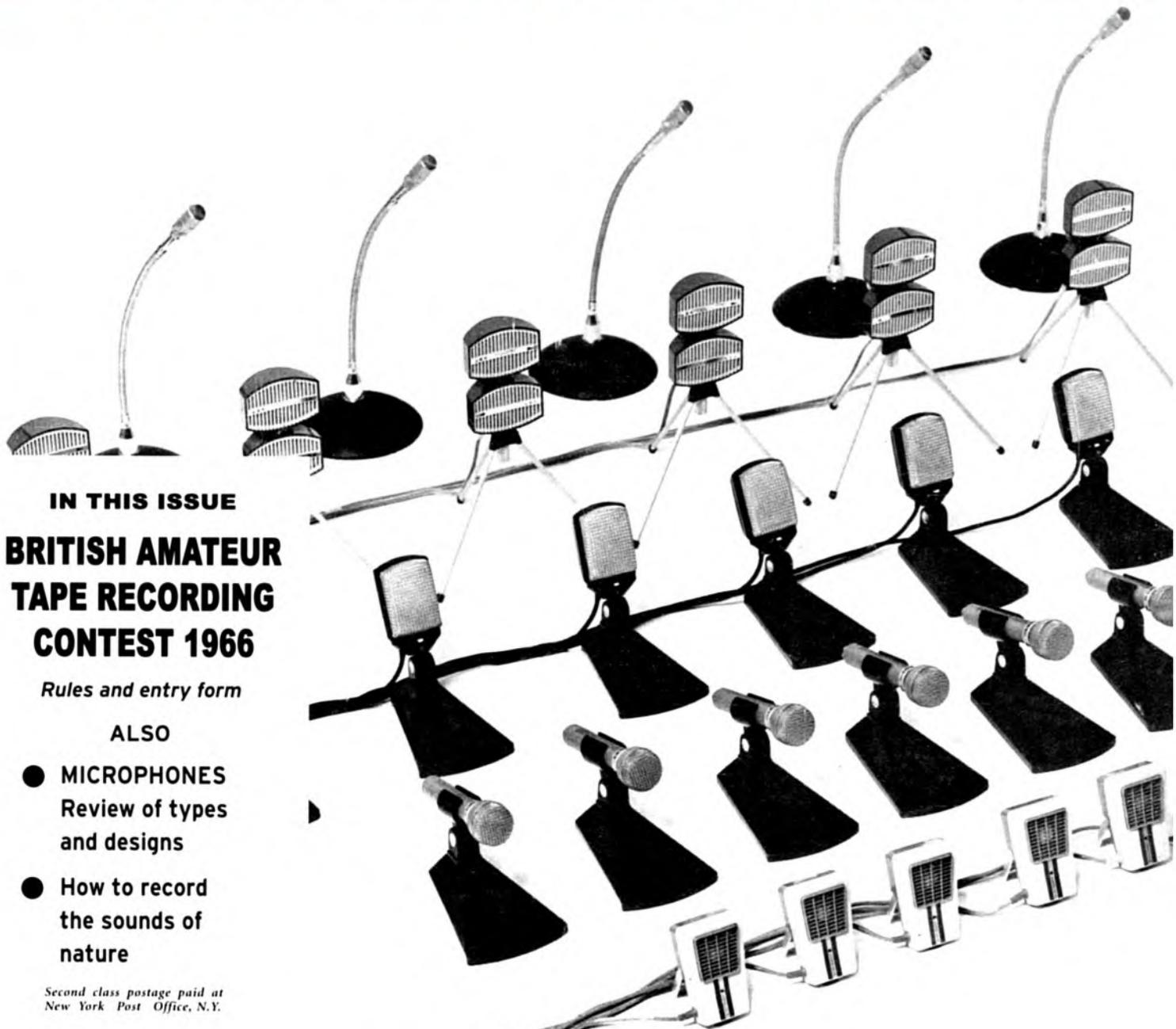


MARCH 1966

# TAPE

RECORDING MAGAZINE



## IN THIS ISSUE

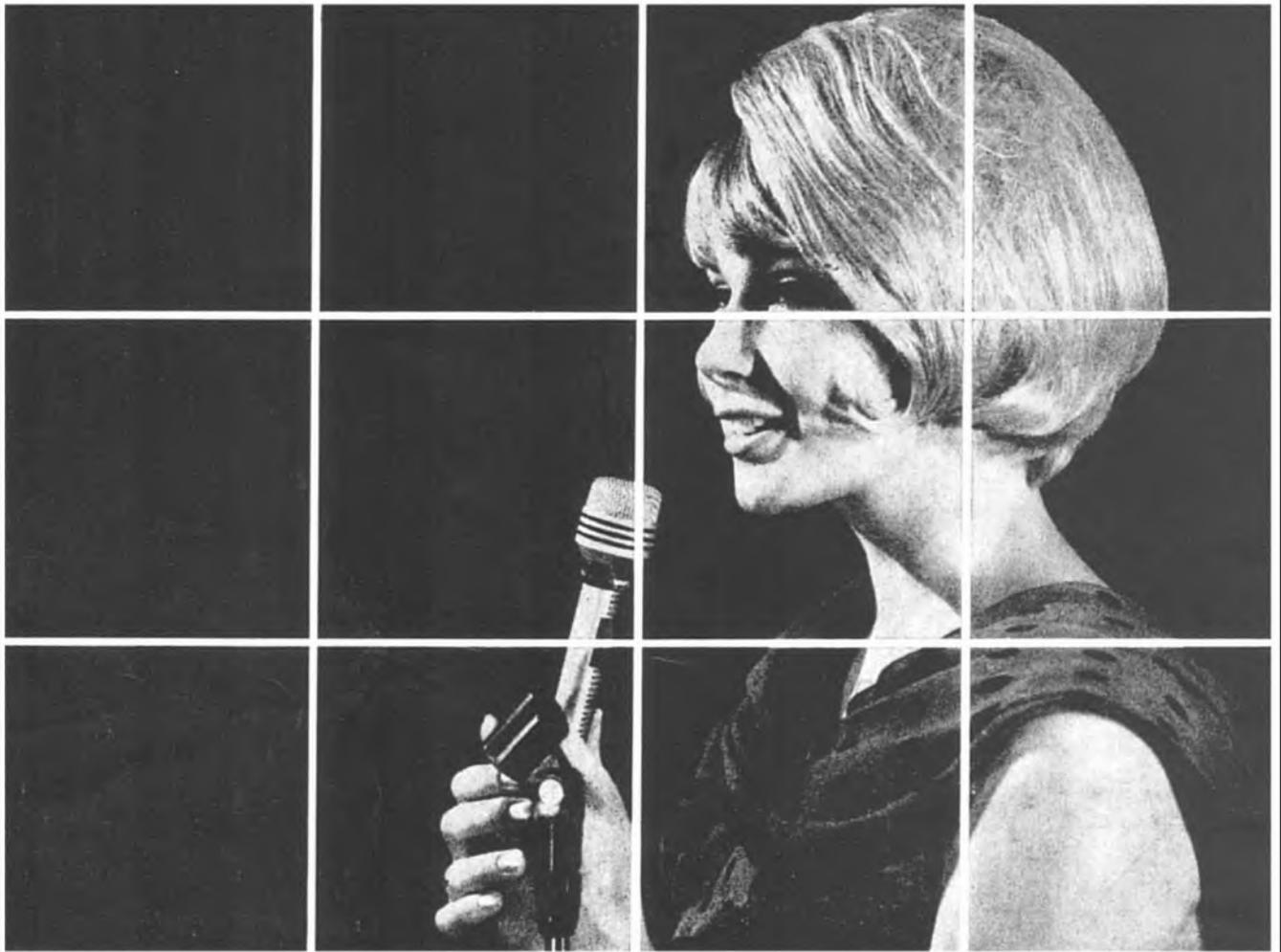
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*Rules and entry form*

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the sounds of  
nature**

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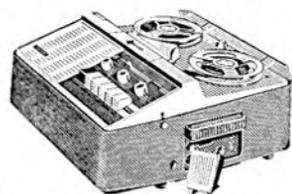
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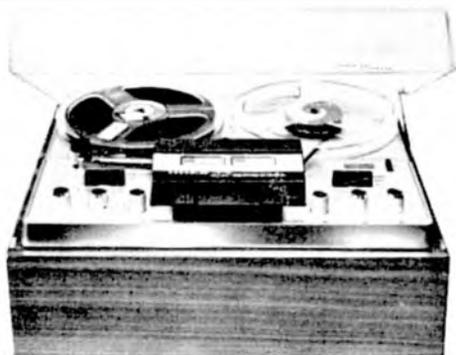
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every amateur and  
professional  
enthusiast**



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



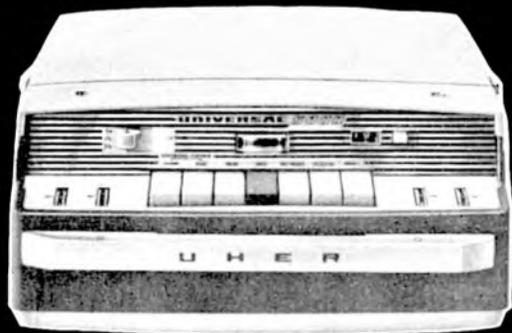
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### **724 L STEREO**

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



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## cardioid pencil dynamic microphone

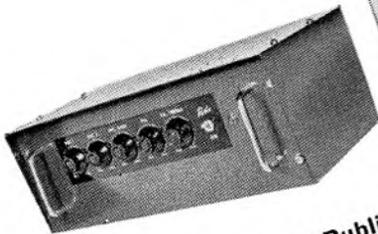
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Spring Gardens, London Road,  
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Phone Nos.: 49087, 46645. STD. RO.



SR430



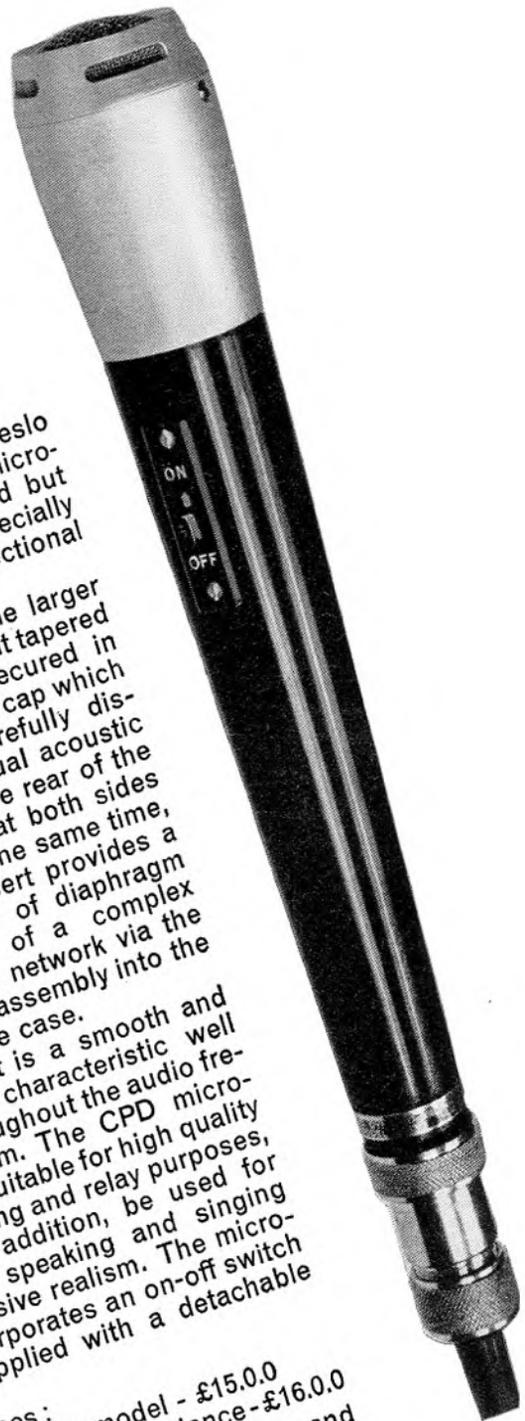
LS100A

### The RESLO range of Public Address Equipment.

**Line source and cabinet loudspeakers.**  
The LS100A line source loudspeaker is one of a range specially designed for Public Address installations in churches, assembly rooms, factories, theatres etc.

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ALSO

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**THIS UNREPEATABLE OFFER REMAINS OPEN ONLY WHILE STOCKS LAST! DON'T DELAY—SEND NOW!**

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Don't forget our other ACCESSORY BARGAINS!

