

the TAPE

PRICE 1/6

March 1962
Vol. 4 No. 2

RECORDER

INCORPORATING "SOUND AND CINE"



IN THIS NUMBER

The Calibration and Use of Test Tapes (Part 1) • Equipment Reviewed • Tape Recorder Service
• Tape Recorder Workbench • Soft, for Art's Sake! • These Dealers offer Good Service • Our Readers
• Write • Sound and Cine • Field Trial of the Dokorder PT-4K • News and Pictures from the Clubs

Your Recorder deserves

The tape that speaks from space*



Soundcraft Products are selected for the U.S. Space Satellites, Tyros I and II—(*Tyros II now transmitting on 108 and 108.03 M/cs.) and by all leading Hollywood Film and T.V. Production Companies in outstanding features such as:

"BEN-HUR"
"RAWHIDE"
"HAVE GUN—
WILL TRAVEL"
"PHILIP MARLOWE"
"BORDER PATROL"
"PORGY & BESS"
"PERRY MASON"
"WELLS FARGO"
"HIGHWAY PATROL"
"WAGON TRAIN"



New from America—'SOUNDCRAFT', the quality Magnetic Recording Tape uniquely honoured by its makers being awarded a Hollywood Oscar for their work in magnetic oxides; proved best by millions of American recording enthusiasts.

Now, you can prove it best on *your* Recorder—prove that it gives more faithful reproduction than you have ever known. Life-long fidelity too.

Why? Because of the unique 'SOUNDCRAFT' 3-way Manufacturing process—pre-coated base; 'Uni-level' oxidation; Exclusive Micro-polish mirror finish. Gives you recording at its finest—a new recording experience that you must NOT miss.

HEAR THE DIFFERENCE—SWITCH TO—

SOUNDCRAFT

MAGNETIC RECORDING TAPE

On 'Mylar' (Polyester) Long Play and Double Play tensilised or Soundcraft Tri-Acetate. Standard and Long Play. Each in 3", 5", 5½" and 7" reel sizes.

YOUR DEALER HAS THEM NOW!

FREE INTRODUCTORY OFFER

To celebrate the introduction of Soundcraft to this country, we are including, Free (while stocks last) with every 7" reel of tape, a supply of indexing Tabs—an exclusive 'Soundcraft' device to make identification and subsequent play-back of recordings easier than you've ever known.

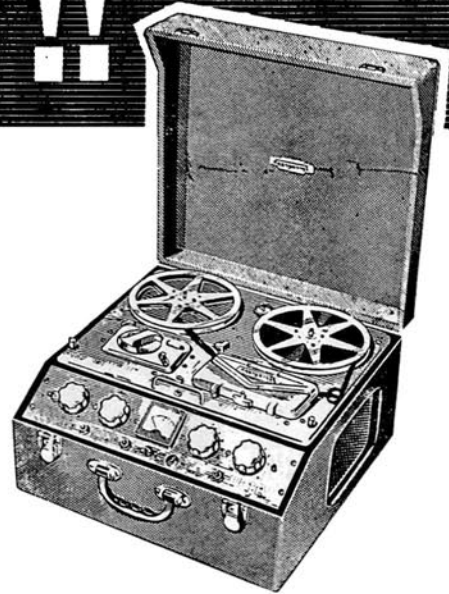
SOUNDCRAFT MAGNETICS LIMITED, Haddenham, Bucks.

Manufactured by Reeves Soundcraft Corporation, Connecticut, U.S.A.

2 YEARS FREE SERVICING!!

FREE HOME DEMONSTRATIONS!!

So great has been the demand for Home Demonstrations that we have decided to extend the scope of these to all prospective customers residing in the Greater London Area, and its immediate suburbs. To avail yourself of this wonderful opportunity simply cut out and fill in the form below and upon the date requested, we will demonstrate, in the comfort and convenience of your own home, the recorders you wish to see, hear and compare. Our City Manager, Mr. Wells, who is well known as the Chairman of the famous Walthamstow Tape Recording Club, will personally supervise each demonstration. You may therefore be assured of expert technical knowledge and experience, plus a personal interest being shown. Alternatively a personal visit to our showrooms will enable you to see the finest and largest selection of both new and second-hand tape recorders on display in this country. All new recorders carry our unique **TWO YEARS FREE SERVICING GUARANTEE**, ensuring two whole years of worry-free, trouble-free and above all cost-free servicing.



