

the TAPE

PRICE 1/6

OCTOBER 1960
Vol. 2 No. 9

RECORDER

INCORPORATING "SOUND AND CINE"



IN THIS ISSUE

- Radio Show Report
- Building a High Quality Transistorised Mixer/Pre-amplifier
- 4 Track Tape
- "Profit and Loss" Account
- Tape Recorder Workbench
- A Custom-Built Stereo Recorder, Part 2
- Equipment Reviews
- News and Pictures from Here, There and Everywhere
- Teaching Tape -a Special Series for Beginners



Only with **FI-CORD** can you have it both ways—really HI-FI and really portable

Don't be misled by the compact size. The **FI-CORD** is a high fidelity instrument of advanced scientific design—assuring true-to-life recordings.

Frequency 50-12,000 c.p.s. \pm 3db. Tape speeds $7\frac{1}{2}$ i.p.s. and $1\frac{1}{2}$ i.p.s. Twin track record/playback, using standard $3\frac{1}{4}$ " spools.

Wherever you go, you can take your **FI-CORD** with you, it is ideal for adding

the realism of sound to movie films.

The **FI-CORD** weighs only $4\frac{1}{2}$ lbs., measures $9\frac{1}{2}$ " x 5" x $2\frac{1}{4}$ ", operates in any position (lid open or shut) and requires no power point. It runs on 4 batteries, rechargeable from the automatic charger supplied.

Built-in speaker. Full playback volume. Extension speaker socket. Dynamic microphone with stop/start switch.

**CATCH IT—
AND KEEP IT—WITH**

FI-CORD

Write for name and address of your nearest stockist to:—

FI-CORD Ltd · 40a Dover St · London · W1
Tel: HYDE PARK 3448

Complete with
Microphone, Tape,
Batteries and Charger

59 GNS

or with Gramplan DP4/M
Microphone

66 GNS



**CHOOSE IN PERSON—
CHOOSE BY POST—
NO INTEREST CHARGES ON H.P.**

All makes of Tape Recorders and Hi-Fi Equipment. Make sure you get exactly what you want and what you need. Make sure you get it at the best H.P. terms offered anywhere today — No interest charges on orders over £30. Make sure you choose from the Tape Recorder Centre. Choose in person — compare different makes on the spot in the Tape Recorder Centre Showroom; or choose by post — get a **Free copy of the unique 72-page illustrated Tape Recorder Centre catalogue**, listing hundreds of models and types.

In person or by post, the best choice in the country —

THE TAPE RECORDER CENTRE

For free Catalogue, send this coupon to
The Tape Recorder Centre Ltd., Dept. R.
75 Grand Parade, Green Lanes, Harringay,
London, N.4.
Telephone STAmford Hill 1146

TCR

Name

Address

BLOCK LETTERS PLEASE

SHOWROOMS: Central London—82 High Holborn, W.C.1. CHAncery 7401

North London—75 Grand Parade, Green Lanes, Harringay, N.4. STAmford Hill 114

DON'T CROSS THE CHANNELS

Stereo tape recording has come to stay. If you want first-rate stereo sound in the end, you must have a first-rate stereo microphone from the start. This microphone must have the same balanced, wide-frequency response as a mono mike, and in addition achieve separation of all sound into two separate channels. Acos microphones have long been amongst the best in the world; Acos are the leading pioneers in stereo. No wonder, therefore, that the new ACOStereo microphone is strictly in the champion class for performance, separation, good looks and good value.



MIC 44

The new ACOStereo MIC 44 is a fully stereophonic microphone, operating on the coincident phase principle. It contains two inserts with figure-eight characteristics, at 90° to each other, giving overall clover-leaf response with first-rate channel separation. Output -68 dB ref 1V/dyne/cm²; frequency response 50-8,000 c/s; separation better than 12 dB at 1 kc/s. UK retail price £6.6.0.



GET SET FOR STEREO WITH AN ACOSTEREO MICROPHONE

acos ARE DOING THINGS IN STYL! *also*

COSMOCORD LTD WALTHAM CROSS HERTS · TEL: WALTHAM CROSS 25206 (London subscribers please dial WS25206)



SOUND STUDIO DE LUXE 4-track tape recorder

This version of the popular Studio model gives up to *18 hours* record and playback time! This sensational recorder makes the most of every inch of tape and has a host of fine features.

- Monitoring, Mixing, Superimposing ● Visual Place Indicator ● Amplifier Facilities ● 4 Tracks
- 3 Speeds, $7\frac{1}{2}$, $3\frac{3}{4}$, $1\frac{7}{8}$, i.p.s. ● Takes 7" Spools with lid closed ● Fitted with 1200 ft. of Standard Tape
- Dimensions $18'' \times 14\frac{3}{4}'' \times 7\frac{1}{2}''$

45 gns. complete with crystal microphone and 1200 ft. tape



TAPE RECORDERS (ELECTRONICS) LTD.

784-788, High Road, London, N.17. Tel: TOTtenham 0811-3. Cables: Taprec, London

**For the
technically minded:**

High fidelity
reproduction with
frequency response
50 to 16,000
c.p.s. at $7\frac{1}{2}$ i.p.s.
record/
playback response
60 c/s. to 15 kc/s. at
 $7\frac{1}{2}$ i.p.s.

here



The FANTABULOUS NEW SPECTONE 070

Coin a word! that's the only way to describe the spectacular new SPECTONE 171 tape recorder—a new high in quality for a new low in cost! Fitted with the famous GARRARD DECK and a new concept in recording—the tape cassette. Just drop in and away you go—no complicated threading! Plus!

loads of fun giving features including:—

- ★ Easy operating via two simple operating controls.
- ★ Monitoring, mixing, and superimposition facilities.
- ★ Provision for separate amplifiers and speakers.
- ★ Can be used as a straight amplifier.
- ★ Modern, compact, neat, and with super sound reproduction.

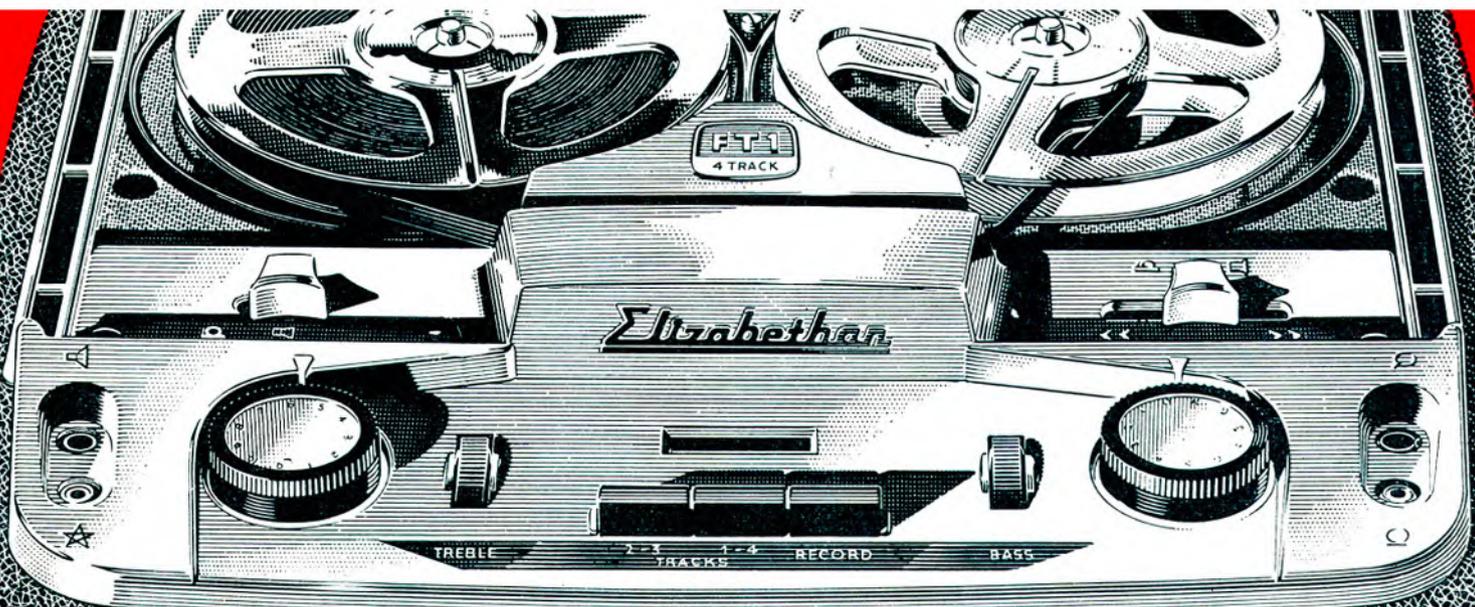
39 gns.

IMPORTANT

See and hear the Fantabulous Spectone 171 at your local dealers, or write for colour brochure.

Specto
LIMITED

VALE ROAD · WINDSOR · BERKS Telephone : WINDSOR 1241



WHAT IS ELIZABETHAN 4-TRACK ?

Specially designed new micro-gap recording heads register *four separate tracks* on any ordinary spool of tape instead of the two tracks used up to now. Obviously 4-track offers tremendous advantages: playing time is increased by 100% at all speeds, cutting tape costs by half. And *stereo* too can now be yours . . . a simple add-on unit is all that is needed to give you the magnificent extra dimension of stereophonic sound!



ELIZABETHAN 4 TRACK

THE SENSATION OF THE RADIO SHOW!



4-TRACK AT ITS ECONOMICAL BEST

The Elizabethan FT1 offers 4-track at an irresistible price. Yet it carries a real thoroughbred high-performance specification packed with "extras".

- Over 6 hrs. recording time
- Press-button track selection
- Monitoring through loudspeaker
- Independent mixing and bass/treble controls
- Stereo playback facilities (with additional equipment)

39 GNS

Complete with microphone, tape, etc. for only

OVER 17 HOURS ON ONE TAPE!

The Elizabethan FT3 offers this fantastic playing time. More than this, the FT3 incorporates practically every facility the recording enthusiast looks for.

- 17 hrs. recording time at 1 1/2 ips
- Complete stereo recording and playback facilities (with additional equipment)
- 3 speeds, 1 1/2, 3 1/2, and 7 1/2 ips
- Frequency response 50 - 16,000 cps at 7 1/2 ips
- Monitoring through loudspeaker
- Independent mixing and bass/treble controls
- Press-button track selection

55 GNS

Complete with microphone, tape, etc. for only

ELIZABETHAN CUT TAPE RECORDING COSTS IN HALF! Double the playing time, double the versatility. That's what you get when you switch to Elizabethan 4-track. Yet even with these tremendous advantages, an Elizabethan 4-track tape recorder costs *no more than most ordinary twin-track machines!*

NEVER BEFORE SUCH VALUE . . . SUCH FEATURES! Two outstanding new Elizabethan models incorporate the new 4-track system. Up-to-the-minute electronic techniques place each machine at the top of its class. Both models set record-breaking new standards of performance and value for money.

DOUBLE-UP ON YOUR EXISTING TAPES Not only can you play your present twin-track tapes on an Elizabethan 4-track machine—you can actually *add two more tracks* without affecting the previous recording. Thus you can literally double your own collection of recordings without buying a single foot of new tape!

Everyone's going Elizabethan 4-track. As an enthusiastic you mustn't miss out on a development like this. Get your radio or electrical dealer to demonstrate Elizabethan 4-track right away!

EVERYONE'S GOING ELIZABETHAN

going for Britain's most popular tape recorders

SEND NOW FOR FULL COLOUR BROCHURE

To: ELIZABETHAN (TAPE RECORDERS) LTD.
Bridge Close, Romford, Essex

NAME _____

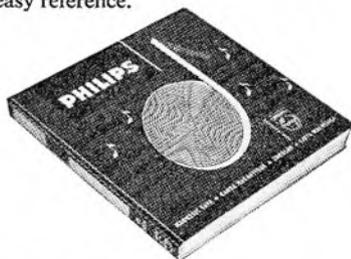
ADDRESS _____

T.RR6



PHILIPS TAPES...better for all tape recorders!

On any tape recorder, Phillips Tape gives you better results. It has great sensitivity, a very wide frequency range, and extremely low noise level. This superlative tape is equally good for music or voice recording. Available in all reel sizes from 3", 5", 5½" and 7". For those building up a reliable tape library, Phillips 5", 5½" and 7" reels are specially packed in durable books designed for convenient storage, and quick easy reference.



- * Strong pvc base.
- * Resistant to stretch, snapping and tearing
- * Powerful adhesion of magnetic coating
- * Unvarying high-quality performance
- * Standard, long-play, and double-play tapes available



PHILIPS ELECTRICAL LTD · CENTURY HOUSE · SHAFTESBURY AVENUE · LONDON WC2

(PR2916)



the *FINEST* TAPE RECORDERS on *INTEREST FREE* TERMS...

Write, Phone or Call today. You can buy by post with perfect confidence
Deposit from 20% 12 months to pay

I know how difficult it is to choose *the* Tape Recorder. That is why more and more people come to the Royal Opera Arcade, because my advice, personal attention, and help are freely given. Full demonstrations at any time and you can always examine and hear the latest and most interesting machines. Remember—I am here to help you. LAURENCE DICKINSON.
Leaflets gladly sent if you are unable to call.

Model	Gns.
Philips 3515	32
Sagatone	38
Elizabethan Princess	39
Simon Minstrelle	39
Perth Saja	45
Wyndsor Victor	45
Electron	47½
Magnaфон	49
Spectone Ex Tape	49
H.M.V.	£50
Grundig TK20	52
Telefunken 75 with Mic	56
Perth Saja Deluxe	56
Brenell 3 Star	58
Veritone	58
Mobile	58
Ficord	59
Grundig TK25*	62
Telefunken Deck*	63
Korting Stereo*	68
Telefunken 4 track with Mic	68
Stuzzi-Magnette	69
Brenell MKV with Mic	69
Grundig TK 30*	72
Brenell M.V. with meter, Mic	74
Electron Stereo*	77
Telefunken 85KL*	79
Sabaфон Automatic*	79
Harting Stereo*	86
Timbra*	89
Simon SP4*	95

Machines Marked * are excluding Microphone.



NEW! 4 Track Monaural Recorders
PHILIPS 59 gns. TELEFUNKEN 64 gns.
4 Track STEREO/MONAUURAL Recorders
PHILIPS 92 gns. HARTING 86 gns. KORTING 68 gns. ELEKTRON 77 gns.

ACCESSORIES. We carry a wide range of microphones, earphones, leads, telephone adaptors, etc., etc.

SERVICING. We undertake Rapid and Efficient Servicing of all Tape Recorders.

TAPES. Audio, Agfa, B.A.S.F., E.M.I. GELOSO, Scotch Boy, Telefunken, etc. Send for lists.

CAMERAS. By Zeiss, Agfa, Eumig, Voigtlander, etc. Send for lists.

READ the all-in-one Tape Recorder Book, 12s. 6d. Packed with Information.

TELEFUNKEN DA CAPO RADIO, 39 gns. Call and Hear this fine instrument.

TELEFUNKEN TAPE DECK, 63 gns. Use it with your Amplifier or with the Telefunken Radio.

Dickinsons of Pall Mall Ltd.

11 ROYAL OPERA ARCADE, PALL MALL, S.W.1 TRA 2881

The Royal Opera Arcade lies behind Her Majesty's Theatre in the Haymarket (one minute from Piccadilly Circus or Trafalgar Square.)

YOU GET *Vivid* REALISM...

...with the
wonderful



HMV TAPE RECORDER

Speech, music, sound effects . . . you get VIVID REALISM every time with this fine tape recorder. This isn't surprising when you consider its many 'professional' features. What is surprising is that such a quality machine should be so modestly priced. Hear it at your dealer's and you'll realize that "His Master's Voice" offers TODAY'S FINEST TAPE RECORDER VALUE!

- * Two speeds: $7\frac{1}{2}$ i/s and $3\frac{3}{4}$ i/s
- * Frequency response: 50-10,000 c/s at $7\frac{1}{2}$ i/s \pm 3dB
- * Takes 7" spools
- * Half-track operation
- * Three-motor drive
- * Separate record and playback amplifiers
- * Three head system for instantaneous playback
- * Pause control for instantaneous stop/start

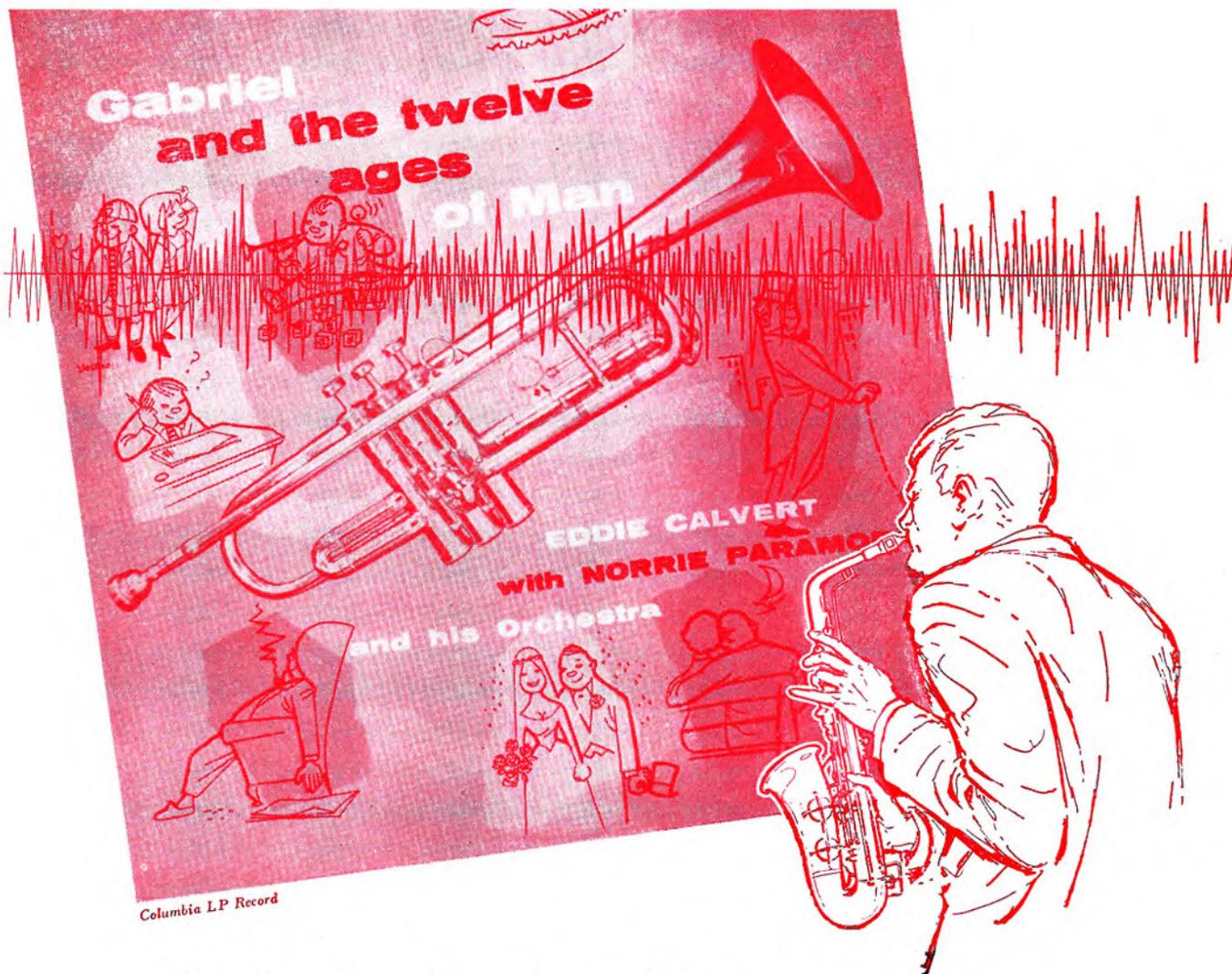


ONLY £50

Complete with 1,200' Emitape, spare spool and crystal microphone.



THE GRAMOPHONE COMPANY LIMITED · HAYES · MIDDLESEX



Perfection in Recording

Behind those brilliant, flawless performances on your favourite records lies a major technical triumph—EMITAPE! For some years now the “masters” of most LP and STEREO records have been made on the same standard .0015 in. base Emitape that you can buy . . .

Proved technical superiority and durability of the PVC recorded tape—make Emitape the choice of world-famous companies like “H.M.V.,” Columbia, Parlophone—for recording all the greatest artists of our day . . .

For the same reason, the B.B.C., Independent Television and broadcasting authorities all over the world use hundreds of millions of feet of Emitape every year; it is equally in demand in the fields of industry and science.

Backed by E.M.I.’s unique experience—going back over 60 years—and manufactured in the largest and most modern magnetic tape factory in Europe, Emitape is the basis for perfection in recording.

Emitape

the world's finest magnetic recording tape made by E.M.I.

EMI SALES & SERVICE LTD., (Recording Materials Division) HAYES, MIDDLESEX

the TAPE RECORDER

Editor - - - - - MILES HENSLOW
 Technical Editor - - - - - John Borwick
 Assistant Editor - - - - - Julian Berrisford
 Editorial Offices - - - - 99 Mortimer Street, London, W.1
 Telephone - - - - - MUSEum 3967 to 3969



MEMBER OF THE
 AUDIT BUREAU
 OF CIRCULATIONS

EDITORIAL

DEVELOPMENTS in the world of tape and tape recorders remind us of that very clever and popular series of *Shell* advertisements, with the speaker looking both ways, and with wording to the effect of: "This will be good, wasn't it". Things are happening so fast that they are *fait accompli*, and almost past history, while one is still discussing their future. These remarks apply particularly to four-track tapes and recorders. One year and three months ago, while a member of our editorial staff was on holiday in Germany, he sent us a news hand-out from Telefunken which described that Company's latest development—a four-track system for domestic tape recorders. Today, counting swiftly and probably inaccurately on the fingers, there are a dozen British-made four-track recorders in production. At least six months ago, the *Ampex* Corporation of America formed its new subsidiary company, U.S.T. (United Stereo Tapes) and, as we reported some time ago in this magazine, successfully tied up some of the world's best disc label titles for release on tape—at four tracks and a speed of 7½ i/s.

On another page in this number of *The Tape Recorder*, James Moir discusses four-tracks under the heading of "Profit and Loss", and inevitably the editorial content of the magazine will be dealing with the subject more frequently and at length. In the meantime, however, we can use the remainder of this column more usefully by concentrating upon those three magical American initials—U.S.T.—and by speculating, first, upon the possible reasons for their non-appearance over here, and (second) upon the apparently disinterested attitude of the Record Companies towards tape records in general. It was September 1959 that we retold the story about the ostriches in this column and on this very same subject. Perhaps, after twelve months of "nothing doing", fishermen readers will prefer to think in terms of trout and flies. No one really knows why a trout leaps out of the water after a fly, when his basic rations are far more solid and fishy. Some say he does it for fun; others maintain that he regards the fly as a delicacy—something to fill in the odd half hour and the odd corner of his tummy. Be that as it may, neither the spotted brown disc Trout, or the rainbow disc Trout of this country has yet condescended to rise to the tape fly that has been dangled so invitingly above their noses—although we know from what we read that disc sales are not all that they ought to be. Why, then, no tape records?

Could it be, perhaps, that we are going to be given four-track tapes, as and when the time is considered to be ripe? Could it be that, great as the present market appears to be, the holders of the big music catalogues are deliberately overlooking it, pending the four-track day?

CONTENTS

	Page
Teaching Tape	
(5) Microphone Balance	
By I. W. Jarman	437
Here, There and Everywhere	
Six pages of pictures and news	438
High Quality Transistorised Mixer Unit	
By N. W. Bridge	445
Tape at the 1960 Radio Show	
A report in words, photos, and cartoons	448
A Custom Built Stereo Tape Recorder	
(2) The Circuitry	
By A. G. Watling	450
Four Track Recording	
A Profit-and-Loss Account	
By James Moir	453
Readers' Problems	455
Tape Recoil	
By Stanley Unwin	457
Tape Recorder Workbench	
(16) Building a mixer	
By A. Bartlett Still	459
Our Readers Write	461
Details of New Products	465
Equipment Reviewed	467
Classified Advertisements	472
Advertisers' Index	474

COVER PICTURE

WE have several times included stories on telephone answering devices, which rely on tape to deliver a pre-recorded "standard instruction", and in several cases even record short messages from callers. This month's cover picture shows a clever application of the Ansafone (see story on page 438) in which the typist transcribing some of the requests for loan renewals on books (up to 40 per day) telephoned into the St. Marylebone Central Library by borrowers.

NEXT MONTH

ALAN Watling gives the final details of his *Custom-Built Stereo Recorder*, next month, including the setting up procedure and how the whole equipment was fitted into a "Stag" dressing table. Also of interest to the technically-minded will be a home built tape deck, designed by one of our readers to operate with simple transistor circuitry of the kind described in the recent series of articles by A. Tutchings. The readers who prefer to use their tape recorders creatively, and are less interested in the technicalities, have not been forgotten, however, and in addition there will be a full coverage of news and pictures from the world of tape and all our regular features. As we continue to hear of people having difficulty in obtaining copies of "The Tape Recorder" we strongly advise the placing of a firm order with your dealer or newsagent.

The Tape Recorder November issue—on sale October 28th.

SUBSCRIPTION RATES

The subscription rate to *The Tape Recorder* is 21/- per annum (U.S.A. \$3.00) from The Tape Recorder, 99 Mortimer Street, London, W.1. Subscription+Index, 24/- (U.S.A. \$3.25).

GREAT NEW PERTH CLARISSA MK III



Beautifully styled slim blue and gold case with brilliant gilt fittings and white grille. Speeds— $7\frac{1}{2}$ — $3\frac{3}{4}$ i.p.s. Using $5\frac{3}{4}$ " reels it can take up to three hours recording and play back at $3\frac{3}{4}$ i.p.s. with double play tape. Accidental erasure impossible. Frequency range up to 9 k.c.s. Monitor through magic eye and built-in speaker. Superimposing and automatic muting of built-in speaker. High gain amplifier circuit. Wide range tone control with large elliptical high flux speaker ensures a clear 3 watts output of outstanding fidelity. Size $15\frac{3}{4}$ " \times $12\frac{3}{4}$ " \times $6\frac{1}{4}$ ". Weight 17 lbs.

