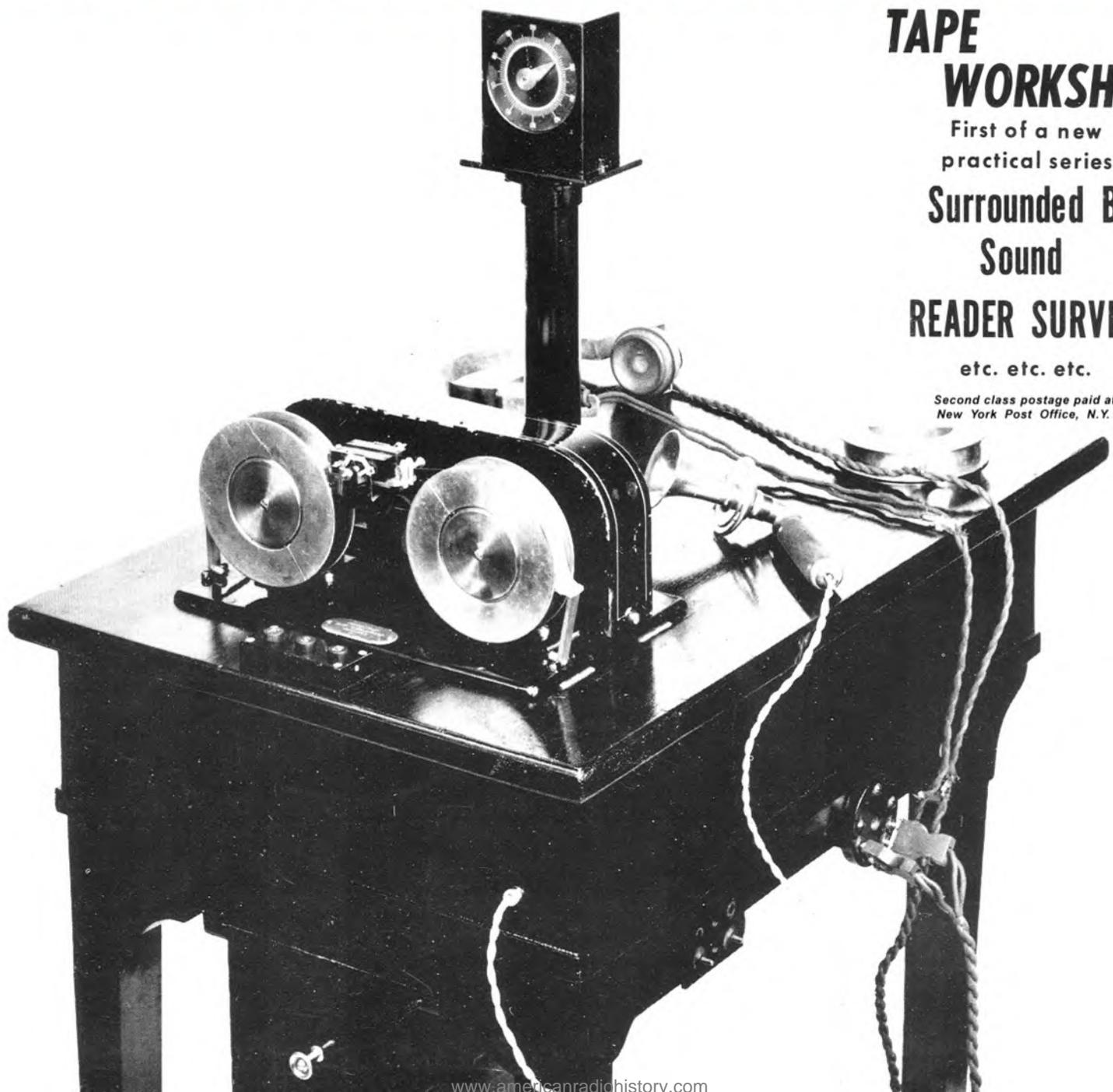


FEBRUARY 1970

TAPE

RECORDING MAGAZINE

2'6



TAPE WORKSHOP

First of a new
practical series

**Surrounded By
Sound**

READER SURVEY

etc. etc. etc.

*Second class postage paid at
New York Post Office, N.Y.*



Of all P.V.C. recording tapes.....

'Synchrotape' is the one unconditionally guaranteed

Only the finest materials go into the production of British-made Synchrotape. The result . . . no stretching . . . no snapping . . . no storage deterioration. Perfect for mono or stereo . . . two or four track.

Synchrotape is so easy to use. Most sizes have coloured leaders, trailers, metallic stop-foils, and include a free booklet with unique recording log and are packed in skin-wrapped, colour-coded boxes.

Synchrotape's unconditional guarantee speaks volume to the technical enthusiast . . . underwriting its claim to be the finest value in P.V.C. Recording Tape on the British market.

And there's a bonus. Most sizes of Synchrotape carry a built-in insurance against theft or fire damage to your recorder . . . and also contain coupons towards the special half-price tape splicer offer.

SIZE	STANDARD	LONG	DOUBLE	TRIPLE
BASE	P.V.C.		POLYESTER/P.V.C	
2½"		200' - 5 9d	300' 8 9d	
3"	150' - 4 9d	225' - 6 3d	300' 8 9d	450' 13 9d
4"		450' - 12 -	600' 18 -	900' 27 -
5"	600' - 15 -	900' - 18 6d	1200' 28 6d	1800' 45 -
5½"	900' - 18 6d	1200' - 22 6d	1800' 36 -	2400' 57 6d
7"	1200' - 22 6d	1800' - 28 6d	2400' 48 -	3600' 75 -

Comprehensive Synchrotape Editing Kit 29/6d. plus 7/2d. P. Tax.

'Synchrotape' ADASTRA ELECTRONICS LTD.,

167, Finchley Road, Swiss Cottage, London, N.W.3. England. (01-624 8164/5)



Introducing the Akai 4000D with new one-micron head. Result: Another 2000Hz at 3 $\frac{3}{4}$ I.P.S.

This impressive increase in frequency response from 14000Hz at 3 $\frac{3}{4}$ i.p.s. on the previous 3000D model to 16000.Hz on the new 4000D is a direct result of the new one micron gap head.

Of the 3000D, the reviewers in the March 68 edition of Tape Recording Magazine said: 'It can claim to achieve a standard of technical performance

far in excess of that indicated by its price.'

All of which makes the new Akai 4000D even better value at £89.18.8 (recommended), and almost certainly the best tape deck in Britain for under £100. And don't forget the 4000D is just one of Akai's range—the most comprehensive range of tape recorders in Britain.

PERFORMANCE SPECIFICATIONS

TAPE SPEED 2 speeds... 3.3 4 and 7.1 2 ips
WOW AND FLUTTER Less than 0.15% RMS at 7.1 2 ips
 Less than .20% RMS at 3.3 4 ips
FREQUENCY RESPONSE 30 to 22,000 Hz \pm 3db at 7.1 2 ips
 30 to 16,000 Hz \pm 3db at 3 3 4 ips
SIGNAL TO NOISE RATIO Better than 50db

LEVEL INDICATOR 2 VU meters
RECORDING SYSTEM 4 track stereo/monaural system
FORWARD/REWIND TIME 150 seconds using 1,200 foot tape at 50 cycles

SPECIAL FEATURE 3 heads for off-the-tape monitoring. Plus sound-on-sound recording.

For further details, write to:

 **AUDIO PRODUCTS**
 PULLIN PHOTOGRAPHIC-RANK ALDIS

AKAI®

PHILIPS FAMILY TAPE RECORDER

OUR PRICE
36^{GNS}!
List Price
£46.13.11



N 4305

Everything the family could want in a tape recorder. Record your children's first words, music lessons, etc. A lifetime's enjoyment. Superb quality, won't let you down. Four tracks, two speeds. Excellent reproduction and many features of much more expensive recorders. Supplied complete with microphone, recording playback lead, reel of long-play tape, empty spool.

Main Fisher Agents
Immediate stocks available
Please send for details



THE ONLY PHILIPS
SOUTH LONDON
AUDIO CENTRE



THE GREAT AKAI 1710W MIGNON STEREO TAPE RECORDER

OUR PRICE 89½ gns!
List price £109

The latest compact, high-quality stereo tape recorder. 4-track. 2 x 4 watt channel amplifiers and built-in speakers. Robust metal construction. Attractive oil-finished wood cabinet. You must see this machine in action—one of the best ever REW offers!

DON'T MISS THESE VALUE FOR MONEY OFFERS...

Send coupon for interest-free easy terms, available over 12 months, one-third deposit required.

range of the biggest names in the sound business. Our amazing "Specials" and offers will delight you. Interest-free easy terms are available. If you can't call, write or phone for details. Our rapid reply mail order system is very popular.



FERROGRAPH MODEL 713

A mono machine of professional quality. 3 motors, 3 heads. Half track. Tape speeds 1½, 3½, 7½. Output: 10 watts RMS.

OUR PRICE £153.6.3

List Price £174 13s. 6d.

MODEL 722 4 A masterpiece in stereo equipment. 2 x 10 watt output. A speaker for each channel. All-silicon solid-state amplifiers with FET input stages and wide input overload margins. Adjustable reel height control. 8½" capacity. Re-record facility on stereo models for multiplay, echo effects, etc., without external connections. The ultimate machines for the enthusiast and professional. Model 722 half track. Model 724 quarter track.

OUR PRICE £194.3.1

List price £204 14s. 9d.

IN EXTREMELY SHORT SUPPLY. PREFERENCE GIVEN TO R.E.W. CUSTOMERS! (The above are pre-increased prices.)

Come along to either of our showrooms and you can see and hear the equipment of your choice. REW are the only authorised Philips Audio Centre in South London. Our experienced staff will help you select from a comprehensive range of the biggest names in the sound business. Our amazing "Specials" and offers will delight you. Interest-free easy terms are available. If you can't call, write or phone for details. Our rapid reply mail order system is very popular.

Microphones

for every purpose



The DP4

Designed for general use—P.A., tape recording etc.



The DP6

Small in size, large in performance. As a lavalier type and for panel mounting on control units etc.



The GC/1 Cardioid

For stage and church work, P.A. use, lecture halls etc., where acoustic feedback is a serious problem.



The GR/1 and GR/2 Ribbon

Ideal for studio and similar uses, when a high standard of fidelity is essential. Easily replaceable ribbon assembly.

Other models and a full range of stands, reflectors, windshields and accessories available

All microphones are manufactured in a special section of our works, under strictly controlled conditions with stringent test and inspection at every stage.

Each and every microphone is individually tested both aurally and on Bruel & Kjoer visual and graphic recording test equipment for conformity to a prescribed performance.

Grampian SOUND EQUIPMENT

Integrity that you hear

Send for leaflet giving full details

GRAMPIAN REPRODUCERS LTD.,

Hanworth Trading Estate, Feltham, Middlesex. 01-894-9141

(M18)

JACW/X/18

REW AUDIO VISUAL CO

HEADQUARTERS SHOWROOMS AND MAIL ORDER: DEPT. TRM9
266-8 UPPER TOOTING RD., LONDON, S.W.17. Tel.: 01-672 4471/2 and 9175

WEST END SHOWROOMS:

146 CHARING CROSS ROAD, LONDON, W.C.2.
Telephone: 01-836 3365 (opposite Astoria Cinema).

Name

Address

TRM



EMITAPE Afonic

low-noise recording tape

quiet as a mouse!



don't buy any tape – buy **EMITAPE**

THE RANGE OF EMITAPE AFONIC LOW-NOISE TAPE

88

STANDARD PLAY

The best general purpose tape, giving maximum durability at all professional speeds. Pre-stretched polyester base film of super strength.

99

LONG PLAY

50% longer recording time – specially designed for multi-track recorders – pre-stretched polyester base film of super strength.

100

DOUBLE PLAY

Twice the recording time for a given size of spool – the perfect film for low speed, multi-track recorders – superflex polyester base film.

300

TRIPLE PLAY

Maximum playing time on spools up to 5" dia. – extended dynamic range – specially suitable for battery operated recorders – extra tensile polyester base.

EMITAPE IS AN EMI GROUP PRODUCT





Model MR-115 -the powerful portable

Operates on six flashlight batteries, or regular AC household current. 1,200 mW output power. Automatic level control (ALC) constantly keeps recording level adjusted for optimum recording quality, no manual adjustments required, especially useful for speech recordings. Three digit tape counter. Spindles accommodate 5 inch reels. Mixing while recording. Two signal sources (i.e. mike + radio, mike + record player) can be used simultaneously. Convenient for blending background music into narration. Continuous tone control. Battery condition indicator. Extension speaker and earphone outlet. Practically designed plastic cabinet designed for easy carrying.

SPECIFICATIONS

Recording system :
AC bias, 2 track
Erasing system :
DC erase

Tape speed & Recording time :
(With 5" reel, 2 tracks, 50 μ tape)
3 $\frac{3}{4}$ ips (9.5 cm/sec) 64 min.
1 $\frac{7}{8}$ ips (4.8 cm/sec) 128 min.
Frequency response :
(Record & Playback)
150-6000 cps at 3 $\frac{3}{4}$ ips
150-4000 cps at 1 $\frac{7}{8}$ ips
Output power :
Maximum 1.2W
Power requirement :
AC: 115/230V, 50-60 c/s
DC: Size D (UM-1) x 6
Output impedance :
EXT. SP: 8 ohm
Loudspeaker :
6 $\frac{1}{4}$ " x 3 $\frac{1}{8}$ " permanent dynamic speaker
Voice coil impedance 8 ohm
Power consumption :
15VA
Dimensions :
11 $\frac{3}{8}$ " width x 10 $\frac{5}{8}$ " depth x 3 $\frac{7}{8}$ " height

(295 mm x 270 mm x 98 mm)

Weight :
9.4 lbs (4.3 kg) approx.

Accessories :
Microphone, 5" full tape
Empty reel, Splicing tape
Power cord

The MR-115 is available from the Sanyo dealer in your area, specially selected for first-class before-and-after-sales service. Or you can write for illustrated leaflet to :

Sanyo Marubeni (U.K.) Ltd.,
Bushey Mill Lane, Watford, Herts.
Telephone: Watford 25355.



People the world over agree there's something about a Sanyo



COME TO THE TAPE RECORDER CENTRE

... the largest showrooms in
Great Britain devoted exclusively
to Tape Recorders and
Tape Recording equipment!

Whether you are interested in a general purpose tape recorder or a de luxe professional machine, the expert and friendly staff of The Tape Recorder Centre will be pleased to give you the benefit of their many years experience of selling everything in "Tape." You will see tape recorders from Germany, Britain, Japan, Norway, Denmark, etc. etc. all available for immediate demonstration. Make your choice at The Tape Recorder Centre and be certain of purchasing the machine that is ideally suited to your individual requirements.

ALL LEADING MAKES AVAILABLE

Akai, Ampex, B. & O., Brenell, Chilton, Crown, E.M.I., Elizabethan, Ferguson, Ferrograph, Grundig, Loewe-Opta, National, NuSound, Philips, Repts, Revox Sanyo, Sharp, Sony, Tandberg, Telefunken, Teleton, Truvox, Uher, Van Der Molen, Vortexion, Wyndsor, etc., together with a wonderful range of Tape Accessories.

**Expert Staff—Expert Advice ● Generous Part Exchanges
Easiest Hire-Purchase Terms ● Free After-Sales Servicing**

Remember—the Tape Recorder Centre Showrooms are the only showrooms in Great Britain specialising exclusively in every make and model of mono and stereo tape recorder available today.

Only one minute from Holborn Tube Station—Half-day Saturday.

THE TAPE RECORDER CENTRE



82 HIGH HOLBORN, LONDON, W.C.1

Telephone: 01-242 7401

TAPE

RECORDING
MAGAZINE

Incorporating TAPE RECORDING & HI-FI MAGAZINE
and STEREO SOUND MAGAZINE

Vol. 14 No. 2 February 1970

IN THIS ISSUE

Tape trends and tape talk	44
Douglas Brown	
READER SURVEY	45
SOUND SENSE	47
The Editor	
Cross Talk	51
Audios	
SURROUNDED BY SOUND	53
TRM Report	
TAPE WORKSHOP	54
Denys Killick	
Nature Notes	56
Richard Margoschis	
Test Bench — TELEFUNKEN M-501	57
New Products	
Music Reviews — MUSICASSETTES	63
OPEN SPOOL	65
Advertisement Inquiry Service	69

Cover Photograph: Last month Douglas Brown wrote about the "Man who Invented Magnetic Recording" Valdemar Poulsen. Now we feature on our cover an early Poulsen wire recorder. This machine, in perfect working order, is housed in the Tage Schouboe Museum in Copenhagen, where with a large number of historic radio and sound recording devices it is one of the more treasured exhibits. Another picture of a rather strange piece of audio equipment from the museum will be found on Page 47.

"TAPE Recording Magazine" is published on the third Wednesday in the month by Print and Press Services Ltd., from 16a Bevis Marks, London, E.C.3.

"TAPE Recording Magazine" is available by a postal subscription of 25s per annum (U.S.A. and Australia \$3.75) including postage, or it can be obtained at newsagents, bookstalls and radio and music dealers. In the event of difficulty, write to the Publishers at 16a Bevis Marks, London, E.C.3.

Back numbers, if still in print, are available, at 2s 6d per copy.

Address all communications

16a BEVIS MARKS,
LONDON, E.C.3.

EDITORIAL

01-283 1724

Publisher,

R. DOUGLAS BROWN

Advertisement Manager, VIVIANNE GOODING

ADVERTISING

01-283 1622

Editor,

DENYS G. KILICK

Tape trends and tape talk

By Douglas Brown

I HAVE JUST COMPLETED one of the most fascinating recording exercises to which I have ever put my hand, and others may like to try to organise something similar. The story begins well over a year ago when a team from the B.B.C. programme "Man Alive" made a TV documentary about life in Haverhill, a small but rapidly expanding town in Suffolk.

The programme caused a furore. I spend part of my working week in Haverhill and I know the place well and I shared the general view in the town that the "Man Alive" programme gave a completely unfair and unbalanced picture.

After protesting vigorously but vainly to the B.B.C., a group of Haverhill people decided that their energy would best be applied more constructively. Haverhill's future is based upon a plan to "import" industry and population from London and co-operation between the Greater London Authority and the local authorities in Suffolk is producing impressive results. But if Londoners thinking of making the move saw the "Man Alive" programme, their enthusiasm would almost certainly have evaporated.