Specialists in

BRENELL · REFLECTOGRAPH
 FERROGRAPH · VORTEXION
 GRUNDIG · REPS · REVOX · ETC

- ★ OVER 250 NEW AND LOW PRICED SECONDHAND RECORDERS ON DISPLAY ★
- ★ GENEROUS PART EXCHANGES ★ CASH and H.P. TERMS OVER 9-24 MONTHS ★

Free Home Demonstration Application

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

TELEPHONE No.....

DATES CONVENIENT (ALL DEMONSTRATIONS ARE AFTER 7 P.M.).....

RECORDERS YOU WISH TO HEAR. (Max. 3).....

IF YOU WISH TO PART EXCHANGE STATE DETAILS BELOW.....

MAKE..... TYPE..... AGE..... CONDITION.....

ADDRESS FORM TO: Mr. B. Allerhand, City & Essex Tape Recorder Centres, 2 Maryland Station, Stratford, E.15

SHOWROOMS

228 BISHOPSGATE, E.C.2 BIS 2609
 OPPOSITE LIVERPOOL STREET STATION

2 MARYLAND STATION, STRATFORD, E.15
 ADJOINING MARYLAND STATION MAR 5879

205 HIGH ST. NTH., EAST HAM, E.6
 OPPOSITE EAST HAM STATION GRA 6543

CITY & ESSEX TAPE RECORDER CENTRES

For highest quality equipment

Heathkit

DAYSTROM

at lowest possible prices

HI-FI FM TUNER Model FM-4U

This model is available in two units which, for your convenience, are sold separately. They comprise a Tuning Unit (model FMT-4U) at £3.5.0. incl. P.T. and an I.F. amplifier unit (model FMA-4U) at £11.11.0. The Tuning Unit is despatched wired and tested. Provision is made for stereophonic F.M. radio transmissions. Printed circuit for I.F. amplifiers and ratio detector. Built-in power supply, 7 valves, many refinements. Range 88-108 Mc/s. (Illustration bottom right.)

Total Cost **£14.16.0**

TO ALL MUSIC LOVERS HI-FI ENTHUSIASTS

Our wide range does not permit adequate coverage of all models. A FREE CATALOGUE and full specifications of any particular model will be gladly sent on request without obligation on your part. WIRED AND TESTED MODELS NOW AVAILABLE. PRICES ON REQUEST.

All prices include free delivery in U.K. Deferred terms available on orders over £10.

TAPE RECORDING AND REPLAY HI-FI AMPLIFIER

Mono. model TA-IM, Stereo model TA-IS

For use with most tape decks. Thermometer type recording indicators, press-button speed compensation and input selection, 3-position bias level and printed circuit construction.

TA-IM	£18. 2.6
TA-IM and Collaro "STUDIO" ...	£30.10.0
TA-IM and Truvox Mk. 6 ...	£46.17.6
TA-IS (illustration Centre) ...	£23. 6.0
TA-IS and Collaro "STUDIO" ...	£35.14.0
TA-IS and TRUVOX Mk. 6 ...	£52. 1.0

A WHOLE RANGE OF PACKAGED DEALS (INCLUDING "CONNOISSEUR" TURNTABLES and DECCA fss PICK-UP) NOW AVAILABLE TO SAVE YOU FURTHER MONEY.

HI-FI EQUIPMENT CABINETS

A range of equipment cabinets is now available to meet the differing needs of enthusiasts. All are accurately machined for ease of assembly and left "in the white" for finish to personal taste. Designed for maximum operating convenience or for where room space is an overriding consideration, this range has at least one model to meet your requirements. Why not send for full details?

