

Amateur Tape Recording

AUDIO-VIDEO

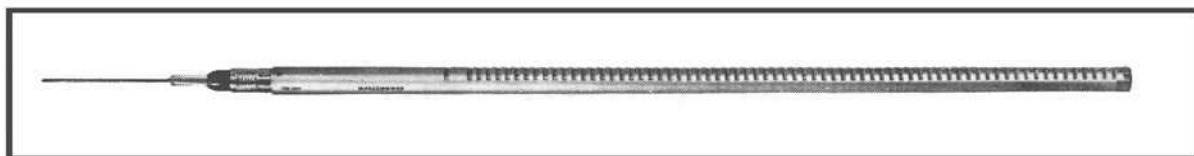
August 1967 Vol 9 No 1 2/6



**SOUND IS WHERE YOU FIND IT
A TAPE ECHO SYSTEM
TOMORROW'S TRAINS TAPED TODAY
TAPE RECORDER & HIFI TEST REPORTS**

Sennheiser

For the perfectionist



The MKH 805 R.F. condenser gun microphone is the ultimate in modern microphone techniques. Used mainly by professional studios where the sound quality is of the utmost importance this highly directional microphone has caused a minor revolution in the film and television industries.

For the 'beat group'

The obvious choice for 'beat group' and general PA work – the Sennheiser MD 420 N has all the specially designed advantages of a really professional noise cancelling and close talking microphone. Lightweight and easy to handle with steep attenuation at the sides and the back of the microphone, MD 420 has excellent anti feedback properties and cancels all unwanted noise. The bass response has been specially designed to give a natural quality to the voice when the MD 420 is used close to the mouth. The MD 420 is fitted with a large Tuchel connector and costs £16.5.0.



For the amateur

Sennheiser's most famous microphone is used by almost every broadcasting station in Europe and over 30,000 amateurs have saved up to buy this 'acoustic Leica'. Accurate cardioid characteristic and smooth frequency response permit high quality sound recordings in difficult situations. Ideal for prestige public address sound reinforcement and stage use. Built-in dual impedance transformer and variable bass attenuator control. Only the huge amateur demand for this professional microphone has brought the price from £70 to £31.12.6.

Audio Engineering Ltd

33 Endell Street London WC2 TEM 0033

Amateur Tape Recording

AUDIO-VIDEO

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. © 1967 Printed by The Sidney Press Ltd, Bedford. Title registered at Stationers' Hall. Subscription Rates: 36s post paid UK, 42s overseas.

Vol 9 Number 1 August 1967

Feature	Author	Page
Tomorrow's Trains Taped Today	Bob Danvers-Walker	4
On Test - Optacord 450 Cassette	Peter Knight	8
Sound Scene	ATR	10
A Touch of the Old Safari	Graham Harris	12
A Tape Echo System	B. E. Wilkinson	14
Introduction to Tape Recording	Gordon J. King	18
Sound is Where You Find It	F. C. Judd	20
Things You Say	ATR Readers	24
Tape in the Junior School	Peter F. Walker	25
Tape Club News	Isabelle Tournor	26
Tape Directory	ATR	27
<i>ATR Hi-Fi Section</i>		
Test Report - Ferguson Unit Audio	Peter Knight	29
Tape and Disc Review	Russ Allen	34
Audioview	ATR	35

EDITORIAL COMMENT

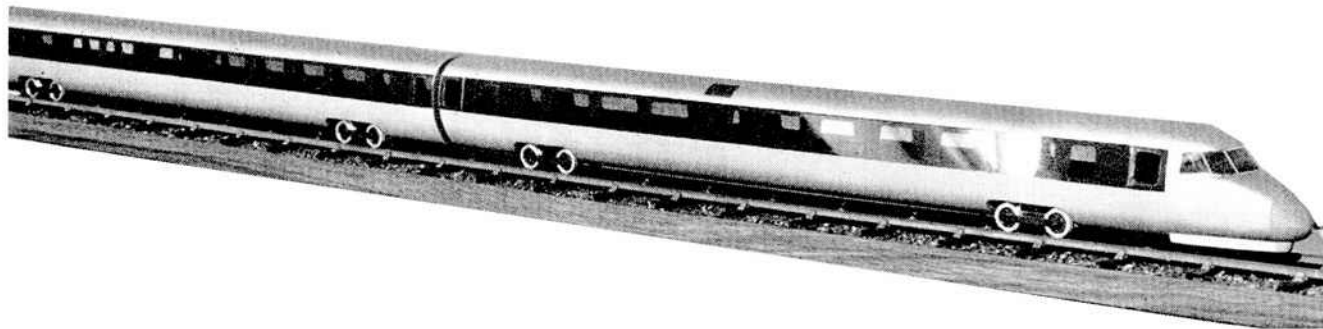
Two annual tape recording contests and acceptance by local broadcasting authorities of amateur tape productions - now that should keep the enthusiasts occupied for a while but how many will be taking up this challenge to enthusiasm? How many readers of this magazine, for instance, are sufficiently dedicated to the hobby of tape recording to enter both the BATR contest and the BBC National Contest? How many readers are dubious about producing tapes for local broadcasting because of professionalism and/or competition from the more enlightened amateur with a studio of his own and a formidable array of equipment? None of these questions can be answered until the enthusiasm is shown by the number of entries to the contests and the number of amateur tapes broadcast over local radio. But if you

feel doubtful about your own ability, keep in mind that even the professionals use only the same medium for their work, the same kind of tape recorder and tape and often the same kind of microphone. If you are still doubtful about your equipment, let me tell you that a month or so ago I used a 29 guinea portable for some interviewing and actuality work. When the tapes were played on high grade equipment, equal to that which might be used by the BBC, they were found to be of very good quality. The reason is simple - the losses in sound quality during the process of recording are very small and providing the tape recorder (however low its price) has a reasonably well designed record system, there is no reason why the tape, when played on high fidelity reproducing equipment, should not be comparable with

one recorded on a professional recorder. Only one other item can influence quality and that is the microphone. As I've said many times in *ATR*, a good microphone is always worth considering whatever the price bracket of your tape recorder. I hope that in this issue you will find some ideas for the two tape contests and, as promised, there's more to follow.

FRONT COVER

The spectacular looking microphone shown on our front cover this month is the Sennheiser MKH804 ultradirectional (rifle) microphone, being used with its windshield, for birdsong recording near Geldeston in Norfolk. The tape recorder is an EMI L4 full-track professional portable.



TOMORROW'S TRAINS TAPED TODAY

by Bob Danvers-Walker

In the 70's trains will travel at speeds of up to 150 mph. They will be driven by either highly developed electric motors or Rolls Royce 'Dart' gas turbine engines of 1,500 hp each. An exciting development emerging out of the infusion of aircraft industry talent with British Railways research.

This is Bob's suggested subject for competitors entering the 1967 British Amateur Tape Recording Contest (closing date 30th December 1967) or the BBC (North Region) Amateur Tape Recording Competition (closing date 30th September 1967), the theme for which is 'On The Move'.

In more than one of my *ATR* articles I have urged TR clubs to engage in the making of documentary programmes either as a club exercise or with eventual local radio presentation in mind. Now, the BBC Competition and the BATR Contest give clubs and individuals alike the chance to test their skills.

In conversations with British Railways officials I have it on authority that permission can be obtained for club groups or individuals entering for either of these contests to visit the British Railways' Research Centre at Derby, providing an assurance be given that the object of the tour carries the backing of a Club's Secretary or bona fides provided as to intent by an individual. Applications in the first place should be addressed to: The Chief Public Relations Officer, British Railways Board, 222 Marylebone Road, London, NW1.

To 'sound out' its potential, I spent a whole day at the Derby Works carrying out a recce at this, the world's foremost railway technical and scientific centre. From the literature freely available, after a six-hour escorted tour in company with an official photographer, meeting heads of departments and with eyes and ears searching for sounds to tell the story of tomorrow's trains, I can now put forward to you in pictures and words some of the ingredients for what could become a most impressive documentary. Here are some facts upon which to draw for your narrative and pictures to help visualize certain sounds. Believe me, the Derby Works has sounds galore. Exciting noises, from the busy sounds of computers and the thump and bang of testing devices, to high-pitched

whines and explosive sounds of the releasing of power under compression. Bear in mind that the 150 mph train is as yet only rudimentary, so where important aspects of its development lack sound I suggest a recorded comment from an official of that section should be considered.

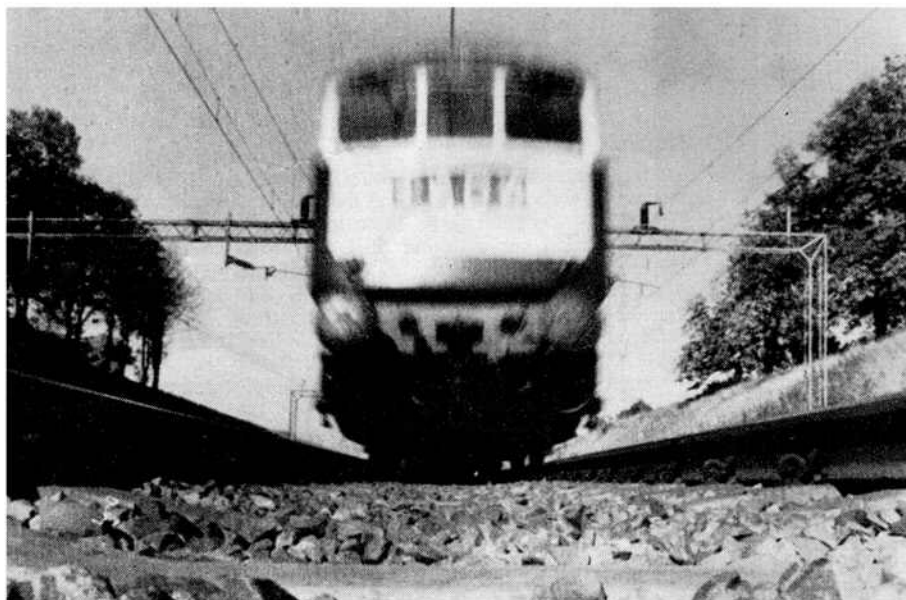
Since the vast complex of research, design and development covers a site of 20 acres at Derby, don't expect to see everything or

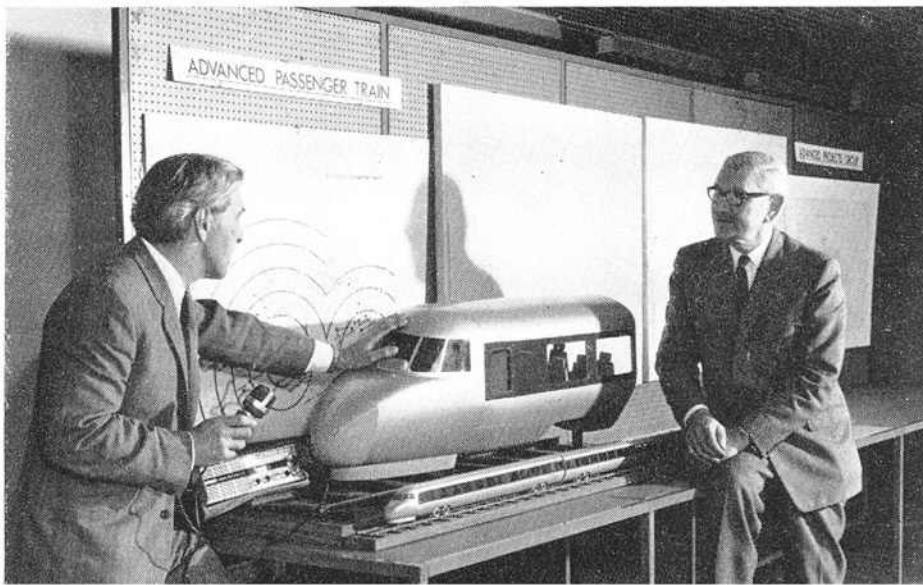
try to embrace too much into your story. I restricted my investigation to those sections devoted to research. On the other hand you might favour a treatment on workshop repairs and maintenance of the big diesels, the building of new locos or permanent-way construction. Others might like to build a programme about all three types of railway motive power; the steam of yesterday, today's diesel or powerful electric motors and the gas turbine locomotives of tomorrow. The choice is yours but all lines of thought must ultimately bring you to Derby.

At the £4M design centre and research laboratories the trains of tomorrow are in embryo. Over half of the 1,500 people who work here are professionally qualified scientists, engineers and technicians.

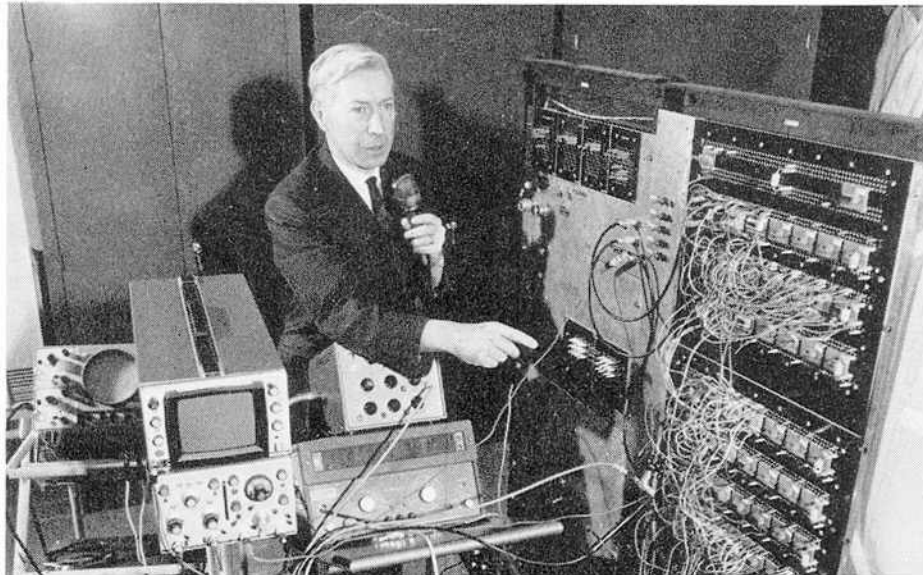
The technologies involved in the design of trains which will travel at tremendous speeds bring into calculation such sciences as Physics, Metallurgy, Aerodynamics, Geology, Chemistry and Acoustics. The quickening sounds of the future creation come from the test beds, instruments and voices of men employed in a kind of obstetrical engineer-

continued on page 38





2



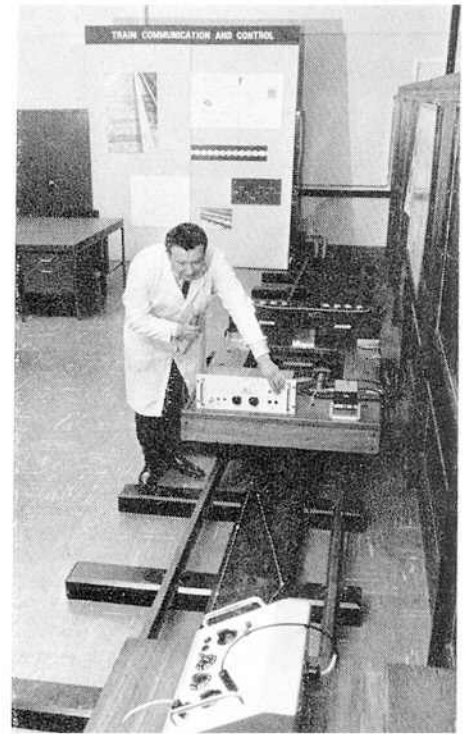
4.

The picture above the title shows the 150 mph train.

(1.) 'Doing the ton'. Modern electric and diesel trains travelling at 100 mph offer a wide and dramatic range of sounds. When you travel in one (and position yourself as near the loco as possible), everything from starting, the changes in tone as it passes over bridges, through tunnels, over points and the application of the brakes on entering a station are available to you. Nothing is more evocative of high speed than the Doppler effect at a level crossing as the two-tone horns bellow out and, as the train flashes through, the note alters pitch as the thunderclap of sound explodes to drown the warning bell ringing at the automatic level crossing. Were you to be within a few yards of the rails (such as at a foot passenger crossing point) you would actually hear the rails 'singing' as the train, a mile and a half away and out of sight and earshot, comes pelting along at 100 mph. In 30 seconds that shock wave of sound would be on you.

(2.) Mr Stanley Smith, Director of British Railways Research, explains to me how body tilt will function as the train takes curves at high speeds. This tilting will tremendously reduce the gravitational stresses upon passengers riding in air-conditioned, pressurized and sound-insulated coaches fitted with aircraft-type seats. The aerodynamic shape is just one of the means whereby air resistance is reduced quite dramatically. Perhaps by the year 2000 a guided surface transport system will operate a city-centre to city-centre passenger service with speeds of 200-300 mph.

(3.) A hand-held mic and recorded voice on a Philips Cassette are used in research into new type train communication and control systems. A zig-zag wire, encased in plastic, is laid between the rails and supplied with a high frequency alternating current. A coil on the locomotive forms the other part of an inductive coupling between track and train, which allows information to be transmitted from the ground to the moving train and back again. The amplitude of the signal

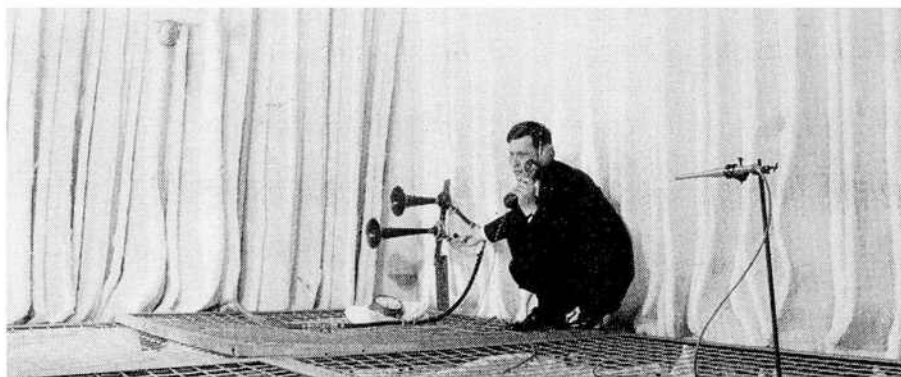


3.

which the coil receives fluctuates at a frequency which is proportional to the speed of the train. The computer equipment on the locomotive counts the fluctuations in the signal and compares these with a pre-set target frequency. The driver of the train sees a simple indicator which tells him whether the train is travelling at the correct speed for that type of train and that particular section of the track. This train control system also conveys information which is used to indicate in the cab the state of the signals ahead of the driver, and it will also indicate the position of the train along the line. The system also incorporates a radio-telephone link between the driver and the signal control centre; this means that the driver can instantly report any emergency. This is a step in the direction of fully automatic computer controlled trains.

(4.) This experimental digital-analogue computer, demonstrated by the Head of Control and Communications Group Mr H. Ogilvy, will ultimately be scaled down to about shoe box size, installed in the control cab and fed with two sorts of information. In memorized form will be the train's performance and characteristics while geographical and variable information will be picked up from the track conductors. This means that a ten-coach train weighing some 450 tons carrying as many people as would populate a village and travelling at speeds equalling many light aircraft will be supervised by the computer. In a sense it is an electronic brain thinking and translating the information fed into it faster than the speed of thought. In another department there is a computer installation which represents the work potential of 50,000 clerks. Working on a mathematical problems which would have taken one man 1,000 years to work out, the computer can provide the answer in ten minutes.

continued overleaf 5



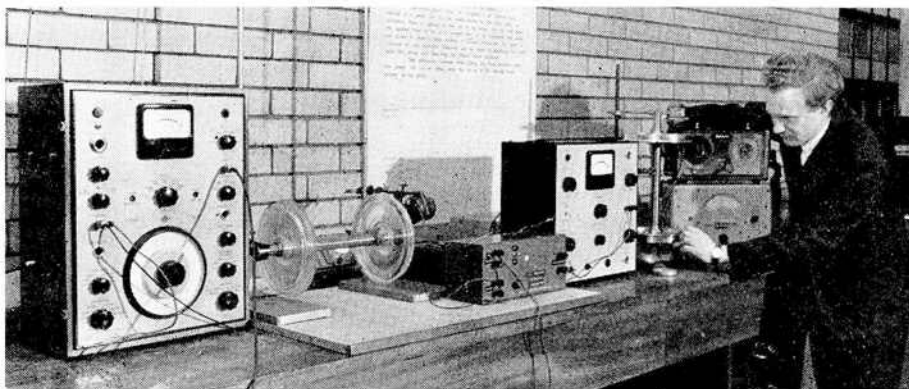
(5.) Mr J. M. Stirling of the Physics Section supervises the arrangements for testing horn frequencies in the Anechoic Room. The experiments include variation of pitch. A B & K $\frac{1}{2}$ inch condenser microphone registers the intensity of sound. Mr Stirling is in communication by telephone with control. Sound from the horn can be so intense that ear defenders have to be worn. The gauge registers air pressure to the horns. A problem for study; warning sound from the horns and the high speed train itself could arrive at the same point ahead almost simultaneously.

5.

TOMORROW'S TRAINS TAPED TODAY

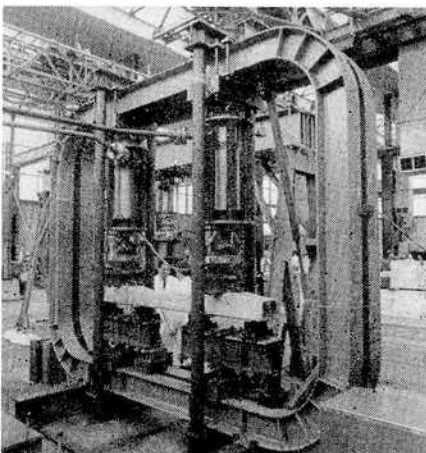
continued

(6.) Mr Tom Dawn, Senior Technical Assistant Physics Dept, investigates the modes of vibration of a scale model wheel set. This researches into the sources of noise in a railway vehicle, only a beginning into a long chain of investigations into the problems of sound insulation. The EMI 'L4' is being used to excite the wheels with recorded noises; i.e. vibrations recorded from an actual railway vehicle are being fed into a vibration transducer to the tyre of the wheel. The wheels are shown to have a large number of resonant frequencies. The mode of vibration at any particular frequency can be found by sprinkling fine sand on to the wheel and observing the 'Chladni' figure produced.

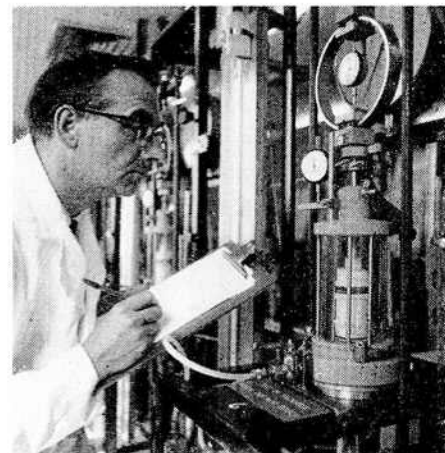


6.

(7.) Sleepers and bridge structures being tested to destruction. By a series of controlled, repeated stresses exerted over a period of a few weeks or months (accelerated if need be) wear and tear of up to 50 years normal service life can be simulated. Within this section sounds range from heavy bangs and thumps of such devices to the roar of roller rigs testing lateral oscillation of vehicles (called 'hunting') which occurs at high speeds. Bogies remain stationary as the wheels are driven on the roller rigs at 150 mph.



7.



8.

(8.) In the Department of Soil Mechanics Mr Fred Mear, Soil Laboratory Technician takes readings from cycle-loading machines which simulate trains passing over various soil structures.

The sounds here: the click and plop as air pressures operate plungers loading the soil samples at various pressures.

(9.) I am not the only one still to confess a great affection for steam. I got Peter Bolland to draw me one of his amusing cartoons as a reminder of the good old days when we used to record the snorting giants of yesterday.



9.



A Winner

The DP4 microphone is another winner—by performance alone it has achieved world wide acclaim. It is used regularly by P.A. engineers, broadcasting and television companies, film studios, etc., as well as by many professional and amateur tape recordists. Its winning qualities have been designed and produced by Grampian—specialists for over thirty years in the field of sound equipment. We shall be pleased to send you full technical details of the DP4 and other microphones, together with descriptions of various accessories.

Specially designed to use with the DP4, in order to cut down wind noise is the Windshield — as illustrated here.



There is also the "Grampian" Parabolic Reflector. Where it is not possible to place a microphone close to the source of sound such as when making recordings of bird songs, weddings, car and train noises etc. the Parabolic Reflector has been proved over and over again to be of enormous value.

Grampian

Grampian Reproducers Ltd.,
Hanworth Trading Estate, Feltham, Middlesex.
Telephone: 01-894 9141

UP TO 50% OFF!

FANTASTIC SAVINGS

We have a fantastic selection of tape recorders, new, shopsoiled and secondhand showing savings on the manufacturers' list price of up to 50%. Our quoted prices are absolutely unbeatable, so why not call at any of our showrooms and see the fantastic savings that we, as Britain's largest tape recorder specialists company, are able to offer you by virtue of our ability to purchase large quantities and pass the savings thus obtained on to you! (Personal Callers only.)

- UNBEATABLE NO-INTEREST TERMS
- OVER 100 MODELS ON DISPLAY
- EXPERT STAFF EXPERT ADVICE
- GENEROUS PART EXCHANGES
- SAVINGS OF UP TO 50%

THIS MONTH'S BARGAINS

PHILIPS EL4306—Latest 1967 4 track 2 speed model. List £44 2 0. Brand new, boxed.	OUR PRICE	36gns.
SABA TK230 Superb 4 track, 3 speed stereo model. Absolutely as new. List £100.	OUR PRICE	39gns.
AKAI M8—Stereo. One only S/S. Latest 1967 Model. List £146	OUR PRICE	99gns.
REVOX 736—2 track stereo. One only S/S. List £135 9 0	OUR PRICE	69gns.
AKAI 1710—Latest 4 track stereo. One only S/S. List £83	OUR PRICE	64gns.
B. & O. 2000—2 track suitcase. Stereo. Absolutely as new. List £129.	OUR PRICE	79gns.
AKAI X4—4 track stereo battery/mains portable. List £143	OUR PRICE	79gns.
Two only. Brand new (Brown model)	OUR PRICE	21gns.
PHILIPS TYPE—Cassette battery/mains portable. Brand new. List 27 gns. Few only.	OUR PRICE	29gns.
PHILIPS EL4305. Latest 1967 Model. List £37 16 0. Brand new, boxed. Few only.	OUR PRICE	49gns.
PHILIPS EL3556. Latest 1967 4 track, 4 speed model. List price £65 2 0. Brand new, boxed.	OUR PRICE	59gns.
GRUNDIG TK45—4 track stereo. Perfect condition. 1 only. List £112.	OUR PRICE	39gns.
PHILIPS EL3536 4 track mono/stereo. Perfect condition. Original list £97.	OUR PRICE	59gns.
UHER 4000S.—Superb 4 track. Battery/mains portable. List £104. 1 only.	OUR PRICE	59gns.
TELEFUNKEN 85KL—De luxe. Superb 2 track model. As new. List £95.	OUR PRICE	39gns.
TANDBERG 64—4 track, 3 speed hi-fi tape unit. As new. List £115. One only.	OUR PRICE	69gns.