The problem was, then, to make available to all intending emigrants from London a more attractive report on Haverhill. A committee was formed: the head of the local secondary school, the youth organiser for the town, the social development officer and the managing directors of three local firms.

A decision was taken to make an 8mm feature film, in colour, with sound. This film would be made freely available to any London firms thinking of moving their factories, so that they could show it to their staffs; it would also be loaned to Rotary clubs and other similar organisations.

So our committee became a film production unit. We were acting unofficially; we were determined that the film should have genuine documentary value and should not be simply a propaganda piece; but it was obvious common sense to inform the local council of our plans. As a result, they voted £200 to cover the costs of materials.

We then recruited an amateur film-maker of outstanding talent, Mr Stan Butcher, of Felixstowe. He looks after the publicity for the very successful Felixstowe Docks enterprise and we saw several films he had made documenting that story.

The making of the Haverhill film has taken almost exactly a year. By the time these words appear in print it will have had its *premiere* — a private showing to the councillors who put up the

money.

We have made the film without any sort of interference with its content. I think it is a notable example of amateur film-making, and I think it will do the job it was intended to do. My own principal role in this exercise was to prepare a part of the script and to act as commentator. But the most satisfying moment was when, watching the "rushes" for the first time, I read, among the credits: Recording — Douglas Brown.

I recommend whole-heartedly this kind of film-making. Not only does it give satisfaction to a recording enthusiast to play an important role in a team effort of this kind; the end result must interest many people not only in the subject matter of the film but also in the techniques used to produce the film.

* * *

THE HANOVER FAIR is one of the biggest trade exhibitions in the world and most years it has been the stage on which important new developments in tape recording have been unveiled. Now the German industry has decided the time has come to move out of Hanover and to stage a special radio and hi-fi exhibition of its own.

Next year in Dusseldorf the first of the new-style exhibitions will be organised as a national event; in 1971 it will be staged as an international fair. Thereafter, there will be national and international exhibitions in alternate years.

Anyone who knows how the Germans arrange these things will realise that this is bound to become one of the biggest events in the tape recording year.

* * *

DETAILS ARE NOW AVAILABLE of the 1970 British Amateur Tape Recording Contest and application forms are available from *Tape Recording Magazine* office or from the Contest Secretary, John Bradley, 33 Fairlawnes, Maldon Road, Wallington, Surrey.

Closing date is June 30, 1970, so if you begin to think about it now there is plenty of time to make several contest tapes. Prizes in the British Contest add up to £200 in cash and equipment. And, as I pointed out last month, the best British tapes go into the International Contest, where they stand a chance of sharing in over £1,000 worth of prizes.

What more incentive than that can the enthusiast be offered? Get down to it now!

ARE YOU AN AVERAGE TAPE RECORDING FAN?

We have a great respect for our readers – and we should like to know you better. Do you think you are yourself a typical tape recording enthusiast – or are you a strictly individual type?

We invite you to join with us in an interesting experiment which will provide the answer.

If you will fill in the form below and post it to us – it need not take long, as all but one of the questions can be answered by marking a cross in the space provided – we will make a detailed analysis and print in due course a special portrait of “the average reader”.

You will be interested to compare this image with the person you are yourself. You will be giving us valuable practical assistance in our task of producing a magazine that will meet your needs.

As you will see, the information you give is confidential – we shall have no means of identifying which readers have filled in the individual forms.

When you have completed the quiz, tear out the whole page, fold as shown overleaf, and post it to us. No stamp is required; we will pay the postage.

1. What tape recorders do you have?

- A mains model
- A battery portable
- A Compact Cassette model
- None

2. Did your recorder (the most expensive, if you have more than one) cost?

- Under £30
- £30 to £60
- £60 to £90
- Over £90

3. Do you have stereo facilities?

- Tape recorder and replay
- Tape replay only
- Disc only

4. Do you possess any of the following?

- Turntable and pickup
- Additional microphone(s)
- Tuner
- Extension speaker(s)
- Mixer
- Splicer

5. Are you satisfied with your existing equipment?

- Yes
- No

6. Have any of your friends, during the past year, asked for your advice or recommendations before buying equipment?

- Yes
- No

7. How old are you?

- Under 20
- 20 to 30
- 30 to 40
- Over 40

8. What sex?

- Male
- Female

9. Are you –

- Single
- Married
- A parent

10. Where do you live?

- Big town or city
- Country town or village
- Overseas

11. Which income bracket are you in?

- Under £850
- £850 to £1,250
- £1,250 to £1,600
- Over £1,600

12. Do you belong to a club?

- Local
- National
- International
- No Club

13. Do you “tape-spond” by exchanging messages with friends?

- In Britain
- Overseas
- Not at all

14. How long have you been a reader of TAPE RECORDING MAGAZINE?

- Since the first issue
- Over a year
- Less than a year

15. How do you get your copy?

- Newsagents
- Postal subscription
- Club or Library copy
- Any other source

16. How long have you been interested in tape recording and/or hi-fi?

- Less than six months
- Six months to two years
- Over two years

17. How much have you spent in 1969 on tape recording and hi-fi equipment, including records, tapes and reading matter?

- Less than £10
- £10 to £25
- £25 to £75
- Over £75

18. Are you thinking of improving your set-up by buying any of the following?

- New microphone(s)
- New speaker(s)
- Tuner
- Mixer
- Splicer
- Amplifier(s)
- Any other accessories

Continued overleaf.

THE TEXT OF A TALK GIVEN BY THE EDITOR
AT OLYMPIA UNDER THE TITLE

SOUND SENSE

One of the impressions left with me at the end of the combined Audio and Photo-Cine Fairs was a feeling of disappointment that so much emphasis should have been placed upon equipment rather than sound. Perhaps such a remark might be thought to be naive. The firms exhibiting were there to show their products which it was hoped the public would ultimately buy. With this approach one could not quarrel. Unfortunately too many manufacturers are so close to their own goods that they can only think in "product terms." What matters to me is not the cleverness and ingenuity that has gone into all the tiny little bits and pieces that make up a modern piece of audio equipment but rather the sound that the equipment will help to produce.

Personally I found myself to be dazzled and bewildered by the constant references to sophisticated engineering techniques. Integrated circuits and field effect transistors were solemnly discussed and advocated. Loudly heralded as "technical break-throughs" it seemed that each firm had a special piece of expertise without which – if one is to believe all one is told – the realisation of good audio quality would be quite unthinkable.

To the design boffins and the research engineers I take off my hat. They have all of them certainly done an extremely good job. But what I wish to point out now is that the cash customer will be far better off buying *sound* rather than buying *engineering*.

There has been *one* colossal, monumental, stupendous break-through in sound recording which to my knowledge was not mentioned at the Fair. The equipment is the most brilliant ever conceived by any human brain within the audio field and yet it could be neither seen nor heard at Olympia.

Think of all the superlatives that could be conjured up by the advertising agencies and apply them to this piece of audio equipment. They would all be justified. And yet unfortunately, the sound it produces is absolutely *horrible!*

I am talking about the very first record/playback mechanism, the Phonograph invented by Edison less than one hundred years ago. Think for a moment of the countless aeons of man's history before that date. During the whole of that enormous time span it had been impossible to artificially record and then reproduce sound of any kind – let alone the human voice. Then came the break-through – Edison, with his Phonograph. The words he is reputed to have bellowed into the open horn are said to be: "Mary had a little lamb, its fleece was white as snow and everywhere that Mary went that lamb



An enthusiasm for audio also implies an incurable optimism. The inventor of this device must surely have been the greatest optimist of them all! The two stylii have to be located in the same groove when the sound will have an echo effect produced by the time constant of the distance between them. We are indebted to the Tage Schouboe Museum, Copenhagen, for the use of this illustration and also for our front cover this month.

was sure to go." On playback the sound of the words can only just be identified through an almost deafening mush of background noise. For the first time in mankind's history he had succeeded in conquering and (partly!) capturing that most illusive of all physical phenomena – living sound. If we are to bow down and worship before the shrine of engineering and technical achievement then that machine, the Phonograph, is the only true idol.

Thoughts along these lines make me want to politely but firmly tell some of the enthusiastic sales staff at Olympia that they should quietly go and jump in the nearest lake. Their achievements are insignificant compared to Edison's. And yet the sound quality is terrible.

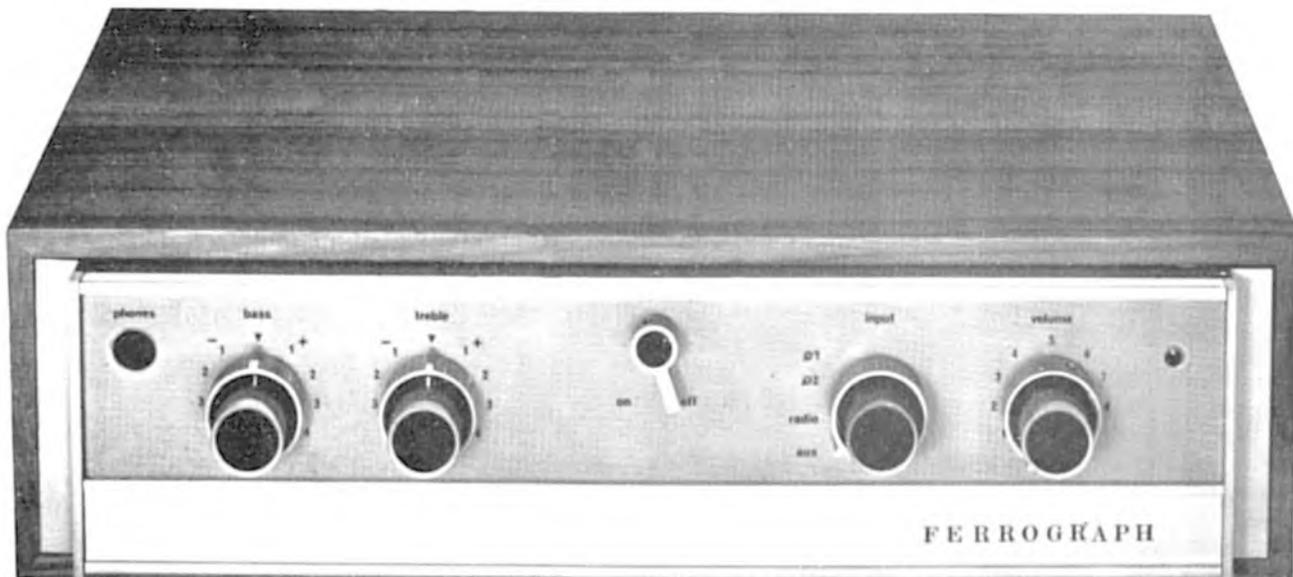
This is the danger of permitting oneself to be mesmerized by a superficial technical brilliance. What matters most – whether a piece of equipment has six field effect transistors or a hundred and six? Whether the sound it is producing sounds right or wrong?

Which led me quite naturally into a line of thought as to just what high fidelity sound really is. There was no shortage of salesmen at the Fair advocating the purchase of hi-fi equipment, but how many could define what high fidelity reproduction is?

At one time we used to talk – hopefully – of "the closest approach."

By this we meant the closest possible approach to an original sound. In my opinion this no longer applies. Today recording engineers suffer from the same over-sophistication as the design engineers. Instead of straining with might and main to give us a sound that is literally the closest approach to what one might expect to hear in real life they have abandoned the task as impossible. Instead they tend to give us their own representation of a performance – a representation which ideally has been tailored to suit average listening conditions in average domestic rooms.

Please turn to Page 49



Ferrograph F307 stereo amplifier— the heart of great Hi-Fi

F307 is an integrated Stereo Amplifier, built in a tradition of excellence and extremely versatile in its capabilities.

It presents a clean uncluttered appearance, conforming very closely with the Series Seven Recorder in this regard. Only its main controls appear on the panel—all subsidiary controls being housed beneath a hinged extruded aluminium flap.

F307 delivers power output of 20 watts RMS per channel into a load of 8 ohms and has a total harmonic distortion of less than 0.25% at 1kHz at all levels up to its rated output.

Your Ferrograph dealer will be pleased to demonstrate F307 to you. When planning your Hi-Fi system, this is an Amplifier to which the most serious consideration must be given and its Manual makes informative and compelling reading.

FERROGRAPH

The Ferrograph Co. Ltd.
Mercury House, 195 Knightsbridge, London, S.W.7.
Telephone: 01-589 4485

To The Ferrograph Co. Ltd.
Mercury House, 195 Knightsbridge, London, S.W.7.

Please send me FREE details of the Ferrograph Stereo Amplifier F307
OR send me the F307 Manual for which I enclose 5s 6d post paid

Name

Address

TRG

There are all sorts of fallacies about this "closest approach" philosophy. Many recordings are made in studios, not concert halls. The sound heard in a studio is not the same as the sound heard in a concert hall. Even in public halls the variations in acoustic quality are always peculiar to individual buildings. There is no magic formula that will produce ideal listening conditions from every seat in every auditorium. Instead each building colours the sound produced within it and this colouration (a word calculated to make the addicted hi-fi enthusiast turn pale with fright) helps to give individual musical performances their own personal characteristic which will neither be repeated elsewhere nor preserved on record so that people like you and I can enjoy them in our drawing rooms.

No; the whole question of sound reproduction is far more subtle and abstract than that. Having listened to the sales talk at the Fair I could not help wondering how many members of the public really believed that if they were to purchase certain specified equipment and certain specified records they could really reproduce sounds within their 20ft. x 16ft. living rooms that would give an illusion of sitting in the Festival Hall? The truth is that such a proposition is utterly impossible. It is contrary to the laws of physics. We

The vaulted vastness of Canterbury Cathedral produces a highly individualistic acoustic. Can the recorded and mechanically reproduced sound of a choir or the organ from such a great church ever be a faithful representation of the original? Especially when played back in a small living room? Even with the use of a "multi-channel" system designed to re-create the reverberence of the building we should still be left with the impossibility of reproducing the lowest audio frequencies in a confined air space.



The Festival Hall was designed for musical performances, but as built the acoustic left something to be desired. A few years back the interior was modified to improve sound quality. Is there any real substitute for live performance in a good concert hall as this now is?

know how an organ sounds in a vast cathedral; a recording of that organ will not sound the same when reproduced under domestic conditions in suburbia. Not with all the integrated circuits and field effect transistors in the world will it sound the same. Unless, of course, we can change what I have always regarded as being the immutable laws of nature.

It is my opinion that high fidelity sound reproduction can be described as the creation of an illusion. In other words, when listening to hi-fi we permit ourselves to be tricked into believing in something which does not really exist. With the record of a full symphony orchestra we can certainly be tricked into visualising a performance taking place; but having admitted this we must also understand that what we are hearing will probably bear little relation to an actual live performance of the same work by the same orchestra. In saying this we have moved quite a long way from the concept of "the closest approach."

But there are forms of music, more intimate types of programme, where

Please turn to Page 59

SONY

For spot-on sound . . . from on-the-spot recording – Model TC 800A, a compact battery/mains portable mono tape recorder for the discriminating enthusiast. Three speeds ($1\frac{7}{8}$, $3\frac{3}{4}$, $7\frac{1}{2}$ i.p.s), two tracks, 5" reel capacity, and a servo-controlled motor for precise timing accuracy. An automatic recording level control (with manual over-ride) ensures perfect recordings every time. And to complete the picture, there's that superb finish which Sony make the rule.

Recommended retail price £84.15.0

Recording system 2-track monaural.

Power requirements AC 110, 120, 220 or 240V, 50/60 Hz; DC 12V.

Power consumption AC 8 watts (max).

Reels 5 in. or smaller.

Tape speed $7\frac{1}{2}$ ips (19 cm/s), $3\frac{3}{4}$ ips (9.5 cm/s), $1\frac{7}{8}$ ips (4.8 cm/s).

Frequency response 30 Hz – 18 kHz at $7\frac{1}{2}$ ips; 30 Hz – 13 kHz at $3\frac{3}{4}$ ips; 30 Hz – 7 kHz at $1\frac{7}{8}$ ips.

Power output 1 watt.

Inputs Microphone: sensitivity 0.195 mV, impedance 600 ohms.

Line: sensitivity 0.055V, impedance approx. 100k ohms.

Remote control.

Speed tuning.

Output Monitor: standard output level 0.775V (load impedance 10k ohms).

Motor D-503F DC servo-motor.

Speaker $3\frac{1}{8}$ in x $6\frac{1}{2}$ in.

Battery life Up to $6\frac{1}{2}$ hours in continuous recording (with supplied batteries).

Dimensions $12\frac{1}{4}$ in. (w) x $4\frac{3}{8}$ in. (h) x $10\frac{1}{4}$ in. (d).

Weight 11 lb. 13 oz. with batteries.

Accessories Microphone (F-85 MTL), pre-recorded tape (5 in. tape), Sony reel (R-5A), connecting cord (RK-36), head cleaning ribbon, super batteries, magnetic earphone (ME-20).

Optional accessories Telephone pick-up (TP-4S), car battery cord (DCC-2AW), remote control (RM-6), microphone mixer (MX-600M), foot switch (FS-5), carrying case (CK-8B).



SONY
RESEARCH MAKES THE DIFFERENCE

Sony (UK) Ltd Ascot Road, Bedfont, Feltham, Middlesex

SOME DISTURBING reports have been appearing in the national press. They reassure people who have not yet converted their mono gramophone equipment to stereo.*

"Just as well", they say. "Now you will be able to take advantage of the very latest audio development from America. Two channel stereo is old hat. Don't waste money on it. Soon we shall have four channel stereo from gramophone records. This will be the thing to buy."

Four stereo channels? Hardly a new idea. Stereophony implies the use of a multiple channel system of some kind; the two channels generally used domestically represent the minimum stereophonic requirement at minimum cost. The cinema has been using far more complex systems for quite a long time. Typical is the Todd Ao eight channel method where the entire programme can be recorded on a single track; separation giving directional information is achieved by the modulation of carrier frequencies outside the audio spectrum. All very impressive and worth-while in the vast auditorium of a cinema — hardly something that the ordinary person would welcome within their own home.