29 $\frac{1}{2}$ gns

Complete with specially matched crystal microphone and tape

PERTH RADIOS LTD., 39-47 EAST ROAD, LONDON, N.1.

CLERkenwell 2413-4

TEACHING TAPE

A SPECIAL SERIES FOR BEGINNERS

By I. W. JARMAN

PART 5—MICROPHONE BALANCE

IN the previous article, I dealt with the various types of microphone available and the the problems of balancing the microphone to obtain the most realistic reproduction of the original sound.

It was pointed out that one of the major problems of balance is obtaining the correct ratio of direct (the sound which travels straight from the sound source to the microphone) to the indirect (the reflected sound which reaches the microphone by various paths). I explained that these reflected sounds may well be distorted, certain frequencies having been absorbed to some degree by furnishings, etc. The frequencies so affected are mainly those above 500 c/s.

Since the room in which the amateur will be making his recording is likely to be the lounge at home, we can assume that a certain amount of high frequency "damping" will take place because of the curtains, carpets and armchairs or settee, possibly resulting in a muffled sound. To achieve a faithful reproduction of the original sound, it is necessary to ensure that all frequencies are equally affected as far as damping goes.

Low frequency (bass) absorption

The absorption of bass notes can be achieved by using either resonators or resonant panels. The most common example of a resonator is an empty bottle—by blowing across the mouth of which, vibrations are set up and a note is produced, the frequency of which will depend on the volume of the bottle. If the bottle is filled with absorbent material then the sound produced will quickly die away.

The absorbent panels, which may be of hardboard or plywood, will also resonate, the vibrations being damped out by heavy absorbent material behind the panel. A disadvantage of this type of absorber is that although it will damp out the particular frequency for which it is designed, it may leave other frequencies unabsorbed.

Somewhat similar is the membrane absorber which is in the form of a shallow box, inside which is absorbent material (e.g. glass wool)—one end of the box being covered with roofing felt protected by perforated or slotted hardboard. As with resonators, the size of the membrane absorber will determine the frequency to be damped. In order to achieve any substantial bass damping many resonators (or other forms of treatment) must be used affecting different frequencies. Multi-resonators in the form of special tiles, drilled or slotted, are the most usual forms of bass absorption.

Before moving on to talk about microphone balance, it is necessary to point out that the acoustical treatment of a room to control the sound reflections (reverberation) is not the same as insulating a room against external sound. Sound absorbing materials may help in insulation of a room, but for complete insulation thick laminated walls or double walls with an air gap between them are necessary.

Microphone balance

The exact position in which to place the microphone depends, of course, on the acoustics of the room and therefore although the positions recommended may be satisfactory for most occasions, on others it will be necessary to experiment to determine the most suitable position.

Speech balance: Generally speaking, the person to be recorded should be between one and two feet from the microphone and should talk directly to it. If the speaker is excessively sibilant, this can be partially overcome by slightly tilting the microphone. The microphone should, of course, be kept well away from the recorder to avoid picking up motor noise and should



In this B.B.C. studio discussion the microphone (a condenser cardioid) is suspended so as to avoid table-bumping, pick up all speakers equally, and not obscure vision. The table surface is perforated to prevent reflections. (B.B.C. Photo)

never be used on the same table as the recorder, since any vibrations of this may be picked up by the microphone.

Piano balance: The main problem when balancing a piano is to achieve a reasonable balance between the treble and the bass notes which, of course, carry more power than the treble. It follows, therefore, that the microphone should be positioned near the treble end of the piano, suspended slightly above the level of the strings (tilted towards them) and not placed on the piano since the vibrations, in the form of an annoying "thumping" noise, may be picked up by the microphone.

Generally speaking, when balancing an upright piano, the best position for the microphone will be just to the right of the pianist and about 5 ft. above the floor, the microphone tilted towards the strings. In the case of the grand piano, the best position will usually be found about two to three feet out from the centre of the curve on the right hand side. As in the case of the upright piano, the height of the microphone should be about five feet and it should be tilted towards the strings.

Trial and error

Variations around these positions will, of course, be necessary in some cases, depending on the acoustics of the room in which the recording is made. You may find it worthwhile experimenting with other positions also—I have heard of a good piano balance being achieved by placing the microphone under the piano, the reflected sound being recorded.

If you intend doing any experimentation, you should keep a note of the various positions, i.e. make a rough drawing of the piano and mark the positions around it. Identify each recording as its made, e.g. "Position 3, mic. 5 ft. high". Having made a number of recordings, play them back and compare them.

Vocalist with piano accompaniment: To record a vocalist with piano or any other instrumental accompaniment using only a single microphone, you will probably find that the bi-directional, ribbon type is best. The vocalist, of course, will be on one side and the instrumental backing on the other. One of the most important things to remember is that the accompaniment should be sufficiently soft to enable the vocalist to perform naturally and not have to shout to be heard above the instruments.

The vocalist should be about eighteen inches from the microphone and the piano about five feet or so. In the case of a crooning technique, where the sound produced by the vocalist is of low volume, the microphone will need to be much closer.

(To be continued next month)

HERE, THERE AND EVERYWHERE



Tape helps the Marylebone Library

THE Ansafone is an instrument for answering an unattended telephone—it is a piece of simple automation and can maintain a telephone service without human aid". That is the claim by the manufacturers of the Ansafone, and after seeing one of these machines in operation at St. Marylebone Central Library we feel that this claim is completely justified.

It was found at this library that valuable time was lost answering telephone calls. It meant that a Librarian must interrupt the work he was attending to and answer the phone. Mr. Guy, Head Librarian and his assistant Mr Larksworthy discussed the problem and after contacting several large organisations found that there was a machine that would cut down waiting time by answering phone calls automatically, known as the Ansafone. It is done in the following way. On an incoming call the bell is allowed to ring for 10 seconds, at the end of which the instrument answers with a recorded message of approximately 14 seconds duration. (This announcement cannot be varied by the owner or user of the instrument except by application to the manufacturers.) When this message has been relayed the caller may record the details required. The total recording time available is 60 minutes made up of one or more messages and a full 3 minutes recording time is always guaranteed. If the caller should speak for the full sixty minutes, towards the end of this period a pre-recorded announcement will advise them that the instrument is about to disconnect itself from the line. If less than three minutes is available on the tape the machine will not answer and the bell will keep ringing. If the caller should stop speaking for a period which exceeds 10 seconds, a pre-recorded announcement of termination is made at the end of which the machine disconnects itself and is then ready to receive further calls. Although the instrument is always connected to the phone, calls can be made or received in the usual way. The recording level is controlled automatically to compensate for the good and bad lines and soft and loud speech.

This system was ideal for the library. It allowed people wishing to retain their books for a further period to phone, record their book number and the date issued and save them the trouble of travelling to the library.

Underwater music on tape

THE Olde Fellbridge Hotel, East Grinstead, Sussex, recently became the first hotel in Europe to have a solar heated swimming pool. Called the Bahamas Pool, it provides salt water bathing at temperatures from 10 to 20 degrees above normal.

The pool is also the first to incorporate underwater music, which comes from a specially designed loudspeaker linked to a general sound system for background music, on the Reditune endless tape principle. The underwater music is part of a very comprehensive and flexible system supplied and installed by Magneta (B.V.C.) Ltd. This incorporates a 50 watt amplifier serving twenty-four speakers, which are operated on eight circuits to distribute sound in other parts of the hotel. The sound system enables VHF interference-free radio and continuous recorder music to be broadcast and a calling and paging service operates from the same instrument with provision for microphone announcements to take priority on all circuits.

Electronic Stethoscope

A novel scientific use of a tape recorder has been found by a doctor engaged in investigating the noises which can be heard in the heads of patients suffering from certain forms of neurosis by means of Soniscope electronic stethoscope. It was necessary to record these noises for further hearing by other doctors, and the only instrument for this purpose was a tape recorder. With the assistance of E.M.I.'s miniature dictating machine—the Minifon Attaché—a suitable attenuator circuit was assembled for connecting the stethoscope to the recorder. The interesting experiments were featured in a paper read at the recently held Third International Conference on Medical Electronics at Olympia.

Ampex distributors name change

THE name of the company marketing Ampex Professional recording equipment in the United Kingdom has been changed from the Redwood City Engineering Ltd., to Ampex Great Britain Ltd. They will continue to perform the sales, service and liaison functions previously carried out by Redwood City Engineering Ltd. Offices of the renamed firm, a subsidiary of Ampex International S. A. Fribourg, Switzerland are adjacent to Ampex Electronic Ltd., Reading, Berks.



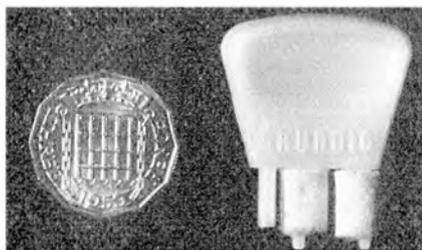
Al Burnett and Ann Austin of the Pigalle Club in London took their Grundig "Cub" battery recorder to London Airport to greet American cabaret star Steve Rossi (left) who is here to perform at the Club.

HERE, THERE AND EVERYWHERE

Londoner Wins Emitape Silver Challenge Cup

THE Emitape Silver Challenge Cup for the Tape of the year, entered in the Competition Section of the 1960 British Amateur Tape Recording Contest organised by the *Tape Recording and Hi-Fi Magazine*, has been won by Mr. N. Paul of London for his 15 minute tape entitled "The Rest is Silence." Club section winner was Mr. C. J. Garrett of Tonbridge, for his tape entitled "Ban the Phon" and the School Section award went to Mr. P. J. Kingston of the Stanground V.C. Primary School, Peterborough, for their tape entitled "Our School."

Mr. Paul's winning tape, described the tense drama of a condemned man's last hours before going to the gallows. It was made with members of an amateur dramatic group in Muswell Hill. Beside the Emitape Cup, Mr. Paul also won a Truvox R6 Tape Recorder presented by the manufacturers together with a cheque for £10 and a certificate presented by the magazine sponsoring the competition.



The "Grunbug"?

A tape-cleaning attachment is now supplied with the Grundig TK24 4-track recorder (see photo). This plastic

attachment has three prongs, two fitted with felt pads round which the tape travels to remove dust and other foreign particles. It fits into three holes in the deck of the recorder.



A Fi-Cord reports the Show

WITH the experience of several year's foot-slogging around Radio Shows, Audio Fairs, and the rest, behind us, and the difficulty of note-taking while carrying cameras etc., we decided to give a try to the new Office Dictating system from Fi-Cord, described in these pages last month.

The 27 ounce Fi-Cord 101 was found to be ideal for verbal note-taking as we visited the various Stands and Demonstration Rooms. Instead of laboriously writing down the details of new products on show, or items of special interest, we simply spoke the information into the built-in microphone. Better still, we often persuaded the Exhibitors to record the story, but in all too many cases we found that they were so intrigued by this new midget machine that we had to reciprocate and give a demonstration ourselves!

This last aspect made it very necessary for us to make the fullest possible use of the *Wind On* and *Wind Back* facility—which is controlled by different degrees of pressure on a single control button—and the Digital Position Indicator was fairly whizzing round as we wound on to demonstrate, and returned to our previous setting for further note-taking. We relied on the Indicator entirely, and it never once let us down. Associated with this numerical indication is a useful accessory in the shape of a pad of Memo Cards. Using these, we were able to jot down brief notes of where exactly on the tape our most important items were recorded. Back at the office, transcribing of these notes on to a typewriter was plain sailing, and except for the softening of a few superlatives, which had somehow crept into the notes dictated by actual Radio Show exhibitors, we had the whole Exhibition taped. Our photograph shows John Borwick recording notes on the G.E.C. Periphonic loud-speaker system which is being explained by G.E.C.'s Dennis Humphriss. Information on the Fi-Cord 101 may be obtained by writing to Fi-Cord Ltd., 40a Doves Street, London, W.1.



Auditions were being held every afternoon at the "Boys and Girls Exhibition" at Olympia recently. The Leslie Paul trio were ready to play almost any number, and Olympic Sound Studio's sound engineers were on hand to record members of the audience. A panel of judges including such well-known people as Cliff Richard, his manager, Tito Burns, and the Editor of Disc, Gerald Marks. The prizes included a recording test with a well-known record company, a long week-end in Vienna for two, and a Stuzzi Magnette battery portable tape recorder.

NEWS AND PICTURES FROM THE WORLD OF TAPE



First "Trade" broadcasts ever

MR. G. S. TAYLOR, Chairman and Managing Director of Grundig (Great Britain), Ltd., is seen above recording an announcement opening a series of special radio programmes to the tape recorder trade. These programmes will be transmitted from Radio Luxembourg, commencing on September 23rd.

The Tape Recorder Centre in Central London

THE North London Showroom of the Tape Recorder Centre has long been known as one of the best places to visit when shopping for tape recorders and Hi-Fi equipment. Hundreds of different makes are always in stock and so conditions are ideal for inspecting and comparing various types before purchase. The staff are experts on their subject and can be relied upon to advise where necessary. We now learn that a new branch Showroom has been opened at **82 High Holborn, London, W.C.1. (Chancery 7401).**

P.S. Opened Monday—crowded Tuesday—raided Wednesday! The new Tape Recorder Centre Ltd. showroom had only just been stocked up with a display of hundreds of models and makes of tape recorders and Hi-Fi equipment. It was crowded



M.S.S. Calculator

THE M.S.S. Recording Co. Ltd., have produced this handy calculator for tape recorder enthusiasts. Printed with playing times for all grades of tape, reel size, and tape lengths at speeds of $1\frac{1}{2}$, $3\frac{1}{2}$, $7\frac{1}{2}$ and 15 i/s, and costing 2s. 6d., it is available from retailers stocking Mastertape.

out on Tuesday and aroused great interest from the public. Too much interest it seems, because at 3.15 a.m. on Wednesday morning the 7th September, two men drove up on a motor scooter outside the Tape Recorder Centre, smashed the plate glass with a dust-bin lid, grabbed a most valuable recorder and made off. The noise attracted the attention of a police officer but the raiders got away on their scooter.

MR. H. A. Spender would like to hear from anyone interested in forming a Russian Language Tape Club. It is hoped to record "Russian by Radio", which is transmitted by Radio Moscow; and also enlist the assistance of amateur dramatic groups to record plays and books which have been made available. Full details can be obtained from Mr. H. A. Spender, 169 Henry Prince Estate, Earlsfield, London, S.W.18. Typewritten letters or tapes at $3\frac{1}{2}$ i/s are requested as the Mr. Spender is partially blind and would experience difficulty reading handwriting.

AT the second meeting to be held at the St. Georges Hall, Pinner View, North Harrow, **The Harrow Tape Recording Club** enlisted three new members. The treasurer Mr. D. Fisher played back extracts from a varied selection of Fi-Cord recordings, ranging from an interview with West End buskers to a Norfolk Broads holiday tape. The next meeting will be held at the above hall on Thursday, 29th September at 7.30 p.m. More information will be supplied on request from the Secretary, Mrs. T. Fisher, 5 Gloucester Road, North Harrow, Middlesex.

MR. R. V. Huddleston, European Secretary of **Stereo International**, the organisation catering solely for stereo enthusiasts, would like to hear from any reader interested in this branch of recording. No membership charge is required and the only rule is that members must own a stereo recorder. Membership forms can be obtained from Mr. Huddleston, but any enquiries should be sent on tape and not in a letter.

Secretary: Mr. R. V. Huddleston, 33 London Road, Grantham, Lincolnshire.

AT a meeting held on the 19th August at the King's Head, Acton High Street, the **Acton and West London Recording Club** received a visit from Mr. Wells and his team from Cosmocord Ltd. The main point of interest was the new Acos "Stereo 44" microphone, which was stripped down showing the component parts. An impressive demonstration followed showing the capabilities of this microphone when used with a Brenell recorder and Tannoy speakers, and after this a discussion took place which allowed the members to split up into smaller groups to talk to Acos engineers. This enabled questions to be answered on various problems of microphone techniques. Several visitors from other clubs were present showing keen interest in the proceedings. Details of future meetings can be obtained from the Secretary, Mr. D. Wiseman, c/o 8 Woodhurst Road, Acton, London, W.3.

SEVERAL readers in the Taunton area are taking preliminary steps to form a tape recording club. If anyone is interested in this new venture they should contact Mr. R. V. Smith, 83 Priorswood Road, Taunton, Somerset.

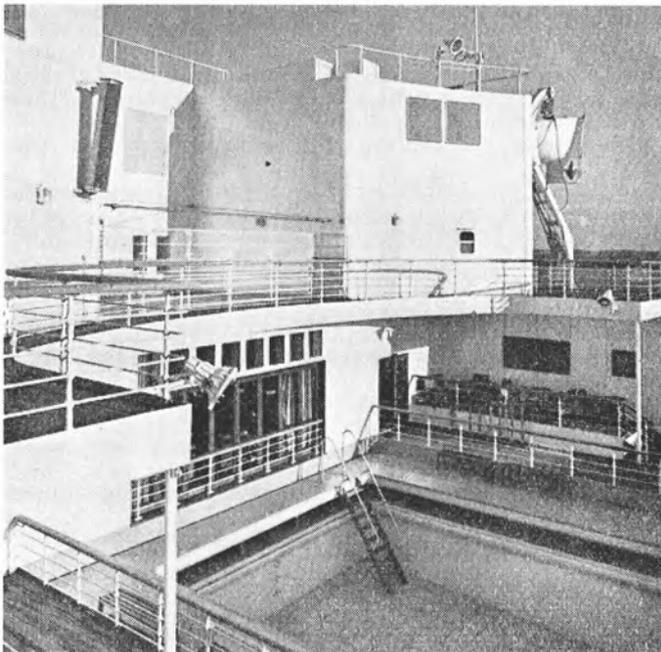
NEWS AND PICTURES FROM THE WORLD OF TAPE

ON the 16th August, Mr. House of Grundig (Great Britain) Ltd. visited the **Brighton Tape Recording Club** showing the range of tape recorders and accessories manufactured by his firm. At a later meeting the club was "at home" to the Eastbourne Tape Club, who provided an interesting evening's entertainment in the form of *Music Concrète* and interviews with holiday makers. New members will be welcome and information of future meetings can be obtained from the Secretary, Mr. R. Vivian, 37 Ditchling Road, Brighton.

Reflectograph playback machine

THE Reflectograph Model "D", which comprises the new professional Multimusic Tape Deck and specially-designed playback pre-amplifier, was shown for the first time to the public at this year's Radio Show at Earls Court. It is believed that the Model "D" is the first British professional machine which has been produced especially for making copies of tapes. It can be used for replaying tapes, when connected to a high-quality external amplifier. The stop and start facilities of the new Tape Deck makes this model particularly suitable for copying and editing. It will also permit copying half-track recordings for use on a quarter-track machine. Both the playback pre-amplifier and power pack are bolted to the main deck for standard rack mounting. The pre-amplifier comprises three stages—two voltage amplifying and a cathode output stage. There is no output gain control. The price of the Reflectograph Model "D" is 55 guineas, and supplies will be available during November of this year. Manufacturers: **Multimusic Ltd., Maylands Avenue, Hemel Hempstead, Herts.**

Sea-borne Hi-Fi



The "Windsor Castle" is the newest vessel in the Merchant Navy, and has tape and hi-fi equipment to match. The photograph shows one of the many column loudspeakers over the swimming pool. Stanley Kelly contributes an appraisal of the audio installation in this month's "Hi Fi News".

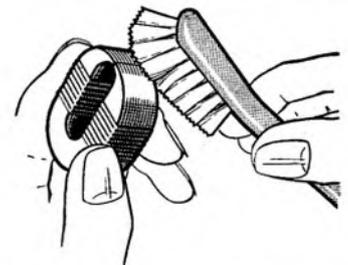


The Directors of Elizabethan (Tape Recorders) Ltd., entertained the Press in true Elizabethan style at the Gore Hotel, London recently. The party was held in the realistic Elizabethan setting of the hotel's "Star Chamber." As the guests entered they were requested by a bearded gentleman in full Elizabethan costume to sign the visitors book with a quill pen and then to start the afternoon with a drink of mead. Serving wenches waited upon them and Mr. Lubin, Mr. Larholt, and Mr. Newland-Smith demonstrated the fine range of 4-track recorders introduced at this year's Radio Show.

TAPE TIPS — by Guy

— No. 1 —

Keep the
Erase Head Clean!



ALL manufacturers stress that the heads on a tape recorder must be kept clean but many users do not realise quite how important this is. An erase head, for example, that is coated with the powdered tape coating will not erase properly. This is because the erase flux, due to the alternating erase currents fed into the coils of the head, is shorted through the oxide powder—leaving less demagnetising flux to wipe the unwanted recording from the tape. A soft brush such as a baby's tooth brush is the best cleaning instrument. In case of severe clogging the brush may be wetted with methylated spirit. Polish off with soft cotton cloth.

These tips are abstracted by permission from "How to get the Best out of your Tape Recorder" by Percival J. Guy. Norman Price (Publishers) Ltd. 1958. 8s. 6d. net.

NEWS AND PICTURES FROM THE THE CLUBS



The display of "Hi-Fi News" and "The Tape Recorder" current issues attracted a great deal of attention at the Herbert & Lascelles 12th Exhibition in the Reading Town Halls. This year practically the whole of the smaller hall was devoted to tape recording equipment and accessories. Reading Cine and Tape Recording Society built and manned their own stand, giving an excellent demonstration of how tape recording can be used to add sound to slide projection. Demonstrations were given every hour, using a Paximat automatic projector controlled by a sync unit from a Telefunken Tape Recorder. One member printed an informative leaflet giving the history of the Society and full details of membership, etc. Anyone interested in obtaining a copy of this leaflet should forward a stamped addressed envelope to the Secretary who will be pleased to forward one, complete with full details of future meetings.

Affiliated to the Institute of Amateur Cinematographers, the club has already won several National contests with films produced by members. They are also proud of the fact that they were the first Club in the country to recognise the importance of linking tape with cine. In the past year the membership has trebled.

The equipment on the Society's stand was very impressive, including a home-made bulk eraser, twin turntables with groove selectors, mixers, titling equipment and a parabolic sound reflector mounted on a tripod. This last piece of equipment was built after reading the articles in "The Tape Recorder".

Secretary: D. M. Noyes, 4, Froxfield Avenue, Reading, Berks.

The Coventry Tape Recording Club have received another piece of equipment for the use of members. This comprises a tape deck and pre-amplifier for dubbing purposes. A robust cabinet will allow members to transport this machine to their own home without damage. Future meetings will be held on 29th September and the 13th October. Visitors will be welcomed and further details will be supplied on request from the Secretary, Mr. R. Reynolds, 1 Thurlstone Road, Coventry.

Visiting Whipsnade Zoo to record sound effects provided members of the West Middlesex Tape Recording Club with the opportunity of testing their portable equipment. However it

appears that very few sounds were recorded due to the poor co-operation of the animals. Nevertheless three portables were used and the results were played back at a later meeting when it was decided to produce a feature tape later in the year. Future meetings will be held on the second and fourth Thursday of each month, any person wishing to attend should contact the Secretary, Mr. H. E. Saunders, 20 Nightingale Road, Hampton, Middlesex.

The Harrow and District Recording Club held its first meeting at their new club premises in North Harrow. 15 members attended the meeting, and the new committee was elected. Future meetings will be held on 29th September and 13th October at St. Georges Hall, Pinner View, North Harrow, commencing 7.30. Further details from the Secretary, Mrs. T. Fisher, 5 Gloucester Road, North Harrow, Middlesex.

Mr. J. C. Webley, 34 Silver Lane, West Wickham, Kent, is anxious to correspond on tape with any person in America and Spain. Anyone interested should contact Mr. Webley at the above address.

Another person interested in correspondence by means of tape is Mr. M. Geldenhuis, P.O. Box 3, Bredasdorp, Cape Province, South Africa. Tapes would be welcome from either sex on matters of everyday interest. Tape speed of 3½ in. only.

Thirty-seven members attended the meeting of the Coventry Tape Recording Club to hear talks on "The Best Ways to Record from the Radio", "Commandments of Conscriptio", and "The Law of Copyright". Mr. Peter Warden produced a recording of an interview with the two British Army Sergeants who spent their leave walking across America—thus proving to members that bringing a tape recorder to a club meeting was simple compared to that Marathon!

Secretary, R. V. Reynolds, 1, Thurlstone Road, Radford, Coventry.

We have received a letter from Tape Aids for the Blind (South Africa) giving details of the free Library Service available to the Blind. A charitable non-profit-making concern, this organisation already has 108 English, 30 Afrikaans and several German books, plus 6 English periodicals and a special selection which are all stored on "master tapes". Copies are dubbed for blind listeners (who must own a tape recorder and at least one reel of tape).

The Studio is equipped with Revox semi-professional recorders, and Lustraphone microphones—in the near future they hope to instal Goldcrown Imperial Professional recorders. By arrangement with the Post Office, the tapes are carried free through the post. All work is done on a voluntary basis, and funds are provided by public subscription. Enquiries should be addressed to R. Davimes (Hon. Librarian), 806/807, Payne's Building, West Street, Durban, South Africa.

A demonstration of equipment including the Ferrograph and Stuzzi recorders, provided the members of the Rugby Amateur Tape Recording Society with an excellent opportunity of comparing their equipment with the recorders on show. Mr. A. W. Dakin, Technical Director of Nottingham Tape Recorders Ltd., and his assistant Mr. A. Lowe, described the main features of the recorders, and ended with a demonstration of the first recording ever made on disc in 1912. Many exciting meetings

NEWS AND PICTURES FROM THE THE CLUBS

have been arranged: readers interested in attending a club night should contact the *Secretary*: M. Brown, 219, Clifton Road, Rugby.