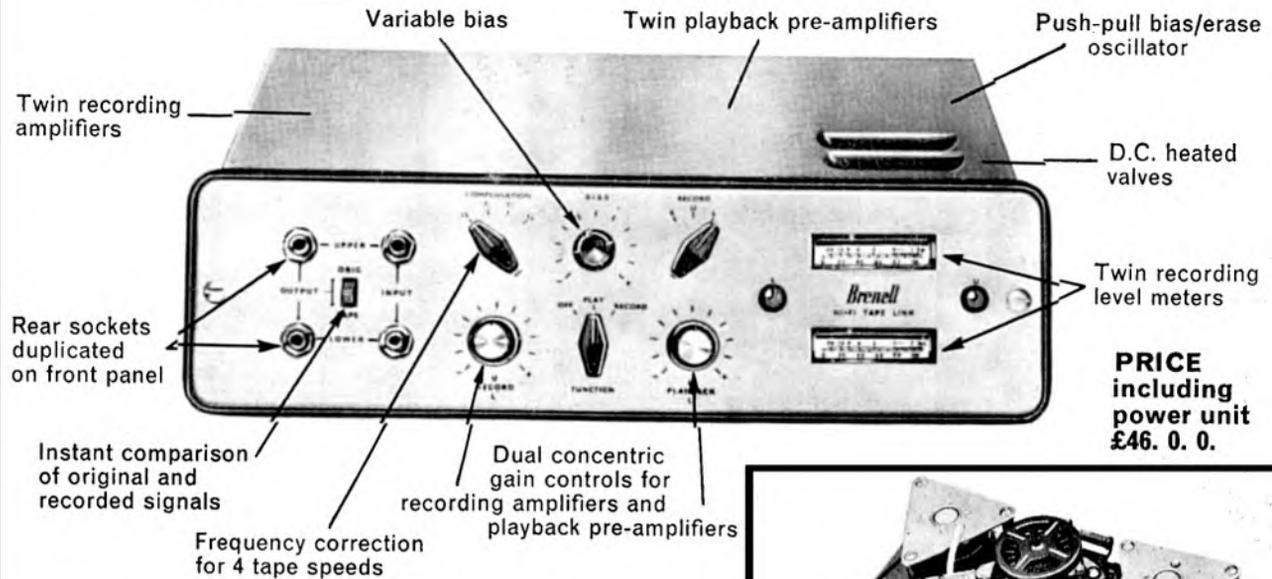
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	or 3 for 30/-	post free
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Mic Mixer, transistor 4 channel (HI-Z)	Only 49/6	P. & P. 2/6

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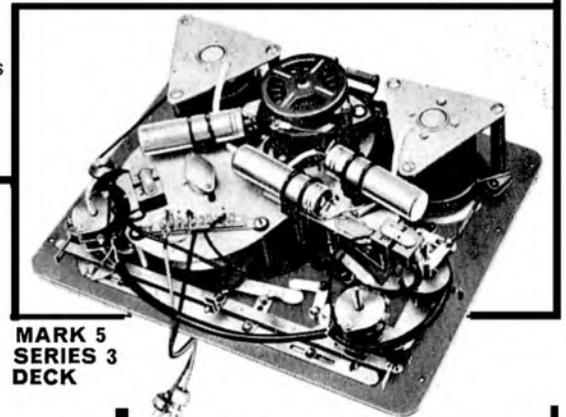
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**PRICE including power unit £46. 0. 0.**

*Designed for use with 2 1/2 or 2 1/4 track heads*

Built to the same high standards as our tape recorders and decks this HI-FI TAPE LINK has been developed for use with your high fidelity equipment. It is capable of giving superb results when matched to one of our Mark 5 Series 3 decks fitted with the appropriate heads. Write for full details of this amplifier and deck and complete range of tape recorders.



**MARK 5 SERIES 3 DECK**



**MARK 5 SERIES 3**

**MONO—HALF TRACK—TWO HEADS—MAGIC EYE**  
(Available with recording level meter at extra cost.)

High quality amplifier—with power output of 2½ watts r.m.s. and a frequency response of 40—20,000 c/s—can be used independently of tape recorder—narrow gapped record/playback head for extended frequency response—double gapped ferrite erase head to minimise erase noise—headphone monitoring.



**MARK 5 TYPE M SERIES 3**

**MONO—HALF TRACK—THREE HEADS—RECORDING LEVEL METER**  
Separate record and playback heads—separate record and playback amplifiers—amplifier frequency response 25-26,000 c/s ±3dB—power output 2 watts r.m.s.—separate bass and treble controls—mixing of input signals—speaker monitoring whilst recording.

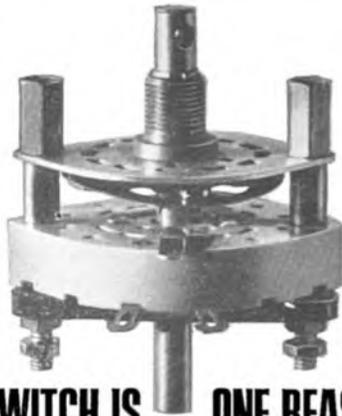


**STB2**

**MONO/STEREO—HALF TRACK (Record/playback)—QUARTER TRACK (playback) FOUR HEADS—TWO EDGEWISE METERS**  
Designed for use with high fidelity stereo installations—adjustable attenuators on all input channels to ensure perfect matching with all auxiliary equipment—dual concentric recording level and playback level controls—cathode follower output—four channel mixing on mono programme sources—twin recording and twin playback pre-amplifiers—comparison of original and recorded signal—adjustable bias level—recording facilities for 1/2 and 2/2 track—playback facilities for 1/2, 2/2, 1/4 and 2/4 tracks—sound-on-sound facilities—two edge-wise meters for recording level, tape output level and bias level.  
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Since 1949, when magnetic tape recording began in this country, Ferrograph has striven for perfection, and it is not without significance that Ferrograph tape recorders are used by Broadcasting Authorities the Armed Forces, Government Departments, Language Institutes, as well as by innumerable discriminating music lovers.

Every part of a Ferrograph is assembled by specialists, many of whom were with Ferrograph in 1949. The result is a tape recorder of the highest quality meeting the strictest standards.

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TRM 1

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Other outstanding features include  
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 ■Public address facility  
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Other tape recorders in the SONY range featuring the SONY-O-MATIC recording level control include

**MODEL TC-900**, a mains/battery portable with two track monaural recording and playback system at 32 gns. and

**MODEL TC-135**—an easy to carry two speed, two track extra lightweight portable with 5" reel capacity. Complete with highly sensitive SONY microphone. 28 gns.

Studio models also available—Send for details.

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TRM I

#### SPECIFICATION TC-357-4

Power requirement:	100, 110, 117, 125, 220 or 240 volts, 60 watts, 50/60 cps
Tape speeds:	Instantaneous selection 7½ ips, 3¾ ips or 1¾ ips (19, 9.5 or 4.75 cm/s)
Tracks:	4 tracks, monophonic
Recording time:	45 minutes per track, 3 hours in total at 7½ ips (With SONY Tape Super 7) 1.5 hours per track, 6 hours in total at 3¾ ips 3 hours per track, 12 hours in total at 1¾ ips
Reels:	7 inches or smaller
Frequency response:	40-15,000 cps at 7½ ips 40-12,000 cps at 3¾ ips 40- 6,000 cps at 1¾ ips
Flutter and wow:	Less than 0.12% RMS at 7½ ips Less than 0.2% RMS at 3¾ ips
Record/Playback head:	In-line quarter track (2 channel)
Erase head:	In-line quarter track (2 channel)
Bias frequency:	Approx. 55 Kc
Inputs:	High impedance microphone input (1) High impedance auxiliary input (1)
Outputs:	High impedance line output (1) 8 ohm external speaker output (1)
Speaker:	4 x 6" (10 x 15 cm) dynamic
Power output:	Max. 2 watts
Tube complement:	6267 (x 1), 6AN8 (x 1), 6BM8 (x 1)
Diodes:	1T22 (x 1), SE-05D (x 1)
Weight:	Approx. 22 lbs. (10 kgs.) (without accessories)
Dimensions:	14.8"W x 7.9"H x 12.2"D (375 x 200 x 310 mm)

# SONY®-O-MATIC

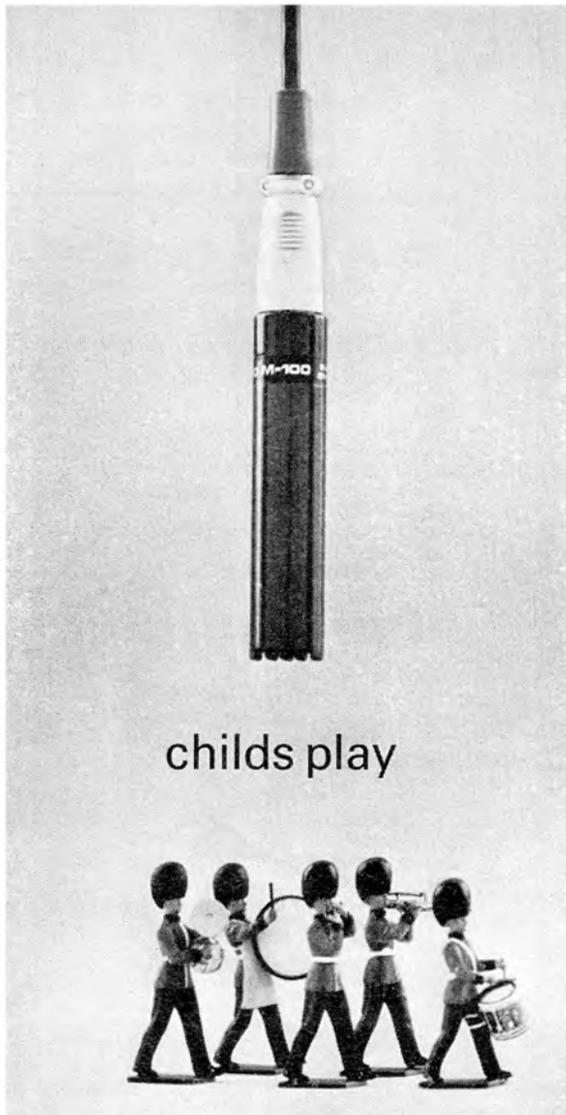
The tape recorder with completely automatic recording level control\*.



**MODEL TC-357-4:**  
62 gns.

\*Can also be manually adjusted





**yes  
and professional  
quality too**

With the Hammond M-100 the full dimension of the studio comes within the command of the amateur. Let your dealer give you a demonstration but be prepared for your previous conceptions of the "live sound" to be shattered. Write for full details from **C E Hammond & Co Ltd** 90 High Street Windsor Berks.

**with the Hammond  
M-100 Condenser  
Microphone 29 gns**

**TAPE**  
RECORDING  
MAGAZINE

Vol. 10

No. 3

March 1966

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**COVER PHOTOGRAPH:** *The choice of microphone may sometimes give rise to some heart-searching particularly with the increasing number of makes available. Some indication of the varieties currently on the market is given in our cover photograph specially taken by Studio M Photograph Ltd. showing part of the AKG range.*

*In an effort to ease the task of selection we publish in this issue a special feature describing the basic types and their design. This special feature also includes test reports on four current instruments, and the second part of a series which this month advises on the choice of microphone for a particular application.*

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**EDITORIAL**

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# Tape trends and tape talk

By the Editor

THE ORGANISING COMMITTEE of the British Amateur Tape Recording Contest—details of which are announced opposite—are determined to make a maximum effort to get this event “off the ground” and to attract a record number of entries this year. With this aim, the form of the Contest has again been changed slightly; the purpose is to make it easier for *anyone* to enter a tape, to banish the idea that some novices may have had in the past that they could not face the competition of more experienced amateurs.

The first big change since the 1965 event is the abolition of a class for professionals. This experiment created a number of problems for the organisers last year and the conclusion has been reached that any professional contest—and there may well be a case for one—must be organised separately from an amateur event.

The next change concerns the classes into which the Contest is divided. Last year the old categories, based upon the International Contest, were abandoned and the event was thrown wide open, so far as the content of tapes was concerned.

This year, while having only three broad classes—novices, amateurs and groups—the Contest organisers have offered guidance as to the type of tapes expected—and this guidance follows closely the old classification of the earlier Contests.

It remains to be seen how far competitors follow this guidance: we may receive a lot of tapes that do not fall into any easy classification, but I doubt it. The organisers of the International event knew what they were doing when they arrived at their categories; they had had a lot of experience. The main argument against their system is, in fact, a matter of semantics. For example, few Englishmen understand what sort of tape qualifies for a class called “Actuality.”

Let us hope, then, that the British Contest has now arrived at a formula that will produce the best results all round. The Organising Committee is strengthened this year by the addition of Grundig (Great Britain) Ltd.—a particular pleasure to me personally, as Grundig were one of the staunchest supporters of the Contest in its early days—up until the reorganisation a couple of

years ago which placed the event in the hands of the magnetic tape manufacturers alone. Now the Committee is anxious to get the support of any firms in the tape recording field.

THIS YEAR the Contest has a bigger budget than ever before. That means better publicity and stronger organisation. It is now up to the tape amateurs to do their part in stimulating entries from everyone they know with a recorder.

The one problem that remains is how best to maintain the close link between the British and International Contests. Many of our readers, I know, wish to enter the same tapes in both events.

In the past there has been a joint entry form; but I can understand the point of view of those British organisers who feel that this complicates the picture and may deter the less experienced amateurs from entering the British event.

There is no doubt that it is in everyone's interest, in the long run, to build up the biggest possible entry for the British Contest.

*TAPE Recording Magazine* will, therefore, play a special part this year in linking the two events. We shall publish next month a special entry form for the International Contest (CIMES). If you wish to enter your tape for *both* Contests, fill up that form when it is published and send it to CIMES, 7, Tudor Street, London, E.C.4. Send it *separately* to your entry in the British Contest.

WHEN THE BRITISH CONTEST is over, we will then extract from the entries those tapes for which we hold CIMES entry forms and we will see that these tapes are properly entered for the International event.

It should be noted, however, that the playing times of tapes in the British Contest are not the same as those in the International event and competitors who wish to enter both should make sure that the duration of their tapes fulfil the rules of *both* Contests. I recognise that this complicates the situation a little; but it is worth a little extra trouble if, in this way, popular support can be built up.

As I continue as Vice-Chairman of the British Contest Organising Committee and maintain my contacts with the International Contest organisers and their affiliate in Britain, the Federation of British Tape Recording Clubs, I shall be in a position to watch the development of events closely and to seek at each stage to accord the interests of the two events.

I HAVE JUST HEARD from Dr. Jan Mees, the Secretary-General of the International Federation of Sound Hunters, that the 1966 International Contest will be judged in Holland. I have the most pleasant recollections of CIMES 1960 held in Amsterdam and Hilversum and keenly anticipate another visit next October.

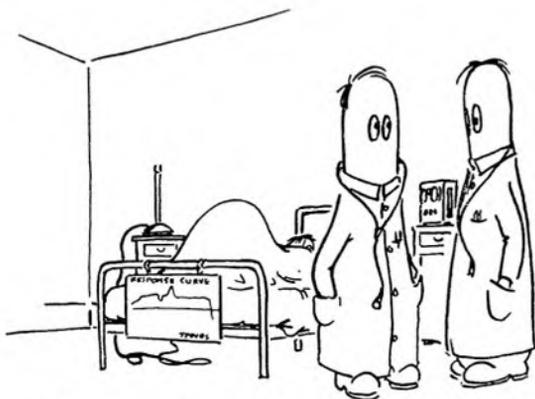
Entries in our own Script Editing Contest—announced last month—are already beginning to arrive, and these early programmes show promise of an interesting session sifting the various interpretations of a set programme.

Back copies of the February number are still available if you missed this issue. There are still two weeks to go before the closing date, March 1, and the chance to win the Philips cassette-loaded battery-operated tape recorder.