At one time it was thought that three channel stereo would be a great improvement on the familiar left-hand and right-hand arrangement we are used to. The idea was to provide a centre channel to avoid the disastrous "hole-in-the-middle" effect. In fact a third channel used in this way is quite unnecessary. When a good stereo recording is well reproduced the "sound stage" is as solid in the centre as it is on the sides. A vacuum in the centre indicates either poor recording or poor reproduction. It does not mean that two channel is inadequate.

Why, then, should a new four channel system be advocated? The first reason, I suspect, is that of commercial interest. If some-one some-where has patented a method of getting four separate channels of information from the single groove of a gramophone record then that person presumably would be anxious to market his invention and to popularise it. For the consumer it must mean double the cost of loudspeaker and amplifier equipment.

The advantages of two channel stereo over mono are now so well known as to need no further emphasis. The change in sound quality is dramatic. The sense of realism can (as yet) be got in no other way. The extra cost is thoroughly justified. But to change from two to

CROSS

TALK

By Audios

four channels is quite another matter.

Many of us already experience difficulty in housing a pair of reasonable quality speaker enclosures. Two more would often be impossible. And the result of these extra sound sources could be no more than to produce an "envelope of sound" instead of a frontal "sound stage". Do we really want to be surrounded in sound ("smothered" would perhaps be a better word!) in this way? At enormous expense? You might. Personally I do not.

At the Audio Fair last year (Russell Hotel, remember?) the 3M Company demonstrated a four channel stereo system using Scotch tape. The recording had been specially prepared by Bob Auger of Pye and it had a somewhat mixed reception from the public. We praised it for its originality. We did not say that we would like to live with it — which is quite another matter.

In fact if there were to be any valid reason for adopting four channels as the domestic standard for stereophonic reproduction then tape would be the obvious medium to use. We already have eight tracks on ¼-inch tape in the Stereo-8 cartridges and it would be technically feasible to accommodate the same amount of programme material on a tape of given length as we now get in two channel reproduction. But that is hardly the point. The vital question is: do we really want four separate channels?

Doubtless commercial interests have looked with envy at the money that was made when we changed from 78s to 331/3 l.p.s., and again at the profits from the later change from mono to stereo. So, inspired by the need to produce something new, we are now threatened with what I am sure will come to be known as "total" stereo: four channels.

Why stop at four? Let's have six. Or eight. Or sixteen. Let's make the walls of our houses gigantic loudspeakers with countless transducers pumping out noise in every direction from every direction. Then the only commodity worth selling will be the most valuable of all. Silence. And I shall invest in a great deal of it.

CHANGES are taking place in the audio magazine world. Another publication whose name has been similar to our own is changing both its title and its editorial emphasis. This will leave TAPE Recording Magazine as the only publication for the amateur enthusiast as it was when founded some fourteen years ago.

Looking back over those fourteen years one can trace a pattern of progress in technical development that is truly staggering. It is easy to complain about costs today, and yet when purchasing equipment we get so much better value for our money than we did all those years back. Yes, there was a time when 3¼ ips was the slowest practical speed to get acceptable sound quality, just as half-track was the amateur standard. Valves glowed. Transistors were something of a curiosity.

I still have a machine which when bought in the dim and distant past cost over £100. Working half-track at 3¼ ips its claimed response was 9,000 Hertz with a signal-to-noise ratio of heaven-knows-what. Stepping the speed up a notch to 7½ ips produced the dramatic fidelity of a response curve leaping up to a (claimed!) 12,000 Hertz. Compare that performance with the published results of some of our recent machine reviews of models at the same price level. After taking into account the depreciation in the value of money over the passing years one begins to realise just how very fortunate we are today.

But change has not been limited to technical progress or relative values. The attitude of the enthusiast has changed too. Ownership of equipment is no longer confined to a creative minority; tape recording is accepted as a part of modern living. Contemporary styling has introduced machines to the living room where they can be used by all the members of the family. The idea that involvement in sound recording demands the practice of strange rites amounting to a religious cult is as out-dated as those old fashioned machines we used to talk about back in the fifties.

I believe that the next ten years will find more and more people turning to tape in conjunction with associated audio equipment. Emphasis will be on the recording and reproduction of music for pleasure and entertainment. Fortunately the versatility of the medium is such that creative endeavour need not be stifled.

To the contrary, the amateur now has ready access to equipment that will work to a higher standard of efficiency than that of the machines used by the professionals of a few years ago. There will always be people who delight in accepting the challenge that sound recording presents. There will always be enquiring minds ready to explore its possibilities in new ways. In spite of the soporific effect of the television screen, or perhaps even in revolt against it, the pleasures of "pure" audio divorced from visual images become more and more attractive.

* * *

I WAS RECENTLY telephoned from home with the sad news that a piece of my equipment had broken down. Later that night I checked myself. It was true. The machine was as lifeless as it could possibly be. With muttered invectives it was packed up for service. As an after-thought I unpacked it and tried it in a different mains plug. Was my face red when it worked perfectly. The "fault" was accidental disconnection from the mains . . . !

*The word "stereo", derived from the Greek, means "solidity" and does not imply "two".



Recording studios use it every day.

'Scotch' low noise 'Dynarange' Magnetic Tape is the choice of top recording studios such as CBS, Decca, De Lane Lea, Lansdowne and Pye. Both the tapes and cassettes are now available in smart

new plastic packaging.
Your dealer stocks the complete range.



Scotch Magnetic Tape

3M 'Scotch' and 'Dynarange' are trademarks

SURROUNDED BY SOUND



Mr R. C. Hibbard, Chairman of Photo-Scan International with the 3-Dimensional Sound Capsule which he claims will "surround the listener with sound."

IN CROSS TALK this month Audios refers to the latest development trend in sound reproduction. This looks as if it will be towards "multi-channel" systems. With cynical humour he sees no reason why this principle should not be extended to its logical conclusion. Why, he asks, should we not convert the very walls of our living-rooms into gigantic loudspeakers? In this way we could literally surround ourselves in sound. Horrified at such a prospect he then votes in favour of that most blessed of all conditions — golden silence.

But developments occur so quickly in audio that at times we have difficulty in keeping up with them. Believe it or not, within hours of reading Audios' caustic remarks we received information about a new appliance which has been designed to do precisely what he was ironically suggesting. Called the 3-Dimensional Sound Capsule it is claimed to "bathe any area in gentle stereophonic sound of uniform volume without regard to where the listener might be standing or sitting". Intrigued by such an unusual suggestion we took immediate steps to examine one of the only two of these appliances at present in this country.

The equipment is being marketed by Photo-Scan International of America. We located the Company's Chairman, Mr Ronald C. Hibbard, in a hotel room in the centre of London's West End. In his hand he held a metal object about the size and shape of half a grapefruit. Fabricated in metal it has a plunger terminating in a flat flange drilled with three fixing holes protruding from its flat underside. There are a couple of tags to accept the wire conductors that will carry an audio signal from an



A close-up of the Capsule with a telephone in the background to indicate scale. It can be fixed to any surface, other than marble or solid concrete, and is then claimed to "make music" over the entire area.

amplifier. Mr Hibbard told us that any amplifier will suit provided it has at least 2½ Watts output and a matching impedance of 4 Ohms.

He explained that the appliance is intended to be screwed on to any flat surface (other than solid concrete or marble). When in position it will cause the whole of the surrounding area to "make music". Perhaps our incredulity was too obvious. Without saying another word he switched on a little 8-track cartridge playback machine which had been previously wired to the capsule, held the flange firmly against the wall of the hotel bedroom, and invited us to listen. Let us next assure readers that not a single drop of alcohol had passed our lips. We stood there in cold sobriety and heard music radiating from the whole of the wall against which the capsule was being held.

Observing the somewhat glazed expression in the editorial eye Mr Hibbard removed his gadget from the wall and held it against the back of an

upholstered settee that happened to be in the room. Can you imagine a musical settee? That is what we instantly had. The sound vibrations could be felt through the fabric and the music was certainly coming from the whole of the article.

Encouraged by these dramatic demonstrations we asked Mr Hibbard if his products could do something really interesting — like turning a swimming pool into a vast loudspeaker.

"No trouble at all" he answered. "All you have to do is to dump the unit in the water. Actually for best results it should be fixed first to a piece of polystyrene. If you do that then the entire surface of the water will make music. Even more interesting, why not try fixing it to the trunk of a tree? It's ideal for an outdoor barbecue party. The entire tree will make music for you."

Bewildered at the prospect of musical walls, settees, swimming pools and trees,

Please turn to page 67

TAPE WORKSHOP

OVER THE YEARS TAPE RECORDING MAGAZINE has published a number of practical features dealing with the basic elements of the techniques of sound recording. For the sake of new readers who might not be familiar with these first principles it is necessary to go over this ground again. However, in this series of features under the title "Tape Workshop" it is our intention to adopt a new and completely fresh approach to the subject. We are going to establish what will literally be a workshop for the handling of recorded sound. Its development and progress will be regularly reported and through it we shall be able to recapitulate on the fundamentals of the subject for the benefit of beginners whilst at the same time providing a "refresher course" for more experienced readers. We propose to adopt a strictly practical approach by relating recording techniques to the actual requirements of enthusiasts and equipment owners. Because of the versatility of the medium of recorded sound the same processes we shall be discussing are equally valid for personal private use, for educational applications, and for all the vast range of subjects and applications to which tape recording now finds itself closely allied.

It is strongly felt that there is little practical difference in the handling of equipment between the techniques used by the competitor in a tape contest, a schoolteacher in his schoolroom, and the private owner who merely wishes to derive pleasure and entertainment from the use of his machine. There is always a grave danger, when undertaking a project of this kind, of falling between two stools; the absolute beginner might

complain of too much technicality too soon whilst the older reader might object to going once again over ground that has already been covered. It is hoped that by emphasizing the practical nature of what we are doing and by suggesting a programme of experimental work that we shall provide continuing interest for all.

First we have to say a few words about sound itself, what it is and what it does. Unless we happen to suffer from a serious and tragic physical defect sound is something with which we live from the moment we are born until the moment we die. Because we are so familiar with it we accept its presence without question. Until, that is, we hear so much unwanted sound that we begin to call it "noise" when we object to it strongly.

A gardener thinks of weeds in cultivated ground as plants that happen to be growing in the wrong place. It is useful to bear that definition in mind when thinking about noise. Noise is sound that happens to come in the wrong place. Very often the difference is only that of a different point of view. If you are playing music loudly at home with a window open on a warm summer's night what is then a pleasant sound to you is probably an annoying noise to your neighbour.

Much of the art of sound recording and reproduction lies in this separation of the sounds we want from the sounds (noise) we don't want.

From the scientific point of view, which need not bother us greatly, sound is caused when vibrations are set up. These vibrations require some physical substance through which to travel. For

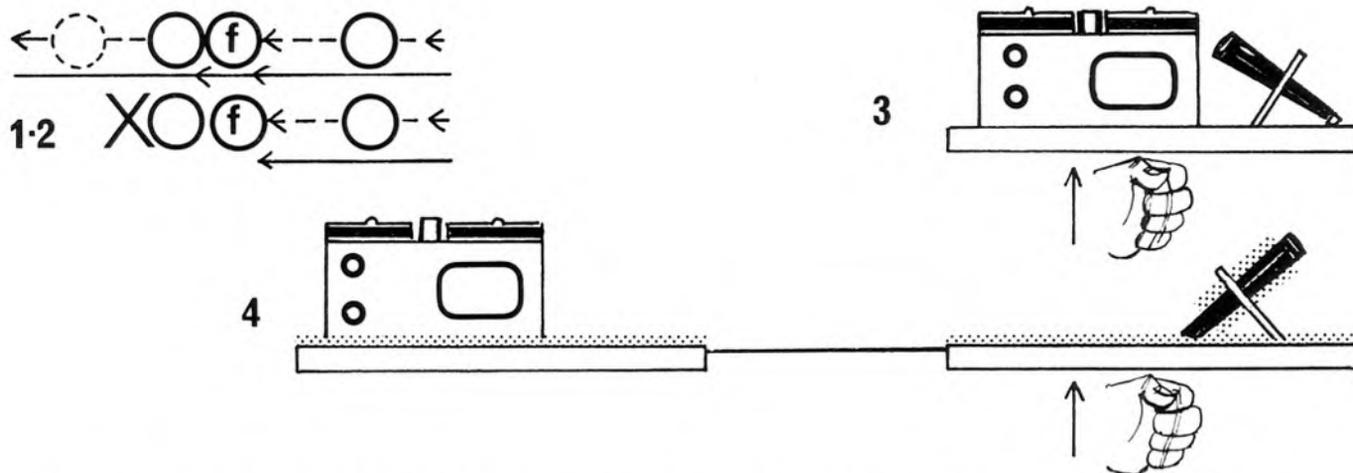
instance, you could make as much din as you liked in a vacuum and nothing would be heard at all. Before experimenting along these lines it might be as well to remember that one can't live in a vacuum either.

Do you remember the press reports of the effects of crashing the Lunar Excursion Module from Apollo 12 on to the moon at high speed? It was reported that the reverberations set up continued for some 30 minutes, much longer than would have been possible under terrestrial conditions. The papers referred to the moon as being like "a great gong in the sky."

Since there is very little physical material around the moon — it has no atmosphere (air) as we know it — it is difficult to understand how the "gong" could have possibly made any audible sound at all other than by transmission through its own solid material. So the idea of an unearthly noise reverberating through the heavens might be good journalism but is hardly within the realms of scientific probability.

Sound does travel through solid objects as well as gases (air) and for our first experiments in the Tape Workshop we suggest investigating and proving this fact in practical ways.

If we are to record the sounds we want without those we do not want — the first principle of good recording — then it is of the greatest importance to avoid being taken unawares by the kind of sounds that have a nasty habit of "creeping up behind one's back". By conducting the experiments suggested in the adjacent page we will be demonstrating one source of unwanted noise and showing how it can be avoided.



Figs. 1 and 2. The three coins in our first experiment; the circle marked "f" is the fixed penny to be held immovable by the left hand. In the upper drawing the left-hand penny is projected sharply towards the left, in the lower no movement can occur because of the separation between it and its partner. Fig. 3 illustrates noise interference caused mechanically by direct transmission of energy. Fig. 4 shows insulation against such noise pick-up.

EXPERIMENT 1. TRANSMISSION OF ENERGY.

Apparatus required: Three pennies

One hard, smooth surface such as a table top

For the first of our practical experiments we are going to demonstrate the fact that energy can be transmitted through solid objects. The story of the soprano who, by hitting a particularly high note, causes a tumbler to shatter is very well known. Yet one could be excused for insisting that the only thing that could make a glass break must be a physical force of some kind, such as a blow. The truth is that if we describe such an impact as "mechanical energy" (which is what it is) then we can describe sound as "sound energy" (which is what that is, too). In other words both mechanical violence and sound can be expressed as energy. So, for the sake of convenience we will first use the simplest form of energy for demonstration purposes, that of mechanical force. Because sound is a form of energy its behaviour can be thought of in mechanical terms.

Method

- A) Place the three pennies in a row on a hard, smooth surface so that their edges are just in contact with each other.
- B) Hold the centre penny firmly in place with the fingers of the left hand so that it cannot possibly move.
- C) With the right hand slide the right-hand penny back a few inches and then bring it sharply forward so as to strike the centre penny a smart blow on the edge nearest to it. The centre coin must be held so firmly that it does not move under the impact.
- D) Observe how in spite of no movement having occurred in the centre coin the left-hand one has been projected violently away from the point of impact.
- E) Repeat the experiment, but this time leave about an 1/8 th of an inch clearance between the left-hand penny and the one in the centre.
- F) Observe that when the centre coin is now struck by the right-hand penny no movement at all will occur in the left-hand coin.

We have now shown that energy is transmitted through physical contact. We have proved that contact alone caused the left-hand coin to move – when we separated it from its partner, even by the smallest distance, transmission of energy

could not take place and so it remained stationary.

This first experiment has been little more than a child's party trick, but it clearly demonstrates a most important principle. Energy – whether mechanical or sound – can be transmitted in more ways than one. Unwanted sound (noise) can easily interfere with a recording if precautions are not taken to insulate against it.

EXPERIMENT 2. TRANSMISSION OF NOISE

Equipment required: One tape recorder with tape

One microphone

One table

In our first experiment we caused the apparently inexplicable movement of a coin by transmitting energy through another stationary coin. Now we can turn to that other kind of energy – the energy we call sound.

Microphones are instruments designed in such a way that they convert sound waves into *electrical* energy, yet another "energy form". To people not used to handling them microphones are sometimes regarded as being rather frightening. No-one is frightened of a loudspeaker, but a loudspeaker is nothing more than a "microphone in reverse". One converts sound to electrical energy whilst the other turns electrical energy into sound. Both are constructed on similar scientific principles and either can be described as a "transducer", the name given to any appliance that converts energy in one form into an equivalent energy in another form.

This function of a microphone as an "energy convertor" is important. It is made to convert sound to electrical energy in as efficient a manner as possible. But, by the nature of its construction, it is also liable to convert other unwanted energy forms to electrical energy as well. Mechanical energy, for instance. And the energy this generates will be regarded as "noise".

Method

- A) Connect the tape recorder to the mains supply, lace up the tape, connect the microphone and set the Record Gain Control to an average level for speech recording.
- B) Place the microphone on the table close to the recorder and start recording.
- C) Play back the tape.

Please turn to page 67



NATURE NOTES

FOR FEBRUARY

BY RICHARD MARGOSCHIS

LAST month I suggested that conservation can start at home and that it can be coupled with sound recording. There are a number of circumstances which are likely to influence the success of such a venture; the part of the country in which you live, the size of your garden and whether or not your home is situated in town or open country. If you have a sizeable garden then your attitude to gardening will also have its effect, for a well tended garden may not attract so many species as one which has an area left in a wild, or semi-wild state. Weeds, especially when in seed, provide excellent food for many birds; so, unenthusiastic gardeners, here is the excuse you have been waiting for! I have a small patch around some fruit trees where the grass has been allowed to grow up and not far away is a rockery with plenty of hiding holes. Around here I can find numerous insects, frogs and toads, hedgehogs and occasionally a stoat. Unfortunately we live on the edge of a small town and so I am troubled with traffic noise but there are ways and means of attacking this problem and I will try to say something about it in a future issue.