Final preparations are being made by the **West Middlesex Tape Recording Club** to provide a person-to-person message scheme for patients in the Hillingdon Hospital. Inter-ward messages are also planned for patients unable to move about the hospital. At a recent meeting, three demonstrations showing the use of cathode ray oscilloscopes, soldering techniques and dubbing, editing and splicing were given. Four members provided equipment for the lectures and extra-keen interest was displayed in the technical side of the subject.

Secretary: H. E. Saunders, 20, Nightingale Road Hampton, Middlesex.

At an inaugural meeting held at the Naval Base on the island of Singapore, it was decided to form a club suitable for tape, disc and hi-fi enthusiasts, to be known as the **Singapore Naval Base Tape and Disc Club**. Plans are already being prepared for future meetings and the secretary would be pleased to hear from any club in this country suggesting suitable and interesting programmes.

Secretary: R. S. Hellyer, c/o R.N.A.D., H.M. Naval Base, Singapore, 27.

Anyone wishing to assist in the formation of local tape clubs in the **East Sussex** and **Dartford** areas should contact the persons named below.

East Sussex area: Mr. H. R. Chapman, "Little Tysoe", Churchland Lane, off Hurst Lane, Sedlescombe, Battle, Sussex.

Dartford area: Mr. E. H. Foreman, 117, Westgate Road, Dartford, Kent.

A Wyndor Tape Recorder, Serial No. 9675, was stolen from the home of Miss M. J. Bather, 43, Whitehall Park, London, N.19., on the 3rd August 1960. Any reader receiving information regarding this machine should contact Miss Bather at the above address.

Members of the **Nottingham Co-operative Amateur Tape Recording Society** visited the City of Nottingham Fire Brigade recently, interviewed the Fire Prevention Officer and recorded sound effects. Other members toured the offices of the "Guardian Journal and Evening Post" whilst a third section interviewed members of the public in the Market Square. At a later meeting the three recordings were edited, and a programme was compiled entitled "Nottingham Newsreel".

Future meetings: September 29th, "Tape in the Theatre"; October 13th, "Recorders in the Raw"; October 27th, Demonstration of W.B. Loudspeakers and Enclosures.

Secretary: N. D. Littlewood, 129, Standhill Road, Carlton Hill, Nottingham.

A ten-minute feature programme on Ilford's talking newspaper for the blind, produced by **Walter Gillings Sound Features**, was broadcast in the Pacific Service of the B.B.C. and included in the fourteenth edition of *What Goes On Here* at Ilford. Walter and Ronald Gillings, the father and son team who produced these programmes, reviewed three weeks' local news for the Blind Social Circle. When interviewed by Mr. Sparke, of *Calling Australia*, Walter Gillings spoke of his plans for a National sound magazine for the blind which will be distributed to groups and individuals throughout the country.

Walter Gillings: 115, Wanstead Park Road, Ilford, Essex.

Hull and District Tape Recording Society are the latest to join the ranks and although they have only been formed for one



The Ilford club gather round to hear their chairman, Dr. P. Ager (bottom left) describe how he uses his Fi-Cord recorder professionally and as a hobby.

month, already 18 members have enrolled. With the co-operation of local dealers they are distributing leaflets throughout the district and new members are joining at each meeting. If any reader in that area would like further details, contact the Chairman:

K. Fulston, 17, Lowfield Road, Anlaby, Hull, East Yorks.

At the General Meeting of the **Ilford and District Tape Recording Society** it was announced that a Tape Recording Course would be held commencing September 13th. The session will be held for the first hour of each meeting and will include lectures beginning with the basic principles of recording. After the business for the future months had been decided, Mr. K. Hartman demonstrated his Fi-Cord, and Mr. Faulkner took photographs. One is reproduced on this page showing members taking keen interest in the machine. This prompts us to remind Club Secretaries that we would like to receive interesting photographs of club meetings and activities. All correspondence should be addressed to the Editor.

It has been suggested by Mr. J. Hone, a reader of *The Tape Recorder*, that Clubs should be formed for certain makes of tape recorders. This certainly is a new approach to consider. It would be styled on the present-day car clubs, i.e. M.G., Lagonda, Bentley car clubs, etc. If any reader has any views on this subject please let us know and we will publish any interesting letters.



OCTOBER NUMBER

★

Contents include:

- Building the TWA/1515D Stereo Tape Amplifier
- Readers' Hi-Fi Furniture Designs
- For your Better Listening Equipment and Record Reviews

★

NOW ON SALE

hi-fi perfection with enough volume to fill a small hall on BATTERY or MAINS

Walter
'TRANSISTOR'

BIG OUTPUT!

2 WATTS PLUS
UNDISTORTED

BIG REELS!

5 $\frac{3}{4}$ " TO GIVE 3
HOURS PLAYING TIME

The only **BIG** recorder
with **BIG** performance
on **MAINS** or **BATTERY**

Note these other features:—

Revolution counter · Completely transistorised
Mixing facilities · Superimposing facilities
40/15000 cycles amplifier response
Signal/Noise ratio better than -40db.



55
GUINEAS
(Batteries extra)

The **WALTER** records or plays **Outdoors**
or **Indoors** . . . anywhere . . . everywhere

Double your fun with this revolutionary tape
recorder. It makes you independent of mains
electricity supplies; yet it's full size (takes 5 $\frac{3}{4}$ "
reels) and gives you **BIG** 2 watt output and faith-
ful reproduction on batteries or on mains.

WALTER INSTRUMENTS LIMITED, GARTH ROAD, MORDEN, SURREY. Tel: DERwent 4421

By N. W. Bridge

HIGH QUALITY TRANSISTORISED MIXER UNIT



THE writer recently constructed a 15-watt amplifier using OC16 transistors for the output, to a Mullard circuit. The inter-connection arrangements for the amplifier, signal input, loud-speaker and 12 volt DC power supply were arranged to be very simple, and foolproof, with no controls whatever on the power amplifier. The microphone, to be used with it when a P.A. system was required, was housed in an old Tannoy carbon microphone case which contain the first stage transistor amplifier too. The press button switch of the microphone housing was removed, and the volume control put in its place, so that the output is under the immediate control of the speaker. For more involved work, however, it was decided to design a mixer-preamplifier unit with three inputs, each of high or low input impedance, which could be plugged straight into the power amplifier instead of the single microphone, or into any other power amplifier as necessary.

The requirements were that the unit should be small and light, have a fader for each of the three inputs (but no other volume control), and bass and treble tone controls. The inputs should all be jack sockets, arranged so that plugging into one gives a high input impedance and plugging into its neighbour gives a low input impedance. The input signal may be from a few millivolts to 0.1 volts or more, and the output signal up to about 2 volts. The power is derived from the main amplifier supply, and is about 15 mA at 14 volts., plus 60 mA for the pilot light. The frequency response is level to over 50 Kc/s, and down to 50 c/s, being 3 dB down at about 30 c/s. All transistors in the original unit are OC44's, but other types can be used with possible reduction of frequency response and increased noise.

Input circuits

In order to get a high input impedance, an emitter follower is used for each of the input stages, V_1 , V_2 , and V_3 . The three stages are identical except that in the writer's unit, the middle one has a switched fader instead of potentiometers like the other two. This is not essential, of course, but it means that inputs can be increased or decreased by known amounts, and reset exactly at any time. Further, the contact is less noisy (though more expensive). The 11-way switch goes down in steps of 3 dB as far as 21 dB below maximum, then 27 dB, then 39 dB down,

Building the mixer into this rugged metal box produced an eminently portable unit, easy to operate, and only 1½ in. deep.

and off. It also happens to be continuously rotatable, so that maximum volume may be obtained immediately from zero, and no-one can wreck the switch or loosen the knob by trying to turn it against a stop.

To avoid extra switches for changing the input impedance, two jack sockets were used for each input, J_1 and J_2 , J_3 and J_4 , J_5 and J_6 , and the contacts arranged so that with a plug in J_1 , J_3 , or J_5 , one side was connected straight to the emitter follower input, and the other side earthed through the contacts on J_2 , J_4 , or J_6 respectively. If a plug was in J_1 , say, and another in J_2 , neither would produce a signal, because that connected to J_2 would not be earthed, and the signal side of the transformer secondary would be disconnected from the amplifier.

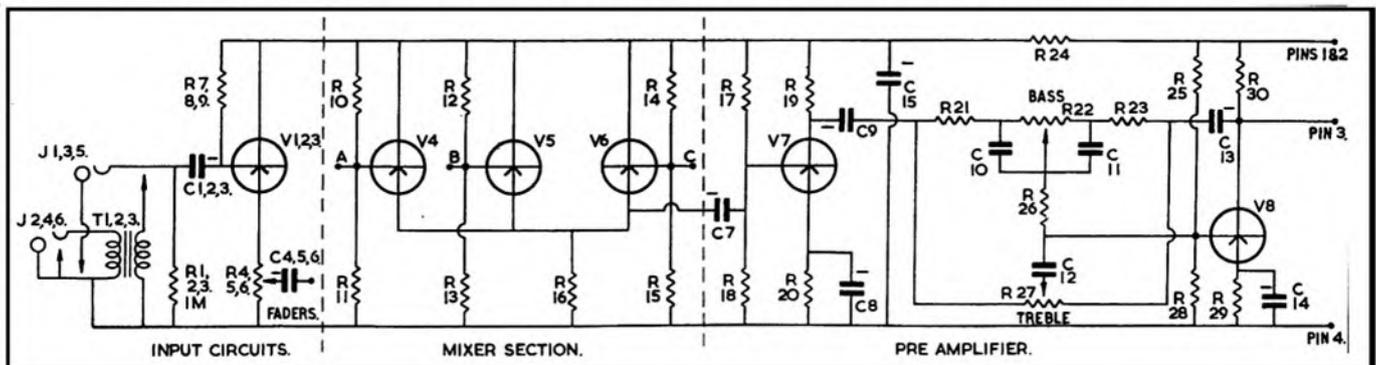
With a jack plug in either J_1 or J_2 alone, the signal gets through either direct, or via the step-up transformer, as necessary. The impedance of the microphone, pickup, etc., is not critical, over a wide range, for each input. The easiest way to explain its use to the non-technical is to say, "Plug it into whichever hole gives the louder output!" The three fader outputs then go to the mixer.

Mixer

This is simply three transistors with a common emitter resistance R_{1a} , and individual biasing resistors R_{1b} , R_{1c} , R_{1d} , R_{1e} . No doubt a common collector resistance would be just as good here, but has not been tried since the first arrangement works well. The crosstalk is kept down to a negligible level, and rotating any fader (with no signal on that channel) has no noticeable effect on the output signal from any other channel, which is as it should be. Each of the mixer transistors passes about 2 mA collector current.

Pre-amplifier and tone control circuits

Having decided long ago that the Baxendall tone control circuit is the best in valve amplifiers, the author decided to make a transistorised version. This worked very well, so is used in





Half the fun
of owning a tape recorder
lies in discovering

the hundreds of different,
exciting things you can do with it.

This free book written for you
by twelve top stars is full of fun,
entertainment and ideas.

Read Tony Hancock on public speaking
and Joan Regan on home movies,

see what David Nixon

Eric Robinson and many other

names in show business have to say
about their tape recorders;

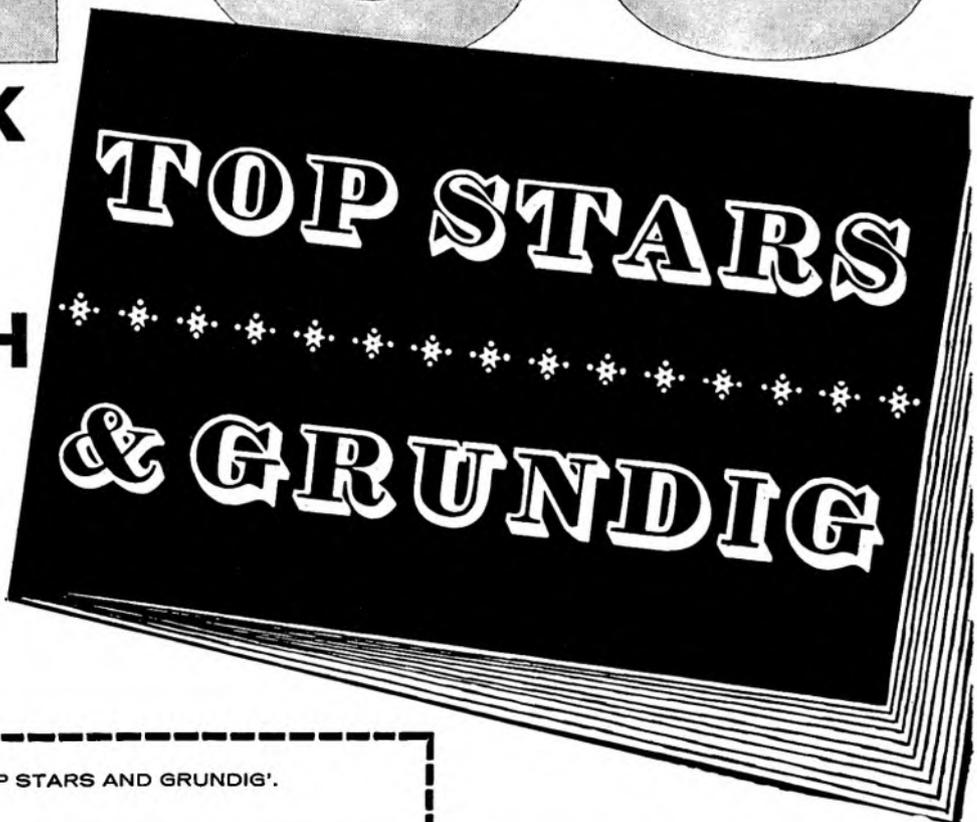
write today for a copy of

'TOP STARS AND GRUNDIG

free

**BOOK
OF
THE
MONTH**

for
tape
recorder
fans



Please send me my free copy of 'TOP STARS AND GRUNDIG'.

NAME.....

ADDRESS.....

NEAREST TOWN.....

GS.TR.247

GRUNDIG (GREAT BRITAIN) LTD.

Advertising & Showrooms:

39/41 New Oxford Street, London W.1.

Trade enquiries to:

Newlands Park, Sydenham, S.E.26.

(Electronics Division, Gas Purification & Chemical Co. Ltd.)

TRANSISTOR MIXER—(continued)

the present unit. Roughly speaking, the resistors used are about a twentieth of the values used in the standard valve circuit, and the capacitors about twenty time their corresponding values, for a similar frequency response. A path to ground, from the centre of the treble control (or its ends) is not needed here because of the individual biasing of the transistor V_8 , and a further blocking

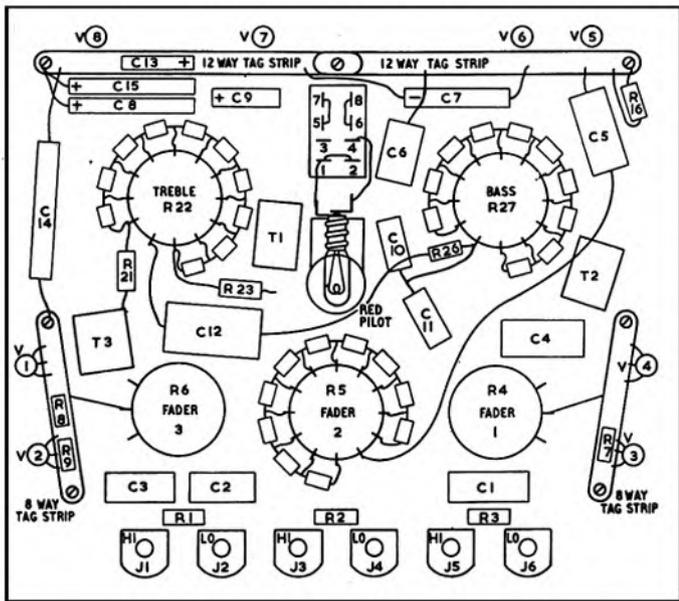


Although space is limited, the components are not unduly crowded.

capacitor is not needed for feeding the base of V_8 , because of C_8 and C_{15} . The output from the collector of V_8 is at about -6 volts DC, so a blocking capacitor may be needed here, but one is not used in the original because of the input capacitor of the power amplifier it is designed to feed. The signal output should be more than enough to feed any standard power amplifier.

Construction

The details of construction are very much a matter of individual preference, since some people swear by beautifully neat tagboards, while others get identical results electrically with a rat's nest, but the layout of the original is shown in the wiring diagram. It may not be optimum, and it certainly limits the size



Layout is not particularly critical, and was dictated by the box used. However, the above diagram indicates the wiring arrangement.

of components used, but a box $8\frac{1}{2} \times 7\frac{1}{2} \times 1\frac{1}{2}$ in. deep was obtained in London for a nominal sum, and looked ideal for the job. It had three holes suitably placed for the faders, and four below these (which were slightly enlarged to take jack sockets) in the top panel. Two further holes were made for the other two jacks, and a piece of paxolin (attached to the top panel) was replaced by a piece of aluminium, with holes for the tone controls, the pilot lamp, and a Painton 8-way connector. This latter was solely to ease connection with the original power amplifier, and for other amplifiers could be replaced by any signal socket and power input leads.

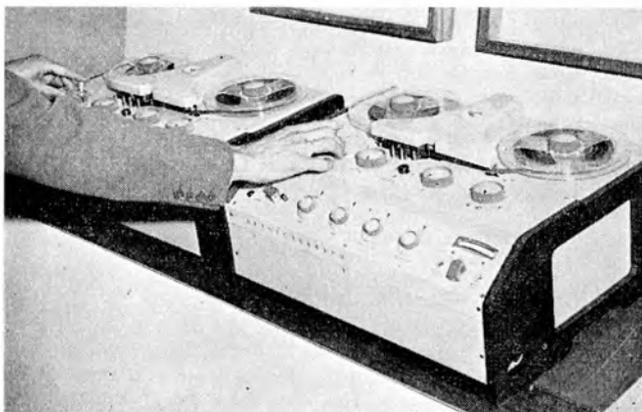
Batteries may be built in

If required, the input jacks could be altered, and a couple of 6.5 volt mercury batteries put in the case, arranged so that plugging into any input switched the unit on, and no external supply would be necessary. However, since the present unit was designed to plug straight into a transistor amplifier, the simplest way was obviously to take the supply from that amplifier. It also happens that no power is supplied to either unit till the two are connected together, even though the battery is connected to the power amplifier plug. Thus, apart from the remote possibility of plugging a microphone in where a speaker should go, the whole system is virtually foolproof.

The case was already black crackle finished, and when fitted with a chrome handle, looked quite presentable; which according to some, is a change from some of the author's other apparatus!

COMPONENT LIST

Resistors		Capacitors	
R1	1M	C1	100 μ F
R2	1M	C2	100 μ F
R3	1M	C3	100 μ F
R4	15K	C4	100 μ F
R5	15K	C5	100 μ F
R6	15K	C6	100 μ F
R7	68K	C7	100 μ F
R8	68K	C8	100 μ F
R9	68K	C9	40 μ F
R10	33K	C10	0.1 μ F
R11	6.8K	C11	0.1 μ F
R12	33K	C12	2.2N
R13	6.8K	C13	40 μ F
R14	33K	C14	100 μ F
R15	6.8K	C15	100 μ F
R16	330 ohms		
R17	47K		Miscellaneous
R18	10K		
R19	3.3K	2	12-way } Tag
R20	1K	2	8-way } Strips
R21	2.7K	1	Pilot Light
R22	50K (see text)	1	8-pin Painton Chassis
R23	2.7K		Mtg. male connector.
R24	3.3K	3	Small Knobs
R25	47K	2	Large Knobs
R26	22K	2	Miniature Mic.
R27	50K (see text)		Transformers.
R28	10K	6	Jack Sockets
R29	1K	8	OC44 Transistors
R30	3.3K	2	15 K Potentiometers.
		3	11-way Switches



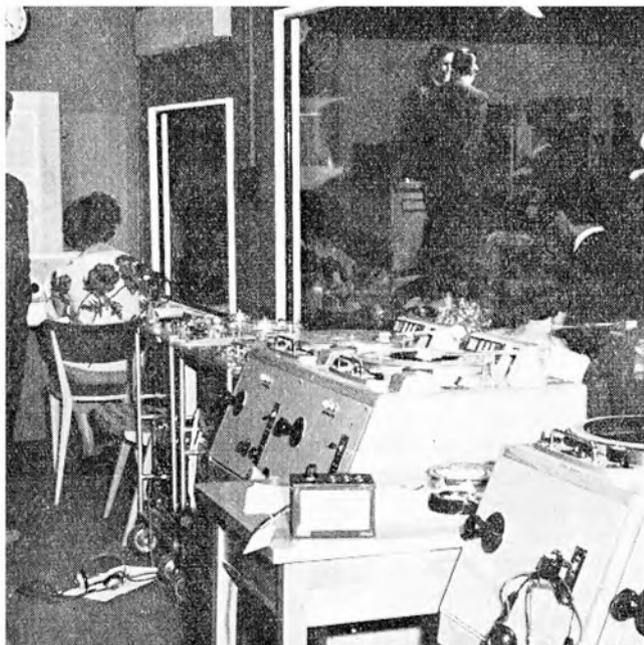
The new Reflectograph Model "D" playback machine (left) was producing fidelity dubbings to the Model "A".

THE Audio Hall was much less representative than in previous years and was, therefore, to our minds, much more disappointing. The fact that practically all the large radio manufacturers have now produced at least one tape recorder in some way compensated, but since these new machines are all in the lowest price bracket it must be admitted that there is a certain sameness about them.

All together 31 exhibitors were demonstrating tape recorders and, perhaps, the most important development was the appearance of 4-track machines—noticeably those of **Elizabethan**, **Multicore**, **Sound**, and **Fidelity**. The greatest argument for these 4-track tapes (see the discussion by James Moir elsewhere in this issue) is, of course, the 50 per cent. saving in tape for a given length of playing time. This saving will apply to monaural as well as stereo tapes, and it is expected that 4-track tape records will soon be available in this country in large quantities.

Elizabethan 4-track

An ingenious approach to the 4-track idea was shown by **Elizabethan**. Here the FT3 recorder, which is 4-track monaural only, may be converted to stereo replay by the addition of an auxiliary amplifier and loudspeaker unit. This extra device is

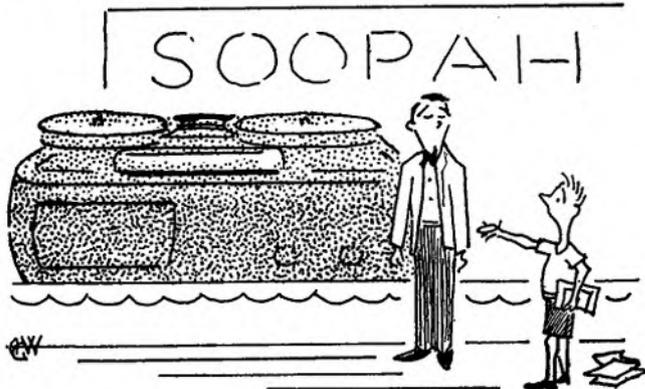


Behind the scenes at the BBC Gramstand we were privileged to see the Engineers and Studio Managers at work.

TAPE AT THE RADIO SHOW

• We always enjoy our annual Pilgrimage to the Radio Show at Earls Court and in company with David Wedgebury (photographer) and Alan Watling (cartoonist) we covered most of the 11 acres and 156 demonstration stands. This was a year of consolidation rather than of startling new inventions, but nevertheless there were all together 31 exhibitors of tape machines. Our report has not attempted to be exhaustive but confines itself to a few highlights.

shown in one of our photographs, the 2 halves being easily fitted together to form a carrying case identical in size and appearance to the main recorder. It was emphasised that in this way customers may convert to stereo at any time after



"Could you play this message tape for my mum?"

purchasing the recorder and need never feel that their equipment will become out of date.

The latest addition to the **Reflectograph** range is the Model D. This is a playback only instrument and costs 55 guineas. Our photograph shows a Model D and Model A in use for the quality dubbing of tapes. Instantaneous comparison between the input and recorded signal allows copies to be made which are indistinguishable from the original tape. We were able to examine also the new "Bib" accessories, which include a useful tape calculator and a tape labelling system.

Gainsborough giant

On the **Gainsborough** Stand a giant model of the Gainsborough Mark 1 came in for a lot of attention, and we heard someone remark "I've heard of midget recorders, but this is ridiculous!" Gainsborough have been doing a great deal of development work of late and their Mark 2 and Mark 4 recorders were given convincing demonstrations. The latter is described as a semi-professional machine and incorporates separate record and playback amplifiers and three speakers.

Other complete recorders whose names are well known to readers were on show at the stands of **Brenell**, **Ferguson**, **HMV**, **Lee Products** (Elpico), **Perth**, **Regentone**, **Trix**, **Truvox**, and **Walter**. Amongst those which are perhaps less familiar were tape recorders by **Alba**, **Amplion**, **Argosy**, **Defiant**, **Dynatron**, **EAR**, **Echo**, **Ferranti**, **Kolster-Brandes**, **Murphy**, **Peto-Scott**, **RGD**, **Redicord**, and **Symphony Amplifiers**.

The only recorded tapes at the Show were those of **E.M.I. Records**, but every possible tape accessory could be seen in one guise or another. For example, an excellent opportunity was

A ROUND UP OF EXHIBITS IN WORDS, PHOTOS AND CARTOONS

afforded to examine the workings of the various popular tape decks, e.g. those of Brenell, Collaro, Garrard, Multicore, and Truvox. Lustraphone had their usual display of microphones to suit every application and we were particularly interested in their new £15 15s. stereo microphone.

Professionals at work

Although we must confess to a certain amount of disappointment at the tape coverage at this year's Radio Show— compared, for example, with the London Audio Fair (This is no doubt,



"... and for stereo, Sir, you just need ..."

brought about by the public's preoccupation with television sets)—there were the usual unique opportunities to see professionals at work in the BBC Gramophone and Television exhibits as well as those of Independent Television. The slick manner in which tape exhibits and sound effects, etc., were introduced into programme items would make the average tape enthusiast green with envy, and the special Equipment Servicing Exhibit gave many useful ideas on getting down to this important aspect of the hobby.