£11.5.6 to £17.18.6



THE "MALVERN"

"COTSWOLD" HI-FI FREE SUSPENSION SPEAKER SYSTEM

This is an acoustically designed enclosure 26 in. x 23 in. x 14½ in. housing a 12 in. bass speaker with 2 in. speech coil, elliptical middle speaker, together with a pressure unit to cover the full frequency range of 30-20,000 c/s. Capable of doing justice to the finest programme source, its polar distribution makes it ideal for really Hi-Fi Stereo. Delivered complete with speakers, cross-over unit, level control. Tygan grille cloth, etc. All parts pre-cut and drilled for ease of assembly and left "in the white" veneered for finish to personal taste. Can be easily assembled in an evening and you then have a system fully comparable with any in the £40-£75 class. Assembled weight 61 lb.



COTSWOLD

Here are some other interesting Heathkit Models for you:

HI-FI SPEAKER SYSTEM Model SSU-1. This kit is easily assembled. It contains twin speakers and balance control in its direct ducted port reflex cabinet. It is equally suitable for stereo or mono in average room. (Legs £1 1s. 0d.) Less legs. £10 17s. 6d.

HEATHKIT ELECTRONIC WORKSHOP KIT, Model EW-1. This new kit will help your boy to understand electronics, by making at least 20 exciting experiments, including Transistor Radios, Intercom Sets, Burglar Alarm, Electric Eye, etc. £7 18s. 0d.

HI-FI STEREO 6-WATT AMPLIFIER Model S-33. Attractively styled, completely self-contained. Printed circuit makes it easy to build. Only 0.3% distortion at 2½ W/chal. U/I output, ganged controls. £12 8s. 6d.

AUDIO SIGNAL GENERATOR Model AG-9U. Delivers up to 10 volts pure sine-wave (less than 0.1% distortion, 20 c/s to 20 kc/s). Decade switch-selected frequencies from 10 to 100,000 c/s. Internal 600 Ohm N/I load, or external. £19 19s. 6d.

POWER AMPLIFIER 12-WATT Model MA.12. Single channel, ideal for stereo conversion. £10 19s. 6d.

LOW INPUT HI-FI STEREO PRE-AMPLIFIER Model USP-1. An input of 2-20 mV will produce an output adjustable from 20 mV to 2 volts. This enables low-input p.u.s, etc., to load fully subsequent amplifiers of medium sensitivity. Negligible distortion. £6 17s. 6d.

COLLARO "STUDIO" TAPE DECK. Two tracks. "Wow" and "flutter" not greater than 0.15% at 7½ p.s. Long Term Speed Stability better than 0.5%. £17 10s. 0d.

SUGDEN MOTOR UNIT "CONNOISSEUR". Heavy duty motor, operating at 33½ and 45 r.p.m. Very heavy 12" turntable. £17 1s. 5d.

COMPLETE MATCHED STEREO OUTFIT, including RP-1U Record Player (until supplies are exhausted), S-33 Stereo Amplifier and SSU-1 Twin Speaker Systems. Pedestal Speaker legs £2 2s. optional extra. £44 9s. 4d.

HI-FI STEREO 16-WATT AMPLIFIER Model S-88. within its power rating, this is the finest stereo amplifier available, regardless of price. U/L push-pull output. 0.1% distn. at 6 w/chal. £26 12s. 6d.

TRANSISTOR INTERCOM. Models XI-1U and XIR-1U. Ideal for office or home. Each Master operates up to five Remotes. 9v battery operated. XI-1U £10 15s. 6d. XIR-1U £4 3s. 0d.

STEREO CONTROL UNIT Model USC-1. A deluxe stereo control unit with variable filter, switched rumble filter, printed circuit boards and many other refinements. Operates direct from tape heads. £18 18s. 6d.

TRANSISTOR PORTABLE RADIO Model UXR-1. Superbly styled hide case, with golden relief and crystal easy-to-tune dial; this completely self-contained 6-transistor dual-wave set performs brilliantly everywhere, even in a car. Reproduction is exceptionally good. Printed circuit. £14 18s. 6d.

