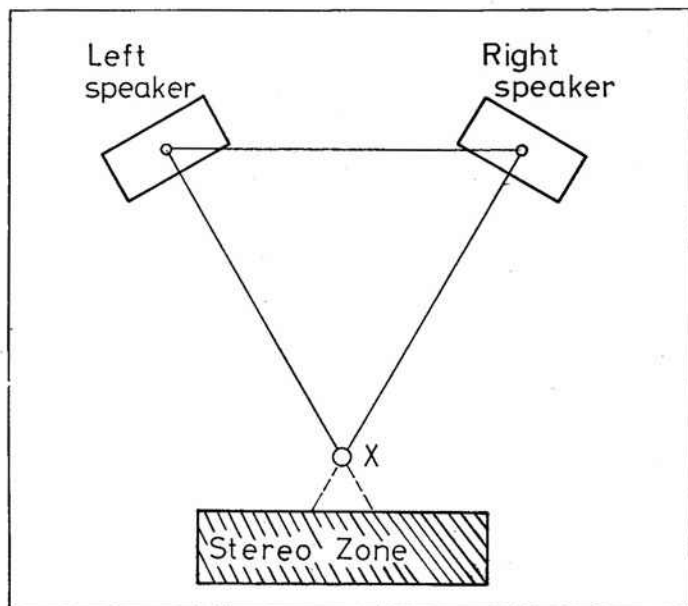


Fig. 4. The ideal positions for the two loudspeakers. Point 'X' in the diagram shows the position for optimum stereo. The stereo effect is still very good in the shaded area.

THE FITTING CHOICE

Have you ever investigated the proportion of *really* good and extremely popular loudspeakers which are not just rectangular boxes, or, put another way, have you investigated the proportion of non-rectangular loudspeakers which are really good and extremely popular? No? Then try it.

There are various reasons of course; for instance, electrostatic units just can't be made like that, horns are difficult to fold, columns are inherently longer one way than another, and so on.

Then there is the OMNI, which has its own special reasons for not being "a square".

Firstly, any flat surface directly behind and parallel to the cone causes "standing waves" which are a product of reflection from such a surface, and result in narrow troughs at harmonically related frequencies, usually in the upper mid-frequency range.

Even tightly packed absorbent material does not obviate these entirely in the short distances found in small enclosures, and it creates other problems, too: the OMNI has no surface in this position, and these annoying standing waves are just not there to need absorbing.

Secondly, parallel surfaces allow air resonances to build up between them, resulting in peaks, again harmonically related, and again in the precious mid-range; the OMNI only has one pair of such surfaces, the sides. At the top the massive bass driver separates them; lower down the reflex tunnel and generous damping material are in the way.

Thirdly, there is the little matter of bass response: for confirmation of this, you only have to ask someone who visited our Demonstration Room at the Fair—it is undeniable.

So much for technical reasons—don't forget the fantastic and unique versatility of the OMNI.

Thus we have a remarkably smooth response, and good clean bass, and ability to fit in.

What about the stereo image? The hemispherical-domed tweeter takes care of this with its gentleness and wide dispersion, not to mention how far up the scale it goes.

These are the plain reasons why the OMNI is so excellent; there is no other word: it is—

A FITTING CHOICE

Also—our Conversion System makes it possible for you to reach OMNI STATUS by stages—ask for details: OMNI, AMBI and CONVERSION SYSTEM—all on our Fair leaflet.

The AMBI, by the way, is a "square"—not as good as the OMNI, we admit, but as good as they come and styled the characteristic "Rectavox Way", smart and ageless, a fitting companion to the OMNI.

**THE
RECTAVOX COMPANY
CENTRAL BUILDINGS
WALLSEND, NORTHUMBERLAND**



Fig. 1. Truvox Series 100 Stereo Tape System complete.

HI-FI ON TEST

QUALITY SOUND REPRODUCTION BY TRUVOX

Peter Knight takes a look at domestic Hi-Fi

Not long ago an amplifier delivering two times ten watts of stereo at low distortion *plus* a pair of speakers going down to 35 c/s and up to 15,000 c/s *plus* an FM tuner with facilities for duplex (stereo) *plus* a stereo tape recorder, would have occupied at least the full length of one wall. Moreover, it would have endowed the room with the flavour of a radio ham's den with its dissimilar control knobs and cabinet sections, hosts of interconnecting wires coupled with the reverence surrounding its use.

Indeed, early hi-fi was by no means a domestic pet! The lady of the house was conditioned to live with this highly technical creature and keep the kids well away from it while its master was away earning enough to keep it going. No matter how much she liked listening to the realistic noises it could make, rarely – if ever – did she venture to switch it on by herself. She made do with the kitchen portable radio instead.

Thanks to firms like Truvox, this sort of situation is rapidly changing. There is no doubt that hi-fi has so wrongly been placed on a high technical pedestal. It has so often been looked upon as something very scientific that only near-boffins can operate. It is scientific of course – the same as computers and colour television – but this is no reason why it should not be fully enjoyed all the time by everyone. In America hi-fi is almost a household appliance, something that even a housewife can use for 'music while you work'. On the other hand, it must be aesthetically unobtrusive and not take up large spaces and it must fit in with the domestic *decor*. It must not turn the lounge into an electronics laboratory. It must be a family piece – suitable for all, including the teenage daughter for the playing of her pops!

Another sort of hi-fi

This, then, is popular hi-fi. The kind that uses massive loudspeaker enclosures and amplifiers with powers of 60 or 100 watts and very expensive pick-ups, etc., is of course greatly favoured by the purists.

36 After all, hi-fi does mean for ever striving towards absolute perfection,

but no matter how close one gets, there will always be that small margin which separates electrical reproduction from the original sound. Hi-fi, it seems, follows an exponential law. Very much greater effort and cost is demanded for marginal improvements than is required initially for 'good reproduction'. Mediocre reproduction (as from ordinary radios and radiograms) calls for very little effort and expense. The expense thus rises relative to results on an exponential scale.

Popular hi-fi, of the kind made possible by Truvox for instance, is quite a way up the exponential scale of price versus reproduction, a long way up in fact, but without becoming completely fanatical.

Fig. 1 shows how all the necessary equipment can be neatly contained on a wall-rack or book shelves. This is called the *Truvox Series 100 Stereo Tape System*. In the middle of the picture – above the tape unit – are placed the *Model FM100* tuner and below the *TSA100 Stereo Amplifier*. The tape unit is the *PD102* two-track or *PD104* four-track and the speakers comprise a pair of *Truvox SL120s*.

What it can do

With this system one is able to record and reproduce in mono at a nominal maximum power output of 20 watts from FM radio or tape. The system will, of course, record or reproduce in stereo at 10 watts per channel from tape or stereo radio transmissions. The tape unit will reproduce tape records at very fine quality, either quarter or half-track versions mono or stereo. Moreover, a stereo tape can be reproduced mono-wise simply by pressing a button which combines the two outputs into one channel.

A pair of microphones or a stereo microphone can also be accommodated for making excellent stereo recordings at home. Moreover, the amplifier will accept any type of pick-up, magnetic or crystal, mono or stereo. A record transcription unit would not only add to the programme sources but also permit experiments in stereo tape recording from disc. As they are primarily tape recorder and amplifier manufacturers,

Truvox have left the disc unit and pick-up to those who specialize in this field. ADC and Shure cartridges make perfect partners to the amplifier, while the Thorens TD135 or the Garrard 401 motor does justice to the cartridges.

How much does it cost?

The picture in Fig. 1 shows how neatly the Truvox equipment can be housed, but how much does it cost? Well, the reproducing system without programme sources (i.e. the TSA100 with a couple of LS120s) costs 87 gns. To give a high-quality radio signal the FM100 tuner adds 32 gns to this, while the tape system adds on another 89 gns. This might seem to be a formidable amount of cash to the hi-fi newcomer but, taken individually, the prices compare quite favourably with similar equipment. It was not so very long ago that one had a job to buy a single hi-fi, full-range speaker system for 38 gns, which is the price that one now pays for two of the Truvox Minis.

The tape unit

The tape unit adds most to the system and in itself is an excellent instrument. It has three motors and a fully transistorized amplifier sealed and screened in the cabinet below. When this unit is used in conjunction with the TSA100 amplifier, any programme signals connected to the amplifier can be recorded and monitored 'off tape' or 'on tape'. The tape unit has separate record and replay heads. Head-phones are thus not essential for monitoring, but they can be used if required, there being a dual-output jack socket on the amplifier panel for accommodating them. The monitoring system is the same on the four-track (PD104) unit as used in the test but the mono unit differs a little, it appears. Unfortunately, the instructions fail to make this very clear (a real criticism!) but they do make it clear that monitoring direct from the tape immediately following a recording, and while a recording is being processed, is possible with all decks of this series.

Facilities are available so that a recording from one track can be re-recorded on to another track. This can be done either way, i.e. from upper track to lower track and vice versa or, if desired, the signals from each track can be combined. This latter function can be used to play a stereo tape record in mono. A form of echo can also be obtained by recording on one track and copying on to another track, the echo being due to the displacement between the recording and playback heads. A superimposing control is also incorporated and there is a pause control that can be locked-on if required during recording or playback. A four-digit counter provides accurate location of a recorded item.

Other features include piano-key motor control, an editing panel for tape splicing, an automatic stop which operates at the end of the tape or even, should the tape break during recording, replay or wind.



Fig. 2. The Stereo hi-fi tape unit. This measures $16 \times 16\frac{1}{2} \times 8$ inches approximately.

Two easy-to-read VU meters, illuminated whilst recording, are featured on the stereo models. A useful feature of the tape units is that they can be operated in a vertical or horizontal position. Locking devices are included on the spool carriers.

Separate amplifier channels are provided for recording and playback and suitable input and output impedances allow the tape unit to be used with other makes of equipment. Microphone mixing is included and programme sources being recorded from any medium other than the microphone can be controlled separately. The levels of the two signals can thus be independently controlled.