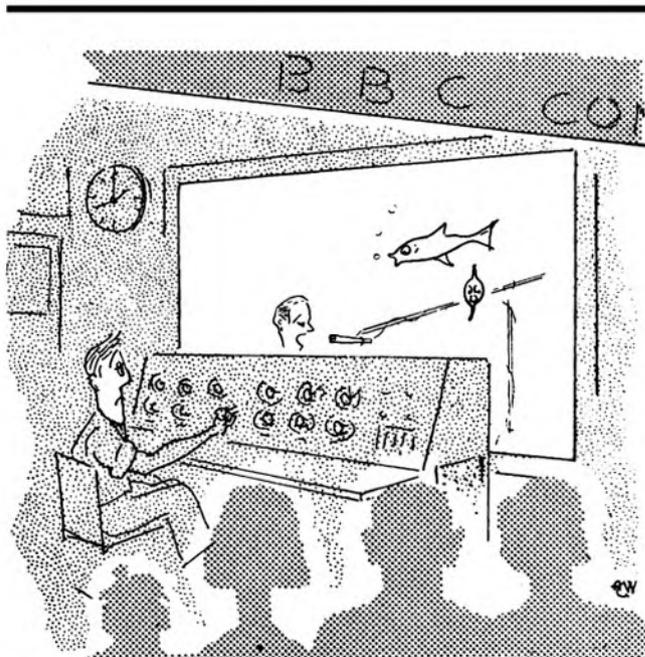


Purchasers of the new Elizabethan FT3 4-track recorder may convert to stereo simply by adding the neat units on the right.



The R10 is the latest recruit to the Repls range of recorders, and in addition to the standard portable version was shown in an attractive console.

The only battery-operated tape recorders to be seen were those at the Casian and Walter Stands. The Casian "Trav-ler", price 29 guineas, was the subject of our field trial in July and is now available with a built-in radio. The latter is also to be produced as a plug-in unit. Just in time for the show Casian had also produced the "Trav-ler Professional". This is a transistorised machine operating at 7½ i/s with no erasing facilities. It is priced at £89 5s., tax paid. We have referred previously to the Walter mains/battery recorder in these pages, and have been promised one for review purposes very shortly. It operates at 3½ i/s and has many facilities normally associated with mains machines, such as superimposing and tone controls, while being fully transistorised and capable of being used anywhere. Its dimensions are 17 × 15½ × 5½ in. and it weighs 17½ lb. Yet another recorder whose power supply arrangements are unusual is the aptly-named "Marine" of Amplion Ltd. To make it suitable for use on board ships this recorder will operate from DC supplies over the wide range of 100-250 volts as well as from standard AC mains. The price is 45 guineas and a standard AC model is also available, price 26 guineas.



A CUSTOM-BUILT STEREO RECORDER DESCRIBING THE CONSTRUCTION OF A HANDSOME MACHINE OF UNIQUE DESIGN

Part Two — The Circuitry

AFTER the brief description in Part 1, you will realise that this is no poor man's recorder. That is unfortunately one of the Laws of Hi-Fi—repealed, it seems, in many advertisements, but nevertheless inexorable—"The higher you go the mucker". To meet the specification at a lower cost one may cut corners in raw materials (like the old TV chassis used here) or "double up" on parts of the circuit by appropriate switching, making playback amplifiers become microphone pre-amps and output amplifiers become recording amplifiers. This undoubtedly saves money, but increases the fault liability and makes quick fault location difficult. There is an easing of construction problems too, when each part of the circuit is designed for one job alone.

Plan of action

The Block Diagram shown was the start of things, and soon gave an idea of the problems involved. Earth connections, power supplies and use of the deck selector switch arcs were worked out on this. Small neons were used for pilot lights to indicate the presence of HT, and to avoid 6.3v AC supplies wandering about the deck switches near sensitive leads. An unexpected bonus was the discovery that a neon "struck" satisfactorily from the high impedance tap of a Mullard oscillator coil, thus showing that Erase volts were, in fact, being generated. (An oscilloscope check confirmed that waveform from the lower tap was unaffected). A corresponding pilot

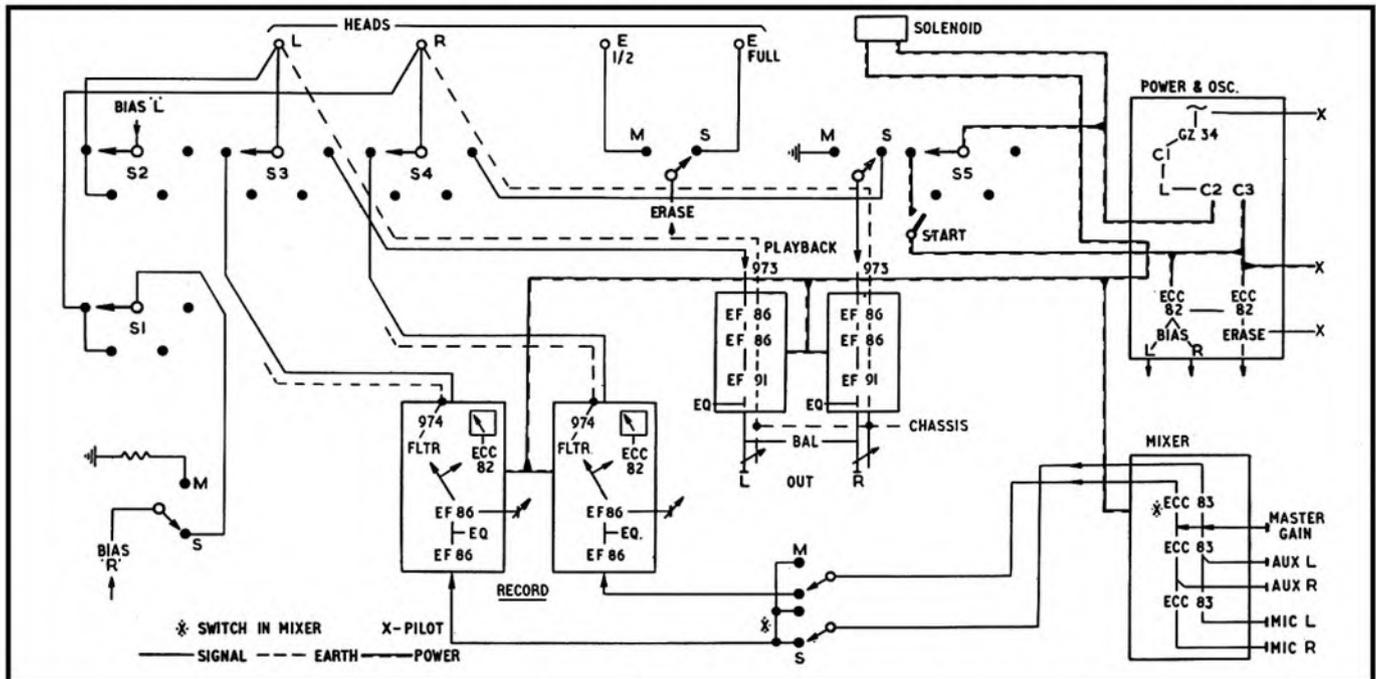
on the oscillator HT gives double reassurance when recording, and a visual check on the voltage available, judged by the brightness of glow.

The playback amplifiers

These were constructed on home-made printed (etched) circuits, mounted in die-cast screening boxes at the rear of the chassis. The advantages of this type of construction were discussed in an article in *Hi-Fi News* February, 1960, with photographs of the assembly. The two boxes were mounted on 1-inch plastic foam to avoid microphony (the individual valves are rigidly mounted in the etched board). The circuit is two stages of straight amplification followed by a high-slope valve round which is the feedback equaliser—bass boost to CCIR limits, and a treble boost to overcome head losses. The output from this stage, via a series resistor, goes to a balance potentiometer between the two channels and then to preset output controls to feed external amplifier equipment. At this point the two earth circuits from the heads are brought together for the first time, and also connected to the chassis.

The mixer

This is a modified version (really two two-channel mixers put together) of Mr. Reginald Williamson's circuit (*Hi-Fi News*, December 1959). It consists of three double triodes on another home-etched circuit. The first ECC83 is the microphone ampli-



The above diagram was worked out before the actual assembly was started on. (See text).

A CUSTOM BUILT STEREO RECORDER

● Last month we gave details of the particularly handsome "stag" dressing table into which the author has built his "no compromise" stereo tape recorder. The construction is described here, and will be concluded next month.

fier for each channel, fed from balanced transformers. The high impedance grid circuit of the original was changed to direct transformer feed, with cathode bias, as it was found difficult to keep the hum-level low enough on the etched board. The second ECC83 mixes in the auxiliary input from each channel. Then comes the master gain control (a two-gang potentiometer) the outputs of which feed the last ECC83, either as a two-channel signal or combined (with the "4/2+2" switch on the control panel) to the left channel only. This flexibility avoids wasting half of the mixer when switched to "Mono." The position of the mixer, upside-down under the control panel, can be seen in fig. 4. The printed board allows connections to be made to potentiometers and jacks which have been positioned for the best control panel layout—the importance of which was stressed in the first article.

The recording amplifiers

These are based on the published Mullard circuit, using treble-lift inductors for pre-emphasis at the higher audio frequencies and an EF86 with cathode feedback to deliver 18v signal to the recording-head transformer. A pre-set gain control and a separate valve/meter level circuit is incorporated for each channel. The level to the meters must also be adjustable, although this can be done at the lining-up stage with fixed resistors.

Cathode follower

From the same point as the meter, a cathode-follower valve supplies a monitor signal for headphone use. The input impedance exceeds 10 megohms, so there is no shunting effect on the recorded signal. Although stereo monitoring with headphones gives an exaggerated stereo effect, it also exaggerates faults in balance and perspective, which is quite valuable. As

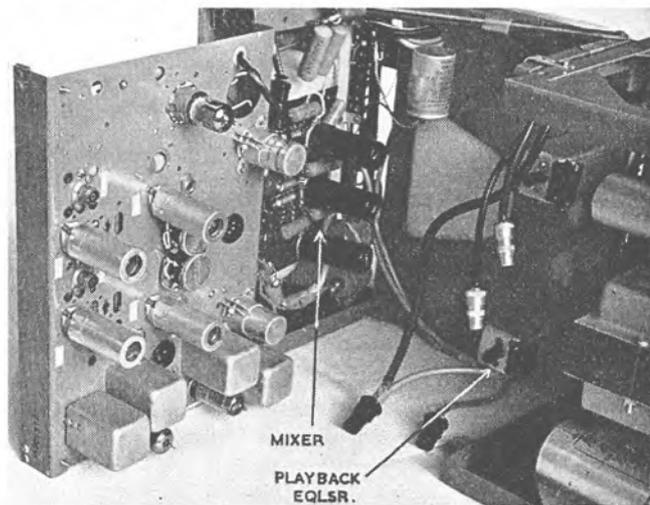


Fig. 4. Record chassis showing mixer on printed board.

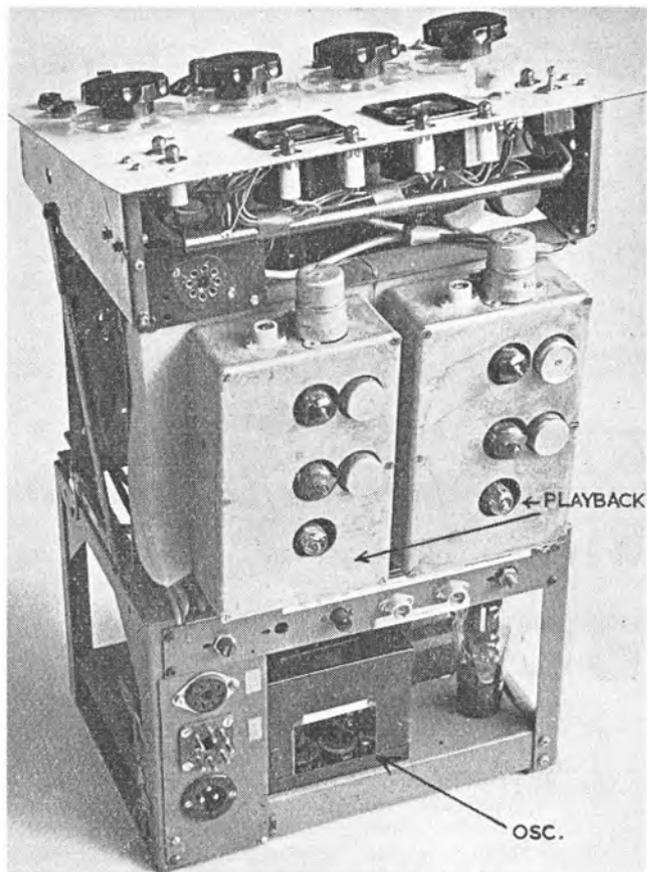


Fig 3. Rear view of main chassis.

will be seen from the photographs, the recording amplifiers were assembled on a conventional chassis (albeit rather crowded!) to allow experimental work to be done from the front while lining up. In particular, several types of pre-emphasis were tried.

The power pack and oscillator

The power supply presented no difficulty, as all the dodges of providing a low-ripple HT supply are well-known by now. The distribution of HT supplies had to be carefully thought out as the oscillator HT is switched at the deck, and a capacitor (C3 on the block diagram) must be tied to the oscillator to allow it to die slowly on switch-off. The deck solenoid has

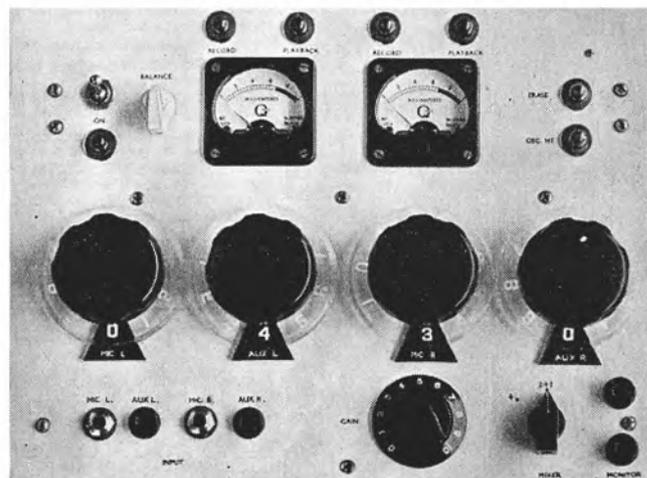
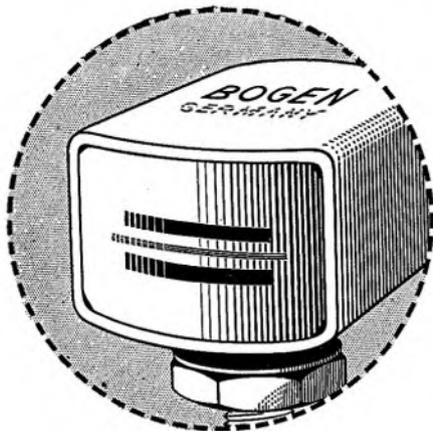


Fig. 5. The skirts on the control knobs are the author's own design.

BUY THE RECORDER

(Stereo
or
Mono)

FITTED
WITH
BOGEN HEADS



BOGEN heads are to be found in the finest recording equipment throughout the world. BOGEN heads are also to be found in an increasing number of well-known British and Continental recorders made for domestic use. Through BOGEN, four track domestic stereo and/or mono recorders are made possible, doubling playing time and providing at $3\frac{1}{2}$ " per second standards better than those often associated with twice and four times that speed. In fact, these heads are used by commercial producers of pre-recorded stereo tapes. With BOGEN you are assured of fine recording and playback, long working life and dependability. That is why you should look for and buy the recorder with BOGEN on the heads, be it two track or four, stereo or mono. They are the world's finest.

4-Track Heads for Stereo and Mono

LEFT—820. 6-ch. Head—108 gns.
CENTRE—SA720. 4-ch. Head—72 gns.

BELOW—SA420. Head for sound or 16 mm. film—11 gns.

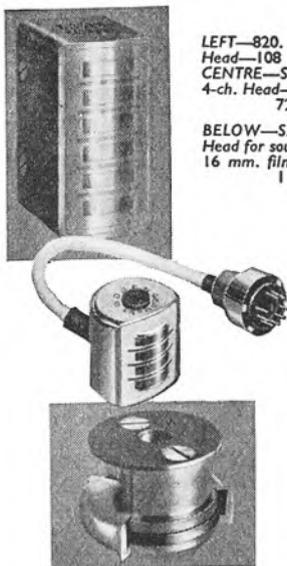
- Frequency response 30–16,000 c/s at $3\frac{1}{2}$ i.p.s.
- Gap—3.5 microns (0.0001375 in.) per channel ground and lapped.
- Magnets—special laminated steel.
- Working life—10,000 working hours; about 10 years normal use.
- Screening—full mu-metal, with colour coded leads.
- Price—set comprising 4-track record/replay head and erase head—15 gns
- Bogen heads are easily fitted. They are characterised by the same standards of manufacture as Bogen heads costing over £100 each.

BOGEN

MAGNETIC HEADS

For further information, please write

GOPALCO LTD.
1, LONG ACRE, LONDON,
W.C.2. Telephone: COV. 2052



CUSTOM-BUILT RECORDER—(Continued)

also to be supplied with at least 30mA, and can be used as an additional smoothing choke.

The oscillator

The oscillator proved to be the biggest problem, and could not be solved without an oscilloscope. Mullard's push-pull ECC82 oscillator was favoured, but did not deliver sufficient power to drive the full-track erase head and two bias supplies. I first decided to use one oscillator to give two stable bias supplies and a second one to supply erase volts—synchronising

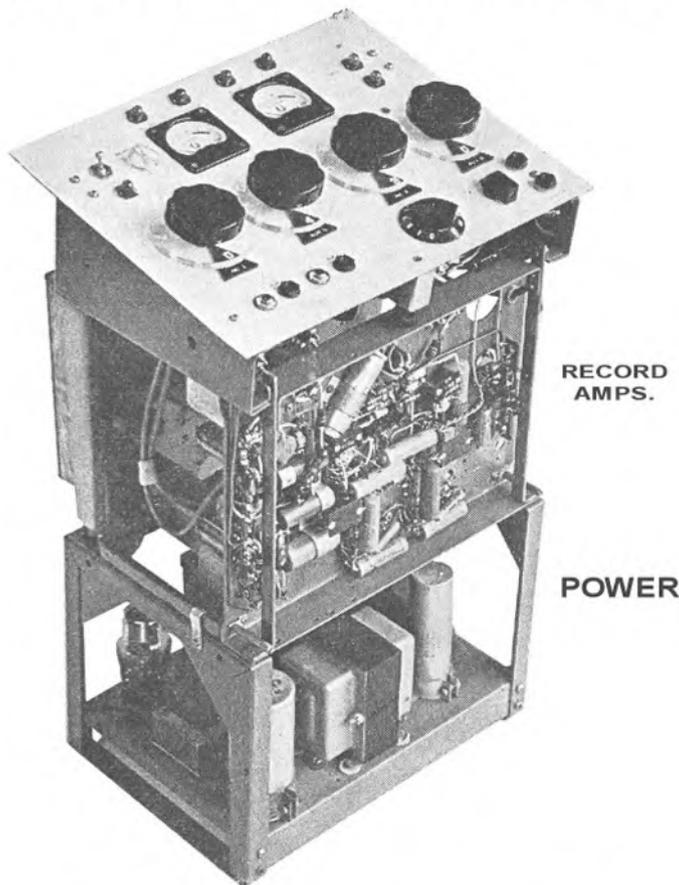


Fig. 2. View of the main chassis showing the record amplifiers.

the two to avoid "beats" (which are not just theory!). However, the erase head itself affects the tuning of the oscillator which drives it, and switching from a full-track to $\frac{1}{2}$ -track erase desynchronised everything! The oscilloscope showed that quite conclusively. Thus I came back to the scheme of driving the second oscillator from the first as a tuned push-pull amplifier, which has worked well. It is worth pointing out that an ECC82 has to work hard on full-track erase and a 6V6, or equivalent, would probably have been a better proposition. Some commercial circuits use the two valve circuit feeding two separate $\frac{1}{2}$ -track erase heads (upper and lower track). (Note: Always use silver mica capacitors to tune the oscillator coils. Ceramics often smoke—however young they are!)

The chassis

The general construction is clear from the pictures. The points to watch are accessibility (the resistor that burns out is always under something), ventilation and a foolproof system of connections to the deck. Label everything you can—it will be blessed a hundred times when you come to "Testing and Lining-up", the subject of the next article. **A. G. Watling.**

4-TRACK RECORDING

A PROFIT-AND-LOSS ACCOUNT

—By JAMES MOIR



FOUR track recordings appear to be the next development in the tape field, and as the first four track machines are now appearing, it may be well worth looking at some of the advantages and disadvantages of the new standard.

An increase in playing time, or what is more to the point, a reduction in the cost per hour of recording time, is the obvious advantage in doubling the number of tracks. The initial cost of recordings has undoubtedly been one of the reasons why tape has failed to displace records as the primary medium of home entertainment. The use of four tracks instead of two on standard $\frac{1}{4}$ in. tape removes the price handicap in a single step. What are the disadvantages?

Track dimensions

Four tracks each 0.043 in. wide separated by unrecorded lands 0.025 in. wide, will now be used instead of two tracks each 0.110 in. wide with a 0.03 in. land between them. There is an obvious loss in signal, for all other parameters remaining the same, the signal that can be obtained from a tape is directly proportional to track width. The reduction from 0.110 to 0.043 implies a signal loss of $20 \log 0.110/0.043 = 7.8$ dB. However, the signal obtained depends on the width of the recorded track that is actually scanned by the replay head. Two

That 4-track recording has really "arrived" is confirmed by the appearance of 4-track machines from many makers, e.g., the Elizabethan FT3 (right) and FT1 (top of page).



track machines use heads 0.09 in. wide, the full track width of 0.110 in. not being scanned to allow for some weave of the tape under the head. No information on the width of head to be used with four track tape appears to be available, but if the same margin of 0.01 in. is allowed on each side of the head, it would only leave a width of 0.025 in., and the signal would be 11 dB below that obtained from the standard two track head. Efforts to decrease the allowance for weave will presumably be made and we may expect that the head will be designed to scan the same fraction of the recorded track as does the head on a two track machine, and the signal will be 8 dB lower on replay.

Noise level

Though the signal obtained on replay is reduced about 8 dB by the reduction in track width, the same change also reduces the noise produced by the track, and thus the signal/noise ratio decreases by less than 8 dB. The noise components being randomly distributed in frequency are not reduced in proportion to the track width reduction, but in proportion to the square root of the track width change. Thus the noise is reduced by $20 \log 110/45 = 4$ dB and signal/noise ratio by $8 - 4 = 4$ dB. It has been claimed that measurement has shown that the reduction is in fact only 3 dB, but no explanation

has been offered for the one dB discrepancy. It might be expected that the sources of noise other than the tape, such as hum pickup in the leads, noise introduced by the first valve, etc., would stay constant and thus the signal/noise ratio would decrease by a dB or so more than the calculated figure (4 dB) rather than a dB less than calculated.

Table 1 indicates the signal/noise ratios that have been claimed for the tape speeds in general use, while Table 2 gives my views on the acceptability of typical signal/noise ratios.

TABLE 1—SIGNAL/NOISE RATIO VERSUS TRACK WIDTH

Track Width	Tape Speed (i/s)	dB
0.25	15	68
0.09	15	61
0.09	7½	61
0.09	3½	58
0.045	3½	55

It should be noted that the basic signal/noise ratio is independent of tape speed but secondary differences arise due to the difference in recording and replay characteristics.

Professional standards

It should be emphasised that the signal/noise figures quoted in Table 1 are values of signal/tape noise obtained under laboratory conditions and represent ceilings which domestic machines can approach, but at the moment are not likely to exceed.

If the value of 55 dB claimed for four track recordings is achieved, it is adequate for almost all purposes. I would suggest that the recording companies will have to do something about their signal/noise ratio, for at present the signal/recording studio noise ratio is well below 55 dB. I have several tapes in which the noise level decreases by some 6-10 dB as soon as the microphones are faded down, well after the end of the

TABLE 2—SIGNAL NOISE RATIO RATING

30 dB	Pre-war 78 r.p.m. records. Tolerable to the non-critical.
40 dB	Acceptable if the programme volume range is low, or the room noise level high.
50 dB	Very good, acceptable to most listeners.
60 dB	Excellent, completely acceptable except when noise is concentrated in a narrow band, i.e. single frequency noise.
70 dB	Acceptable to a very critical listener in a very quiet room.

orchestral performance when the recorded noise is only that from the recording equipment and the studio.

Apart from the problem of keeping the amplifier noise down to a very low level, the designer of a machine faces another problem, satisfactory tracking of the tape. All tapes tend to curl up slightly at the edges and thus lose contact with the head, but while the tracks are wide this is not of great consequence, for an

(continued on page 455)

MSS MASTERTAPE ACCESSORIES FOR YOUR TAPE RECORDER



THE MSS TAPE CALCULATOR

An indispensable aid for everyone owning a tape recorder. Gives playing times for grades, spool sizes, tape lengths at each one of four speeds, at a glance. Price 2/6

MASTERTAPE SPLICING KIT

Contains a generous supply of jointing tape, leader tape, jointing fluid with brush and bib splicer. In attractive box with full instructions. Price 3/76



MEMBER OF THE BICC GROUP OF COMPANIES

Splicing kits and calculators are obtainable at all suppliers of MSS Mastertape. In case of difficulty obtainable direct, post free from the address below. Send also for free literature on all MSS tapes and accessories.