PERSONAL CALLERS ONLY

HURRY WHILE STILL AVAILABLE!

NuSound

TAPE RECORDER CENTRES

82 HIGH HOLBORN, W.C.1 (200 yards Kingsway)	CHAncery 7401
228 BISHOPSGATE, E.C.2 (opp Liverpool St. Station)	BiShopsgate 2609
36 LEWISHAM HIGH STREET, LEWISHAM, S.E.13	LEE Green 2399
242/4 PENTONVILLE ROAD, N.1 (200 yards Kings X)	TERminus 8200
2 MARYLAND STATION, STRATFORD, E.15 Adjacent Maryland Point Station	MARYland 5879

ON TEST OPTACORD 450 CASSETTE

by Peter Knight



Fig. 1. General view of recorder with cassette cover open.

A product of the Loewe Opta Industries, distributed in Great Britain by Highgate Acoustics of 71-73 Great Portland Street, W1, the Optacord 450 is a tape-cassette type transistorized tape recorder, designed for running on batteries or mains supplies. The tape runs at the Philips cassette (or magazine) speed of $1\frac{1}{2}$ ips. Apart from anything else, therefore, the machine will reproduce quite accurately any of the pre-recorded 'Musicassettes' and at the time of writing there are over 100 titles available from the repertoires of Philips, EMI and Pye records – and more added monthly.

While on this trend, it is worth noting that tape-loaded cassettes of pre-recorded music equivalent in length to the popular EP 45 rpm disc record are now becoming available. These are complete in magazine and ready for insertion into the 'Philips standard' ($1\frac{1}{2}$ ips) replay machine or recorder. They sell for 14s 6d – a little under twice the cost of an EP disc.

The 450 is pretty personal in size, having dimensions of $11\frac{1}{2}$ inches wide, 3 inches high and $8\frac{1}{2}$ inches deep, and less batteries has a weight of a little over $6\frac{1}{2}$ lb. For ease of carrying there is a sturdy, fold-down handle. The general appearance of the machine is shown in Fig. 1, while Fig. 2 shows a slightly different view with the cassette lifted up from its housing ready for extraction. This is easily accomplished by slipping two fingers into sunken sections either side of the inserted cassette and lifting upwards. The cassette can be inserted just as easily. Like disc records, music cassettes have A and B sides, and these letters are also indicated on cassettes loaded with virgin tape.

Normally, of course, the lid shown in the 'up' position in Figs. 1 and 2 is closed, and the finish on its top matches that of the loudspeaker grill on the left of the case, above the three control knobs. It clicks into position when pressed down, and can be released for observing how much tape is left on the spools through the window of the cassette or for cassette changing by depressing the key to the far right of the recording level indicator. The lid then

spings up. The body of the machine is made of a black, crackled plastic material, while the speaker grill, cassette top cover, control panel and front are made of silver-finished metal. The overall effect is very pleasing to the eye, but having something in common with the smaller type of transistor radio set. The design is for mains operation on nominal voltages of 110 and 220 (suitable for the British voltage and American) at 50 or 60 Hz, and for battery operation from five U2 size, leakproof cells of 1.5V each. It can also be used from 6V or 12V electrical systems or from 6V or 12V car-type batteries by means of a car adaptor for the higher of the two voltages.

The machine is made with the precision of a wrist-watch, and some idea of this can be seen in Fig. 3, revealing the inside of the machine with the bottom cover removed. The cavernous section at the bottom of the picture accommodates the five 1.5V cells, and on the right can be seen part of the printed circuit board section. The 8 inch internal speaker is located on the opposite side. The neatness of the wiring is apparent from that connected to the three potentiometer controls in the far left-hand corner.

Circuit Details

The electronics employ 10 transistors and 5 semiconductor diodes, and a class-B push-pull output section is used in the playback amplifier. Two transformers are featured, one a driver and the other for speaker matching. The latter is possibly because the speaker used has an impedance of 4-7 ohms but transformers, as distinct from transformer-less stages, do reduce the number of components required for a given power output and sensitivity.

The main signal input is to a DIN socket on the right-hand side of the case, and it is to this socket that a microphone or other low-level signal is applied. This same socket also delivers a signal for connecting to another tape recorder or amplifier system from a replayed tape. There is also a DIN speaker output with two positions of plug insertion. With the matching plug inserted one way an external speaker can

be run together with the internal speaker; round the other way, the internal speaker is automatically disconnected and only the external speaker is operated.

A round socket between the two DIN sockets accepts 6V powering from a car electrical system or battery or 12V, via the car adaptor lead previously mentioned.

On Test

The machine is very simple to work, and it was run for almost a month before tests were made on it, and there was no trouble at all. One little problem of the sample model was displacement of the DIN sockets from the hole cut-outs in the plastic case. The two failed to line up correctly, and a small amount of leverage was required to persuade the plugs to enter the sockets. But this has no effect on the performance of the machine generally. Compatibility between the Philips cassette machine was tried by running a tape made on the Philips on replay in the 450 and a tape made on the 450 in the Philips. This worked perfectly.

The microphone supplied with the machine has a sensitivity such that with the recording level control half advanced, full tape modulation is possible at ordinary speaking level 1 ft away from the microphone. The replay section can also be brought into action during recording. Care should be taken when attempting this with the internal speaker working for fear of acoustic feedback, unless the microphone is far removed from the recorder or in a different room, but the major advantage of this attribute stems from the use of headphones in the external speaker socket connected so that the internal speaker is switched off as explained above. The 'phones can then be used for monitoring a recording at any level required – adjusted by the replay volume control. The other two controls are (i) tone and (ii) recording level.

The machine is switched on automatically when the *functions* key is moved upwards. This starts the machine on replay. To start on record, the red button to the left of the functions key also has to be depressed. The remaining button operates the cassette lid



Fig. 2. Showing how the cassette is removed from its well.

catch, as already mentioned. Fast forward and reverse winds are achieved by sliding the functions switch left or right as appropriate.

Tests were made to appraise overall record/playback frequency response, and to this end the tape was recorded with sine-wave signal at intervals over the spectrum 40 to 10,000Hz. The signal was fed into the microphone input and correctly matched and the level control and generator's signal output control were adjusted to give full recording level deflection on the level indicator at 1,000Hz (with the recorder's recording level control set to about 50% advanced). The tape so recorded was then played back on the machine and the output power monitored across 5 ohms at the external loudspeaker socket with the internal speaker muted. An oscilloscope was also connected at the output to observe waveform.

The full-line curve in Fig. 4 shows the results relative to 700mW at 1,000Hz. This shows half-power points at 50 and about 8,500Hz, but with a substantial lift at about 200Hz. Although this may appear to be serious on the graph, it has very little subjective effect, particularly on the internal speaker, and it is possible that this bass lift does tend to improve reproduction from the internal speaker, keeping the bass up when the speaker response starts to fall off.

The dotted-line curve gives an indication of the response of the recording level indicator on the constant amplitude input signal. This shows large bass and treble lifts, coming in at about 100Hz and 4,000Hz. While this test does not reveal conclusively that the recording amplifier is actually tailored this way, to give extension of the frequency response at the low tape speed, it does tend to indicate this but of course this might be revealing the response of the recording level indicator itself, though this is unlikely from a study of the circuit. The makers state the frequency response as 50 to 8,000Hz, but give no reference level.

At 1KH the distortion was a little over 5% at 700mW output, which appeared to be

about the maximum possible from the sample below the onset of waveform clipping. The distortion worsened considerably at that power towards the low and high frequency ends of the spectrum, however.

The noise level is reasonably low for this speed and wow and flutter effects are just about discernible at 2000Hz tone output. The drive motor runs relatively silently, and on mains operation the hum level is about 45dB below the full power output level of the replay channel with tape running.

This is a very pleasant little machine to handle and extremely well made. To those contemplating cassette running, it is a machine worth considering along with the others, and the standard tape speed makes it suitable for the playing of Musicassettes, upon which a lot of money is currently being invested.

Maker's Specifications

Power: Mains 50 or 60Hz 110/220V, consumption 6VA. Batteries 5 U2 type dry cells or 12V accumulator (car electrics) using adaptor lead. 6V can be fed in direct. **Recording:** Double-track, international standard 4.75cm/S velocity. **Frequency Response:** 50 to 8,000Hz. **Dynamic Range:** better than 46dB. **Sound pitch fluctuations:** $\pm 0.3\%$. **Distortion Factor:** 5%.

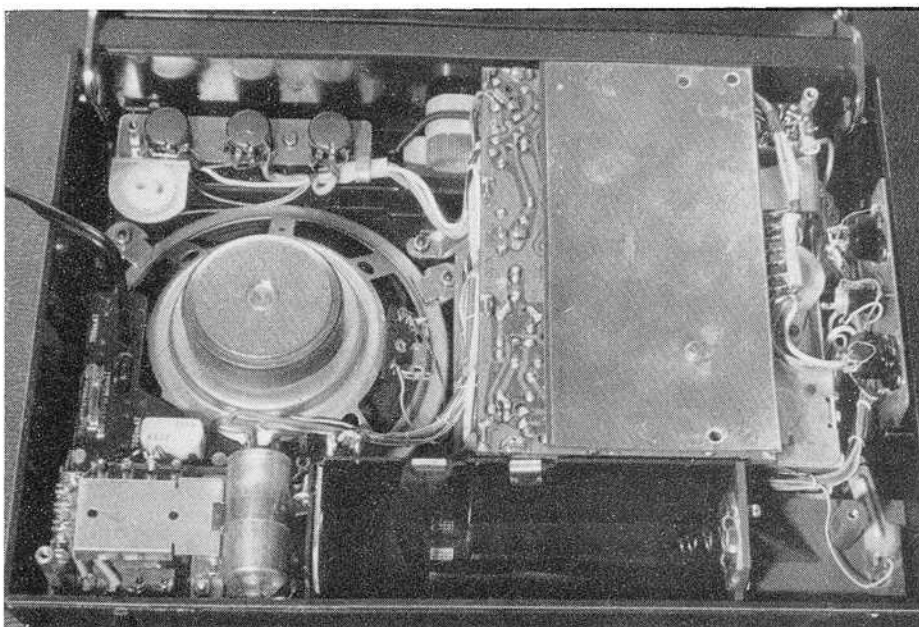


Fig. 3. Inside view of machine.

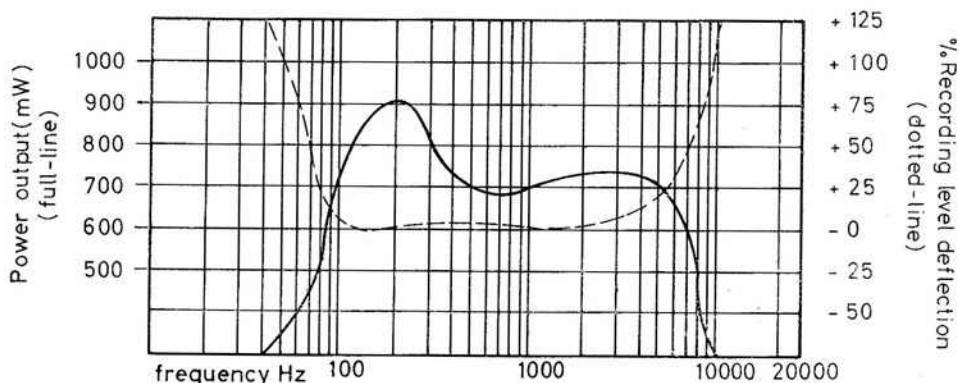


Fig. 4. Overall frequency response curve with constant amplitude recording signal.

SOUND SCENE

New Cordless Microphone System

The latest addition to the range of VHF and UHF communications equipment by Audac (Audio Associates Limited) also manufacturers of special purpose recording mechanisms and audio equipment is a cordless radio microphone system, to be known as the 'Hike Mike' shown in Fig. 1. The system features the use of an exclusive 'integrated' microphone/transmitter incorporating a microphone capsule complete with cavity, transmitter unit and re-chargeable power supply. The whole unit is no larger and weighs no more than the average studio quality microphone. Another exclusive feature is the electronic switching unit which effectively 'mutes' the receiver when the transmitter is switched off. (Note that radio microphones of this kind require a special GPO licence.) Further details of the Hike Mike can be obtained from the Audac Marketing Co Ltd, Forest Works, Carey Road, Wareham, Dorset.

Agfa Price Cut

Agfa-Gevaert Limited, one of Britain's largest suppliers of magnetic recording tape, are ending Resale Price Maintenance on their range of Agfa-Magnetron tape and tape accessories. At the same time they are making reductions in the selling prices of their tape, ranging from sixpence to ten shillings, according to size. The largest price cut is on the PE65 7 inch reel of triple-play tape reduced by ten shillings, the smallest reduction is a sixpenny cut in the price of a 4 inch spool of PE31 longplay tape. The end of RPM and the reduction in prices coincides with the introduction of several new items in the Agfa-Magnetron range. The cardboard swivel-type box will remain the standard packing for all Magnetron tapes but several sizes will now be available in a dustproof clear plastic container. These new plastic packs cost less than the standard type of pack and further reduce the price of 3, 5½ and 7 inch spools.

Also new to the UK are 'Universal-Kassettes' (Fig. 2) designed for postage. In future all 3 inch tapes will be supplied in these unbreakable plastic boxes which are ideal for mailing, conforming to all international postal regulations and coming complete with two weatherproof self adhesive labels. The storage of tapes is always important. Agfa 'Novodur' plastic library boxes have only been available previously when supplied with tape. Now the two-tone grey shatterproof swivel-type boxes are available separately in the 4½, 5, 5½ and 7 inch spool sizes (see Fig. 3).

Agfa-Magnetron tape is now available in the Compact Cassette, type C60 (2 x 30 minutes) and the system DC International Cassette type DC90 (2 x 45 minutes). Also available for the first time is PE31 long play tape in 4,200 ft lengths on a 10½ inch Novodur plastic spool with cine type centre, specially

made for use on the 'Revox' range of tape recorders.

A new leaflet *Agfa-Magnetron Recording Tape for Sound Value*, together with a list of the new recommended prices is available from the Magnetic Tape Division, Agfa-Gevaert Limited, 27 Great West Road, Brentford, Middlesex.

Tape Deck for Constructors

In response to a large number of requests from hi-fi dealers and home constructors Van Der Molen are now marketing the vertical tape deck mechanism used in their VR4 and VR7 tape recorders as a separate unit (Fig. 4).

This now makes available for the first time in the medium price range a quality tape deck that can be mounted vertically, thus providing greater flexibility in the design of

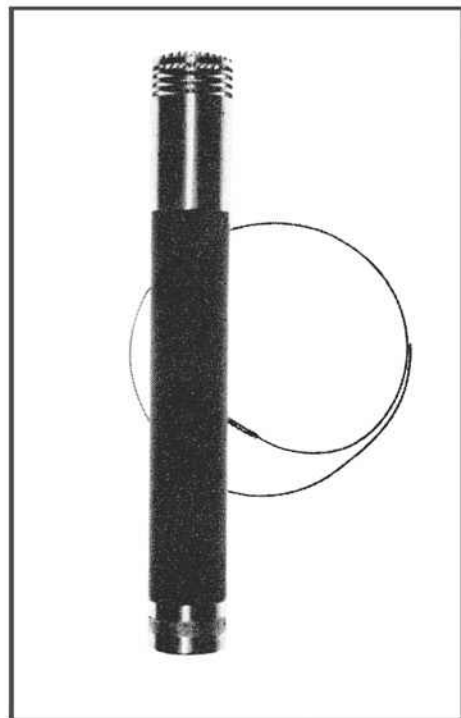


Fig. 1. The new Audac radio microphone known as the Hike-Mike.

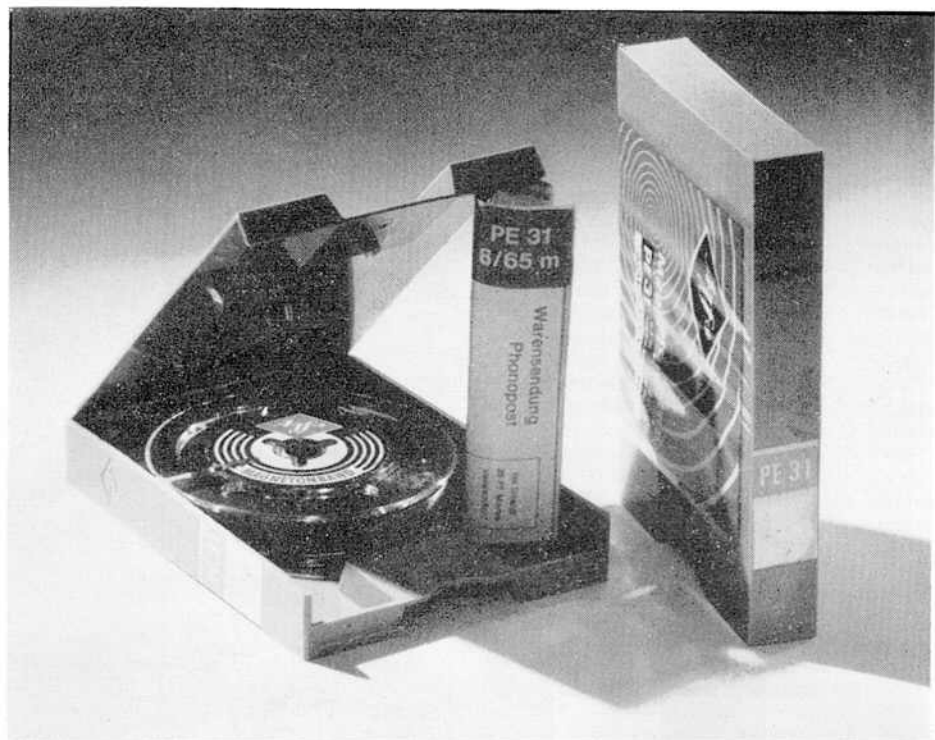


Fig. 2. The new Agfa 'Universal-Kassettes' for 3 inch tapes are designed for sending through the post.

the associated cabinets.

Specification: 7 inch spools - fast wind and rewind - rev counter - wow and flutter 0.15% at 7½ ips - 6 watt overwind on motor. Normally supplied with quarter-track record replay head and ferrite erase head. Price £15 15s 0d. Further details from Van Der Molen Limited, 42 Mawney Road, Romford, Essex.

Tape on Wheels

The British Cycling Bureau advocate cycling

for the younger holidaymaker. With a cycle holiday a variety of other hobbies can be included - photography, camping, sailing, swimming, climbing, walking and tape recording. The latter is becoming very popular among cyclists - not only can you take your own cassettes of music with you, you can record the many different sounds on a holiday jaunt - farm animals, wild birds, local dialects, village church bells, sounds of the sea, anything that captures your imagination. Small battery-operated tape recorders, no

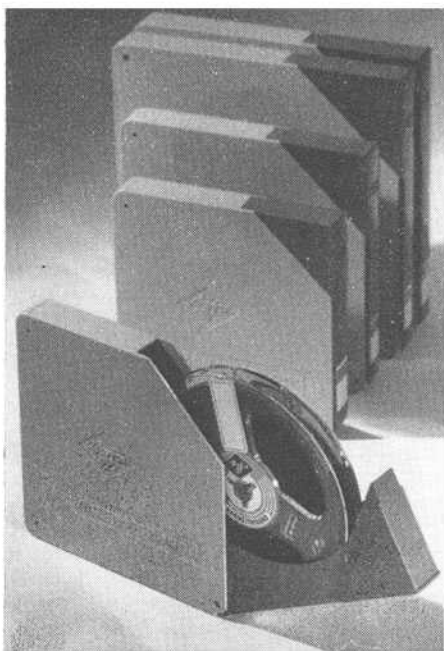


Fig. 3. Agfa 'Novodur' plastic tape library boxes are available for 4½ inch, 5 inch and 5½ inch and 7 inch spool sizes.

bigger than a camera, cost about £20. Well, at least they have the right idea and a cycle is one way of getting around with a portable.

Tandberg - New Tape Recorder

The Tandberg Model 9 three-speed tape recorder is now available for 4-track operation at 72 guineas. This recorder is very suitable for cine sound use and has similar facilities to the model 843 and is known as Model 94. It is shown in Fig. 5.

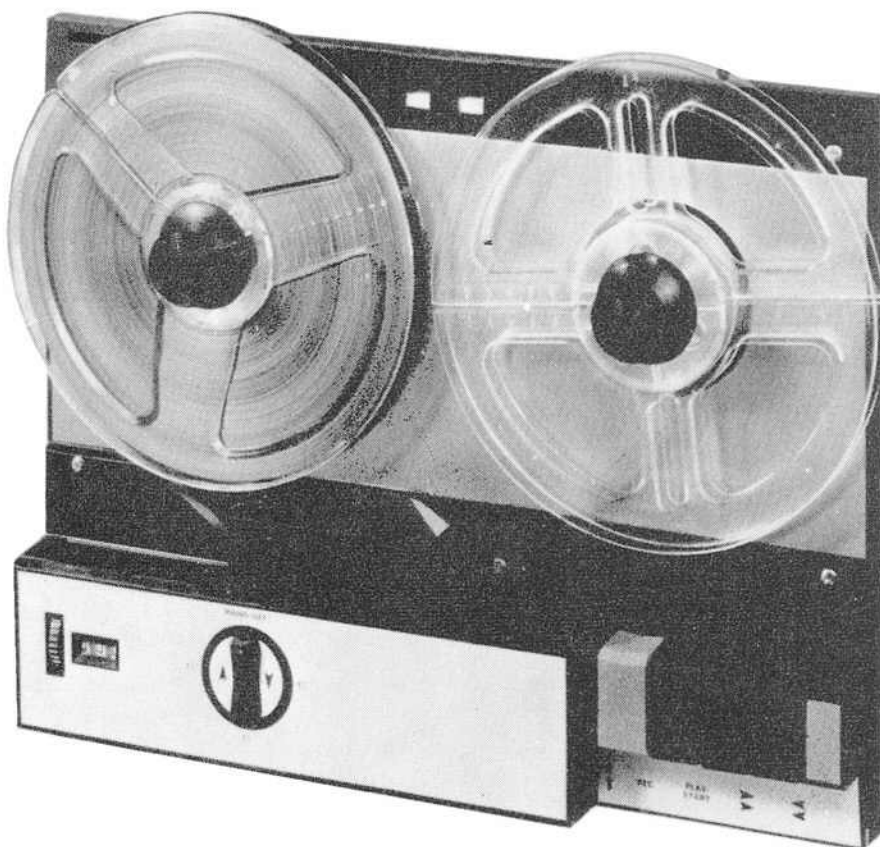


Fig. 4. The Van Der Molen tape deck now available for home constructors.

New Ferguson Portable

A battery/mains tape recorder weighing only 10 lb is now included in the Ferguson range by British Radio Corporation Limited. This is their Model 3234 shown in Fig. 6, a two-

speed two-track machine with recording speeds of 3½ and 1½ ips. Completely transistorized, it operates on either six U2 batteries or a 220-240V 50c/s mains supply; a meter indicates the state of the batteries. Features of the tape deck include interlocked piano key controls, recording level indicator, push button reset tape position indicator, graduated tone and volume controls and automatic level control for speech. Further details from British Radio Corporation Limited, 284 Southbury Road, Enfield, Middlesex.

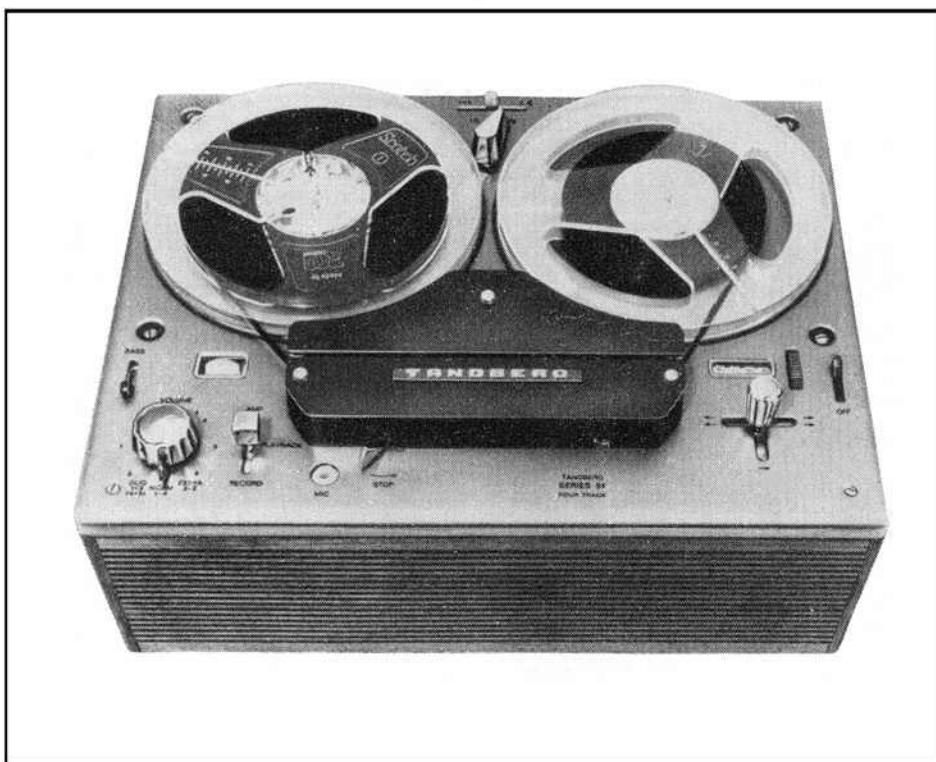


Fig. 5. The Tandberg series 9 tape recorder is now available for 4-track operation and is known as Model 94.



Fig. 6. The new Ferguson portable, model 3234 is a two-speed machine for battery or mains operation.

A TOUCH OF THE OLD SAFARI

Graham Harris stresses the importance of getting the right sound at the right time



'The microphone is a lethal side arm.'

There's no reason whatsoever why the old motto, 'Bring 'em back alive' shouldn't apply to modern game hunters. Although the game has changed, the microphone, probably just as lethal as the elephant gun, is at least an established 'side arm', the use of which is well within the capabilities of most people. When the elephant gun went out of fashion and Nature Reserves came in, the camera became a welcomed instrument. The potential of this thing soared to dizzy heights, affording the makers the chance to develop and improve everything that went with it. Suddenly the whole world was going 'click-ety click!' Photographs of quaint things from far away places made such magazines as the *Strand* and *Harper's*, riotous sensations. The semi-tamed colonies of the Empire ceased to be just words narrowly crammed within the pages of *The Times*. They became one step nearer to being real through the pictures that were unleashed on to our Victorian ancestors.

Game hunting expanded into wider fields – as it were. The camera 'brought back alive' glimpses of abandoned bacchanalias. Colour

transparencies have resurrected even keener interests of life (tame and wild) around us. Modern journals thrive on the results of a shutter! What happened with the camera could also happen with the tape recorder. A picture is one dimension of life; sound is another. One without the other creates only a flat conception, yet, sound has an advantage over the still pictures – it moves! (Of course with the advent of cine, television and videotape, seeing has been brought into the same category as hearing.) The 'still' scene is, so far, the more popular escape within the world of photography. It's cheaper!