Still on the subject of tape competitions, I hear that Grundig have received an encouraging entry for their special Schools Contest. Some 140 entries arrived, including tapes from schools for British Servicemen's children in Aden, Belgium, Cyprus and Germany.

Some 25 per cent of the entries have been of school choirs and bands, but playlets, reports on school visits, and dramatised descriptions of tape exchange activities are also included in the wide range of subjects.

## LAUGH WITH JEEVES



**“Most unusual case. Amateur recordist who asked some stevedores where he could put his microphone—and they showed him.”**

# BRITISH AMATEUR TAPE RECORDING CONTEST 1966

**YOUR TAPE  
CAN WIN  
YOU ANY  
OF THESE  
PRIZES**

**TAPE OF THE YEAR** The outstanding tape from all sections of the 1966 Contest will be Tape of the Year. Remember a novice stands an equal chance with an enthusiast in winning this prize.

£100 cash PLUS a silver trophy PLUS a chance to hear your tape broadcast PLUS a free trip to London.

**NOVICE AMATEUR** Those who have only recently bought a tape recorder or who have never entered a tape contest before.

**Suggested subjects:** Children, transport, holidays, birds and animals, music and other sounds.

**1st Prize:** A silver trophy plus £10 cash, plus £15 worth of magnetic tape, plus a free trip to London.

**2nd Prize:** A silver trophy plus £10 worth of magnetic tape.

**3rd Prize:** A silver trophy.

\* \* \*

**ADVANCED AMATEUR** Those who make a serious hobby of tape recording, or who have entered a similar contest in the past.

**Suggested subjects:** Newsreel, drama, technical experiment, music and other sounds.

**1st Prize:** A silver trophy plus £10 cash, plus £15 worth of magnetic tape, plus a free trip to London.

**2nd Prize:** A silver trophy plus £10 worth of magnetic tape.

**3rd Prize:** A silver trophy.

\* \* \*

**GROUP ENTRIES** Schools, clubs of every kind, and other groups working together. This section is open to all amateurs irrespective of experience.

**1st Prize:** A silver trophy plus £10 cash, plus £15 worth of magnetic tape, plus a free trip to London.

**2nd Prize:** A silver trophy plus £10 worth of magnetic tape.

**3rd Prize:** A silver trophy.

## RULES OF THE CONTEST

1. Classes of entrants will be as follows:—

**Novice Amateur.**—Those who have only recently bought a tape recorder or who have never entered a tape recording contest before. Maximum playing time for entries: four minutes.

**Advanced Amateur.**—Those who make a serious hobby of tape recording, or who have entered a similar contest in the past. Maximum playing time for entries: eight minutes.

**Group Entries.**—Schools, clubs of every kind, and other groups working together. This section is open to all amateurs, irrespective of experience. Maximum playing time for entries: eight minutes.

2. No tapes submitted may contain anything taken from radio or TV transmissions or commercial recordings. Any competitor who has fully or in part used any literary or musical production of which he is not the author or composer and which is still in copyright, must obtain authorisation from the author, composer or organisation owning or controlling the copyright and must produce proof of such authorisation. This proof must be submitted with this form and must state expressly that the author, composer or the organisation owning or controlling the copyright forgo any payment by the broadcasting organisations which transmit the recording. (This does not imply that, in the countries where they apply, the normal rights of payment arranged by the organisations owning or controlling the copyrights are relinquished.)

3. The programme must commence at the beginning of the tape and only one track may be used (when judging, there will be no reversal of spools to hear second tracks). Tape should be prepared between white or coloured "leader" tapes.

4. Recordings must be made on 1/2-inch tape at either 15, 7 1/2, 3 1/2 or 1 1/2 inches per second. Stereo recordings may be entered.

5. All tapes will be returned to competitors, provided adequate return postage is sent with entries. But the Contest organisers will retain copies of the winning tape and of the runners-up tapes. Copyright of these will be the property of their owners, but the Contest organisers reserve the right to arrange for the publication of the whole, or parts, of any or all of them, by radio, disc or tape, or by any other means.

6. The Contest is open only to residents in the U.K. The decision of the judges will be final and no appeal may be made, nor correspondence entered into.

7. The closing date for receipt of tapes will be Saturday, July 30, 1966. No entries received after that date can be considered in any circumstances. The winners and the runners-up will be notified immediately judging is completed and a complete list of awards will be circulated to all entrants.

8. Every tape entered must be adequately packed and properly stamped and addressed to the British Amateur Tape Recording Contest, 7, Tudor Street, London, E.C.4, and a completed entry form and return postage included with the tape. Name and address should also be written on a small label firmly affixed to the tape spool and to the containers, and the title of the entry written on the leader tape.

**Copyright Note:** Special care should be taken in reading the section of the rules concerning copyright (2). If in doubt, consult the Mechanical Copyright Protection Society, 380, Streatham Hill Road, London, S.W.16.

## ENTRY FORM

(Please use block letters)

Name and Address .....

.....

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

.....

How long have you been doing amateur recording? .....

.....

Special interests .....

.....

Details about the attached recording:

1. Title—if there is one .....

2. Exact duration .....minutes .....seconds

3. Recorded at a speed of 1 7/8/3 1/4/7 1/2/15\* inches per second.  
Stereo/Mono\*

4. Category in which you wish it to be entered: Novice Amateur/  
Advanced Amateur/Groups\*

\* Delete as necessary

5. Make of recorder used .....

6. Make of magnetic tape used .....

7. Any other equipment used (i.e., microphone, mixer unit, tape  
splicer, etc.). Give details and manufacturers .....

.....

.....

.....

8. When and where was the recording made .....

.....

.....

.....

9. Titles of works used. Names of authors or composers, duration,  
etc. ....

.....

.....

10. Names of any assistants and how they helped in making the  
recording .....

.....

.....

I declare that the enclosed tape feature is entirely my own work,  
and that I have not included on the tape any copyright material from  
radio, commercial recording, or any other source, for which author-  
isation has not been granted.

Signed .....

## Types and designs for the tape enthusiast

By H. BURRELL HADDEN

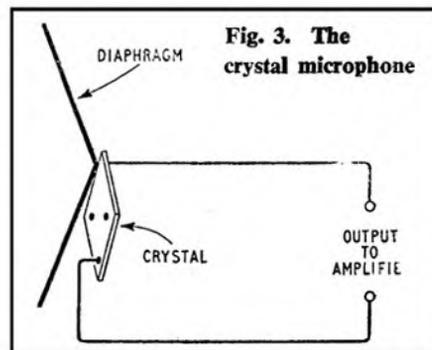
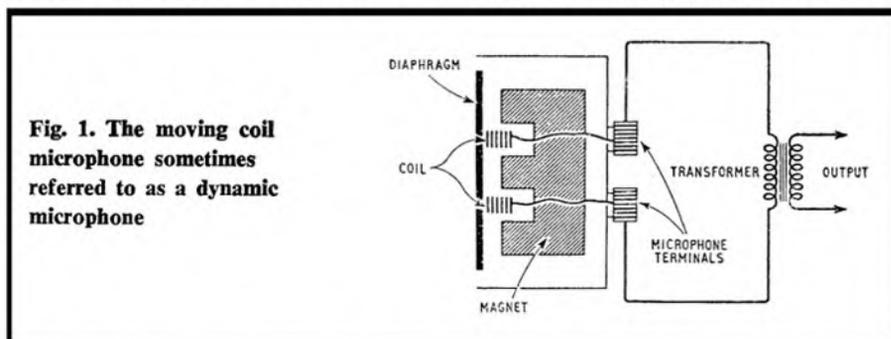
IN the same way that the painter has a number of different brushes to produce his various visual effects, so the recordist can choose from a varied collection of microphones to suit different requirements. The results also have something in common: the painter makes a distillation of the essence of his subject and puts it down on canvas; similarly the recordist shapes his sounds to give his audience a realistic impression of the essence of the original.

Unfortunately for the artist in sound there the analogy ends since though there are probably hundreds of different brushes and painting implements, relatively few different types of microphones are available. If the recordist is to be fully equipped to carry out his task, he should possess, or at least be aware of, the various available microphones, and should have a working knowledge of the types and their design.

Microphones can be described in a number of ways. The first classification is in the mode of generating the electrical

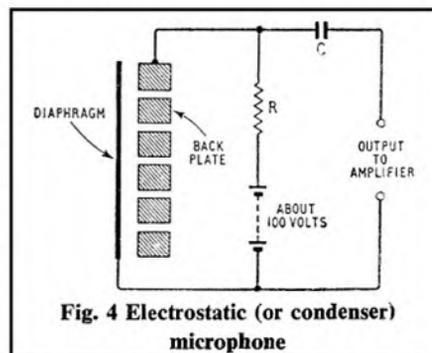
basically low impedances, although some may have built-in transformers to increase the impedance to a higher value.

The moving coil (Fig. 1) can have a small to medium output, whereas the ribbon (Fig. 2) will always have a very small output which will require amplification. The crystal microphone (Fig. 3) will have a much



response, this is the way the voltage output of the microphone varies as a sound source of constant amplitude is moved round the microphone at a constant distance from it.

There are three main types of polar responses: omni-directional, figure-of-eight and cardioid. In simpler terms, these mean that the instrument is sensitive to sound from either all round, on two sides, or on one side only, and this knowledge immediately

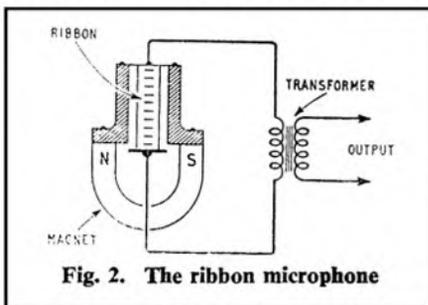


gives us a more useful criterion with which to judge the microphone.

Any of the types of microphone described above, dynamic, ribbon, electrostatic or crystal, may be made to operate with any of the three polar responses, or with many other polar responses in between the three mentioned. However, in the main, the

signal from the original sound. Microphones are described as moving coil (or dynamic), ribbon or crystal. These terms describe the type of transducer, but provide little information about the instrument, except perhaps some idea of the impedance of the microphone and possibly the amplitude of its output.

The first two types mentioned are both electromagnetic in operation and will have



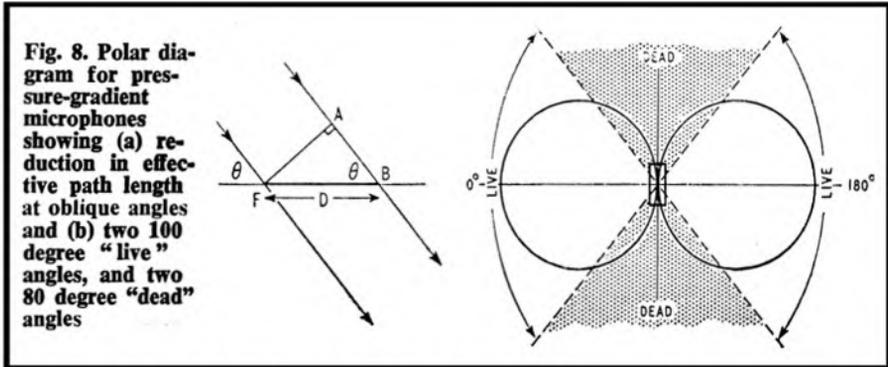
larger output, and will almost always be of very high impedance. Another type of microphone, the electrostatic (Fig. 4) is seldom met outside professional circles because of its high cost.

The importance of impedances is felt mostly with regard to the applications of a given microphone allied to the socket to which it will be fed. A low impedance unit is much more useful if long distances exist between the sound source and the recording equipment. It does not suffer from loss of output, particularly at high frequencies, which occur when high impedance types are used. They are also less likely to pick up extraneous noises, such as hum, on their cables.

Whilst all this information is very necessary from the point of view of connecting the microphone to the recording equipment, there are other differences which describe the behaviour of a microphone as a sound pick-up device. These differences are concerned with the way the sound forces act on the diaphragm of the instrument, and provide the next descriptive step—the directional pattern. Also known as the polar

moving coil is either omni-directional or cardioid, the ribbon is figure-of-eight, and the crystal almost always omni-directional. The electrostatic microphone can be made to function in any of the three main modes, and some of the professional types can be switched to give the particular characteristic desired. The cheaper types of electrostatic microphone likely to be encountered by the amateur recordist are almost certain to be omni-directional.

In order to understand how the various polar responses can be arranged, it is necessary to consider the ways that the forces—due to the sound wave—can be made to act on the diaphragm of the instrument. If the diaphragm is open to the air on one side only, the microphone is said to be pressure-operated, and is rather like a quick acting aneroid barometer. The size of the force exerted on the diaphragm depends on its area and on the instantaneous pressure of the sound wave. It is, of course, necessary



amount, depending on the size of the object in relation to the wavelength of the sound. The microphone itself is, of course, such an object, and when it is small compared to the wavelength, little or no reflection

it can be arranged that nevertheless, the microphone has a uniform output.

Turning now to the polar response, it will be evident that the pressure microphone, since it only responds to the sound pressure at the point in space where it is located, will give the same output whether the sound actually arrives from the front or the back, or indeed any other direction. This is, in fact only theoretically true, since the microphone has a finite size, and two effects occur. Firstly, the obstacle effect mentioned earlier; and secondly, at oblique angles the sound will arrive at different parts of the dia-

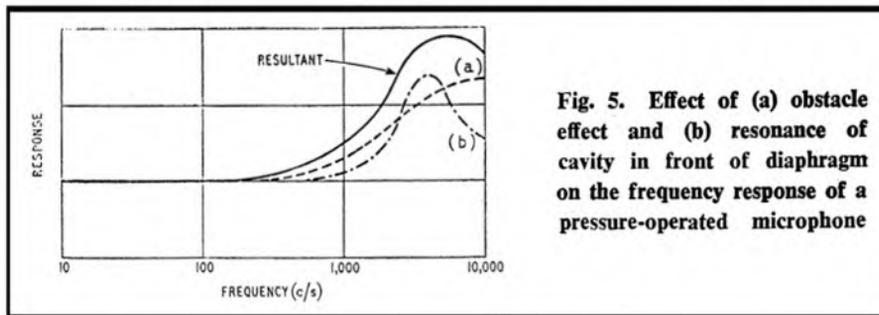


Fig. 5. Effect of (a) obstacle effect and (b) resonance of cavity in front of diaphragm on the frequency response of a pressure-operated microphone

to provide a small passage to the rear of the diaphragm in practice so that the diaphragm can move freely; if this were not done the air in the cavity behind would become compressed and would affect the movement.