MSS Mastertape

MSS RECORDING COMPANY LIMITED, COLNBROOK, BUCKS
TELEPHONE: COLNBROOK 2431

FRANCIS OF STREATHAM

● The Centre for Prompt Personal Attention and respect for your Pocket

NO EXTRA FOR CREDIT

Minimum deposits and no interest or charges on HP up to 18 months
FREE SERVICE WHILST UNDER GUARANTEE

HIRE SERVICE

Tape Recorders available on hire from 45/- per week

MICROPHONES AND MIXERS

	s.	d.
Lustraphone LD/66 New Dynamic	4	2 6
Lustraphone "Lustrette" M/C	3	7 6
Lustraphone VR/64 Ribbon	7	17 6
Lustraphone LFV/59 Dynamic	8	18 6
Lustraphone VR.65 Stereo Ribbon	30	gns.
Lustraphone Stereo Ribbon V/65 N.S.	15	gns.
AKG Dynamic Stereo, D88, High Z	19	19 0
Simon "Cadenza" Ribbon	10	10 0
Simon "Cadenza" Crystal	3	13 6
Reslo Ribbon	8	15 0
Grundig Mixer	16	16 0

Also by Ronette, Acos, etc. We will gladly advise on the type best suited to your requirements.

HI-FI & ASSOCIATED EQUIPMENT (AT 181 STREATHAM HIGH ROAD)

£	s.	d.	£	s.	d.
Rogers Junior FM Tuner	24	13 5	Collaro 4T200	18	13 0
Armstrong ST.3	26	gns.	Lenco GL/58 less cartridge	19	17 6
Decca ffas P.U.	20	9 5	Garrard 301	22	7 3
Dulci AM/FM	23	15 8	Garrard 301/strob	23	18 4
Jason FM	22	15 8	Garrard 4HF	18	9 9
Jason JTV/2	25	7 3	Leak Stereo 20	30	9 0
Jason "Monitor"	19	16 3	Tannoy Cartridges		
Jason J2-10/MKIII	39	gns.	Loudspeakers by—		
Quad Amplifier	22	10 0	Goodmans, Expert, W.B., Pye,		
Quad II Control Unit	25	0 0	Wharfedale, etc.		

TAPE TO DISC AND TAPE COPY SERVICE

- ★ COMPLETE T.R. SPECIALISTS
- ★ LARGEST SELECTION OF LATEST MODELS
- ★ SEPARATE HI-FI DEPT.

*Brenell Mk. V	64 gns.	*Reflectograph B-½ Tr.	105 gns.
Brenell 3 star	58 gns.	*Saba	79 gns.
*Brenell 3 star Stereo	89 gns.	*Simon SP4	95 gns.
Coscor 4 Track	37 gns.	Simon Minstrelle	39 gns.
Elizabethan Avon	27 gns.	Spectone 161	49 gns.
Elizabethan "Princess"	39 gns.	Spectone 171	39 gns.
*Elizabethan Major	65 gns.	*Telefunken 76 4 Track	64 gns.
Elpico TR.400	26 gns.	*Telefunken 85KL	75 gns.
*Ferrograph 4AN	81 gns.	*Telefunken 75/15	54 gns.
*Ferrograph 4AN/H	86 gns.	*Telefunken 76	62 gns.
*Ferrograph 4AN/S	88 gns.	Uher Universal	79 gns.
*Ferrograph 808	105 gns.	*Uher 4 Track Stereo	102 gns.
Fidelitty Argyll	29 gns.	*Vortexion WVA	£93 13 0
Gainsborough	39 gns.	*Vortexion WV8	£110 3 0
*Grundig TK60 Stereo	128 gns.	Wyndor Victor	45 gns.
Grundig TK20	52 gns.		
Grundig TK 24	62 gns.		
*Grundig TK25	62 gns.		
*Grundig TK30	72 gns.		
*Grundig TK35	82 gns.		
*Harting 4 Track Stereo	86 gns.		
H.M.V.	£50 0 0		
Magnafon	49 gns.		
Philips 4 Track 3541	34 gns.		
Philips 4 Track 3542	59 gns.		
Philips 4 Tk. Stereo 3536	29 gns.		
*Reflectograph A-½ Tr.	95 gns.		

TRANSISTOR MODELS

*Butoba	69 gns.
Grundig "Cub"	26 gns.
Clarion	25 gns.
Clarion Twin Set	8 gns.
Minivox	37 gns.
Fi-Cord	59 gns.
Stuzzi "Magnetite"	69 gns.
Stuzzi de luxe	75 gns.
Steelman	55 gns.
Trav-Ler	29 gns.

ALSO Pre-Recorded Tapes by Saga and "Music on Tape," etc. Tapes of every size and type by leading makers ready for prompt despatch *Microphone extra

169-171 STREATHAM HIGH ROAD, LONDON, S.W.16

Between St. Leonard's Church and Streatham Station

STReatham 0466/0192

Hi-Fi Dept. 181 STREATHAM HIGH ROAD, S.W.16

adequate proportion of the tracks remain in contact with the head. First experience seems to indicate that the trouble is much more serious with four track tapes when using ordinary thick tape but is almost non-existent when using the thinner "long play" and "double play" tapes. As the thick tapes have a performance superior to that of thin tapes only in respect of "print through" they may cease to appeal to the amateur.

Heads for four track use will clearly be more expensive than two track heads for they contain four separate units but the extra cost is small in comparison to the savings on tape. There is some saving in using smaller spools, and an indirect saving in that small spools permit a smaller machine. The reduced signal obtainable on replay will necessitate even greater care in shielding and layout if the stray hum pickups, that occur all too easily, are to be kept to acceptable limits.

In summary it will be seen that the potential performance of a four track machine is technically adequate for all domestic needs and given an improvement in tape performance of perhaps 6 dB, it would be adequate for most semi-professional work. It will be interesting to see from the subsequent review of machines whether the potential performance is realised in practice.

Owners of twin track machines and lots of twin track tapes, will get some comfort from the knowledge that the recording standards for four track recordings have been so arranged that existing twin track tapes can be played on four track machines without any modification. An in-line arrangement of heads has been adopted as for stereo tapes, tracks 1 and 3, and, 2 and 4 being paired for stereo playing. When playing single channel, track 1 is recorded with the tape running left to right, track 3 when running right to left, while 4 and 2 are available when the tape spools are reversed in the machine. Four tracks tapes cannot be played on two track machines however.

James Moir

READERS' PROBLEMS

Tape hiss

Dear Sir:—Perhaps you will be kind enough to supply a little information on a subject which I have never seen clearly explained in any of the magazines devoted to tape recording.

When a tape becomes "hissy" due to its travelling past magnetised heads, can this hiss be effectively erased when next used for recording? In other words—will the erase head erase hiss? If so, would a second, or third erasure assist in reducing any remaining after one trip past the erase head? I understand, of course, that the heads, etc., should be properly de-fluxed before trying the first method.

May I take this opportunity of saying how much I enjoy the pages of *The Tape Recorder* and *Hi-Fi News*. Can you recommend a good reference book on tape recording, or has no one got around to writing one yet? *Yours faithfully, J.S.B. Liverpool.*

Tape hiss, which occurs due to the use of accidentally magnetised heads and other causes, is completely eliminated by a bulk eraser, and will normally be wiped out by the action of the erase head. Of course, when tape hiss occurs on a recording which is to be retained, then there is no method of eliminating it. There have been a number of excellent books on tape recording and one which we feel would meet your purposes as a permanent reference is "Magnetic Recording Handbook" by R. A. B. Hickman, published by George Newnes.

Tone Controls

Dear Sir:—My recorder boasts separate tone controls for treble and bass, and I feel sure that they might be very useful. Strangely enough, however, I get the feeling that they work sometimes and not others. Do you think it could be something wrong with the controls, or with the way that I'm using them? They are meant to give a lift to the treble or bass as well as cut, and there is a small dot on the controls which I take to indicate the normal position. Any suggestions you have to offer will be most welcome.

Yours faithfully, J. K., Harlow, Essex.

The tone controls on 95 per cent. of tape recorders—whether separate bass and treble, or the simple Top Cut variety—are situated in the playback amplifier, and have no effect during recording. This may account for your erratic results. If you think about it for a moment, you will see that this is a highly sensible arrangement.

If they operate on recording also, and we juggled about with the tone controls at the time of recording, or accidentally left them at an odd setting, we should be chasing the recorded quality on playback, and never be quite sure where we were. With the normal arrangement, at least the quality from microphone, disc, radio, etc., is transferred to tape through a circuit of constant characteristic.

We may then utilise the controls to correct, on playback, any recordings which appear to emphasise or attenuate one end of the frequency scale or the other. Of course no tone control is a cure for all ills, and it will be better to stick to the Normal setting in many cases.

Actually a principal use of the tone controls is to compensate for possible shortcomings of the loudspeaker—an external one or that built into the recorder—or perhaps the acoustic environment. This use is quite logical, and once the best settings are discovered for a particular room, etc., they should seldom require re-adjustment.

There is one type of tone control which is often fixed in the recording circuit, at least in expensive recorders. This takes the form of a two or three position bass cut switch. It is intended to eliminate the steep rise in low frequencies which is experienced when recording speech at a close position relative to ribbon microphones.

MAKE YOUR TAPE RECORDER REALLY PORTABLE

WITH A **Valradio** CONVERTER

A Valradio converter enables you to operate your tape recorder from car, boat or caravan battery, or any other source of low voltage or D.C. supply, making it possible for you to record outdoor events, or dictation, or to provide entertainment when you go on holiday or picnics, etc.

Prices range from £6.10.0., many models available.

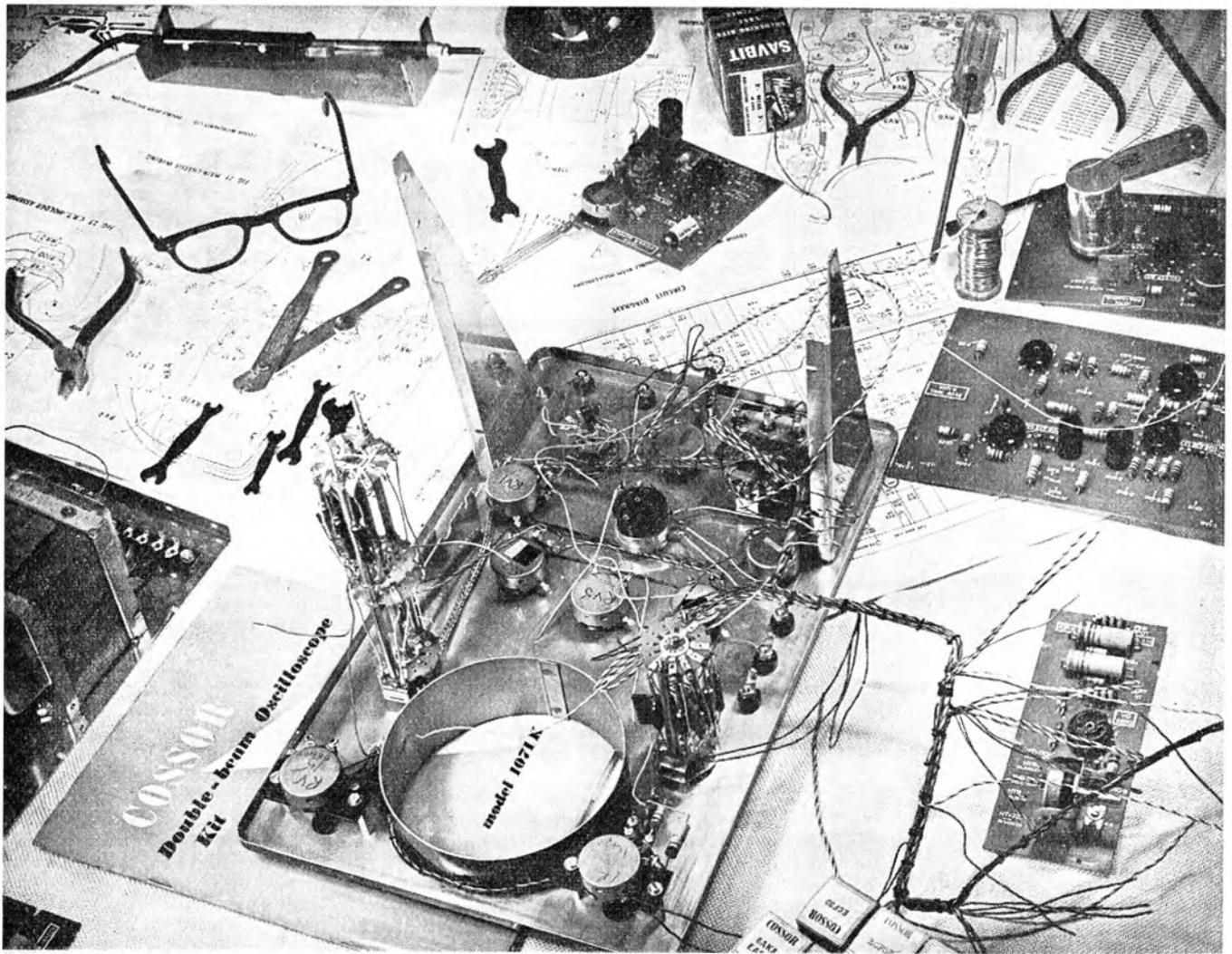
Write for fully descriptive folder to

Valradio

VALRADIO LTD.
Dept., TR/C.,
Browells Lane,
Feltham, Middlesex.
Tel. Feltham 4242

To Valradio Ltd., Dept. TR/C., Browells Lane, Feltham, Middlesex.
Please send me fully descriptive folder for converters suitable for Tape Recorders.

NAME _____
ADDRESS _____



Notice to Manufacturers

Whatever your product, and whatever its state of development, a photographic record can be invaluable — for future reference — for publicity — and for sales. We specialise in the photography of industrial products — particularly electronics — in black-and-white (as above) or in colour, for showcards and catalogues. We are the official photographers for Hi-Fi News and The Tape Recorder. Our prices are very competitive, and we invite your enquiries.

COLOUR PRINTERS (LONDON) LTD.

29 GEORGE STREET - LONDON - W.1 - HUNter 1771

Tape recoil

by STANLEY UNWIN

● Readers will be indebted to Stanley Unwin for drawing their attention to this problem. It is something that no one appears to have considered. We do not necessarily share the author's views, and we cannot undertake to answer technical queries on the subject.

THE importance of standardisation in terms of tape speeds, frequency characteristics and other tolerances must be obvious, but how can the layman with the limited means at his disposal achieve this? Firstly he must have a standard reproducing tape covering frequencies from thrifty up to several thousand cycloads or twelve C.C.I.R. Characteristics with a constant spiel through the capstan and pinch willy. The take-up must be a little more and no less to assist the latent strain so that there is no take-over bid for a gabby in the voices. Reverse take-up should be sufficient to keep a tension of inch ounces or back-lode. This helps to keep a nice flat and face on the heads and proximity for the azimold. This is very important for the playing on other machines where small variables add or subtract the errors. Having adjusted the azimuth, and assuming the same heads are used for recording the bias should be adjusted for a droppy half dB over the hill of the peak and not far away.

Do have a de-gausser handy. It will save many a hiss, grumble and dirty backgrove noise which in any case should be better, than minus fortyfido.

Erasing

Good wave fordyform is important and a reference to oscillators would not be a mistress. Self oscillating erase circuits are good if grid currents are limited by a therm (Mr). A push-pull dopple trilode is recommended however as simple to make and good for a sinus wave.

The choice of a microphobia is always difficult. A ribbon is usually expensive and booms if bitterne, while a crystal ball may foretell hum especially if it has a high impudence output. This brings us to hum problems which can give quite



"Professor" Stanley Unwin, beloved of radio and TV audiences alike, also writes in this month's "Hi-Fi News".

a troubload in high gain amplifies. The hum pick up in heads and head transformers, inductors and motors demands careful in the layout and earthing of the heatery wire and screened leady most. Oh yes. Earthy wire round the bolves concerned must seek the shortest way to the kathyode.

Mixers

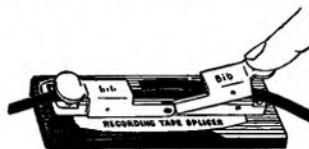
High or low level mixey? There is a deprecale on the low road on account of the high gain after the movie contacts. In any case use a cathy folly-o for your outpost. This allows many inputs for a loadymost without upsetting the import.

The absorbing interest of a time most taken, shows a worth while for all this, definitely and the firstjoys experienced of hearing your symphold, must be an improvement over the repeating grube of a rotatey diskier and no worn needles either!

So now for a settly down in a comftybold armcheese and a mutual enjoym of recording with your wify rolling pin.

Bib RECORDING TAPE SPLICER

FOR EASIER AND ECONOMICAL TAPE EDITING



The easy-to-lift clamps on the new Mark II Bib Recording Tape Splicer are both hinged on the same side of the splicer, making the jointed tapes easy to remove. Precise, rapid tape jointing is ensured, and because you can use all the odd lengths of tape, you soon save the cost of the splicer.

18/6 each (subject)

Everyone who uses a tape recorder will need this little tool. It is indispensable. P. Wilson. "The Gramophone." Send a stamped addressed envelope for a helpful leaflet on tape editing.

If you have difficulty obtaining a Bib splicer, let us know the name and address of your dealer.

Multicore Solders Ltd., Multicore Works, Hemel Hempstead, Herts. Tel: Boxmoor 3636

"Sound" re-opens on Network Three

AS we go to press, our Technical Editor has given us news of the re-opening of the B.B.C.'s Network Three programmes specially aimed at tape recorder enthusiasts. He has just recorded the opening programme in company with John Kirby (Chairman), Donald Aldous, R. D. Brown, and Ken Blake (of the London Tape Recording Club). This first edition of "Sound" took the form of a discussion on how the programme itself can best supplement the work of the printed magazines, through its ability to illustrate aurally what the periodicals cover in words and pictures. Its broadcast dates are Sunday 18th September, 3-3.30 p.m., with a repeat on Monday 26th September at 6.40 p.m. The series proper commences at its regular time of 2.40 p.m. on Sunday, 2nd October.

R.E.W. Features the Tape Recorder of the Month
 Only with the WYNSOR "VICTOR" can you have it
 both ways! High Quality and Low Price

MARK THESE OUTSTANDING
 FEATURES

- ★ Frequency responses:
 - 7½ i.p.s. 50 to 15,000 c.p.s.
better than ± 3 dB.
 - 3¾ i.p.s. 50 to 9,000 c.p.s.
better than ± 3 dB.
 - 1½ i.p.s. 50 to 5,000 c.p.s.
 - ★ Full frequency equalisation at all speeds.
 - ★ 10" x 6" elliptical speaker in detachable lid.
 - ★ Monitoring own speaker, separate control.
 - ★ Up to 8 hours playing time on D.P. tape.
 - ★ Mixing facilities for mic—gram—radio inputs.
 - ★ Facility for use as an amplifier.
 - ★ 3 independent 4 pole motors.
 - ★ Twin tracks—pause control—tone control.
 - ★ Guaranteed 12 months.
- NO INTEREST TERMS
 - Free insurance. Your payments cancelled if you fall ill or become unemployed.
 - Free delivery anywhere in U.K.
 - Free Service.



45 GNS. Complete with 1200 ft. tape, spool, mic., jack plug

Deposit £9-9-0
 12 payments of £3-3-0
 18 and 24 month terms available

Call in person or write to our mail dept. T.R.

Send your deposit today for immediate delivery! To THE TAPE SPECIALISTS

R.E.W. EARLSFIELD LTD. Telephone
 545 GARRATT LANE, LONDON, S.W.18 WIMBLEDON 0709



BRITISH-MADE MICROPHONES

consistently
 specified for quality
 and reliability

MODELS FOR TAPE RECORDERS,
 STUDIO USE AND SPECIALISED
 APPLICATIONS

Literature on request

LUSTRAPHONE LTD. ST. GEORGE'S WORKS
 REGENTS PARK ROAD, LONDON, N.W.1

PRImrose 8844

Armstrong Quality Tuners

The name ARMSTRONG is our registered trade mark

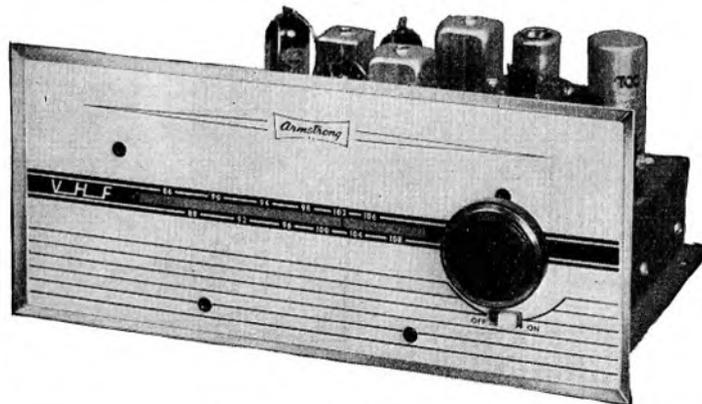
MODEL T4 (Illustrated) 19 GUINEAS

A high fidelity VHF tuner designed for operation with any good performance amplifier or tape recorder. Incorporating many features normally found only in the most expensive tuners it represents outstanding value at its price (which includes purchase tax). The T4 is completely stable with no trace of drift and automatic frequency control provides broad easy tuning. An attractive cabinet in polished wood (price £2 16s. 0d.) is available as an optional extra.

- Self powered ● Full VHF band (87-108 m/cs.) ● Automatic frequency control ● Cathode follower output ● Variable output 0-500 mV. ● Multiplex output for stereo radio adaptor ● Separate 75 ohm and 300 ohm aerial inputs.

MODEL ST3 Mk 2 27 GUINEAS

This new AM/FM tuner is the successor to the well tried and successful ST3. Improvements in design and a considerable reduction in size make the new tuner even more attractive than its predecessor. It includes all the features of the T4 Tuner and is similar in styling. The AM section covers the long and medium bands and includes a miniature bright-line indicator for easy tuning.



Post this coupon for free catalogue or call at your High Fidelity dealer or our Holloway Showroom for demonstration. Open 9-5.30 weekdays, 9-5 Saturdays.

NAME TOT

ADDRESS

ARMSTRONG WIRELESS & TELEVISION CO. LTD., WARLTERS ROAD, HOLLOWAY, LONDON, N.7. NORth 3213

... tape recorder workbench

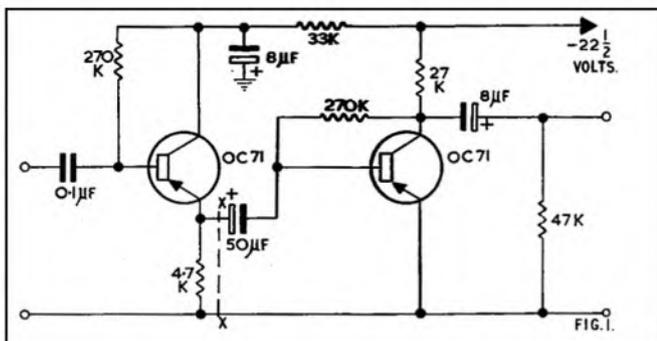
Practical suggestions for the tape handyman _____ by A. Bartlett Still

No. 16 - BUILDING A MIXER

THE transistor pre-amplifier circuit that I promised last month appears as fig. 1. Comparing this with the valve pre-amplifier given last month it will immediately be noticed that two stages have been used, against the single valve. The reason for this is that a transistor voltage amplifier arrangement invariably results in a low input impedance, of the order of a few hundred ohms only. The playback head which we wish to connect, will however most probably have an impedance of the order of 50 K ohms, so an impedance transfer is necessary.

My circuit, then, consists of two transistors, the first, a "grounded collector" stage, performing a similar function to a valve cathode follower, while the second, "grounded emitter", stage gives voltage amplification. The overall gain will probably be of the order of 30-40 times. If greater gain is needed it will be necessary to add a further stage. For those who wish to experiment with transistors I cannot do better than recommend the helpful leaflets and other literature produced by Mullard, Ltd.

My main subject for this month concerns the mixing of inputs to your tape recorder, assuming that your machine is not already fitted with this facility. It is not possible, in my opinion, to design a simple mixer that will suit the various



purposes that different readers might have in mind. Therefore I will try to describe principles rather than concrete designs, although both the circuits I give can be used as they stand.

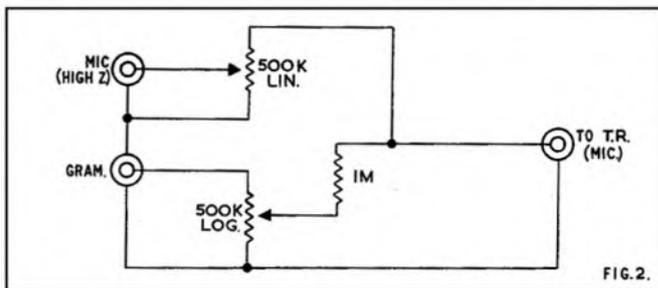
Fig. 2 represents about the simplest way of mixing two inputs—say a high impedance microphone, and a gramophone pickup or radio having a greater output. This is a passive circuit (i.e. no amplification) and so care has to be taken to lose as little as possible of the low level microphone signal. The 1 Megohm resistor should prevent any of this signal being lost into the "Gram" circuit, and it represents the usual way of decoupling the various channels. Quite obviously if it were not there the mic signal would be short-circuited when the Gram control was turned down. The inclusion of this resistor also results in attenuation of the Gram signal to an extent that cannot be allowed on the Mic channel.

Losses not serious

Since we still have to avoid the short-circuiting effect, the Mic gain control has been turned round, and it will be found that a linear law potentiometer will give a smoother control with this arrangement. Very little of the microphone signal is lost on this mixer, at the expense of some variation of Gram level with movement of the Mic control, and change in the Mic frequency response with control setting. Admittedly not up to BBC standards, but it is doubtful if the home recording enthusiast need worry, considering how cheap and simple the

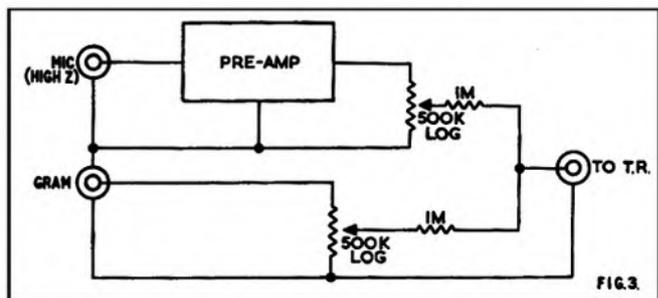
unit is. Additional channels of either type can be added, but it is advisable not to press your luck too far!