SHORTWAVE TRANSISTOR PORTABLE Model RSW-1 Four wave-band seven transistor portable with telescopic and ferrite aerials, slow-motion tuning. Covers Medium, Trawler, and 6-26 Mc/s in four switched bands. Uses printed circuit board and latest circuit technique. Superbly styled leather case. £22 10s. 0d.

TRUVOX TD-1 Mk. 6 TAPE DECK. High quality mono-stereo Tape Deck. Three B.T.H. shaded pole motors with silent drive. "Wow" and "flutter" limited to less than 0.2%. Complete operation by push-button controls. £29 15s. 0d.

"MOHICAN" GENERAL COVERAGE RECEIVER Model GC-1U. Fully transistorised. Four piezo-electric transistors. To overcome the problems of alignment, etc., the R.F. "front end" is supplied as a pre-assembled and pre-aligned unit. £38 15s. 0d.

GOLDRING-LENCO TRANSCRIPTION RECORD PLAYER Model G.L.58. Fitted with the G.60 pick-up arm, it has infinitely variable speed adjustment between 33½ and 80 r.p.m. and four fixed speeds. ¾ lb. turntable to reduce rumble, "wow" and "flutter". £20 12s. 0d.

OTHER HEATHKIT MODELS AVAILABLE

World's largest-selling VALVE VOLTMETER	Model V-7A	£13.0.0
G/P OSCILLOSCOPE (5 in. Flat-face screen)	Model O-12U	£36.10.0
"HAM" TRANSMITTER	Model DX-40U	£32.10.0
VARIABLE FREQUENCY OSCILLATOR	Model VF-1U	£11.2.0
TRANSISTOR RADIO for the youngsters	Model UJR-1	£2.16.6
RESISTANCE/CAPACITANCE BRIDGE	Model C-3U	£8.6.6
AUDIO VALVE MILLIVOLTMETER	Model AV-3U	£13.18.6
AUDIO WATTMETER	Model AW-1U	£14.14.0

DAYSTROM LTD. DEPT. HTS GLOUCESTER, ENGLAND

A member of the Daystrom Group, manufacturers of
THE LARGEST-SELLING ELECTRONIC KITS IN THE WORLD



SSU-1



S-33



AG-9U



MA-12



USP-1



USC-1



TA-IS



TRUVOX Mk 6



STUDIO



S-88



RSW-1



UXR-1



GL-58



F.M. TUNER

JUST POST THIS COUPON FOR FURTHER INFORMATION

Without obligation please send me

★ **FREE BRITISH HEATHKIT CATALOGUE** ...

FULL DETAILS OF MODEL(S)