Undoubtedly the two most popular ways of attracting birds to the garden are the use of food tables and bird boxes, and there is nothing really difficult in the construction of either. I have a food table constructed out of a four foot length of 3 x 3 inch timber with a 3/4 inch piece of wood measuring 12 x 18 inches nailed to the top, the whole being supported on a fairly heavy wooden base for stability. In the table I have cut a hole in which I can set a Grampian D.P.6 microphone suitably protected by a small cage of fine wire mesh. The local bird population will soon know where and when food is available, so when I put food out I sometimes set up the microphone with a lead into the sitting room and spend a pleasant, and comfortable, hour watching and listening to chattering and squabbles.

Bird boxes require much more care in design, but I see no reason why provision should not be made for inserting a microphone. A point that should be realised is that if you have a microphone in a box and a pair of birds start nesting, then it might be necessary to leave it there until the nest is vacated to prevent undue disturbance. The alternative is to provide a means of mounting the microphone near the box rather than in it.

The internal measurements of the box, and the diameter of the entrance hole, will depend upon the species you hope to attract. For instance for a great tit, which is very prone to using boxes, the hole should be 11/8 inches, average depth 5 inches and floor 4 x 4 inches. Details of the correct boxes for a large variety of birds are given in a small book by Edwin Cohen, under the title 'Nestboxes', obtainable from the British Trust for Ornithology, Beech Grove, Tring, Herts, (price 3/6) The R.S.P.B., The Lodge, Sandy, Beds., also do a small book called 'The Bird Garden'.

Great tits will start their song around mid-January and will very soon be exploring possible nesting sites; weather conditions will of course, have a bearing on their activity. Males first tend to sing from high perches, but when a site has been selected, and particularly when the hen is sitting, he will sing for long periods near the nest. This, and when he is displaying, are the times when you will be able to hear, and record, his whole repertoire - and it is very varied.

Once the song posts have been discovered a microphone can be placed as near as possible and a lead run to a suitable spot to observe and wait. An alternative is to use a parabolic reflector, either hand-held or mounted on a tripod and aimed at the song post, but if you have neither long lead nor reflector do not be afraid to try with a hand-held open microphone.

The language of the great tit has been the subject of a detailed study by Miss Terry Gompertz. Having become very familiar with the great tits in her own area she now wishes to extend her research to other parts of the country and would be pleased to receive recordings from anybody interested. All she requires is about a minute of each song type. She prefers the originals to be made at 3 3/4 ips at least, but is prepared to accept recordings made on cassette machines. Copies should be sent at 7 1/2 ips if possible, otherwise 3 3/4 ips, along with very full details of location and equipment used. Tapes will be returned if requested. Address: Woodway, Pinner Hill, Pinner, Middlx.



Microphones and Pick-ups by Bang & Olufsen

MICROPHONES



Beomic 1000 Omni-directional moving coil microphone. Response 50 - 17,000 Hz \pm 2-5 dB. Sensitivity 0.1 mV/ μ bar. Hum sensitivity -139 dB. Output: 200 ohms at 1 KHz. via 9ft lead, 5 pin DIN plug. Supplied with frequency response chart, lavalier cord, anti microphonic base, and packed in a futuristic container. Price *£9.9.0d.



B.M.5. Studio quality Stereo ribbon microphone. Figure of 8 response: Sections may be swivelled up to 90° relative to each other for the desired stereo effect. Fitted with music/ speech switch. Response 30 - 13,000 Hz \pm 2.5 dB. Sensitivity 85 dB below 1 volt/ μ bar. Hum sensitivity -146 dB. Output 200 ohms at 1 KHz. via 9 ft lead, 5 pin DIN plug. Supplied in rosewood

presentation box with table stand. Price *£30.9.0d.

B.M.6. Mono ribbon microphone (lower half of the B.M.5). Specification as B.M.5. Supplied in presentation case with table stand, price *£21.2.0d. It may be converted to a B.M.5 by an addition of the B.M.7. (available separately price *£9.19.6d.)

Microphone Accessories Stereo/Mono extension leads: prices *15 ft £1.17.6d. 30 ft £2.9.6d. 45 ft £2.19.6d. 60 ft £3 15s. 75 ft £4 5s/Floor Stand £7.15s. Boom Arm £4.19.6d. Line matching transformer to 50 K ohm impedance; £2.9.6d.

PICK-UP CARTRIDGES

A range of quality magnetic cartridges using the B & O patented micro-cross system giving low harmonic distortion and a smooth frequency response. They follow the International tracking angle of 15° and, with standard 1/2" mounting centres, will fit virtually all quality pick-up arms.



S.P.6. Response 20 - 20,000 Hz \pm 2.5 dB. Compliance 15 x 10⁻⁶ cm/dyne. Pressure 1.5 - 2.0 g. Stylus: 15 μ diamond. Output: 7 mV. 47K ohms. Price *£7.19.6d.

Replacement styli available: 15 μ , 75 μ , and 5 x 17 μ elliptical.

S.P.8. As S.P.6, but supplied with 5 x 17 μ elliptical stylus in Rosewood box, price *£12.19.6d.

S.P.10. Response 15 - 25,000 Hz \pm 3dB. Compliance 25 x 10⁻⁶ cm/dyne. Pressure 1.0 - 1.5g. Stylus: 15 μ naked diamond. Output: 5mV. 47K ohms. Price *£9.19.6d. Replacement styli available: 15 μ and 5 x 17 μ elliptical.

S.P.12. As S.P.10, but supplied with 5 x 17 μ elliptical stylus. Price *£14.19.6d.

* Prices indicated are recommended retail prices.

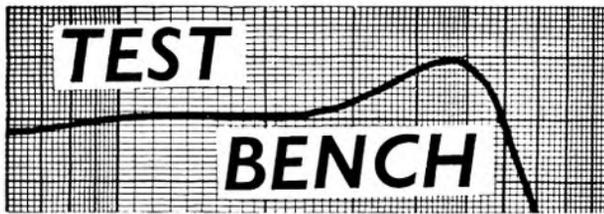
B & O quality accessories are obtainable from B & O dealers:

Send for further details to the Accessory Department,

Bang & Olufsen U.K. Limited,

Eastbrook Road, Gloucester.

Telephone: 0452 21591.



TELEFUNKEN M-501

INVESTIGATED BY R. HIRST AND D. KILLICK

MANUFACTURER'S SPECIFICATION

Magnetophon 501

Mains: 110, 127, 220, 240 Volt, 50 Hz, switchable to 117 Volt, 60 Hz.

Power Consumption: Approx. 25 Watts.

Tape Speed: 3¾ ips.

Reel Diameter: Max. 5¾ ins diameter.

Tracks: 4-track according to international standards.

Frequency Range: 60 – 13,000 Hz (DIN 45 511).

Signal-to-Noise Ratio: 46 dB.

Wow and Flutter: 0.3%.

Recording Inputs: Radio/Microphone 0.2 mV into 5k Ohm. Pick-up/Tape 90 mV into 2.2 MOhm.

Playback Inputs: Radio 1 V into 18 kOhm. External Speaker 4.5 Ohm.

Power Stage: Push/Pull 2.5 Watts.

Counter: Dial counter 270 mm two-directional.

Dimensions: 350 x 130 x 286 mm.

Weight: Approx 11 lbs.

Recommended Retail Price: £41. 9s. 6d. including purchase tax. (A deluxe model is also available at £44. 2s. Od.)

Distributors: AEG/Telefunken, 27 Chancery Lane, London, W.C.2.

Frequency Hz	Overall Response dB 3¾ ips	Playback Only dB 3¾ ips	Signal/Noise Ratio dB	Distortion %
50.....	-2.8	-2.5	48	2.4
60.....	-2.0	-0.6		
125.....	-1.2	-0.8		
250.....	-1.0	-1.2		
500.....	-1.0	0		
1000.....	0	+0.8		
2000.....	+1.0	+1.4		
4000.....	+2.2	+1.6		
6000.....	+2.4	+2.2		
8000.....	+2.8	+2.0		
10000.....	+1.6	0		
12000.....	+1.4	-3.5		
14000.....				
Wow & Flutter	0.28%			

NOTES. -The Overall Response figures relate to record and playback. Playback Only relates to the reproduction of a DIN calibration tape at 3¾ ips.

For Signal-to-Noise Ratio the tape was recorded of 0VU and then the input signal was removed from the record amplifier. By reference to the signal level recorded and the resultant tape noise, the noise voltage was read off, with the tape still in motion. Distortion is quoted against a 1,000 Hz signal recorded at the same level and the figure is an R.M.S. value (see text).

Wow and Flutter is also R.M.S. the test frequency being 3,000 Hz. Test equipment used includes: Bruel and Kjaer Signal Generator, B & K Frequency Analyser Type 2107, B & K Level Recorder Type 2305, Marconi Distortion Factor Analyser and Gaumont-Kaylee Wow and Flutter Meter.

FOR THE SECOND month in succession we find ourselves turning our attention towards a low cost, single speed, monophonic machine. The subject of our present investigation is the Telefunken Magnetophon 501, a complete record/playback mechanism operating ¼-track at the single tape speed of 3¾ ips. It is a machine that is particularly noteworthy because its tape transport mechanism has been fabricated almost entirely out of modern plastics. The word "plastics" has unfortunately acquired a somewhat derogatory meaning; too often it indicates the worst kind of cheapness. A great many plastics

consumer goods are intended to be used once and then thrown away. Let us therefore hasten to explain that there is no connection at all between the advanced plastics' technology employed in the design of the Magnetophon 501 and that used in the manufacture of such low-class merchandise.

There is not the slightest reason why the right kind of plastics should not be extensively used in tape recorder decks. Of course such decks will be cheaper to produce than those made exclusively from metal. This cost reduction is one of the first advantages that can be passed on to the consumer. But it might

come as a surprise to some to learn that far from being inferior to metal decks in terms of performance, reliability and longevity, a plastic deck can actually offer better performance in all these respects. So it was with the greatest interest that we began to investigate the technical performance of the 501, a machine that owes its very existence to the sophisticated use of these new materials.

Before sending the machine across to the laboratory we took a quick glance at the specification and at the price ticket. Obviously one must always relate performance standards to cost and in

this case the recommended retail price of just over £40 including purchase tax makes the 501 one of the least costly machines we have examined for a very long time. The manufacturer claims a frequency response of from 60 to 13,000 Hz. (to DIN standard 45 511), a signal-to-noise ratio equal to or better than 46 dB and wow and flutter figures equal to or better than 0.3%. Distortion is not quoted.

Following our usual procedure we first replayed a standard DIN calibration tape and measured the output at the line-out socket. With quite remarkable accuracy the Magnetophon 501 was shown to be producing an outstandingly flat response curve well within tolerance limits of plus or minus 3 dB over the specified range of frequencies. In fact from 125 to 12,000 Hz. the curve is virtually flat to within plus or minus 2 dB.

For overall response we recorded the same series of tones and again measured the output at the line-out socket. Once again the outstanding result is a curve flat to within plus or minus 2.8 dB all the way from 50 to 14,000 Hz. It is really quite remarkable that such a performance should be achieved on a piece of equipment in this price range.

As we have said so often before it is our opinion that signal-to-noise ratio and distortion are at least as important – if not more important – than frequency response figures. It is useless adequately covering the audio frequency spectrum only to destroy audio quality through either obtrusive background noise or by unpleasantly distorted sounds. We must say that we were delighted to find that the 501 gives a highly creditable signal-to-noise ratio of 48 dB at 1,000 Hz with a distortion content of only 2.4% at the same frequency when recording under the same peak conditions. Bearing in mind the fact that this is a ¼-track machine, at what can only be described as modest cost, this relatively high standard of technical performance should earn congratulations for the manufacturer's design team.

But what about all those plastics components beneath the main deck plate? Can we really expect speed stability from such a method of construction? Well the claimed wow and flutter figures are equal to or better than 0.3% and our own instruments gave us a figure of less than 0.28%.

The achievement of mechanical speed stability is one of the most difficult problems that face any designer. Even at exorbitantly high prices the vagaries of mechanical engineering present greater difficulties than those of the electronics. This fact is exemplified in the 501 where the electronic performance in actually recording and



reproducing sound is so dramatically good whilst the speed stability is only just in excess of the level that we would regard as a minimum requirement. A wow and flutter content in excess of 0.3% can betray disturbing variations in pitch – certainly enough to spoil the discerning listener's enjoyment. Really keen ears can detect variations amounting to less than 0.3%. Again we have to relate performance to cost, so although we would be critical of a £100 machine with a wow and flutter figure of around 0.28% we can hardly complain when we arrive at that figure on a machine costing less than half as much money.

The audio output power is claimed to be 2.5 Watts and this was substantiated by our measurements. The single tone control provides a top cut of minus 12 dB at 10,000 Hz.

Laboratory technicians tend to be suspicious of equipment at the bottom of the price-list. Being purists at heart they concern themselves solely with performance regardless of commercial possibilities. In the present case they were more than pleasantly surprised with the performance standard recorded by this remarkable little machine. So from this point we move on to our user investigation.

In appearance the Magnetophon 501 has a distinctively "Telefunken" look about it. Small in size, slim in build, and light in weight, it displays a considerable area of clean looking deck plate together with a neatly grouped arrangement of controls. It was noted with interest that all the obstructions to the sound channel (things about which we have complained on other Telefunken models) can be speedily removed by merely undoing a couple of screws. At

the same time the head assembly is effectively exposed for cleaning, thus simplifying maintenance procedure.

A row of five very positive push-keys to the left of the front of the deck plate control the transport system. Reading from the left they are: Fast Rewind, Run, Fast Forward, Stop, and last, brilliantly red in colour, is Record. Adjacent to these is a slide knob for track selection (tracks 1 and 4 to the left and 3 and 2 to the right) and a similarly styled Pause control. On the right of the control assembly are a pair of horizontally pivoted wheel-like knobs each bearing its own numeric scale. The one on the left serves the dual function of Gain control during recording and Tone control during playback; the one on the right incorporates the mains On/Off switch and playback Volume control. Situated on the raised bar between these two controls is an edge-typed Record Level Meter without a numbered scale but with black and red segments to indicate modulation levels. This meter is not lit and in fact the machine does not incorporate any pilot light to show when the mains power supply is switched on.

A recessed panel in the left-hand side of the body contains a 3-pin DIN receptacle for Record/Playback together with the usual DIN extension speaker socket. The mains cable is a permanent fixture which exits from the underside of the equipment where a cleverly recessed and shaped hollow enables the machine to be carried comfortably and conveniently without the need for a carrying handle. One other unusual design feature is the vernier type slide position indicator which extends across the full width of the vertical front face of the machine. A transparent plastic

bar carrying a red indication line travels across a numeric scale as the tape is wound back and forth. This is a change from the more conventional digital counters now found on most tape recorders but unfortunately we experienced some difficulty in making the vernier slide on our review sample operate efficiently. It was probably in need of some quite simple minor adjustment.

After plugging in to the mains and switching on we were rather surprised to hear the relatively high noise level emanating from the equipment. This takes the form of a "chuntering" sound from the deck mechanism. One would hesitate to conclude from this that a deck made of plastics is inherently more noisy than a metal fabricated equivalent; we suspect that the noise level would probably decrease after the machine has been "run in" with a hundred or two hours' use.

First playing back some commercially pre-recorded material we were impressed by the easy and positive action of the tape transport keys on the deck. Not too stiff but yet not too loose they worked very well indeed. The sound produced at the loudspeaker was quite cheerful, free from irritating bumps and rattles. To obtain the maximum advantage from the high technical performance standard of the machine we connected a small acoustically designed loudspeaker enclosure to the external speaker socket. As always happens under such circumstances the improvement in audio quality was dramatic.

For recording tests we took signals from VHF radio and also the output from another tape recorder on which we were playing back 15 ips master tapes. After allowing for the degradation in quality that must occur when stepping down speed from 15 to 3¾ ips we concluded that the 501 was functioning

so well that it was a credit to the great name of Telefunken which it bears.

In a previous review of another budget-priced ¼-track monophonic open spool machine we compared its performance to that of Compact Cassette. As with that machine we have in the 501 a mechanism that will produce and reproduce recordings to a remarkably high technical standard — a standard which as yet Compact Cassette has not been able to reach. So we would have no hesitation in recommending the 501 to those who are interested in acquiring a ¼-track mono machine of good quality at a realistic price level. It would be a sad day if machines of this calibre were to disappear before the onslaught of the tiny cassette package. We believe that the Magnetophon 501 will do much to maintain the popularity of open spool recordings at this very competitive price level.

SOUND SENSE
From Page 49

conceivably the performers could be standing in front of us between a pair of stereo speakers. The kind of works I have in mind are the small string ensembles, solo performances, all manner of repertoire which has been conceived and performed on the smaller scale which is more suited to domestic living conditions. When such a recording is reproduced under high fidelity conditions then the listener should indeed be able to sit back, close his eyes and visualise the living flesh and blood of the human participants as they perform in front of him.

So here we have come back to this "closest approach". Very close indeed. It is quite impossible for me to believe that my very modest home is either the Festival Hall or Canterbury Cathedral. So for musical works normally performed in such locations the illusion fails; the trick doesn't come off. But I can easily imagine a solo pianist, solo violinist, a soprano or any small ensemble being welcomed in my flat and then making music for my enjoyment. In this the illusion works perfectly.

So my conclusions about high fidelity are that its success or failure relates at least as much to the kind of programme being reproduced as to the equipment I happen to use. This is a point of view I did not hear voiced anywhere at Olympia.

It would be reasonable to ask whether, in view of this argument, good quality audio is really worth worrying about at all? My answer to that is quite straightforward. Artificial sound reproduction at any level of fidelity never has been, and I suspect never will,

be, a proper substitute for live performance. It is often very much worse, although sometimes on rare occasions it can be very much better. If recording engineers use their skill and imagination with taste and discretion they can give us a new blend of sound quite different to anything that will be heard in life and which might legitimately be thought by some to represent an improvement.