Two other effects can cause variations of the output of the microphone, mainly at high frequencies. Firstly if any cavities

occurs. When, however, it is comparable with the wavelength, at very high audio frequencies, then these sounds will be reflected and an increase of microphone output will occur. (In early pressure microphones, where the diameter of the diaphragm was upwards of three inches this effect gave rise to the characteristic toppiness by which these instruments were known. (Fig. 5).

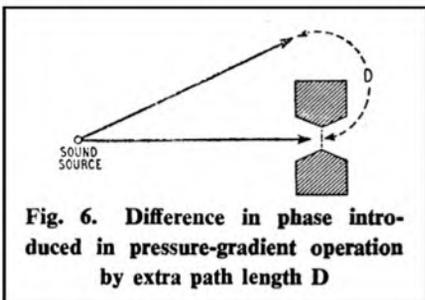


Fig. 6. Difference in phase introduced in pressure-gradient operation by extra path length D

formed in front of the diaphragm—due for example to the design of the case—the pressure on the diaphragm and hence the output, will show a peak due to the cavity resonance. I can remember a classic case some years ago where a microphone was produced whose response was anything but what the makers specified. It was subsequently discovered that the published response was that of the internal microphone capsule only, and the designers had not taken into account the effect of the case which was designed by a different department! Needless to say, there is not much fear of this sort of thing happening nowadays.

The second effect is caused by the fact that all objects in the path of a sound wave will reflect sound to a greater or lesser

When both sides of the microphone diaphragm are left open to the air (Fig. 6), (most ribbon microphones come into this category) then the sound wave can reach both sides, and the force acting on the diaphragm is due to the difference in pressure between the two points. The size of this force will depend on the phase difference between the pressures at a given instant, and this will depend on two things—the difference in path length between the front and the back of the microphone, and the wavelength of the sound. Since the path length is fixed for a given microphone, the phase difference will be small at long wavelengths, and large at short wavelengths. So it will follow that the force will increase with rise of frequency. By suitable design,

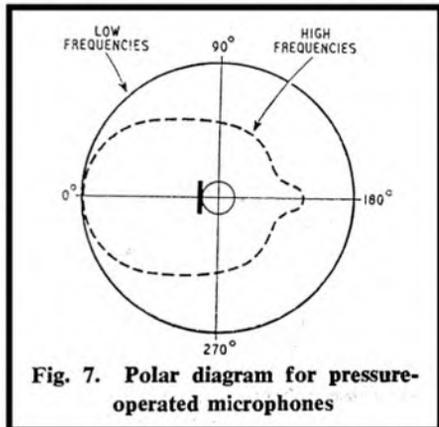


Fig. 7. Polar diagram for pressure-operated microphones

phragm at different times. At high frequencies, when the wavelength is smaller than the diameter, these different arrivals may be out of phase, and there will be partial cancellation. Hence the microphone will tend to become more and more one sided as the frequency rises. (Fig. 7). With careful design, this effect need not be too serious, and indeed some excellent omni-directional microphones are available.

When the microphone depends on pressure difference, or pressure gradient, we have seen that the force depends on the difference

Continued on page 95

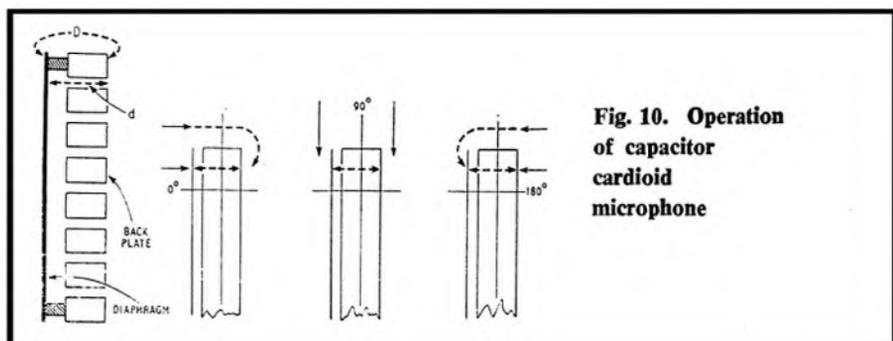
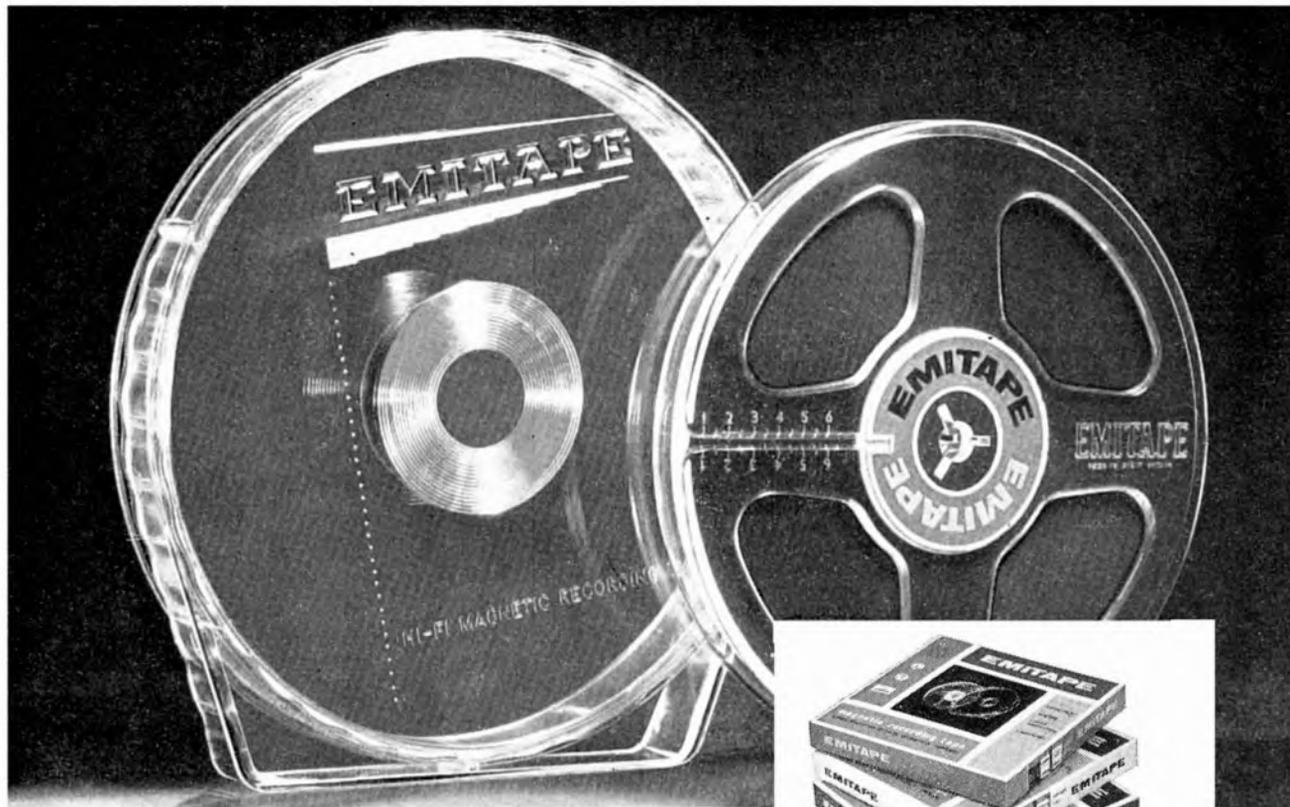


Fig. 10. Operation of capacitor cardioid microphone

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# FOCUS on microphones

## H. Burrell Hadden examines four of the current microphones



LM100

**T**HIS month I was sent four microphones for review, two having omnidirectional characteristics, the others having cardioid polar responses. Prices vary from just under £3 to £10, and of the instruments tested, the cheapest one is without doubt the best value for

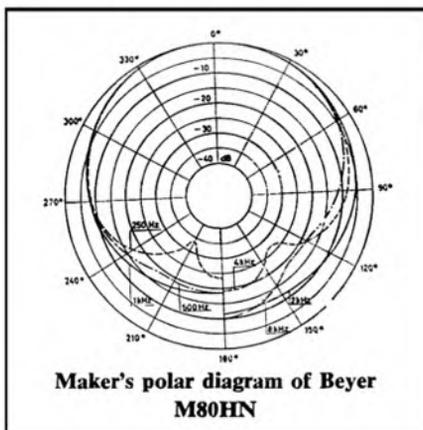
First, the omnidirectional types. The **Lustraphone LTD59** is a well made, well finished, moving coil unit, supplied mounted on a swan neck fitting, with an elegant table stand; it could equally well be mounted on a floor stand. With an impedance of 500 ohms, it would match easily into any of the transistorised equipment now available, as well, of course, to standard professional equipment.

in that the omnidirectional characteristic was well maintained at low and middle frequencies, but the instrument became more and more one-sided as the frequency was raised. On speech, this meant some loss of sibilance as the angle increased from zero on axis to 90 degrees, but there was little further change as the angle was increased to 180 degrees. As a robust microphone, for general knockabout use, with little fear of it being easily damaged, I can recommend this as a good buy at £8 18s. 6d.



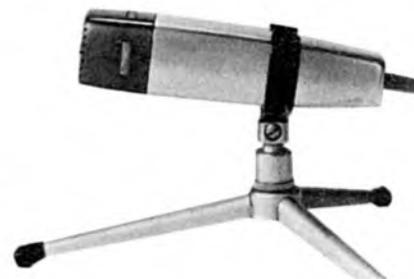
Left: The **AKG D145**. Above: The **Lustraphone LTD/59**

money. That is not to say, however, that the others are not good microphones, they certainly are, and any one of them would be a useful addition to the armoury of the amateur recordist. The microphones were made by A.K.G., Beyer, Lustraphone, and the London Microphone Company.



The frequency response was as expected from a dynamic unit of this size, having a slight but not unpleasant high frequency rise, and a noticeable lack of extreme bass. However, on a listening test there seemed to be a lack of lower middle frequencies on the specimen tested, which gave a rather hollow effect to speech. The polar response was fairly typical of a pressure microphone,

The second omnidirectional microphone was the London Microphone Company's type **LM100**. This was the lowest priced instrument sent for review, and I was very agreeably surprised to find that it had an individual calibration curve of frequency response attached to it. This is most unusual for a microphone costing only

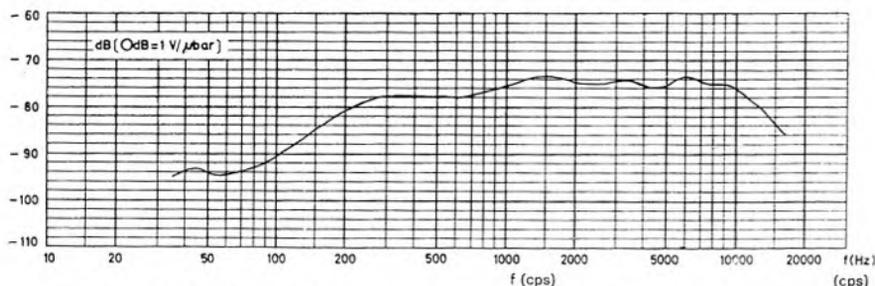


The Beyer M80HN

£2 19s. 6d., the anticipated list price, I must add, as this microphone is not yet on the market. The microphone tested came up to this specification and was the subject of considerable interest to several friends who heard it. It is a small plastic-cased instrument, and although the case says firmly that it is made in England, I understand that the moving coil capsule is the product of a famous continental manufacturer.

The polar response was again typical of a pressure microphone, but the high frequency response did not fall off quite so rapidly at 90 degrees as the Lustraphone instrument. The impedance was again suitable for connection to transistorised equipment, although low, and high impedance versions will also be available.

(Continued on page 95)



Maker's frequency response of Beyer M80HN microphone

**L**AST month we discussed the selection of equipment for recording nature—nature in the form of bird song—describing the most desirable features on a tape recorder and referring to the use of a parabolic reflector to channel distant sounds to the relatively tiny microphone face.

Although the Grampian reflector would seem to be the obvious choice, being the only one regularly advertised, it is of course possible to adapt reflectors constructed for photographic and other lighting purposes.

The other alternative is to construct the reflector yourself and so have complete freedom of choice on the questions of diameter and focal length. This month I wish to describe the construction of my own reflector which was illustrated in use last month.

The most suitable material is 18 or 20 gauge aluminium sheet spun to the correct curve. This is the work of an expert and if you are not capable of doing it then it is advisable to have it done to your own template; a friend employed in a panel beating shop can be very helpful in this sort of work! I have heard it suggested that reflectors can be moulded in fibre-glass and whilst I think this feasible have no experience of the results obtained. Such a bowl, however, would at least have the advantage of being lightweight.

A parabolic curve is given by the formula  $-y^2 = 4ax$ , where  $y$  is the vertical axis,  $x$  the horizontal and  $a$  is the distance of the focal point from the point where the axes meet. However, from the curves and figures given in Fig. 2 and Table 1 it should not be difficult to construct a template in hardboard for the type of bowl you wish to make up.

To prepare the template draw vertical and horizontal axes and mark off inches along the vertical axis. Decide focal length and refer to appropriate column in Table 1.

# RECORDING THE SOUNDS OF NATURE

**RICHARD MARGOSCHIS**, past winner in the British Amateur Tape Recording Contest, and a keen enthusiast of bird-song recording, continues his series relating his experiences in the field, describing his approach, methods and equipment used. In this article he describes the construction of a parabolic reflector and advises regarding the choice of microphones.

Mark off distances from vertical axis at each one-inch step and connect up to produce curve; repeat to produce other half of curve. For example a curve having a four-inch focal length is 1.6 inches from the vertical axis and five inches from the horizontal, then 2.2 and six inches respectively and so on.

When the aluminium is spun fix a ring of heavy galvanised wire, the type used for fencing is ideal, around its circumference to give it added strength.