For a more ambitious design of mixer, capable of handling the low level signals obtained from a microphone, pre-amplification is essential. Not only does it prevent the loss of precious millivolts, but the effect of noise that can be introduced by operation of the potentiometers is reduced, by virtue of the fact that the wanted signal is that much larger. Fig. 3 will be seen to be, in effect, two 'Gram' channels from fig. 2, with the



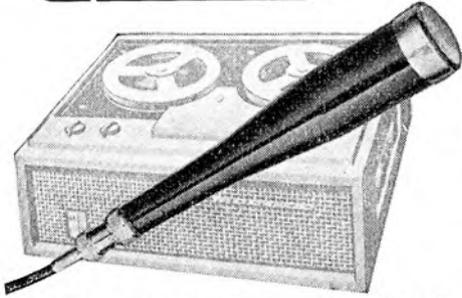
addition of a pre-amplifier stage shown in diagram form. Here we return to the valve circuits given last month or the transistor unit of fig. 1. It should be noted that all three circuits as drawn, are arranged for the connection of high impedance microphones, i.e. crystal, or moving coil and ribbon types which have built-in transformers. If low impedance mics are to be used, and they can offer distinct advantages, then a microphone input transformer will have to be used with the valve circuits. With the transistor circuit, however, we can make use of the low input impedance and connect at "X-X", leaving out the first stage. The output voltage available will not be as great as if an input transformer had been used, because of the effective voltage gain it gives, but the signal will be brought to a level that allows normal mixer attenuation while still delivering a reasonable signal to the input of the tape recorder.

As many as five or six channels can be used in the arrangement shown in fig. 3, with amplifiers in those channels that have to handle the lower signals. Screened cable should be used to connect from the mixer to the tape machine, and for



all High Z input leads. Using a metal box to house the mixer itself will be helpful and, in the case of valve amplifiers, the heater wiring should be kept well clear of the signal circuits. The power requirements for the valve stages are 200 mA @ 6.3V, and 1 mA @ 250V each. Components to make up a power unit to supply 4 or 5 stages can be readily obtained from any radio component shop. You would be well advised to keep the power unit separate in order to avoid hum troubles, unless you are prepared to experiment with the positioning of the transformer and rectifier, which can be of the metal, contact-cooled, type.

Grampian DP4



brings out
the best
in any
recorder

Even the most expensive recorder will only give its best performance if a good quality, reliable microphone is used. In the DP4, with a uniform wide frequency response from 50 c/s to 15,000 c/s, Grampian have developed an outstanding, moderately priced instrument which will please the most exacting recordist.

The DP4 is equally suitable for Public Address, Broadcasting, Call Systems, etc.

Output Levels.—DP4/L low impedance—25 ohms 86 dB below 1 volt/dyne/cm. DP4/M medium impedance—600 ohms 70 dB below 1 volt/dyne/cm. DP4/H high impedance—50,000 ohms 52 dB below 1 volt/dyne/cm.

Retail Price.—DP4/L complete with connector and 18 ft. screened lead £7 11 0
(Medium or High Impedance models £1 0 0 extra)

A complete range of stands, swivel holders, etc., is available also. A matching Unit (Type G7) can be supplied for adapting the microphone for a Recorder having a different input impedance, or when a long lead is required. ... Retail Price £3 5 0

Write or telephone for illustrated literature.

GRAMPIAN REPRODUCERS LIMITED
Hanworth Trading Estate, Feltham, Middlesex Feltham 2657

WHY NOT BIND THEM?

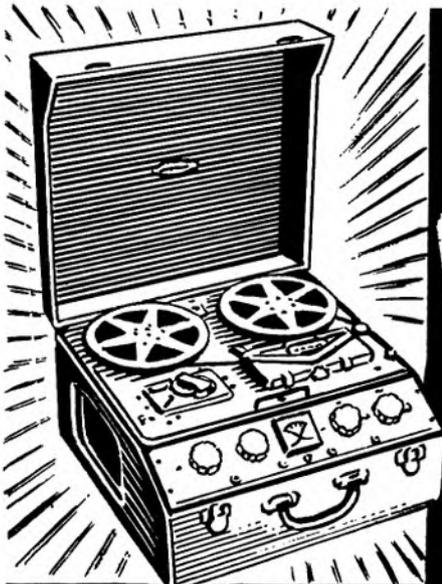


★ Semi-permanent binders for The Tape Recorder keep your copies clean and ready for easy reference. Each case is gold blocked on spine with the name and volume number, will take twelve copies plus index, and will open flat at any page.

Price 15 Shillings

Available post free from:

THE TAPE RECORDER,
99, Mortimer Street, London, W.1.



SOUND TERMS FOR YOU

WE CANCEL
NOT JUST DEFER
YOUR PAYMENTS
IF YOU FALL ILL
OR BECOME
UNEMPLOYED

WE GIVE YOU
FREE INSURANCE
AND ASK ONLY
A LOW DEPOSIT

WE CHARGE NO
INTEREST. UP
TO TWO YEARS
TO PAY FOR ANY
Tape Recorder

Details of any model sent on request from
SOUTH WEST LONDON'S HI-FI CENTRE

SANDS HUNTER DEPT. T.R.

85, THE BROADWAY, WIMBLEDON, S.W.19. CHerrywood 4393

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

43, MITCHAM ROAD, TOOTING, S.W.17.

37, BEDFORD STREET, STRAND, W.C.2. TEMple Bar 8858.

Also
at

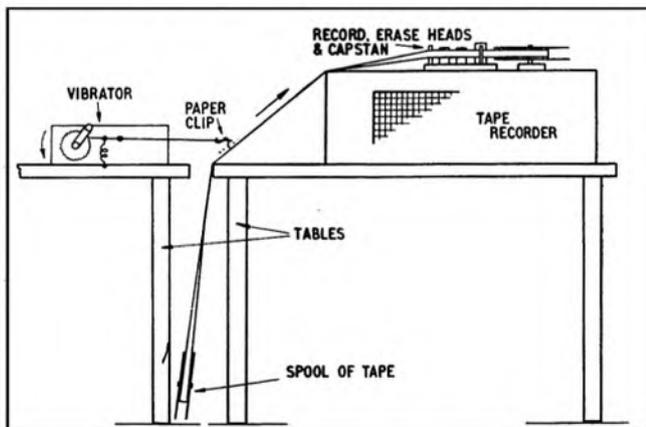
PRE RECORDED MONO & STEREO TAPES, TAPE COPYING & TAPE-TO-DISC SERVICE

our readers write

. . . about magnetic writing

From:—Charles Platt, 34 Baldock Road, Letchworth, Herts.

Dear Sir:—The letter you published from Mr. Kay intrigued me, and I decided to carry out one or two minor experiments in "Artificial Recording" myself (i.e., producing sound effects by drawing on tape). My first attempt was as basic as possible: I magnetised a piece of metal tapering to a fine point, and, while pulling the tape manually under it, I moved the metal back and forth at varying degrees. Playing back the resulting recording



produced noises which I have christened "blups". As far as I could see, whether one played the tape at $1\frac{1}{2}$, $3\frac{1}{2}$, or $7\frac{1}{2}$ i/s, forwards or backwards, the blups were of no use to anyone, unless you happened to like listening to a "wupph-wupph" noise produced at irregular intervals.

I had obviously not realised the high frequency needed. Short of taking a day to draw over a reasonable length of tape, I could see no other method of increasing the number of oscillations per inch than by making a form of vibrator. I quickly threw together something of that description, using a "Meccano" construction kit. I enclose a sketch of the machine. It consists simply of a cogwheel rotated by a handle; a strip rubs against the cogwheel, and on the end of the former I attached loosely a magnetised bent paper clip, which handily converted the vertical vibrations to horizontal ones.

This time I let the recorder pull the tape (partly because I needed two hands to work the vibrator), and I left it on playback at $1\frac{1}{2}$ i/s. Thus I could monitor the noise I was drawing. The result was a trifle disappointing. The noise I had produced was a whole succession of blups at fast speed, rather like interference on a television set. When greatly speeded up, this still failed to produce an actual noise, and so still faster vibrations did not seem to be an answer. This marks the end of my "research" to date. Has anyone any ideas? Or any successes? I would be glad to know.

Yours sincerely,

. . . about specifications

From:—J. R. Cross, 8 Chaucer Way, Addlestone, Weybridge, Surrey.

Dear Sir:—In your columns recently there seems to be great controversy over tape speeds and frequency responses, generally to the exclusion of other inter-relating facts. May I be as bold as to say just this: In order to make a tape recording that will reproduce as near as possible to the original sound a balance must be sought between the following factors:—frequency response, harmonic distortion, transient response, dynamic range and background noise, for one can be improved at the expense of another. When all these important facts are taken into consideration a frequency response of 50-12,000 c/s \pm 3 dB at a

speed of $7\frac{1}{2}$ i/s is achieved. So when considering such things as $1\frac{1}{2}$, extra narrow gap heads and responses of 30-25,000, think again.

Yours sincerely,

. . . about choosing tape

From:—R. Day, 59 Oaklands Avenue, Brookmans Park, Hatfield, Herts.

Dear Sir:—The technical articles of your magazine have been of great interest, and the requirements of a good tape recorder and its maintenance are beginning to take shape. There have been articles on wow and flutter, signal to noise, gain frequency response, etc., but no mention of tape.

What is to be looked for when buying tape? What makes for a good frequency response and low background noise? One manufacturer of tape heads claims a frequency response of up to 10 Kc/s at $1\frac{1}{2}$ i/s when using "high quality" tape. Does long playing tape which is thinner than normal playing tape require a lower level of magnetizing force, if so what about distortion occurring when working to normal recording levels as indicated by the magic eye indicator? An article on tape would be most

Yours truly,

We'll see what we can do. (Editor)

. . . about professional recorders

From:—E. W. Berth-Jones, Chief Engineer, Recording and Relay Equipment Division, The Gramophone Company Limited, Hayes, Middlesex.

Dear Sir:—The remarks of your correspondent Mr. Rae of Carlisle, in your July issue, on Mr. Moir's review of the E.M.I. Model TR52 Professional Transportable Stereo Tape Recorder, deserve some comment, and we should like to try to clarify some of the points raised.

In the first place, the performance figures quoted for professional type equipment are factory test figures, which each and every machine must pass before being issued. With domestic class equipment, the specification often describes the best which has been achieved on the prototype, and all too frequently is little more than the wildest hopes of the designer's imagination! However, this latter accusation cannot be levelled at the more reputable instruments, and here the differences lie less in what is stated than in what is left unsaid.

Mr. Rae quoted upper frequency range figures without reference to other factors. In professional equipment, a much more significant factor is the signal/noise ratio. In normal professional usage, the maximum signal level is taken as that which produces about 2 per cent. of total harmonic distortion in the output, this point lying about 10 dB below the saturation level of the tape. In typical amateur usage, considerably higher signal levels are commonplace, allowing the distortion to rise to some 10-15 per cent. or more for short periods. This is often not intolerable, provided that the signals do not have to be re-recorded or broadcast, but for really high quality work the levels must be restricted. This means that for the same, or better, signal/noise ratio, the background noise level of the professional tape recorder must be drastically reduced, and the distortion contribution of the amplifiers, particularly the replay first stage, must be carefully watched.

As is well-known, the standard reproducing amplifier has a response rising at high frequencies relative to the basic 6 dB/octave characteristic, and the higher the response is taken the greater the rise. This increases the high frequency noise output from both tape and first valve stage and, thus other things being equal, extension of frequency range increases measured noise. True, this increase may not be very noticeable on the small built-in monitor loudspeaker, but it will soon make itself obvious when reproduced on a wide range high fidelity system.

Furthermore, extension of the frequency range at the low end

(continued on page 463)

People in Search of Perfection Choose
FILM INDUSTRIES



The M8 is a ribbon microphone of exceptional merit, with a frequency response of 35-13,000c/s ± 3 dB and yet selling for only £8 15s. 0d. This microphone has its own inbuilt transformer and the source impedance is 30 ohms, 12 ft. of screened cable is supplied, other lengths can be fitted on request. Alternative models with source impedance of up to 57 K ohms are available.

We also manufacture the popular M7 moving coil microphone, this sells for £6 5s. 0d. and has frequency response of 35-9,000 c/s ± 3 dB. The source impedance is 20 ohms.

Desk, table and floor stands are available for all models.

Write for complete details

FILM INDUSTRIES LTD.

90 Belsize Lane, London, N.W.3.

Tel.: HAMstead 9632

SPECIAL ANNOUNCEMENT

"Advertising Pays", so we are told, but we often wonder exactly how to convey to readers of the **Tape Recorder** the facilities we can offer to those seriously considering the question: where shall I buy, and where shall I find a Firm willing and interested in MY requirements. One such Firm is **NUSOUND RECORDING COMPANY**, in the heart of London, and **THORNTON HEATH (Croydon) Surrey**, where we are really enthusiastic about Tape Recorders and Audio equipment. **WHY NOT WRITE TO US, OR PAY US A VISIT.**



Geoffrey V. Smith
(SOLE PROP.
NUSOUND REC. CO.)

NUSOUND RECORDING CO.

Ferrograph

(Appointed Dealer)

Tape Recorder and Hi-Fi Specialists

Showrooms: First Floor
**3-8 BRIGSTOCK PARADE
LONDON ROAD,
THORNTON HEATH,
SURREY.**
(Opposite Thornton Heath L.T. Bus Depot)
TELEPHONE: THO 7609

London Showroom
**35 CRAVEN STREET,
TRAFALGAR SQUARE,
LONDON,
W.C.2**
TELEPHONE: TRA 2080

2 FREE BOOKLETS!

"How To Make BETTER Tape Recordings" (Irish Tape) and Our SENSATIONAL CATALOGUE with Details of 140 DIFFERENT MODELS!

! R. B. TAPES DO IT AGAIN !

Brand-new FAMOUS FOREIGN TAPE RECORDERS offered at the Fantastic Price of **35GNS** Dep. £7-5-0 Balance 24 mths.

including TAPE, MIC, AUTOMATIC TAPE STOP, FULL MIXING, FREQU. 50-16,000 cps. 2½ watts undisturbed output!

LOOK! EASIEST TERMS EVER !!

CASIAN Travler	29gns	dep. £ 6- 9-0
FANFARE 60	23gns	dep. £ 5- 3-0
GRUNDIG TK 24	62gns	dep. £13- 2-0
ELIZABETHAN Major	65gns	dep. £13-15-0
WYNSOR Victor... ..	45gns	dep. £ 9-15-0

FREE AFTER-SALES SERVICE WITH 12-24 MONTHS GUARANTEE

R.B.TAPES
THE SIGHT AND SOUND CENTRE

179 STOKE NEWINGTON HIGH ST
LONDON N16 CLISSOLD 9477
also at 89-91 Gt. Ancoats St. Manchester 4



OPEN ALL SATURDAY

Agents for
GRUNDIG
TELEFUNKEN
WYNSOR
SIMON
YERITONE
SABA
ELIZABETHAN
SOUND
SPECTONE
and many others

Write NOW for ALL Your FREE Literature

NAME

ADDRESS

T.R.

READERS' LETTERS—(continued)

leads to serious design problems of both noise and distortion, and is, in fact, more difficult than extension of the upper end. The problem of high frequency noise would be much simplified if we could use high frequency pre-emphasis when recording, but this involved special quality tape and a change in the standard recording and replay characteristics.

The curves published by Mr. Moir as a result of his tests are not, in fact, typical of this model, which normally has a response flat within $\pm 2\text{dB}$ up to at least 12 Kc/s at $7\frac{1}{2}$ i/s and higher at 15 i/s. The reason for the discrepancy in this case is being investigated. However, the sales specification is limited to 10 Kc/s in order to be sure that the machine will still meet requirements after long periods of continuous usage under professional conditions. As an analogy, a very expensive motor car may well have a top speed no higher than that of a much cheaper model, but it is likely that its performance will be maintained longer, more consistently, and with less attention, when given hard usage.

On the subject of the use of very short replay head gaps to improve high frequency response, it should not be forgotten that, with a short gap, a large proportion of the useful flux is short-circuited across the pole faces, without passing through the pick-up coils, and hence the signal output of the head is reduced, leading to first stage noise troubles. Apparently the only practical way of avoiding this is, at the same time, to reduce the depth and hence the area of the abutting pole faces, which are already fairly small. This leaves little room for wear on the heads, which is important to the professional who may run thousands of feet of tape over the heads every day.

In addition, tolerances are more difficult to maintain on short-gap heads, so that the production of heads to the precision required becomes very expensive. Head gaps of .00015 in. or .0002 in. are commonly used, but shorter gaps than this to the precision required by the professional user become a costly proposition.

In short, the matter boils down to a problem in "Information Theory". A given area of tape will hold just so much information, and the machine designer can choose his own compromise between frequency range, signal/noise ratio, and freedom from distortion. In general, the professional requires low distortion and low noise, with reasonable frequency response, all of which must be maintained from month to month and from machine to machine with high precision, if necessary at the expense of increased running cost in terms of tape consumption.

The average amateur requires, above all, low running cost, implying low tape speed, and often prefers an extended though perhaps variable frequency range at the expense of noise and/or distortion. The really serious amateur having first-class reproducing equipment and good recording conditions from original sound sources will, however, often side with the professional in his requirements.

Two points of fact arise from Mr. Rae's letter: the capstan speed of the Model TR52 is 1,500 rpm or 750 rpm, direct coupled to a 2-speed synchronous motor, and the price is £245 not £285, as stated.

In conclusion, it may be of interest to many readers to know that, as a result of the interest shown in this machine following the publication of Mr. Moir's review in *The Tape Recorder*, the Gramophone Company Limited is considering the marketing of the tape deck as a separate item, for the benefit of those enthusiasts who prefer to build their own electronic units and mounting arrangements. More information will be available shortly.

Yours faithfully,

... about 4-track recording

From:—Andre Lemaire, 20 Rue Hanotte, Wasmuel, Hainaut, Belgium.

Dear Sir:—In your issue of July, the four-track recorder was presented as a very economic machine by the fact that the tracks are twice narrower. But, if, with this new conception, the frequency scale becomes smaller, I do not think that this model is better.

For a serious amateur of music, what is most important: High fidelity or long play? I would like to know the variations of

the frequency scale with a twin-track recorder and with a four-track one.

Yours truly,

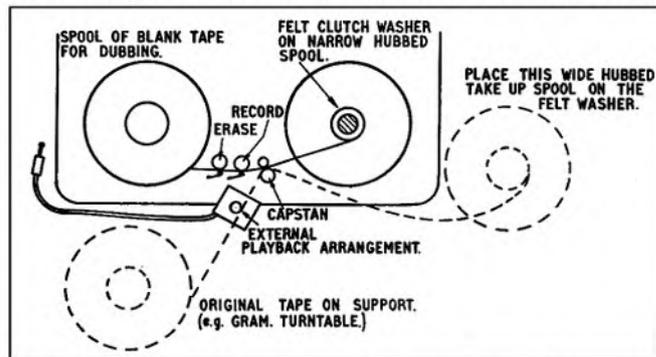
The pros and cons of four-track recording are discussed by James Moir on page 453, (*Editor*).

... about dubbing on one machine

From:—Donald J. Squire, Ashley Clinto School, R.O. Takapau, Hawke's Bay, New Zealand.

Dear Sir:—H. J. Anstey and others who would like, but can't afford, two recorders for dubbing, may be interested in an idea that makes high quality dubbing possible with only one recorder.

Set your tape recorder up threaded ready for recording. Use an externally-mounted replay head, compensated and pre-amplified (e.g. Tutchings transistor arrangement). Place the spool of tape



containing the original programme on a holder of some sort (gram turntable?). Lead this tape past the external PB arrangement, on to and past the capstan (or pinch wheel) and finally to a take up spool of greater hub diameter than that being used for the dubbing tape. Place the programme take up spool on top of the dubbing take up spool, separated by a felt washer to act as separator and clutch.

When the machine is started, both tapes will move simultaneously, and the signal from the external PB arrangement can be fed into one of the recorder's input sockets and treated in the usual recording fashion. One or two guides will be needed to help the programme tape move "upstairs" to its take up spool and/or to provide tension on its magazine spool.

The system has obvious limitations—inability to change speed by dubbing, no wind on or rewind facilities without swopping the places of both tapes, etc., but it is a cheap idea for a fairly handy man. P.S. Please thank the editor of *Hi-Fi News* for the article on biasing various tapes.* It was just what the doctor ordered.

Yours sincerely,

*Issue dated December, 1959, page 491. (*Editor*)

... more about the Time Switch

From:—A. H. Uden, 7 Carrington Road, Aylesbury, Bucks.

Dear Sir:—I have just been reading the first part of the interesting article, "A Delayed Action Time Switch" by R. E. Steele in the July issue. From this, I gather that the idea is to pre-set the controls on the tape machine, etc., and use the clocks to switch ON and OFF from the "mains". It occurs to me that this arrangement will present some important difficulties with at least one tape recorder.

On the well-known Wright & Weare (Ferrograph) recorder, the machine is started by drawing a spring loaded control forward into contact with an energised solenoid. In order to set up this deck in advance, it will be necessary to have some means of keeping the start control forward against the solenoid, so that the machine will start when the timing device switches the electricity supply ON.

I tried using two chinagraph pencils to wedge the start control, but found that they did not bring it sufficiently far forward to the solenoid to start the machine running.

Even if the start control is successfully wedged, a further difficulty arises when the timing device switches the electricity supply OFF. The solenoid will be de-energised but the start

(continued overleaf)

Chitnis 4-TRACK STEREOPHONIC RECORDER

9/S4K



*truest to
the original*

There is no doubt about which recorder you will buy when you see and hear this 4-track Stereophonic Model. It has so much to offer both to professional and domestic users alike. The incorporation of world-famous Bogen heads with an advanced powerful twin amplifier system provide sensationally brilliant standards of reproduction at a tape speed of only $3\frac{3}{4}$ inches per second. Mechanically, too, the Chitnis 9/S4K is a masterpiece of efficiency and dependability. Response to all controls is instantaneous; a self-locking arrangement prevents accidental erasure of wanted material. **YOU CAN USE THIS RECORDER FOR STEREO OR MONO AS REQUIRED**, and four track facilities double the playing time of each reel and halve your tape costs. Controls are very well positioned, and the complete instrument (with its own built-in loudspeaker for monitoring, etc.) is housed within a case of remarkable compactness and elegant modernity.

- **RESPONSE** 30–16,000c/s \pm 3dB at $3\frac{3}{4}$ i.p.s.
- **INPUTS** Radio (2) Pick-up (2) Microphone (2).
- **OUTPUTS** 2 at 15 ohms; 2 at 5 ohms; two low level.
- **SIGNAL-NOISE RATIO** better than 55 dB.
- Counter, recording level indicator, pause, superimpose, etc., etc. Size $13" \times 10\frac{1}{2}" \times 6"$.

62 GNS	FOR STEREO OR MONO BOGEN HEADS PAPST MOTOR $3\frac{3}{4}$ i.p.s. 15-ohm OUTLETS
------------------	------------------------------------------------------------------------------------------------

CHITNIS ELECTRONICS LTD
1, LONG ACRE, LONDON, W.C.2

Telephone: COVent Garden 1918/9

READERS' LETTERS—(continued)

control unable to spring back to its 'off' position if it has been wedged. This is most important, for if the control cannot return to the "off" position, no braking will be applied to the spools. There is a considerable risk of not only the tape over-running, but also of snatching or even a break occurring. The latter remarks particularly apply when the machine is switched on and off several times or running at one of the higher tape speeds.

"Flats" may also develop on the pulley wheels etc. and this applies to nearly all recorders which use this system of tape drive.
Yours sincerely,

R. E. Steele replies as follows:—

Some makes of tape recorder employ what is known as solenoid switching, and readers using the delayed action time switch described will find difficulties due to the start control not staying in the START position. The object of this is to prevent the tape recorder from actually recording until the amplifier has warmed up. However no harm can possibly occur if the start control is held in this position—other than about 15 seconds of unrecorded tape (this being the time to warm up). The control could be held in various ways depending on the type of deck employed. A simple way would be to attach a strong rubber band (or a number of thin ones) around the control and stretch them to some convenient point on the tape recorder.

A more permanent method and of better appearance would be to make a hinged clip that swung over on to the start control engaging a hole drilled in the appropriate position. This will not of course allow the control to release and apply the braking mechanism. This is not serious as the tape will only be travelling at a maximum of $7\frac{1}{2}$ i/s for the majority of recording, and the amount of spill will be very small.

The use of the brake is mainly made use of in stopping the machine when using the fast rewind. There is little or no risk of snatch because the tape is driven by the capstan, the take off reel being free. The take up reel usually employs a slipping clutch, and any increase in tension between the capstan and take up reel will allow it to slip.

A few readers have queried the possibility of flats occurring on the pinch wheel of their recorders. Now, flats could appear in two ways, (1) due to the pinch wheel being pressed hard against the capstan of the flywheel thereby flattening the surface, and (2) due to the tape being gripped by the capstan and pinch wheel and then snatched by the take up reel and abrading the surface of the pinch wheel in the process.

If we consider (1) this is most unlikely to occur because the rubber in the pinch wheel—like a spring—has resilience and when compressed (providing it is not overstressed, i.e. pressed too hard) will retain its original shape when the pinch wheel is pulled away from the capstan. The pinch wheel is usually kept in contact with the capstan by a fairly light spring—certainly not strong enough to overstress the rubber. Taking case (2):—Although the tape is gripped by the capstan and pinch wheel, the tape will not be snatched because the tape between the capstan and the take up spool is tensioned then, upon starting, the capstan and take up spool will start at the same instant—or nearly—causing the tape to start moving. Even if the take up spool starts just before the capstan, the moving tape would merely cause the flywheel to turn until it was taken up by the drive of the motor.