The truth is I have no great wish to live in either the Festival Hall or Canterbury Cathedral. Neither do I have the money or the time to spend a large part of my life touring the great concert halls of the world listening to musical

performances. Instead what I do have is a small living room and some reasonable quality audio equipment. With the help of these electronic marvels, for all of which owe an undying debt of gratitude to Edison and his Phonograph, I am able to enjoy the great thrill of "high fidelity" sound reproduction whilst at the same time not kidding myself that I am experiencing anything other than an illusion. It is hoped that these remarks make sense of sound. They certainly make sound sense to me, and I have found that my enjoyment of artificially reproduced sound has increased enormously since I became aware of its true limitations.



The very small Purcell Room is regarded as being more suited to the "intimate" kind of musical repertoire than the large Festival Hall. But if it is necessary to change the auditoria to suit the programme, how can we expect all records to sound equally good in one small room at home?

The Stars are FREE!

WITH EVERY 7" 2,400ft. REEL OF 1/2 mil MYLAR



RECORDING TAPE

This outstanding GIFT OFFER is made to enable you to verify the excellent quality of RECOTAPE RECORDING TAPE and to enjoy the superb music on the 40-minute REPRISER SAMPLER Tape. This 7 1/2 ips 4-Track STEREO tape, which is not available elsewhere in this country, would cost you more than 70/- . The reel of 1 mil Polyester Base recording tape has a recommended retail price of 63/- which means that you are getting nearly 130/- value for the price of 63/- Post and Packing FREE. RECOTAPE Recording Tape is manufactured in the U.S.A. by one of the world's leading makers and is unconditionally GUARANTEED.

This unique 7 1/2 ips 4-Track STEREO tape brings to you a fascinating collection of world leading artists performing some of their greatest successes. On Track 1 the ever popular FRANK SINATRA sings *INDISCREET*; ESQUIVEL, the famous Pianist, plays *I GET A KICK OUT OF YOU*; the one and only DEAN MARTIN sings *IN A LITTLE SPANISH TOWN*; popular CHUCK SAGLE plays *THE MOON WAS YELLOW*; the uniquely fascinating SHORTY ROGERS brings *SAMBA DO DORHINO*; fabulous Bandleader arranger LES BAXTER plays *BIRD OF PARADISE*. On Track 2 there's FRANK SINATRA conducting, for a change, themes from *EXODUS*, taken from his recording *FRANK SINATRA CONDUCTS*; the great, the inimitable SAMMY DAVIS Jnr. sings *WHAT KIND OF FOOL AM I?*; NEAL HEFTI does *CORAL REEF*; EDDIE CANO brings *A TASTE OF HONEY* and the recording comes to an exciting end with FRANK SINATRA singing *IN THE STILL OF THE NIGHT*.

HUGE NEW TAPE CATALOGUE

TAPE MUSIC PARADE, the fabulous new tape catalogue which lists within its 96 pages, over 1,500 reel-to-reel, mono and stereo tapes, Cassettes and 4 & 8 track Cartridges. The most complete catalogue ever produced. Your guide to the magic world of music recorded on tape. Published 4 times a year, price 4/6. Send for your copy to-day. Just write "Catalogue" on the coupon below and enclose P.O. 4/6.

GUARANTEE. If you do not agree that this offer represents exceptional value or you feel that it falls short of what you expected, just return both tapes to us within seven days. We undertake to refund your remittance in full, plus the cost of the stamps used in posting it back to us.

Recommended Retail Prices			
	STANDARD PLAY	LONG PLAY	DOUBLE PLAY
5"	19/-	24/-	37/6
5 3/4"	24/-	30/-	51/-
7"	30/-	42/-	63/-

POST THIS COUPON TO DAY

Music Tapes (Mail Order)
26 Water Lane
Salisbury, Wilts

Please mail to me, Post and Packing FREE, at the address below, one copy of the 7 1/2 ips 4-Track Stereo tape REPRISER SAMPLER, together with one 7 in. 2,400 ft. reel of 1/2 mil Mylar Base RECOTAPE Recording Tape. I enclose Cheque/P.O. value 63/-

NAME

ADDRESS.....

TRM 71

**THE LOW PRICED
HIGH QUALITY
RECORDING TAPE**

YOUR LOCAL DEALER

THE NORTH

CHESHIRE

Charlesworths
HI-FI & CINE CENTRES

112 FOREGATE STREET, CHESTER. Tel. 25075
and 28 HIGHTOWN, CREWE. Tel. 3327

For all leading makes of Audio and
Photographic equipment

*Spacious demonstration studio *Easy Parking
*Half Day Wednesday

CUSSINS & LIGHT LTD.

YORK'S LEADING RADIO
TV & ELECTRICAL STORE

Visit our First Floor
TAPE RECORDER
CENTRE

LARGEST RANGE
OF RECORDERS
& ACCESSORIES
IN THE NORTH

KING'S SQ.
YORK



TEL.
55666

TRM BINDER

Tape Recording Magazine
Binder in two-tone green,
gold stamped on sturdy
spine. Insert your copies
of TRM month by month
as they are received to
form a smart, complete
and tidy volume.

14/6
Post Free
16/3
Outside UK

PRINT & PRESS SERVICES LTD.
Prestige House, 14-18 Holborn,
London, EC1

MUSICASSETTES

- LIBRARY SERVICE
- PART-EXCHANGE
- MACHINES
- LANGUAGE COURSES

Send 1/- stamp for comprehensive list.

THE MUSICCASSETTE SUPPLY COMPANY
2, Hopmarket Yard, Worcester
For Jiffy-fast Postal Service

YOUR LOCAL DEALER

LONDON

Masseys Centre of Sound

West London's Hi-Fi tape Recorder Specialist
—Demonstration Room with Comparator
APPOINTED FERROGRAPH DEALER

**AT
CHISWICK, W.4**

Accessories, All Kinds—Servicing—Pre-Recorded
Tapes Mono/Stereo
121-123 High Road—10 a.m.—7 p.m.
◀ TEL: CHI 2082 ▶
(not closed for lunch)

LONDON

**TAPE RECORDER HI-FI CENTRE
(SHEEN) LTD.**

HI-FI EQUIPMENT
TAPE RECORDERS
ACCESSORIES
SERVICE

3 & 4 STATION PARADE, CLOSED WEDNESDAYS
SHEEN LANE, SHEEN, 01-876 0985
LONDON, S.W.14 Opposite Mortlake Station S.R.

THE SOUTH

**THE SOUTH WEST
TOM MOLLAND LTD.**

Invite you to visit their
well-equipped
Demonstration Theatre and
compare all the leading makes of
Hi-Fi and Tape Equipment at
110 CORNWALL ST., PLYMOUTH
Telephone 69285
Immediate delivery to ALL Areas

SUBSCRIBE TO TRM

and receive your monthly
copy by post for 1 whole
year (12 issues). Send 25s.
(U.S.A. \$3.75) by postal order
or cheque today.

25/-
U.S.A.
\$3.75

To: TAPE RECORDING MAGAZINE,
16a Bevis Marks, London, E.C.3.

Name.....

Address.....

NEW PRODUCTS

**LATEST TELEFUNKEN
MACHINES OFFER
ADVANCED STYLING
REALISTIC PRICES**

LATEST range of tape recorders from
Telefunken distributed by AEG (Great
Britain) Limited is said to offer advanced
styling and technical performance at realistic
prices.

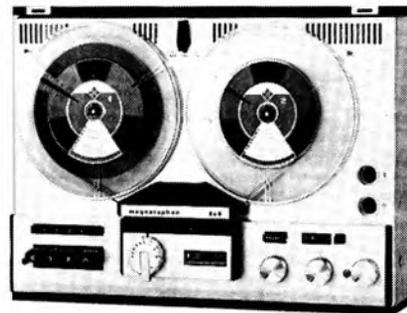


Model M 201 de luxe, an updated version
of the M201 series, is a four track single speed
(3 3/4 ips) mono machine. Taking spools up to a
maximum of 7 inches in diameter the wooden
cabinet is fitted with a strong Plexiglass cover.
Frequency response is claimed as 60-13,000
Hertz and wow and flutter better than 0.20%.
Signal-to-noise is quoted at 46 dB and the
output power is said to be 2.5 watts.
Recommended retail price of the M 201 de
luxe is 49 guineas.



Model M 212 automatic is a four track
version of the M 202 running at a single tape
speed of 3 3/4 ips. Suitable for either vertical or
horizontal operation the machine accepts 7
inch spools and the transparent cover can be
left on during operation. The automatic
record level control has manual override.
Specification figures are similar to those of
the M 201 de luxe and the recommended
retail price is 69 guineas.

Catering for the owner of existing quality
stereo equipment the M 205 stereo tape deck
provides full stereophonic four track facilities
at three speeds, 1 7/8ths, 3 3/4 and 7 1/2 ips, but
without the final audio output stage for
loudspeakers.



The M 205 can be operated in either the
vertical or horizontal positions – it can even
be used whilst fixed to a wall. Maximum reel
size is 7 inches and the equipment is provided
with a multi-function switch and
sound-with-sound facilities.

Claimed frequency response is 40-18,000
Hertz, 40-15,000 Hertz and 40-8,000 Hertz at
7 1/2, 3 3/4 and 1 7/8ths ips respectively and wow
and flutter at the fastest speed is given as
0.1% with signal-to-noise ratio 50 dB.

Recommended retail price of the M 205
stereo tape deck is 79 guineas.

Model M 207 is a complete four track three
speed stereo machine incorporating its own
two separate loudspeaker units. Suitable for
either vertical or horizontal operation separate
level indicators and controls are provided for
both channels. Technical performance is
similar to that of the 205 and the
recommended retail price is £109.4s.



Coming now to the portable field we have
the M 300 TS, a half track 3 3/4 ips portable
for battery operation. The machine is so
designed that all operating functions can be
controlled with one hand – the same hand
which carries the recorder. The instant stop
button and level control are ingeniously set
within the carrying handle itself and all other
controls are grouped in one set of easy-to-find
buttons thus leaving the other hand free for
the microphone. In spite of its small size the
M300 TS can take spools up to a maximum of



5 inches in diameter and can be supplied in a choice of colours; Rio brown, wine, sea green, and pearl, all offset with a brushed aluminium fascia.

Claimed frequency response at 3 3/4 ips is 40-14,000 Hertz with wow and flutter of 0.2% and signal-to-noise 46 dB. Output power is claimed to be 1 watt.

Recommended retail price of the M300 TS is 55 guineas.

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

SONY TC 252 UNDER £100

AMONGST many new models from Sony is the TC 252, a complete four track three speed stereo tape recorder with lid integrated speakers. Features include all silicon transistor circuitry, sound-on-sound recording, seven inch reel capacity, vertical or horizontal operation, dual VU meter, automatic shut-off switch, etc, etc.

Operating from AC mains the tape speeds are 7 1/2, 3 3/4 and 1 7/8ths ips with a claimed frequency response of 30-18,000 Hertz at 7 1/2 ips and 30-13,000 Hertz at 3 3/4 ips. Wow and flutter at those two speeds is said to be 0.12% and 0.15% respectively with signal-to-noise ratio of 50 dB and harmonic distortion of 3%. Power output is claimed to be 4 watts on each channel and the equipment is supplied complete with microphones and demonstration tape at a recommended retail price of £99.15s.

Sony (U.K.) Limited, Ascot Road, Bedfont, Feltham, Middlesex.



UHER HI-FI AMPLIFIER

THE NAME of Uher has long been associated with quality recording equipment. Now for the first time this manufacturer has entered the "high fidelity" audio separates market with Model CV 140 power amplifier. The various input channels provide for tape recorder, radio tuner, disc, etc., each of which can be individually regulated by small presets on the front panel. These, in conjunction with the meter provided, are said to ensure that: all signal sources are set to a common level before being passed to the main amplifier stages, the full output of the amplifier is available without overloading, the full dynamic range of the original sound is retained and sudden changes in volume level when switching inputs are obviated. Through the use of the preset controls the main volume level setting can remain constant.

Six input sockets to the DIN standard are provided, three of which have facilities for plug-in pre-amplifier modules which will provide correct and equalised matching for a choice of low impedance microphones, magnetic or ceramic pick-ups. As supplied the amplifier has all six inputs directly linked via



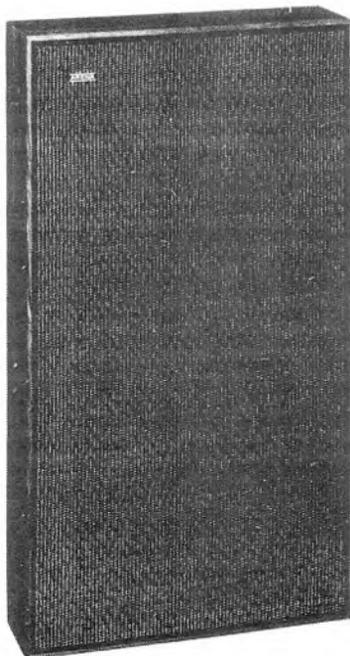
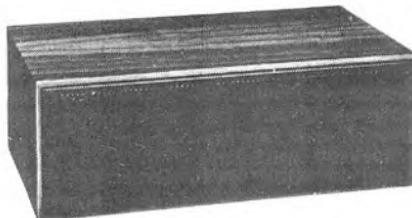
the selector switch to the first amplifier stage. No additional modules are necessary if equalised sound sources are available.

The specification claims an output audio power of 35 watts continuous sine wave into four ohms per channel or 70 watts music power. Frequency range is quoted as 20-20,000 Hertz plus or minus 1 dB and the distortion factor referred to a 1,000 Hertz tone is claimed to be better than 0.2%. Control facilities include bass, treble, presence, scratch and rumble. Recommended retail price of the Uher Model CV 140 power amplifier is £174.6s.

Bosch Limited, Uher Division, Rhodes Way, Radlett Road, Watford, Hertfordshire.

TWO ARENA LOUDSPEAKERS PERPETUUM-EBNER TURN-TABLE

TWO new additions to the family of Arena pressure chamber loudspeakers were available in the U.K. from last month. Both units have the same specification but feature entirely new cabinet designs. The power handling capacity of both is said to be 20 watts RMS and each are of 4 Ohms impedance.



Model HT 27 is 16 inches high x 5 1/2 inches wide x 8 1/4 inches deep and has a volume of 9 litres and costs 21 guineas. Model HT 28 has a volume of 8 litres, measures 21 1/2 inches high x 12 1/4 inches wide x 3 3/4 inches deep and costs 20 guineas.

In each case frequency response is given as 45-20,000 Hertz with a cross-over frequency of 5,000 Hertz. Finished cabinets may be either teak or rosewood and as will be seen from the illustrations and dimensions the chief differences lie in the ultra slim but larger faced HT 28 against the taller but deeper HT 27.

The distributors of Arena, Highgate Acoustics, are also handling equipment by Perpetuum-Ebner. This company dates back to the turn of the century and was founded in the Black Forest region of Europe. Already famous for their production of fine watches, clocks and scientific instruments they are today producing top quality transcription standard automatic turntables.

The two models now being introduced are the PE 2018 and the PE 2016.

The PE 2018 costs 39 guineas less cartridge. The PE 2016 costs 35 guineas less cartridge. The extra for mounting on a base with cover is 10 guineas for either model. Full details are available from:

Highgate Acoustics, 184/188 Great Portland Street, London, W.1.

MINIFLUX WOW AND FLUTTER METERS

THE current range of ME101, 102, and 103 Miniflux wow and flutter meters is being discontinued and will be superseded by Models Nos 102B and 104. In addition there will also be a wave analyser Model No. 301.

The ME104 meter will have all the features previously incorporated in Nos 101 and 103 with three measuring positions: 0.3 per cent, one per cent and three per cent combined with modern appearance, fewer switches and more push buttons. Cost of the ME104 wow and flutter meter is £125.

Model ME102B wow and flutter will be almost identical to the previous ME102 model except for the up-to-date all push-button front at a cost of £155.

The HE301 wave analyser is an entirely new unit. Fully transistorised and mains operated it is particularly suitable for noise and vibration investigations in the range of 1-330 Hertz. The instrument has been designed as a double filter, an effect achieved through two amplifying units, switched in series, each one with a Wien-bridge in the negative feed-back circuit. Size of the instrument is identical to the ME102B and 104 with socket connections at the rear for these and the cost is £250.

Lenard Developments Limited, 497 Green Lane, London, N.13.



Music

Musicassette Reviews Consultant Critic Katinka Seiner

SIEGFRIED BEHREND, Guitar, with the Berlin Philharmonic Orchestra conducted by Reinhard Peters. D.G.G. 923 019. 49s 6d including purchase tax.

For this virtuoso display of classical guitar playing the chosen programme comprises: Rodrigo, *Concierto Aranjuez*; Castelnuovo-Tedesco, *Concerto in D Opus 99*.

The guitar family, which includes the lute and the zither, originates from the East and later found its way to Spain. In the present day the most famous member of the instrumental family is the Spanish guitar which became fashionable on the Continent in the 18th century. Many famous composers wrote for the instrument: Kreutzer, Falla, Debussy; Berlioz and Paganini were themselves accomplished guitarists.

After having to endure so much coarse strumming on the guitar from many of the pop groups – and others – it comes as a delightful change to hear the instrument properly played. In this album we have much more than that, Siegfried Behrend is a virtuoso performer of the first order. The things he does with that instrument are truly incredible.

The recorded quality of this album matches the performance standard. One can only marvel at the balance that the engineers have achieved between what is really a very slight instrument and the weight of the Berlin Philharmonic.

Rodrigo is one of the best known of Spanish contemporary composers and his *Concierto Aranjuez* is his most famous work. The other composer Castelnuovo-Tedesco, is Italian and was regarded in his youth as an "Italian Brahms".

Neither of the two works is either deep or pretentious. Both offer pleasant listening; of the two I prefer the Rodrigo which has an undeniably Spanish flavour.

Summarising this album I can say that for me it made a refreshing and pleasant change. There is a fascination about the guitar to which I have myself succumbed. I envy the way Behrend plays. So I thoroughly enjoyed listening to it.

HAYDN. Symphony in G Major, H.I. No. 100 "Military" and Symphony in G Major, H.I. No. 94 "Surprise". Wiener Symphoniker conducted by Wolfgang Sawallisch. Philips CPC 0074 49s 11d including purchase tax.

Both these Haydn symphonies were written during his various visits to England. Their nicknames are derived from the loud drum chord in the "Surprise" and the use of instruments normally associated with military bands in the "Military". Haydn himself did not use these names; they were acquired in the friendliest of ways as countless audiences came to appreciate these popular works from "the father of the symphony".