Kindly write below in BLOCK CAPITALS

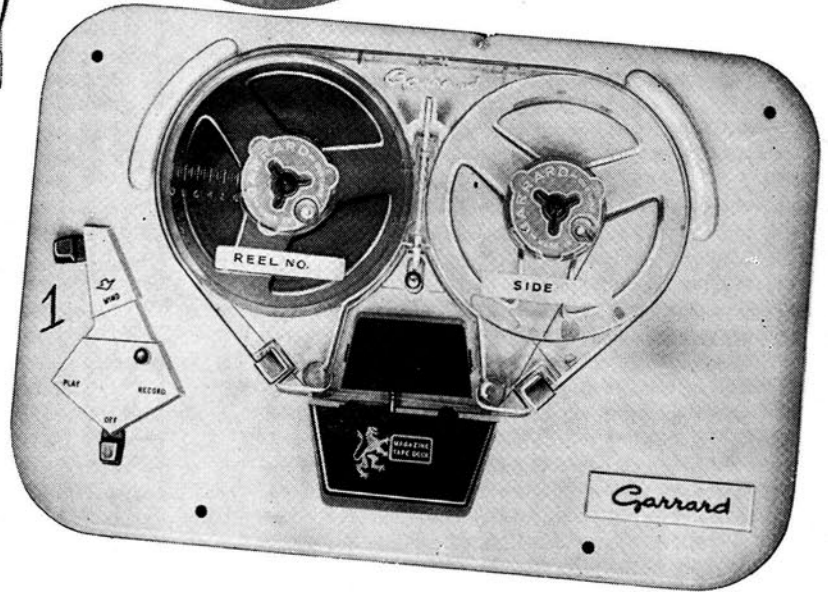
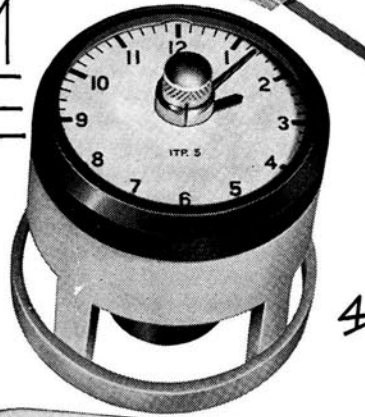
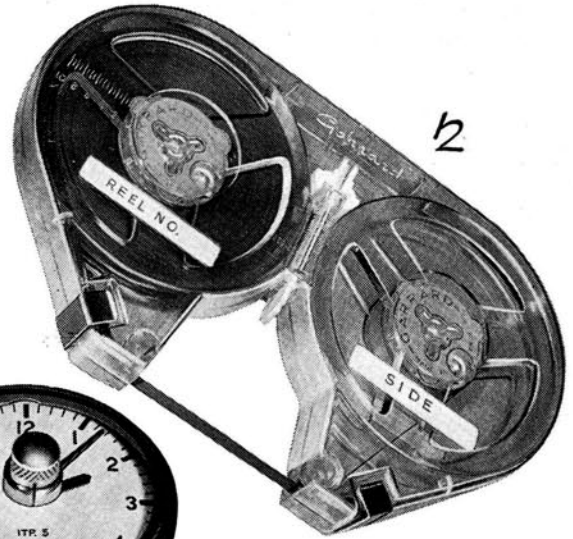
NAME

ADDRESS

TICK
HERE

HT5

4 REASONS THAT MAKE THE **Garrard** TAPE SYSTEM SO SIMPLE



1 SIMPLE TO OPERATE

Anyone can operate the Garrard system. Controls have been simplified. There are three positions only—PLAY—RECORD—WIND.

2 MAGAZINE LOADING

No tape threading. No spilling. No anchoring of tape. Just place the magazine on the deck and it is ready to operate.

3 EASY STORAGE

The Magazine is the same size as an average book. It fits neatly on a bookshelf using the Library Storage Unit.

4 GARRARD TAPE POSITION INDICATOR

Gives precise and accurate indication of recordings on the tape.

CONTINUOUS-EASY TAPE RECORDING & PLAYBACK WITH THE GARRARD MAGAZINE METHOD

MAGAZINE TAPE DECK ACCESSORIES

	£	s.	d.
Magazine containing 650 ft. Double Play Tape in container	1	13	4
Magazine only with one empty spool	8	0	
Reel of 650 ft. Double Play Tape	1	4	0
Garrard Spool only	3	3	
Library Storage Magazine Container	3	6	
Tape Position Indicator	1	19	6

THE GARRARD ENGINEERING & MANUFACTURING CO. LTD.

SWINDON WILTSHIRE

today's best on NOW BEST ON WORLD RECORD CLUB OFFERS

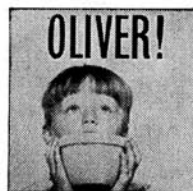
ANY 3



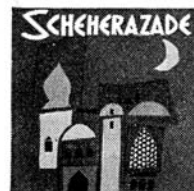
29. Me and My Shadow, Among My Souvenirs, Mean to Me . . . 11 great Garland songs. Disc/Tape: mono only



2. Grieg Piano Concerto. Odd Gruner-Hegge dynamically conducts the Bavarian State Radio Orchestra. Alexander Jenner piano. Disc/Tape: mono only



30. Ian Carmichael, Joyce Blair, star cast/ orchestra. As Long as He Needs Me, Consider Yourself, plus 10 hit numbers from Bart's great show. Disc: mono/stereo. Tape: mono only