... about recording in South Africa

From:—W. J. Botha, 5 Breanith Court, Stirling, East London, South Africa.

Dear Sir:—I build all my own equipment purely as a hobby and have recorded a number of South African artists as well as overseas visitors. I must admit that I go to some lengths to get these recordings in view of restrictions, but then a collector pays such a price, which price really amounts to what others would call "inconvenience", "hardship", etc.

I shall be happy to interchange or swap tapes with anyone in the British Isles. Our native and coloured people have a talent which is unique.
Yours sincerely,

TAPE, RECORDERS & ACCESSORIES

FIRST DETAILS OF NEW PRODUCTS

● We remind our readers that notices of equipment listed and illustrated in this monthly feature are in no sense reviews. When figures, specifications and diagrams are published, these data are extractions from manufacturers' lists. When samples of this equipment are submitted for test, they are passed to our technical contributors, whose reports are published in a separate section.

★
**PARABOLIC
 REFLECTOR
 FOR OUTDOOR
 RECORDINGS**
 ★



Grampian Parabolic Reflector

THE recent articles by E. D. H. Johnson on *Designing and Using a Parabolic Reflector* have raised a great deal of interest, and we have been most interested to receive details of a unit now in production by Grampian Reproducers Ltd. It consists of an aluminium dish accurately formed to give the maximum pickup of distant sounds, and the whole assembly is arranged for mounting on any heavy duty cine tripod fitted with a pan-and-tilt head. The reflector is approximately 24 in. in diameter and 5 in. deep. It is finished in dark green matt, and weighs 5½ lbs. including Grampian DP/4 microphone, which is the recommended type.

A sighting tube is fitted and focusing is achieved by adjusting the distance between the microphone grille and the Parabola. The gain of the reflector is of the order of 14dB over the frequency range of 500—5,000 c/s. The retail price has been fixed at £5 5s. complete with fittings and instructions, less microphone and tripod. We shall be publishing a full scale report by E. D. H. Johnson in the very near future, and in the meantime readers may obtain further particulars by writing to **Grampian Reproducers Ltd., Hanworth Trading Estate, Feltham, Middx.**



★
**CINECORDER
 DESIGNED TO
 SIMPLIFY THE
 SYNCHRONISING
 OF SOUND AND
 CINE**
 ★

AN instrument designed especially with the needs of the Cine amateur in mind has been produced by K.G.M. Electronics Ltd. Known as the Cinecorder it makes possible lip-synchronisation inserts with existing camera equipment. Using perforated

tape, and with a special remote control, it is intended for use with the Eumig Imperial 8 mm cine projectors, but may be used with certain other makes of constant-speed or controlled-speed projectors.

Facilities include: (1) Separate capstan tape position indicator, measuring tape length in terms of time in seconds. (2) A Tape Lift Lever which lifts the tape away from the recording head, enabling sound to be inserted without clicks or other noises being recorded. (3) A "Varitrack" Tape control permitting multi-track recording. (4) A fully-controllable Bias Control allowing fading and superimposition. (5) Switched inputs on both the mixing channels allowing the volume levels to be pre-set and the sound "keyed in" instantaneously. Also available at a later date will be a Synchronising Unit which will be suitable for perforated tape, and will thus allow a wider variety of projectors, 8 mm, 9.5 mm and 16 mm, to be operated with 100 per cent. synchronisation. Available from photographic dealers and direct from the manufacturers it is priced at 55 guineas. Write for details to: **K.G.M. Electronics Ltd., Bardolph Road, Richmond, Surrey.**

★
**NEW "STICK"
 MICROPHONE
 FROM SUPER
 ELECTRONICS
 AVAILABLE
 WITH DYNAMIC
 OR CRYSTAL
 INSERTS**
 ★



AS shown for the first time in the microphone survey in the August issue of *The Tape Recorder*, Super Electronics Ltd. have introduced a new selection of microphones. The Crystal Stick Microphone (Type S.E.101), has a claimed frequency range of 30-12,000 c/s. Sensitivity is 1 mV μ b. at 1,000 c/s, and the unit is High Impedance (Capacity 2,000 pf) with a recommended load resistance of 1 Megohm. The retail price is £1 15s. with the jack plug an extra 5s. This microphone is also available fitted with a Dynamic insert at £3. The other microphones announced are the Diana with magnetic base—fitted with a crystal unit—at £3 3s., and with Dynamic insert £4 4s. Manufacturers: **Super Electronics Ltd., 5, Violet Hill, London, N.W.8.**

New "Bib" accessories

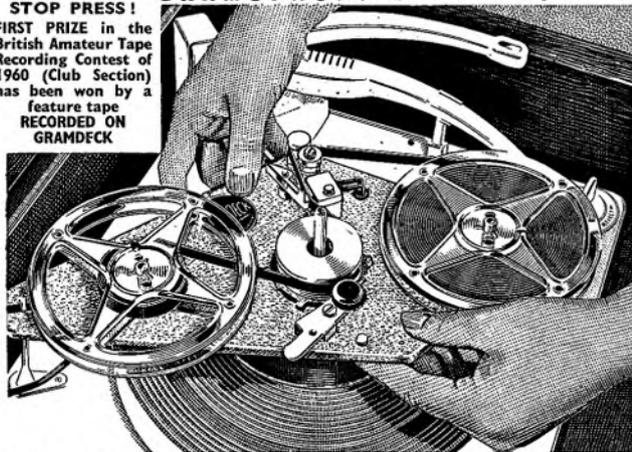
THREE new Bib Tape Accessories are announced by Multicore Solders Ltd., manufacturers of the Bib Tape Splicer. The first is a sheet containing 24 self-adhesive tape reel labels packed in a two-colour printed envelope. These labels can be detached easily from the backing sheet and pressed on the tape reel. They will fit most types of reel from 5 in. upward. Each label

(continued overleaf)

New! A TRULY REMARKABLE BRITISH INVENTION! Gramdeck

GRAMOPHONE TAPE RECORDER

STOP PRESS!
FIRST PRIZE in the
British Amateur Tape
Recording Contest of
1960 (Club Section)
has been won by a
feature tape
RECORDED ON
GRAMDECK



Turns any gramophone into a superb TAPE-RECORDER!

11 GUINEAS

YOURS FOR 13/- DOWN
AND 18 FORTNIGHTLY
SUMS OF 13/-.

Ready to record, complete with
control unit and 600 ft. of
twin-track tape. Special moving
coil microphone extra.

EASY TERMS

- ★ Plays at 7½" per sec.
or three other speeds
- ★ Records direct from
radio or microphone
- ★ Erase and fast rewind

—and back into a
record-player in a moment

Gramdeck is completely new . . . a revolutionary
invention that instantly turns your gramophone into
a tape-recorder and back into a gramophone at will.
You simply slip it on to your turntable and you are
ready to record direct from radio or microphone . . .
the voices of your family . . . radio programmes . . .
your favourite music—and you can instantly play it
back through your own gramophone or radio with
Lifelike Fidelity. Made by the firm that makes radar
runs for Viscounts and Britannias, the amazing
Gramdeck brings full tape recording and playing facilities
to every gramophone owner, at little extra cost.

Send for informative free book

This wonderful new invention means that any gramophone
owner can now add superbly good tape-
recording facilities to existing equipment at a fraction
of the usual cost. Full details, photos, specifications,
Easy Terms, etc., are given in the Gramdeck Book.
Send for your copy today—FREE and entirely without
obligation.

PRaise FROM THE PRESS

"Real hi-fi results . . . reproduction excellent."—Radio &
T/V Retailers' Review. "Provides the same recording
and playback quality as many high priced tape recorders."
—Radio Review. Results better than those obtainable
from many tape recorders in the £50-£60 price range."
—Amateur Stage. "Better than many so-called hi-fi
recorders."—Amateur Cine World.

FREE BOOK—POST NOW!

I would like to know how to turn my gramophone
into a first-class tape-recorder . . . please send me
the Gramdeck Book—FREE and without
obligation. (Write if you prefer not to cut page.)

NAME

ADDRESS

Gramdeck

GRAMOPHONE TAPE RECORDER

(Dept. TA/815), 29, WRIGHT'S LANE, LONDON, W.8.

GRAMDECK TURNS A TURNTABLE INTO A TAPE-RECORDER

NEW PRODUCTS—(continued)

provides space for title, composer, artist, reel number, speed,
date and type of tape used. Price 2s. 6d. per packet.

A Calculator which gives the recording times of one, two
and four track machines, with twelve different reel sizes and
five speeds, is the second new accessory available. The range of
speeds covered are 15, 7½ 3¼, 1½ and 15/16th i/s, and each speed
forms the subject of a separate table. On the reverse side the
calculator gives the approximate performance times of 48 of the
most popular classical works, which should be of great interest
to recording enthusiasts for timing broadcast concerts. The
price is 2s.

The final item is the Bib Tape Splicer Kit. Contained in a
hinged box, with a recess for each item, it is claimed to be
the most comprehensive range of accessories available to the
tape recording enthusiast. The Kit includes Bib Tape Splicer
and Cutter, complete on baseboard with instruction leaflet, 6
spare blades, a reel of splicing tape on a dispenser, and a package
of 24 Bib Tape Reel Labels with a Data Calculator. The
complete Kit is available at 28s. 6d. Manufacturers: Multicore
Solders Ltd., Multicore Works, Hemel Hempstead, Hertfordshire.

★
NEW
"CORDOVA"
RECORDER
FROM
DYNATRON
RADIO
★



DYNATRON have presented their first Tape Recorder known
as the Cordova. This instrument has incorporated the
Collaro Studio Deck, with pause control, superimposition, three
speeds, revolution counter, and safety switch. It can be used
for amplifying inputs from Radio or Crystal Pick-up, and the
power output of 2½ watts is fed into a 10 × 4½ in. elliptical
speaker. Supplied complete with microphone and tape, the
Cordova is priced at 39 guineas. Manufactured by Dynatron
Radio Ltd., Maidenhead, Bucks.

New Lustraphone products

L USTRAPHONE have added two new components to their
range of equipment. The first is an entirely new Tubular
Pencil Switch Adaptor, which incorporates a silent-action switch.
Designed for the standard switch requirements, it can be
adapted for various combinations including Double-Pole change
over. The second item is a simplified version of the VR/65
"Stereomic" Ribbon velocity microphone. Known as the
VR/65NS "Stereolus" it differs only in such details as the
omitting of the phase switching and other mechanical features,
yet the performance characteristics have been fully maintained.
The "Stereolus" microphone is now available, price 15 guineas.
Manufactured by Lustraphone Ltd., St. George's Works, Regent's
Park Road, London, N.W.1.

EASYSPLICE, guaranteed for easy accurate
tape splicing, spring clamps hold tape
while splicing. Thousands sold & exported
Price 5/- p. & p. 6d. Trade discounts



EASYSPLICE CO. 30 LAWRENCE ROAD, EALING, LONDON

EQUIPMENT REVIEWED

★
**WYNSOR
 VISCOUNT
 PORTABLE
 TAPE RECORDER**

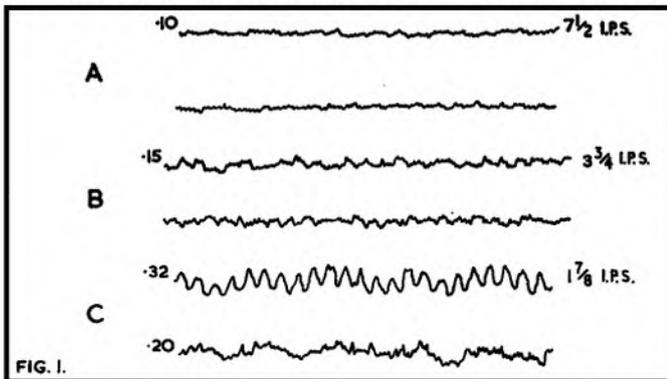


Manufacturer's Specification

Deck: Collaro Studio. **Frequency Response:** $7\frac{1}{2}$ i/s, 50-15,000 c/s; $3\frac{1}{2}$ i/s, 50-9,000 c/s, all within ± 3 dB. **Level Indicator:** magic eye. **Recording sense:** Standard half track. **Hum and Noise:** -40 dB. **Wow and Flutter:** less than 0.1 per cent. **Loudspeaker:** 10 in. \times 6 in. unit in detachable lid. **Monitoring:** with independent volume control. **Mixing, tone, and pause controls.** **Size:** $14\frac{1}{2} \times 12\frac{1}{2} \times 9$ in. **Weight:** 29 lb. **Price,** with tape and crystal microphone, £47 5s.

Manufactured by WyndSOR Recording Co. Ltd., WyndSOR Works, 2, Bellevue Road, Friern Barnet, London, N.11.

I LOOKED forward to testing this machine, which has a larger than usual speaker in the detachable lid, and I must admit that playing a $7\frac{1}{2}$ i/s pre-recorded tape fulfilled all my expectations. The quality and musical balance was markedly better than that obtained from other units with small speakers built into their cabinets and speech was crisp and clean with no cabinet boom to spoil it. I recorded speech and music from microphone and FM tuner, but this time I was much less happy; the quality was thin and edgy, and fatiguing to listen to. One felt the need constantly to alter the volume and tone



controls, but no combination gave the desired result. I guessed what the trouble might be, but pressed on with the instrumental tests to see how much of the story they told.

Wow and Flutter

The wow and flutter at $7\frac{1}{2}$ i/s and $3\frac{1}{2}$ i/s were beyond reproach (fig. 1, A and B), but at $1\frac{7}{8}$ i/s, 24 c/s flutter from the driving

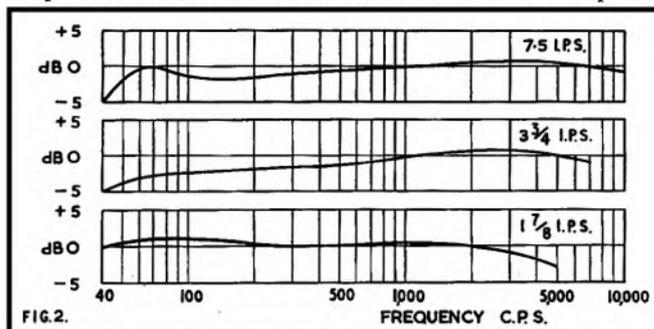
motor showed up intermittently as the recorded and playback flutters came into phase; the adding and cancelling effects are shown in fig. 1 C. The same 24 c/s flutter can just be seen in the $3\frac{1}{2}$ i/s fluttergram, and a very slight suspicion of it is visible at $7\frac{1}{2}$ i/s. The improved smoothing effect at the higher flywheel speeds is very evident. No cyclical disturbances from capstan, pressure roller, or idler roller could be distinguished, and at the two higher speeds the flutter bridge readings remained remarkably steady.

Playback responses

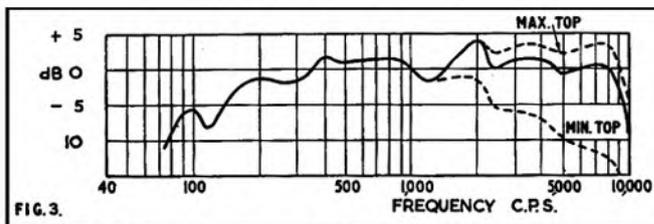
C.C.I.R. test tapes having surface induction characteristics of 100 microseconds, 200 microseconds and 400 microseconds were played at the three speeds and responses plotted from the low level output jack. Fig. 2 shows that playback equalisation follows the C.C.I.R. recommendations to very fine limits.

Acoustic response

A $7\frac{1}{2}$ i/s White Noise test tape was next played, and the sound output measured at a distance of one foot from the speaker



● Low level jack output—C.C.I.R. test tapes



● Acoustic output— $7\frac{1}{2}$ i/s white noise test tape

grill The solid line curve of Fig. 3 was obtained with the tone control set about half way; this also corresponded to the preferred setting when playing the pre-recorded tape. Turning the control to one extreme gave a slight increase in top response, and turning it in the other direction resulted in a fairly vigorous top cut.

Peak output

The maximum undistorted acoustic power output at one foot from the loudspeaker was 106 phons; this corresponds very closely to that of other domestic recorders recently reviewed. Waveform distortion was just visible on a C.T.R. when the voltage across the 3-ohm speaker voice coil terminals reached 2.2 volts R.M.S.; this corresponds to an electrical power output of 1.6 watts.

Signal noise ratio

Hum level depended somewhat on the setting of the gain control. At normal listening level it was 36 dB below test tape level, but at higher and lower settings of the control the ratio

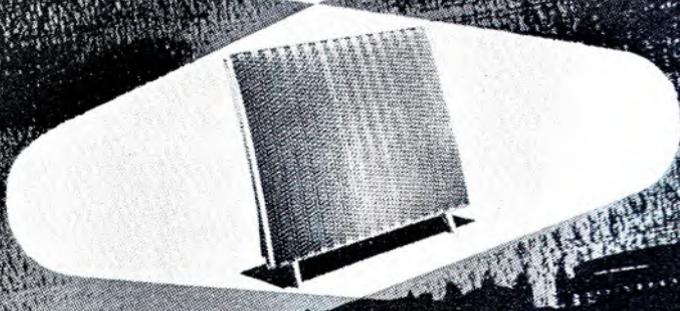
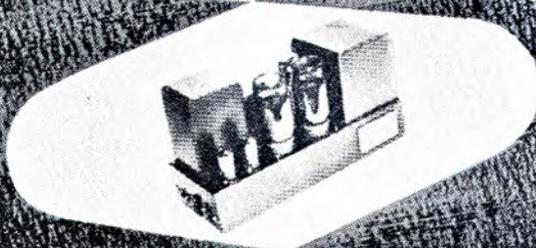
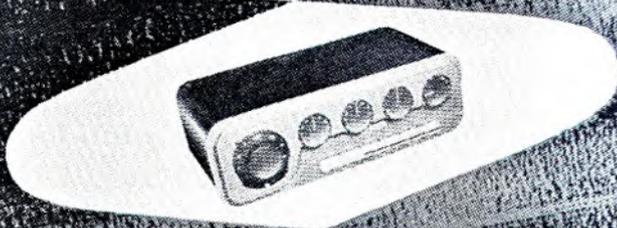
(continued on page 469)

1960

Hi Fi

YEAR BOOK

Including Tape & Tape Recording
and . . . Cine Sound Supplement



QUAD

For the closest approach to the original sound

ACOUSTICAL MANUFACTURING CO. LTD. HUNTINGDON, HUNTS

PICKUPS • MOTORS • TUNERS • SPEAKERS •
AMPLIFIERS • MICROPHONES • RECORDERS

10/6

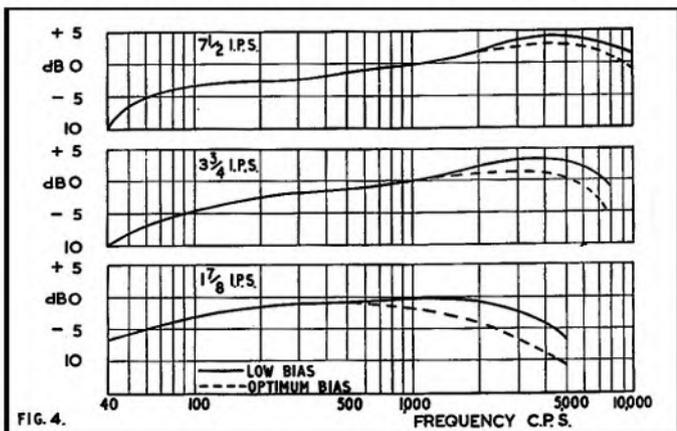
HI-FI YEAR BOOK (1960 Edition) Now Ready. Price 11/6 Posted.
MILES HENSLOW PUBLICATIONS LTD.
99, Mortimer St., London, W.1.

dropped to 30 dB. This indicates that some cancellation is taking place between head pickup hum and output stage hum. Thus the hum is between 42 dB and 48 dB below tape peak recording level, and is perfectly adequate for this class of instrument. Hiss and tape noise was commendably low, which points to good waveform in the erase and bias oscillator.

Record/replay tests

The tests so far have confirmed that there is little cause for complaint on the playback side. The solid line curves of fig. 4 show the record/play responses for the three speeds; apart from a slight top lift, which can be reduced by the tone control, they give no indication of the cause of the trouble mentioned in the opening paragraph. Further recording tests at 1 Kc/s showed that test tape level, which is 12 dB below tape peak recording level, was recorded with the cathode ray beams of the volume indicator moved about $\frac{1}{4}$ in. from the zero position; the recorded waveform at this level was relatively clean. Turning up the gain control to close the indicator beams to the blue cursor resulted in extreme distortion of the recorded signal, and serious distortion commenced at a level only 6 dB above test tape level, when the indicator beams were half closed. This explains the edgy distorted sound obtained during the early recording tests, and readers of my other reviews will guess that such results are caused by under-biasing. The bias was measured and found to be barely 30 volts at 68 Kc/s which is rather low for a Collaro head.

To avoid removing the amplifier from its cabinet, I disconnected the erase head so that the bias voltage was increased to 40 volts, and continued tests using bulk-erased tapes. Recordings were much improved, and were comparable to pre-recorded tape quality in every way. The record/play responses were re-checked and are shown as the dotted curves of fig. 4. Closing the volume indicator beams now resulted in a recorded level 10 dB above test tape level, with just perceptible distortion. This shows that



● Low level jack output—record/replay

the bias should be increased still further for minimum distortion, but with a three-speed machine one is tempted to seek a compromise bias which will allow enough top response to be recorded at 1 7/8 i/s without causing audible distortion at the higher speeds.

Personally I would prefer to raise the bias to prevent any possibility of harmonic distortion at any tape speed, and then peak the 1 7/8 i/s pre-emphasis correction circuit at a lower frequency; but such is the power of advertising that extended frequency response is still put before "deep down cleanness".

Comment

I like the functional styling of the cabinet, and the close grouping of the controls. The edge-operated controls should be calibrated in some way so that preferred settings can be repeated. Also, with one going up, one down, and one across for increase of gain, my recordings were marred by occasional

blasts of sound caused by turning the controls the wrong way and too far!

The low bias on this particular recorder may have been the result of adverse component tolerances, but the recorded quality is so vastly improved with optimum bias that a pre-set bias control would be a worthwhile refinement. The large speaker, mounted on what is in effect an open baffle, contributes markedly to the very fine sound quality of this recorder, and offers the added advantage that it may be placed for maximum acoustic effect without reference to the operating position of the recorder proper.

With correct bias the recorded quality does full justice to the excellent playback characteristics, and I have no hesitation in recommending this machine where a compact self-contained unit of better-than-average tone quality is required.

A. Tutchings

FIDELITY RADIO
"ARGYLL"
PORTABLE
TAPE RECORDER



Manufacturer's Specification

Tape speed: 3 1/2 i/s. **Frequency range:** 60-10,000 c/s. **Fast winding or rewinding:** for 850 ft. of tape, 3 mins. **Built-in loudspeaker:** Permanent magnet 7 x 4 in. high flux. **Output impedance:** 3-5 ohms. **Amplifier power:** 4 watts. **Mains voltage:** AC only, 200/250 volts. **Overall dimensions of case:** 17 x 13 1/2 x 7 1/2 in. **Net weight:** without reels and mic., 21 lb. **Signal to noise ratio:** 50 dB down. **Wow and flutter:** Total 0.4% R.M.S. **Price:** £30 9s.

Manufactured by Fidelity Radio Ltd., 11-13 Blechynden Street, London, W.11.

WITH the extremely rapid growth of the popularity of Tape Recorders, it was inevitable that a market would be created for machines that do not offer the ultimate in performance but that do have the right sort of price ticket. In the reviewer's opinion, the "Argyll" is worthy of the consideration of prospective purchasers in that market.

It must be said that the machine reviewed does not quite meet the specification set out above, and thereby earns an unnecessary black mark. Unnecessary, because of a system that seems to have grown up whereby Manufacturers, and they nearly all do it, have to claim a little bit more than the other chap, and, if need be, a little bit more than the machine will do. Unnecessary also, because the performance of the "Argyll" reflects great credit on its price, and upholds the promise of the smart, yet workmanlike appearance.

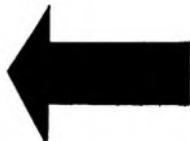
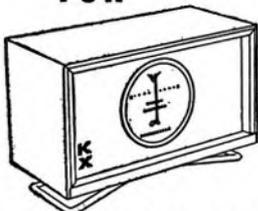
Controls simple

The B.S.R. "Monardeck", used on this machine, has proved to be justly popular, and represents an ideal choice in view of the simplicity of operation of the controls. The makers do not claim a fantastic wow and flutter figure, and I am glad to except them from my previous remarks. Such wow as was present occurred at the frequency of the capstan rotation and, digressing for a moment, one cannot help wondering how much improvement in this direction would cost. (A reviewer must surely strive towards a raising of real standards!)

The measured performance figures are shown in the graph and table. In the absence of an "Amplifier" output, all output

(continued on page 471)

STEREO BALANCE UNIT FOR



VISUAL DISCRIMINATION

Perfect enjoyment of stereo recordings can only come with perfectly balanced loudspeakers. The S.B.I Unit completely eliminates error by giving an accurate visual indication and enables any type of stereo system to be "tuned" in seconds.