The benefits to be gained from putting sound to still pictures have already been discussed in *ATR*, but the actual development of sound is still floundering. Friends in the trade might wince at this statement, if they accept it as true – and it is true – but they are not to blame. The development of sound is floundering because the tapists themselves have yet to realize and practise the full potential of a tape recorder. Regular members of *ATR* may contest this, but let's face it, could not the tape recorder be put to more advan-

tageous use than it has been?

The battery portable has given the tape recording fraternity panoramicscope! Take the case of the holiday. Since sound gives life to projected slides, for a tapist to go on holiday without his battery portable (providing, of course, he owns or can borrow one) can be likened unto the traditional white hunter going into the jungle without a machete. He would have been considered something of a twit! Indeed, most owners do, in fact, take their recorders with them – but – a majority of them have that deplorable habit of leaving them scattered in cars, in hotels, in buses – anywhere in fact except hanging around their necks. Hence the old story:

'Suddenly we were faced with this mountain man with a ruddy great alpine horn stuck in his mouth. You ought to have heard it! Marvellous!'

'Yeah!' you think, 'we ought to hear it.'

'But I left my recorder in the car.'

Amazing!

Bad habits can only be quashed with the substitution of good ones. Personally when on holiday, I carry my battery portable everywhere – yes, *everywhere*. There will be days, of course, rare ones, when I'll never use it, but rather than kick myself afterwards. I don't believe that the complaint made by some people, that the tape recorder is too cumbersome to 'lug' around, is a justifiable one. Especially if one is totting a camera as well! Given a short time, the shoulder muscles develop to the extent when the weight of the tape recorder is hardly noticed. To record, or not to record – is never the question. At least it shouldn't be. What sounds like an insignificant noise to the human ear is not necessarily so to the sensitive – and sometimes, highly strung – microphone. Equally important is that what may sound like a jungle of noise at the time can, at a later date, be atmospheric. An ordinary street scene is not so cosmopolitan as it may seem to be at first. What applies to the camera also applies to the tape recorder. It is not always the pretty picture that sends friends into ecstasy: it is not always the unusual sound that pricks the ear.

During one holiday I stood in one of the streets of Salzburg – away from the tourists' attractions, the castle, the Platz, away from the narrow streets with wrought iron shop signs. I was in the centre of a crossroads –



12 *'A ruler is as good as any gun shot!'*

dull perhaps, but precarious. I fired the camera and detonated the tape recorder for no other reason than that scene with its mass of sound was what I saw and heard at that time. The slide, after processing, showed a bus with a trailer, a speciality of Austria, careering around a corner. The microphone picked up its horn. At the time I noticed none of these things. Later I incorporated the sounds and the scene within a show. That particular sequence was no epic, but it was Salzburg and, what is important, it still is. It can be brought back to life any time!

All right, so that was Salzburg. Austria is different to England. I applied the same thing to Penzance, firing the camera into the main street and letting the spools revolve away. Does a Cornish street sound the same as a Yorkshire one? A car horn might, but not the dialect! Today, at home, the Cornish street can throb with life backed by the unmistakable lilt of an unknown shopper's tongue saying,

'Werl, how're you then, my love?'

I am not proposing that tapists with battery portables should go raving mad and record anything and everything everywhere. Although it's not practicable, it is better than nothing at all. I am not proposing that a recorder should run twenty-four hours in an effort to miss nothing. Not only would this operation prove to be expensive but it would also involve the same amount of time - perhaps more - to edit out those parts that might be required for future use.

Might be required. That is the whole crux of of the matter. Since it is difficult to know what sounds will be wanted at a later date, it is essential that the tapist adopts a self-bestowed generosity in the supply of tapes. After all, three-inch tapes aren't really so expensive and a moderate supply of them will not set you on the National Assistance. Played at the normal battery portable speed of 1½ ips, a wealth of sound can be stored within a very small space.

Whilst on one holiday I filled up five such tapes. Afterwards, at home, I dubbed an edited version on to a standard five-inch spool and now have an hour's concise record of sounds from the time I left the home airport to the minute I returned to the local railway station (the latter part was due to a fog-bound airport in Basle and somewhere along the line I seemed to miss an aeroplane). Since then I have probably used only twenty-five per cent of the sounds on this tape, but I have a lot to choose from.

When I say 'dubbed', I might just add at this point, elementary as it might seem to most readers, I dub via a line input. I make this point because I have been amazed - and only recently - to find that there are still some ardent fanatics who dub through a microphone. To beginners who may be studying this magazine, I should point out that dubbing via the mike is, of course, possible and very easy, but you will also lose fifty per cent of the original quality.

It is not just for holidays that the battery portable is an essential piece of equipment. There are the cases, more premeditated, of planned programmes, where the sounds have been, more or less, decided upon: the object being 'Go out and get 'em!' Most sounds can be simulated and in some cases the artificial effect proves to be better than the real thing - the gun shot compared with the slam of a ruler being the classical example. In fact, when such an effect is the main sound,



'Quickly, Carruthers! Hand me my Mono-DI, Acos DB159, suregrip mic!'



'...can be as perilous as the old time game hunts.'

it is usually better to simulate the noise (a car crash, an explosion, a machine, a window breaking, etc). Since the acquisition of the real thing might prove to be costly, time-taking and sometimes nigh on impossible, simulating or faking the sound is essential. These are 'sound effects' and are not within the province of the battery portable. They can be, of course, but a mains machine will do the job better.

The battery portable's main use in these cases, is for the collecting of atmospheric sounds. I have already mentioned streets, but there is the sea shore, shopping centres, zoos, cattle yards, and so on *ad infinitum*. (You can't simulate *ad ifninitums* for love nor money, I've tried!) It is these everyday, 'mundane' sounds that put life into a programme.

Perhaps you don't want life putting into your programmes. Perhaps you have managed along quite well thank you very much without such details. Good luck! Or is it just your opinion? Do you really enjoy other people's 'soundless' programmes? I mention this because of an earlier article I wrote in *ATR*, *Maps of Sound*, in which I strongly advocated the use of a script for all taped

programmes including so called 'mundane' sounds. I recently attended a film show and during the interval the 'man in charge' said to me, in confidence and with, I suspect, a certain amount of pride,

'I never use a script!'

He didn't have to tell me. The lack of a script in the show stood out like a sore thumb. He didn't believe in using sound effects nor even atmospheric sounds. A pity really. His films and general ideas were good but the narrative was repetitive and unstable. In fact the whole dimension of sound just didn't exist.

It is not difficult to include atmosphere in tapes, once you have a stock library. It is the hunting and the collecting which holds the adventure. Sound safaris can be just as perilous as the old time game hunts. It isn't just a matter of simply waving the microphone around willy nilly. On the contrary, a fully trained sound scout will be a professional listener. For instance, if the programme calls for the sounds of a busy shopping precinct, he will realize that the busy shopping precinct is the last place to go. (Such a recording can easily be confused with that of a cattle market!). A recording

continued on page 23

A TAPE ECHO SYSTEM

by B. E. Wilkinson

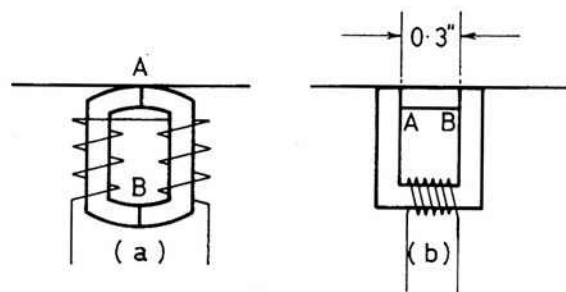


Fig. 1. Standard and echo replay head system

One of the problems of home-recording, particularly in respect of music, is that it is difficult to get the acoustics of the 'studio' right. Recordings made in well-furnished rooms tend to have a certain flatness due to the absorbent properties of curtains, carpets and furniture. The bathroom on the other hand, is a much more effective studio as the hard surfaces of the walls improve the sound reflection and the area of sound absorbing curtain is small. The microphone thus receives sound directly from the source and via the wall surfaces. Owing to the differing lengths of the sound paths, the various signals reach the microphone displaced slightly in time and the overall effect is to increase the harmonic content and make the sound more pleasing. This 'echo effect' is now well-known and the effect of certain types of music is heightened by artificially adding a 'reflected' signal. This is achieved electrically by dividing an audio-frequency signal into two identical components, introducing a delay to one and then re-mixing. The delay is introduced by using a loop of tape moving at a constant speed. The length of tape is not important and three heads are fitted — erase, record and replay. As the tape passes the erase head any existing record is obliterated. The signal to be delayed is applied to the tape via the record head. Replay is delayed because of the record-replay head distance and the tape speed. If the heads are d inches apart and the tape speed is S inches/sec, then the delay is d/S sec which is also the delay to the signals. The result is an echo effect which can be varied by adjusting the tape speed. With this system, the echo can be added to a live performance, but if we are prepared to forego this advantage, then we can quite easily introduce an echo effect to an existing tape recording.

Details of the Echo Head System

In Fig. 1(a) a normal replay head is shown. The core consists of two C-shaped pole pieces, each carrying a coil. Gaps are formed where the pole pieces meet and it is across the gap A that the tape passes. The coils are connected in series in such a way that the induced voltages due to the pole piece fields reinforce and provide a useful signal. The arrangement of Fig. 1(b) is similar, except that the back gap (B) has been moved round and there is only one coil. Recorded tape passing across the head from left to right, passes gap A first and the magnetic field induces a voltage in the coil winding. A fraction of a second later, the tape reaches the gap B and a second, identical signal is induced. The two signals mix in the head so that the output is complete with echo effect. The advantage of an echo head is that the echo can be added to any recording when required and the recording itself is not altered in any way. It may well be suggested that the same effect could be obtained by placing a second replay head against the existing head and connecting the outputs together. With the slower tape speeds now in general use, it is normally not possible to place the heads close enough together, due to the head dimensions. A time delay of 0.08 sec between signals will produce an acceptable effect and at 3.75 ips, represents a

distance between magnetic gaps of 0.3 inches. With a distance of 0.5 inches, the delay is 0.13 sec and the effect is beginning to become lost as the ear can readily discriminate between the signals. Clearly, even 0.5 inches is too close for two heads to be used. At a tape speed of 7½ ips the arrangement becomes more feasible, as the required inter-gap distance is doubled, but at 1½ ips the gap distance is halved.

There are those who might shrink from the prospect of making a replay head, but if we accept certain limitations, the task is not difficult and does not involve special tools or techniques. Limitations to home-made heads mainly apply to the formation of the correct magnetic gap. There is a relation between the length of the gap, the tape speed and the frequency range accepted by the head and this implies that the finer the gap, the greater the frequency range for a given tape speed. We cannot hope to produce gaps as fine as those produced commercially, so we must accept a limited frequency range. We are however, distorting the signal by adding the echo to it so any restriction in response is not really significant. A further limitation is the head output,

which will be smaller than that from a commercially-made component, due to losses in the non-laminated core and the oversized gap. Fortunately, the output is very much dependent on the record itself and can be drastically increased by ensuring that the tape signal has been fairly heavily recorded, although this does not imply modulating to the point of distortion. The head output can be used:

- (a) to replay a tape with echo effect added, through a loudspeaker or headphones, or
- (b) to replay a tape with echo effect added, through a pre-amplifier for re-recording.

The head shown is used with a 3-stage transistor amplifier which, with a normally-recorded tape will drive a pair of headphones or provide a record-amplifier input. Where a fairly heavily recorded tape is used, the amplifier will (at full power) drive a speaker or headphones very loudly.

Construction

An exploded view of the echo head is shown in Fig. 2. The basis of the unit is a U-shaped core of soft iron. The most important feature of the core

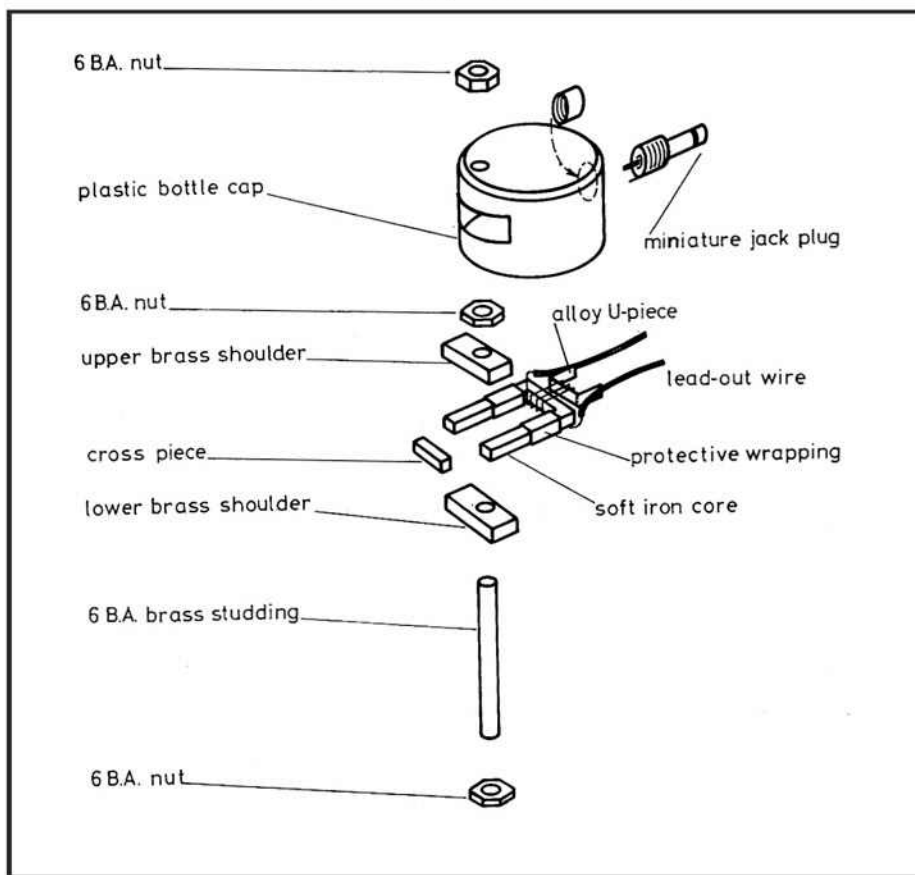


Fig. 2. Exploded view of the echo head

is that it must not retain magnetism after the tape field has been removed. Mu-metal is the ideal material, but it is expensive and good quality soft iron or mild steel is satisfactory. In selecting the iron, the reader should remember that hard and brittle iron is more likely to retain magnetism than the softer grades, so he should look for a material that files easily and does not snap when bent. The head is to be for use with a twin-track recorder so that the core will be 0.1 inches thick — i.e., the width of one track. One is not likely to find iron or mild steel of this thickness, but strip of $\frac{1}{8}$ inches (0.125) thickness is available. The only critical measurement in the head, is the inter-gap distance of 0.3 inches (delay of 0.08 sec). Apart from this, the size of the core is very much a matter of choice, but it is convenient to make it rectangular in plan with a square cross-section (0.1 × 0.1 inches). This makes the overall width of the core 0.3 + 2 (0.1) = 0.5 inches, so that the first step is to cut a piece of iron 0.5 × 0.7 inches. The centre of the core is then removed to form the U-shape. When cutting out the centre, it is important to make the inter-gap distance less than 0.3 inches. The inside surface is then cleaned up by using a warding file. The inter-gap distance is filed to about 0.3 inches and the core rubbed on emery paper laid flat until the thickness is reduced to 0.1 inches. To finish the core, a fine file is used. The edges that will form the gaps are carefully filed parallel to one another and at right angles to the flat plane of the U. It is not wise to try to square up these edges with emery paper as the result is invariably a convex surface. The cross-piece is 0.3 inches long — i.e., the inter-gap distance, and is cut from the same material as the U-core. In shape the cross-piece is rectangular with a square cross-section (0.1 × 0.1 inches) and is filed very carefully so that it will just slide into the U-piece. The most important feature of the cross-piece is that when in position, the gaps formed between its ends and the U-piece are parallel. Where the sides of a gap are not parallel, they must be carefully filed until the error is corrected. By the time that this condition has been effected, it may well be that the cross-piece is no longer such a good fit. However, as we shall see, any end-play can be taken up when the core is finally assembled.

Although the track width is 0.1 inches, the tape must run across a surface of at least its own width to avoid curling. The soft iron core is thus held between two rectangular brass shoulders, and these are made from two rectangular pins taken from a three-pin ring mains plug. Each piece is $\frac{1}{8}$ inch long and is drilled to receive a 6BA bolt, which holds the brass/iron/brass sandwich firmly. When drilling the holes, it is important to ensure that they will lie behind the cross-piece, thus allowing the 6BA bolt to pass. The shoulders need only be roughly shaped at this stage and should be fitted approximately so that an idea can be gained of how much space is available for the coil; a mark should be made on the core to indicate this. The small alloy U-piece shown is bound to the core with Sellotape and its purpose is to ensure that the turns are kept in place during winding. It is a good plan to wind Sellotape or gummed paper around the U-piece and the arms of the core so that the windings will not be chafed by the bare metal. The coil wire is thin and to avoid the possibility of breaking, particularly at the start of the coil, short lengths of plastic-covered stranded wire are lashed with cotton to the arms of the alloy U-piece. Before binding these wires in position, about $\frac{1}{8}$ inch of plastic is removed and the wire ends tinned. The length of lead-out wire is not significant and about 2 inches for each should be sufficient; if these wires are too long, they tend to interfere with the winding process.

The coil comprises a number of turns of insulated copper wire, wound on to the central member of the core. Suitable wire is taken from the primary of an old output transformer. I have found that when taking wire from a transformer bobbin, there is always the possibility of coming to the end of the winding or finding a break before the coil being made is complete. To avoid this, it is

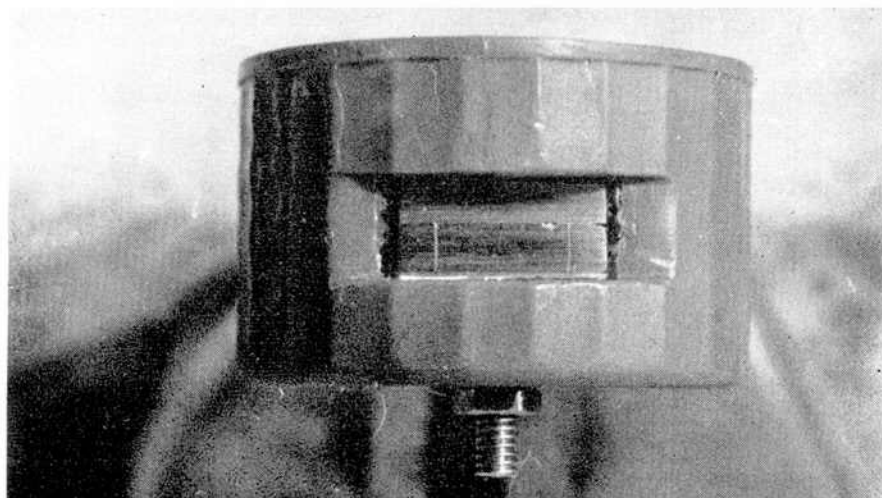


Fig. 3. The completed echo head

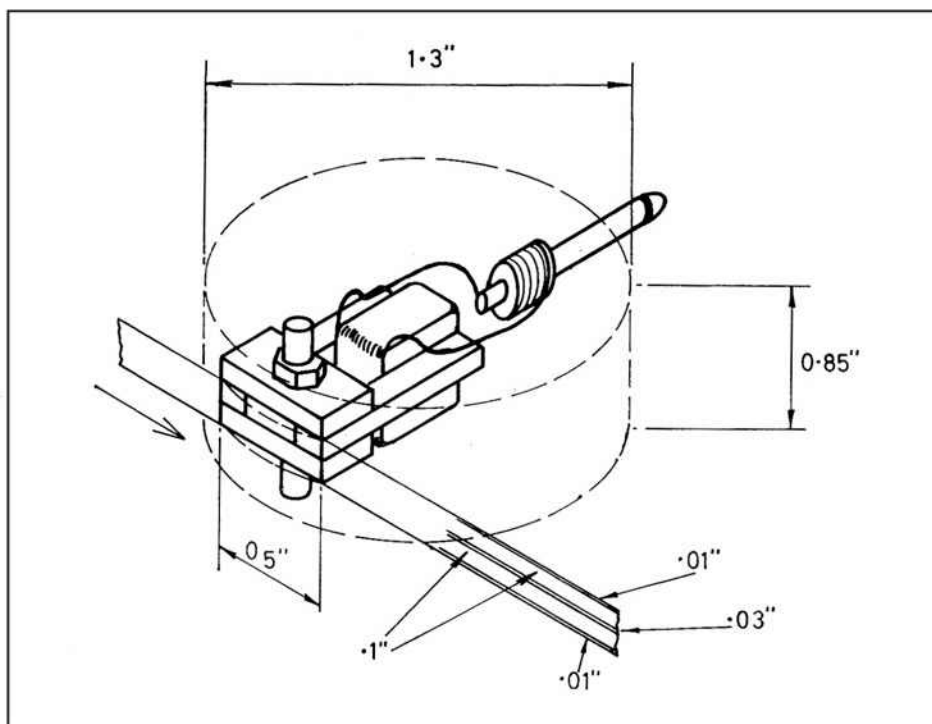


Fig. 4. Head assembly showing tape position

a good plan to first wind the wire from the bobbin on to an empty cotton reel. If the quantity of wire on the reel is known to be greater than that required, then winding can proceed. To wind the core, one end of the coil wire is bared, using emery cloth and wound around the tinned end of one lead-out wire; this joint is then tinned. Winding is carried out by hand and it will be found convenient to hold the core in the jaws of an adjustable lock-wrench or hand vice. The number of turns is in no way critical, but with a gauge of wire which can be hand-wound without the probability of breaking, the resulting head will be of a fairly low impedance. Between 200 and 300 turns should produce a coil that will match directly into a transistor with grounded emitter input. The wire is wound on as evenly as possible so that the coil is uniformly distributed along the core. Winding proceeds until the coil approaches the mark indicating the back edge of the brass shoulders, but some clearance must be left here so that the outer turns are not chafed when the shoulders are fitted. Once the coil is complete, the wire is cut and the outer end bared and soldered to the other lead-out

wire. At this stage, the coil is tested for continuity and to ensure that there is no short circuit between core and coil. The coil is then connected across the input of an audio-amplifier driving a loudspeaker or headphones. If a permanent magnet is now moved in the immediate vicinity of the core, a 'rushing' noise should be heard.

Once the coil is complete, the cross-piece can be fitted to form the two magnetic gaps. The purpose of the magnetic gap is to provide a high magnetic resistance (reluctance) in the core loop at the point where the tape makes head contact. Since the tape coating is magnetic in nature, it has a lower reluctance than the gap and completes the magnetic loop around the core. The recorded field thus extends into the core as it passes the head and, due to the tape movement, the flux changes, inducing a voltage in the coil. The gap then, can be formed of any non-magnetic material which can be made sufficiently thin. To get some idea of what is meant by the term 'thin', we must consider the factors which determine the gap size. We know that each half-cycle of recorded signal exists on the tape as a magnet and that adjacent half-cycle magnets are equal in strength

A TAPE ECHO SYSTEM

continued

and opposite in polarity. Thus, where f is the frequency, there are $2f$ magnets for every second of tape play and if the tape speed is S in/sec, then each magnet is $S/2f$ inches long. If the magnetic gap is twice this value — i.e., S/f inches, then when replaying a frequency f there will be, at any instant, two adjacent half-cycles across the gap. The induced flux and thus the output will be zero. This situation will occur when the frequency is such that there is an even number of half-cycles across the gap and conversely, the head output will be a maximum when the gap will just accommodate one half-cycle or any odd number of half-cycles. Clearly the best arrangement is when the gap length is equal to or smaller than the length of one half-cycle of the highest frequency we wish to replay. Suppose we accept a frequency limit of 15KHz and our tape speed is $3\frac{1}{2}$ ips. The magnetic gap should thus be no longer than S/f or $3.75/15000 \times 2 \approx 0.0001$ inches. This is an idealized solution and in practice gaps may be two or three times this value. However, the figure gives some idea of the kind of length involved. Using non-specialized tools at home, we cannot hope to achieve such small gaps, but it seemed to me that it ought to be possible to tin the gap faces and sweat the core pieces together, the magnetic gap being a layer of solder. When a metal is tinned, the solder forms an amalgam with the surface molecules of metal. Even when excess of solder is wiped away, a layer still remains and when two such tinned iron surfaces are joined, there exists a very thin solder layer of high reluctance. At this stage, the gap faces of the core and the ends of the cross-piece should be tinned and the excess wiped off. Although its ends are tinned, the cross-piece should still fit into core without being forced. To position and fix the cross-piece, the reader should proceed as follows:

(a) position the cross-piece as accurately as possible in the core and grip the arms tightly with an adjustable lock-wrench. This has the effect of tightening the arms of the core against the cross-piece, ensuring that the gaps will be as small as possible.

(b) now apply a hot soldering iron along the cross-piece. A large soldering iron is advisable as it is required to sweat the cross-piece in position quickly before the heat travels to the coil assembly. As soon as the thin lines of solder in the gaps are seen to melt, the heat should be withdrawn.

The lock-wrench is now removed and the solder cleaned off the core. A fine file is used and care taken to ensure that it does not slip and damage the coil. The cross-piece should be squarely positioned between the ends of the U-piece arms and if it is not, the assembly must be unsweated and the cross-piece re-positioned. The face of the core is now filed as flat as possible using a fine file. On no account should a coarse file be used as this tends to produce ragged and unsatisfactory edges to the magnetic gaps. Once deep scratches have been filed from the face, the core is set between the brass shoulders and the assembly held using a short length of 6 BA brass studding and two nuts. The block formed by the shoulders and core is now filed until the faces are flat. The front face is finished by rubbing down on fine emery paper laid on a flat surface. As the emery paper picks up brass and iron particles, it becomes less abrasive so that the face will finally assume a good polish. The gaps will be visible as two, fine, vertical lines of solder (see Fig. 3). There should also be two fine horizontal lines indicating the brass/iron/brass sandwich. The assembly should now be tested as before.

The head assembly is encapsulated in fibreglass in a plastic bottle cap. No difficulty should be experienced in finding a cap of suitable size, the one shown being 1.3 inches in diameter and 0.85

inches high. It will be noted that the face of the head assembly forms a chord at the inner circumference of the cap so that a slot must be cut to allow the tape to make contact with the magnetic gaps. The lead-out wires project from behind the coil and are connected to a miniature jack plug fitted to the cap. There is no reason why the lead-out wires should not be taken directly through a small hole in the plastic cap, but the use of a jack plug eliminates the possibility of lead-out wire fatigue and failure. Having selected a cap of suitable size, the first task is to remove the internal thread. This can be scraped out with a knife blade and the surface then rubbed with coarse sandpaper. A rough surface is an advantage as it helps to provide good keying for the fibreglass. Once the thread has been removed, a small hole (6 BA clearance) is drilled in the top to receive the 6 BA studding through the head assembly. The hole is positioned so that the front face of the core forms the chord mentioned above. The positioning is not critical so that it is not important if the corners of the head assembly do not actually touch the internal circumference. With the head in position and held by a 6 BA nut, the height of the core in the cap is estimated and a small saw-cut carefully made with a small hacksaw. The cut is then widened until the core face can be seen. This must be carried out carefully to avoid damage to the core face. Once the face can be seen, it becomes obvious which way the cut must be widened to form the tape slot shown in Fig. 4.