In the centre of the bowl drill a hole suitable to receive a brass sleeve through which can pass a length of quarter-inch rod. A small knurled knob threaded into the sleeve provides a means of fixing the rod at the correct spot. The rod should be cranked so that when the microphone is carried in a clip at the other end it is in line with the centre of the bowl; the crank should be deep enough to allow for the possible use of a wind shield. (See Fig. 3.) An advantage of this method is that the microphone, complete with mounting, can be removed easily and quickly by the simple expedient of loosening the knurled knob. Fix the smallest obtainable "Terry" clip on the rim of the bowl to hold the microphone lead steady. If sighting is required a spy hole can be drilled just above the centre to give alignment along the microphone.

A convenient way of mounting the reflector is shown in Fig. 4. The bracket, about  $1\frac{1}{2}$  inches wide, is bolted at top and bottom to the bowl with 4 BA nuts and bolts; it can be made of steel but 20 gauge aluminium is strong enough if the edges are lapped over. In the horizontal section fix

a  $\frac{3}{8}$  Whit. nut to allow fixing to either a tripod or a wooden handle. The nearer this fixing point can be to the plane of the reflector the better will be the overall balance when the microphone is in place. This is an important point when using the reflector held in the hand.

Finally cover the whole of the back of the bowl with an absorbent material to reduce unwanted ringing in the recorded signal. Expanded polystyrene matting as used for bath mats, and applied with Evo-stik is suitable and adds little weight.

I use a 20-inch diameter by 5-inch focal length reflector constructed on these lines and find it much lighter and easier to handle than my Grampian.

If you wish to check the focal point set the reflector up on a tripod and connect the microphone to an amplifier. Line up on to a constant note source of fairly high frequency and slide the microphone in and out until the strongest reproduction is obtained. When the correct point is obtained mark the mount in relation to its sleeve in order that it can always be put back in its correct position.

Having given fairly detailed consideration to the parabolic reflector the microphone which will be used with it is obviously the next item for discussion.

The microphone sold with a recorder is properly matched so far as impedance is concerned. This is a vital matter as incorrect matching can be the cause of poor quality recordings. If you are considering purchasing another microphone be sure to find out first the input impedance of the recorder. In certain circumstances microphones of a different impedance can be used by including a matching transformer in the line, such a transformer should be at the recorder end of the lead.

Irrespective of impedance we must consider crystal, ribbon and moving coil microphones. The crystal is fairly sensitive, has a good frequency response and has the advantage of being cheap. However, because its impedance is high it is unlikely to correctly match a transistorised recorder. A high impedance microphone cannot be used with a long lead and so if the input to your machine is designed for use with a crystal microphone it will be necessary to use it in a reflector held in the hand, in order to keep the lead as short as possible. (More about hand-held reflectors later and see my remarks last month.)

The directional characteristic of a ribbon microphone will be of little benefit when used in a reflector, in fact it may be detrimental according to how it is mounted. The main objection to the ribbon however, is its great sensitivity to wind which could damage the instrument under conditions often found in the field.

This leaves the moving coil which may

Vertical Axis 'y'	Distance Along Axis 'x' for Five Different Focal Lengths				
	4	5	6	7	9
2.....	0.2	0.2	0.2	0.1	0.1
3.....	0.6	0.4	0.4	0.3	0.2
4.....	1.0	0.8	0.7	0.6	0.4
5.....	1.6	1.2	1.0	0.9	0.7
6.....	2.2	1.8	1.5	1.3	1.0
7.....	3.1	2.4	2.0	1.7	1.4
8.....	4.0	3.2	2.7	2.3	1.8
9.....	5.0	4.0	3.4	2.9	2.2
10.....	6.2	5.0	4.3	3.6	2.8
11.....	7.5	6.0	5.0	4.3	3.4
12.....	9.0	7.2	6.0	5.1	4.0
13.....	10.6	8.4	7.0	6.0	4.7
14.....	12.2	9.8	8.2	7.0	5.4
15.....	14.1	11.2	9.4	8.0	6.2
16.....	16.0	12.8	10.7	9.1	7.1
17.....	18.1	14.4	12.0	10.3	8.0
18.....	20.2	16.2	13.5	11.6	9.0

Table 1: Used in conjunction with Fig. 2 (February issue) for design of template for construction of parabolic reflector

# RECORDING THE SOUNDS OF NATURE

be either omni-directional or directional, and again there is little point in the latter unless it is to be used without a reflector. It is less sensitive to wind than the ribbon and when constructed as a stick or hand microphone it is easily mounted in a reflector. Furthermore, its impedance can be high, medium or low.

Of the three types mentioned the moving coil answers the needs best and by adding a wind shield its sensitivity to wind can be still further reduced without unduly affecting its frequency response.

The hand type moving coil has been my choice and for some years I have been using the Grampian DP4. This is a fairly low-priced instrument which I can highly recommend for the purpose. It has served me well and, in fact, helped to produce two winning tapes in the British Amateur Tape Recording Contest. The manufacturers have now produced a windshield for it which is effective and also reasonably priced.

The one snag that I have met when using the DP 4 is that at medium impedance (600 ohms) considerable interference is picked up when using a long lead. This could be overcome by using the low impedance version with a suitable matching transformer—but it means another bit of equipment to carry around and to me weight is all important. Consequently I have recently purchased a Beyer M 119 (200 ohms) which matches the Fi-Cord 1a satisfactorily and, so far, has not given any trouble on leads up to thirty yards long. This instrument does give better quality than the former and is rather more sensitive, but this should be so because its price is about two and a half times as much.

Now this raises two other points, the first being that if you have a good recorder your results will be improved using a better microphone. This is a point well worth serious

consideration and it brings me to the second point.

During discussions with other people interested in recording bird song it has been suggested that the use of a parabolic reflector accentuates the high frequencies too much and results in a false reproduction of some bird songs. I do not agree.

Writing in a contemporary magazine A. G. Field has suggested that this can be overcome by the use of filter pads in front of the microphone and covering the internal surface of the reflector with a thin baize material. This is contrary to the principles of the reflector and if, as he suggests, it will have the effect of slightly reducing the high frequency element it is similar to using a lower quality microphone. The idea is certainly worth a try if you think that your recordings are too "hard," but I think the higher the frequencies that can be recorded the better the final result.

Let me return for a moment to the problem of wind affecting the microphone. This is one of the most common difficulties in the field and it needs only a light breeze to ruin a recording. Well-known bird recordist, John Kirby, in a lecture at Bristol, suggested the use of nylon netting and I have found this to be highly effective. The idea is to make a sort of big bonnet out of a double layer of stiff nylon netting with elastic threaded around it. In use it is slipped over the microphone and held around the circumference of the reflector by the elastic.

So much for the principle pieces of apparatus required, let us now give some thought to their use in the field.

The first essential is familiarity with the equipment and practice is the only way to make sure that it can be operated properly—in darkness if necessary for many of the sounds of nature are peculiar to the night.

To the experienced amateur recordist the handling of the recorder should present no difficulty, but if a reflector is being used then this has to be handled at the same time. Should it be mounted on a tripod or should it be held in the hand? I think the answer is—whichever suits you best.

If I knew exactly what I was going after and exactly where the sound would come from then I should mount my reflector on a tripod and direct it at the anticipated point. Using a long lead I should then be able to secrete myself as far away as possible to minimise disturbance. If it is likely the sound source is not within the field of the reflector when mounted then it would be necessary to remain near to it. In such a case a "pan and tilt" head is essential to

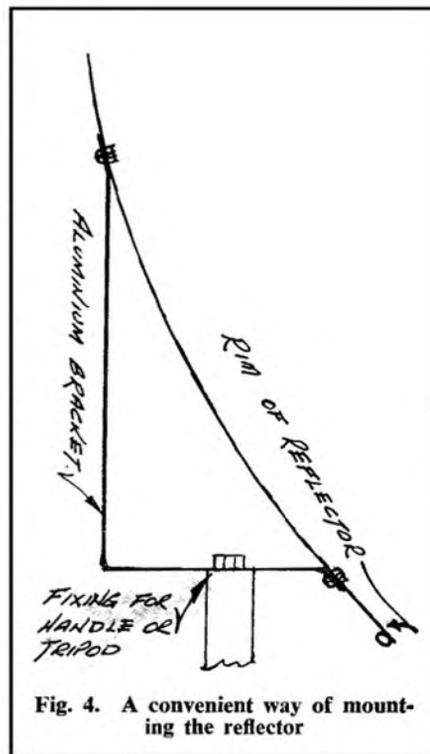


Fig. 4. A convenient way of mounting the reflector

facilitate easy and noiseless movement of the reflector. If the reflector is heavy and a long wait is anticipated at one spot then a tripod is a great help.

On the other hand, when sitting and waiting for a sound which might come from any direction I find it better to hold the reflector by hand. This is where a light reflector is a great help, but even so practice is required in handling it. The slightest touch on the bowl or the movement of a finger on the handle will be recorded as extraneous noise, in fact a knuckle cracking can be recorded! The handle must be held firmly and movement to re-direct the reflector made with the whole arm rather than from the wrist. A little practice whilst monitoring the results will soon show you what I mean.

There are many occasions when I am not looking or listening for anything in particular, simply wandering around enjoying the country but constantly alert to record anything which turns up. It is on such occasions that my very portable equipment scores. The Fi-Cord 1a rests just forward of my left hip with its carrying strap over my right shoulder to ensure that it cannot slip off when bending or crossing awkward stiles or streams. My right hand holds the reflector carrying the microphone which is connected to the recorder by a lead of just sufficient length to allow adequate movement. Within seconds the reflector can be directed to any spot and the recorder started by my left hand which slides easily on to the controls. In my left ear is a small earphone for monitoring purposes. Thus rigged out I have found little discomfort during a day's walking in the Welsh mountains.

\* \* \*

Next month I shall be describing some of my experiences using the home-constructed reflector on location recording and discuss some of the common faults met during replay of bird song recording.

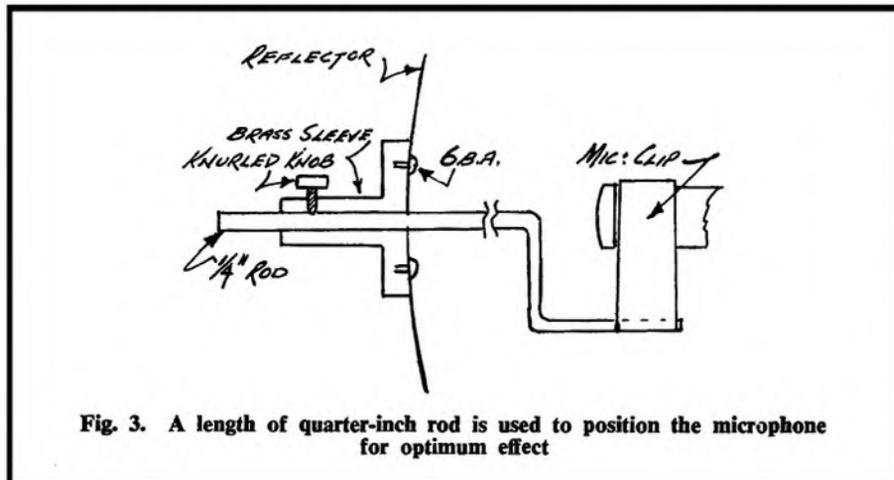


Fig. 3. A length of quarter-inch rod is used to position the microphone for optimum effect



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**PHILIPS—THE FRIEND OF THE FAMILY**

(PTRO129)

**WHEN** is a decision going to be made to permit local broadcasting? The subject has been discussed, argued about, analysed, costed, programmed and even had a trial studio devoted to it. With unfailing regularity the government is asked to act. What happens? Nothing.

Yet whilst the heat of this controversy is dissipated through the chill corridors of Whitehall we are being bombarded daily with salvos of pop music from local stations against which the government is apparently powerless. The pirates around our coasts continue to operate without let or hindrance. Since they are illegal they cannot be subjected to control.

Their standards, imposed by the dictates of commercial profit, are what might be expected under the circumstances. Their transmissions bear no relation to the programme structure it is hoped to achieve by a legal, nationally-organised local broadcasting system.

We, as the backbone of the amateur interest in recorded sound, should be seriously concerned at the position. Consider the possibility of a local station in your own area transmitting on VHF over a radius of, say, about ten miles. The demand for recorded material of purely local interest would have to be met. What a chance for amateur skill and ability to at last find an outlet.

But all we get is official procrastination. It's always easy to find an excuse to do nothing. It would not be politic to act against the pirates, too many people listen to them and such a move would be unpopular. The cost of setting up local stations is too great in view of the economic situation, but this is a development that must come, sooner or later.

Note the reference above to "skill and ability." These will show in a finished recording as "quality." Don't ever let the side down by offering professionals work that can be dismissed as "typical amateur rubbish." Set yourself the highest standards and work to achieve them. Thanks to official inaction we all have time—time to work out ideas, make contacts and polish technique. The opportunities will be there. When they come will you be ready to take advantage of them?

**I HEAR** rumours that several manufacturers of tape decks are increasing their orders for component parts. It is, therefore, reasonable to suppose that the

**CROSS**

**TALK**

## By Audios

industry is expecting to step up its output in the immediate future. Gazing still more intently into my crystal ball I have the feeling that a healthy proportion of these decks will be destined for export. The more the merrier, and congratulations to both the companies and the individuals concerned.

But—a note of warning! British exporters have long been criticised for poor workmanship, lack of spare parts and service facilities—even lack of instructions printed in the language of the country to which the goods are sent. This has been a general comment about merchandise of all kinds.

The companies now exporting owe their existence to us, the home cash buyers of their equipment. By and large, we're a loyal crowd and we should like to think that our favourite possessions are also coveted by other enthusiasts in other countries. But if the service isn't adequate they're more likely to be roundly cursed. Nothing is more frustrating than a minor breakdown such as a broken drive belt if the replacement is unobtainable. So Mr. Manufacturer, please don't just sell machines but help us to spread enthusiasm for recording by building up a reputation for quality and service, both at home and abroad. It'll pay handsomely in the long run.