The FM100 tuner

Now a brief look at the FM100 tuner. This, of course, covers the whole of the FM band from 88 to 108Mc/s, is completely solid-state and has muting and automatic frequency correction circuits built in. The muting circuit allows one to tune over the band without the annoyance of the

continued overleaf

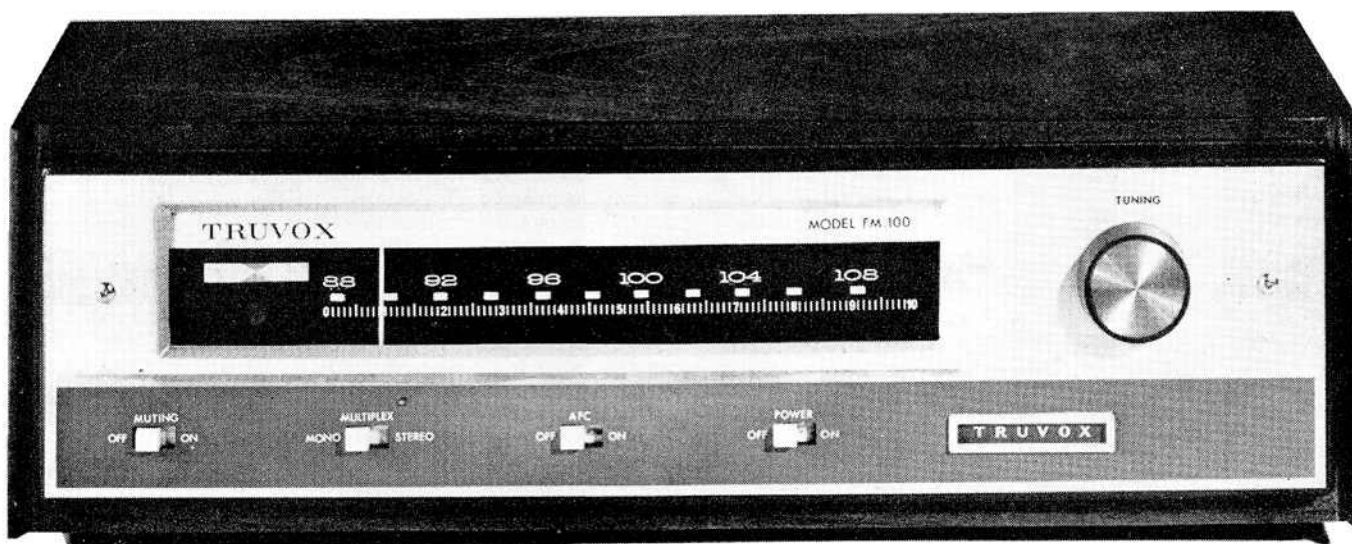


Fig. 3. The FM100 FM mono/stereo tuner. This measures $16 \times 6\frac{3}{8} \times 5\frac{1}{8}$ inches.

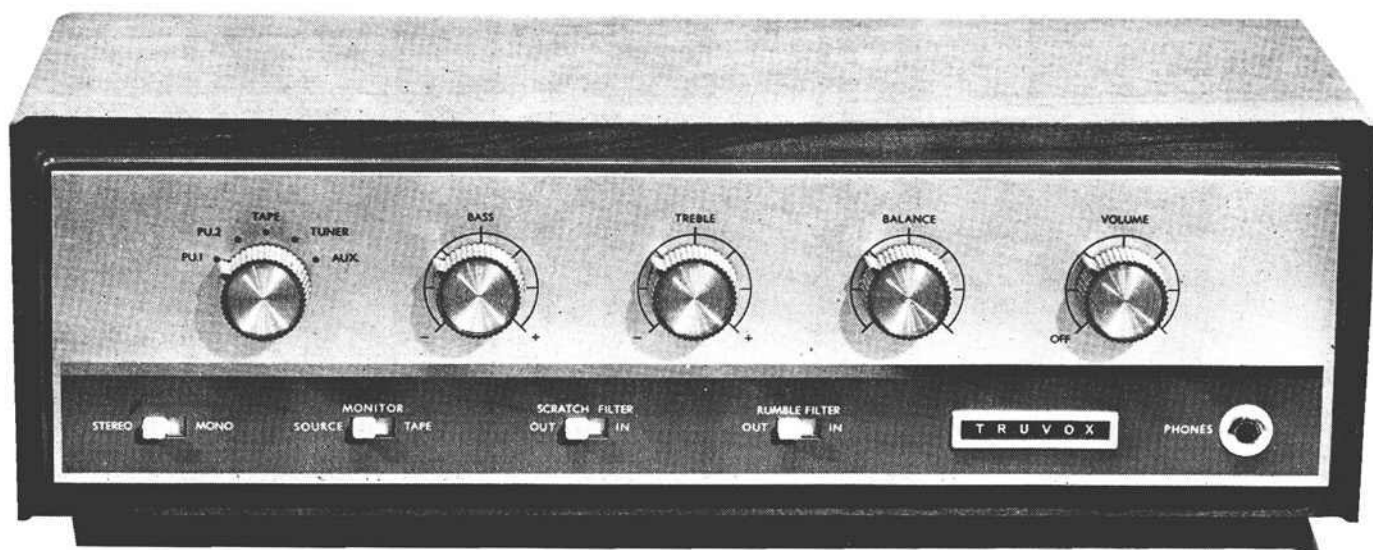


Fig. 4. The TSA100 stereo solid-state amplifier. This measures the same as the tuner.

high background noises between stations. The tuner becomes automatically responsive only when a station or carrier is tuned in. The afc circuits ensure accurate tuning by automatically pulling the local oscillator frequency to give optimum discriminator (FM detector) balance. Tuning is usually undertaken with this switched off, and then any 'rough' tuning is automatically corrected when the afc is switched on.

A tuning indicator is included, however, and consists of a balanced cylinder mounted horizontally on its axis behind a glass window. Two arrow heads are painted on this with their points together. When a station is tuned the cylinder rotates a little one way or the other, depending in which direction the discriminator is unbalanced. The idea is to tune until the exposed areas of the arrow heads are equal either side. This signifies correct balance. Even after this exercise it is best to take advantage of the afc to correct for any small amount of oscillator drift. The tuner is designed for the fitting of a multiplex unit for FM stereo transmissions. This would seem to be a relatively simple exercise, for inside the tuner is a valveholder into which the stereo unit will plug. Dual outputs (for stereo) are provided via a ganged preset potentiometer with an output of up to 1 volt (from zero) at 600 ohms from an emitter-follower (i.e. common-collector amplifier). When stereo transmissions are being received and the multiplex decoder is in operation a small lamp on the panel lights up showing that stereo is, in fact, being received. There is, however, a 'mono/stereo' switch which allows mono signals from a stereo transmission should this be required.

The TSA100 amplifier

This employs germanium transistors and a special low-noise input transistor. A transformerless class B output stage with a pair of AD140s is driven by a complementary pair of transistors in direct coupling. Three driver transistors complete the circuit back to the tone control, which is a Baxandall type. Feedback is applied over the whole of the power amplifier section, the amount of which can be adjusted by a 2Kohms preset resistor. There is also a bias preset in the output circuits. Three more transistors complete the circuit from the programme inputs up to the tone control, and in these are included the rumble filter, scratch filter (both switchable) and the signal source equalizing. The equalized output is available at the second transistor (before the tone controls) as a recording signal. Each channel thus features ten transistors and power is supplied by a bridge rectifier from a fully isolated mains transformer. The balance control turns down to zero on either channel.

Other features include a stereo jack socket connected at the out-put stages which disconnects the speakers when the plug is inserted. This allows connection of headphones from 8 to 600 ohms impedance. A 'stereo/mono' switch which parallels the mono signal inputs to both amplifier channels is also included. The amplifier will accept any programme source, there being two inputs for pick-up tape, tuner and auxiliary. The instruction book gives a whole list of pick-ups which can be used with the amplifier.

Output ratings are 10 watts rms per channel across 15 ohms and 12.5 watts rms across 8 ohms. The music power rating is above this, of course, being up to 15 watts across 8 ohms and 18 watts across 4 ohms. Another interesting feature is the 'cone/electrostatic' switch on the rear panel. Some transistor output stages will not operate with an electrostatic speaker and become unstable. In the Truvox TSA100 the speaker coupling can be switched for optimum matching whichever type of speaker is employed.

The LS120 loudspeakers

These are really remarkable, measuring only 13 x 8 x 7 inches. The infinite baffle technique is adopted, which means that the units are sealed in the cabinet, their cones (the bass one, that is) working against a cushion of air. This ensures acoustical loading of the 5 inch bass unit down to low frequencies. Because of the damping action the cone takes almost a second to return to its normal position after being carefully pushed inwards up to maximum cone excursion.

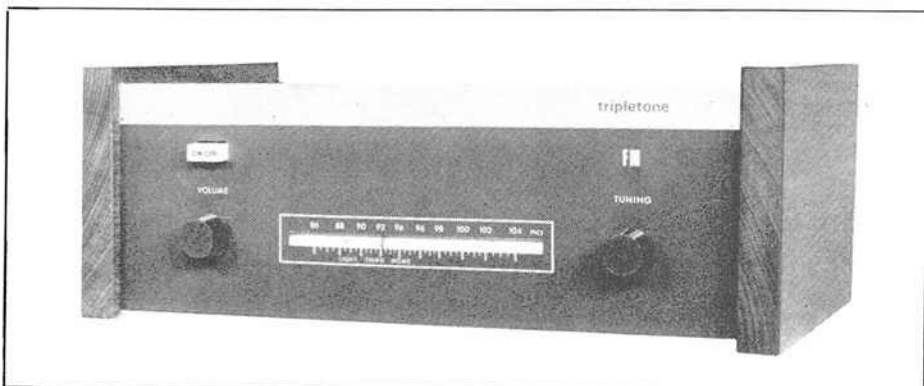
For treble, a moving-coil pressure unit is employed, taking over at around 3,500c/s and extending up to 15,000c/s (± 2 dB). The crossover frequency is 3,500c/s and the ± 2 dB response of the bass unit is from 90c/s to 3,500, falling at 12dB/octave below 80c/s. The LS120 as a whole can handle up to 12 watts rms. The impedance is 15 ohms and the weight 12 lb.

This, then, is domesticated hi-fi by Truvox and in spite of the small dimensions of the various items of equipment extremely good reproduction is possible. This is, indeed, hi-fi that the average music lover can live with and really enjoy at all times. It conforms to modern techniques, is transistorized and mains powered throughout. There is no difficulty in its operation and it blends admirably to the background of a contemporary household. It is not cheap – nothing that is good ever is – but it is not expensive either. It is popular hi-fi and worth looking into.

Further details of all the items mentioned in this review can be obtained from Truvox Ltd, Neasden Lane, London NW10.

THE TRIPLETONE FM TUNER

by Gordon J. King



The Tripletone Manufacturing Co Ltd, of 241a The Broadway, London SW19, specialize in audio equipment of the medium-price range, including amplifiers and speaker units as well as tuners. The FM tuner tested was the self-powered model, suitable for direct connection to 200-250 volt ac mains supplies. However, there is also an unpowered model, calling for an external supply of 250 volts dc at 25mA and 6.3 volts ac at 2 amps. This latter model, of course, would generally pick up its supplies from a partnering amplifier.

An outstanding feature of the tuners is their low relative price. The self-powered model retails at £17 15s 10d and the unpowered model at £15 18s 11d, both prices including purchase tax. They are built into substantial black-finished metal cases, allowing easy integration into a hi-fi or audio set-up. A facility has been created in the form of attractive end pieces to allow the equipment to be free-standing on a table or bookshelf. The end pieces are made of teak wood, unpolished, and the amplifier or tuner is clamped between the ends by wooden struts. The accompanying photograph shows these ends in position on the self-powered tuner.

It is interesting to note that the tuner and the 12 watt *Hi-Fi Major* amplifier from Tripletone have been accepted by the Council of Industrial Design for inclusion in the Design Centre. Immediately obvious from tests carried out on the tuner was its great overall sensitivity. The data sheet supplied with it states that the sensitivity is such that 0.5V output is obtained from an input of 10µV. Your reviewer was unable to substantiate this specification – not because it was not met, but because the sensitivity of the sample model was substantially above this!