Both are so well known that they really require no further words of mine. All that really matters is the quality of the recording we are now considering and, of course, the performance of the Wiener Symphoniker under Wolfgang Sawallisch.

So far as the recording is concerned I was rather disappointed to hear the generally dull quality. With its lack of brilliance it is certainly not a cassette for the hi-fi enthusiast. On the other hand the performance of the orchestra is sensitive with beautiful playing and delicate phrasing. The whole is expressive of the composer's intentions. What a pity it should be marred by a slightly muddy audio quality. It could have been so brilliant. But it is well worth considering for the sake of its musical content.

Haydn wrote more than 100 symphonies, many of which are regarded as masterpieces. He influenced both Mozart and Beethoven; in fact within his texts we can almost hear the moods of Don Giovanni and a hint of Beethoven's middle period. The composer was born in 1732 and died in 1809. His parents were not rich – they were what we would today call "working class". But they loved music. Haydn was first taught by a relative who appreciated his talent. Even from the age of six he was displaying musical precocity. He had a pleasant voice too, and was a member of his local church choir.

No stranger to this country he made a number of visits when he acquired many friends and doubtless became Anglicised in outlook. So these two symphonies which derive from this period of his life are of particular interest to us. All the more reason to deplore the fact that this issue in cassette form should be rather weak in audio quality. The trouble occurs during the loudest passages when little instrumental separation is apparent. So my recommendation must once again be directed towards the music lover rather than the audio enthusiast.

BRAHMS. Symphony No 2 in D Major Opus 73 and Academic Festival Overture Opus 80. Wiener Symphoniker conducted by Wolfgang Sawallisch. Philips CPC 0053. 49s 11d including purchase tax.

Brahms was one of the great romantic composers following in a direct line from Schubert and Schumann; indeed he was discovered by the latter. But there is one very remarkable and significant fact in his works. Although the feeling and handling of musical thought as well as the deep emotional content is romantic, the Brahmsian orchestra is based on the classical symphonic concept. He is, therefore, considered as some-one who turned back to the classical idiom.

This might appear to be a contradiction in terms, but listening carefully to any of his works it will be found that he manages to express the romantic feeling in an exquisite and unique way.

From his four symphonies the Second is often described as *The Pastoral*. At the time it was written he was living in the country; this was probably one of the most contented periods of his life. This serenity is reflected in the music of the Second Symphony. It has an abundance of melodies masterfully treated and developed in its various sections. Musically it is probably the second movement which is the most satisfying although all four movements are in perfect cohesion.

The performance of the Wiener Symphoniker under the baton of Wolfgang Sawallisch is exemplary. With beautiful musical phrasing, warm string tone and excellent brass and wood-wind playing the whole express a perfect harmony which is enhanced by the recorded quality of the album.

The other item is the *Academic Festival Overture*. This was written for the University of Breslau when he received his honorary degree of Doctor of Philosophy. The Overture incorporates some well-known German student songs, ending with the famous *Gaudeamus igitur*. The standard of performance matches that of the main work. Both are equally good.

So with fine performance and equally fine recorded quality this album can be strongly recommended.

GAMES THAT LOVERS PLAY. James Last and his orchestra. Polydor 914 537. 47s 6d including purchase tax.

Right from the beginning I really enjoyed listening to this album. I could feel myself being almost immersed beneath the languorous melodies – rather like slipping into a lovely, warm bath. And just in case anyone should imagine that to be a derogatory remark let me hasten to add that I *love* my hot bath and to compare it to an album of salon music is praise indeed – for the music.

Let us be objective. This is not great music. It makes no pretensions to be. But it is pleasant listening – or would be if the recorded quality had been better. Once again I find myself having to qualify any recommendation by adding: not for the hi-fi addicts. Draw back the curtain that has been drawn between performers and listener and we would really have something. As it is we have to accept an excellent repertoire well presented but with much more of a "bundle of noise" than dramatic presence.

The collection includes: *Games that lovers play, I left my heart in San Francisco, Make this night last for ever, Never on Sunday, Fly me to the moon, This is my song, Lara's theme, Now I know (Laguna), What now my love, Elizabethan serenade, A man and a woman and Blame it on me (Sandy's theme)*.

Choice of titles shows a curious sense of humour. *Fly me to the moon* and *Elizabethan serenade*. Actually this is the best I have yet heard from Mr Last and his orchestra. If he keeps on like this there's a danger that he might make a fan out of me yet.

SIMON & GARFUNKEL. Sounds of Silence. CBS 40-62690. 47s. 6d. including purchase tax.

In a review of another record I mentioned the fact that the seventies are nearly on us. Now I would like to stick my neck right out and suggest that here, with the Simon and Garfunkel material, we have something that could be taken as indicating the music of that decade. This duo have succeeded in looking ahead whilst at the same time remaining supremely intelligible in the present. All their words in the lyrics are meaningful, and in the recording every syllable can be heard. Accompaniment is musical but does not dominate. The whole can be either taken as easy pleasure or as a stimulant to make one think. And I believe that during the coming ten years young people will think and speak even more vigorously than they did in the sixties. And jolly good luck to them too.

The collection includes: *The sounds of silence*, *Leaves that are green*, *We've got a groovy thing goin'*, *Kathy's song*, *Somewhere they can't find me*, *Anji*, *Homeward bound*, *Richard Cory*, *A most peculiar man*, *April comes she will*, *Blessed* and *I am a rock*.

As if to emphasise the depth of the thought that goes behind these numbers the sleeve notes consist of extracts from the lyrics. Seeing the words in cold print has a strange effect on one. Take *A most peculiar man* "He died last Saturday. He turned on the gas, and he went to sleep, with the windows closed, so he'd never wake up . . . And all the people said, "What a shame that he's dead. But . . ." What a shame – but.

Yes, this is all good stuff, well performed and well recorded. As such strongly recommended.

FRANK SINATRA. Cycles. Reprise CRP 370. 47s. 6d. including purchase tax.

The cover illustration shows Sinatra (at least one imagines it to be he) seated with his head sunk into his hand. A sort of a "what time does the executioner arrive?" pose. Or perhaps he could be listening to the playback of his own tape? If he is then his thoughts might well be running along the same lines as my own as I listened to the cassette. Dare one ask if the old man is not quite what he used to be, or is that sacrilege? Without wishing to be unkind someone, sometime, has got to suggest that the passing years are leaving their traces, as indeed they are.

Mind you, every word can be heard and there's still plenty of the old feeling about this collection. But this is no youngster singing for us. There's a quality about the voice that begins to remind me of a certain well-known but elderly vocalist who has been inflicted on us too frequently recently. It would be very strange if it were to be otherwise.

The Sinatra programme includes:

Wandering, *Both sides now*, *Little green apples*, *Pretty colours*, *Cycles*, *Rain in my heart*, *By the time I get to Phoenix*, *Moody river*, *My way of life* and *Gentle on my mind*.

Sinatra fans will not complain. Others might expect something rather better than the performance offered here. And for saying that I shall probably be condemned to eternal perdition . . . !

PIANO A GOGO. James Last and his orchestra. Polydor 911 124. 47s 6d including purchase tax.

As I had to criticise the recorded quality of another James Last album this month let me at once say that this cassette has all that one could wish for in terms of audio. Here we have all the exciting presence that was missing from *Games that Lovers Play*. All the instruments, plus the honky tonk piano, are right here in the room. Only snag is that I found the tinny sound of the piano getting on my nerves after a time . . . Which just goes to show how difficult it is to please some people.

Rhythmically this programme is excellent. I also liked the playing of the anonymous trumpet. Why, oh why, does Polydor persist in denying us sleeve notes? James Last's own arrangement of *My Bonnie* is rather pleasing, although I was less keen on *The house of the rising sun* – not arranged by James. Other numbers include: *Java*, *Lingering on*, *Mack the Knife*, *Everybody loves a lover*, *My guy's come back*, *Mexico City*, *Love me or leave me*, *Bei mir bist du schön*, *Happy days are here again* and *America*. This last item, written well enough by Bernstein, is something of a travesty and my pet hatred of the cassette. Best of the bunch? *Mack the Knife*. But then that has always been one of my favourites.

On the whole a pleasing enough cassette with some really fine sound quality. As such recommended.

IDEA. The Bee Gees. Polydor 914 571. 47s 6d including purchase tax.

The Bee Gees. A group with an IDEA. And talent, too. Add to that mixture the excellent recorded quality of this album and that becomes a pretty fair summary of what this album is all about.

It's a pity so many of the younger groups have to endure the mistaken adoration of their even younger audiences. As we can so often hear the effect on their work is little short of disastrous. Whatever adulation the Bee Gees might have to put up with they have managed to escape from it with an encouraging freshness plus a standard of professionalism that does them credit. I especially liked Barry in *Swan song* and Robin in *I started a joke*. *Down to earth*

is another good number with vocals by Robin and Maurice. For the rest of the collection we have: *Let there be love*, *Kitty Can*, *In the summer of his years*, *Indian gin and whisky dry*, *Such a shame*, *Idea*, *When the swallows fly*, *I've decided to join the air force* and *Kilburn Towers*.

If one might be allowed a little constructive criticism I think the weakest parts of the Bee Gees' performance lie in their occasional repetitiveness, primitive guitar accompaniment in some of the items and occasional submersion of lyrics so that words become unintelligible. The lads are quite capable of correcting those short-comings, and if they did I for one would vote them a resounding success. None of which prevents me from thoroughly recommending the present offering which displays both ideas and talent. For Bee Gee fans it is, of course, a must.

CREAM. Goodbye. Polydor 914 596. 47s 6d including purchase tax.

I am a square. Unabashed and unashamed – a square. However, this does not stand in the way of my enjoying good pop, or good jazz for that matter. In fact I count myself as something of a jazz fan. So I started listening to this collection with interest, an interest which unhappily quickly faded.

This recording, taken at a public performance, (was it the group's last? Once again Polydor fail us with a complete lack of information) comprises: *I'm so glad*, *Politician*, *Sitting on top of the world*, *Badge*, *Doing that scrapper thing* and *What a bringdown*. And that is what it is – a Bringdown, or rather a Letdown. I found myself becoming more and more nervous and irritable as I listened. Perhaps this is the aim of the group? Certainly it is their greatest achievement. I refuse to believe that the Cream's audiences would not listen to something better if it should be offered to them. As it is this treatment of music, musical instruments and poetry (?) is an offence against the intelligence, whether yours or mine.

Am I to be treated as a wild animal, caged and ready to be sacrificed by a few lunatic tribal priests? Priests who very rarely manage to cajole the odd decent sound from their instruments. Most of the time they go on and on and on with a monotonous persistence to shake, torture and nauseate.

At times they reminded me of a dog, who having got hold of a bone, refused to let go on any account. Relentless, that is the word I am looking for. Long-drawn-out numbers. Excruciating repetitions. In spite of the good-will with which I approached this album it produced within me only a feeling of unhappiness. Recorded quality is mediocre, and this added to my suffering. All in all, unless you are the keenest of fans of the Cream this tape is definitely not for you.

Music

Open Spool Reviews
Consultant Critic Katinka Seiner

3 $\frac{3}{4}$ ips STEREO

Equipment used for review tapes: Amplifiers—Quad valved and Ferrograph F307. Loudspeakers—Celestion and Jordan-Watts. Tape Recorders—Akai 3000D and Tandberg 64X

TCHAIKOVSKY. Nutcracker Suite Opus 71a and Suite from "The Sleeping Beauty" Opus 66. The Royal Philharmonic Orchestra conducted by Sir Adrian Boult. EMI Columbia Studio Two TD-TWO 183. 3 $\frac{3}{4}$ ips four-track stereo. 41s including purchase tax.

Of this popular composer's repertoire these two items must surely be the most popular of all. Or so it would seem from the number of versions we have to review. The identical programme, by the way, is available on 8-track cartridge under the number 8X-TWO 183.

Dare I confess that The Nutcracker Suite was one of the very first l.p. records I ever bought? Not quite the first; that was Mozart. And my regard for these composers is in no way lessened through having heard them so many times.

But to return to Tchaikovsky. He was a strange chap. At one time he was convinced that his head was about to fall off so he always held his head when he conducted. And yet in spite of his odd ways he produced music that has thrilled us all down the years.

This version of — I can't bring myself to repeat the titles yet again — is well up to modern standards of recorded quality. For my sins I have also listened to the Stereo 8 cartridge in my car and that, too, is equally good. Sir Adrian gives us the performance we have come to expect of him and that is just about all there is to be said about this album.

If you do not have this repertoire on tape already then this is undoubtedly the album to buy.

CHICO. Chico Arnez and his Cubana Brass. Columbia TD-TWO 279. 3 $\frac{3}{4}$ ips four-track stereo. 41s including purchase tax.

The best that can be said about this album is that it is Chico Arnez with his Cubana Brass at their best. And that best is very good indeed.

So readers will know just what to expect from: *One for Pancho, Granada, The Mardi*

Gras, Story of Eileen, Mas que nada, Mexican whistler, One mint julep, My boy, Mexico '70, Bossa nova '69, Ludvig in Venezuela and Peanut vendor. All good brassy sounds plus latin rhythms.

Recorded quality is well up to EMI's current high standard with none of the irritating faults that have had to be mentioned lately. Strange how these things seem to crop up more frequently on classical than popular repertoire. This tape is first-class in every way. The stereo spread is particularly satisfying; voices and instrumentalists do seem to occupy solid positions in space to give a convincing impression of presence, an illusion which is helped by the low level of background noise.

As with all of Chico Arnez's music this album can either be used for serious listening or, as is more likely, as a pleasing background sound. Either way it represents good value for money and as such is recommended.

When speaking of using a tape of this kind as "background music" this usually implies listening at a rather low volume level. It must be remembered that at such levels much of the low frequency content will be lost — so don't turn the knob down too far.

3 $\frac{3}{4}$ ips MONO

TCHAIKOVSKY. Symphony No. 4 in F Minor, Opus 36. The Philharmonia Orchestra conducted by Otto Klemperer. EMI Columbia TA-33CX 1851. 3 $\frac{3}{4}$ ips half-track mono. 47s 4d including purchase tax.

Tchaikovsky was surely the supreme writer of tunes. Perhaps his music might be described as "superficial", but that is a pedantic judgement of the purist. In fact one can always thoroughly enjoy his works, and the 4th Symphony is no exception.

With its glorious melodies and heroic themes it portrays the Mother Russia of his time; above all else Tchaikovsky was a patriotic Russian and delighted in using his art to express the emotions aroused by his homeland. One could speak of Tchaikovsky in relation to Russia in the same way that one could refer to Elgar and England or even Sibelius and Finland. All were great nationalists; in each the pride of country is strongly expressed.

It is strange how much there is in common between the compositions of these three men. The meandering string passages of each so perfectly describe their own countries; the Volga winds through the passages of Tchaikovsky just as the Thames flows through

the music of Elgar. And who can listen to Sibelius without picturing the desolate, wooded slopes of Finland?

But does nationalism inspire good music? Certainly it produces "listenable" music, but the narrow, artificial boundaries of nations have no place in the finer, broader world of art.

Is all this too highbrow? Does it matter? The fact remains that Tchaikovsky gives us some rattling good tunes, many of which are in the 4th Symphony. Recorded quality is fair without being startlingly good. A few brass passages are inspiring — others have a "boxed-in" quality. Performance is somewhat laboured; certainly not up to the standard we have come to expect from Klemperer and the Philharmonia. Perhaps they have played the 4th just once too often. It certainly sounds as if it had begun to bore them.

So, all in all, we can say that this album offers nothing outstanding. Worth buying only for those who are really keen to acquire the work.

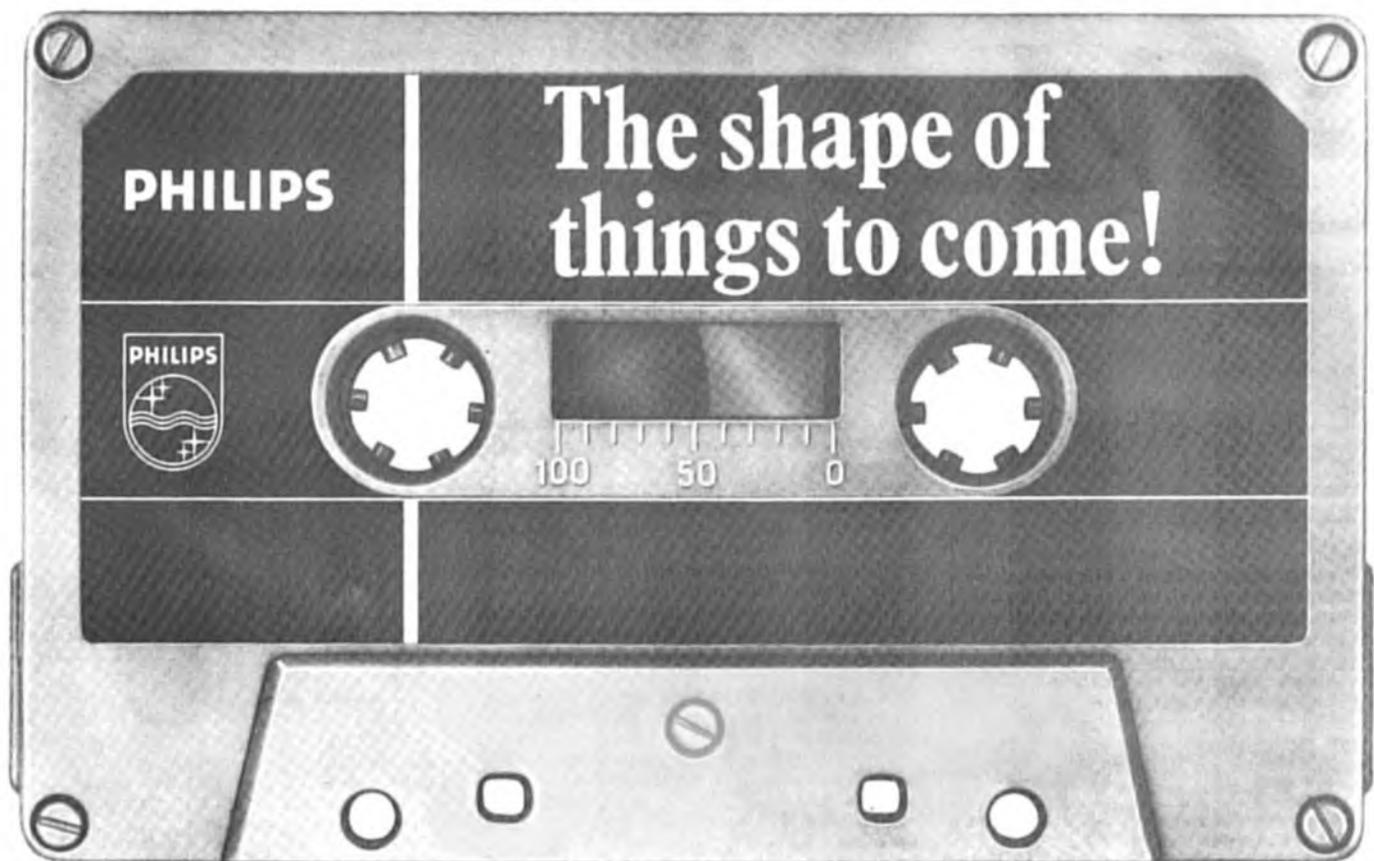
CILLA BLACK. Surround yourself with Cilla. EMI Parlophone TA-PMC 7079. 3 $\frac{3}{4}$ ips half-track mono. 41s including purchase tax.