Fig. 5. Underside of assembled and encapsulated head

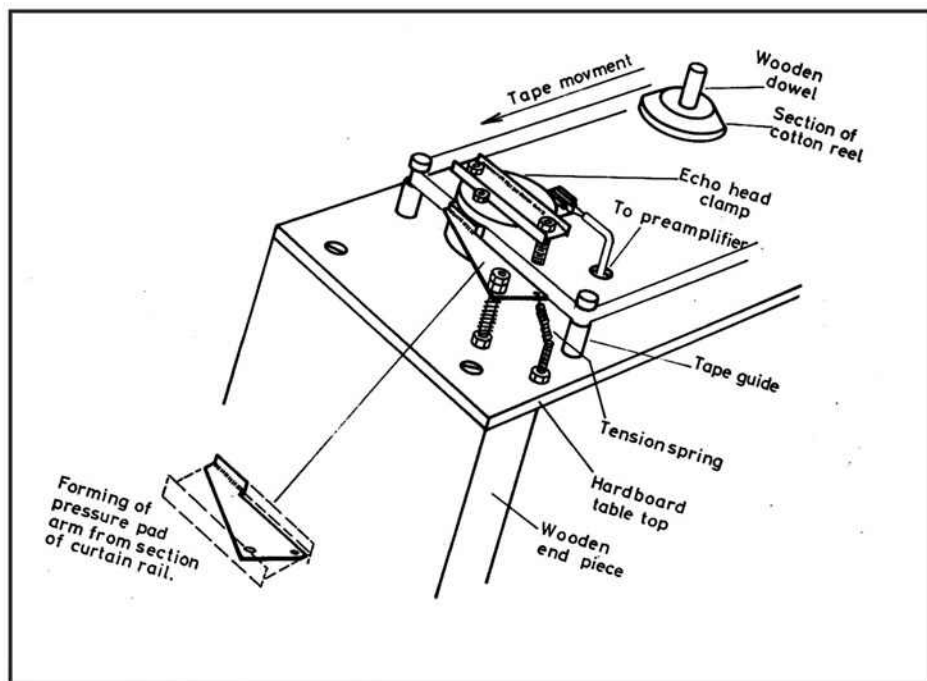


Fig. 6. Assembly of the system onto a platform (see also Fig. 7)

Assuming that the track sense is normal — i.e., upper track used with tape moving from left to right (with coating away from observer), the slot, which is slightly over $\frac{1}{4}$ inch wide is formed so that its top edge (nearest the closed end of the cap) is 0.01 inches above the top edge of the core face. In practice, 0.01 inches is so small that it is sufficient for the upper slot and core edges to be in line. The slot must be parallel with the plane of the core so that the tape path is at right angles to the magnetic gaps. After the slot has been formed to the correct width, the core should be removed and the slot deepened with a fine file. It may be necessary to refit and remove the core frequently during this process, thus gauging how much further filing is needed to bring the slot edges level with the core face.

It is now necessary to drill a small hole in the circumference of the plastic cap directly opposite the tape slot. This will be widened to receive the jack plug, but for the moment it is used to carry the lead-out wires. With the core assembly in

position and the lead-out wires passing through the jack plug hole, the echo head can be tested with tape. It should be pointed out that testing at this stage is to establish that the head is working and an echo effect is obtained. The $3\frac{1}{2}$ ips tape speed is effected by using the drive of a mains machine. A spool of recorded tape is loaded on to the take-up platform and about 30 ft is pulled off and laid in a loose pile some 3 ft to the left of the recorder. When the recorder is set to replay, the tape is wound back on to the spool at $3\frac{1}{2}$ ips. The echo head, connected to a transistor amplifier, is held to the left of the recorder so that the tape runs in the slot. A pressure pad is necessary to maintain good tape-head contact and a piece of cloth or the corner of a handkerchief lightly pressed into the slot is satisfactory. The head should be kept away from the immediate vicinity of the recorder to avoid mains pick-up. This is very much an improvised arrangement, but it does permit the echo effect to be checked. It is quite essential to check the working of the head

before proceeding further as the encapsulation process will make it impossible to recover the core assembly if it is subsequently found to be faulty.

The small hole opposite the slot in the cap is widened to receive the threaded section of a miniature jack plug and the curved area around the hole on the outside should be slightly flattened with a fine file so that the flange on the plug will bear correctly on the outer cap surface. The plug sleeve, which passes over the contacts and screws on to the plug body, is cut down so that it becomes a threaded ring, used to anchor the plug body firmly to the plastic cap. The jack plug is fitted as follows:

(a) pass the threaded ring over the lead-out wires inside the cap.

(b) now pass the lead-out wires through the hole in the cap, cut down to a convenient length (if too long) and solder to the contacts on the plug body.

(c) carefully push the threaded part of the plug body through the hole so that it projects into the cap.

(d) run the ring over the thread and tighten up. Do not overtighten as the plastic of the cap may crack.

(e) check that the plug contacts are not short-circuited and that the coil circuit is complete.

Encapsulation in fibreglass is carried out as it prevents movement of the core and damage to the winding and generally results in a more robust unit. Before mixing the resin, it is necessary to stick a length of Sellotape over the tape slot and so prevent liquid fibreglass from flowing through the holes as it is poured in. The reader may decide to make more than one head, varying the gap distances to produce different echo effects. It is therefore a good idea to seal into the fibreglass a small label with relevant head details typed on it. Fig. 5 shows a view of the echo head with such data recorded. The quantity of fibreglass needed to encapsulate the head is quite small, but due to the critical nature of assessing small quantities of hardener, it is wise to mix up a larger amount. This improves the chances that the resin/hardener proportions will be correct so that the compound will harden correctly. The resin should be introduced on a small paint brush at first, ensuring that air bubbles are not trapped in inaccessible corners. When the contents of the plastic cap have been liberally coated, the resin is poured in with the cap level so that the liquid rises evenly. When the head assembly is just covered, the typed label can be introduced and more resin added. Owing to the viscosity of the fluid, the cap can be over-filled, a convex meniscus forming at the top. This is a useful feature as it ensures that the cap will be full when the resin has hardened; excess can then be ground off. However, in overfilling the cap the reader should be careful not to spill resin over the side. Correctly-mixed fibreglass will harden fairly quickly at room temperature, reaching the jelly stage in about twenty minutes and being hard within an hour. The head therefore should not be moved for at least an hour after filling.

Excess fibreglass is ground off using a medium grade of wet-or-dry carborundum paper laid on a flat surface. When the hardened resin is flush with the rim of the plastic cap, grinding should be continued on the wet-or-dry, now wet. This will produce a finer surface and should be followed by scouring powder applied with a rag and finally, metal polish. It is quite easy to achieve a mirror finish so that the typed label and core assembly are clearly visible (see photograph). Resin in the tape slot is removed by filing until almost down to the core face when it can be prised away carefully with a knife blade. Finally, the area can be cleaned up by rubbing a $\frac{1}{4}$ inch wide strip of fine emery paper through the slot. During this process, the emery paper should be pressed against the core face by means of some flat object $\frac{1}{4}$ inch wide.

Initial Testing

The head itself is now complete, but it remains to find some means of mounting it in the path of tape driven at 3 $\frac{1}{2}$ ips. The objection to mounting



Fig. 7. The completed echo system set up with a tape recorder

it, even temporarily, on a recorder deck is that the modern layout is compact and it is difficult to find sufficient space at an appropriate position to locate the component; there are also problems associated with fitting the head without some modification to the recorder itself. A simple and effective means of mounting the head is shown in Fig. 6. Here, the head is clamped on to a small table constructed from two wooden end-pieces and a flat, hardboard top. The height of the table is such that when the head is in position, tape led from the supply spool passes through the slot without twisting. Two tape guides are fitted to ensure a smooth flow, while the actual mounting of the head is effected by means of a horizontal bar, which is pressed down against the head with two bolts. The bar is in fact, a short length of H-section alloy curtain rail, which, due to its sectional shape, is very rigid. This method of fixing allows for fine adjustment of the head so that the optimum position can be found by trial and error. Vertical head adjustment is made by inserting cardboard shims under the head and washers under the tape guides. Since the head already incorporates a tape guide in the form of the tape slot, there is no real necessity for slots in the tape guides, which can thus be pillars of brass rod. In this event, no height adjustment of the guide is necessary. Head output is picked up by the contacts of a miniature jack plug socket connected to cable which passes through a hole in the table and is taken to the amplifier input.

It is possible to adjust the head to a position where a pressure pad seems unnecessary, but the output is improved by good tape/head contact. The pressure pad arm is made from a short length of H-section alloy curtain rail – the shaping detail is clear from Fig. 5. The pad is a piece of felt or leather (0.5 x 0.25 inches) stuck to the arm with an impact adhesive. The arm is roughly triangular in shape with two holes, one at each of the apexes away from the pad. One hole, drilled to clear 6BA, is used to mount the arm on the table, the mounting taking the form of a 6BA bolt projecting vertically and locked with a nut. The arm is positioned between two 6BA nuts, the lower of which is secured by means of a compression spring; the arm height is varied by adjusting these two nuts. A locknut maintains the position of the upper 6BA nut. The second hole is much smaller and receives one end of the tension spring which presses the pad against the head. The other end of the spring is anchored to a 6BA bolt projecting through the table. The spring must press the pad lightly against the head and must not restrict the tape movement. Passing the tape around two extra tape guides increases the tension of the tape and thus the load on the recorder drive. To offset

this, the supply spool does not rotate on its associated platform (which incorporates friction to maintain tape tension), but is carried on the table where it can rotate freely as tape is drawn off. The spool fits over a small wooden dowel or length of pencil pushed firmly into a section of cotton reel. This arrangement is stuck to the hardboard table-top with impact adhesive. For rewinding of course, the spool must be returned to the recorder.

A suitable mounting table

The table-mounted head has two main advantages. Firstly, the echo replay system can be kept completely separate from the tape recorder, which is used simply as a means of tape transport. Using the head with its own transistor replay amplifier is much simpler than trying to use the tape recorder replay amplifier as it avoids the problems of switching out the existing replay head and connecting in the echo head. Secondly, the arrangement ensures that the echo head is well away from the recorder so that no screening is required. I found that close to the recorder deck, there is considerable hum pick-up, but this falls off rapidly as the head is withdrawn. In the photograph, Fig. 6, the table is shown fairly close to the recorder, but it can of course be moved further away. The table height is calculated for use with one specific recorder and is fairly critical, but the arrangement can be used with machines of different heights by raising the level of the recorder or the echo head table.

Final adjustments

The assembly is now complete, but there are certain aspects that may require attention or adjustment. Firstly, the head slot must be level with the tape path. Where the slot is too low, the head is raised by using cardboard shims, as already mentioned. If the slot is found to be too high, it may be necessary to reduce the height of the platform slightly. Where the discrepancy is very small, the head can be lowered by grinding more fibreglass from the base. Pressure pad adjustment is fairly critical and should be carried out with the tape moving across the head. The light tension spring is adjusted by stretching or cutting out turns to reduce or increase the tension respectively. By commercial standards, the home-built head is inefficient, so that it is important that the coil is matched to the amplifier. Matching is not critical, but losses would occur if the head is used with either a very high or a very low impedance. If the amplifier input characteristics are not well-known, the reader might well try the effect of a matching transformer in both step-up and step-down functions.

INTRODUCTION TO TAPE RECORDING

PART 4

This month—track width and signal to noise ratio

by Gordon J. King

A quarter-track tape recorder will replay, without particular loss of frequency response, a tape recorded on a half-track machine. This often comes as a surprise to the beginner, for he often anticipates a substantial fall in sound quality because the quarter-track head is scanning only half of the recorded half-track.

Fig. 1 shows the situation. Here the tape is recorded fully on both half tracks by a half-track machine and it is being replayed on a quarter-track machine (at the correct speed, of course). With the top head section switched on, the recorded A track is replayed correctly and with the bottom head section switched on the recorded B track is replayed backwards — that is, assuming the half-track recordings were made in the usual manner, shown in Fig. 2.

It will be recalled from Part 3 that first one half-track is recorded, the tape then being turned over to record the remaining half-track, the gap of the head being at the top to record in the manner shown in Fig. 2. Diagram (a) shows a blank tape with the first track (called track A here) being recorded, while diagram (b) shows a tape with track A fully recorded and inverted to record track B. Clearly, then, such tape would be in the correct recording sense for the top head in Fig. 1, but in reverse for the bottom head. Thus, in spite of there being two head sections on a quarter track machine, a half-track tape still has to be inverted to secure correct replay of its B track. In other words, the top head section of the quarter-track machine is always used, this simply taking the place of the full half-track head of the half-track machine.

Since only half the recorded track passes the gap of the replay head, the novice can be forgiven for assuming that correct replay from a quarter-track head would not be possible. However, Fig. 3 shows why the scheme does, in fact, work. Here track A of a half-track tape is shown to be fully recorded. In reality, of course, the recording cannot be seen on the tape oxide, but if it were visible, an audio pattern would be discerned embracing the full width of the track. Thus, at any width across this track the characteristics of the recorded pattern would be fully retained. They would be the same as those across the whole track.

This means, therefore, that all the recorded information can be 'read' from the track provided the gap of the replay head scans a practical slice of the track. There is no need, therefore, for the gap to scan the whole width of the track to respond fully to the information recorded. This is all very well, one may say, but surely there must be a loss of some sort. Indeed there is, but this is not information loss — all the information exists right across the track.

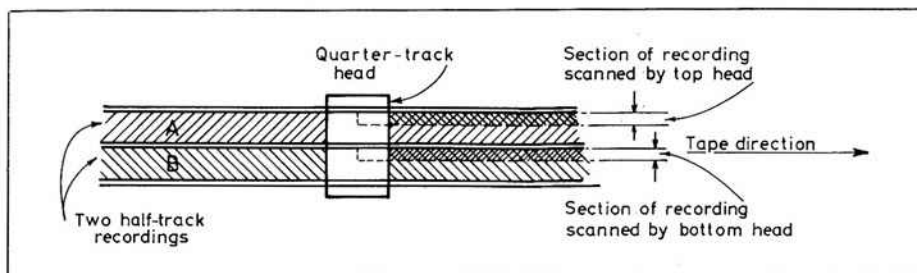


Fig. 1. Showing how a quarter-track head scans only half the width of a tape recorded on half-track.

The loss simply resolves to a reduction in signal output from the replay head.

Track width v. audio signal loss

To illustrate this point, let us suppose that we have a machine in which the gap length of a half-track head can be gradually reduced from its full half-track length right down to zero, and that we use this machine to playback a half-track tape recorded, say, with a constant tone. Across the replay loudspeaker let us connect an output meter (that is, a meter which simply records the loudness of the loudspeaker signal). If the replay output is adjusted with the head gap at its full length for an arbitrary indication on the output meter, evoked by the tone recording on the tape, we should discover that as we reduce the gap length the reading on the output meter would also reduce correspondingly, right down to zero, with zero gap length which, of course, is the same as having no head at all!

If we were listening to the tone at the same time from the loudspeaker, we should also have discovered that the tone remains at exactly the same pitch, irrespective of the

length of the head gap. This proves that the information recorded is not affected. If we wanted to, we could keep the pointer of the output meter reading the original arbitrary value by turning up the replay volume control as we reduce the length of the head gap. We have discovered, then, why a quarter-track machine will replay half-track recordings quite successfully, from the mechanical aspect (Fig. 1) and also from the electrical one. However, those of us who have used a quarter-track machine to listen to, say, tapespondents' half-track tapes, might have been disappointed in the results, when compared with the known replay performance of the quarter-track machine.

To get anything like reasonable replay volume we might find it necessary to turn the replay volume control towards maximum. This is because of the reduced head output signal, as we have seen. In practice, however, this brings in troubles like background noise and hum. When we get the full output voltage from the replay head from a tape track embracing the whole length of the head gap, we can usually get adequate replay volume at about half-

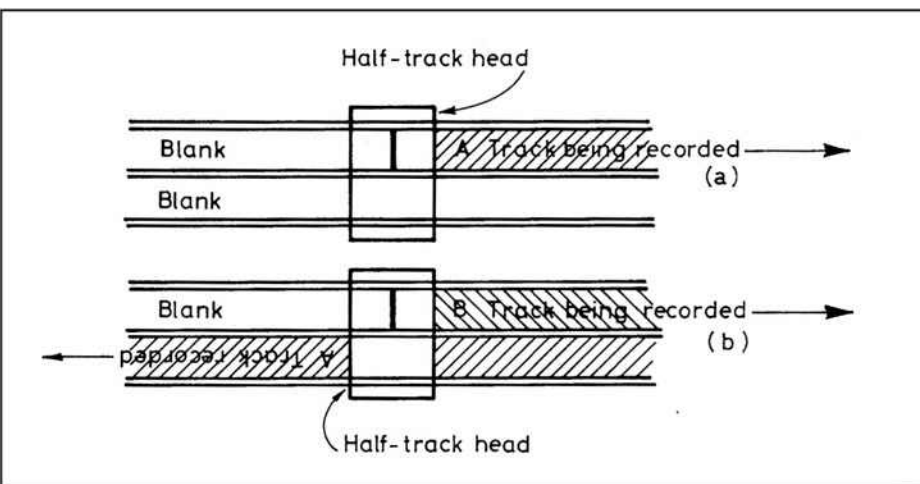


Fig. 2. This diagram shows why it is not possible to use the lower head section of a quarter-track head to replay the B track of a half-track recording (see text).

setting of the volume control, but when only half the recorded track is being scanned by the head gap, we may have to turn towards full volume to maintain the same replay output.

Signal-to-noise ratio

This extra volume control setting reduces the so-called *signal-to-noise ratio*. Now, this is an important aspect of tape recording, and even beginners to the art should have a basic idea of what it is all about. Moreover, it is related to the merits and demerits of half- and quarter-track recordings. Signal in this context is the strength of the electric currents produced at the terminals of the replay head when a recorded tape is passing its gap. We know that electricity is measured in volts (V), and that a torch battery, for instance, gives out about $4\frac{1}{2}$ V, while the mains supply delivers 240V. A battery produces a steady voltage, giving a direct-current in the torch bulb, but the mains supply produces a voltage that rises from zero to a maximum in one polarity, then falls to zero again and rises to a maximum in the opposite polarity. This gives an alternating-current. The time taken for one complete cycle of alternation is termed the frequency (Hz) and the mains supply, as we know, runs at 50Hz. The electricity delivered by the replay head from a fully recorded tape is little more than about 0.001V (or 1mV). This is quite insufficient to light a bulb or operate a loud-speaker. In fact, the head voltage as it is delivered is virtually useless! To be of use it must be considerably amplified, and this is the job of the amplifiers in the replay section of our recorders.

The head voltage is alternating, giving alternating-current, but the frequency is directly related to the pitch or frequencies of the sound originally recorded. Thus, our tape replay amplifiers are ac or signal amplifiers, as distinct from dc amplifiers. We may well need about 5 volts across the replay loudspeaker to get the required sound volume, and since we start with, say, 0.001V at the head, the amplifiers must give a signal magnification of some 5,000 times. The output amplifiers feeding the loud-speaker must also translate the signal more into *power* than voltage – but this is another story.

Hum and Noise

Now, when we set up an amplifier to give a signal lift of some 5,000 times we also establish conditions for the same magnitude amplification of spurious signals, and one of these is the 50Hz mains signal. Mains supplies, circuits and components emanate magnetic and electric fields which induce very small 50Hz 'signal' currents into the amplifier's wiring and components.

In addition to this, the wiring, components and valves or transistors themselves produce spurious signal voltage. This is called noise signal or noise voltage. It cannot be heard directly, but if greatly amplified it produces a hiss in a loudspeaker connected to the output of the amplifier. Noise voltage results from the random shifting about of free-electrons in components and conductors and in valves and transistors. There is not very much that can be done to remove the disturbance. It is one of nature's works and in all conducting mediums, unless they are taken down to very sub-zero tempera-

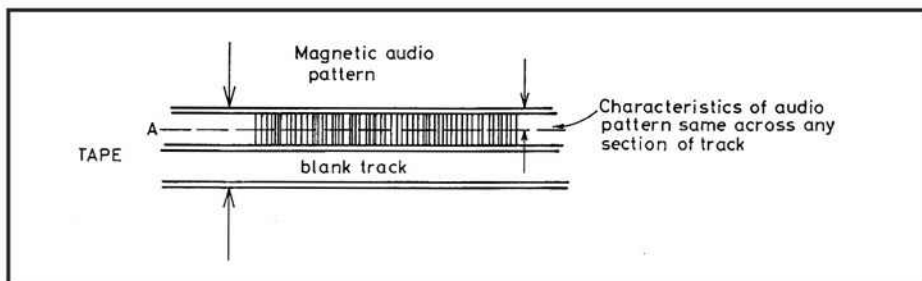


Fig. 3. Because the characteristics of the recording is contained within the width of a track, it is possible to extract all the original information by a head whose gap 'reads' less than the full width.

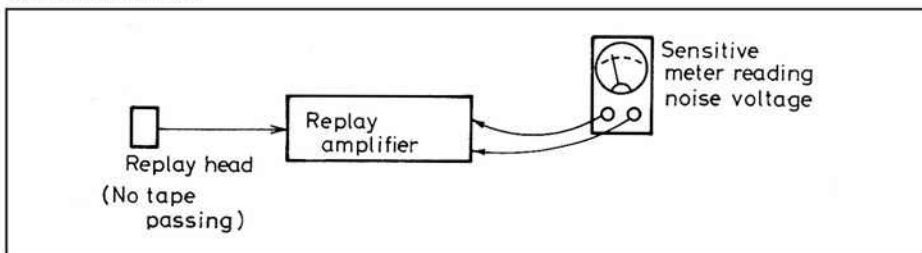


Fig. 4. Showing how the noise output of an amplifier can be measured.

tures (the temperatures at which gases liquify), the free-electrons will always be jumping to and from the orbiting paths of adjacent atoms.

A flow of electric current is nothing more than an *orderly* movement of electrons in a conductor. The mains supply, a battery or even the replay head of a tape recorder instigates this orderly flow. It represents the *real* signal we want, while the signal created by the random movement of electrons is the noise signal.

Thus, our very weak replay head signal is always in competition with spurious hum and noise signals, and the more amplification given to the head signal, the more amplification that is given to the noise signals. From the very beginning in electronics, it has been the aim of the engineer to minimize these spurious signals. In audio and tape recording equipment, for example, special components, including resistors, valves and transistors, have been developed specially to keep the noise signals as small as possible; but it is impossible to delete them completely.

Let us take a replay amplifier whose input is connected to a tape head and whose output is connected to a very sensitive meter that responds to noise signals (Fig. 4). Turning the amplifier to full gain (volume) will give an indication on the output meter, even though tape is not passing the head. This reading indicates integration of all the spurious signals generated in the amplifier, by its circuits and components and coupled-in by induction.

If we disconnected the output meter and introduced a loudspeaker stage instead, the spurious signals would be heard as hiss and hum – the hiss the true noise signals and the hum as mains signal pick-up. In most tape recorder designs the hum level is insignificant, especially battery models – but the hiss is still there.

Now let us suppose that we turn down the gain of the amplifier and get a recorded tape to pass the gap of the head in the ordinary way. The amplifier would then pass wanted signal, and this (plus noise signals) could be read from the output meter. If the amplifier has a maximum rated out-

put of, say, 5 volts, we could turn up the gain control until 5 volts was indicated on the output meter. If at this control setting we stop the tape, the pointer of the meter will fall to a very low reading – this, again, being noise signals at the new gain control setting. If this is, say, 0.005V, we then have a ratio of 5-to-0.005, which is 1,000-to-1. This is the signal/noise ratio referred to earlier. It means that the noise contribution is 1,000 times below the full output from the amplifier. This is often expressed in decibels, and a 1,000-to-1 voltage ratio is equivalent to 60dB. This is a good specification.

With the system set-up just as previously described, let us suppose that we pass a half-track tape through the deck, which has a quarter-track head. The meter will now indicate something below the full 5V output. It may be about $2\frac{1}{2}$ V, and to get the full 5V output we will need to turn the gain control to some more advanced setting. Let us halt the tape again and take a reading of the noise at this new gain setting. This time it will certainly be above the original 0.005V, now possibly 0.01V or even higher. This gives a new ratio – 5-to-0.01, which is 500-to-1. Thus, the signal/noise ratio has been reduced by a factor of 2, now being equal to 54dB, or –6dB down. This is approximately what happens, in fact, when a half-track tape is replayed on a quarter-track machine. For noise signals not to give trouble the signal/noise ratio has to be at least 200-to-1 (46dB). If this is just about possible on replaying a tape actually made on the machine, then one can expect the ratio to fall – bringing in background hiss and possibly hum – when only half of the recorded track is scanned by the replay head. This is why half-track tape to quarter-track machine interchange fails sometimes to work out as expected. However, many machines have such a good signal/noise specification that 6dB drop still keeps the ratio well below subjective noise threshold.

Next month we will consider the noise produced by the tape itself and compare half-track and quarter-track machines replaying their own recordings.

SOUND IS WHERE YOU FIND IT

Some ideas for
actuality-documentary
or travelogue
contest tapes

by F. C. Judd

First you must have a subject. Having settled on this the next step is to gather together the ingredients – the sounds, the backgrounds and the characters. From thereon much depends on one's ability and expertise in scripting and editing. Even straight music recordings should have some verbal support if only a few words about the composer or artistes etc, and, of course, the title. This year's *British Amateur Tape Recording Contest* and the *BBC National Tape Recording Contest* (see July issue of *ATR*) between them offer a wide range of possible subjects from set themes to straight music taking in actuality, documentary, interviewing, technical recordings and so on. The BBC contest is based on a single theme 'On the Move' and the variations of this alone offer tremendous scope.

Keep on the Move

Earlier this year I set out on a 1500 mile car



Railway control systems offer a subject for the BBC recording contest theme 'on the move'. Photo shows a Dutch Railways control room where the sounds are being recorded for a documentary.



British United Airways Air Ferry Service. I film the loading of my car into the Carvair aircraft – Chelsea Bridge. Less than one hour later I was driving out of Ostend on the way to Antwerp and thence into Holland.

tour through Holland, Germany and Belgium with the sole object of making an 'on the move' film and of course recording for the sound for the film. During the course of this tour literally dozens of *sound only* subjects came to light. For instance I took the car over, loaded with recording and filming equipment, by the *British United Airways Air Ferry Service* from Southend to Ostend. This unique air ferry system in itself was a subject for a documentary – in fact a few words with Mr G. Turberville, the BUA public relations officer at Southend Airport revealed that tape recording and cinefilm enthusiasts are always welcome to a tour of the airport. Here was an 'on the move' theme on air travel which could be recorded without taking a foot off the ground. However, on arriving at Ostend my objective was to motor

up through Antwerp, across to Rotterdam and finally into the bulb growing area of Holland. Keukenhof Park and the Dutch bulb fields in April or May are a cine enthusiasts' paradise.