*TALKING of British manufacture, I was playing around the other day with a Wearite Mark 6 deck. This is made in several versions, the one in question running at 15, 7½ and 3¾ ips, half-track mono. Coupled to a specially built record/playback amplifier the quality at 3¾ ips was a revelation. It would have been fascinating to try out this set-up at 1½ ips. Losses would be inevitable, of course, but I suspect the result would still have been a very cheerful sound. Mind you, the special electronics used were rather special and very costly, but it goes to show that good quality is possible at slow*

tape speeds: the snag is it's not cheap by domestic standards.

The deck itself has several improvements over earlier models and the one used was almost noiseless in operation. Rugged reliability has always been a feature of Wearite decks, so in spite of a cost of around £50, depending on the model, it would seem to be a pretty good investment. As a matter of interest I've been running a series 4 deck for nearly five years during which time it has been in use on average five days out of every seven. Affectionately known as "Old Groaner" I suspect it will continue to clank away for at least another four or five years. Rather a pity, really. It makes it more difficult to find a satisfactory excuse for buying a new one.

\* \* \*

**I** have no patience with obsolescence for its own sake. Never spend money on a new machine just because the latest model has a "Design Centre" appearance. Our equipment is primarily functional. Contemporary design is all very well provided it is secondary to performance. New models with new looks don't always live up to expectation. We buy, or should buy, equipment to use, not to look at. One finds as a rule that when performance is excellent the apparatus has a purely functional attractiveness of its own.

Only last month Richard Margoschis was referring nostalgically in his interesting article "Recording the Sounds of Nature" to the dear old Fi-Cord 1A, a model no longer in production. What a machine that was! In many ways primitive, often temperamental, hated by some and loved by others. The pair of 1As I own would not be sold at any price. Just because they're now obsolete, and have been for several years, it might be possible to pick one up quite cheaply. Could be a good buy if it's in good condition, but remember this is really a recording instrument—its own playback is hopelessly inadequate. And make sure the battery charger is included in the price. Look, too, at the microphone socket. Originally this was a four-pin connection and the microphone plug used to fall out regularly in the middle of recording! The last production run was fitted with an improved socket, the plug to which has a self-locking collar. Microphone connections on battery equipment are of vital importance and this is the best I've ever come across on any machine. If you do buy a 1A don't forget to turn the selector switch out of the record position before winding back, as otherwise you'll be passing the recorded tape over a live erase head. . . . Oh yes, we've all done it. Just once!

\* \* \*

**COMMENT** of sweet old lady after listening to demonstration playback of choral recording: "Yes, it's very nice, but I'm afraid I can't quite see where the choir is. . . !"

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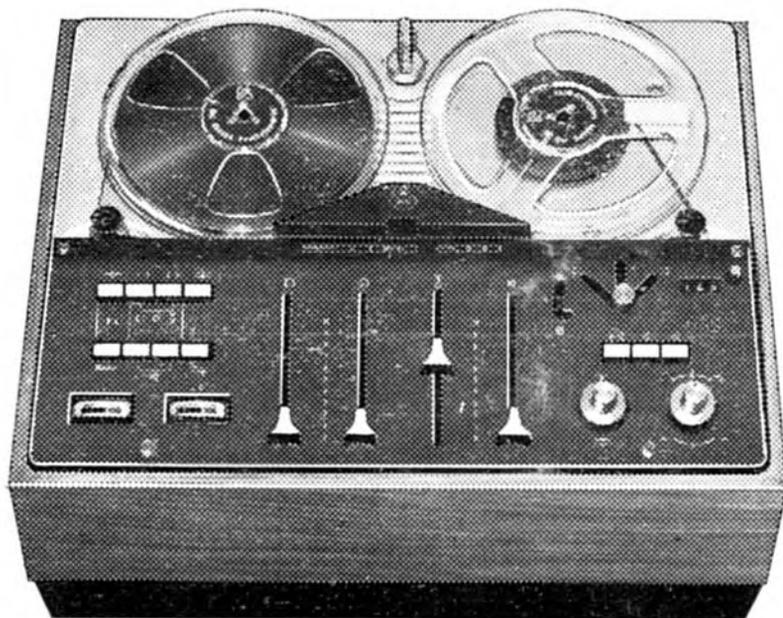
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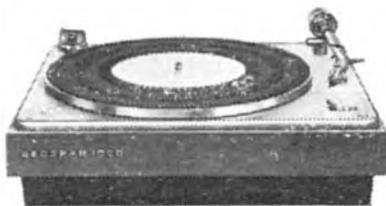
## Enthusiasts demand the best—they choose the Bang and Olufsen Beocord 2000K tape recorder



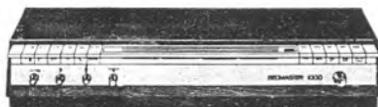
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# FOCUS

## on microphones

# Four units on the test bench

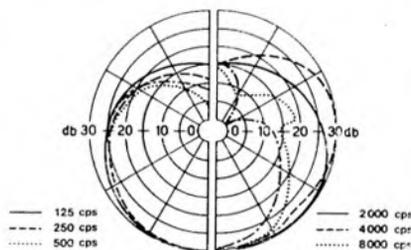
(Continued from page 89)

The microphone suffered from one slight snag, in that it was rather sensitive to handling noise. This was a bit surprising in a pressure-operated microphone—this type of noise is more associated with cardioid microphones. Still it was not serious, and seems a small price to pay for such an otherwise good instrument. Excellent value for money.

The first of the cardioid microphones is the **Beyer M80HN**, a small, elegantly styled moving coil instrument. It is completely encased in metal, and very sturdy and shock resistant. The M80 was supplied complete with a tripod table stand, but by removing the microphone clamp from this, the microphone can be secured to any other stand. The output impedance is 200 ohms and 80,000 ohms, and so this microphone can be connected to most tape recorders.

gressively attenuated. The polar response is quite a good cardioid, except at low frequencies, where there is the usual tendency in a microphone of this type to become omni-directional. The front-to-back ratio is good, and gives a useful discrimination from unwanted sounds, except, of course, in the bass. Here the bass loss mentioned above will help a bit. Apart from the bass loss, I can recommend this microphone as an ideal instrument for use with a portable recorder. It is priced at £12 18s. 6d.

The last microphone to be reviewed, another cardioid, comes from the famous A.K.G. stable and again is a moving coil instrument. The **D14S** is rather larger than the others tested, and is primarily intended for use on a stand for public address and sound reinforcement systems, as well as the amateur recordist. It has a built-in wind-shield, and so is ideally suited for out of doors. The output impedance is switchable for low and high values, so again, matching is simple.



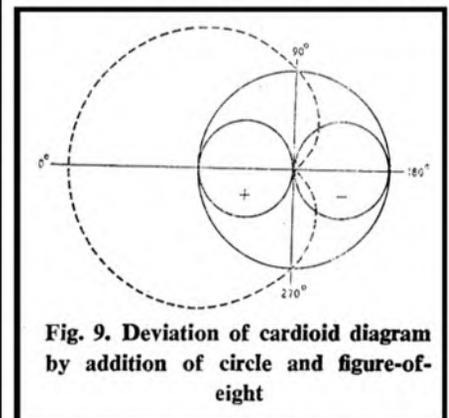
The frequency response was very smooth, and this microphone made a very nice sound, in spite of some lack of bass. This was not nearly so serious as in the case of the Beyer instrument. The cardioid polar response was well maintained down to quite low fre-

# Microphones : types and designs

(Continued from page 87)

in path length. This will in turn depend on the angle at which the sound reaches the instrument. It will be greatest on the front and the back, and at the sides will fall to nothing. In fact it can easily be shown that the output is proportional to the cosine of the angle of incidence. The familiar figure-of-eight pattern is the result. (Fig. 8).

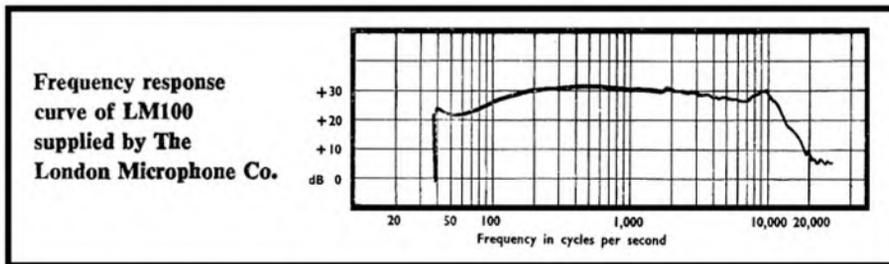
If the omni-directional pattern of the pressure microphone is combined with the figure-of-eight of the pressure gradient microphone, then a heart shaped (or cardioid) pattern will result (Fig. 9). In earlier days this was achieved by combining the outputs of two actual microphones, but the result was not very satisfactory, and the modern cardioid has a single capsule which combines the two types of operation. This



is achieved by allowing some of the sound to reach the back of an otherwise pressure-operated capsule. A number of ways of doing this have been devised.

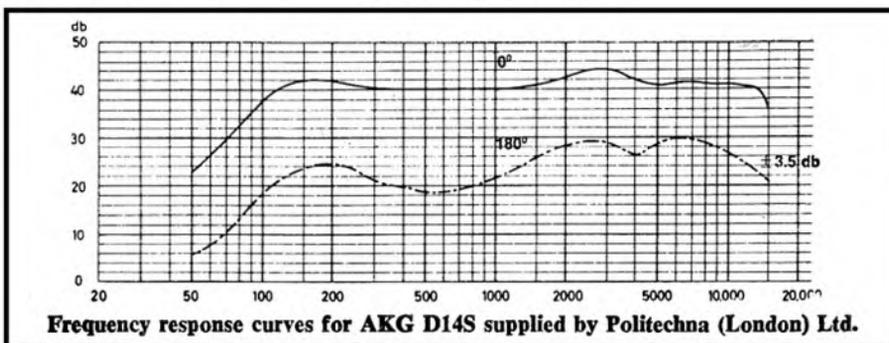
In one electrostatic microphone, a pattern of fine holes is bored through the back plate of the capsule, so that sounds may reach the rear of the diaphragm. The path length from front to back will in this case be made up of two parts, one outside the capsule, varying with the angle of incidence as in the pressure gradient microphone, and the other the fixed distance through the back plate. If these two distances can be made effectively equal, then the path difference from the front of the microphone will be the sum of the two, from the side will be the distance through the back only, and from the back will be nothing, since the two are equal. Hence the output of the instrument will have a cardioid polar response (Fig. 10).

The illustrations used in this article are reproduced from the author's book "High Quality Sound Production and Reproduction," a BBC Training Manual published by Iliffe Books Ltd.



The frequency response was smooth, but very noticeably lacking in bass. From the maker's curve, this bass loss starts at about 250 cps, and the instrument is some 15 dB down at 50 cps. This is not really good enough, and makes a very noticeable difference on speech. On music, it means that everything below middle "C" will be pro-

quencies, although there was the usual tendency towards an omni-directional response at the lowest frequencies. The front-to-back ratio of 15 to 20 dB is very acceptable. For P.A. applications, the built-in noiseless "on/off" switch is a useful addition. I can thoroughly recommend this microphone as good value at £10.



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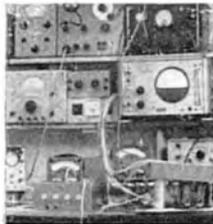
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# TEST BENCH

## PHILIPS EL3556

By John Borwick

THE Philips EL3556 is the most ambitious range of new machines with a "furniture" look, obviously designed to bring tape recording more pleasingly into the living-room. The outer case is of teak and the lid, front grille, and most of the top deck is of dark grey plastic. Besides the attractive styling, the shallowness of the machine—it is only  $6\frac{3}{8}$  inches high—will help this new recorder to fit into a home music system. The lid has a slide catch at each side, and the carrying handle is spring-loaded to lower against the side of the case when not in use.

This is a versatile recorder, with its four speeds, four tracks, mixing of two inputs, etc., but I should expect any beginner to operate it easily within a very short time. On the top deck are the on/off switch, speed selector switch ( $7\frac{1}{2}$ ,  $3\frac{3}{4}$ ,  $1\frac{7}{8}$  and  $15/16$  ips) and track selector switch (tracks 1-4, 2-3 or parallel).

Then on a raised platform are features including the four-digit position counter with reset-to-zero button, strip recording level indicator and the six piano key controls. These, from left to right, are for pause, rewind, wind on, start, stop and record. This last key is a safety interlock and is coloured red. It is necessary to press both the "start" and "record" keys simultaneously for recording; pressing the "start" key by itself gives replay and pressing the "record" key by itself allows you to rehearse a recording, set the input

volumes by reference to the level indicator, or use the recorder as a "straight through" amplifier.

A front panel carries five control knobs giving independent control of the microphone and radio/phonograph inputs, playback volume and bass and treble tone. An impressive array of input and output sockets is contained in a recess at the rear of the machine. These are for microphone, gramophone, radio (in and out combined), exten-



sion loudspeaker, pre-amplifier and headphones. A separate socket permits the attachment of a foot-switch to operate the pause control remotely. Philips of course market suitable accessories for all these functions, including a useful pre-amplifier EL3787 which, using the pre-amplifier outlet mentioned above, permits replay of stereo tapes and various multi-track recording tricks.

The single multi-purpose lead supplied with the EL3556 is  $6\frac{1}{2}$  feet long and has a three-pin socket at one end and the usual black (earth), red (record in) and white (playback out) wires at the other. This should cope with most connections to other equipment. A  $1.5\text{ M}\Omega$  resistor is wired into the record side of the plug, to preserve matching and to attenuate high signals such as those from a radio's extension loudspeaker outlet or a crystal pickup. However, this resistor could be changed or bypassed by a dealer if necessary for a particular application.

Tape threading is made simple since the head cover is also over the tape guide pillars

and only a straight slot remains for inserting the tape. A separate contact pillar gives automatic stop on tapes fitted with metal stop foil, and this operates on fast winding as well as during record and replay. The single drive motor runs as soon as the mains is switched on and uses belt drive to a stepped pulley (for the four speeds) and then via a rubber idler wheel to the heavy flywheel which carries the large diameter (approximately  $5/16$  inch) drive capstan and is most unusually mounted inside a plastic outer wheel with a slipping clutch, friction drive action. The motor noise is silent enough not to intrude seriously on "live" microphone recordings at a few feet distant.