Personally I would be only too glad to accept the invitation implied in the title. Come to think of it, had the tape been issued in stereo we could probably have literally done just that! Our Cilla is now established as such a firm favourite that few would decline to surround themselves either with her or with the sound of her voice.

What is so endearing about Cilla is her underlying simplicity. Basically she is still an ordinary girl from you-know-where, and she's proud of the fact. Why not? This ingenuous good humour came over very well in her television shows; such a change from the more pretentious showing-off of some of her contemporaries. So on this album Cilla surrounds us with: *Aquarius* (from Hair), *Without him, Only forever will do, You'll never get to heaven (if you break my heart), Forget him, It'll never happen again, Think of me, I am a woman, Words, Red rubber ball, Liverpool lullaby* and *Surround yourself with sorrow*.

Recorded quality is fine with Cilla given a firm perspective in the foreground plus plenty of presence. Just once or twice I would have modified the balance a little to hold her more firmly over the backing, but that is only a trifle. In many of the numbers our impish little Cilla stands right there in front of the speaker, singing and smiling in her inimitable way.

A good collection with adequate scope for changing mood. Recommended to all who have a soft spot for our Cilla.



As the preference for musicassettes grows, so does the repertoire. Already more than 550 titles—from 8 major recording companies—are available through the Philips Group alone. Before the end of the 70's present marketing practice will be reversed. All recorded material will be coming out on cassettes first—with only a few selected titles being issued on old-style discs, for die-hard record enthusiasts.

So start off the 70's in the right way. By building a Philips playback machine into your existing audio system. And buying new recordings on musicassettes.

Out this month

Now from only

47/6

recommended retail price

Herb Alpert
THE BEAT OF THE BRASS
CYP 1116

Jimmy Blair
HIGHLAND PARTY
CFP.4042

Fontana Concert Orchestra
LPC 13011

Vicky Carr
FOR ONCE IN MY LIFE
CO930

Marat/Sade
CCS 0813

Sleeping Beauty Ballet
CPC 0081

Benny Goodman
SWING CLASSICS
CPP 1089

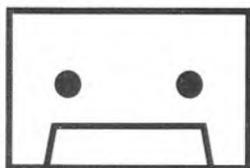
Musical Treasures of Germany
CPP 1091

Colosseum
CVO 16000

Coniff's Greatest Hits
40 63671

Johnny Cash at San Quentin
40 63629

Andy Williams
HAPPY HEART
40 63614



**Go into the 70's with the sound of the 70's -
Musicassettes from Philips**

- D) Note the recorded noise level, and in particular sounds which might have been induced through mechanical vibrations travelling through the table from the tape recorder.
- E) Wind back the tape and start recording again.
- F) This time scratch the table surface with the finger nails; strike the underside of the table with the clenched fist so as to make little sound but to cause a fairly violent physical impact.
- G) Play back the tape and note the difference between the recorded sounds and the actual sounds heard by the ear during the course of the experiment. If necessary repeat again until these differences are obvious.
- H) Wind back the tape once more and re-commence recording.
- I) Now pass the hands over the live microphone, touching it "noiselessly" but firmly; if the instrument has a wire grille run the finger nail over it very softly; tap the instrument with the soft flesh of the finger.
- J) Play back the tape and listen carefully. Many of the "noiseless" actions will now be recorded as sounds approximating the delivery of coal down a domestic chute.

In our second experiment we have shown the practical effect of the transmission of energy as demonstrated with the three pennies, but this time we have related the same phenomenon to a practical recording application.

EXPERIMENT 3. INSULATION AGAINST UNWANTED ENERGY TRANSMISSIONS.

**Apparatus required: One tape recorder with tape
One microphone
Two tables
Piece of foam rubber or plastic**

Having identified the enemy we now have to eliminate it. The problem is to ensure that the only form of energy reaching our transducer (microphone) is sound – we will come later to the separation of different kinds of sounds. For the time being we are concerned only with the insulation of equipment against mechanical interference. It is one of the easiest recording problems to overcome.

Method

- A) Set up the recording equipment as before, but this time place the microphone on the second table – as far

- away from the first as possible.
- B) Record at the same level as before.
- C) Play back and note the difference in noise pick-up.
- D) Stand the microphone on the piece of foam rubber.
- E) Record again making the same scratching and banging actions on and under the table.
- F) Play back the tape and note the greatly reduced noise level in the recording.
- G) Using the foam as an insulator, wrap it around the body of the microphone (taking care not to cover any air vents that might be present).
- H) Record once more, this time touching the rubber instead of the microphone body.
- I) Play back again and compare the results with those obtained in Experiment No. 2.

If these instructions have been conscientiously carried out they will have demonstrated beyond any doubt the need to remove microphones well away from possible sources of mechanical interference. By using a second table on which to stand the microphone we have done the equivalent of moving the left-hand penny in Experiment 1 out of contact with the centre coin. By standing the microphone on foam we have introduced a layer of insulating material between the transducer and a potential source of mechanical energy.

The rubber we placed around the microphone body replaces the internal insulation that is often built into more expensive instruments intended for hand holding. As a temporary expedient it will often work quite well, but care must be taken not to transmit noise through movement of the cable.

At important musical recordings where a high sound level is expected it is essential to insulate microphones against the effect of mechanical energy due to sound vibrations travelling through the floor structure and passing on up the microphone stand. The cure is to place the stand on a mat of foam rubber, and ideally this should always be done.

It should now be very clear that one of the very worst places for a microphone is on the same table as the tape recorder and very close to it. This is asking for trouble.

More simple experiments along these lines are planned for the future. All have been specially designed to help newcomers and old hands alike to gain a better and more practical understanding of the fascinating subject of sound recording. And at least if you should have known this month's facts all the time it is hoped that you might now have a new party trick using just three pennies and a hard, smooth surface . . . !

SURROUNDED BY SOUND

we weakly asked when this miraculous contraption would be available in the shops and how much it would cost?

"Availability? About the middle of this year. Cost? The retail price will be about £10."

Mr Hibbard went on to say that he was considering the possibility of building a miniature cassette playback mechanism into the sound capsule itself. If this should prove to be possible we would then have a completely self-contained music-making appliance, small in weight and size, yet with the ability to produce "a gentle flow of background music which would appear to come from nowhere and yet be everywhere. We should literally surround ourselves with sound.

During our subsequent conversations it was quickly established that the 3-Dimensional Sound Capsule has as yet been thought of only as a means of providing background music. Our own interest in high quality sound reproduction prompted us to ask if anyone had tried using the Capsule in conjunction with a domestic hi-fi set-up? We could imagine an installation with the usual pair of high quality loudspeakers giving right-hand and left-hand stereo channels but with a pair of Sound Capsules fixed to the walls at the opposite end of the listening room. This would immediately produce (or so we imagine!) a rather uncanny – and perhaps effectively realistic – effect. Could such a simple installation bring some of the benefits of multi-channel

sound reproduction without involving any change of equipment or exorbitant expense?

To our great delight we discovered that this possibility had not even been considered. Inspired by our own enthusiasm Mr Hibbard promised to let us have a pair of Sound Capsules just as quickly as possible so that we can experiment with this highly unorthodox suggestion. Our progress will be reported in detail in due course, but in the meantime if you should own a swimming pool which is as silent as the grave then please do not feel deprived. It will not be too long before your pool is able to take on the character of Prospero's magic island, ". full of sweet sounds that can delight and hurt not".

CLASSIFIED ADVERTISEMENTS

Rate.—One shilling per word: box numbers, 2s. 6d. extra. Payment with copy, which should be sent to Advertising Department, "TAPE Recording Magazine," Prestige House, 14-18, Holborn, London, E.C.1.

FOR SALE

60% OFF EMI and SCOTCH TAPE 5" L.P. polyester tape (boxed). These tapes have been partially used by the professional recording industry, and electronically cleaned. Satisfaction or full refund. 10s. each. Five for 45s. Post 2s. 6d. per order. AVON ENTERPRISES (Dept. T.1) Fladbury, Pershore, Worcs.

BLACKBURN has Lancashire's leading Hi-Fidelity/Tape Recorder stockists and Electronic Engineers at HOLDINGS AUDIO CENTRE, MINCING LANE/DARWEN STREET, BLACKBURN (Tel.: 59595).

FERROGRAPH 5/AN MINT £60 o.n.o. R. CHILDS, 37 SOMERS ROAD, NORTH MYMMS, HATFIELD, Herts.

TAPE RECORDS

Tape records, Mono, Stereo, Reel, Cassette, 4 or 8 track cartridge. Just quote maker's name and catalogue number. Top Speed Service. Satisfaction guaranteed. Music Tapes MAIL ORDER, 26 Water Lane, Salisbury, Wilts.

PRE-RECORDED AMERICAN STEREO TAPES, 7½ ips. Cheap as records. Bernsteins, Mahler, Maazels, Sibelius, Karajan, Beethoven Symphonies. £15 per set of 5 tapes incl. PT and duty (any duty or purchase tax charged by the postman will be refunded — see instruction slip in tape box). £3 cheaper than records. PO 5s. for complete catalogue. Postereo Tapes 9 Darley St., Harold's Cross, Dublin 6, Eire.

OPENING THE BIBLE. Series of half-hour tape recorded addresses by Mr Stuart Allen, Principal of Wilson Street Chapel, London, E.C.2. At 1-7/8 ips, 4 track on 5-inch spools. First twelve addresses available for £1 from Mr B. Marple, 20 Rowley Gardens, Littleover, DERBY, DE3 7GF.

TAPE DUBBING

GRAHAM CLARK RECORDS. Tape to Disc Pressings. 23 The Grove, Walton-on-Thames, Surrey. Tel.: WALTON 25627.

J. & B. RECORDINGS. Tape to Disc — latest high level disc cutting, all speeds. Mastering, pressings, studio, mobile. 14 Willows Avenue, Morden, Surrey. Telephone: 648 9952.

JOHN HASSELL RECORDINGS Tape - to - Disc Service using latest high level disc-cutting system. Quality pressings made. Studio with Bechstein Grand Mobile unit, 21 Nassau Road, London, S.W.13. RIVERSIDE 7150.

YOUR TAPES to DISC, 7 in. 45-22s., 10 in. LP-55s., 12 in. LP-65s. 4-day postal service. Top professional quality. SAE photo leaflet: DERVOY STUDIOS, High Bank, Hawk St., Carnforth, Lancs.

MISCELLANEOUS

ALWAYS BE CAREFUL (and money wise) before buying quality equipment. Send your requirement list to AUDIO SUPPLY ASSOCIATION for evaluation and quotation. See below . . .

HIGHEST CASH PRICES offered for good quality Tape Recorders and Hi-Fi. See our advert. page 40 this issue. R.E.W. 266-8 Upper Tooting Road, London, S.W.17.

IF QUALITY MATTERS consult first our 75-page illustrated catalogue with technical specifications (6s. 6d.). Members enjoy unbiased advisory service, preferential cash terms. Membership 7s. 6d. Our Associates also manufacture records from your own tapes, or record the Master at our studios (Steinway Grand). Bulk terms for choirs. (Excellent fund-raiser). Please specify requirements. AUDIO SUPPLY ASSOCIATION, 18 Blenheim Road, London, W.4. 995 1661.

WANTED

GOOD QUALITY TAPE RECORDERS PURCHASED FOR CASH. TELEPHONE: 01-472 2185.

TAPE RECORDER WITH FOOT PEDAL. THREE SPEED. BOX NO. 491.

TAPE EXCHANGES

IF YOU PAID MORE THAN £20 for your Recorder, it's worth 2/10 to learn how to use it more fully. Send 2s 10d for fascinating booklet: Worldwide Tapetalk, 35 The Gardens, Harrow, HA1 4HE.

WORLDWIDE TAPESPONDENTS, FREE SOUND MAGAZINES. FAR & WIDE RECORDING CLUB, 117 Plains Avenue, Maidstone. SAE.

MAKE INTERESTING NEW FRIENDS. ALL AGES OVER 17. Send SAE. for free details. VICTORY BUREAU, 34 Honeywell Road, London, S.W.11.

FRIENDLY FOLK ASSOCIATION, Torquay (Est. 1943). Social introductions, Pen-friends, Book-lovers, Stamps, Photography, Tapesponding. Members 100 countries.

EDUCATIONAL

Tapespond with the COUNTRY OF YOUR CHOICE by means of ESPERANTO. Details of Correspondence Course from British Esperanto Association (TR), 140 Holland Park Avenue, London, W.11.

REPAIRS

Dictating and AUDIO SERVICE LTD. for Tape Recorder service. Authorised service agents. Grundig, Philips and other leading makes of tape recording equipment repaired to Manufacturers' Standards by skilled staff, using modern test equipment — audio generators, oscilloscopes, audio voltmeters, etc. 5 Coptic Street, London W.C.1. (Near the British Museum). Telephone: 336-6314/5.

PUBLICATIONS

Every pre-recorded tape, reel, cassette, 4 and 8 track cartridge, available in the UK, is listed with full contents in TAPE MUSIC PARADE. Europe's only complete tape catalogue. Price 4s 6d Post Free from TAPE MUSIC PARADE, Bristol & West House, Salisbury, Wilts.

Watch out for the new series of TAPE HANDBOOKS that will shortly be available from TAPE BOOKSHOP, Prestige House, 14/18 Holborn, E.C.1. We are planning to issue one exciting new title each month.

INDEX TO ADVERTISERS

Adastra Electronics Ltd	38
Audio Products (AKAI)	39
Advertisement Enquiries Service	69
Bang & Olufsen U.K. Ltd	56
Berean Tape Service	69
Charlesworth's of Crewe Ltd	60
Classified page	68
Cussins & Light Ltd	60
Documentary Programmes on Tape	69
E.M.I. Tape Ltd	41
The Ferrograph Co. Ltd	48
Francis of Streatham	72
Grampian Reproducers Ltd	40
Massey's Centre of Sound	61
Minnesota Mining & Manufacturing Co. Ltd. (Scotch)	52
Tom Molland Ltd.	61
Mora Trading Co.	72
Musicassette Supply Co.	60
Philips Records Ltd.	66
Rapid Recording Service	69
Recorder Co.	71
R.E.W. Audio Visual Ltd.	40
Ronlex Productions Ltd.	60
Sanyo Marubeni (UK) Ltd.	42
Sony (UK) Ltd.	50
Tape Hand Books	71
The Tape Recording Centre	43
Tape Recorder Hi-Fi Centre (Sheen) Ltd.	61
Western Mail Order	72

DOCUMENTARY PROGRAMMES ON TAPE

by Peter Bastin 5/-

This is the first in a new series of tape handbooks, and is available from us at 5/- post free

PRINT AND PRESS SERVICES LTD.,

16a Bevis Marks, London, E.C.3.

Cheque or Postal order must accompany order

Other Titles in preparation: ABC of Audio Advice on Script Writing; Natural History Sound Recording

**The Berean
Tape Service**

(NON-DENOMINATIONAL)

Loan of over 1,000 reliable expositions of the Bible available on tape (3 1/4 ips) for cost of postage only. For Bible Study groups or private meditation. Supporting literature also available. Details from: Miss R. Hammond (TRM), Burwood, Blofield, NORWICH, Norfolk. NOR 84Z.

**PLEASE MAKE USE OF THE
ADVERTISEMENT INQUIRIES
COUPON BELOW**

Complete details of products in which you are interested, fill in your name and address, fold and post. No stamp required when posted in U.K.

RAPID RECORDING SERVICE

L.P.s from your own tapes. Master discs and pressings. Recording Studio. Multi-channel facilities for transfer to 8 or 16 mm film tracks. Sound effects library on discs.

Associated Company

EDUCATIONAL RECORDINGS LTD.

The Art of Conversation

Many people suffer from loneliness simply because they are unable to express themselves as they would wish. These people are missing things in life. Happiness and success go hand in hand with the ability to make good conversation.

Send for particulars of this and 20 other tapes on self-improvement.

Distributors of the Cassette battery mains Sleep-o-matic Unit, Pillow speakers, Time Clocks.

Publications: "Sleep-learning, Its Theory, Application and Technique." "Mental Power through Sleep-suggestion."

Brochures from:

RAPID RECORDING SERVICE, 21 Bishops Close, London, E.17

**ADVERTISEMENT INQUIRIES
SERVICE**

I should like further information about
Messrs 's advertisement
on page..... of TAPE Recording Magazine
about..... (product)
NAME.....
ADDRESS
.....
.....
.....
.....
.....
February, 1970

This is a special service for readers of "TAPE Recording Magazine." It enables you without cost to get fuller information about those products in which you are particularly interested. Fill in one coupon below for each inquiry, with your name and address in block capitals in each case. Then cut out the whole of this section, following the dotted line, fold as indicated overleaf and post to us.