The next step was Den Helder in the North of Holland where the fishing harbour offered some interview material (see July front cover of *ATR*) and where the ferries to Texel Island and its bird sanctuaries presented more possibilities. Then on across the 22 mile long sea wall which keeps the North Sea out of Holland, another documentary subject, and finally into Germany. As far as Germany, France and Belgium are concerned you have only to look back through recent issues of *ATR* to find many ideas presented by Bob Danvers-Walker or myself. I could go on ad infinitum outlining subjects for recording that



Almost a classic sound in most large Continental towns. Bob Danvers-Walker engrossed in recording tram sounds in Munich. One photo he didn't know I'd taken.



The tall ships. I recorded the going ashore ceremony of this beautiful sailing ship – the Christian Radich – in the harbour at Oslo. Ships offer many possibilities for documentary and travelogue recording.

Right: Another photo of Bob Danvers-Walker in action in Paris recording the sound of a Hurdy-gurdy played by a French gypsy in colourful costume.

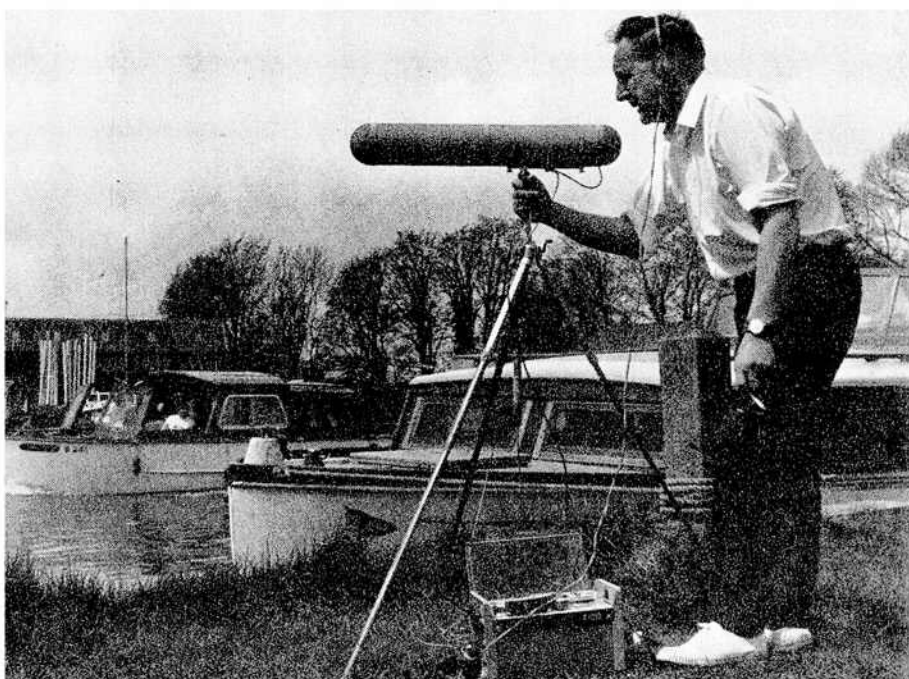
are to be found everywhere on the continent. Even the few photographs of actuality recording accompanying this article show barely a sample of what can be found if you get out and about but I hope they will at least trigger off some thoughts for a recording contest subject.

Recording at Home

Of course one does not have to go to the continent to find ideas for a contest tape, at least not until everything recordable in this country has been exhausted and that should be a long time from now. My most recent trip in search of sound and dare I say it, sound ideas, was to Norfolk. Attention Norwich Tape Club – have you made a documentary about the Norfolk Broads or its boat building industry or the unique holiday boats service – all subjects for the BBC contest theme 'On the Move'? During the course of my Norfolk Broads sound hunt I came across a BBC film unit doing an actuality film on Potter Heigham and its famous bridge which, because of its low head room, defies most broads motor cruiser enthusiasts. The stories that can be related by the bridge 'pilots' at Potter Heigham about boats stuck under or colliding with the bridge are inexhaustible but nevertheless entertaining and recordable. Right alongside the bridge is Herbert Woods Ltd famous boat yard. I



City night life anywhere in the world is first-class actuality material. The Montmartre area in Paris is much the same as London's centre of entertainment around Piccadilly.



I check the Sennheiser rifle microphone and EMIL4 prior to a daybreak recording session to capture the dawn chorus. The Norfolk Broads offers excellent scope for birdsong enthusiasts.

SOUND IS WHERE YOU FIND IT

continued

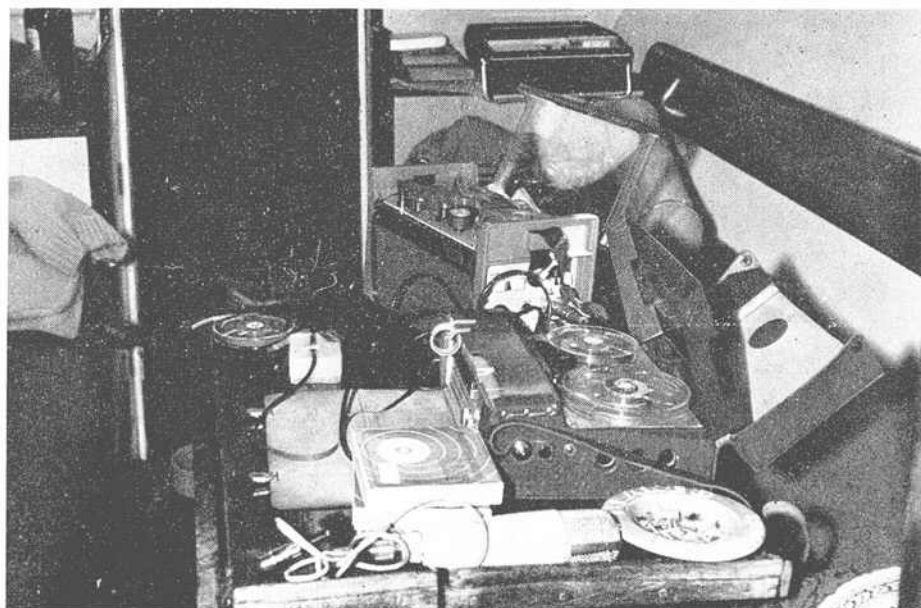
spent best part of two hours there with a tape recorder gathering material on the subject of boat building.

Go right down the River Bure through Yarmouth, across Breydon Water and on beyond Beccles and you will eventually come to Geldeston Lock where there is a tiny inn set in a small wood. It's called *The Locks* and dates back to Charles I. Its owner – Susan Ellis – is known all over the Broads and has been featured in many radio and TV documentaries about the East Anglian Waterways. A wonderful personality for an interview if ever there was. Moor up at Reedham and you will find the Ship Inn where you can record Eddie Gates and his Hammond Organ. Just mention *ATR*. He was our front cover subject for the June issue, you may remember.

Again I could go on almost through the rest of the magazine outlining ideas and subjects for actuality and documentary recordings but by now someone may be saying 'what if I haven't got a portable tape recorder?' In that case try writing for travel brochures which any tourist bureau will send for the asking. Here you have the raw material for scripts on travel and places of interest of all kinds. With these and a few sound effects you could still produce an *armchair travelogue* as convincing as the real thing.



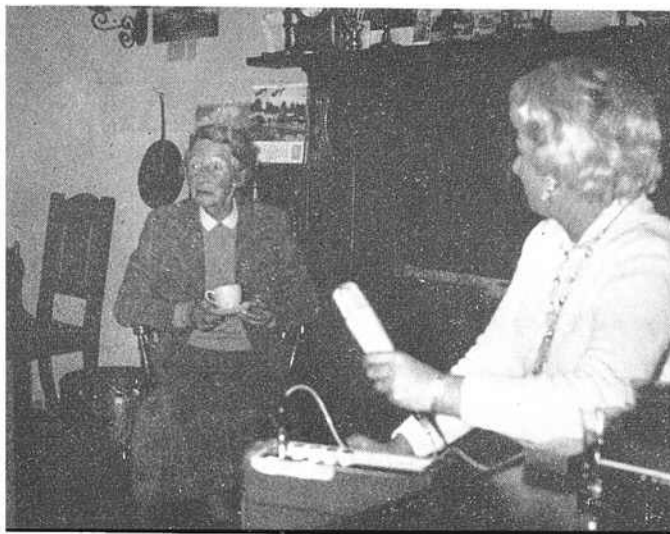
The Sanyo MR130 portable, costs only 29 gns and makes excellent recordings. Here it provides music 'on the move' for the helmsman.



The vast number of recordings made during my week of cruising around the Norfolk Broads necessitated some pre-editing. The EMI and Uher portables set up in the cruiser cabin for listening to and cutting tapes into the required order. Temporary splicing carried out with a soap box and razor blade!



Ambrose Canham (left), veteran of the Norfolk Broads, boatbuilder and Potter Heigham bridge pilot, talks about boats and life in general on the East Anglian Waterways. The interviewer with the Sanyo MR130 is Mr Keegan, an *ATR* reader, of Sutton Coldfield.



Miss Susan Ellis (left), owner of the 17th-century inn The Locks near Geldeston, relates the history of the inn. Susan Ellis, now over 70 years old, has been featured in East Anglian TV and BBC documentaries about the Norfolk Broads and is a brilliant conversationalist.



Eddie Gates, blind Hammond organist featured on our June front cover, provides the right atmosphere for an evening ashore in the Ship Inn at Reedham.



An interview with boat yard owner and boatbuilder Clifford Allen of Coltishall. His family have been building boats for the Norfolk Broads since around 1850.



Mr J. Corlett of Clapham, borrowed the Sanyo MR130 to tape the sounds of getting underway. Any 'on the move' holiday could provide the subject material for the BBC tape recording contest.

A TOUCH OF THE OLD SAFARI *continued from page 13*

of a supermarket on one of its quieter days will sound more like a precinct. Is this defeating the object? Is this not just another form of simulation? Not really, there is a difference. A simulated sound is a counterfeit. The rustle of crisp brown paper to sound like a fire is an example of such a deception. An assimilated sound – as gathered by the battery portable – is one that is, more or less, the same as the required noise. The supermarket resembles a shopping pre-

inct, in more ways than one. The supermarket sound is a modified shopping precinct. You want a shopping precinct for your programme. The supermarket sound is an atmospheric one that is assimilated into the required scene. Before I am accused of repeating myself and of labouring a point, I would just add that if the topic of your programme is the historic closing down of the local cattle market, then, in this case, you must record the market. If you use a shopping precinct sound to assim-

late into the scene someone may take legal action. But if it is atmosphere alone that you are after, that thing that gently throbs with life, then this is where the battery portable comes to town. This is the object of a sound safari. The hunters collect realistic sounds that can be used either in their own right or to be assimilated into a likened sound scene. This is what makes the battery portable a valuable asset towards the re-introduction of Sound Life.

THE THINGS YOU SAY

Copyright – Two Points to Remember

After having read the letter from Mr Sweetman in the May issue of *ATR* I find that there are one or two aspects of copyright which he has omitted to make clear.

1. There are lots of choral works not covered by his society which are, in fact, performed regularly by choirs and choral societies. The reason is that they are of unknown origin, folk songs and works by composers who have been dead over 50 years.

2. There is also a lot of music which can be played and recorded freely for the same reason. Gilbert and Sullivan operettas being a typical example.

Surely, Mr Sweetman, when a work comes under these headings the copyright of the performance is with the artist/artists who perform and the copyright of the recording is with the person who records the result, having, in fact, a joint copyright. These people can then replay and re-record as much as desired without any licence being necessary.

R. Dowd

Stoneycroft,
Liverpool 13

Copyright Licence Co-operation?

I was most interested to read the remarks under *The Things You Say* regarding copyright in your May issue, and would like to make some further observations.

Copyright is a problem of which the amateur must be fully conscious and he should be thankful to the MCPS for providing licensing facilities at reasonable terms. Reading on, however, we are told that the number of licences issued compared with the number of tape recorders sold is very small. Peace of mind at a reasonable cost would, without a doubt, appeal to the majority of tape club members, so obviously there must be a reason for so few taking advantage of the scheme. The answer, unfortunately, is quite simple. The MCPS covers the initial recording rights and their licence is an extremely good start. The remarks continue to mention several tape clubs and we can do no more but assume they are not in possession of the MCPS licences. It is not made clear, however, whether they would be strictly within the law if they did possess one.

What other licensing facilities are available to tape recording clubs? The answer, I am led to understand, is none. A request to copy records for hospital programmes was turned down, although this is granted to individuals only.

On the other hand, many recognized charitable organizations openly admit that they cannot afford to pay for licences, but their programmes go on. What can we do other than assume the authorities either turn a blind eye or accept some mysterious unwritten law and allow them to continue. If this is so, what of the tape clubs doing similar work?

An example came to light recently concerning a tape club in possession of a licence and an operatic society who had paid the usual fees

to perform a musical show. Permission was requested through the correct channels to make recordings to be used in programmes to be played in local hospitals. The request was refused and the notification arrived several days after the last performance.

It is easy to criticize, but consider the average person who buys a tape recorder. The first thing he is told in the instructions is how to make recordings from the wireless or gramophone and invariably there is no mention of any reason why he should not do so. The member in the club room is in a slightly different position. He is soon told of the copyright laws and no doubt he will dream of the day when the amateur will be recognized not only by the MCPS, and when he will be able to embrace the opportunity of availing himself of the facilities provided.

J. T. Gilbert,
(Secretary),

**Association of Midland Tape
Recording Clubs**

Appeal to Recording Companies

We are continually being told that it is illegal to record records other than in the home, provided we don't listen to them.

There are many thousands of people who would be only too willing to pay an annual fee to the record companies jointly in order to satisfy everyone, including the composer. After all, they are getting nothing from us at the moment, and it could be made to pay if record companies came out of the clouds and tackled this in a realistic manner. After all, there are a lot of us doing this and it would be a job having all of us dragged off to Court with our tape recorders clutched under our arms and flowing reels of evidence.

E. G. Waters

Croydon,
Surrey

Copyright – fair play please!

I have read with interest, but with mixed feelings, the letters and articles appearing from time to time in *ATR* on the subject of copyright. Taking into consideration the different views expressed by the writers, I believe we are inclined to lose sight of the fact that rules are made to be observed (yes, I can hear the opposition remarking 'they were made to be broken' – never mind) and in this particular case I would use an ordinary game of sport with which to illustrate my point. The introduction of rules is necessary before any game can be played, and very few games are played without a referee being in attendance to watch for fair play all round. This, in effect, cannot be followed unless the match is played strictly in accordance with the rules appropriate to the game in progress.

Let us assume that a referee of a game has given a decision strictly in accordance with the rule applicable to that match, in other words his decision was a correct one and left no doubt in anybody's mind. The players and spectators alike accept the decision, however painful it might appear to a certain

individual participating in that match, and there would not seem to be any cause for complaint against the referee so no one quarrels with him on that occasion. The referee, by his decision, is doing nothing more than passing on his interpretation of a specific rule.

Let us now apply the principles outlined here to the subject of this article, using the illustration to clarify my point. For the game, we have tape recording, for the rules we have the Copyright Act, with all its implications, to guide all concerned; the referee, for the purpose of this exercise, shall be The Mechanical Copyright Protection Society, the field of play the tape recording club room and the spectators, all those interested in the subject. Because no one is in a position to give away that which he does not legally possess, and since MCPS does not possess the right to authorize the copying of gramophone records (this being the sole prerogative of the several manufacturers of discs), we should not blame him for not giving the tape recording clubs all that they would like to have. He has at least placed certain facilities within their reach, and I feel certain that if he were in a position to do so, he would give them all a great deal more, but that 'giving' is not within his power. So, why condemn MCPS for not authorizing the use of discs in the manner desired by the members of the tape recording fraternity?

It is my contention that the matter, the subject of so much apparent bitterness, should be referred to the manufacturers in the first place by appealing to their governing body to use their better judgment, asking them to consider very seriously the position of the tape recording clubs in their efforts to entertain patients in hospitals, old-age pensioners, Derby and Joan clubs, Blind Peoples' Associations and other recognized charitable causes, by playing recordings to these groups in their time of need for this entertainment. I am inclined to feel that the case of the discum-tape recording matter has not been properly represented to the manufacturers of gramophone records. I will not be prepared to believe that, in the event of the issue of a blanket licence to any number of tape recording clubs, the sales of discs will be considerably reduced, because it is already common knowledge that discs are being copied now by their thousands all over the country, without permission being first obtained. The furnishing of written permission by the manufacturers to tape recording clubs will therefore make very little difference, if any, to the number of discs sold over the counter.

Individuals, as distinct from tape recording clubs as a composite body, may, of course, apply to the manufacturers for permission to copy records on to tape, within certain limits. Subject to certain conditions, such permission is usually granted. Let me say here that I have never experienced any difficulty or unpleasantness in dealing with manufacturers on this score. The conditions as I know them are few in number, and to my way of thinking, very reasonable. They are:

1. discs shall be obtained in the first instance by direct purchase over the counter;
2. copying shall be limited to certain (specified) works and for a specific purpose only;
3. all dubbing shall be erased immediately following the event, the object for which the copy was made;
4. the taped material will be used only once

continued on page 38

TAPE IN THE JUNIOR SCHOOL

by Peter F. Walker



Gulliver's heavy footsteps (left) make him effectively larger than the Lilliputians behind him.

Once the teaching staff of an average Junior School have become fully aware of the value and uses of the tape recorder, the big disadvantage is that most establishments have only one machine at their disposal.

On perhaps the most mundane level, a school with a recorder need never hold its morning assembly without accompaniment to its hymns, merely because no member of staff can be found who is willing to risk the abilities gained from long-forgotten piano lessons. There is always a pianist (or organist) available somewhere who would be flattered at the prospect of recording a complete tape of hymn tunes.

Most English teachers are vaguely aware that a new recorder offers many new opportunities in the realm of speech training, but beyond the idea of 'hearing ourselves as others hear us' – and the fact that this can point out faults – the need for practical work which appeals to or instructs children is seldom immediately apparent. This conception is largely an intellectual one anyway, and few children can be expected to hear much to criticize in what is, after all, merely a reflection of their vocal environment.

In the early stages – ideally – the teacher should be able to allow the children to 'play' with the machine, so far as this is practicable,

as this gives the teacher (and possibly some of the more responsible children) an idea of what can – and more importantly, what cannot – be done in a purely mechanical way. Practical use also rids the children of self-consciousness before the microphone, and the inevitable giggling at 'it sounds like your voice, but doesn't sound like mine'. Also in many classes such practice will eventually lead to suggestions from some of the more original spirits for creative use of the recorder which, as any teacher knows, can be of far more value than ideas imposed by himself. For a slow-starting class, however, a periodically-recorded programme of readings, music, improvisations, schools news (football or netball matches, etc) can provide a useful beginning. If this is maintained regularly, children will realize after a time the need for variety in material and will show surprising powers of inventiveness and originality. An important point to remember here is that as many of their ideas as possible should be tried; unsuitable material will clearly show up as such – especially before the critical ears of their classmates who should, of course, promptly be invited to improve it.

The tape recorder can also be used very profitably as a starting point for composition and poetry writing. A piece of music or a

carefully selected sequence of sound effects (which, incidentally, may be repeated when ever necessary) can often spark off most vivid flights of fancy – and, of course, many pieces thus produced are particularly suitable for inclusion in recorded programmes.

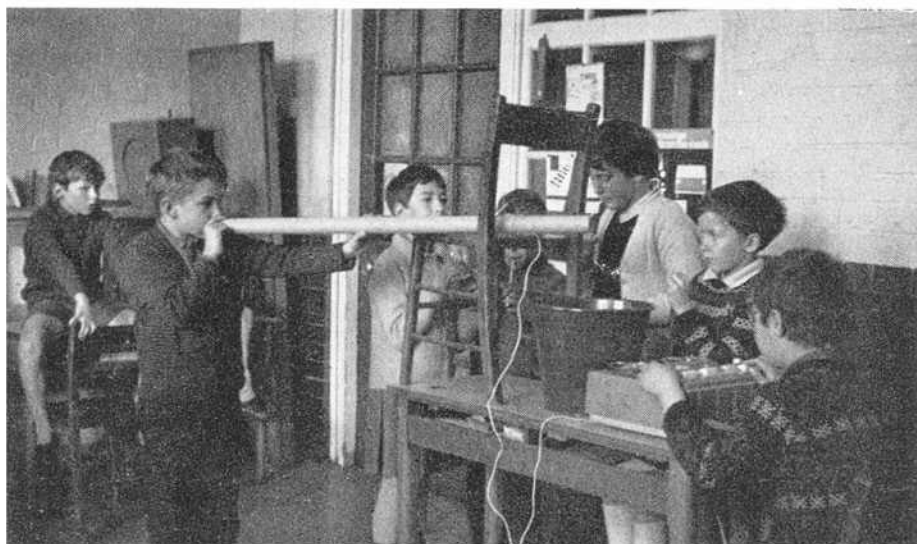
Children's imaginations tend to be very responsive to sound effects and music of a suitably dramatic nature, and great use of this can be made in simple dramatizations of stories, which are made considerably more vivid in this way. Thus the difference between the sizes of Gulliver and the Lilliputians can be quite sufficiently pointed by the heavy clumping of Gulliver's feet – without the need for technical tricks to suggest the smallness of the Lilliputians, who nowadays anyway might easily invite comparison with Chipmunks or Diddy Folk (*accomplished by raising the speed of the tape recorder on replay—Ed.*). The invention of their own sound effects is generally far more satisfying to children than the use of those taken from discs.

Once children become used to working with the recorder, their dramatizations of Bible incidents can make a very real contribution to morning assembly; and on a purely practical level, a tape recorder takes up far less room than eight assorted readers in a crowded carol service. Falterings and errors caused by nerves in a live performance can be corrected on the pre-recorded readings.

Experiments have been very successfully attempted in the recording by several voices of the exact words in chapters of text books. The recording is played in the classroom, and the children follow the 'script' in the book before them. Members of local dramatic societies are usually more than willing to undertake such work, and the sound of a variety of unfamiliar voices, played slightly louder than is necessary for audibility, has been found almost invariably to rivet the interest and attention of the children.

The tape recorder is also a considerable aid in the learning of material by repetition. Suppose that one wishes the children to learn a poem. Firstly it is recorded, then played over and over to them until they are so familiar with it that they can repeat it with the recording. The next stage is to repeat the process, but to turn down the volume control at the more familiar parts, and so on progressively over longer passages, until the children are able to repeat the

continued on page 38 25



The large ship is about to leave harbour. The water splashes (group round chair, blowing through straws into water), the siren blows (left), and the ship's bell (right) awaits his cue.

TAPE CLUB NEWS

Centenary Celebrations

The big event of the summer season for Barrow Soundtrack Club was the centenary celebrations of the town's incorporation as a borough. A cast of 650 townsfolk mimed and acted an historical pageant held in the local football ground and the club provided a three hour soundtrack of dialogue, music and sound effects for the whole production. Performances were held on three evenings to capacity audiences and unusual features included the portrayal of a gigantic model airship breaking up and the launching of Barrow's first all-metal ship.

The weekly hospital record request programme and the weekly visits to the Barrow Home for the Blind are continuing throughout the summer. When one of the residents was temporarily in hospital in Lancaster, the club arranged for a tape to be sent to her which included messages from the Matron and all other residents. With the help of a nurse, the patient recorded a reply which club members then played back at the Blind Home. The local press printed a story about this service as it has been greatly appreciated.

The club's busy summer programme has also included a sound-quizzing night when every member provided a 5 minute taped quiz and a 16mm film show when colour films were shown depicting tape recording in various forms and the uses of magnetic tape. For more details of the club contact the Public Relations Officer, Jane Rayner, 123 Abbey Road, Barrow-in-Furness, Lancs.

Dublin Club Growing

Since the inaugural meeting held in June 1966 and attended by 14 persons, membership of the Irish Tape Recording Society has soared to 65. The past year has seen the club organize, among many other things, nine lectures, two manufacturers' demonstrations, three tape and film shows, an auction night and two live outdoor recording sessions.

At the recent AGM, Charles Stokes was elected as Chairman, Sean Logue was re-elected Secretary with Jackie Kennedy as his assistant. Joint treasurers are Dermot O'Reilly and Brian Gribben, and elected as members of committee were M. Purcell, D. Bradshaw and B. Pender. The main event of the evening was the presentation to the *Tape of the Year* competition winner, Sean Logue. His entry was a humorous, imaginative and observant study of man's uses for his feet, from work to play. All the special effects were recorded in Dublin and the tape was, naturally enough, entitled *Feet*.

The club welcomes sightless people as members and is building up a library of recorded books, articles, music and plays for them. They will also service tape recorders for the blind.

Secretary Sean Logue would like to hear from other clubs with the view of exchanging ideas for programmes. Our Dublin readers interested in knowing more about the club are also invited to contact him at 17 Shanboley Road, Dublin 9. Telephone 371815.

From across the Atlantic

The Great Lakes Tape Club is not actually a club in the English sense of the word; it is a tape exchange but it is unique in that it is directed by and composed mainly of teenagers. Director of the club, Bruce Sherman, hopes that news of their activities will be of interest to ATR readers.

Lynda Weisblum of Huntington Woods, Michigan, reads *Teen Talk*, the club's monthly magazine, and the membership list for any sightless member, and Joe Brunner of Franklin Park, Illinois, is the club librarian. He presents selections from the library in the form of a programme for the monthly round robins as a means of stimulating the members' interest in this service. He provides members with recordings from his collection or from the collection provided by Les Beeher of Niagara Falls, New York.

A club activity which will be of interest to ATR readers is the play *The Missing Round Robin Affair*. It is a humorous take-off of *The Girl from UNCLE* and members who became interested in the roles of certain characters applied to act out these roles. Members are mailed the script and directions and act their

lines on tape. At the club's headquarters there is a battery of five tape recorders to smoothly mix the lines of several characters into an entertaining play. The resulting tape will be distributed to the membership via the monthly round robin.

This monthly round robin, usually of an hour's duration, is heard not only in the States but overseas. Interested members produce a programme and mail it to GLTC headquarters where Morris Edelman and Bruce Sherman copy members' tapes and introduce comments and club news. From the resulting master tape they produce the necessary number of copies and distribute them throughout the membership. It is proposed to start a stereo round robin in the near future.

ATR readers can contact the Director of GLTC, Bruce Sherman at 13346 Sherwood, Huntington Woods, Michigan.

Ron Barrett Memorial Trophy Presentation

Jack Willis was the member of the Rugby TRS to be awarded the Ron Barrett Memorial Trophy for achievement during the past quarter. Nominations were also submitted in respect of Len Stephens, Dorothy Key and Janet Clarke but it was the club's blind member who was voted overwhelmingly as recipient. Thanks go to Jack for his untiring work for the club, whether at meetings or in recording or dubbing and his regular attendance at club nights.

At the club's AGM, the Secretary Janet Clarke, in her first report to the society since taking office recounted the more prominent activities of the year such as the Percival Guildhouse project tape, the club's entry in the Rag Carnival Procession and the award to the society last February of the ATR Challenge Cup. The following officers were re-elected: President, J. O. Bannister; Treasurer, L. P. Stephens; Secretary, Mrs J. B. Clarke; Assistant Secretary, T. Reader; Auditors, Mr and Mrs G. D. Kay. M. F. Brown, I. P. Drinkwater, J. W. Long, L. G. S. Routh and B. M. Woodcock were elected as committee members.