High Sensitivity

The output signal was monitored simultaneously on an oscilloscope and on a wide-range audio voltmeter. The input signal at 90Mc/s was obtained from a signal generator, but before being applied to the tuner for the test it was connected to a signal strength meter and its level carefully set to 10µV. The signal at this level was then passed direct to the tuner from the generator and the tuner was adjusted for maximum output signal. This was found to be 5V rms on both the oscilloscope and the audio voltmeter! The level of the input signal was then progressively advanced and the output signal was still below clipping level when the output signal monitors were reading 15V rms, although the distortion was now pretty high for an FM tuner.

The tuner employs a total of four EF80 valves in the pre-detector stages, and since these are quite high-slope valves one would expect considerable sensitivity. The final EF80 is arranged as a limiter stage, with a resistor and shunt capacitor in the control grid circuit to provide the required time-constant. The negative voltage developing across this time-constant under conditions of limiting is fed back to the control grid circuit of the first EF80 for automatic control of gain. This first valve is arranged as a vhf amplifier and is followed by the self-oscillating mixer stage, a straight if amplifier and then the if amplifier/limiter.

The vhf amplifier is effectively untuned, a broadly-tuned aerial coupling circuit being used in the control grid circuit. The output signal at the anode is capacitively coupled direct to the tuned control grid of the self-oscillating mixer stage. The mixer is caused to oscillate by a tuned circuit in the screen grid of the valve. This technique, which is perfectly sound, calls only for a two-section tuning-gang assembly.

FM detection is accomplished by a pair of solid-state diodes in ratio detector configuration. A balanced circuit is, in fact, utilized and an interesting feature here is an arrangement of simple biasing from the ht positive line, via a 1 megohm resistor, to the negative side of the detector's reservoir electrolytic capacitor. This serves reasonably well as an inter-station quietening artifice.

Double-triode Audio Output

The final valve in the tuner is a double-triode ECC83. The first section of this receives the ratio detector signal direct at its grid and gives substantial amplification, the anode load being 100Kohms. This is the valve that gives the audio output signal quite a lift, reflecting in high overall sensitivity as per the test above. The second triode section does not contribute to gain, since it is arranged as a cathode-follower output, the signal being taken direct from its cathode at medium to low impedance. A volume control is interposed between the two triode sections and this is brought out to a knob on the front panel.

The self-powered model embodies a fully-isolated mains transformer with a 6.3V winding from the valve heaters (and pilot bulb) and a centre-tapped ht winding for feeding a full-wave rectifier valve, EZ80. Ht smoothing is given by two 32µF electrolytic capacitors and a 2.8Kohms series resistor. Further decoupling is provided on the first audio triode anode circuit by a 16µF capacitor and 47Kohms resistor. Unfortunately, in spite of all this smoothing the hum signal at the

output on the model tested was found to be rather high in practice with the volume control fully advanced and with the input signal removed. Under normal medium-fi operating conditions, however, with a fair (100µV) aerial signal and with the volume control only just a little advanced, the hum background was tolerable.

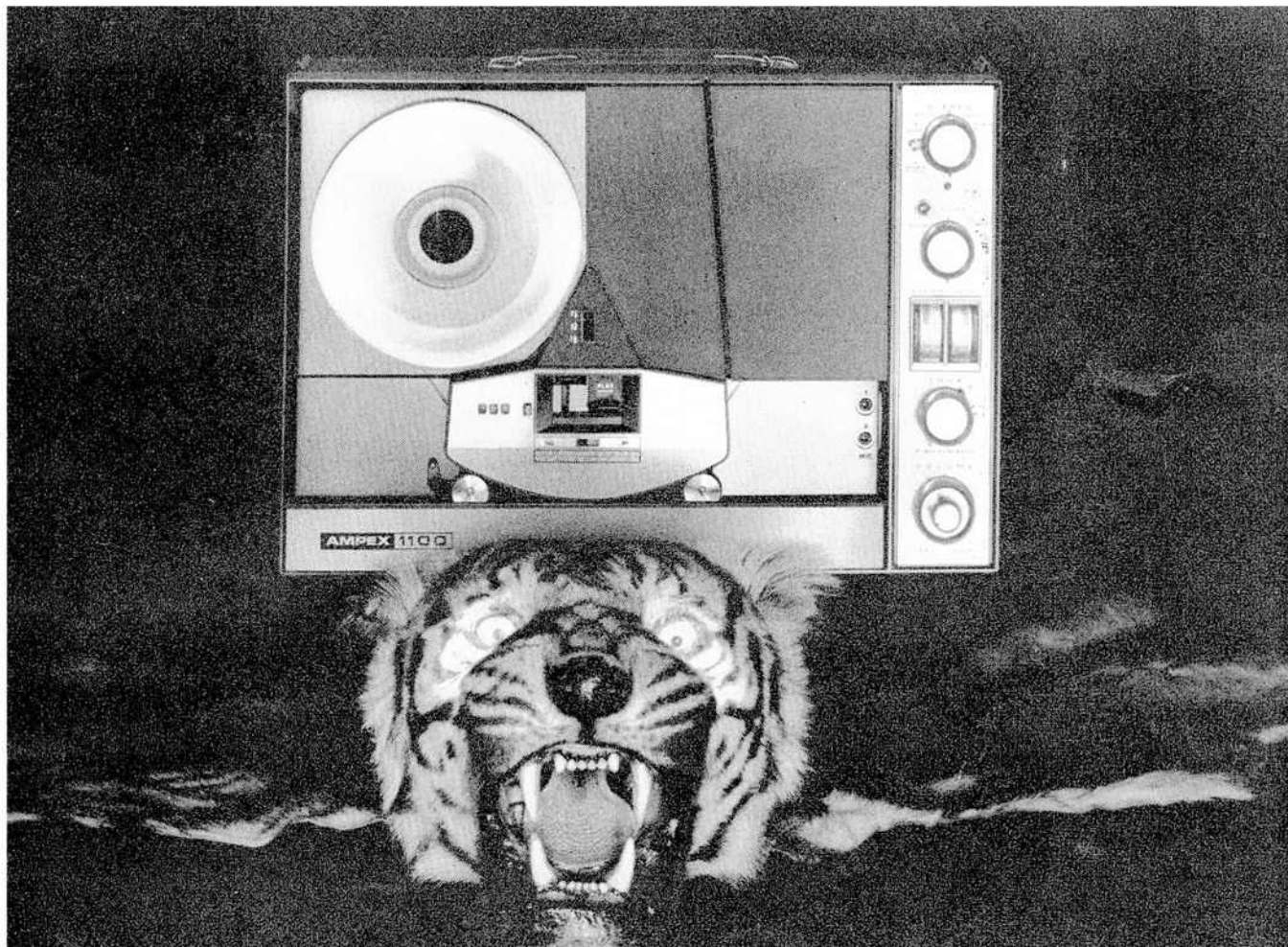
Of course, it is extremely unlikely whether one would ever want to run the tuner at full audio gain. This would never be so when used with any ordinary hi-fi amplifier, and with the reviewer's set-up only a few degrees of volume control setting were needed fully to load the ratio discriminator input circuit of the amplifier with which the tuner was tested. It is possible that some of the hum in the test tuner was emanating from the cathode-follower stage due to a bad valve; but this was not proved. On the other hand, some of it may have been injected into the grid circuit of the first triode.

Although there is no flywheel to assist ease of movement, the tuning system is free from backlash and there should be no undue difficulty in establishing the correct tuning point. The lack of a tuning indicator may prove to be a minor disadvantage from the point of view of a non-technical user; but one soon becomes accustomed to tuning FM by ear, provided the if and ratio detector alignment is optimized.

Response curve tests of the test model revealed a little unbalance in the ratio detector response, although the symmetry was good. The pass band, however, was a little narrow for the reviewer's needs, resulting in rather too sharp tuning and 'edginess' of reproduction resulting, possibly, from a little oscillator drift. This was soon modified by realignment with a wobulator and oscilloscope. There was plenty of spare gain to facilitate this!

The tuner worked well with an attic aerial (single dipole) at a distance of 30 miles from the local high-powered station, and even on this simple aerial picked up signals from substantially far more distant stations at entertainment value. European stations were also received since the model was tested subjectively during a warm spell when tropospheric conditions bring distant vhf signals into this country. The tuner could be coaxed to work from a simple indoor (set-side) aerial, but trouble was experienced in maintaining stability under this condition, as should be expected with a tuner of such high gain. This is not a shortcoming, but rather a natural effect due to incorrect loading on the input circuits.

continued on page 41 39



Beware! This one is Wild!

It's Ampex 1100: the professional recorder with an amateur price

Just produced by Ampex, world masters of Audio equipment, the 1100 is packed with exciting features. Features that make this professional standard stereo recorder a pleasure to use, a revelation to hear. It loads the tape *automatically*, reverses *electronically*, and the unique dual-capstan drive keeps precise tape tension without pressure pads, without wow and flutter, even at the slowest speed.

No frustrating warm up with your 1100. It plays instantly. Perfectly. Because all its electronics are solid-state. Tantalum capacitors and Silicon transistors tremendously increase overall reliability and performance. Weight and service problems are minimised.

Punish it. It can take it. Over a third of the weight is rugged die-cast aluminium frames. So alignment is critically precise. And precision lasts a lifetime. The 1100 is the portable that can take rough handling. And still run silk smooth. An air-tight warranty sees to that. So does our name. Ampex.

Thrilling voice . . . lovely body. The 1100 not only looks good, it sounds good too. Compare it with live sounds; the truth is obvious. Compare it with other recorders; it's so much better the difference is embarrassing.

Most men will never handle a machine this good. What about you? Be warned, it will drive you wild. It's the professional recorder with an amateur price. From: £149. 10. 0.

AMPEX

Ampex sales and service facilities are conveniently located throughout Europe and the Middle East. For more information write to: Ampex Great Britain Ltd., Acre Road, Reading, Berkshire, England. Telephone: Reading 84411. Ampex S.A., Via Berna 2, Lugano, Switzerland. Telephone 091/3.81.12. Ampex Europa, G.m.b.H., 6 Frankfurt/Main, Düsseldorf Strasse 24, Germany. Telephone: 252001-5. Ampex, 41 Avenue Bosquet, Paris 7e France. Telephone: 705.38.10.

Wired For Stereo

An output socket is provided at the rear of the tuner for connecting to a multiplex adaptor for stereo reception on the FM channels. Indeed, at the time of writing this is no longer in the distant future, for following the transmission of three stereo programmes each day from the Wrotham and Dover stations which began in July, the BBC is to introduce stereo transmission from the Sutton Coldfield and Holme Moss stations in 1967. Facilities for multiplex attachment now assumes some importance in the selection of a new tuner.

The front panel of the Tripletone tuner is composed of a Perspex material backed and engraved for the tuning scale. This carries the tuning and volume controls and also a push-type mains on/off switch on the self-powered version. Chassis construction is adopted as distinct from printed circuit boards, and having in mind the very moderate price of this tuner, it can certainly be said to represent good value for money, although it may not please the highly critical hi-fi type. It is the type of tuner that one could readily employ to work in conjunction with a tape recorder, for there is plenty of output audio available to work even the most insensitive of recorders.