All the usual listening, recording and measuring tests were carried out. The moving coil microphone supplied is neat and capable of good quality, natural recordings. It is listed as a cardioid type, though the front-to-back ratio was not found to be very marked at middle and low frequencies. It has a speech/music switch which cuts the bass frequencies in the speech position, giving crisper quality—though I preferred the full range position.

Recordings from radio and other sources were simple to make and came close to the original when played back through the same loudspeaker system. Background noise was not obtrusive and wow and flutter were not evident except at the lower two speeds. Fast wind and rewind of the seven-inch reel of long-play tape supplied took three minutes.

The measured frequency responses are shown in the diagrams. Fig. 1 shows the performance obtained when recording and replaying via the radio inlet/outlet socket at each of the four speeds. These are very good results and well within the specification.

Fig. 2 shows the response obtained when replaying a test tape to the earlier CCIR characteristic and demonstrates the downward slope to be expected with a recorder set up to the new CCIR proposals. This performance was checked at the external loudspeaker socket and is again very good. The result of turning the bass and treble controls to minimum is also illustrated and is unusual in that quite an overlap was discovered, that is the response at 1,000 cps was also affected. However, some control of extreme bass and treble balance is achieved.

To sum up, the Philips EL3556 is a well styled recorder with plenty of potential for working with a radio or other equipment and the addition of the range of Philips accessories. The mechanical and electrical performance are up to the required standard for a machine at this price and a successful break has been made with the traditional box-like tape recorder design.

### MANUFACTURERS' SPECIFICATION

Power supply: Switchable for operation on 110, 127, 220 and 245 Volts, 50 c/s AC. (Dealer can convert for 60 c/s.)

Power output: Four watts.

Frequency response: 40-18,000 cps at  $7\frac{1}{2}$  ips; 60-15,000 cps at  $3\frac{3}{4}$  ips; 60-10,000 cps at  $1\frac{7}{8}$  ips; and 60-4,500 cps at  $15/16$  ins. all within 6 dB.

Inputs: microphone (0.25 mV 2K); radio diode (2 mV 20 K); and gramophone (100 mV 1 Megohm).

Outputs: diode (1 mV 50 K); loudspeaker (5 Ohms); headphone (200 mV 1.5 K); "stereo" from head for pre-amplifier.

Dimensions:  $17 \times 13\frac{1}{4} \times 6\frac{3}{8}$  inches.

Weight: approx. 22 lb.

Price: 62 guineas.

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

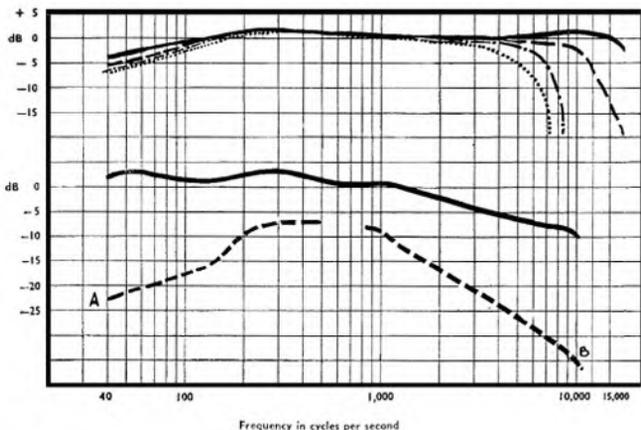


Fig. 1 (top) Record/replay frequency response of the Philips EL3556 at four speeds. —  $7\frac{1}{2}$  ips; - - -  $3\frac{3}{4}$  ips; . . .  $1\frac{7}{8}$  ips; and - - - -  $15/16$  ips. Fig. 2 (bottom) Replay response using CCIR test tape controls at maximum; - - - - minimum bass (A) and minimum treble (B)



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## MAGNEGRAPH

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## Tape records reviewed

### CLASSICS



By Edward Greenfield

## Delight in this rich music

**RAVEL.** *Daphnis and Chloe*—complete ballet. French Radio Chorus, Orchestra of the Theatre des Champs-Elysees, conducted by D. E. Inghelbrecht. WRC (TT 438), 3½ ips, mono, 29s. 6d.

Ravel's "Daphnis and Chloe" is arguably the most beautiful ballet score ever written, and the final part of it, usually described as the "Suite No. 2" has long been popular in the concert hall. But the complete score, contained on this tape, is three times as long and contains other colourful and atmospheric music if nothing quite as impressive as the grand crescendo of *Daybreak* and the wild frenzy of the *Danse Générale* at the end.

The ballet was commissioned from Ravel by the great impresario, Diaghilev, anxious to have spectacular new scores for his Russian ballet company. Ravel spent a full two years on it, and though he chose a classical Greek subject, he very definitely set his mind against any classicism in a musical sense. This is rich, evocative music that, according to Ravel, reproduced "the Greece of my dreams."

It is a highly taxing work to play even for the very finest orchestras—the famous suite used regularly as a virtuoso show-piece in fact—and I was too disconcerted to see on the box the name of a theatre orchestra. But I suspect that this is a more famous French orchestra hiding under a pseudonym, for it is a warm, committed performance, not the most precise ever recorded, it is true, but still very brilliant. On this showing Inghelbrecht should be invited to the recording studio a great deal more often. And what a delight it is in this rich music to have the added richness of the optional choral parts. Recording quality very good indeed.

**SCARLATTI.** Ten Harpsichord Sonatas. No. 142 in E flat; no. 488 in G minor; no. 14 in D major; no. 10 in C minor; no. 238 in A major; no. 449 in B minor; no. 294 in F sharp minor; no. 208 in D major, no. 220 in E flat; and no. 257 in E major. Valda Aveling (harpsichord). WRC (TCM 68), 3½ ips, mono, 29s. 6d.

Domenico Scarlatti, born in the same year as Bach and Handel (1685) is only just getting the attention he deserves, and even now too many music-lovers tend to think of him as merely the brilliant writer of virtuoso "firework" music for the harpsichord. In fact a fair share of Scarlatti's many hundreds of sonatas are slow and meditative, with something of the tragic gloom which inhabits the Spanish character alongside gaiety and colour.

For Scarlatti became very much at home in Spain, and the fast sonatas too tend to reflect the Spanish character in dance rhythms and imitations of the guitar. Examples here include the D major (No. 14) and E major, with the D major also showing inspiration from a courtly background in its hunting horn theme. Brief as most of these sonatas are, the arguments are lively and original, and this selection gives a very fair idea of the whole range of Scarlatti's achievement. None of the most popular sonatas is included—those well known from the ballet "The Good-Humoured Ladies" for example—but all are attractive and Valda Aveling's performances, though sometimes wayward rhythmically, exploit the full range of tone-colour possible on the concert harpsichord. With all the different registrations possible on multiple keyboards, it is certainly no question of a "toasting-fork on bird-cage" as one rude critic once put it.

**SCHUMANN.** *Symphony No. 3 "Rhenish"; "Manfred" Overture.* Bamberg Symphony Orchestra conducted by Robert Heger. WRC (TT 460), 3½ ips, mono, 29s. 6d.

For over a century now curmudgeons and pedants have been complaining that Schumann's symphonies are badly orchestrated, missing the far more important point that they contain some of the most vividly argued music from any symphonies of the romantic period. True, Schumann often doubles the woodwind parts unnecessarily, but a clever conductor can use a light hand there, and the result need not be heavy. Certainly this "Rhenish" symphony is exhilarating in its energy with a first movement that leaps along masterfully in triple rhythm, a surging second movement, an intermezzo delicately scored, an organ-like slow movement inspired by a service in Cologne cathedral, and a final fifth movement returning to the carefree joy of the opening.

This is not a specially good performance—rather heavy at times and not very well disciplined—but it is the only Schumann symphony currently available on tape, and the glory of the music should certainly be clear whatever the shortcomings in the playing. The "Manfred" Overture generously included as a fill-up is another of Schumann's most vital and original scores, inspired by a poem of Lord Byron.

## The stamp of class and authority

### POPULAR



By Don Wedge

**ANITA O'DAY SWINGS COLE PORTER.** Anita O'Day, with orchestra directed by Billy May. WRC (TT 439), 3½ ips, mono, 29s. 6d.

Great! Anita Day swings beautifully, sings wonderful songs and gets terrific support from Billy May's accompaniment—which is less witty than often, though.

A matured singer, Anita O'Day gives enormous feeling to Porter's lyrics. She

masters each song and finds new projections for all of them are oft heard.

If the same old numbers are to be re-worked, let's have them with this stamp of class and authority.

A great capture for WRC.

**STRANGE ENCHANTMENT.** Vic Damone with Billy May and his Orchestra. WRC (TT 493), 3½ ips, mono, 29s. 6d.

Billy May is heard in a very different style—soft, lazy strings are the feature, Hawaii the inspiration.

The atmosphere is caught by a restrained Vic Damone. Cool, quiet and refreshing, the album is almost mood music. But someone decided to make it interesting as well.

The songs are not the greatest, but Damone's sensitive treatment gives them added lustre.

It's an ideal record to store in case we get a hot summer's day. The cooling breeze it gives will be very welcome.

**HOLLIES.** The Hollies. Parlophone (TA-PMC 1261), 3½ ips, mono, 35s.

The Hollies are one of the most musical of British groups. Concentration on the music rather than on an image has led them to be less widely known by the general public.

The extremes of fan mania have avoided them, but they have had a longer career than many who have been worshipped by the fickle.

This album is excellent. From the opening folksy *Very Last Day* to the closing *Mickey's Monkey* (an escapee from Detroit's Tamlam-Motown circus), there isn't a dull bar.

The Hollies' version of *That's My Desire* is vastly altered from the one that caused so many to swoon at Frankie Laine's feet a decade ago. Much changed from the original, also, is *Lawdy Miss Clawdy* but the difference makes good entertainment—and good dance party music too.

**GORME SINGS SHOWSTOPPERS.** Eydie Gorme. WRC (TT 434), 3½ ips, mono, 29s. 6d.

WRC continues its absorbed interest in show tunes. This album follows the pattern set by many British recordings made for WRC—studio re-creations of stage musicals.

The difference here is that they come from a selection of shows—the 1927 Rodgers and Hart musical "A Connecticut Yankee (*Thou Swell*) to the not very recent "King And I" (*Hello Young Lovers*)—and are all performed by one singer, Eydie Gorme.

The subtlety she usually brings to her treatments of songs is missing. She belts like a junior Ethel Merman.

Perhaps producer Don Costa, who has done so much to further Eydie Gorme's career, intended it as an audition sampler for Broadway producers. It is not very cosy for a living room. At any rate, not my living room.

**SAMMES SESSION.** The Mike Sammes Singers. WRC (TT 455), 3½ ips, mono, 29s. 6d.

Mike Sammes has the cleverest of the British choral groups who are so often in demand for accompanying solo singers on

record, radio and television. WRC gives his choir a showcase of its own.

Their material is hipped up versions of the classics, somewhat in the manner of the Swingle Singers' Bach treatments, but done with humour rather than dedication to the original.

The people who object to up-dating classics will throw up their hands in horror. Those who enjoy musical experimentation will dig.

**HURTIN' 'N' LOVIN'.** Peter and Gordon with accompaniment directed by Geoff Love. Columbia (TA-33SX 1761), 3½ ips, mono, 35s.

Geoff Love, whose versatility knows no bounds, must get a lot of the credit for the success of this album.

His strong, beaty accompaniment transforms the rather insipid Peter and Gordon duo as they over-reach themselves.

Elvis Presley's *All Shook Up* is not ideal for them, however they might visualise themselves in such a role. *Crying In The Rain* is more their material, but even their own composition *Don't Pity Me* seems to strain their range.

Another of their songs, *When The Black Of Your Eyes Turns To Grey*, sounds decidedly tongue-in-cheek. Perhaps the rest of the album is and I didn't notice.

## Peterson's JAZZ night on the town



By Mike J. Gale

**A NIGHT ON THE TOWN WITH THE OSCAR PETERSON TRIO.** Personnel: Oscar Peterson, pno; Herb Ellis, gtr; Ray Brown, bass. WRC (TT 497), 3½ ips, mono, 29s. 6d.

Leonard Feather in his Encyclopædia of Jazz has described Oscar Peterson with remarkable clarity, thus: "Peterson's style, which at first seemed to be an amalgam of George Shearing, Errol Garner, Art Tatum and other influences, later revealed itself as clearly distinguishable and marked by the best qualities of both the swing and bop schools." There are blemishes and sometimes these are irritating. His response to audiences is sometimes too contrived, his playing too inclined to self destruction with its saturation of technique. My personal adverse criticism is based on his lapses of self discipline and when these are infrequent then I generally appreciate his playing.

What I liked about this album is that it was recorded at the Town Tavern in Toronto, Ontario, and the audience unavoidably act as a sparking plug. Creatively this reduces the chances of a logical conclusion during the exploration of variations because of the time limit set by production requirements while the audience conflict by creating a drive to extend.

Some of the items lacked impact perhaps because of over rehearsal or staleness. *Sweet Georgia Brown, Should I?, When Lights Are Low, Easy Listenin' Blues, Pennies From Heaven, The Champ and Moonlight In Vermont* complete the programme.

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(SEE PAGES 6 & 7)

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The tapes reviewed this month are issued by the following companies:

"Columbia" and "Parlophone": E.M.I. Records Ltd., 20, Manchester Square, London, W.1.

"W.R.C.": World Record Club, Box 11, Park-bridge House, The Little Green, Richmond, Surrey.



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## NEW PRODUCTS

### CO-OP INTRODUCE THEIR LATEST MODEL

LATEST addition to the Defiant range of tape recorders by C.W.S. Ltd. is announced with their introduction of their fully transistorised T18.

This single (3½ ips) speed recorder incorporates the BSR TD2 tape deck. It has a quoted frequency response of 80-8,000 cps ± 3 dB. Wow and flutter is given as better than 0.2 per cent, and signal-to-noise ratio as better than 45 dB.

The four-track Defiant T18, illustrated right, will accommodate 5½-inch reels, providing a playing time of 45 minutes per track using standard-play tape (850 ft.).

Among the features are facilities for superimposition, meter recording level indicator, three-digit rev. counter with zero reset, storage space for accessories, and sockets for microphone, radio and extension loudspeaker (15 ohms).