More information is available from T. Reader, Assistant Secretary, 101 Dunchurch Road, Rugby.

Visit from Rugby

A recent meeting of the Coventry TRC could only be described as 'bursting at the seams' when the Rugby Society brought along 15 of their members. Also present were two students from the University of Warwick who are attempting to form a tape recording club at the university.

The first half of the meeting was devoted to a brief demonstration by Ken Preston of his Tandberg, Pioneer and B&O stereo equipment together with examples of outdoor recordings made with his newest stereo (Beyer) microphones. Later in the evening, due to special requests from the club's visitors, a further brief demonstration was given.

The winning tape of the recent Rugby competition, which was judged by Coventry members, was played and a most amusing and excellently made tape by two of the Rugby members was heard. The latter was of a mock rocket launch using the highly potent beverage 'scrumpy'.

A scheme to encourage and help members with their purchase of more equipment has been started. This is in the form of a savings club and it is hoped that members will take the opportunity of joining.

Secretary of the Coventry club is Mr K. W. Preston, 42 Four Pounds Avenue, Coventry.

16mm Sound Films

Included in a sound programme of sound films at the South Devon TRC were *Sound on Tape*, *Son et Lumière*, *Piccolo Saxo & Co* and *Travelling Tune* from Philips Limited; *The Manufacture of Transistors* and *Thin Film Micro-Circuits* from Mullard Limited. Also seen was *A Child's Guide to Blowing up a Car*, Ford film showing how special effects are created for a James Bond film. Members noticed that sound recording engineers kept well under cover. The projectionist was Jack Steer who showed a film which he had taken of the club's recent outing to Slimbridge.

More shots are yet to be taken for this film which will eventually have a sound track added.

Another evening was devoted to playing members' tapes and some of the winning entries in the 1966 British and International Tape Recording Contests (obtained from the Federation Library). Included were recordings of the unveiling of a plaque erected by the Institute of Electrical Engineers to commemorate the great work of Oliver Heaviside; tobacco auctioneers in Southern Rhodesia; 'vocal sound effects' from a professional entertainer in Texas; and a composition tape from Mr F. W. Richardson. Items from Czechoslovakia, France, Germany and Denmark were also featured.

Secretary of the South Devon Club is Gordon Furneaux, 45 Kenwyn Road, Eliacombe, Torquay.

An Invitation

The Derby TRC will be holding an exhibition and continuous demonstrations at the open day and rally to be held on August 13 by the local amateur radio society. The open day will be held at the Rykneld School, Derby, between 10.30am and 6pm and all are welcome.

Amongst recent activities has been a taped programme of folk songs by Mrs Lenrie Thacker, winner of the latest competition entitled *A Day in the Life of a Window Cleaner*. Mrs Thacker has just emigrated to Australia and club members wish her well in her new life and look forward to hearing from her - on tape of course!

Sixteen-year-old Tony Smith gave a taped documentary on, appropriately enough, The History of Tape Recording and Alf Stanway outlined in his talk entitled *Decibels* just what they are and what they mean. More details of the club from A. F. Stanway, 8 Midland Road, Derby.

Banjo Club Recording

Four members of the North London Tape & Hi-Fi Club attended the Banjo, Mandolin and Guitar Club at Huxley School, Edmonton, with a view to recording the session. Unfortunately, trouble was experienced with the mains socket in the hall and most of the first half of the performance went unrecorded. The club mixer (too large and cumbersome) was used but seems to have introduced hum on two machines. The evening's results were a bit disappointing to all but when in doubt, try again.

An evening was spent in listening to and discussing documentary tapes. Worthwhile suggestions for compiling these were given by Len Ellis, Keith Baker and Charles Davison. At another meeting a wide selection of members' favourite tapes and discs were heard. These covered classical and pop music and humour. Details of membership are available from the Secretary, John Wilson, 202a North End Road, London W14.

AGM

The Thornton Heath TRC's sixth AGM was well attended and a new committee was elected as follows: Mr G. M. Webb, Vice-Chairman, and Mr H. J. Bradley, Publicity Officer, retired from the committee. Mr A. G. Grover, a previous committee member, was elected Vice-Chairman, and will now be able to take a more active and useful part in the organization of the club. Mr B. F. Griggs was elected Programme Organizer and Mr B. C. Percival became Publicity Officer. Mr E. J. Bashford, Chairman, and Mrs M. L. Bashford, Treasurer, were both re-elected. The club has been planning many outings where the families and friends of members can come along. London and Gatwick Airports and London Zoo are among places that the club hopes to visit. Further information about the club is available from B. C. Percival, 19 Woodlodge Lane, West Wickham, Kent.

New Club a Success

The Far and Wide Recording Club was formed in January of this year and has since made rapid strides. Already there are members in Western Canada, New Zealand, South Africa and Scotland, and a branch 'cine-cum-tape' section has been formed in Sydenham, London.

The club's main aim is to produce a really interesting sound magazine six times a year. Three have already been issued and praise and encouragement have been received from practically every member who has sent for a dubbing.

At the club's disposal are a Vox Continental electric organ and an electric guitar. These instruments provide excellent backing and linking music for items in the magazine.

The club shares rosters with the Indiana Recording Club of America and hope to share with the New Zealand Club in the near future.

Membership is 10s per annum and for this amount members receive six magazines dubbed and post free. Full details from The Far and Wide Recording Club, Eccles, Macclesfield, Kent.

THE TAPE DIRECTORY

London

R. Brian Dunkley, 40, cinema projectionist, Top Flat, 80 Herne Hill, London SE24. Round robin tapes, travel, films, stage; all but pop. Fidelity Playmaster, Civic T62, 7 in, 1½, 3½, 7½. UK.

Michael Evans, 24, warehouseman, 7 Cornwall Cottages, Popham Street, Islington, London N1. Short-wave radio, electronics; pop, C&W, folk. Fidelity Playmaster, 7 in, 1½, 3½, 7½. New Zealand, Australia, USA.

Fred Harper, 53, bowling green keeper, 100 Selworthy Road, Catford, London SE6. Show music, classics, jazz. HMV, Philips, 5½ in, 1½, 3½. Anywhere English speaking.

Martin N. Lewis, 15, student, 28 Harman Drive, London NW2. Current affairs, sport, drama; pop, jazz, light classical. Philips EL3558, 7 in, 1½, 3½. USA, Canada, Australia, New Zealand.

Peter Marsh, 35, clerk, 45 Kingswood Avenue, London NW6. Photography, travel, painting; most types. Ferrograph, 8½ in, 3½, 7½. USA, NZ, UK, Africa, Russia, France, Ceylon, UAR.

John Maude, 26, entertainments, 4 Sanderstead Close, Atkins Road, London SW12. Theatre, photography, camping; pop and light classical. Philips, 7 in, 1½, 3½, 7½. Anywhere.

K. Michaels, 40, postal clerk, 287 Navarino Mansions, Dalston Lane, London E8. Photography; ballads and pop. Dual stereo/mono deck, 5½ in, 3½, 7½. Anywhere abroad.

Fred L. H. Jones, 60, retired, 16 Gayhurst Road, Dalston, London E8. Italian language; musica leggera. Grundig TK20, 3½. Italy.

D. Snell, 30, photographer, 43 Domelton House, Wendesworth Estate, Wandsworth, London SW18. Photography; modern jazz and pop. Tandberg 72B, 7 in, 1½, 3½, 7½. USA and Sweden.

Jack Warner, 37, HM Forces, 7 Duckett Road, Haringey, London N4. Cine, driving, people; C&W. Ferguson 3214, 7 in, 1½, 3½, 7½. Anywhere.

Mrs M. S. White, 46, housewife, 49 East Sheen Avenue, London SW14. Reading, people, siamese cats, good food, home decorating; classical and modern jazz. Philips EL3558, 7 in, 1½, 3½. Anywhere English speaking.

John E. Wilkinson, 34, LTD inspector, 34 Gregory Crescent, Eltham, London SE9. Starting stereo round robin; all kinds. Revox G36, 10 in, 3½, 7½. All Revox and Ferrograph owners anywhere.

Middlesex

Michael Bigwood, 28, electronic buyer, 39 Derwent Road, Whitton, Twickenham, Middx. 35mm photography, electronics; classical. Revox 736, B&O 2000, 10 in, 3½, 7½. Anywhere.

Derek Kennedy, 36, assistant air traffic controller, 196 West End Road, Ruislip, Middx. 35mm colour photography; light classical.

Truvox R104, 7 in, 1½, 3½, 7½. Austria, Switzerland, Germany.

E. C. Stoneman, 42, export chemicals, 10 Lincoln Way, Bush Hill Park, Enfield, Middx. Political speeches, wartime documentaries 1914-18, 1934-45; military brass bands; classics. Brenell MK5, 7½ in, 1½, 3½, 7½, 15. UK. USA.

Northumberland

Owen Molloy, 34, warehouseman, 2 Marske Terrace, Walker Estate, Newcastle on Tyne, Northumberland. 8mm cine, gardening, learning French, travel; all but heavy classical. Brenell Mark 5, Philips EL3586, 7 in, 1½, 15. Anywhere overseas.

Les Wilkinson, 24, marine engineer student, 14 Dame Flora Robson Avenue, Simonside, So. Shields, Northumberland. 35mm photography, travel; pop, C&W, Latin American. Sony TC521, 7 in, 3½, 7½. Anywhere.

Northamptonshire

Malcolm C. Wilson, 16, hi-fi shop assistant, 13 High Street, Pytchley, Nr Kettering, Northants. Hi-fi, musical instruments, piano playing, youth club work; classical and pop. Grundig TK18L, Stella battery portable, 5½ in, 1½, 3½. USA and Canada.

Nottinghamshire

Jonathan Gagg, 17, printer, 20 Stanstead Avenue, Tollerton, Nottingham, Notts. Photography, radio; German pops, most English music. Marconi 4210, 7 in, 1½, 3½, 7½. Germany, Belgium, Luxembourg. Preferably person of similar age.

Malcolm J. Matthews, 14, student, 2 Anston Avenue, Worksop, Notts. Reading, swimming, photography; pop, light classical. Philips EL3558, four-track, 7 in, 1½, 3½. Anywhere English speaking.

Oxfordshire

Cliff Freeman, 49, storekeeper/clerk, 21 Princes Street, Oxford, Oxon. 8mm cine, 35mm colour, people, places, travel; musical comedy, hit films and shows. Sanyo, Marconiphone, 5½ in, 1½, 3½. S. Africa, Rhodesia, USA, Italy.

Shropshire

John David Hodgson, 19, post office engineer, 4 Precourse Avenue, Monkmoor, Shrewsbury, Shropshire. Electronics, travel; light, pop. Brenell STB2, 3½ in, 1½, 3½, 7½, 15. America, Hawaii.

Somerset

David Jamieson, 16, student, 8 Canberra Crescent, RAF Locking, Weston-super-Mare, Somerset. Judo, touring, cycling, science; pop, folk, C&W. Grundig TK14, 5½ in, 3½. Female teenager anywhere.

R. Lethby, watch repairer, 8 Orchard Place, Weston-super-Mare, Somerset. Outside recordings; general. Grundig TK20, Stella cassette portable, 5½ in, 1½, 3½. Anywhere English speaking.

John Mingay, 29, organist/music teacher, 144 Sherborne Road, Yeovil, Somerset. Architecture, painting, choral singing; very old and 20th century (no pop). Uher 4000L, 5 in, 1½, 1½, 3½, 7½. UK, Holland, Germany, USA, Canada. Males preferred.

Staffordshire

Sam Bass, 36, 'variety artiste', 98 Orme Road, Newcastle-under-Lyme, Staffs. Epic film soundtracks; most bar guitar, groups. Ferrograph, 7 in, 3½, 7½. Anywhere.

Sussex

David Bruce, 17, student, 5 Brook Lane, Lindfield, Sussex. Hi-fi, radio, construction of equipment; fairly modern classics, pop, light, jazz. Philips EL3552, 5½ in, 3½. France, America, Germany.

Ernest Walters, 19, 8 Cedar Close, Langley Green, Crawley, Sussex. Travel, rifle shooting; all kinds. Philips EL3586, 4 in, 1½. Female contacts in UK or USA.

Surrey

David Chambers, 16, laboratory assistant, 1 The Close, Dale Road, Purley, Surrey. Palaeontology; pop, light classical. Ferguson, 5½ in, 3½. Anywhere.

Larry Lindsell, 40, hospital porter, 99 Bourne-Side Road, Addlestone, Weybridge, Surrey. Camping, touring, fishing, tennis, theatre, still and cine photography; classical and pop. Standard, Philips, Fidelity, 5½ in, 1½, 3½, 7½. Anywhere.

E. G. Waters, 48, technical clerk, 35 Chatsworth Road, Croydon, CRO THE. Taping to blind; big bands, film music. Truvox, 7 in, 3½, 7½. Continent, U.K.

Warwickshire

Sheila Robinson, 22, secretary, 23 Eltham Road, Cheylesmore, Coventry, Warks. Hi-fi, stamps, touring; all kinds. Truvox R44 and PD102, Stella portable, 7 in, 1½, 3½, 7½. Anywhere English speaking. Letters first please.

Cleeve Sculthorpe, 33, production officer, 82 Litchfield Road, Coleshill, Birmingham. Swimming, outdoor life, farming; all kinds. Fergusons, Elizabethan, 5½, 1½, 3½. UK, USA, Canada.

Mary S. Toovey, 21, comptometer operator, 238 Barnes Hill, Wexley Castle, Birmingham 29. Dancing, philately; light classical music. Tandberg 6, Philips portable, 7 in, 1½, 3½, 7½. Anywhere overseas.

Wiltshire

Roy Johns, 35, clerk RAF, 30 Portal Avenue, Rudloe, Corsham, Wilts. Cine and still photography, humour; jazz, popular, classics, music of the 40's. Akai ST/1, Popular 200, 7 in, 3½, 7½. Germany, Sweden, Holland, UK. Male only please.

Jock Lindsay, 23, plant operator, 35 Purton Road, Moredon, Swindon, Wilts. Cycling, car rallying, swimming, photography; light, pop, instrumental. Grundig TK30, 7 in, 3½, 7½. New Zealand, France, Scandinavia, UK.

THE NEW RECTAVOX BROCHURE
includes a considerable dissertation upon
MATCHING LOUDSPEAKERS TO TRANSISTOR AMPLIFIERS
together with full details of
THE RECTAVOX OMNI & AMBI LOUDSPEAKERS
which are ideal for the purpose and
THE RECTAVOX PARTRIDGE
superb matching transformer and other accessories.

SEND FOR YOUR FREE COPY BEFORE YOU FORGET!

The following provincial dealers are regular stockists of RECTAVOX products: they have adequate demonstration facilities and are prepared to allow our products out on demonstration for trial and appraisal in the home, and will give mobile demonstrations by appointment. Should your nearest dealer be temporarily out of stock of a particular model, please bear with him for new supplies will certainly be in transit.

Centre	Dealer's Address	Ask for
Glasgow (Scotland)	James Kerr & Co. Ltd., 435 Sauchiehall Street, Glasgow C.2. Telephone DOU 0988.	Mr. E. H. McCosh Mr. T. D. Simmons
Newcastle (Northumberland)	J. G. Windows Ltd., Central Arcade, Newcastle upon Tyne 1. Telephone 21356.	Mr. F. Moore
Middlesbrough (N.E. Yorks)	McKenna & Brown (Photographic) Ltd., 112 Linthorpe Road, Middlesbrough. Tel. 46958.	Mr. I. G. Brown
Manchester (Lancs)	Lancs Hi Fidelity Ltd., 8 Deansgate, Manchester 3. Telephone DEA 3825.	
Leamington Spa (Warwicks)	Tyson's, 41 Russell Street, Leamington Spa. Telephone 24935.	Mr. W. Tyson
Newport (Mon)	Gwent Audio Centre, 106 Commercial Road, Newport. Telephone 52495.	Mr. K. Holland
Ripley (Surrey)	Mobile Audio Consultants, Villacousta, Portsmouth Road, Ripley. Telephone Ripley 3377.	Mr. D. Rose
Hadleigh (Essex)	Croisette Radio Ltd., 212 London Road, Hadleigh. Telephone Southend-on-Sea 557490.	Mr. C. Honey Mr. B. A. Croisette

THE RECTAVOX COMPANY, CENTRAL BUILDINGS, WALLSEND, NORTHUMBERLAND

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. These postage rates apply to
UK only. Overseas readers please include
sufficient extra postage.

NAME

ADDRESS

ATR, HAYMARKET PRESS LTD.
9 HARROW ROAD, LONDON W2
Please allow two weeks for delivery

SOUND EFFECTS RECORDS

AVAILABLE FROM ATR

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.

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

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

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

Side 1—Lion roaring. Twin piston aircraft landing. Building and
debris falling. Road drills and compressor. Ship's siren. Steam train
leaving station. Small steam loco and whistle. Cell door, keys and
locks.
Side 2—Police car and bell, chase. Police launch and siren. Steam
goods train and whistle. Car door 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—rifle fire, etc.

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

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

K MFX/3—HORSES Price 7/6

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

L LFX/1—SOUNDS OF LONDON Price 7/6

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

M RSX/1—ROAD SAFETY Price 7/6

With Jack Warner (Dixon of Dock Green) and Coco (Bertram Mills
Circus) Documentary with sound.

O MFX/4—MIXED SOUND EFFECTS Price 7/6

Side 1—Hovercraft passing. Hovercraft departure. Car start, drive
away (interior). Car engine rev and tickover. Car starter (continuous).
Car skid. Car skid and crash.
Side 2—Continental town—street sounds and glockenspiel (clock
chimes). Warning siren. Warning bell (all typical continental sounds).

P BGX/2—BACKGROUND SOUND EFFECTS Price 7/6

Side 1—London Airport main lounge. Passenger flight departure
(announcements in English and German). Passenger flight departure
(announcements in English and French).
Side 2—Train interior (continuous). Children playing. Racing Cars
(circuit).

Q EFX/3—RHYTHMIC ELECTRONIC MUSIC Price 7/6

Side 1—Automation (theme of rhythm and melody). Perpetua (theme
suggesting movement). Merry-go-round (theme suggesting fairground
or street organ). Teapotone (electronic sounds in rhythm).

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 bell.

B AFX/1—WILD ANIMALS Price 7/6

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

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

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

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

Side 1—Space ship—take off. Space vehicle—imaginary take-off.
Space vehicle—imaginary landing. Ring modulation—tonal. Modu-
lated 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 ululation. Filtered tone. Stridor (tonal).
Ring modulation and sibilant.

TEST REPORT-FERGUSON UNIT AUDIO

by Peter Knight

Ferguson 'Unit Audio' is designed to bridge the gap between equipment exactly created for the hi-fi perfectionist and that which is capable only of giving mediocre reproduction of radio and records. There are many appreciative of good sound reproduction yet unable financially or unskilled technically to take the plunge into the hi-fi deep end. For these, the Ferguson scheme represents a perfect solution.

The equipment is neither expensive to purchase nor too technical to set-up, and almost all the items available to the real hi-fi type are featured. The various units or 'equipment blocks' as they might be termed have matching outward appearance, very attractively finished in Queensland close-grained walnut and, apart from the larger loudspeakers, are suitable in size for easy placement on shelves or wall furniture.

Everything is available for the reproduction in mono or stereo of programmes from AM and FM radio, tape and disc records and the making of one's own mono or stereo tape records. The 'blocks' are all terminated in DIN plugs or sockets and all the necessary interconnecting cables, suitably terminated are supplied. There is even a 'synchronizing unit', allowing the unit tape recorder to take control of an auto slide projector for the showing of holiday slides with a taped commentary.

The basic range is shown in Fig. 1. The tuner/amplifier shown is stereo audio-wise but mono FM-radio-wise. A stereo decoder is not made for this unit, but there will be a unit - Model 205STA - carrying a decoder, costing 50gns. Another very interesting addition is an audio amplifier, rather like the 201SA in Fig. 1, but incorporating a stereo FM radio section with five push-buttons for programme selection, each button tuneable to any FM mono or stereo transmission within Band II (from 87.5 to 108MHz). This is known as Model 206STA, and costs 46gns plus 13s 5d PT.

System Combinations

Looking at Fig. 1, one can see that a combination of two audio systems are available. The tuner/amplifier gives mono reproduction (on both stereo channels simultaneously) of AM and FM radio programmes, mono or stereo reproduction from disc records with the addition of record reproducer Model 202RP and mono reproduction of tapes by using Model 3216 tape recorder. Stereo tape reproduction from this machine, via the system, is also possible by the connection of Model TA/01, synchro-amp, but

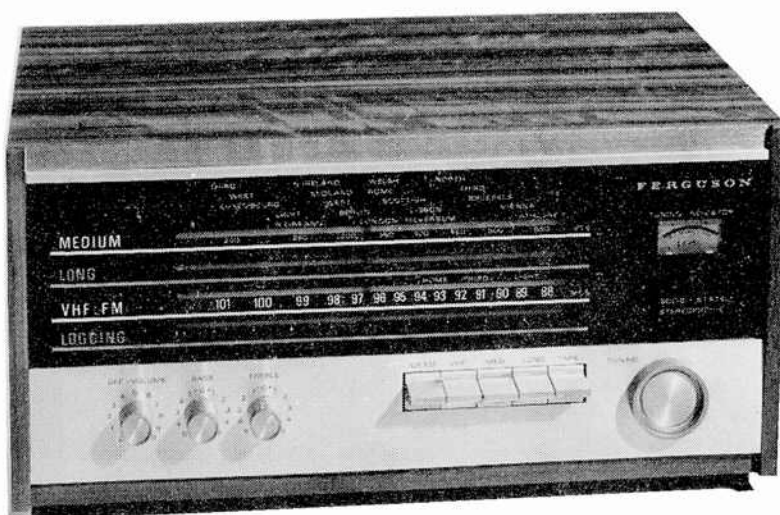


Fig. 1a. Model 200TA Tuner-Amplifier, yielding 7 watts in two stereo channels and giving mono FM and AM radio. Cost 43gns plus 12s 6d surcharge.

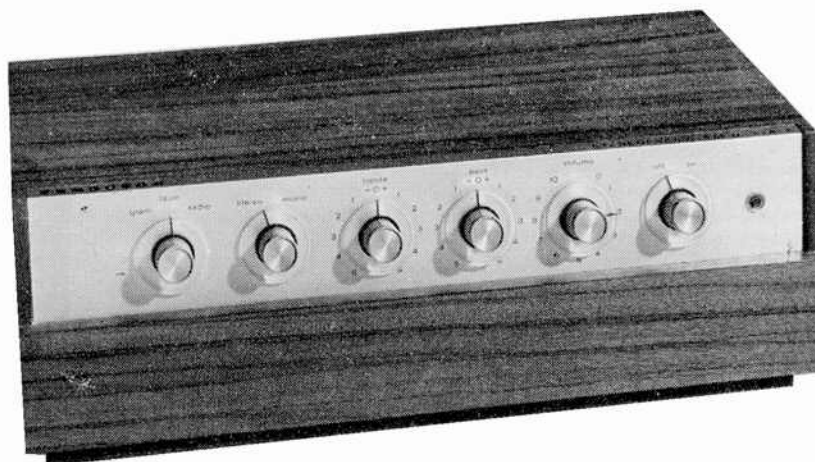


Fig. 1b. Model 201SA Stereo Amplifier, also yielding 7 watts per channel at low distortion and having inputs for gram (unequalized), radio and tape (not from tape head). Cost 26gns.

the recorder is basically a mono model from the point of view of recording. Readers interested in the performance of the tape recorder alone are referred to the Ferguson 3214 Test Report in the February,

1967 issue of *Amateur Tape Recording*. The inside of this machine is virtually the same as the unit audio, Model 3216.

Another combination, without radio, takes in the stereo amplifier, Model 201SA, plus 29



Fig. 1c. Model 3216 recorder with Thorn TA/OI synchro unit for stereo reproduction; also giving auto-slide changes. Cost former 49gns and latter 9gns.



Fig. 1d. Model 202RP record playing unit incorporating the Garrard SP25 single-player with large turntable, bias compensator, cueing device and interchangeable head. Sonotone stereo ceramic turn-over cartridge, type 9TA, with diamond stylus fitted. Cost 27gns plus 7s 10d surcharge.

TEST REPORT FERGUSON UNIT AUDIO

continued

the record and tape players. There is no radio tuner *only* in the range, and if radio is required in conjunction with the 201SA, it is suggested that an input is obtained from one of the domestic Fergusson radios having a DIN terminated low-level signal output for use with a tape recorder. This would possibly fit-in with the 'unit audio' scheme of things without modifications to matching and signal levels. Of course, another make of tuner could be utilized, but this might well call for modifications to the radio input circuits of the amplifier.

Both combinations mentioned can be used either with a pair of the smaller Model 204SS shelf loudspeakers or with a pair of the larger, floor-standing, Model 203SL loudspeakers. The loudspeakers come complete with about 11 ft of cable, wound on a plastic cable holder which is DIN-plug-terminated for immediate connection to the loudspeaker outlets of the amplifier or tuner/amplifiers.

All the equipment was thoroughly tested under domestic conditions, but particularly searching tests were applied to the Model 200TA tuner/amplifier and the stereo amplifier Model 201SA.

At this juncture it should be made perfectly clear that in none of Fergusson's literature can reference be found implying that the equipment is high-fidelity. We read of 'luxury performance' and that 'fidelity of performance far exceeds that of high quality radiograms . . .' and so forth. Fergusson should be well on the ball over this since in their group, the British Radio Corporation, they make remarkably good radiograms! This method of advertising only goes to show that Fergusson are not breaking into the specialist hi-fi market – nor even making

large slice of music-appreciative populace some very nice, relatively inexpensive equipment which needs no technical know-how to operate.

200TA Tuner/Amplifier

The 200TA tuner/amplifier operates over the FM band from 87.5 to 101MHz, on the medium-wave band from 1,620 to 530KHz (that is, 185 to 560 metres) and on the long-wave band from 267 to 148KHz (or 1,120 to 2,025 metres). The long- and medium-wave signal pickup is by an internal ferrite-rod aerial. This kind of aerial is directional – same as used in transistor portables – but it can be internally orientated for maximum response to the most frequently used transmissions after the unit is placed in position for normal use.

It uses transistors throughout, and each audio channel delivers 7 watts of rms sine-wave power into a resistive load of 8 ohms, in spite of the specifications giving this power in speech and music rating. It was encouraging to find that the specification in this respect was, in fact, underrated!

A group of five press-keys select waveband or tape or gram input, while three small knobs control volume, bass and treble, with the first also switching on and off. A larger knob operates the tuning, FM and AM together facilitated by internal ganging of the medium-frequency and vhf tuners. A very large, and clearly printed dial shows where one is tuning, and a logging scale makes it easy to return to any previously logged station on any waveband.