Manufacturer's Specification

Frequency Range: 86 to 104Mc/s. **Output:** from cathode-follower, with input volume control. **Sensitivity:** 10µV for 500mV output. **IF:** 10.7Mc/s. **Aerial Input:** 70-80 ohms coaxial. **Power Input:** 200-250V ac, 30W. **Size:** 11 x 6½ x 3½ inches high.

DISC CORNER



Two records this month from the **Music for Pleasure** releases may be of interest, and the first is a fine collection of Paul Robeson recordings made between 1931 and 1939. A surprising thing about this record is the high quality, since all the tracks would have been originally cut on 78 rpm masters. Not only is the rich voice of Robeson preserved but also the clarity of the orchestral accompaniments. Old favourites such as *Rocking Chair*, *River Stay Away from my Door* and *Lazy Bones* are included among the twelve songs on this record. Truly a disc for collectors or for pleasurable listening. **Music for Pleasure** (EMI) MFP1095. Title: *The Glorious Voice of Paul Robeson*. The other MFP release is **Enchanted Evenings with Geoff Love and his Orchestra**, a collection of twelve hits from the greatest

shows produced at the Theatre Royal, Drury Lane. Side one features *Desert Song*, *Rose Marie*, *Lover Come Back to Me* and three other favourites. Side two covers the all-American era with tunes from *Carousel* and *South Pacific*, etc. Geoff Love, who conducts the orchestra in this selection of music for mood and nostalgia, is a young musician who has made a very rapid advance in British recording since the end of the war. The recording quality is first rate and the musical arrangements interesting, some in fact being slightly unusual. MFP Mono 1092. Incidentally, these MFP records are full 12 inch LPs and cost only 12s 6d. The catalogue covers a wide range of classical, pop, show music and jazz. Sole distributors are Books for Pleasure Ltd, Drury House, Russell Street, London WC2. **ALR**

Low Noise Tape Head Amplifier Amendment

The capacitor connected to the rectifier in Fig. 5 of the above article, page 8 of the August, 1966 issue, is incorrectly rated at 50V. On a 250V rms supply the rating should be 300/350V working. A suitable component is the Radiospares 50µF, 350V tubular electrolytic, available through any radio dealer. P.K.

DON'T MISS THE NOVEMBER ISSUE

Another feature-packed edition of ATR plus the extra Hi-Fi Section

On Tape

- Tracking the Secrets of Magnetic Tape
- Noise Generator
- Useful Microphone Holder
- Tape Recorder Servicing
- On Test - The Ferrograph 633
- On Test - The Beocord 2000K de-luxe

Plus - Tape Record Review - Tape Club News - New Products and still more feature articles

On Hi-Fi

- Loudspeakers for Tape Recorders
- Headphone Listening
- Test Reports - The Beomaster 1000 Amplifier/Tuner and Koss Stereophones
- Audioview looks at Transcription Units

Mood Music Records available from ATR

Please allow two weeks for delivery

These records are high quality 12 inch LPs (33½ rpm). Each contains a wide selection of opening and closing music, mood and theme music and sound effects highly suitable for tape, slide and cinefilm sound tracks. Each record sleeve gives full details of recordings and timings and an instruction leaflet is included.

MM1 Cine Mood Music 24 tracks include openings, closings, themes and effects, grand, prelude, tragic, drama, comedy, holiday, nautical, Christmas, suspense, etc. Airport, jets, fireworks, train, sea, etc. Price £2 9s. 6d.

MM2 Sound for a Picture 25 tracks include openings, closings, themes and effects. Grand, dramatic, gentle, finale, happy, party, holiday travel, parade, circus, playtime, etc. Effects: sea, train, jet, baby, crowd, traffic, etc. Price £2 9s. 6d.

MM3 Custom Music for 8mm 38 tracks include openings, closings, themes and effects. Ceremonial, mellow, finale, movie finale, holiday, travel, continental, birthday, wedding, pageantry, etc. Effects: crowd, dog, baby, seaside, thunderstorm, etc. Price £2 9s. 6d.

To: Haymarket Press Ltd., 9 Harrow Road, London, W.2. Please send me the following records [indicate with a tick in the appropriate square(s)]:

MM1

MM2

MM3

I enclose postal order/cheque/cash for £.....for 1, 2, 3 records, plus 2s. post and packing for each record ordered.

NAME

ADDRESS

Please allow two weeks for delivery. **ATR10**

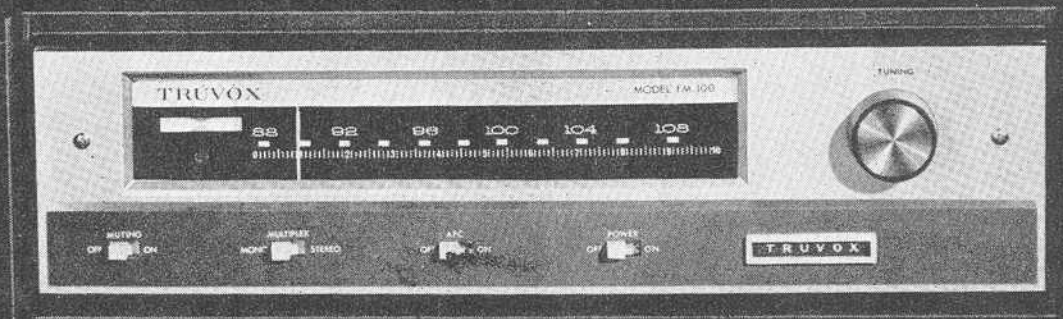
Note: Each record ordered is posted separately in its own packing.

PLEASE WRITE YOUR ADDRESS CLEARLY IN BLOCK LETTERS

This was the most successful ad we ever published. We're sorry to say

We knew our FM Tuner was good—very good. And we expected people like you to want it. We just didn't realise that there were so many people like you around, so a lot of Truvox-hunters had blank days. We're sorry if you were one of them, but happy to tell you that we have put things right *fast*. We caned our advertising manager and gave our production chief a lot of sleepless nights. And there's no reason, now, why you should be without Britain's most advanced Tuner.

GET IT INTO YOUR SYSTEM! This brilliant new F.M. Tuner from Truvox



Here, without question, is Britain's most advanced Tuner—the splendid completion of the trend-setting Truvox Series 100 System.

The reliable, *self-powered*, all-transistor circuit ensures minimum distortion and background noise, and includes provision for fitting a low-cost, plug-in Multiplex Unit at any time for stereo reception.

Among the many advanced features are a unique Rotary Meter and a wide-range, switched, Automatic Frequency Control for high accuracy tuning. A Stereo Beacon lights automatically on reception of stereo broadcasts. Two output signals are taken from the rear of the Tuner via twin phono-sockets. Input sockets are arranged for any type of aerial feeder.

SPECIFICATION FM100

Tuning Range 87.5 Mc/s to 108.5 mc/s
Sensitivity 2 micro V, Sensitivity for 20 db quieting
Frequency response:
Mono 20 c/s to 20 Kc/s ± 1 db
MPX Stereo 20 c/s to 20 Kc/s ± 1 db
Very steep cut Notch filters operate at MPX carrier frequency
Stereo separation—38 db at 1 kc/s
Aerial Inputs—balanced 300 ohms, unbalanced 75 ohms
AFC holding range ± 200 kc/s
Switched AFC
Switched power
Switched inter-station muting control
Automatic stereo switching with manual over-riding stereo-mono switch
Automatic stereo beacon
Outputs variable to 0-1 volt emitter follower
Voltage 100-120 A.C. 50-60 cps or 200-250 A.C. 50-60 cps.
Fused.

Muting Switch

A muting circuit completely eliminates inter-station noise, and prevents false activation of the Stereo Beacon.

Automatic Stereo Switch

The Tuner will produce a mono signal through both outputs. When a stereo broadcast is received, the Tuner will switch automatically to stereo reception. A slide switch on the front panel allows selection of a mono broadcast in place of stereo where the stereo signal is weak, resulting in a better signal-to-noise ratio.

The AFC Control

This holds over a particularly wide band and is controllable for really accurate tuning. Also weak signals adjacent to strong signals may be received without pulling into the stronger signal.

The output from the rear panel phono-sockets is controllable by a ganged potentiometer and thus all possibility of overloading sensitive input stages is obviated.

The Tuning Scale is hand-somely styled, illuminated and fully calibrated. The complete tuner is the same size as the TRUVOX TSA100 Amplifier and is fitted in a matching afroomsia case.

Precision Tuning

A large balanced flywheel is fitted to the tuning control to ensure smoother, more exact tuning.

TRUVOX

Write to K. C. Smith for further information
TRUVOX LIMITED • NEASDEN LANE
LONDON NW10 • Tel: DOLlis Hill 8011

AUDIOVIEW TAKES A LOOK AT LOUDSPEAKERS



Loudspeakers, the units that is, range in size from about three inches in diameter to enormous bass units some twenty inches in diameter. Each have their particular application but within this range of physical sizes are those expressly intended for high fidelity sound reproduction and, moreover, designed to handle a specific input power without stress or distortion. In order to reproduce faithfully over the frequency range for which it is designed a loudspeaker must be built into a suitable cabinet (more formally known as the enclosure). The size and shape of the enclosure is determined mainly by the low frequency response required of the loudspeaker, so if you contemplate building your own enclosure remember that much thought must be given to its design. There is, however, a good deal of design information and even building plans for enclosures available, much of which can be obtained free of charge from manufacturers such as Goodmans Industries Ltd and Rank-Wharfedale, etc. The Rank-Wharfedale Teesdale assembly shown in Fig. 1 is a good example of how complex a really well-designed loudspeaker system can be.

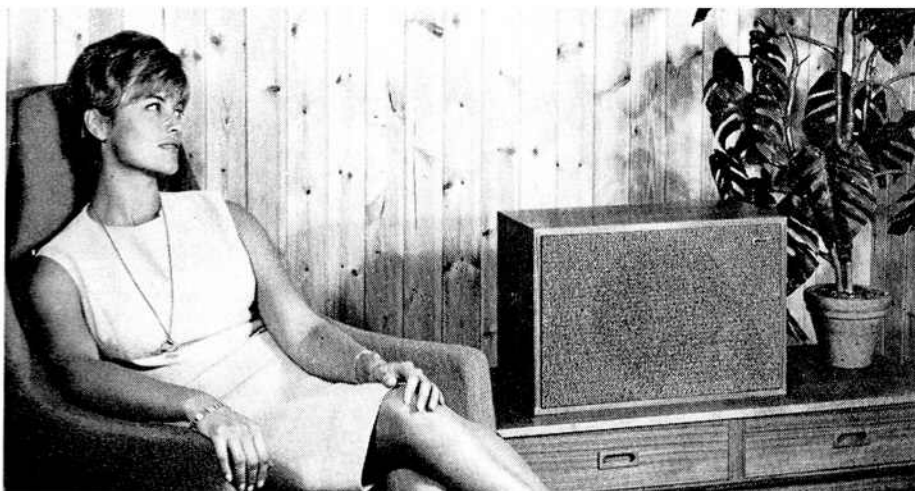
There are many different kinds of loudspeaker unit now available including integrated units with a built-in tweeter, or high frequency unit, like the Celestion CX2012 which covers a frequency range of 30 to 18,000c/s and will handle 20 watts from a 15 ohm output. These are known as co-axial units and the makers, Celestion Ltd, can supply plans for building a suitable enclosure.