I should like further information about
Messrs 's advertisement
on page..... of TAPE Recording Magazine
about..... (product)
NAME.....
ADDRESS
.....
.....
.....
.....
.....
February, 1970

I should like further information about
Messrs 's advertisement
on page..... of TAPE Recording Magazine
about..... (product)
NAME.....
ADDRESS
.....
.....
.....
.....
February, 1970

I should like further information about
Messrs 's advertisement
on page..... of TAPE Recording Magazine
about..... (product)
NAME.....
ADDRESS
.....
.....
.....
.....
February, 1970

I should like further information about
Messrs 's advertisement
on page..... of TAPE Recording Magazine
about..... (product)
NAME.....
ADDRESS
.....
.....
.....
.....
February, 1970

DID YOU KNOW—

- That **TAPE RECORDING MAGAZINE** was the First Publication of its kind in Europe.
- That it is still the Best Tape Recording Magazine.
- That it is the only Tape Recording Magazine staffed by Enthusiasts for Enthusiasts.
- That you can ensure receiving your regular monthly copy by completing one of the two coupons opposite.
- **THAT TAPE RECORDING MAGAZINE POSTAL SUBSCRIPTION IS STILL ONLY 25/- PER ANNUM.**

TO MY NEWSAGENT

I would like to be sure of receiving **TAPE Recording Magazine** regularly. Please order it for me.

NAME

ADDRESS

*TAPE Recording Magazine is distributed by Seymour Press Ltd.
334 Brixton Road, London, S.W.9.*

TO THE PUBLISHERS

Please post me a copy of **TAPE Recording Magazine** regularly. I enclose 25/- as a subscription for one year (USA \$3.75, AUSTRALIA \$3.75).

NAME

ADDRESS

Post to: TAPE Recording Magazine, Prestige House, 14-18 Holborn, London, E.C.1.

CUT ALONG DOTTED LINE

POSTAGE
WILL BE
PAID BY
PRINT AND
PRESS
SERVICES
LIMITED

BUSINESS REPLY FOLDER
Licence No. ND 922

TAPE RECORDING MAGAZINE,
PRESTIGE HOUSE,
14-18 HOLBORN,
LONDON, E.C.1

THIRD FOLD HERE

SECOND FOLD HERE

FLAP A

FLAP B

NO POSTAGE
STAMP
NECESSARY
IF POSTED
IN GREAT
BRITAIN OR
NORTHERN
IRELAND

FIRST FOLD ALONG THIS LINE

Fold along lines as indicated and then tuck Flap A into Flap B

TAPE HANDBOOKS

FOR THE NEWCOMER as well as the ENTHUSIAST OF LONG STANDING

Advice on Buying a Tape Recorder by J. F. Ling.

2s. 6d. (USA \$0.65) post free.

Chapters on preliminary considerations, tape deck, amplifier, etc.

Introduction to the Tape Recorder by C. Langton.

3s. 6d. (USA \$0.75) post free.

To help the newcomer to a working knowledge and maximum enjoyment.

Sound Effects on Tape by Alan Edward Beeby.

3s. 6d. (USA \$0.75) post free.

How to achieve realistic effects simply and economically.

How to Record Weddings by Paul Addinsell.

3s. (USA \$0.70) post free.

Illustrated. Covers preparation, mike positioning, equipment, etc.

Tape and Cine by John Aldred.

3s. (USA \$0.70) post free.

With practical advice on synchronising methods, etc.

The Law and Your Tape Recorder by Andrew Phelan (Barrister).

3s. 6d. (USA \$0.75) post free.

Interprets the law in UK for the tape recorder owner; what is free, forbidden, restricted.

Hi-Fi for the Music Lover by Edward Greenfield.

3s. (USA \$0.70) post free.

Aims at giving the music lover basic technical know-how.

How to Make Money With Your Recorder by Henry Woodman.

3s. 6d. (USA \$0.75) post free.

NEW

Documentary Programmes on Tape by Peter Bastin

5s. (USA \$1.25) post free

This is the first in a new series of handbooks.

MAIL ORDER ONLY

REMITTANCE MUST ACCOMPANY ORDERS

Send Orders to—
PRINT & PRESS SERVICES LTD.

**Tape Bookshop, Prestige House,
14-18, Holborn, E.C.1.**

**TAPE
BOOKSHOP**

GUARANTEED QUALITY & SATISFACTION

4-TRACK STEREO

	Cash Price		deposit		12 Monthly Payments	
	£	s. d.	£	s. d.	£	s. d.
Philips N4404	80	0 0	26	13 4	4	8 11
Ferguson 3232	93	F 0	33	5 0	5	1 10
Sony MR929	97	4 9	33	4 9	5	6 10
Sony TC 252	99	15 0	33	5 0	5	10 10
Philips N4407	103	15 4	33	15 10	5	13 4
Akai 1710L	109	0 0	36	6 8	6	1 2
Sony MR939	112	0 2	38	13 6	6	2 3
Grundig TK247	112	10 0	37	10 0	6	5 0
Sony TC 230	121	11 9	40	11 9	6	15 0
Philips N 4408	136	3 10	46	19 5	7	8 9
Telefunken 204TS	124	19 0	41	19 0	6	13 4
Tandberg 1241X	149	0 0	49	0 0	8	6 8
Beocord 2000K	159	12 0	53	4 0	8	17 4
Beocord 2000T	165	18 0	57	18 0	9	0 0
Ferrograph 722/4	204	16 9	68	16 9	11	6 8
Akai 1800SD	199	0 0	66	6 8	11	1 2
Philips Pro 12	239	0 7	79	13 7	13	5 7
Revov 1122/24	236	5 0	78	15 0	13	2 6

4-TRACK MONAURAL

	Cash Price		deposit		12 Monthly Payments	
	£	s. d.	£	s. d.	£	s. d.
Fidelity Braemar	34	4 8	11	12 8	1	17 4
Fidelity Studio	46	0 10	15	17 10	2	10 2
Grundig TK149	47	13 1	16	10 1	2	11 11
Philips 4307	48	11 11	16	15 3	2	13 1
Ferguson 3228	48	16 0	16	16 8	2	13 4
Telefunken 201	51	9 0	17	3 0	2	17 2
Ferguson 3238	59	12 0	20	12 0	3	5 0
Philips 4308	60	0 10	20	14 2	3	5 7
Ferguson 3216	66	2 0	22	16 0	3	12 2
Tandberg 1541	82	0 0	28	0 0	4	10 0

STEREO TAPE UNITS

	Cash Price		deposit		12 Monthly Payments	
	£	s. d.	£	s. d.	£	s. d.
Sony MR801	72	9 0	24	3 0	4	0 6
Sony TC252	72	15 0	24	9 0	4	0 6
Sony TC355	100	2 6	34	2 6	5	10 0
Tandberg 1641-X	89	10 0	30	0 0	4	19 2
Akai 4000D	87	10 0	29	10 0	4	16 8
Tandberg 62/64-X	157	0 0	52	6 8	8	14 6
Ferrograph 702/4	194	15 8	64	15 8	10	16 8

MAINS TWIN TRACK

	Cash Price		deposit		12 Monthly Payments	
	£	s. d.	£	s. d.	£	s. d.
Fidelity Braemar	31	0 0	10	14 0	1	13 10
Ferguson 3224	33	14 0	11	12 8	1	16 10
Grundig TK120	39	5 0	13	5 0	2	3 4
Tandberg 1521	77	0 0	27	0 0	4	3 4
Beocord 1100	82	19 0	27	13 0	4	12 2
Ferrograph 713	174	13 6	58	13 6	9	13 4

BATTERY OPERATED

	Cash Price		deposit		12 Monthly Payments	
	£	s. d.	£	s. d.	£	s. d.
Philips RR290	31	10 0	10	10 0	1	15 0
Grundig C200	37	17 6	12	7 6	2	0 10
Philips RR482	54	12 0	18	4 0	3	0 8
Telefunken 300 TS	57	15 0	19	5 0	3	4 2
Telefunken 302 TS	68	5 0	22	15 0	3	15 10
Uher 4000L	133	13 1	44	13 1	7	8 4
Uher 4200/4400	162	10 7	54	10 7	9	0 0

SPECIAL OFFER



SANYO MR-910 STEREO

- * 4 Track
- * 2 Speeds, 7 1/2 & 3 1/2 i.p.s.
- * 7" Reels
- * 2 x 4" Permanent Dynamic speakers
- * Sound-On-Sound with optional adapter
- * Sound-With-Sound
- * Supplied complete with 2 Microphones, 7" Tape, Audio leads, Makers 12 months guarantee and full instructions.

62 GNS. List price £84. 15. 0
Initial Deposit £32. 12. 2. 12 Monthly Payments of £3. 11. 8.

SANYO MR-990 STEREO

- * 4-Track
- * 3 Speeds
- * Sound-On-Sound
- * Sound-With-Sound
- * 2 Detachable Speaker Boxes
- * Output 2 x 10 watts Music Power
- * Natural Wood Cabinet
- * Supplied complete with 2 Dynamic Microphones, 7" Demonstration Tape, leads, etc., Makers 12 months guarantee and instructions
- * Automatic Shut-Off

110 GNS. List price £132. 5. 0.

INTEREST FREE H.P. TERMS

OPEN SATURDAY 6 p.m.; FRIDAY 6.30 p.m. IF UNABLE TO CALL, WRITE FOR BROCHURES. PART EXCHANGES.

ALSO 18 AND 24 MONTHLY TERMS.

THE RECORDER CO

(DEPT. T) 186-188 WEST END LANE, WEST HAMPSTEAD, LONDON, NW6

Telephone: 01-794 4977

FRANCIS OF STREATHAM

MEMBERS OF THE HI-FI DEALERS ASSOCIATION

LONDON'S FOREMOST TANDBERG STOCKISTS

DECKS WITH PRE-AMPS

(microphones extra)

Akai 4000D Stereo
 Philips 3 sp. 4 Tr. Stereo
 Sony 801, 3 sp. 4 Tr. Stereo
 Sony 355 3 sp. 4 Tr. Stereo
 Sony 255 Stereo
 Tandberg 6000X 3 sp. 2, 4 Tr. Stereo
 Tandberg 1600 D
 Telefunken 201 de luxe
 Telefunken 203 Studio

COMPLETE TAPE RECORDERS

Ampex 800 Series Stereo
 Ampex 1100 Stereo
 Ampex 2100 Stereo
 *Akai 1710W Stereo
 *Akai M.9 Stereo
 *Akai 1800 Dual purpose stereo 8-track cartridge and tape recorder
 *Brenell Mk. 5 M Series III Mono
 *Brenell Mk. 5 Series III Mono
 *Brenell ST200 2 Tr. Stereo
 *Brenell ST400 4 Tr. Stereo
 Ferguson 3232 Stereo 4 Tr.
 Ferguson 3226 Mono
 Ferguson 3224 Mono
 Ferguson 3216 Mono
 *Ferrograph 713
 *Ferrograph 702 4
 *Ferrograph 722 4
 Fidelity Studio 4 Track Mono
 Fidelity 'Braemar' 2 or 4 Tr. Mono
 *Grundig TK320 2/4 Tr. 3 sp. Stereo
 Grundig TK140 DL 4 Track Mono
 Grundig TK120 DL 2 Track Mono
 *Grundig TK245 DL Stereo Mono
 *Grundig TR247 DL 4 Tr. Stereo
 Grundig 145 DL 4 Tr. Auto Mono
 *Grundig TK340 DL 4 Tr. Stereo 3 sp.

Philips 4307 4 Tr. Single speed Mono
 Philips 4308 4 Tr. 2 sp. Mono
 *Philips Professional PRO.12
 Philips Stereo 4404 2 sp. 4 Tr.
 Philips Stereo Cassette 3312 with 2 sp.
 Philips 4407 Stereo 3 sp. 4 Tr.
 *Philips 4408 Prof. 3 sp. 3 Tr. Stereo
 Pye 9106 Auto Mono
 *Revox 77 Stereo 2 or 4 Tr.
 *Sanyo 801 St. Pre-amp.
 Sanyo 929 4 Tr. 2 sp. Stereo
 Sanyo 939 4 Tr. 2 sp. Stereo
 *Sanyo 990 3 sp. 4 Tr. Stereo
 Sharp RD.706 2 sp./2 Tr./Batt. Mains
 Sony TC230W
 Tandberg 15 2 or 4 Tr. 3 sp./M.
 *Tandberg Series 12X 3 sp. 2, 4 Tr. St.
 *Telefunken M207 2 sp. 4 Tr. Stereo
 Telefunken 204 T.S. 4 Tr./St.
 Telefunken 501 4 Tr./M.
 Telefunken 203 Stereo/Mono 4 Tr. 2 sp.
 Telefunken 201 Mono 4 Tr.
 *Uher 7/4 4 Tr. Mono
 Wyndor Vanguard 3 sp. 4 Tr. Mono

BATTERY PORTABLE & CASSETTE

Philips RR482 Cassette + AM/FM radio
 Philips RR290 Cassette/AM radio
 *Philips 2205 Batt./Mains Cassette
 Philips EL3302 Cassette
 Akai 10 V 4 Tr. St./BM
 Tandberg Cassette Series II 2
 Ferguson Cassette 3240
 Grundig Cassette C200
 Aiwa Cassette/Batt. Mains
 Pye Cassette
 Sharp 505 2 Tr. 2 sp./Batt. Mains
 National 4 Tr. 2 sp./Batt. Mains
 Telefunken 302 2 sp. 4 Tr. Mono
 *Uher 4200 4400 2/4 Tr. 4 sp. Stereo

*Microphone extra

FOR A FAIR AND DEPENDABLE DEAL IN

TAPE and HI-FI

- ★ Minimum Deposit and no Interest or Service Charges on H.P. up to 18 months
- ★ Free Service during Guarantee Period
- ★ Fair Part Exchange Allowance on your old Recorder
- ★ Reconditioned Recorders available to personal shoppers only

● MICROPHONES, MIXERS, etc. by AKG, Hammond, Gramplan, Reslo, Acos, Film Industries, Telefunken, Beyer, Sennheiser, etc.
 Headphones

Bib and EMI splicers, Matching transformers, Defluxers, Bulk Erasers, etc.

● MIXERS by Uher, Eagle, Hammond

Pre-recorded tapes and music cassettes
 Tapes and Cassettes etc.

● MAINS POWER PACKS by Philips, Stella, Telefunken, Uher

AMPEX TAPE OFFER 500 SERIES

Brand new and guaranteed
 (P - Polyester A - Acetate)

7" L.P. 1800' (P)	21/-
7" Standard 1200' (A)	12/6
7" Standard 1200' (P)	15/-
5 1/2" L.P. 1150' (P)	17/6
5 1/2" L.P. 1150' (A)	15/-
5 1/2" Standard 850' (A)	12/6
5" D.P. 1200' (P)	17/6
5" L.P. 900' (P)	12/6
5" Standard 600' (P)	10/-

HI-FI DEPT.

● AMPLIFIERS

Quad . Rogers . Arena . Philips
 Goodman . Nikko . Leak . Armstrong
 Tripletone . Tandberg . Sansui . Sanyo
 ARO English . Audio Linear

● TUNERS

Quad . Rogers . Leak . Armstrong
 Tripletone . Arena . Philips . Nikko
 Goodman . Huldra

● LOUDSPEAKERS

Quad . Rogers . Kef . Wharfdale
 Goodman . Tannoy . Lowther . Leak
 Celestion . Tandberg . Arena

● MOTORS, PICKUPS

GARRARD SP25 Mk2 less cartridge
 Special Price £12 . 0 . 0
 (Carr. pd. UK) Sonotone
 Goldring SME
 Connoisseur Pickering
 Thorns Audiotec
 Shure Neat
 Empire Acos

Diamond stylis, Microlifts, Pressure Gauges,
 Cleaning Accessories, Cabinets by Clearview

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

Between St. Leonard's Church
 and Streatham Station

01-769 0466; 01-769 0192

Please note this is our only address ● Free parking Prentis Road, 2 mins away
 OPEN ALL DAY SATURDAY—EARLY CLOSING WEDNESDAY



To all TAPE Recordists: P.V.C. & BUY BRITISH Polyester Tapes YOU SAVE MONEY AND



SAVE THE POUND

"... could hardly believe that top quality could cost so little...
 — T.H. of Teeside.

The playbacks are crystal clear and I am sure no better results could be obtained by other dearer brands on the market.

Yours sincerely,
 W.S., Hants.
 FREE Library case with £5 orders

	New	3"	5"	5 1/2"	7"
Standard Play each	150'	600'	850'	1200'	
3 for	2/-	5/6	7/-	8/6	
6 for	5/9	16/-	20/-	25/-	
	11/3	31/9	39/6	49/-	
Long Play each	240'	900'	1200'	1800'	
3 for	3/-	7/6	9/6	12/6	
6 for	8/6	22/-	24/9	36/9	
	16/9	43/3	54/9	82/6	
Double Play each	300'	1200'	1800'	2400'	
3 for	4/3	11/-	15/-	19/9	
6 for	12/3	32/3	44/-	58/3	
	24/6	63/9	87/-	115/3	

Postage 1/9 per order. Posted the same date. Money-back gtd.

Compact Cassettes



Standard pattern to fit Philips, Stella, Elizabethan, Danette, Sanyo, etc.

Compact Cassettes with 60, 90 and 120 minutes playing time. Brand new and packed in normal plastic library box. Available at this exceptional price.

OUR PRICES

C.60	C.90	C.120
1 for 10/6	1 for 14/-	1 for 18/6
3 for 30/-	3 for 40/6	3 for 54/-
6 for 55/6	6 for 78/-	6 for 105/-
12 for 105/-	12 for 150/-	12 for 204/-

Mora Trading Co. (1725)
 Mora Works, Mora Road, N.W.2

Twinfone



Multi-purpose phone attachment acts as an extension phone. Attached to the normal phone earpiece by means of springy bracket, it amplifies the sound, almost

twice. It allows two people to listen at the same time, improves reception in noisy places and is ideal around airports.

Slipped easily on and off the phone, it needs no fixing.

Price 19s plus 1s postage. Mail only.



JOIN THE MUSICCASSETTE SET...

Musiccassette Library

FOR as LITTLE as 4/- per WEEK

You are entitled as a library member to receive POST FREE your favourite POP or CLASSICAL MUSIC, which you may keep for up to 28 days or even longer at our specially reduced membership rates.

More details from.

Name

Address

● Western (Mail Order) Tapes ●

31 MONMOUTH STREET BATH BA1 2AN