A moving-coil type signal-level indicator works on both AM and FM and on the sample model maximum deflection on FM certainly put the carrier into the centre of the ratio detector characteristic, not always the case with this kind of indicator working from a discriminator. The rear of the unit carries DIN sockets for tape and gram inputs and for left and right speaker out-

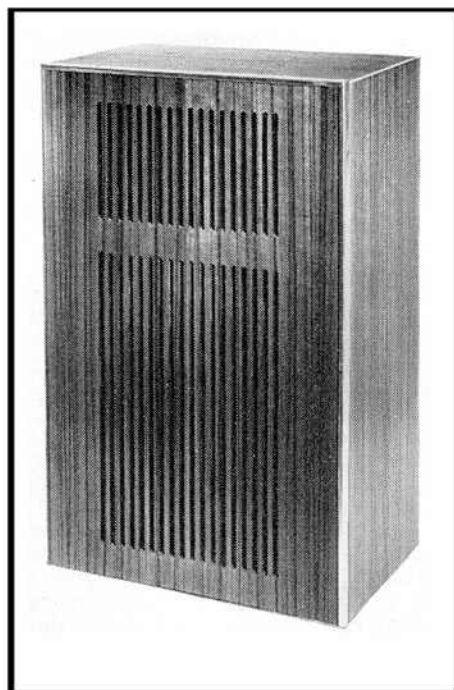


Fig. 1e. Floor-standing loudspeaker system, Model 203SL, housing 13 x 8 inch bass unit and 3 1/2 inch tweeter fed via crossover. Cost 18 1/2 gns.

puts. Another useful rear-unit feature takes the form of a pair of three-pin 2 ampere ac mains outlet sockets. These handle up to a maximum of 2 amperes and are energized only when the front switch is on. Their purpose is for easy connection of, say, the tape recorder and gram unit.

Sockets are also fitted for taking an FM dipole feeder (twin feeder or coaxial cable) and aerial and earth if greater pickup is required on the medium frequencies – though this seems unlikely. Finally, there is

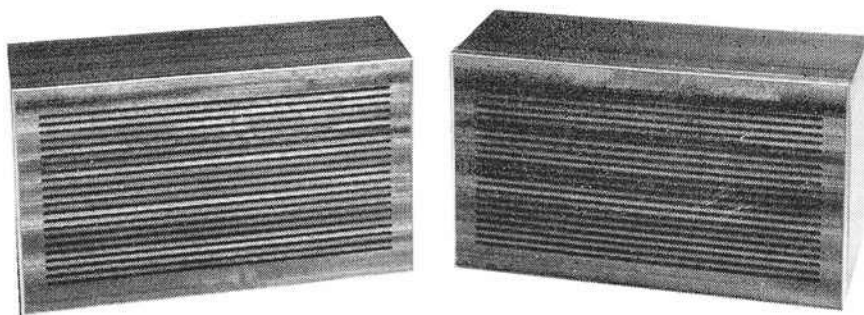


Fig. 1f. Shelf loudspeaker system, Model 204SS, with 6½ inch high compliance bass unit and 3½ inch tweeter, fed via crossover. Cost 12gns plus 3s 6d.

a 'balance control' which is operated by the edge of the knob. A white line marks the 'balanced' position.

It was at first thought curious that this control works only on the pick-up, but having in mind that this is a part of a unital system, with all the other items in balance, about the only thing that may require a degree of balance variation is the pick-up apart from, perhaps, the room acoustics relative to the left and right loudspeakers; but on pick-up the balance control would handle this all right.

Transistors total 24 and semiconductor diodes 4. Operation is possible from any ac mains supply between 200 and 250V, and the power consumption is about equal to that taken by a 15 watt household bulb.

The unit was first subjected to square-wave tests, with the signal from the generator applied at correct impedance to the tape input. The tone controls were carefully adjusted for the best 1KHz square-wave display on an oscilloscope loaded across 8 ohms at the loudspeaker terminals, and the result is shown in Fig. 2(a). With the tone controls in the same setting, (b) and (c) show the output at 5KHz and 100Hz respectively.

The display at (a) is remarkably good, free from overshoot or ringing, and is the sort of display one would expect from an amplifier costing twice as much. At 5KHz rounding of the leading and trailing corners of the wave can be expected, even on expensive equipment, while the apparent mutilation at 100Hz is not abnormal, it simply reveals some If phase distortion, possibly in the tone controls. Phase distortion is not very important at low frequencies, and is

rarely – if ever – discernible on the reproduction.

Next, with the tone controls set for the best 1KHz square-wave, a power response test was made, based on 5 watts across 8 ohms at 1KHz. This is shown in Fig. 3. At 20Hz and 20KHz the power is only about 0.5W down, but there is a lift of power at about 100Hz. By decreasing the bass control setting, the bump could be reduced, but then the power started falling off below about 1KHz.

At this juncture, it should be made clear that the best square-wave setting of the tone controls was with bass +1 and treble +3 on the knobs (these are clearly calibrated). The controls were then each set to zero, and a further frequency response test made, with the Y scale calibrated in intervals of 5dB (Fig. 4). This represents the change in voltage across the properly terminated output at low power. This, again, shows the 100Hz lift.

Full power rms sine-wave tests were then made at the same matched input and across 8 ohms (exactly). Here it was found possible on both channels (with both channels driven hard) to obtain a power yield of just 7 watts to the clipping point on the monitored signal. Clipping was symmetrical, happening just at the same power on both positive and negative half-cycles, indicating good push-pull balance. Distortion at 5 watts, 1KHz was below 1%, but tended to rise at lower frequencies and higher powers. A little more work was carried out to check the tone controls, and with a set output with both controls flat (well below the full power level), a 100Hz input was applied and the bass control fully advanced.

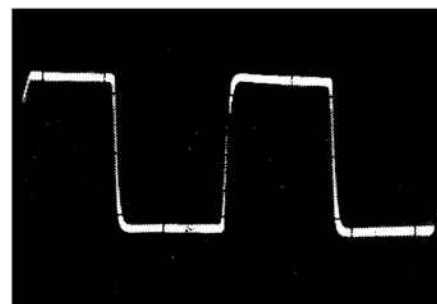
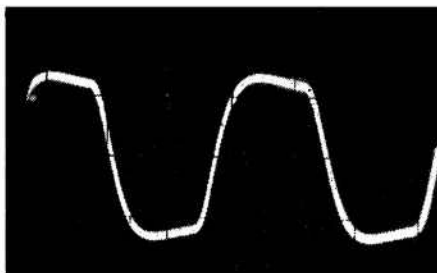


Fig. 2. Square-wave tests on Model 200TA (a) best tone setting for 1KHz,



(b) display at 5KHz and



(c) display at 100Hz.

This, curiously, only gave an output increase (voltage-wise) of 1.5dB. The control was then fully retarded and a drop of 12dB was recorded. The control was then put to zero gain and the treble fully advanced relative to a set flat-setting output on a 10KHz signal. This resulted in a 12dB lift, and with the treble control fully retarded a drop of 14dB was recorded.

The bass control seemed to be playing up, and tests were then made at 40Hz and 25Hz, the latter frequency giving the maximum bass lift (relative to the control's zero setting) of 7dB. At the former frequency +5 and -12dB could be obtained. Results on

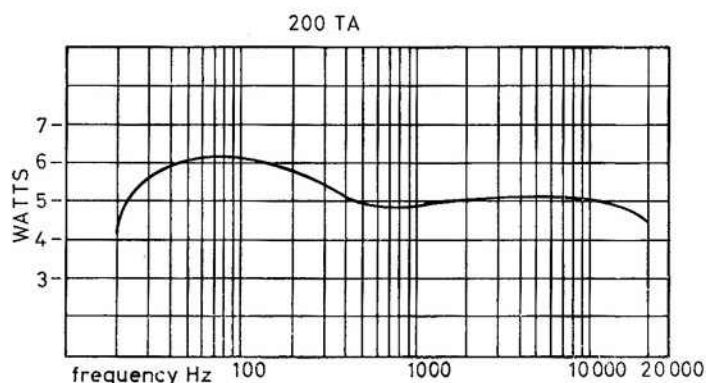


Fig. 3. Power response characteristics of Model 200TA with tone controls for best 1KHz square-wave.

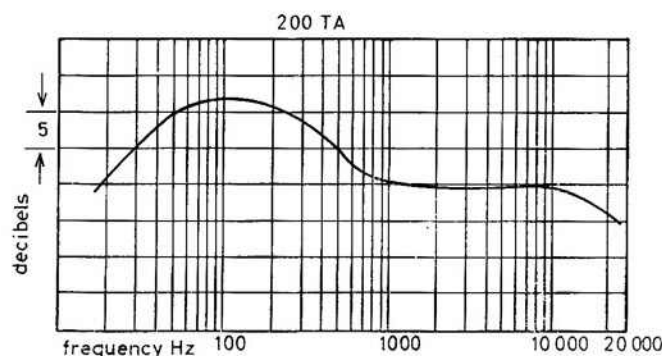


Fig. 4. Frequency response characteristics of Model 200TA with tone controls zeroed.

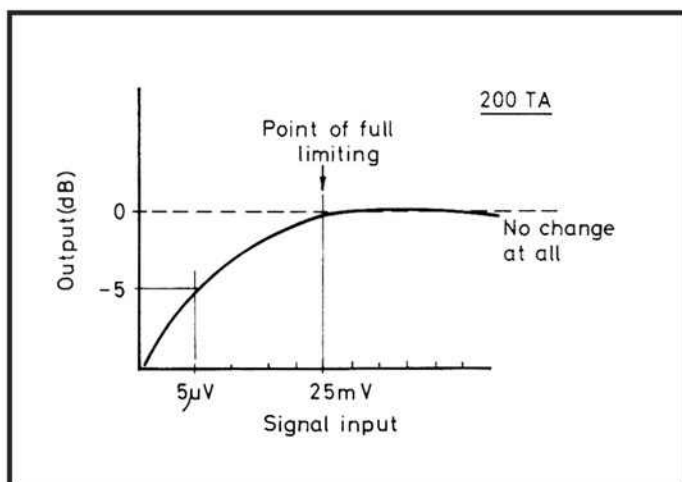


Fig. 5. Limiting and sensitivity characteristics of FM section of 200TA.

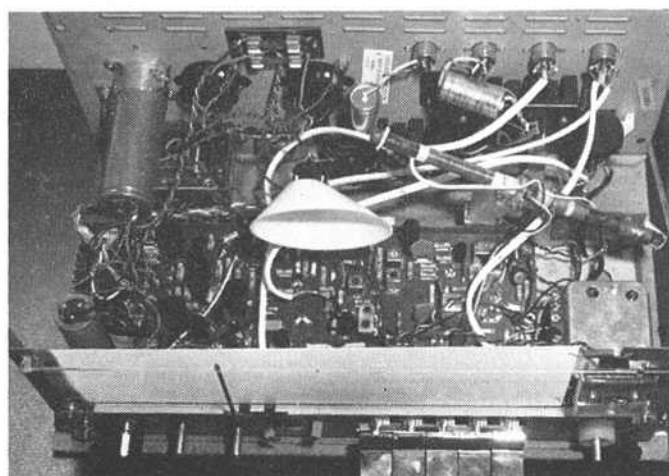


Fig. 6. Whole inside view of Model 200TA.

ON TEST—FERGUSON UNIT AUDIO *continued*

the other channel were not exactly the same, but a similar trend existed. These tests gave the impression that the bump at 100Hz on the power and frequency response curves is not specifically associated with the tone controls, although these did not seem to balance (to zero) very nicely.

Solid Limiting

Next, the sensitivity and the limiting performance of the FM section was investigated. This was extremely encouraging. Indeed, the results here are equivalent to a high-cost tuner! The generator vhf signal, at about 100MHz, was accurately measured across 75 ohms, and the signal – after removing the measuring load – applied to the set's dipole sockets. The results are shown in Fig. 5. Absolutely full limiting was obtained at 25μV input, and signal increase up to 50mV had no measurable effect on the output. With an input of only 5μV, the output was 5dB (voltage-wise) below the full limited output. Very good, indeed! Sensitivity of the AM channels was not measured, but with the internal ferrite rod aerial any signal on the bands could be picked up without trouble. An external aerial was tried, but this put too much signal into the front-end, causing heterodyne (whistle) effects. It is pretty safe to say that the AM section could not be used with an external aerial. There is no need for one, anyway, the ferrite rod picks up as much signal as the circuits can handle.

The inside of the unit comprises small printed circuit boards – not tailor-made, like real hi-fi equipment – but made after the style of ordinary radios and television sets. This is, of course, why the price is that much less than real hi-fi equipment, and why Ferguson do not make hi-fi claims. One will agree, though, that the performance in some aspects, having in mind tolerance spreads that occur in mass-production, is approaching that of some claimed hi-fi equipment. Fig. 6 shows a full view of the inside, while Fig. 7 gives a close-up of an audio printed-circuit board section. That below is the equivalent on the other channel.

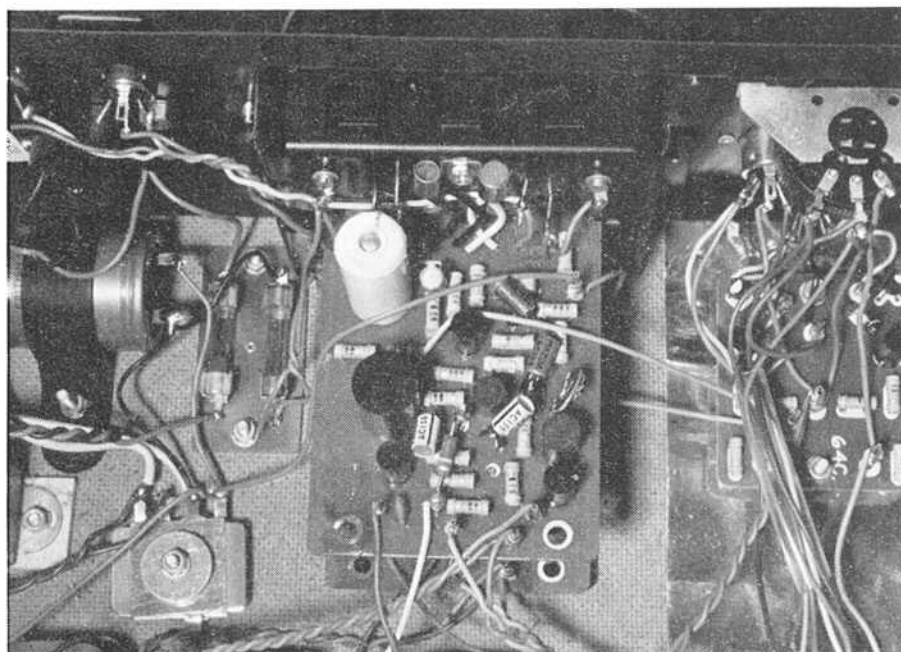


Fig. 7. Close-up view of 200TA printed circuit board audio section.

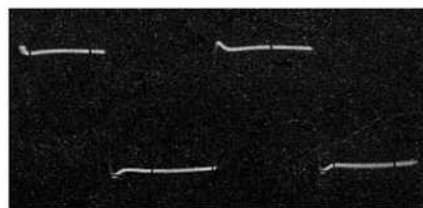
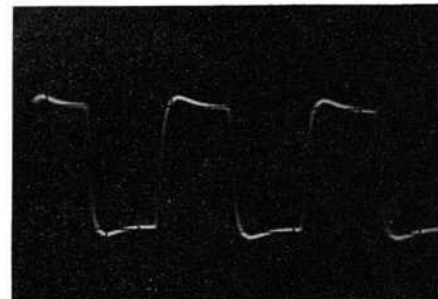


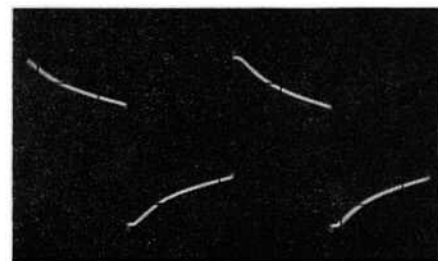
Fig. 8. Square-wave tests on Model 201SA. (a) test tone setting for 1KHz,

common with the amplifier section of the radio/amplifier. It, too, gives 7 watts output on each channel and has only a rear-operated balance control on the pick-up circuit. The pick-up input, in common with that on the 200TA, has no equalization, and is designed for connection at high impedance to the ceramic cartridge in the record unit. There are also two 2-ampere mains power outputs at the rear and DIN sockets for left and right speakers and for gram, tape and radio inputs, all matched to the partnering equipment.

The square-wave performance of this unit is truly remarkable, as shown in Fig. 8. At



(b) display at 5KHz and



(c) display at 100Hz.

201SA Stereo Amplifier

32 The 201SA stereo amplifier has much in

(a) is the display at 1KHz, (b) at 5KHz and (c) at 100Hz. The slight overshoot at (a) can be minimized by adjusting the bass control, but this display is the best overall possible with the tone controls. It is very good. Even (b) is good in spite of the little rounding off of the corners, indicating a falling response up to about 35KHz, at least. The lf distortion at (c) is less severe than on the tuner/amplifier, and this indicates a little fall in low bass. This is borne out by the power response test shown in Fig. 9, made with the tone controls set for the best square-wave at 1KHz, the settings then being treble -2 and bass -3.

A frequency response test was made with the controls 'flat' and the results are shown in Fig. 10. It is interesting to see from this and Fig. 9, that the square-wave test at 1KHz (Fig. 8 (a)), gave almost the right amount of tone control correction for the best overall response. Again, the tone controls were not truly balanced referring to their zeros. At 100Hz +12dB and -7dB could be obtained on the bass control and at 10,000Hz +7dB and -20dB on the treble control.

The power output of both channels, rms across 8 ohms was just 7 watts to waveform clipping level. Distortion at 1KHz was below 1% at 6 watts, rising a little at higher powers towards the clipping point.

The tape recorder and record playing unit matched easily into the amplifier, and no difficulty at all was encountered regarding plugs and sockets and matching. The larger of the two sets of speakers, of course, gave the best reproduction, but even the small ones gave a very good account of themselves. In fact, the DIN plugs were later cut off these and tests made on other equipment with them. They can certainly be considered along with the best shelf-mounting specimens.

Both sizes incorporate inductive-capacitive crossover filters operating at 3 KHz, and both are specified as having a range from 30Hz to 15KHz. Ordinary listening tests and tests made with sine-wave input signals direct to the speakers prove this specification. Indeed, the speakers were run at 7 watts on heavy organ music and were found, admirably, to suit the amplifier units driving them. The large system measures 15½ inches wide by 25½ inches high by 11½ inches deep, and the small one 8½ inches wide by 16½ inches high by 7½ inches deep.

As already intimated, the output from the ceramic pick-up cartridge in the record playing deck offers a very good match to the pick-up input of both the 200Ta and 201SA. The Sonotone stereo ceramic 9TA turnover cartridge, with diamond stylus, is adopted, while the motor is the Garrard SP25, having built-in bias compensator and cueing device operated from the main on/off control level. Both the Model 3216 tape recorder and the 202RP playing deck are fitted with a smoke-grey Perspex lid.

To non-technical readers desirous of obtaining stereo reproduction from any or all mediums of a standard well up on that possible from even the best radiograms, without having to invest much more than the cost of a 'quality' radiogram, the Ferguson 'Unit Audio' can be thoroughly recommended. While the performance falls below that of true hi-fi equipment, it veers much more towards hi-fi than radiogram repro-

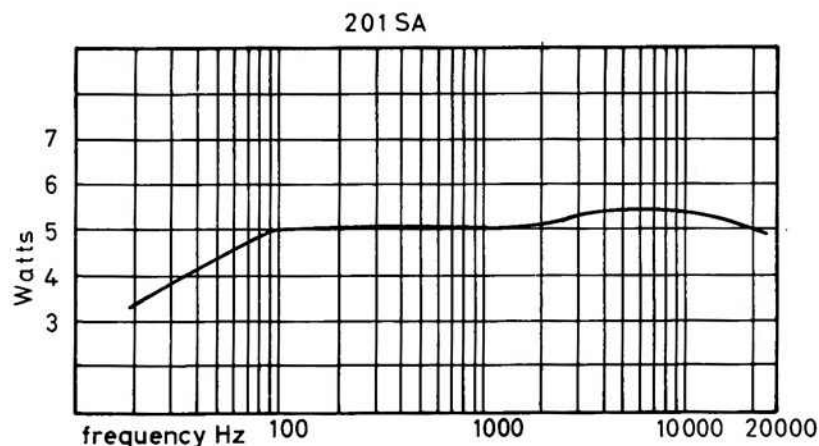


Fig. 9. Power response characteristics of Model 201SA with tone controls set for best 1KHz square-wave display.

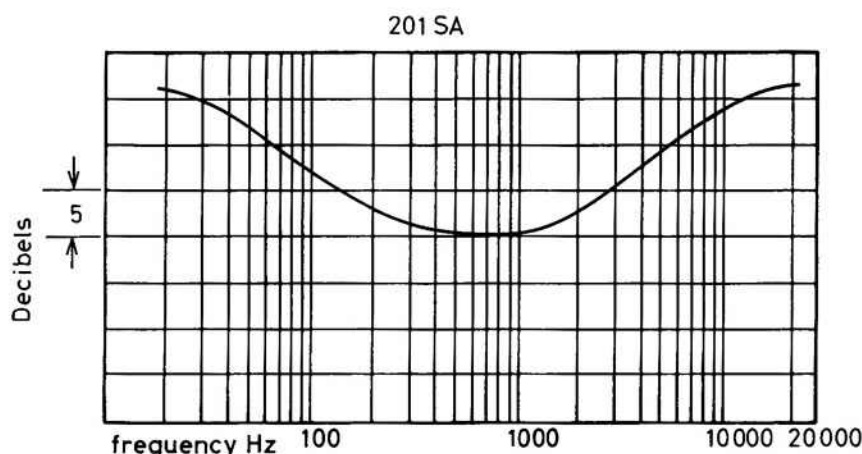


Fig. 10. Frequency response characteristics of Model 201SA with tone controls zeroed.

duction and, as seen in the report, it can offer 'competition' to some so-called hi-fi equipment. As an example, the tuner/amplifier plus record playing deck plus two shelf loudspeakers adds up to 94gns plus £1 3s 10d surcharge. Ferguson's have a seller here!

Makers Specifications

Power Output: 200TA 7 watts (music rating) per channel, 201SA 7 watts per channel (music rating). **Harmonic Distortion:** 200TA and 201SA less than 1%. **Frequency Range:**

200TA and 201SA 30 to 20,000Hz ± 3 dB. 202RP 30 to 20,000Hz ± 3 dB. 3216 40Hz to 7,000Hz at 1½ ips to 14,000Hz at 3½ ips and to 18,000Hz at 7½ ips. 203SL and 204SS 30 to 15,000Hz. **Tone Controls:** 200TA Bass +12dB and -3dB at 80Hz and Treble +14dB and -10dB at 15,000Hz. 201SA Bass +30dB and -8dB at 40Hz and Treble +6dB and -12dB at 10,000Hz and 12,000Hz respectively. **Sensitivities (Radio):** 200TA AM MW max. 45µV/metre for 0.5W output LW 400µV/metre for 0.5W output; TM 10µV for 30dB signal/noise.

FEATURES FOR SEPTEMBER ATR

On Tape

- ★ A Variable Speed Spooling System
- ★ Editing and Programme Planning
- ★ A Recording Level Indicator (constructional)
- ★ On Test - Philips Stereo Cassette Recorder

On Hi-Fi

- ★ Bandwidth in Amplifiers
- ★ Test Report - Grundig Stereo Amplifier
- ★ A to Z in Audio and Video

TAPE AND DISC REVIEW

Railroad Sounds. *Steam and Diesel.* Audio Fidelity Stereodisc AFSD 5843.

From the opening blast of the engine whistle and the myriad sounds of a massive steam engine dragging its vast creaking load, the clack of the iron wheels over the rail joints, clatter of couplings, crashing of buffers, all so beautifully recorded to the final hiss of steam from the brakes on side two, this is an enthralling record.

I admit to being a railway enthusiast and I think that most men at some time or another have had the urge to be an engine driver. Of course some of us have – become engine drivers, that is. There's real life romance and drama in a great hissing monster with its huge wheels and all those driving rods and pistons working away like crazy. You can see it all happening and it's exciting, not like those dreary old electric jobs that look like ordinary carriages with a little man sitting on a seat peering dolefully out of a window and driving the train with far less emotion than you driving your own car.

To me and, I know, millions of others it is a very sad thing that the steam train has practically disappeared from our railway tracks. For this reason alone you should buy this recording so that every now and again you can sit back in your chair and for a while dream of the good old days when trains were trains a man could be proud of. As far as I can make out, this recording was made by the basically simple system of putting a recorder down in the middle of a busy goods yard and just letting it run for half an hour or so. You can picture it all happening: the slow laboured haul, the squeal of brakes, men shouting in the background, a sharp warning blast, the groaning of the rolling stock, a rapid bit of chuff-chuff-chuff, brakes again, the banging of buffers and a truck rolling off into a siding. Another train with bell ringing steams through. A diesel klaxon sounds – it just doesn't compare to the steam whistle, nor for that matter does the sound of its motor which is a bit London Undergroundy, nothing like that fabulous pulsing steam job.

My criticism of this production is the lack of information. Sleeve notes are beautifully romantic but entirely devoid of facts. Railway enthusiasts will want to know what the locos are, what they are pulling, where they were and what they were doing. But just the same, this is glorious music.

Jo Basile's Paris. Audio Fidelity Stereodisc AFSD 5955.

Jo Basile is an accordion-playing arranger and conductor and all these talents are exploited to the full in this sparkling performance of delicious French music. Mostly they are tunes that you'll know, if not by name, by sound. *Ceux Qui Inventerent le Champagne* may suggest that it's *The Night They Invented Champagne*, but *En Ecoutant Mon Coeur Chanter* is not quite so obviously *All of a Sudden My Heart Sings*.

All the tunes are delightfully and tastefully played by Jo with an orchestra that's put its cozier into it and the mood is très romantic

with the tempos just right for the old-fashioned kind of dancing where you actually hold your partner very close and think more about her than the steps. Incidentally I still think this is the best way to dance.

AF's sleeve notes, as on the *Railroad Sounds*, are fanciful and très amusant. Question: what has *Greensleeves* got to do with Paris and what is it in French?

As is usual with this company, all the recording data, mikes used etc, is detailed. A charming recording.

Prague Trio. *Beethoven – Piano Trio in E Flat Major, Op. 1. Schumann – Piano Trio in F Major Op. 80.* Supraphon SUA ST 50639. Stereo.

The Prague Trio of Frantisek Rauch, piano, Bruno Belcik, violin and Frantisek Smetana, cello, was formed in 1957.

Beethoven was born at Bonn in 1770 and began his music lessons at a very early age. It was about all he did learn, as the rest of his education appears to have been negligible. Although he could read and write, his spelling and grammar were very poor and he never did conquer mathematics. Furthermore he was a graceless creature, forever clumsy, bigoted, quarrelsome – characteristics which do not appear in his music. Especially here in the Piano Trio, which is graceful, cheerful and full of charm and light. Schumann, born in 1810 in Zwickau, Saxony, was intended for a career in law. Somehow he became waylaid by music. He, unlike Beethoven, was full of the social graces and a great man for the ladies.

This Trio, the second of the three he wrote, was written in 1847 as was the first in D minor. It is a warm romantic piece, inclined to wander here and there, and is in complete contrast to the Beethoven. Magificently performed and recorded.