If you are not too keen on the 'carpentry' involved in building an enclosure, of Daystrom (Heathkits) can supply a kit of parts for the enclosure, complete with loudspeaker unit. From their range we illustrate, in Fig. 3, the Berkeley Slimline kit which retails at £19 10s 0d. The finished speaker will handle 15 watts and has a frequency range of 30 to 17,000c/s.

Bookshelf Loudspeakers

Modern hi-fi loudspeakers now range in size from the miniature bookshelf types capable of handling around 8 to 10 watts, up to massive systems incorporating three or more speaker units and appropriate cross-over networks. You can have them built in solid concrete or brick enclosures, stone drain-pipes or even in the wall of the listening room, provided you are prepared to mix your own concrete or do your own bricklaying. However, let's return from the somewhat ridiculous (the purists won't agree) to the rather more sublime. Although hitherto hi-fi loudspeakers have mostly consisted of a large heavy enclosure and two or three speaker units, the modern trend is to produce speakers that can be more easily accommodated, on bookshelves for instance.

The Goodmans range is a good example and we reproduce once more Fig. 4 which clearly illustrates how little space is required for a hi-fi loudspeaker. The one at the top is the



Goodmans Maxim which handles about 8 watts, in the middle is the Mezzo which will cope with a little more power and provide a little extra response at the low frequencies, and at the bottom is the Magnum which we reviewed in the April 1966 issue of *ATR*. The Magnum will handle up to twenty watts and has a most excellent frequency response. Also from our collection of brochures can be recommended the Rogers Compact illustrated at the top of the page. The Compact is also a bookshelf speaker and has a frequency range of 30 to 18,000c/s. It will handle about 10 watts (music rating). It includes bass and mid-range speaker units and cross-over network and the enclosure can be supplied in teak or walnut finish.

Larger Loudspeakers

Another loudspeaker we reviewed recently is the new Rectavox Omni which has a rather

continued overleaf

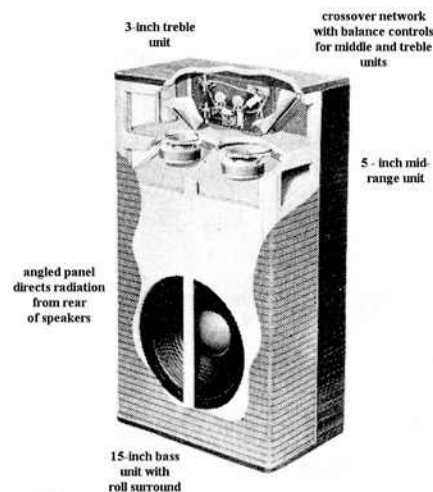


Fig. 1. The Rank-Wharfedale—Teesdale loudspeaker assembly.

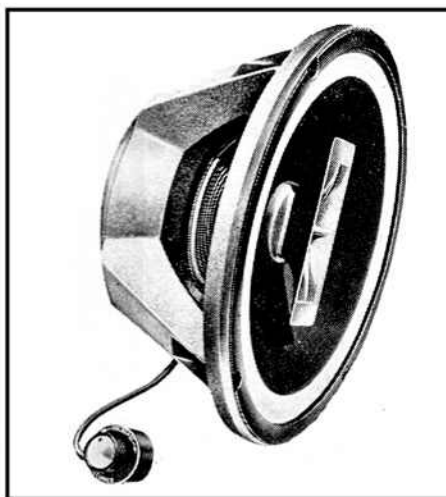


Fig. 2. The Celestion co-axial speaker unit Studio Series CX2012.

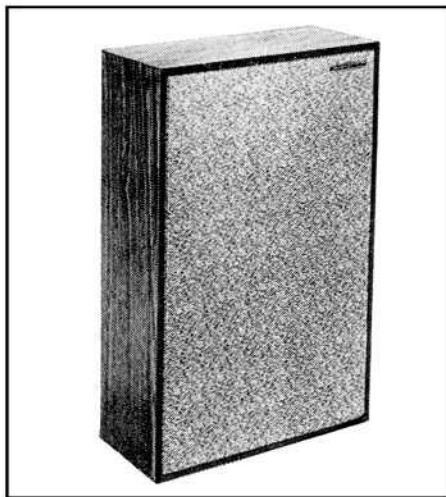


Fig. 3. The Daystrom (Heathkit) Berkeley Slimline loudspeaker available as a kit.

SOUND EFFECTS RECORDS

Now available from Amateur Tape Recording

Please allow two weeks for delivery

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

A ABX/1—BELLS AND SIRENS Price 7/6

Side 1—Fire engines with bells Fire engine—alarm and sirens S.S. Queen Mary siren Factory siren Telephone bell Door bell
Side 2—Clock chime Alarm clock Westminster chime Bow bells

B AFX/1—WILD ANIMALS Price 7/6

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

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

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

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

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

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

Side 1—Delta F Study in Sine-tones
Side 2—Sound object Montage

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

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

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

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

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

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

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

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

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

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

K MFX/3—HORSES Price 7/6

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

L LFX/1—SOUNDS OF LONDON Price 7/6

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

N STX/1—SOUNDS OF TORBAY, DEVON Price 7/6

(33 1/3 rpm LP 7 inch). A take-your-holiday-home record with commentary by Johnny Morris. Authentic sounds of Torbay night life, Kent Caverns, Brixham Harbour, Fishing boats, Moorland streams, etc.

Please send me the following records

Please indicate with a tick in the appropriate squares.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I enclose postal order/cheque for..... to cover the cost of record/s, plus 1s 2d post and packing for first record and 4d. for each additional record ordered.

NAME.....
ADDRESS.....

ATRI0

ATR, HAYMARKET PRESS LTD,
9 HARROW ROAD, LONDON W2

Please allow two weeks for delivery

AUDIOVIEW TAKES A LOOK AT LOUDSPEAKERS

continued from page 43

unusual but otherwise not objectionable shape. The shape is in fact part of the design and has much to do with the distribution of the sound. This one has a 'woofer' (low frequency unit) and a tweeter, together with a four-element cross-over network. The frequency range is 30-20,000c/s and it will handle 15 watts. (See September ATR.)

If you want something really big, then Goodmans, Rank-Wharfedale, Celestion, Rogers and many other loudspeaker manufacturers can supply. For example, Tannoy are specialists in large hi-fi loudspeakers and from their brochure we select the Lancaster enclosure which will accommodate a 12 or 15 inch bass speaker unit and is a bass

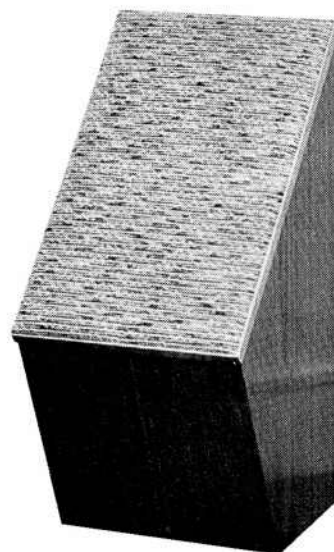


Fig. 5. The Rectavox Omni loudspeaker.

reflex type enclosure. Tannoy do quite a range of enclosures for home constructors and their brochures are worth writing for.

One point to remember when buying a hi-fi loudspeaker: if you are to get the best from your hi-fi amplifier then the loudspeaker must be capable of handling the full power output of the amplifier. Frequency range is not so important but an overloaded speaker can sound terrible. The manufacturers mentioned in this month's *Audioview* will be pleased to supply technical information and price lists, etc., if you write to them.

Rank-Wharfedale, Wireless Works, Idle, Bradford, Yorks.

Rogers Developments Ltd, Rodevco Works, 4-14 Barmeston Road, Catford, London SE4. Celestion Ltd, Ferry Works, Thames Ditton, Surrey.

Daystrom Ltd (Heathkits), Gloucester, Glos. The Rectavox Co Ltd, Central Buildings, Wallsend, Northumberland.

Tannoy Products Ltd, West Norwood, London SE27.

Goodmans Industries Ltd, Axiom Works, Wembley, Middlesex.

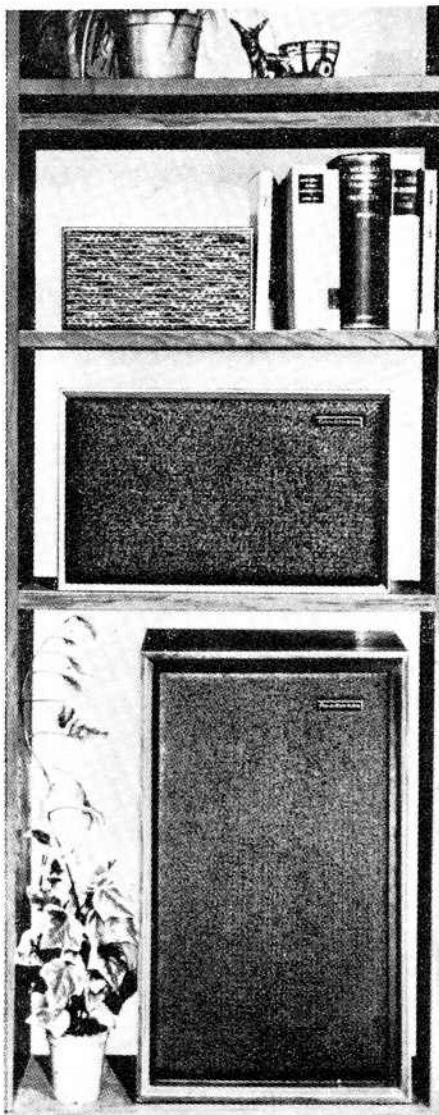


Fig. 4. The Goodmans bookshelf range of hi-fi loudspeakers.