A built-in 7 x 3½-inch elliptical loudspeaker handles the power output of 3½ watts. Designed for mains operation only, the power supply required is 200-250 volts AC. The T18 measures 14½ x 12½ x 5½ inches, and is housed in a perforated light-grey cabinet with a choice of Minerva Grey, Black or Flaminare Red.

The price is £32 11s.

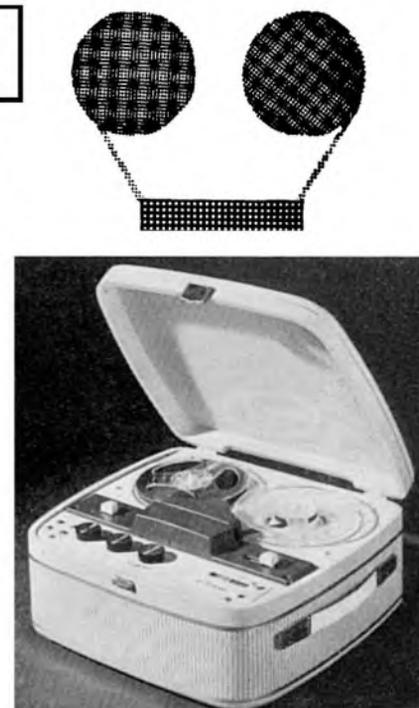
Co-operative Wholesale Society Ltd.,  
Radio and Television Dept., Alma Park,  
Warley Street, Upminster, Essex.

### NEW SPEAKERS BY TANDBERG

A RANGE of loudspeakers manufactured by Tandberg have been introduced by Elstone Electronics Ltd.

Housed in teak cabinets, the new units are identical in appearance and are available in three sizes.

First is the TAN 8 featuring a 2½-inch tweeter mounted co-axially in front of a larger ten-inch woofer. The quoted fre-



quency response is 45-16,000 cps, a filter network being used for crossover at 3,000 cps. Maximum continuous input is 15 watts, and the impedance at 400 cps is 4 ohms. The TAN 8 measures 27½ x 13½ x 11 inches, and costs £26 15s. plus £4 9s. 7d. PT.

The TAN 7, incorporates a co-axial system with a unit for the lower and medium frequencies, and a two-inch tweeter to deal with frequencies above 3,000 cps. The main unit is a 10 x 6-inch elliptical speaker. Maximum continuous input is given as eight watts, impedance at 400 cps is 3.2 ohms. The frequency response is given as 60-16,000 cps, bass resonance frequency as 85 cps. Measuring 20½ x 10½ x 9 inches, the TAN 7 (illustrated below, left) costs £19 6s. 8d., plus £3 5s. 4d. PT.

Smallest of their new speaker enclosures is the TAN 9 (illustrated below). Measuring 14½ x 10½ x 9½ inches, this features a 6½-inch dual cone handling a maximum continuous input of five watts. The frequency range is given as 80-14,000 cps (bass resonance frequency, 115 cps), and the impedance at 400 cps is 5 ohms.

The TAN 9 costs £11 13s. 8d., plus £1 19s. 4d. PT.

Elstone Electronics Limited, 81, Kirkstall Road, Leeds 3, Yorkshire.

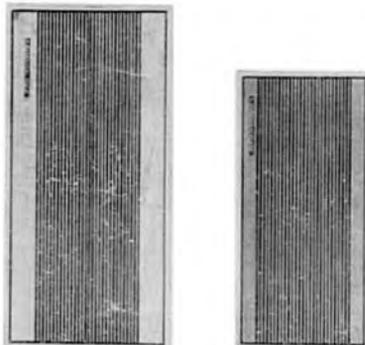
### LEDA ANNOUNCE NEW TAPE RANGE

A RANGE of magnetic recording tapes was recently announced by Leda Tapes, who have introduced their Tape 70.

Produced on a PVC base, Tape 70 is unconditionally guaranteed, and is available in the following grades on spool sizes from three to seven inches in diameter.

**Standard-play:** Three-inch (150ft.) 3s. 3d.; Four-inch (300ft.) 6s. 6d.; Five-inch (600ft.) 11s. 6d.; 5½-inch (900ft.) 14s. 6d.; seven-inch (1,200ft.) 17s. 6d.

**Long-play:** Three-inch (225ft.) 4s. 3d.; four-inch (450ft.) 7s. 6d.; five-inch (900ft.)



14s. 6d.; 5½-inch (1200ft.) 17s. 6d.; seven-inch (1800ft.) 25s.

**Double-play:** Three-inch (300ft.) 6s. 6d.; four-inch (600ft.) 12s.; five-inch (1200ft.) 22s. 6d.; 5½-inch (1800ft.) 29s. 6d.; seven-inch (2400ft.) 37s. 6d.

**Triple-play:** Three-inch (600ft.) 13s.; four-inch (900ft.) 17s. 6d.; five-inch (1800ft.) 35s.; 5½-inch (2400ft.) 48s. 6d.; seven-inch (3600ft.) 62s. 6d.

*Leda Tapes, 30, Baker Street, London, W.1.*

## STEREO TAPE CASSETTES BY VERITONE

A CASSETTE-LOADED stereo tape player designed for use in cars, caravans or yachts, has been introduced by Veritone Ltd.

The new unit, illustrated below, provides continuous music from a half-track recording. Measuring 7½ x 6½ x 3½ inches, it weighs only 7lb. and is supplied with two 7 x 4 inch speaker units handling a power output of four watts per channel.

Primarily designed for reproduction of stereo music and with a library of tapes



covering a wide choice of music, the Veritone tape player is also suitable for playback of a range of Language Tuition courses in Spanish, Italian, French and German.

The player is supplied with one cassette and all accessories, excluding speakers, at 43 guineas.

*Veritone Limited, Eden Grove, Holloway, London, N.7.*

## MORE ACCESSORIES FROM MULTICORE SOLDERS

A NEW cleaning fluid specially formulated for cleaning delicate instrument panels, plastic, and the exterior of electronic equipment was recently announced by Multicore Solders Ltd.

Their new Bib Instrument Cleaner, apart from its excellent cleaning properties, is anti-static, antiseptic, non-flammable, non-toxic, does not smear, and, as it contains no abrasive, will not scratch. It is applied on a soft cloth and then polished off immediately.



Available in bottles with a nozzle for easy application, the cleaner is ideal for use on tape recorders with tape heads. A four-fluid ounce bottle costs 4s. 6d.

Also recently introduced is the Bib Flex Shortener (illustrated below) designed to overcome the problem of trailing flex. Made of clear plastic, it is approximately five inches long, ¼-inch wide and can accommodate three to four feet of standard telephone cable (12ft. normal twin-flex).

The Flex Shortener is sold in a bubble pack holding four units, at 2s. 6d. per pack.

*Multicore Solders Limited, Maylands Avenue, Hemel Hempstead, Hertfordshire.*

## MULLARD INTRODUCE FERRITE TAPE HEADS

A RANGE of ferrite magnetic heads for professional recording equipment is introduced by Mullard.

Record and replay versions are being produced in half, full, stereo-twin and two types of quarter-track twin heads. Supplied as either fixed or adjustable assemblies, the replay heads have 3 µm gaps; the record heads with 25 µm (full track only), 12 µm or 7 µm gaps. All are colour coded.

The adjustable heads are housed in a Mumetal screened assembly. Facilities are provided for pre-set adjustment of "height" and "tilt," and for final azimuth adjustment with the Mumetal screen in position.

*Mullard Limited, Mullard House, Torrington Place, London, W.C.1.*

## SMALLER SELF-THREADING SPOOLS BY 3M

THE 3M company have announced a smaller version of their seven-inch self-threading tape spools. These are now also available in 5¼-inch diameters, selling at 7s. 11d.

To introduce the new size, Scotch have produced a special offer pack. This containing a pre-determined selection or normal order for nine reels, will have three 5¼-inch self-threading reels included free.

*Minnesota Mining and Manufacturing Co. Limited, 3M House, Wigmore Street, London, W.1.*

## LATEST MODEL BY TELEFUNKEN

A TWO-TRACK version of the Magnophon 201 transistorised tape recorder (*New Products*, January issue) is announced by AEG (Great Britain) Ltd., distributors of the Telefunken equipment. The new model will retail at 39 guineas, including tape, spare spool, audio lead and microphone.

AEG also announce that their models M104 and M97 are now discontinued and prices are decontrolled.

*AEG (Great Britain) Limited, Lonsdale Chambers, 27, Chancery Lane, London, W.C.2.*

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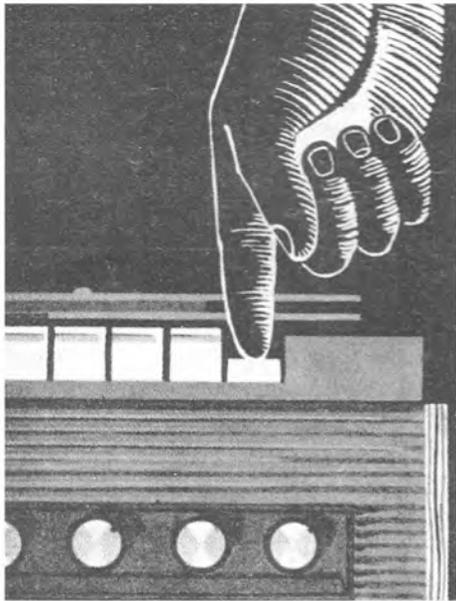
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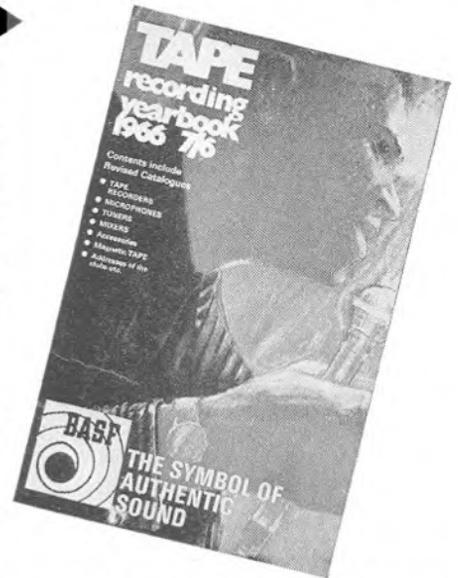
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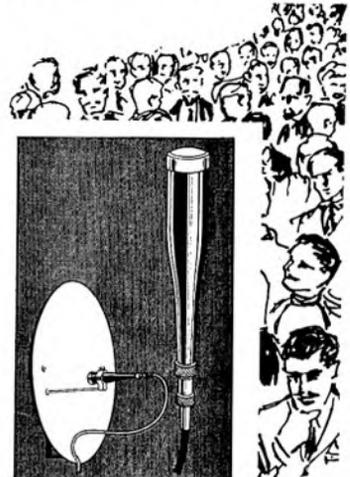
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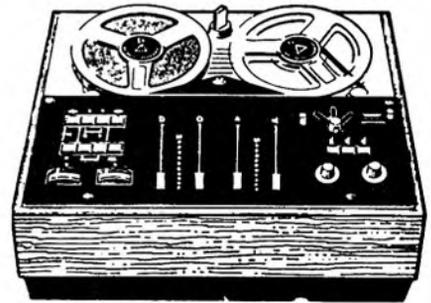


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<b>4-TRACK STEREO/MONO</b>					
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Sony TC200 ...	11	7 0	5	7 1	72
Beocord 1500 ...	14	0 6	6	12 5	89
Philips EL3534 ...	14	10 0	6	16 10	92
Tandberg 74 ...	14	13 0	6	18 4	93
Sony TC500 ...	16	10 9	7	16 3	105
Grundig TK46 ...	16	17 1	7	19 2	107
Beocord 2000TM ...	18	19 0	8	16 8	119
Beocord 2000SC ...	19	8 0	9	2 11	123
Akai M8 ...	23	0 0	10	17 2	146

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<b>MAINS 2-TRACK</b>					
Ferguson 3210 ...	3	15 9	1	15 9	24
Fidelity Playmatic 2 ...	4	8 3	2	1 8	28
Wyndson 707 II ...	5	1 0	2	7 7	32
Grundig TK 18L ...	6	9 6	3	1 0	41
Tandberg 823 ...	8	10 3	4	0 4	54
Reps. R10 Mk. II ...	9	6 0	4	7 9	59
Tandberg 92 ...	10	17 6	5	2 8	69
Brenell V Series 3 ...	11	13 6	5	10 1	74
Truvox R102 ...	11	19 6	5	13 1	76
Brenell 5/3 Mtr. ...	12	9 0	5	17 6	79
Ferroglyph 631 ...	13	17 3	6	10 11	88
Brenell 5/3 'M' ...	14	13 0	6	18 4	93
Revox 736 ...	19	11 0	9	4 5	124

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<b>MAINS 4-TRACK</b>					
Fidelity Playmatic 4 ...	4	18 0	2	6 1	31
Elizabethan LZ34 ...	5	1 0	2	7 7	32
Ferguson 3212 ...	5	4 0	2	9 1	33
Philips EL3558 Teak ...	6	13 0	3	2 5	42
Grundig TK 17L ...	6	15 6	3	4 0	43
Ferguson 3214 ...	6	19 0	3	5 5	44
Grundig TK400 ...	7	9 0	3	9 10	47
Grundig TK23L ...	7	14 6	3	12 11	49
Tandberg 843 ...	9	6 0	4	7 9	59
Philips EL3556 Teak ...	9	15 6	4	12 3	62
Reps. R10 Mk. II ...	10	17 6	5	2 8	69
Truvox R 104 ...	12	9 0	5	17 6	79
Grundig TK40 ...	13	14 6	6	9 5	87

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<b>BATTERY</b>					
Philips "Pocket" ...	4	2 0	1	18 8	26
Philips EL3586 ...	4	2 0	1	18 8	26
Optacord 408 Bat./Mns. ...	6	3 0	2	15 6	39
Telefunken 300 2-Track ...	7	14 6	3	12 11	49
Telefunken 301 4-Track ...	8	10 3	4	0 4	54
Ficord 202A ...	10	8 0	4	18 2	66
Grundig TK6 Bat./Mns. ...	10	17 6	5	2 8	69
Uher 4000L Report ...	16	14 6	7	13 3	103
Akai X4 Stereo 4-T ...	21	11 0	9	13 4	131

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