Antonin Dvorak. *String Quintet in E flat major Op. 97. The Cypresses for String Quartet.* Supraphon SUA ST 50684. Stereo. The Quintet was written in 1893 after Dvorak's three years in America as head of the National Conservatoire of Music in New York. It was written by the homesick composer while holidaying in Spillville, Iowa – a little Bohemian colony as near to home as he could possibly find. He played organ in the village church and played violin with the local schoolmaster.

America influenced Dvorak's composing, particularly rhythmically, and there are very definite suggestions of melody that he must have picked up from the songs of the plantation Negroes. He himself considered that along with the *New World Symphony* and the *Quartet in F Major Op. 96*, sometimes referred to as the *Nigger*, this was his finest work.

The Dvorak Quartet, Stanislav Srp, Jiri Kolar, Jaroslav Ruis, Frantisek Pisinger, are joined by a second viola, Josef Kodousek, a member of the Vlack Quartet.

The Cypresses, played by the Quartet on its own, is a collection of five tunes from a series of eighteen *lieder* written when the composer was twenty-four and never pub-

lished, because they were written as love songs to the eldest sister of his late wife. However, he has quoted various pieces of them in later works. Here as quartets they are but little altered musically from their original form. Naturally they are tender, a little sad and wistful, but beautiful.

Once again I must remark on the exceptionally high quality of these Supraphon recordings as quite the finest value on the market. They are available both as mono or stereo.

Guitars for Girl Friday – Wout Steenhuis. Columbia 3½ ips Twin-Track Mono Tape TA-SX 6125.

Steenhuis plays, it says, lead guitar, hawaiian guitar, bass guitar and ukelele so obviously that there must be a spot of multi-tracking over the backing he received from the Leon Young String Chorale led by Tony Gilbert with the flutes of Derek Grossmith, Al Newman and Ray Willox. Bill le Sage dashes about between his vibes, marimba and celeste, while the banging about side of the percussion is in the very capable hands and feet of Barry Morgan.

Mr, or is it Mijnheer, Steenhuis really works for his living and does a magnificent job on each of his instruments. The arrangements for this one-man showcase have been most tastefully made and the result makes for some really delicious listening.

Six of the tracks are attributed to the pen of one Jelmer – could this be the pseudonym of Steenhuis? If it is, then he's even more talented. Even if it's not, there is at least one fabulous tune, *Grains of Sands*, a particularly lovely, slow and seductive number. There are also some particularly fine bass lines laid down, especially in *Silhouette Hula*.

Shirley Bassey – And We Were Lovers. United Artists. 3½ ips Twin-Track Mono Tape TA-VLP 1160. Arranged and conducted by Marty Paich or Enie Freeman. Produced by Kenneth Hume.

The fabulous Miss Bassey. An extraordinary artiste who appears to give everything she possesses into each song she sings, so that tears often roll down her cheeks as she dramatizes a sad lyric.

Shirley's life has been a series of much publicized episodes – in and out of love, guns, babies, scandals, divorces, yet through them all she's sailed steadily on to the top of her profession with a following that love her no matter what. She has become a legend. Each year she looks more fascinating than the previous, her figure and her clothes get better and better and to watch her working is an experience that leaves me weak and helpless.

Her singing has all the pathos of Judy Garland and she comes to the microphone to make an announcement she becomes a little girl, simple, a teeny bit shy, and sweet. You can feel the audience's love radiating towards the footlights.

Yet that girl has a personality that could burn down a building or melt an iceberg. I can't for the life of me remember whether Kenneth Hume, who produced this session, is her husband again or still her ex or what, and frankly I don't care.

Arrangements are very good of course. My favourite, *If You Go Away*, has just everything – a superb rendering from Shirley's big soul, a tasteful approach from Mr Freeman's writing, with some lovely guitar work. The

continued on page 38

AUDIOVIEW

Hi-Fi

Bang and Olufsen Exhibition

Bang and Olufsen confirm their intention to hold an *Exhibition of Audio Products* in London from August 21st to 25th inclusive. The venue will be the Bang and Olufsen West End London Showroom at 70/71, Welbeck Street, London W1, which will be specially re-designed for this occasion. Although specifically intended to be a trade show, the public will be welcome at all times and special demonstrations of new and existing models will be given throughout the day. The Exhibition will be open from 10 am daily.

New Rogers Stereo Amplifier

The outcome of over two years' intensive development, the new Rogers *Ravensbourne* is a 25 watt integrated stereo amplifier/control unit employing silicon transistors throughout, designed for use in home stereo systems where the highest possible standards of performance are required.

In a single compact superbly styled unit the *Ravensbourne* provides a carefully chosen specification, evolved from a comprehensive study of user requirements. Input facilities cater for all high quality programme sources while control facilities combine simplicity with sufficient flexibility to ensure that optimum results can be obtained from a wide range of programme material under all conditions.

Three main facets of performance are an exceptionally low level of intermodulation distortion, a virtually perfect transient response and the complete absence of background noise. An intermodulation distortion less than 0.5% at 25 watts, total harmonic distortion less than 0.1% at 25 watts, and a signal-to-noise ratio of -80dB relative to 25 watts are impressive figures by any standards. The Rogers *Ravensbourne* amplifier caters for tape replay and record, disc, auxiliary inputs and radio, and includes a headphone socket for personal listening. A new and improved approach to styling features a front panel in grained silver, printed in coffee brown with matching control knobs having spun silver inserts (see Fig 1). The amplifier is available in chassis form for conventional cabinet installations or in a free-standing case suitable for shelf mounting, finished in oiled teak veneers. Further details from Rogers Developments Limited, 4-14 Barmaston Road, Catford, London, SE6.

Garrard - New transcription unit

The Garrard model 3000 transcription unit shown in Fig. 2 was released at the recent Radio and Electronics Components Show.

A low mass, tubular pick-up arm is a predominant feature of Model 3000 designed for use with high compliance pick-up cartridges resulting in attainment of the actual performance of the pick-up unimpeded by the

resonance of the arm. A further benefit of this system is in the excellent tracking characteristics achieved, helping to reduce record wear to the minimum. Further details from your local hi-fi dealer.



Fig. 1. The new Rogers Ravensbourne Stereo Amplifier caters for tape, radio and disc with an output of 25 watts.



Fig. 2. The new Garrard 3000 turntable with a low mass tubular pick-up arm.

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

Mood Music Records available from ATR

Please allow two weeks for delivery

These records are high quality 12 inch LPs (33 $\frac{1}{3}$ 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 6d. post and packing for each* record ordered.
2s 6d postage covers UK only. Overseas readers please include sufficient extra postage.

NAME
ADDRESS

Please allow two weeks for delivery. **ATR**
*Note: Each record ordered is posted separately in its own packing.

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

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 Housing, Fitrobe, 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 8 p.m. 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.

BINDERS FOR ATR

cost only 20s including postage and packing

BINDERS DEPT, ATR, 9 Harrow Road, London W2

When you are ready for
better equipment

move up to **LUSTRAPHONE** quality
LUSTRAPHONE

microphones : audio equipment
accessories : components : fitments
send for illustrated information

LUSTRAPHONE LTD

St. George's Works, Regents Park Road
London, N.W.1 Telephone: 01-722 8844

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 types of machine and equipment. Servicing and Repairs.

22 New Broadway,
Tarring Road, Worthing,
Sussex.

Telephone: WORTHING 3630

SOUTH EAST TAPE RECORDER CENTRE

See Use Compare MONO STEREO

Sands Hunter

45, HARE STREET, WOOLWICH, S.E.18
WOOLWICH 1955

NO
INTEREST
TERMS

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 CHiswick 2082

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

120 HIGH ROAD, LEYTON, E.15

LEYtonstone 6814

Stockists of: Ferrograph, Vortexion, 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, 9 Harrow Road, London W2.

PERSONAL

Major breakthrough in sleep-learning economics. At last we are able to offer a machine which is not only ideal for Sleep-Learning and Therapy and gives excellent results on music, but is at the same time at a sensationally low price - only 25 gns. Send now for our latest catalogue of Separate Accessories and Complete Kits for Sleep-Learning together with latest Press Reports, etc., on this Vital New Subject. Dept. ATR, The Institute of Sleep-Learning, 153 Fellows Road, Swiss Cottage, NW3. Telephone: 01-722 3314. (12/67)

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.

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)

Amazing results! Immediate introductions. Friendship, marriage. Jean's Bureau, 15 Queen Street, Exeter. (1/68)

The East Anglian Bureau. Friendship/Marriage. Action now could mean an end to loneliness. Confidential details from 93 Pottergate, Norwich. (2/68)

Repairs. Our modern service department, equipped with the latest test equipment including a wow and flutter meter and multiplex stereo signal generator, is able to repair hi-fi and tape recording equipment to manufacturers' standard. Teleonic Ltd, 92 Tottenham Court Road, London W1. 01-636 8177. (TC)

Autocourse - a review of international motor sport. Copies of this annual covering the season 1963-64 are now available at 15s post free from Book Sales Department, Haymarket Press Limited, 9 Harrow Road, London W2.

Languages no obstacle to world friendships with Esperanto. Tape lessons. Fascinating new 16-hour method. First lesson 10s. Textbook 5s. The Esperanto Centre, 1A Craigs Avenue, Edinburgh 12. (9/67)

Magazines in sound, Tapespondents. Write for free details to Far and Wide Recording Club, Eccles, Maudstone. SAE please. (8/67)

SITUATIONS VACANT

UNIVERSITY OF NOTTINGHAM

Junior technician preferably of 'O' level G.C.E. standard required as assistant in the Language Centre. The person appointed will be responsible for running a Tape Duplicating Service, assisting non-technical personnel in the use of tape recorders and language laboratories and for minor servicing.

Knowledgeable interest in tape recording desirable. Day release available for approved course of study. Salary £326 to £579 depending on age and qualifications, with prospects of promotion to Technical grade. Applications in writing, quoting the names of two referees, to the Registrar, University of Nottingham, Notts, as soon as possible.

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. SAE for leaflet. Deroy Sound Service, High Bank, Hawk Street, Carnforth, Lancs. (8/67)

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 LP's 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. (8/67)

EQUIPMENT FOR SALE

15%-20% discount on most new, guaranteed, tape recorders and Hi-Fi. Cash only. SAE details. Hi-Fi Club, 70A Liverpool Road, Liverpool 23. (12/67)

Unbiased guide. Our latest 65-page, photographically illustrated hi-fi catalogue (5s). Advisory service, preferential terms to members. You'll be glad to have consulted Audio Supply Association, 18 Blenheim Road, London W4. (8/67)

Save up to 20% on tape recorders and Hi-Fi. New and guaranteed. Cash only. SAE lists. Microservice, Fourways, Morris Lane, Halsall, Lancs. (12/67)

20% cash discount on most famous makes of tape recorders, Hi-Fi equipment, cameras and typewriters. Join England's largest Mail Order Club now and enjoy the advantages of bulk buying. Send 5s for membership card, catalogues, price lists or SAE for free quotations and leaflets. CBA (Dept A5), 370 St Albans Road, Watford, Herts. (8/67)

A better deal for cash customers. We do not provide interest free credit but offer a generous discount of 15% for cash. Call, write or phone. Every item of equipment despatched brand new in sealed cartons on receipt of remittance with order. Agent for all leading makes. Amplifiers, Tuners, Motors, Pick-ups, Loudspeakers, and Tape Recorders. Audio Services Ltd, 82 East Barnet Road, New Barnet, Herts. Tel: Barnet 6605. (6/68)

Sapphire Cutters. New Sapphire Cutters available for all types of disc recording heads. Re-lapping service. Details on request. Martin Watch Laboratories, London Road, Binfield, Bracknell, Berks. (Tel: Bracknell 4935.) (8/67)

Eumig Phonomatic Novo projector. Brand new, still in packaging. Cost £49 15s 0d. Will accept £35 only. Ring 01-262 3200, ext. 21.

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)

Four track stereo tapes are expensive! Join the WSL Stereo Tape Library and enjoy every tape for only a few pence per day. World-Wide service. Send 9d postage for full details to: 104 Norwood High Street, London SE27. (6/68)

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)

Ilford Zonatape. Guaranteed shop quality sealed. Polyester Long Play - 5 in 900ft (list 28s.): one 18s; two 34s; three 50s. 5 1/2 in 1200ft (list 35s.): one 24s; two 46s; three 66s. All post free! Haywood & Sons, 2 Edinburgh Avenue, Leeds 12. (8/67)

RECORDS

Aaron Copland or Broadway Musical. All American records to order at lowest possible prices. Send for free price list or complete catalogue 5s (Classical Artists Catalogue 8s 6d). The Gramophone Shop, 1017 Argyle Street, Glasgow. (8/67)

AMATEUR TAPE RECORDING SUBSCRIPTION FORM

Make certain you receive your copy of AMATEUR TAPE RECORDING Audio-Video 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 Audio-Video for one year, commencing with the next (.....) issue, to the address below. I enclose the annual subscription of 36s (UK only); \$5.90 USA and Canada; or 42s other overseas countries.

Name

Address

Date

Tape Club members wishing to avail themselves of the special Club Subscription rate of 30s 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.

TAPE IN THE JUNIOR SCHOOL

continued from page 25

material without the recorder playing at all. It is perhaps important in the teaching of verse by this method to make several original recordings in order to avoid the children's picking up the interpretation and inflections of one particular reading.

One should not overlook the use of the tape recorder as purely a means of recording school events, such as the school play, prize day or, if one is fortunate enough to possess a portable one, an edited commentary of the football final. Some recordings of the choir can, for example, be professionally transferred to disc for young vocalists who wish to keep a souvenir of their school days. The writer owns an early recording of two very well-known pop singers adding their younger voices to *Nymphs and Shepherds*.

Finally, one technical point. Most classrooms are seriously short of any soft furnishings, and if one is using a microphone of any sensitivity, for achieving worthwhile quality in recording it will be found necessary to hang the walls and desks with blankets, rain-coats, jumpers, jackets – anything, in fact, to prevent sound bouncing from walls and towards the microphone. Two useful tips are to place the microphone near the centre of

the room, keeping the recording volume as low as one conveniently can, and, if possible, to improvise a 'studio' with screens perhaps borrowed from the medical room – though how one supervises those children outside the studio is more a challenge of classroom discipline than a problem of recording.

TAPE AND DISC REVIEW

continued from page 34

lyrics of this French tune are sheer poetry. If there is a bad track, then the nearest to such a doubtful description is *On a Clear Day*, one of Shirley's hit numbers, where she does have some rather dubious notes. It is a very splendid album and I must confess, if you haven't guessed it already, to being a Bassey addict, hooked as from now.

THINGS YOU SAY

continued from page 24

– that is to say, for the original purpose for which the permission was sought and granted – and therefore shall not be re-recorded or re-used for presentation to another audience;

5. no charge for admission to view or hear a programme shall be made, and any monies gained as a result of a presentation shall be wholly devoted to charity, and not utilized for any other purpose.

In the event of permission being granted under these conditions, it is up to the licensee to respect the requirements of the manufacturers, and be honest with himself and his tape recording club and the suppliers of the material used. I know of no reason why anyone should fall foul of the MCPS Performing Rights Society Limited, or Phonographic Performance Limited, over matters which at present appear to be an obstruction to progress.

The business of obtaining licences and written permission of the manufacturers concerned is not a complicated matter, but rather one that calls for the use of discretion and diplomacy, and properly sought, obtained and faithfully applied, should not give anyone cause for concern.

E. E. Austin

Leamington Spa,
Warwickshire

TOMORROW'S TRAINS TAPED TODAY

continued from page 6

ing. Others who attended the birth of the super-fast and ultra-light trains of advanced design can call upon the Plastics Development Unit to advise on the most effective ways of using the very wide range of new plastic materials now available. Chemical services are exploiting thermosetting and thermoplastic substances for passenger transport, freight-liner trains and liquid containers. My mind, trained to think in terms of nuts and bolts and rivets, had to grasp new terms like epoxy-resin adhesives. And as for 'paint'! They talk now about a substance based on 'a vinyl toluenated alkyd resin in conjunction with a non-toxic solvent, with the necessary drying properties and rheological characteristics'. And get someone talking about new sources of power and they will tell you that eventually the conventional electric battery or accumulator will most likely give way to The Fuel Cell, a long-lasting self-energizing source of power. Many are the considerations which come within the Advanced Projects Group examining new techniques and developments. High speeds and passenger safety and comfort go hand in hand. Vehicle dynamics and the design of suspension systems are of paramount importance.

Thanks to Mr Stanley Smith, Director of British Railways Research I was given exciting glimpses into the future. The genius that lies within the mind of man is even thinking further ahead still – to the ultimate in surface transport. One might well ask whether, in the not-far-distant future that scientists will dispense with the steel wheel on steel rail and that hovertrains, monorail systems or vehicles riding upon a magnetic field will become the transport of the day after tomorrow.

My photographic story-board gives you some inviting peeps into B.R. Boffinland. To each I append explanatory captions and, in some cases, the kind of sounds to expect.

YOU WANT YOUR HEADS SEEN TO!

.....YOUR TAPE RECORDER CANNOT GIVE YOU FIRST CLASS RECORDINGS OR PLAYBACK UNLESS YOUR HEADS ARE IN TOP CONDITION. USE A TAPE HEAD DEFLUXER REGULARLY FOR BEST RESULTS



THE AUDIO CENTRE DEFLUXER

Specially supplied to us by the
Ferroglyph Company

THE AUDIO CENTRE DEFLUXER
complete with instructions

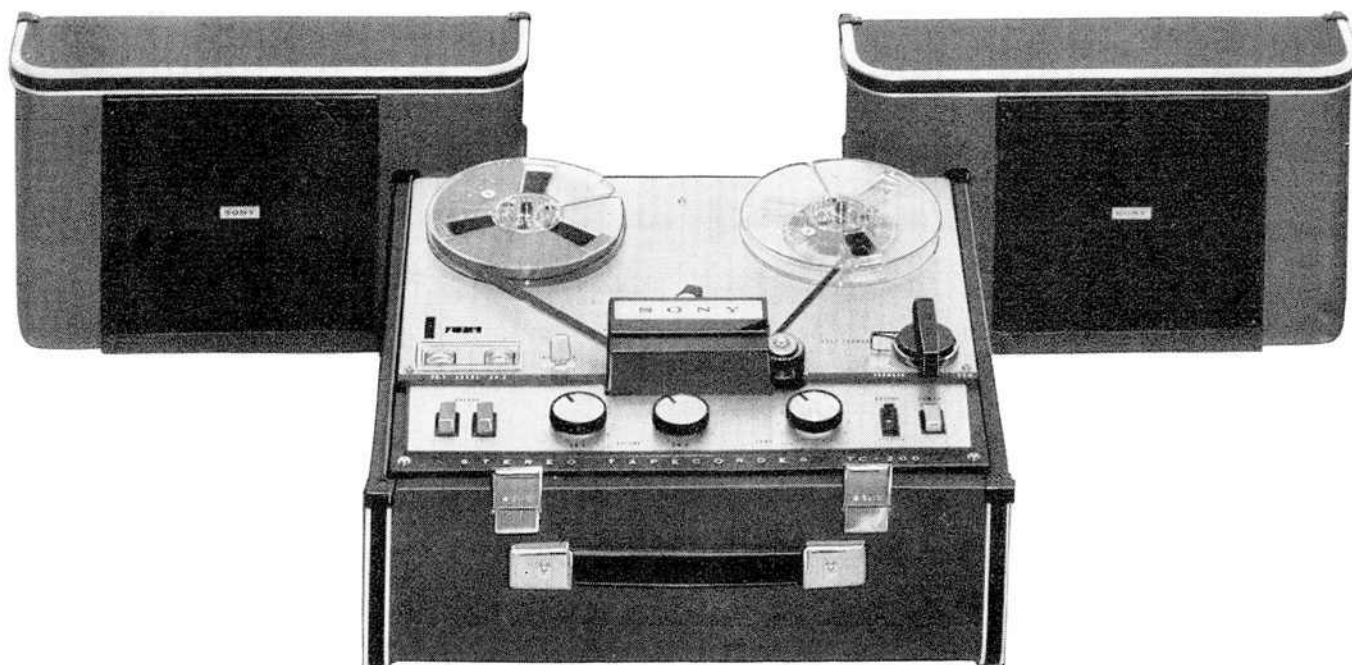
60/-

POST FREE—BY RETURN

THE

Audio Centre

A DIVISION OF THE PHOTO CENTRE 28-30 PELHAM STREET
54833 • NOTTINGHAM • 51247



SONY research makes the difference

TC 200—the finest value in stereo tape recorders

FEATURES ☐ Complete 4 track stereo-
phonic and monophonic tape recording
system ☐ Compact and light weight ☐ 2 full
range balanced satellite speaker systems
☐ Public address ☐ Sound-on-sound
recording ☐ Variable tone control ☐ 2 VU
meters ☐ Instant stop, individual track
selection ☐ Transistorised pre-amplifier
☐ Individual level controls on each channel
☐ 2 SONY F-96 dynamic microphones with
other accessories.

SPECIFICATIONS

Power requirements: 100, 110, 117, 125
220, 240 volts 70 watts, 50/60 c/s

Tape speeds: Instantaneous selection $3\frac{3}{4}$
ips or $7\frac{1}{2}$ ips

Frequency response: 50-14,000 cps at
 $7\frac{1}{2}$ ips \pm 3dB 50-10,000 cps at $7\frac{1}{2}$ ips

Signal-to-noise ratio: 46dB (per channel)

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

Erase head: In-line quarter track

Record/playback head: In-line quarter
track

Bias frequency: Approx. 55 Kc/s

Level indication: Two Level Meters

Level controls: Individual Controls on
each channel for playback and record

Tone control: One Tone Control for treble
boost or roll-off operates both channels
simultaneously

Editing facilities: Instant Stop Lever,
Automatic Tape Lifters, Fast Forward and
Rewind, Manual Cueing and Digital Tape
Counter

Reels: 7" or smaller

Outputs 8 ohms Speaker outputs or high
impedance line outputs selectable by switch
(2) Integrated Record/Playback connector

Inputs: Low impedance Microphone in-
puts (2) High impedance Auxiliary inputs (2)

Power output: Max. 1.5 watts per channel

Tube complement: 6267 (2), 30MP23 (3)

Transistor: 2SD64 (2)

Diodes: 1T22G (2), 1S125 (1)

Weight: Approx. 27 lbs.

Dimensions: 15" W x $8\frac{1}{8}$ " H x $15\frac{3}{8}$ " D

Accessories:

Sony 5" Stereo demonstration tape

Sony 5" empty reel

Two F96L dynamic microphones

Connecting cord (2)

Sound-on-sound recording lead

Earphone

Pinch roller (1) Capstan (1) Pin plugs (2)

Recommended retail price **72 gns.**

Sony offer the finest range of
tape recorders from the battery
portable TC 900 to the studio
quality 777, together with a fully
comprehensive range of accessories.

For further details see your

Sony dealer or write to:

SONY U.K. DIVISION,
Eastbrook Road, Gloucester.

Tel: Gloucester 21591.

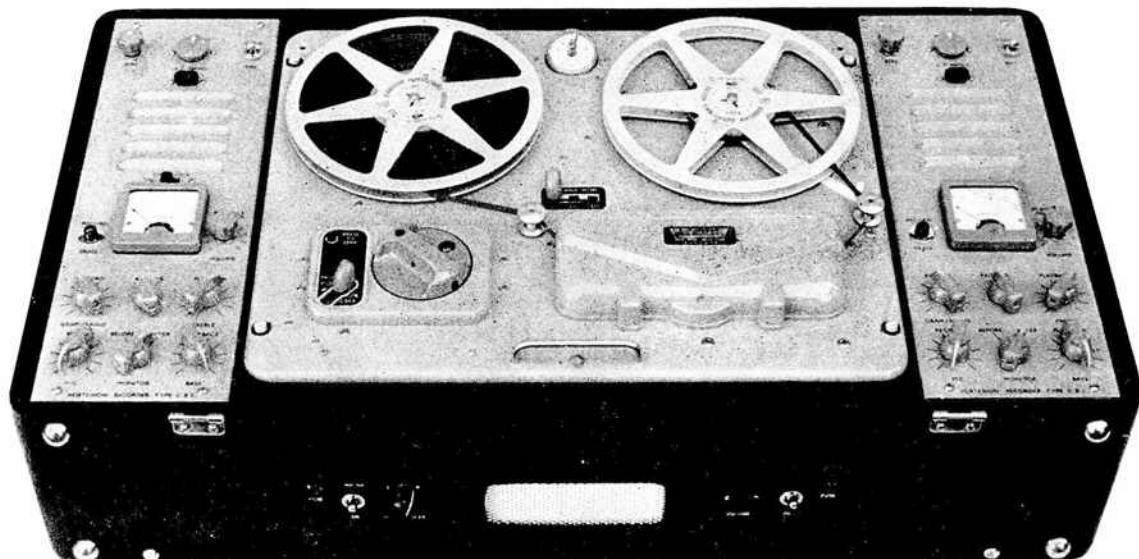
London Showroom,
70-71 Welbeck Street, London, W.1.

Tel: 01-486 2143

SONY®
RESEARCH MAKES THE DIFFERENCE

—Vortexion ***quality equipment***

TYPE C.B.L. TAPE RECORDER



Here is a versatile stereophonic Recorder which has no equal in its price group.

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

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

IT CAN repeat the process and transfer this combined signal to the first track with one or two more signals. Composers use it for this purpose. One track may have music or commentary and the other cueing signals or commentary, and either may be altered without the other.

IT CAN playback stereophonically or monaurally with its own amplifiers of $3\frac{1}{2}$ watts each.

Speeds $1\frac{7}{8}/3\frac{3}{4}/7\frac{1}{2}$ i.p.s. Price: £172 0 0

Speeds $3\frac{3}{4}/7\frac{1}{2}/15$ i.p.s. Price: £180 0 0

The **Vortexion W.V.B.** is a high quality monaural machine with "Before and After" monitoring. The recording inputs are a high sensitivity socket for moving coil or ribbon microphone and a high impedance socket for radio, etc., either of which can be selected by a switch. Superimposing and echo work can be done, and the playback has reserve gain for abnormal requirements. This model cannot be converted for stereo playback, but it is a thoroughly reliable machine for the engineer specialising on monaural work.

Speeds $1\frac{7}{8}/3\frac{3}{4}/7\frac{1}{2}$ i.p.s. Price: £115 10 0

Speeds $3\frac{3}{4}/7\frac{1}{2}/15$ i.p.s. Price: £128 0 0

The **Vortexion W.V.A.** is a monaural machine which has a performance equal in sound quality to the other models. It possesses all the features of the W.V.B. except for "Before and After" monitoring, Dubbing and Echoes. The recording being made can be heard on the internal loudspeaker, as in the W.V.B. and C.B.L. The controls are uncomplicated.

Speeds $1\frac{7}{8}/3\frac{3}{4}/7\frac{1}{2}$ i.p.s. Price: £96 7 0

Speeds $3\frac{3}{4}/7\frac{1}{2}/15$ i.p.s. Price: £107 3 0

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

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

Telephone: LIBerty 2814 and 6242-3-4

Telegrams: "Vortexion London, S.W.19"

★ AUDIO FESTIVAL AND FAIR, HOTEL RUSSELL, DEMONSTRATION ROOM 149 ★