31. Rimsky-Korsakov: Scheherazade. Sir Eugene Goossens and LSO in a breathtaking performance. Disc: mono/stereo. Tape: mono only



38. Hervey Allen, Ian Wallace, Marion Grimaldi and chorus sing the immortal Cobbler's Song, Robbers' Chorus, Chu Chin Chow, etc. Disc: mono/stereo. Tape: mono only



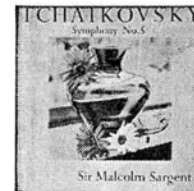
39. Sparkling playing by Sinfonia di London, brilliantly conducted by John Hollingsworth. Disc: mono/stereo. Tape: mono only



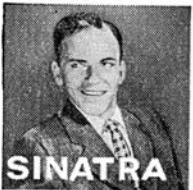
40. Star cast sing highlights from Puccini's great opera, including famous One Fine Day. Disc/Tape: mono only



NAT KING COLE



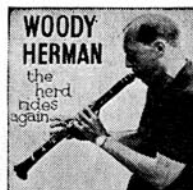
14. Tchaikovsky Symphony No. 5. Sir Malcolm Sargent and LSO in dramatic rendering of this colourful symphony. Disc: mono/stereo. Tape: mono only



19. Look Over Your Shoulder, My Lean Baby, White Christmas, Don't Worry About Me. 12 songs by the one-and-only Sinatra. Disc/Tape: mono only



30. Answer Me, Nature Boy, Ruby and the Pearl, 8 more sung in the unique Nat King Cole manner. Disc/Tape: mono only



45. Crazy Rhythm, Bijou, I Cover the Waterfront, etc. The great clarinetist plays 12 numbers. Disc: mono/stereo. Tape: mono only



22. 12th St. Rag, Isle of Capri, Smiles, Blue Moon. 12 characteristic numbers from the Duke. Disc/Tape: mono only



46. Elizabeth Lerner, Andy Cole, Peter Knight singers. Exciting 'double' featuring highlights from two famous shows. Disc: mono/stereo. Tape: mono only



47. Brahms Violin Concerto. Superb playing by Endre Wolf and Sinfonia di London under the baton of Anthony Collins. Disc: mono/stereo. Tape: mono only

THE BIGGEST BREAK-THROUGH SINCE TAPE RECORDING!

Not only is this the greatest World Record Club introductory offer yet made . . . it is a unique offer never before matched by any record club or company anywhere in the world!

Any 3 for 30/- . . . Tape or Disc!

Choose now any 3 titles from the varied selections shown above. Next, decide whether you prefer them as high-fidelity 3 $\frac{1}{2}$ ips pre-recorded tapes, or as high-fidelity 12" LPs. Either way the price is the same. Just 3 for 30/- tape or disc. *That's only 10/- each!*

Unconditional Guarantee

When you receive your 3 titles you have 7 days in which to listen to your selections and decide whether or not you want to keep them. If you don't, just send them back and you owe us nothing. *This guarantee is absolutely unconditional!*

Joining World Record Club

We know however that you'll not only be surprised but amazed. A host of new technical developments have gone into the production of these tapes. They provide, at 3 $\frac{1}{2}$ ips, a range and response that was never previously attainable at

this slow speed. The LPs too, are the equal in quality of the world's best. We believe you will be anxious to keep them (if you do, you'll be saving up to £6 on shop prices for the tapes, or up to £4.10s. on the LPs). This decision will make you a full member of World Record Club, entitled to share all the many extra unique facilities that make the Club the only one of its kind in the world.

Your only undertaking is to agree to buy four more tape records (or 12" LPs) over the year from the exciting and adventurous selection of at least 60 titles that will be offered to you. Each of these future Club releases will cost you only 29/- plus postage. Tape or 12" LP—both cost the same. Again, far, far below any comparable shop prices for an original full length 'star' recording. This is only possible because of the Club system of direct-by-mail distribution.

The more you buy the more you save!

If you buy more than your agreed 4 (and most members do) you can choose yet another title absolutely free for every 3 extra selections!