The S.B.I is beautifully finished in a blond oak cabinet and costs

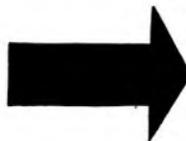
£7.19.6

WILMEX (DISTRIBUTORS) LIMITED

ST. STEPHEN'S HOUSE · WESTMINSTER · LONDON, S.W.1

Tel: WHI 3213/4

*A professional splice
in seconds—*



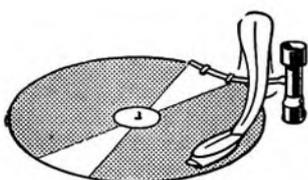
with the

irish S.P.3 Tape Slicer

- ★ Neat blip-free splices
- ★ Unique bow trim leaves edges free of adhesive
- ★ Built-in replaceable blades of high-grade steel for exceptionally long life
- ★ Only ¼" of splicing tape per splice
- ★ Removable base allows splicer to be mounted on recorder

The 'Irish' Splicer is **67/6**
five times better at only

STOP DAMAGING DISC & STYLUS



THE AUTOLIFT

gently and accurately lowers the pick-up on to any size record. Most damage occurs when positioning the stylus—the slightest slip or shake of the hand may ruin your favourite recording in a moment. The Autolift removes this risk forever, and will lengthen the life of both records and stylii.

EASY TO FIT — SIMPLE TO USE

Takes all size records — Fits all record players **27/10** inc. P.T.
Send for **FREE** leaflet and address of stockist.

Autolift Sole Distributors:

PART EXCHANGE

Your unwanted tape recorder, L.P. classical records, and Hi-Fi equipment.

Purchased for cash or taken in part exchange for new goods.

★

NOW IN STOCK

Cossor, Philips, Elizabethan 4-track.

Ferrograph 4.AN

All Quad, Rogers, and Jason Stereo.

★

H. C. HARRIDGE

8 MOOR STREET, CAMBRIDGE CIRCUS, W.1

GERrard 7108

★

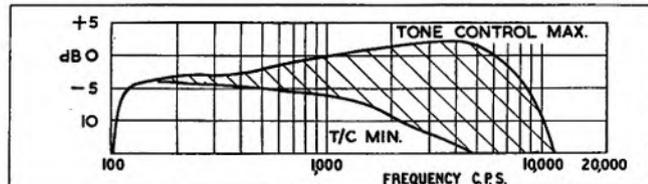
Open daily except Thursday

voltages were measured across the load of the internal loudspeaker, which, incidentally, fulfilled its purpose adequately. The Signal/Noise Ratio quoted was measured below a 1 Kc/s signal level set for 5 per cent. Distortion. Recording at this level the bar type Magic eye was showing about $\frac{1}{2}$ in. gap. With the Magic eye closed, the distortion level was $9\frac{1}{2}$ per cent. The weighted S/N ratio could be improved with attention to the Bias Oscillator, erased tapes tended to be rather noisy, but nevertheless the figure is quite good for a machine in this range.

Table 1

Tape Speed	$3\frac{3}{4}$ " / sec.— $4\frac{1}{2}$ %	} 850' Tape
Fast Forward	3 min. 25 sec.	
Fast Rewind	2 min. 55 sec.	
Wow and Flutter	within 0.4%	
Signal/Noise Ratio	45 dB Unweighted	
	46 dB Weighted	
Input Sensitivity	Mic 1 mV	
	Rad 100 mV	

The two inputs have separate gain controls, and can be mixed. The sensitivity of the "Radio" input is of the right order, while that of the "Mic" input, although very good at 1 mV, is marred by hum, which really sets a level of about 3 mV for a clean recording. This was observed using the



microphone supplied with the machine. It may well be that closer attention to screening, or the placement of wiring, would be of advantage here.

The cabinet design merits full marks for appearance, and also for the two pockets, which, I found, allowed me to pack in the mains lead and plug, microphone, recording lead, and two spare reels of tape, and there was still some room to spare. The machine is delivered complete with a reel of tape and spare spool, a microphone of smart design, a recording lead, a usefully long mains lead, and instruction booklet. All, in fact, that is needed to start recording.

The instruction booklet appears to take brevity to the extreme, but, on consideration, I give full marks for just that. The new owner is given full information without being allowed to feel that there is nothing left for him to find out himself.

In conclusion, while I would not attempt to take this machine out of the "Pop music" class, I do believe that it represents its price bracket at the highest level.

A. Bartlett Still

Tape Recorder Component Accessory Specialists

Jack Plugs, Sockets and Leads etc. for all makes in stock. Standard Jack Plugs 2/11, Chrome 4/6.

Wearite Defluxer 50/-. Instant Bulk Tape Eraser and Defluxer 27/6. Bib Splicer 18/6. Easy Splice Tape Splicer 6/9. Klentazape 12/6.

Teletron Tape-Jack £5 9s. 0d. Truvox Radio Jack £3 8s. 4d. Microphone Cable 9d. per yd. Twin screened 1/6 yd. Lightweight Pickup Screened Cable, Single 1/- yd., Twin 1/6 yd. Phillips/Stellaphone Leads 12/6. Grundig/Telefunken Leads: SL3 8/6, SL3X 13/-, SL33 10/6, SL33S 11/6, SL233 15/-.

Grundig/Telefunken 3-pin Plugs 5/-. Matching Socket SJS3 10/6. Extension Mike Leads: MEC5 30/-, MEC10 37/6, MEC15 45/-.

Volume Controls, Condensers, Resistors, etc., etc., and of course all the best Tape-recorders, P. & P. 1/6; over £2 free. S.A.E. all enquiries. C.O.D. 1/6 extra.

WYNDSOR TELEVISION SERVICE

ST. ALBANS RD., BARNET, HERTS.

BAR. 1769

YOUR TAPE DEALER

Specialists in Hi-Fi Equipment and Tape Recorders

CHELSEA RECORD CENTRE

203 KINGS ROAD, S.W.3 FLA 2596

Open till 8 p.m. (except Thursdays)

Disc and Tape Reproducing Equipment and Tape Recorders
by Leading Manufacturers

CUSTOM BUILT INSTALLATIONS

All High Fidelity Requirement and Services Available

Estimates Free

Personal Service

Custom High Fidelity

371 Green Lanes, Palmers Green, London, N.13

Tel.-PALmers Green 5228

LONDON AREA, W.1

- Stockists of leading makes of Tape Recorders
- Comparative demonstrations at any time

H. C. HARRIDGE

8 MOOR STREET W.1

Telephone: GERrard 7108



ALL LEADING MAKES IN STOCK

Cash or Easy Terms

LONDON'S FINEST SERVICE

207 EDGWARE ROAD, W.2

PAD 3271/2

42 TOTTENHAM COURT ROAD, W.1 MUS 2605

SHEEN TAPE RECORDER CENTRE LTD.

SPECIALISTS IN TAPE RECORDERS AND ACCESSORIES, ETC.,

SERVING LONDON AND HOME COUNTIES

YOUR CENTRE FOR FRIENDLY HELP—SALES AND SERVICE

8 STATION PARADE,
SHEEN LANE, SHEEN,
LONDON, S.W.14

Showrooms: Open until 7p.m.

PROSPECT 0985

(Next to Mortlake Station S.R.)

BIRMINGHAM

TAPE RECORDERS on "NO-INTEREST" Terms!

NO EXTRA CHARGES FOR EXTENDED CREDIT. You pay the Retail Price only. Grundig, British Ferrograph, Philips, Vortexion, Telefunken, etc. Comparative daily demonstrations of all Leading Makes of Stereo Hi-Fi Equipment and Recorders.

JEWKES & CO. LTD.

The Midlands Hi-Fi and Tape Recorder Specialists
285 BROAD STREET, BIRMINGHAM 1. MID 4829/20

R.E.S. (COVENTRY) LTD

SPECIALISTS IN HIGH FIDELITY

and all makes of Tape Recorders

All leading makes of High Fidelity Equipment stocked and demonstrated under ideal conditions. ★ *The Best Selection—Terms and After Sales Service in the MIDLANDS.*

R.E.S. (Coventry) Ltd. 128 Far Gosford St.

Coventry 28781/2

ACOUSTIC PRODUCTS

Hi-Fi Stereo Tape Recorders

Specialised Loudspeaker enclosures and
Equipment Cabinets Designed to order

Write or ask for Mr. Pendreich

54 ELM ROW, EDINBURGH, 7.

Tel.: WAV 6338

— YOUR TAPE DEALER —

FARNHAM, SURREY

- ★ Stockists of all the leading makes of High-Fidelity Equipment
- ★ Comparative Demonstrations
- ★ Cabinet Manufacturers and Designers
- ★ Personal service and satisfaction guaranteed

LLOYD & KEYWORTH LTD, The Record Shop
 26/7 Downing Street, Farnham, Surrey Telephone: Farnham 5534
 SURREY AND HAMPSHIRE'S HI-FI SPECIALISTS

Tape Recorder Centre (Halifax)

Yorkshire's Leading Tape Recorder Specialists
 Comparative Demonstrations Daily • Hi-Fi Stockists • Official Telefunken Service Agents
SOUND INSTALLATIONS
 17 Rawson Street, Halifax Phone: Halifax 66832

LEEDS

VALLANCES

HEADROW HOUSE &
 144 BRIGGATE LEEDS, I.

Branches at Otley, Harrogate,
 Mansfield, and Scunthorpe

**A WIDE SELECTION OF THE FINEST
 RECORDERS AND ACCESSORIES**

LEICESTER

ALL YOUR HI-FI REQUIREMENTS

H.M.V. • DULCI • QUAD • LEAK • CHAPMAN • ROGERS • AUDIOMASTER
 Speakers by TANNOY • LOWTHER • W.B. • H.M.V. • WHARFEDALE
 Tape Recorders FERROGRAPH • REFLECTOGRAPH • GRUNDIG • SIMON
 BRENELL • RECORD DEPT • ALL LABELS • PARASTAT SERVICE

LEICESTER CO-OPERATIVE SOCIETY LTD.
 HIGH STREET Telephone: 20431

LIVERPOOL'S TAPE SPECIALISTS.

COGLAN & ROBINSON LTD.

*Offer unique sales and
 service facilities throughout the
 Northwest.*

stockists of FERROGRAPH
 REFLECTOGRAPH, GRUNDIG,
 etc., etc.

FREE H.P. up to 12 MONTHS

18 HACKINS HEY, (off Dale
 St.) L'POOL 2. CEN: 5245

MANCHESTER



8 DEANSGATE • MANCHESTER
 Next to Grosvenor Hotel

The Tape Specialists

FERROGRAPH • BRENELL
 PHILIPS • TELEFUNKEN
 and all other good makes

PALMERS of MIDDLESBROUGH DARLINGTON

JASON • LEAK • ROGERS • PAMPHONIC • W.B.
 WHARFEDALE • R.C.A. • GOODMANS • GRUNDIG
 Call or send for lists:—
 3 East Street, Darlington or 106 Newport Road, Middlesbrough

WESTWOOD'S of OXFORD

46 GEORGE STREET
 PHONE: 47783

CLASSIFIED ADVERTISEMENTS

Advertisements for this section must be pre-paid, and accompanied by a postal order, money order, or cheque, made payable to "The Tape Recorder", 99 Mortimer Street, London, W.1. They must be clearly written or typed, and must be in the form of a separate sheet of paper if included with a letter dealing with other subjects.

The rate is 6d. per word, with a minimum charge of 7s. 6d. Box numbers may be used for an extra charge of 1s. 6d. The trade rate is 9d. per word, plus 2s. for a box number, conditions on application.

No responsibility will be accepted by the editor, the publishers, or the printers of "The Tape Recorder", for the quality of any goods offered, bought, or exchanged through the medium of these columns, or for any failure in payment, etc., though the greatest care will be taken to ensure that only bona-fide advertisements are accepted.

All advertisements for the November issue must arrive not later than **October 10th.**

For Sale

Ferrograph 4A/N's 808's Vortexion WVA, WVB, Simon SP4, Reflectograph 'B', etc., always in stock and ready for immediate delivery as well as over 200 latest 1960 recorders at London's largest tape recorder specialists. The best, lowest H.P. terms and the finest selection of new and S/H recorders from £18. Generous P/E allowances. Essex Tape Recorder Centres, 2, Maryland Station, Stratford, E.15 and 205, High Street North, East Ham, E.6.

A binder will keep your copies of The Tape Recorder clean and ready for easy reference, price 15s. posted from 99 Mortimer Street, London, W.1.

Tape/Disc/Tape transfer, editing, copying. If quality and durability matter (especially with LP's from your precious tapes) consult Britain's oldest transfer service. (LP's from 16s.). Limited quantity 1,800 ft. American super LP tapes 35s. Sound News, 10, Clifford Street, London, W.1.

Use up those odd lengths of tape, splice them together professionally after reading "How to Splice Tape" price 2s. 6d. posted from The Tape Recorder, 99 Mortimer Street, London, W.1.

Find that review you want—get a copy of the index to volume one Tape Recorder. Price 2s. posted.

New Grundig TK60 stereo tape recorder (1960-1961 model). Cost £135. Accept £110 or nearest offer. Write Dr. Shakir, 13 Coniston Road, N.10.

Telefunken 85KL and microphone. Mint condition. £65 (cost £88). Stanmore, 12 Pollards Hill North, London, S.W.16. POLlards 3330.

Recording Tape. Save up to 30%. Send for list. Also 50 secondhand Recorders in stock. E. C. Kingsley & Co., 132 Tottenham Court Road, London, W.1. EUS 6500.

Pre-Recorded Tapes, all makes, 7½ and 3¼ i.p.s., send for free lists or visit TELETAPE (Dept. T.R.3), 33 Edgware Road, W.2. PAD 1942.

WAL GAIN TRANSISTORISED PRE-AMPLIFIERS. Many applications, extra gain for Mics, Tape Heads, P-U's, etc., etc. Supplied complete with phone plugs, battery, screened lead, etc. Mono £5, Stereo £7.10.0d.
 WAL BULK TAPE ERASER. Erases both tracks, 7" reel of tape in 30 secs. £7.18.6d.
 WALTRAK TRANSISTORISED AUDIO OSCILLATOR, 1,000 cps, supplied complete with probe, battery, etc. Excellent accessory for service, testing, etc. £6.10.0d.



Full technical literature. Supplied through all the leading dealers. All our products designed and built in our Laboratories.
WELLINGTON ACOUSTIC LABORATORIES LTD., FARNHAM, SURREY.
 Fham 6461.

IMPORTANT

Sole Agents for well-known Japanese Tape Recorder, now selling in thousands in U.S.A. and Canada, tape deck as adopted for production in Common Market, invite applications for wholesale importers for distribution in British Isles. Machine is 2-speed, 5" spool twin track, 5" speaker, 2 inputs, extension output, radio connector and microphone. Bulk price £12. Duty 20%. No import licence required.

Write to Box. No. 252

FREE H.P.!

**YOU PAY THE
CASH PRICE
ONLY—OVER
18 MONTHS!**



We sell and stock more Tape Recorders than any other dealer in England, Wales, Scotland or N. Ireland. Why do thousands of people buy from us? Because we give the best terms—terms which include No-Interest Charges at all—Only 1s. in the £ deposit any make—Up to 2 years to pay—Free Servicing—Free Delivery—No Purchase Tax—Free Tape offers—Commission on Sales—and lots more besides.

If you want to know why it will pay you to buy from us, write, phone or call in NOW for full details of all our terms, and free brochures on all the best makes:

HOWARD photographic

218 HIGH ST. BROMLEY, KENT. RAV. 4477

CUT OFF HERE

Please rush me full details of your terms and tape recorder brochures:

Name..... Address.....

Add below any models you are particularly interested in:

ER/I

YOUR TAPE DEALER

PETERBOROUGH, NORTHANTS *Tel: 2759*
 Hi-Fi Equipment and Record Specialists
 Tape Recorders - - Record Players
Comparative demonstrations of all leading makes of Audio equipment
CAMPKIN'S RECORD SHOP
 12 PARK ROAD
 also at KP Camera Shop, Kings Parade, Cambridge

SOUTHAMPTON—SALISBURY
 ★ All the best makes of Tape Recorders
 ★ Hi-Fi Systems and Records
 ★ Expert knowledge and advice
 The West of England High Fidelity Specialists
J. F. SUTTON 421 SHIRLEY ROAD, SOUTHAMPTON
 15-18 QUEEN STREET, SALISBURY

WORTHING, SUSSEX
 We stock Hi-Fi Equipment by Leak, Quad, Goodsell,
 RCA, Acos, Garrard, Collaro, Tannoy, Wharfedale and
 Goodman and give fully comparative Demonstrations
BOWER & WILKINS LTD.
 1 Becket Bldgs., Littlehampton Road Worthing 5142

RAPID RECORDING SERVICE
 78s & LPs from your own tapes
 Master discs and pressings
*Recording Studio equipped with Bechstein Grand
 Mobile Recording Van—"Off the Air" Service*
 Practising studios with or without accompanist
 21 Bishops Close Church Lane, E.17 COP 3889

ADVERTISERS' INDEX

Armstrong Wireless & Television Co. Ltd.	458
B.A.S.F.	476
British Ferrograph Recorder Co.	475
Chitnis Electronics Ltd.	464
Cosmocord Ltd.	428
Dickinsons of Pall Mall	432
E.M.I. Sales & Service Ltd.	434
Easyspice	466
Elizabethan (Tape Recorders) Ltd.	431
Fi-Cord Ltd.	426
Film Industries Ltd.	462
Francis of Streatham	454
Gopalco Ltd.	452
Gramdeck	466
The Gramophone Co. Ltd.	433
Grampian Reproducers Ltd.	460
Grundig (G.B.) Ltd.	446
H. C. Harridge	470
Hi-Fi Year Book	468
Howard Photographic	473
Lustraphone Ltd.	458
M.S.S. Recording Co. Ltd.	454
Magnegraph	474
Multicore Solders Ltd.	457
Nusound Recording Co.	462
Perth Radios Ltd.	436
Phillips Electrical Ltd.	432
R. E. W. Earlsfield Ltd.	458
R.B. Tapes Ltd.	462
Rapid Recording Service	474
Sands Hunter	460
Spectro Ltd.	430
Tape Recorder Centre Ltd.	427
Tape Recorder (Electronics) Ltd.	429
Technical Suppliers Ltd.	462
Valradio Ltd	455
Walter Instruments Ltd.	444
Wellington Acoustic Laboratories Ltd.	472
Wilmax (Distributors) Ltd.	470
Wyndor Television Service	471

CLASSIFIED ADVERTISEMENTS—(continued)

For Sale (continued)

Phillips EL3527, as new, cost £41. Accept £33 o.n.o. Call or phone after 6 p.m. 29 Laurels Road, Iver Heath, Bucks. Iver 1629.

Latest Fi-Cord, hardly used, mains/battery charger, Grampian microphone, cost £69, accept £55 o.n.o. Palmer, 23 Arundel Buildings, Webb Street, London, S.E.1. BER 3096.

Pre-Recorded Tapes. Send 1/- for our list of over 200 pre-recorded tapes. Classical, jazz, pops, etc. Fenham Radio, Sandyford Road, Newcastle-on-Tyne, 1.

Miscellaneous

Tape to Disc—all speeds s.a.e. for leaflet, Omega Recording Company, 112 Sunnybank Road, Potters Bar, Middx. Tel: 6428 (evenings only).

Tape Recorder need repairing? Let London's largest tape recorder specialists do it for you, expertly and economically. Essex Tape Recorder Centres, 2, Maryland Station, Stratford, E.15. MAR 5879.

Tape to Disc—Comprehensive 78-45-33 service available from Rendezvous Records, 19 Blackfriars Street, Manchester 3.

Tapes? Transfer? Consult Sound News for better rates. See above.

Stereo Tape Library. Specialists in the sale and hire of Stereo Tapes. Hire charge 1s. per tape. For particulars send s.a.e. to Stereo Tape Library, Linden, St. Johns Road, Brecon, S. Wales.

Tape to Disc service, editing, and dubbing, all speeds. Studio available for musical groups. Outside recordings our speciality. Ilford Sound Recording Service, 63 Aintree Crescent, Barking, Ilford, Essex.

Sound Services, for high standard, low cost Tape Recorder repairs by professional sound engineers. Telephone Billericay 1391, where your East London or Essex address will be automatically recorded.

ESTRA—The Tape-spondence Club run by Tape Enthusiasts for Tape Enthusiasts. Details from the Secretary, Robert Ellis, Schoolhouse, Whitsome, Duns., Berwickshire.

Tape recordings transferred to modern DISCS. Phillips, 38 Kensington, Liverpool, 7.

Situations Vacant

DEVELOPMENT ENGINEER for laboratory of high reputable tape recorder manufacturers. Electronic and mechanical experience in this specialised field essential. Wyndor Recording Co. Ltd., 2 Bellevue Road, Friern Barnet, London, N.11.

SOUND RECORDIST required by Kodak Limited, to provide recordings for Company lecturers who are also using films and slides. Must be able to make magnetic tape recordings of all kinds with a fairly modest range of equipment. Must have a good knowledge of music and a sense of what is apt for use in film-making. A skilful amateur with a feeling for presentation might well be suitable for this work. Please send an outline of career and qualifications for the post to the Personnel Manager, Kodak Ltd., Kingsway, London, W.C.2.

Wanted

TK20 or similar good Grundig wanted. F. Riddle. 113, Church Road, Northolt, Middx. Viking 4734.

LET US BIND YOUR COPIES

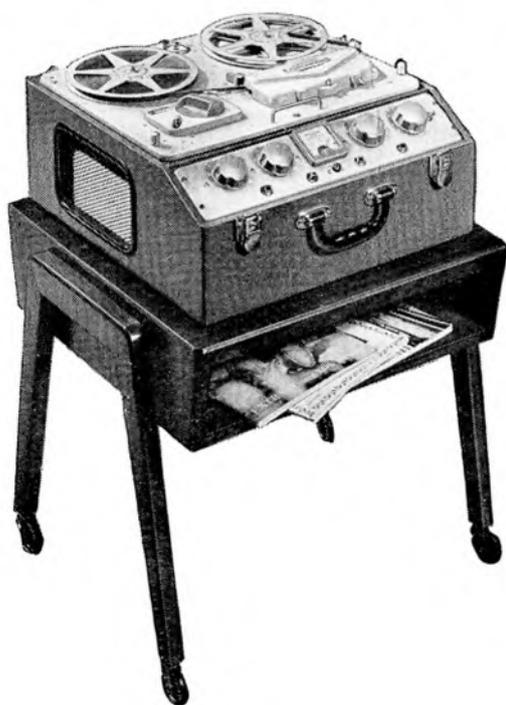
To keep your copies of "The Tape Recorder" in perfect condition send them to us for permanent binding. Hand stitched and covered in black buckram, they will last a lifetime. Price with index and postage only 35 shillings, send to—Back Numbers Dept., 99 Mortimer Street, W.1.

**TAPE RECORDERS . AUDIO EQUIPMENT . DISC
 CUTTING STD & LP FROM TAPE STUDIO
 FACILITIES . HIRE SERVICE . SALES . EXCHANGES**

MAGNEGRAPH

1 Hanway Place, London, W.1 *Tel: LAN 2156*

**About
Tape speeds,
Track widths,
Cassettes
...and the like**



Ferroglyph engineers—as may be expected—are continuously at work investigating the many factors likely to contribute to the advancement of the art of Tape Recording. At the moment considerable interest is being focused upon narrower track widths and slower speeds with the object of compressing more material upon a given length of tape.

With twelve years experience in the design and manufacture of recording heads and ancillary circuitry the Company is in a strong position to evaluate all developments bearing upon those issues.

Because *Recording* is our business, however, it has been our consistent policy to concentrate the greatest emphasis upon the *recording* function of the Ferroglyph rather than attempting to foster its adoption as a competitor to the gramophone.

In our considered opinion—reinforced by our intimate knowledge of the work being carried out by Ferroglyph users throughout the world—the widespread introduction at the present time of narrow tracks and slower tape speeds must lead to a lowering of performance standards. Therefore we at Ferroglyph remain resolutely determined to make no compromise with quality. For those whose quest is still for true Hi-Fi performance over a long period—without recourse to extreme pre-emphasis, hum bucking, short-life narrow gap heads and other such artifices—the logical choice will be the incomparable Ferroglyph in either of the two models listed below.

Series 4A

4A/N Two Speeds $3\frac{3}{7}\frac{1}{2}$ i.p.s.
Monaural Recording/Playback.
81 Gns.

Stereo 808

Two Speeds $3\frac{3}{7}\frac{1}{2}$ i.p.s. For use with external Hi Fi amplifiers and Loud Speakers. The all-purpose machine for Monaural and Stereo Recording/Playback.
105 Gns.

Three Independent Motors · Synchronous Capstan Motor · Recording Level Meter · Brief Stop · Interchangeable Plug-in-Heads
Switched Speed Change with Compensated Correction Network · Separate Tone Controls · High Fidelity $2\frac{1}{2}$ Watts Output Stage
Uses $8\frac{1}{2}$ " Tape Spools · Gear-Driven Turns Counter · Automatic Switch Cuts Motors at End of Spool · Endless Loop Cassette (Optional Extra)

The Incomparable **Ferroglyph**

BRITISH FERROGLYPH RECORDER CO. LTD.

(A subsidiary of the Ferroglyph Company Ltd.)

88 HORSEFERRY ROAD, WESTMINSTER, S.W.1 · Tel: SULLivan 5426/7/8

How can you measure the authenticity of a tape recording? The simple answer is—you can't with any guarantee of accuracy. The sound thing to do is rely on proven quality and choose for all recordings the tape that's made to give Authentic Sound.

the 'rod, pole and perch' of **Authentic Sound**



BASF tape has a base of Luvitherm, the special plastic which permanently holds magnetic oxide in the tightest bond; and the oxide itself is made by a special BASF process to ensure magnetic stability no matter how long the tape is stored. These outstanding features are the reason experts use BASF tape for original research—recording the eating sounds of fish is one unusual field—as well as for true-to-life records of mere mundane events. BASF is the original recording tape. A vast reserve of more than 25 years experience and continued development keeps it ahead for authenticity. On BASF tape you can always be sure of registering your recorder's complete range of frequencies . . . always reproducing them . . . always obtaining Authentic Sound whatever and wherever you record.

Insist on the tape with the Luvitherm base

Magnetic Recording Tape

Standard • Long Play

Double Play • Editing Sound

F. A. HUGHES & CO LTD 4 STANHOPE GATE LONDON W1