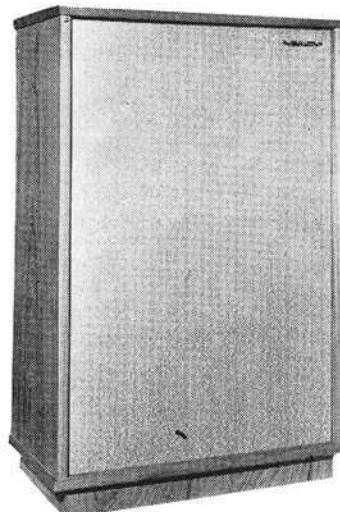
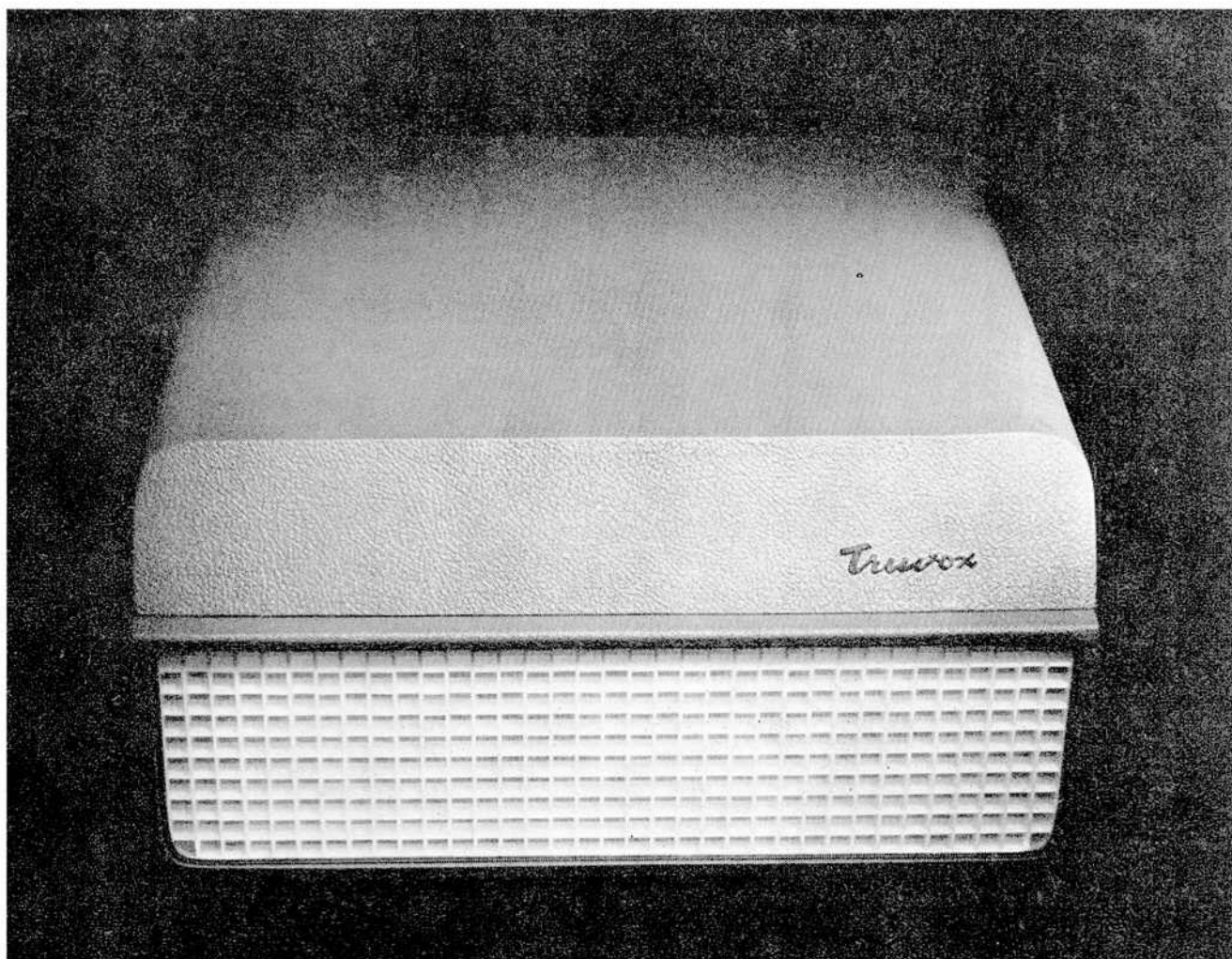


Fig. 6. The Tannoy Lancaster enclosure, one of their range designed for home constructors.

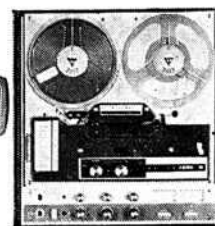


What's in it for you?...

Call it 'the PSP Factor'. It stands for the ideal balancing of Performance, Styling and Price you get only from Truvox. Truvox build this quality into everything they make. You'll recognise it instantly in the all-transistor, all-British Recorders and Tape Units illustrated right. A spec. will give you only the cold clear facts. The moment of truth comes when your Truvox stockist demonstrates it. Then 'the PSP Factor' really comes alive. Only Truvox build this 'PSP Factor' into everything they make.



Tape Recorders (Monaural)

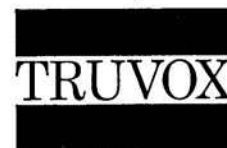


Stereo Tape Units

TECHNICAL SPECIFICATIONS, RECORDERS & TAPE UNITS

Reel size: Up to 7"
 Tape Speeds: $7\frac{1}{2}$ ", $3\frac{3}{4}$ " & $1\frac{1}{8}$ " p.s. constant within $\pm 1\%$
 Drive: 3 motors, separate capstan motor, heavy flywheel, drive disengaged in OFF position.
 Brakes: Mechanical compensated.
 Winding Time: 60 sec. for 1200'
 Frequency response: 30—17,000 c.p.s. ± 2 db, at $1\frac{1}{2}$ " p.s. (19 cm)
 40—10,000 c.p.s. ± 2 db, at $3\frac{3}{4}$ " p.s. (9.5 cm)
 60—8,000 c.p.s. ± 3 db, at $1\frac{1}{8}$ " p.s. (4.75 cm)
 Amplifier distortion: .35 of 1% at 5 watts.
 (Recorder only)
 Hum: better than 45db

Signal to noise: better than 50db
 Inputs: (1) Microphone 1mV at 50K ohms,
 (2) Radio/P.U. 50mV at 100K ohms.
 Output (Recorder only): 5 watts, into 15 Ω load.
 Output to ext. amp: Emitter follower, across 100 ohms,
 output Voltage variable up to 1V.
 Record Characteristics to the new European standards
 70 μ S at $7\frac{1}{2}$ " p.s.
 140 μ S $3\frac{3}{4}$ " p.s.
 Wow & Flutter: $7\frac{1}{2}$ " p.s. better than .1%
 $3\frac{3}{4}$ " p.s. better than .15%
 $1\frac{1}{8}$ " p.s. better than .25%
 Oscillator frequency: 90Kcs.
 Dimensions R102/104: 16" x $17\frac{1}{2}$ " x $8\frac{1}{2}$ " Wt 34 lbs
 and weight PD102/104: 16" x $16\frac{3}{4}$ " x 8" Wt 28 lbs



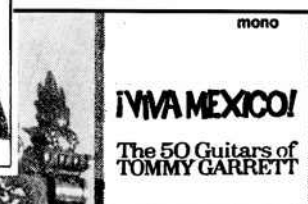
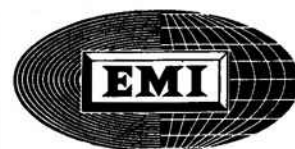
TRUVOX build the
 PSP Factor into everything they make

Write to K. C. Smith for illustrated leaflet and complete technical specification.

TRUVOX LIMITED • NEASDEN LANE • LONDON N W 10 • TELEPHONE: DOLLIS HILL 8011

the big sounds of '66 on tape from EMI

**3 ³/₄ I.P.S.
TAPE RECORDS**
FROM YOUR
RECORD DEALER
NOW



Shirley Bassey
I've got a song for you!

United Artists TA-ULP 1142

Manfred Mann
Mann-Made Hits

HMV TA-CLP 3559

Tommy Garrett
Viva Mexico!

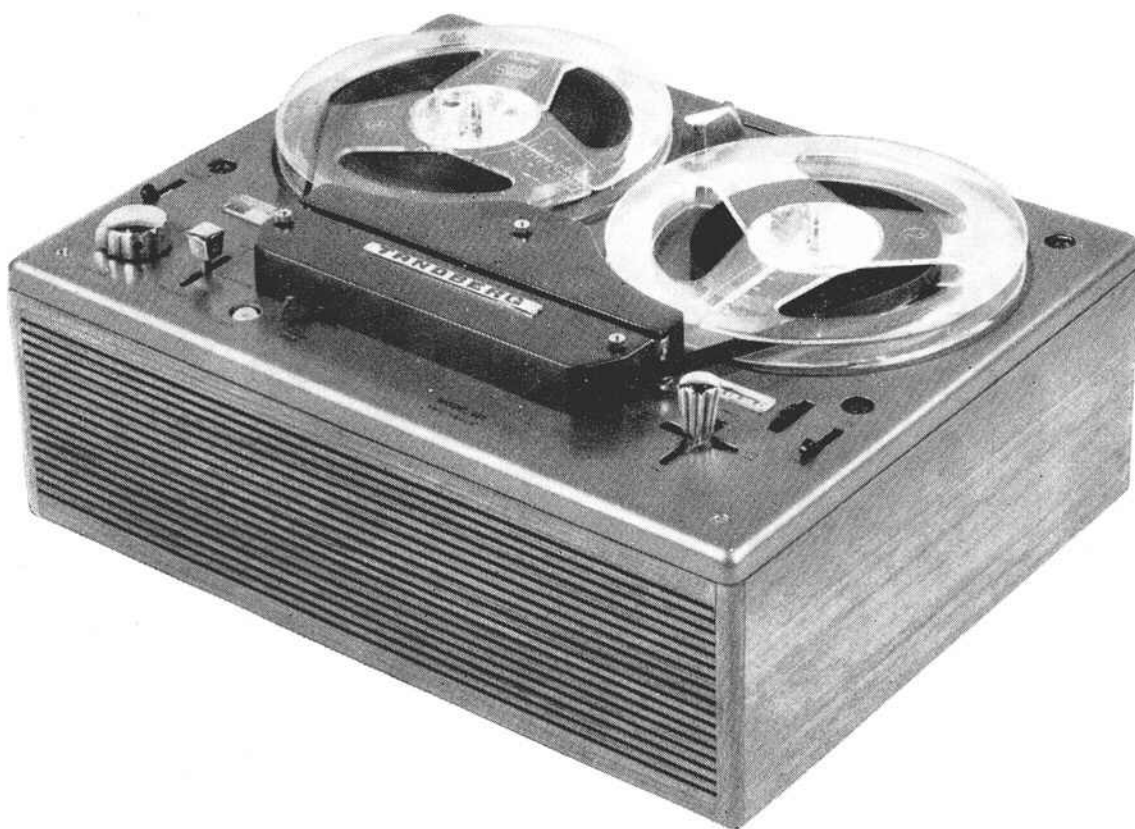
Liberty TA-LBY 1312

Gene Pitney
Nobody needs your love

Stateside TA-SL 10183

E.M.I. RECORDS (THE GRAMOPHONE CO. LTD.) E.M.I. HOUSE, 20 MANCHESTER SQUARE, LONDON, W.1.

Tandberg model 9 the world's finest Monaural Tape Recorder



A new facia in the finest Scandinavian design tradition plus Tandberg precision audio-engineering now combine to make the Tandberg Model 923 the monarch of portable, monaural tape recorders.

The Tandberg Model 923, 2 track, 3 speed ($7\frac{1}{2}$ ips, $3\frac{3}{4}$ ips, $1\frac{7}{8}$ ips) machine includes a formidable built-in speaker and amp system of the highest quality which provide exacting performance standards without any auxiliary equipment.

Superlative sound, functional simplicity, clean design, the classic look of teak combine to make the Tandberg Model 923 the ultimate in the field of portable, monaural tape recorders Price: 69 GNS.

Model 8 (2 speed version) available from 54 GNS.