Your benefits as a club member

- * FREE monthly magazine, packed with illustrated feature articles!
- * FREE bonus tapes and 12" LPs!
- * EXCLUSIVE extra releases!
- * SPECIAL concert and theatre price concessions!
- * EXPERT GUIDANCE: WRC recordings are planned by an eminent advisory panel including the Countess of Harewood, Lord Montagu of Beaulieu, Sir Arthur Bliss, Richard Attenborough, Cyril Ornadel, Ray Ellington, Leon

Goossens, Malcolm Arnold, Steve Race, John Hollingsworth and Antony Hopkins. As special technical adviser on tape, WRC are privileged to have the services of Miles Henslow, editor of this magazine and distinguished authority on electronics.

Your Guarantee of Quality

WRC guarantees that every tape or record you choose (introductory offer, regular selection or bonus) will be of absolute top quality—the equal in every way of the very best recordings available anywhere in the world today. *You may return any tape or record with which you are not entirely satisfied.*

Future titles include:

- Gilbert and Sullivan: Mikado, Gondoliers, Pirates of Penzance.
- Enigma Variations. Boulton/LPO
- Nat King Cole, Lionel Hampton, Dean Martin, Duke Ellington.
- Beethoven: Symphonies 1, 4, 6 & 9. Josef Krips/LSO
- La Traviata—star cast and orchestra.
- Moussorgsky: Night on a Bare Mountain etc., Sargent/LSO
- Porgy and Bess, Carousel, Desert Song, and many other great shows.

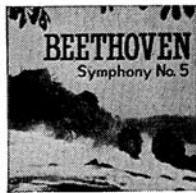
Waste no time!

Select the 3 titles you would like. Fill in and post the coupon today. *Remember to indicate whether you require tape or disc. Send no money now. This is an opportunity you cannot afford to miss!*

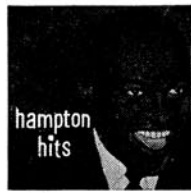
record... TAPE TOO! YOU THE CHOICE OF



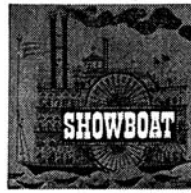
32. Star cast and orchestra stage all the famous songs: Getting to Know You, Hello Young Lovers, etc.
Disc: mono/stereo. Tape: mono only



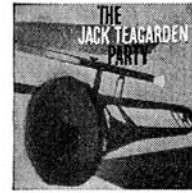
33. Beethoven 5th, plus Egmont, Josef Krips and LSO in a titanic interpretation matching the power of the music.
Disc: mono/stereo. Tape: mono only



34. Stardust, How High the Moon, Nearness of You, 'Round Midnight... 8 numbers by the vibraphone genius, Lionel Hampton.
Disc: mono/stereo. Tape: mono only



35. Of Man River, Bill, Make Believe, many more memorably sung and played by full star cast.
Disc: mono/stereo. Tape: mono only

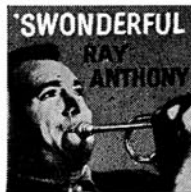


36. Beale St. Blues, After You've Gone, 12 hits by one of the world's greatest trombonists. Disc/Tape: mono only

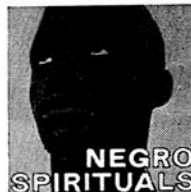


37. Thrilling playing: Revolutionary Study, Polonaises A and A Flat, Fantasy-Limpromptu, 12 favourites in all.
Disc/Tape: mono only

FOR 30' TAPE OR DISC!