Sooner or later you'll turn to Tandberg-why not sooner?

Tandberg

ELSTONE ELECTRONICS LTD.,

81 Kirkstall Road, Leeds 3

Telephone: Leeds 3-5111 (7 lines)

Please send me full details of Tandberg 923 or 8

NAME

ADDRESS

A.T.R. 6

FRANCIS OF STREATHAM

include among their customers many who call personally from all over the country, because of the stocks and service in **TAPE AND HI-FI EQUIPMENT** to be found there. With so many shops to choose from, there must be excellent reasons why people prefer to buy from Francis. Perhaps you would care to find out by calling or writing to us about your requirements.

- ★ **VERY LARGE STOCKS OF TAPE AND HI-FI EQUIPMENT**
- ★ **NO EXTRA FOR CREDIT UP TO 18 MONTHS**
- ★ **OWN SERVICE DEPARTMENT**
- ★ **FREE SERVICE DURING GUARANTEE PERIOD**

FRANCIS OF STREATHAM

169-173 STREATHAM HIGH RD., LONDON, S.W.16

Between St. Leonards
Church and Streatham Stn.

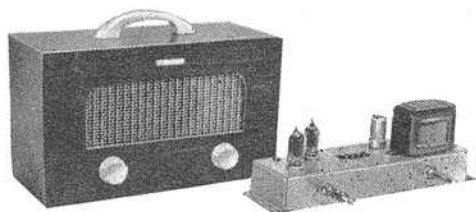
Open all day
Saturday

Phone STR
0192/0466

THE Radio Constructor

BUILD THIS SIMPLE 3-VALVE AMPLIFIER

By V. E. Holley



**OCTOBER ISSUE
ON SALE NOW 2/6**

THE **Radio Constructor**

YOUR LOCAL

Hi-Fi in Sussex

BOWERS & WILKINS

Stocking for comparative demonstrations
Ampex, Ferrograph, Revox, B & O, Tandberg, Truvox.
Becket Buildings, Littlehampton Road, Worthing 5142

WIMBLEDON'S TAPE RECORDER CENTRE

All Leading makes in stock — Ferrograph — Telefunken — Loewe — Opta — Saba — Wyndor — Philips — Grundig — Brenell — Truvox — Ferguson etc. Pre-recorded Tapes Mono — Stereo — Microphones — Accessories

Bargain of the Month **FI-CORD 202 A** Only 39 gns.
TEL-LEE-RADIO

220 The Broadway, WIMBLEDON, S.W.19 LIBerty 4946

TAPE RECORDER CENTRE (HX)

AGENTS FOR ALL THE LEADING MAKES OF RECORDERS AND HI-FI including: B&O, BRENNELL, BRAUN, DUAL, FERROGRAPH, FI-CORD, GRUNDIG, KORTING, OPTA-CORD, PHILIPS, REVOX, ROBUX, SABA, SONY, TANDBERG, TELEFUNKEN, TRUVOX, ETC.

30 KING CROSS STREET, HALIFAX

Halifax 66832

PART EXCHANGE WITH PLEASURE

GODLEYS

SHUDEHILL, MANCHESTER 4

Telephone: BLAckfriars 9432

Sole Manchester Distributors For
The World Famous Bryan Amplifiers

Agents for Ampex, Akai, Ferrograph, Tandberg, Brenell, B. & O., Vortexion, Truvox, Sony, Leak, Quad, Armstrong, Clark & Smith, Lowther, Fisher, Goodmans, Wharfedale, Garrard, Goldring, Dual, Decca, Record Holding, Fitrope, G.K.D., etc.

TAPE HI-FI CENTRE SHEEN

SPECIALISTS IN TAPE RECORDERS, ACCESSORIES HI-FI EQUIPMENT
YOUR CENTRE FOR FRIENDLY HELP—SALES AND SERVICE

3 & 4 STATION PARADE,
SHEEN LANE, SHEEN
LONDON, S.W.14

Now Open Until 8pm Fridays
PROSPECT 0985
(Opposite Mortlake Station, S.R.)

CHARLESWORTH'S OF CREWE LTD.

Head Office: 14 Hightown, Crewe. Tel. 3327
Hi-Fi CENTRE: 28 HIGHTOWN, CREWE
Technical Division: 19/21 Ludford St., Crewe.

LEDA recording tape

THE ULTIMATE IN TAPE VALUE! British made to full specification. Leaders, Trailers and Stop Foils on all types 5" and above. Strong, attractive hinge-lid boxes.

GUARANTEE. If you do not agree that the quality of this tape is as high as any you have ever bought (irrespective of price!) we will immediately refund your money and return postage costs.

STANDARD PLAY (P.V.C.)	LONG PLAY (P.V.C.)	DOUBLE PLAY (POLYESTER)	TRIPLE PLAY (POLYESTER)
3" 150' 2/3	3" 225' 3/-	3" 300' 4/3	3" 600' 8/9
4" 300' 3/9	4" 450' 5/-	4" 600' 8/3	4" 900' 12/6
5" 600' 8/3	5" 900' 9/9	5" 1200' 15/3	5" 1800' 22/6
5 1/2" 900' 10/-	5 1/2" 1200' 12/3	5 1/2" 1800' 19/3	5 1/2" 2400' 28/6
7" 1200' 12/3	7" 1800' 17/3	7" 2400' 21/9	7" 3600' 38/6

P. & P. 2/- per order. We also stock a wide range of accessories, all at lowest-ever prices. S.A.E. list.

LEDA TAPES (A) 30 BAKER STREET, LONDON, W.1

DEALERS

Visit the North's Finest Tape Recorder Showroom. All leading makes in stock, ready for demonstration. Tape, Mics., Mixers, all accessories, Tape Records. Separate Hi-Fi and constructors showrooms. Full Technical Service.



KINGS SQUARE, YORK. Tel. 55666

WORTHING TAPE RECORDER CENTRE

Tape and Hi-Fi Experts. Agents for all makes of Tape Recorders and equipment. Servicing and Repairs.

22 New Broadway,
Tarring Road, Worthing,
Sussex.

Telephone: WORTHING 3630

Tape recorder service in the BIRMINGHAM AREA L. BISHOP LTD.

1708 BRISTOL ROAD SOUTH, REDNAL
BIRMINGHAM

Telephone: RUBery 2709

GRUNDIG SPECIALISTS

G. L. MORTON & CO LTD 12 Oxford St., Newcastle upon Tyne

Telephones 26902 and 20142

Tape Recorder Sales — Specialised Service
Tape to Disc — Recording Studio

MASSEY'S CENTRE OF SOUND

121-123 High Road Chiswick London W4
telephone CHLswick 2082

L.E.C. (Leyton) ELECTRICAL CO.

120 HIGH ROAD, LEYTON, E.15
LEYtonstone 6814

Stockists of: Ferrograph, Votexion, Brenell, Revox, Rogers, Armstrong, Leak, Goodmans, KEF, Record Housing Furniture, etc. Tapes by BASF, AGFA, ZONAL 3" to 10". Demonstrations in the Home. Tape to Disc Service.

The specialists in design and production of high grade sound equipment

GRAMPIAN REPRODUCERS LTD



Hanworth
Trading Estate,
Feltham, Middx.

For straight dealing deal with Grampian

CLASSIFIED ADVERTISEMENTS

Classified advertisements in 'Amateur Tape Recording' cost 1s per word, minimum 10s. Box Nos. 1s 6d extra. Advertisements and remittances should be sent to Classified Advertisement Department, ATR, 86-88 Edgware Road, London W2.

SITUATION VACANT

Tape Recorder Salesman required by busy City specialists. Trainee considered, enthusiasm main asset. Equiv. 5-day week approx. Alternate Sats. Opportunity to join an organization of repute. Please write in the first instance to Mr Atkins, Wallace Heaton (City Sales) Ltd, 93 Fleet Street, London EC4. (11/66)

PERSONAL

Sound effects on tape. Write for full details. KLP Film Services Ltd, 3 Queens' Crescent, Richmond, Surrey. (10/66)

Sleep learning and therapy. Two revolutionary new techniques in their respective fields of Academic Learning and Mental Health which have been rendered possible by the invention of the modern tape recorder. Learn difficult lessons, memorize new data at short notice, master foreign languages, parts in plays or improve your mental powers. Send now for free details of our Sleep Study Recorder, Time Switch, Pillow Speaker, Cassettes, Induction and Language Tapes, and general information about these vital subjects. The Institute of Sleep Learning, Dept ATR, 16 Kings College Road, London NW3. PRImrose 3314. The foremost suppliers of Sleep-learning Equipment in Britain. (TC)

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

Amazing Results! Immediate introductions. Friendship, marriage. Jean Bureau, 15 Queen Street, Exeter. (11/66)

Record Library. Borrow your LPs. Write to Ismay Record Library, Snape, Saxmundham, Suffolk. (2/67)

Tape Recorder Repairs. We specialize in the servicing of recorders including professional machines. Telesonic Ltd, 92 Tottenham Ct. Rd., London W1. MUS 8177. (10/66)

Friendship/Marriage. Interesting opportunities everywhere, home interviews anywhere, all ages welcome. Miss T. R. Bamattre 12/14 Denman Street, London W1. 100 Page Master List 10/-. (12/66)

THE EAST ANGLIAN MARRIAGE BUREAU

Loneliness is a problem. We can help you solve it. Introductions throughout the country. Confidential details from:

93 Pottergate, Norwich, Norfolk

(10/66)

If you are genuinely seeking a marriage partner, let the Margaret Lynn Bureau, 78 Cedar Grove, Yeovil, Somerset, help. Strictly confidential. Brochure on application. (10/67)

Tapetalking Time Again! Join Britain's friendly, foremost Worldwide Tapetalk and discover today's most fascinating hobby. 3d. stamp for particulars: WWTT(ATR), 35 The Gardens, Harrow.

Patrick O'Mahony & Co. Ltd High-fidelity gramophone records made to your own requirements from Tape, Radio, and TV sound. 10 in LP (32mins), 35s, 7 in EP (15 mins), 20s, 7 in Pop (6 mins), 16s. Speciality 45s. Full Editing Facilities 5s per record Pop 45s free. Post and packing 2s 6d. TAPES of any size, speed, track, stereo or mono. Fully PROFESSIONAL RECORDING STUDIO and staff; qualified musicians for sound control balance. Associate of Professional Recording Studios Ltd. 48 hour return postal service; SAE for brochure, Patrick O'Mahony & Co Ltd, 30 Baker Street, London W1. Tel: WELbeck 0441/2 and Southampton 75453. (10/66)

TAPE/DISC/TAPE

Tape to Disc Recording. Finest professional quality: 10 in LP, 42s; 12 in LP, 48s; 7 in EP, 21s; 40 ft recording studio; 48 hour postal return service. Any speed tapes. SAE for leaflet. Deroy Sound Service, High Bank, Hawk Street, Carnforth, Lancs. (TC)

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

If quality and durability matter (especially with LPs from your precious tapes), consult Britain's oldest transfer service. Our mobile units attend anywhere for mono/stereo master recording. Studio with professional facilities available. Records published tax free for schools, choirs, orchestras. Sound News Productions, 18 Blenheim Road, London W4. Tel: 995-1661. (10/66)

MAGNETIC TAPE

A unique tape buy/ Top brand 7 in, 2,400 ft, 25s; 5 1/2 in, 1,200 ft, 15s; P & P: 1 at 2s, 2 at 2s 9d, 3-6 at 3s 6d. Bargains in all sizes, SAE for list. E. C. Kingsley & Co Ltd, 93 Tottenham Court Road, London W1. EUSton 6500. (TC)

Ampex Series 600 Professional Recording Tape. Type 641, 1800 ft Mylar on 7 in spool. Complete with leader. Brand new, in maker's boxes. Usual price £3. Limited quantity available at 67/- for two spools P & P 2/- (or 37/- singly P & P 1/6). E. C. Kingsley & Co, 93 Tottenham Court Road, London W1. EUSton 6500. (TC)

EQUIPMENT FOR SALE

Akai M8 S/Prof. Stereo/Mono T/recorder complete with all accessories: Ase 8 V Stereo headphones, twin speakers, etc., and seven 7" tapes. Little used. Cost over £200. Sacrifice at £130 o.n.o. Owner being posted abroad (Offers Letters only please) to: D. Lewis, 282 Church Road, Mitcham, Surrey. (10/66)

Unbiased guide. Our latest 65-page, photographically illustrated hi-fi catalogue (4s 6d). Advisory service, preferential terms to members. You'll be glad to have consulted Audio Supply Association, 18 Blenheim Road, London W4. (10/66)

Have you details of my inexpensive RMS Fluttermeter? Also available on hire. Leaflet on request. W.H.M. 35 Villiers Road, Watford. (TC)

PRE-RECORDED TAPES

American 4-track stereo tapes covering most famous labels at realistic prices. Why pay more? Imported directly by us, saving distributors' profits. Vast selection at 75s each — send SAE for free lists or call at London showrooms. Teletape of Marble Arch, 33 Edgware Road, W2. (TC)

WALES' LEADING PRE-RECORDED TAPE STOCKISTS

Offer a comprehensive range of E.M.I. Stereo and Mono music on tape. Also full range of Language course tapes. Send S.A.E. (6d) for free list. By return postal service of stock items from:—

ROATH RADIO & TELEVISION Co

Dept A.T.R.

25 MORGAN ARCADE, CARDIFF. Phone: 26838

AMATEUR TAPE RECORDING SUBSCRIPTION FORM

Make certain you receive your copy of AMATEUR TAPE RECORDING Video and Hi-Fi by completing this form and sending it, with your annual subscription, to:

AMATEUR TAPE RECORDING, SUBSCRIPTION DEPT,

9 HARROW ROAD, LONDON W2

Please send AMATEUR TAPE RECORDING Video and Hi-Fi for one year, commencing with the next (.....) issue, to the address below. I enclose the annual subscription of thirty shillings (30s). ATR will pay the postage.

Name

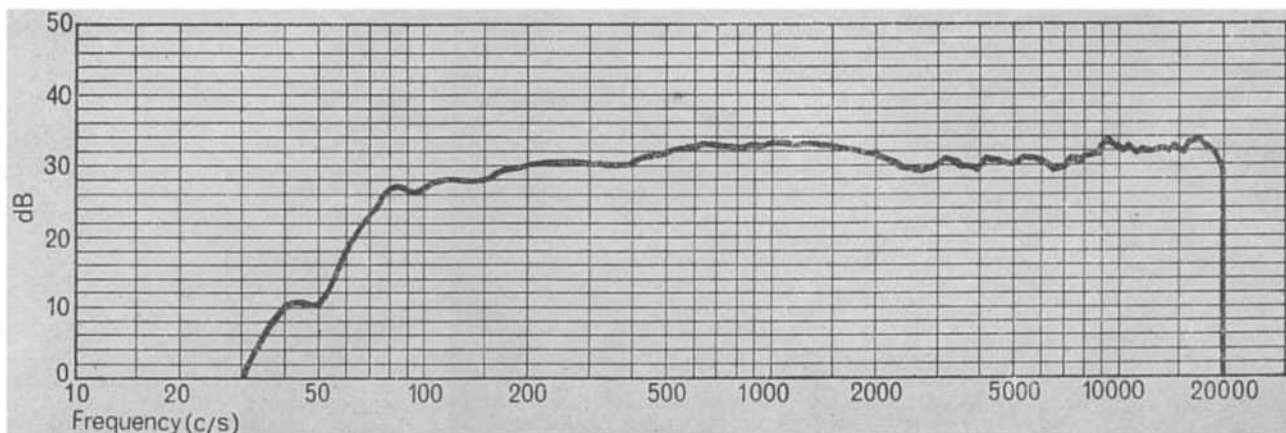
Address

Date

Tape Club members wishing to avail themselves of the special Club Subscription rate of 25s per annum should apply to their local Club Secretary. All Club orders must bear the Club Secretary's signature and be sent to the Subscription Department.

Don't buy a speaker

unless you have this Sonotone Challenge Chart with you—



This is the performance of the Solent, a new speaker by Sonotone, costing only £18 in a modern stylish veneered cabinet. You can easily pay £10 more for speakers which barely equal the performance of the Solent. Clip out this chart. Use it as your yardstick of value when you're shopping for speakers.

Hi-fi connoisseurs have long been familiar with Sonotone, as engineers of fine pick-up cartridges. Now this respected company has produced its own speaker. It's already the sensation of the Audio World. Read the facts. They may revise your thinking about what you should pay for a good quality speaker.

The problem with buying a speaker is knowing where to stop on price! Unless you are a sheepdog or an orchestra leader you may end up with refinements so acute you will rarely be able to appreciate them.

For some years Sonotone have been looking into the question of speakers and have set out to offer three important things:—

Three Achievements

- 1). High enough performance to satisfy 99% of enthusiasts.
- 2). A unit of a suitable size to fit on a bookshelf.
- 3). A sensibly priced speaker.

It wasn't easy—but now Sonotone have achieved all three objects. But claims alone are not enough! Sonotone offer proof!

We don't think you will find a speaker that delivers so much commonsense value. And the ones that deliver this standard of performance will invariably cost you up to £10 more.

Why not write for more information to:—

Sonotone

Technical Ceramics Limited, New Lane, Havant, Hants.

A member of Plessey Components Group.



Attention all addicts

So far we've talked about the logic of this new speaker.

Now for the technical details:

Woofer: 6½", 10,000 gauss, 1" pole.

Free Air resonance: 50 c/s.

Tweeter: 3½"—acoustically loaded (i.e. custom made to the actual cabinet).

Frequency Response: 40 c/s—20 kc/s.

Sensitivity: 98 dB at 12 w. (microphone 6ft).

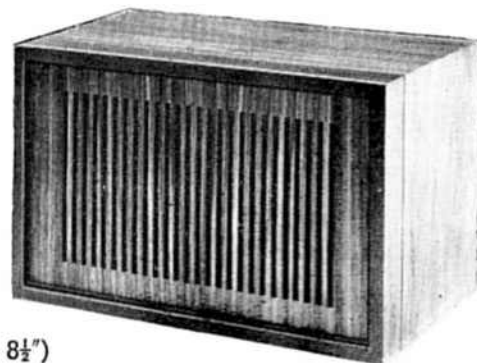
Power Handling: 12 w programme level.

Impedance: 8 ohm system suitable for 8-15 ohm valve or transistor amplifiers.

Drive units coupled with the cross over network have resulted in an outstanding and unusually smooth response. Due to the special design of the bass unit suspensions, linear restoring force against cone movement is ensured. This, coupled with a high degree of damping ensures a bass response free from resonances and other tonal colouration. The use of highly absorbent organic fibre to line the cabinet ensures a clean middle and upper response.

NEW!

Sonotone Solent £18



(14" × 9" × 8½")



Stereo – E.M.I. – Mono

FROM

TAPE RECORD LIBRARY

The whole EMI list of fabulous recordings on 3 $\frac{1}{2}$ ips twin track mono and U.S. Capitol 7 $\frac{1}{2}$ & 3 $\frac{1}{2}$ ips stereo is available to you on these top labels. Hundreds of tape records, thousands of titles by the world's greatest artists. A wealth of entertainment whatever your taste.

Have out from the library any tape of your choice. Keep as long as you like or change as often as you wish. No restrictions. Make use of library to suit your own convenience. Enjoy the wonderful realism of great stereo recordings for a minimal cost.

HAVE WHAT YOU LIKE WHEN YOU LIKE

ONLY 4/9 A WEEK

PAYABLE MONTHLY (QUARTERLY FOR STEREO & LANGUAGE COURSES)

JUST A FEW EXAMPLES OF THE TALENT AVAILABLE

<p>POP-PICS</p> <p>Beatles, Animals, Dave Clark, Hollies, Gerry & Pacemakers, Tom Jones, Peter & Gordon, Gene Pitney, P. J. Proby, Supremes, Cilla Black, Shadows, Herman & Hermits, Manfred Mann, Cliff Richard, Beach Boys, Bobby Vee, Mathis.</p>	<p>CLASSICS</p> <p>Beecham, Barbirolli, Menuhin, Rostropovitch, John Ogden, Sargent, Solomon, Denis Brain, Von Karajan, Otto Klemperer, Efrem Kurtz, Giulini, Colin Davis, David Oistrakh, Hans Richter-Haaser, Robert Irving, George Weldon.</p>
<p>CABARET</p> <p>Eartha Kitt, Shirley Bassey, Sinatra, Sammy Davies, Peggy Lee, Edith Piaf, Nat King Cole, Flanders & Swann, Ray Charles.</p>	<p>SHOWS AND FILMS</p> <p>Sound of Music, Mary Poppins, Black & White Minstrels, Thunderball, Gigi, Help!, Carousel, West Side Story.</p>
<p>OPERAS AND CHORALS</p> <p>Tosca, La Traviata, Maria Callas Sings Puccini Arias, Messiah, Mikado, Red Army Choir, Hansel & Gretel, Huddersfield Choral, Royal Choral, Handels Messiah, Swan Lake.</p>	<p>JAZZ AND FOLK</p> <p>Count Basie, Ella Fitzgerald, Stan Getz, Leadbelly, Authentic Rhythm & Blues, Modern Jazz Quartet, Hank Williams, Del Shannon, Slim Whitman, Downliners Sect.</p>
<p>GOING ABROAD THIS YEAR?</p> <p>Learn a language in record time. High-speed courses in Spanish, Italian, French, Russian, Greek or German ... no extra charge.</p>	

TO: JACK JONES ELECTRONICS LTD.

THE CRAIG-YR-EOS,
OGMORE BY SEA,
GLAMORGAN

Telephone: Southerndown (OOG278) 388

Please send me free EMI catalogue of tape records so that I can make my choice for the month. I enclose my cheque/P.O. for £1.0.7 for one month's supply of tape records (£3.1.9 for three months' supply of stereo and language courses), plus 1/- per tape post and packaging. I understand that by returning tapes in good condition for a period of 12 months, I will receive 75/- worth of tape records free to keep, or 3 months free use of library whichever I wish to choose.

Name

Address