41. Night and Day, King Porter Stomp, Pennies from Heaven, plus 9 more sizing tunes. Disc/Tape: mono only



42. George Browne, Isabelle Lucas and chorus sing Jericho, Swing Low, 12 well-loved songs.
Disc: mono/stereo. Tape: mono only



43. Andy Cole, Barbara Leigh, Mike Sammes singers: High Society, Three Coins, Harry Lime, Gigi, 11 top film hits.
Disc: mono/stereo. Tape: mono only



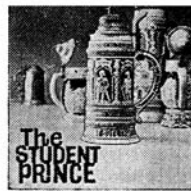
44. Leopold Ludwig and LSO in an exciting 'double': two of the world's greatest symphonies.
Disc: mono/stereo. Tape: mono only



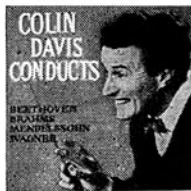
SIR MALCOLM SARGENT



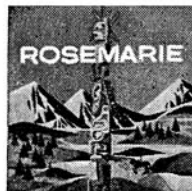
35. Ian Wallace, Joyce Blair and chorus. Some Enchanted Evening and all the unforgettable songs from this great musical.
Disc: mono/stereo. Tape: mono only



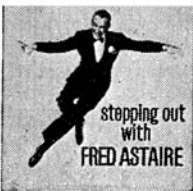
48. Marion Grimaldi, Linden Singers and Orchestra. Deep in My Heart, Serenade—all the old favourites.
Disc: mono/stereo. Tape: mono only



49. Beethoven's Fidelio, Brahms' St. Anthony Vars, Mendelssohn's Hebrides, Wagner's Siegfried Idyll. All under Britain's greatest young conductor.
Disc: mono/stereo. Tape: mono only



60. David Hughes, Barbara Leigh, Andy Cole and chorus sing Indian Love Call, Rose Marie, many more.
Disc: mono/stereo. Tape: mono only



51. They Can't Take That Away From Me, Baby Doll, It Only Happens When I Dance With You. 12 favourite songs from the great Fred Astaire.
Disc/Tape: mono only

FACTS ABOUT WRC TAPE RECORDS

By the use of new electronic techniques, World Record Club is able to offer, at 3½ ips, tapes of a standard previously unattainable at less than 7½ ips.

All are recorded on the same high-class Emitape as that used for professional recordings, with extended frequency response. The tapes are twin-track and can be played on either 2 or 4-track recorders. The spool size is 5".

At this stage all WRC 3½ tapes are *mono* only. However for stereo enthusiasts we have something special too:

STEREO TAPE RECORDS (7½ ips TWIN-TRACK)

An exciting catalogue of 7½ ips pre-recorded tapes *in stereo only* has just been prepared. These are *not* exclusive to club members and may be ordered direct by anyone individually and without membership commitments. Stereo tapes are on 7" spools and run at 7½ ips only. The reproduction quality of this series is fantastic and *must be heard to be believed*. Stereo tapes cost from 50/- to 60/- depending on playing time, plus 3/- postage, packing and insurance. A list of titles will be sent on receipt of a postcard to the Club, marked STEREO. *Do not use the coupon for this stereo list unless you are also joining WRC.*

SEND NO MONEY NOW

TO WORLD RECORD CLUB (DEPT. TRR3)
BOX 11, PARKBRIDGE HOUSE,
THE LITTLE GREEN, RICHMOND, SURREY

I wish to join World Record Club as a

Tape member
(3½ ips pre-
recorded tapes)

Disc member
(12" LPs)

(Please tick which you want to be. Members must select *all* disc or *all* tape—unfortunately it is not possible to mix.)

Please send me the three titles of my choice as indicated. If I keep them beyond 7 days you may enrol me as a member of World Record Club and I will pay you 30/- plus 3/- postage/packing/insurance. As a member I agree to choose a minimum of 4 releases at 29/- each (plus postage) from your annual programme of at least 60 exclusive selections. After 1 year I may cancel my membership with no further obligations if I so choose.

All records/tapes supplied to me are covered by your 7 day unconditional guarantee.

Signed

This offer applies in Gt. Britain & N. Ireland only.

SPECIAL NOTE

FOR TAPE MEMBERS ONLY

Because of the Club outlay involved in setting up its new tape division, we ask tape members only to agree to pay £1 deposit AFTER approving their first 3 choices.

(Send no money now) This deposit will be deducted from the price of your 4th selection

Place record/tape numbers only in boxes

1st Choice No.

3rd Choice No.

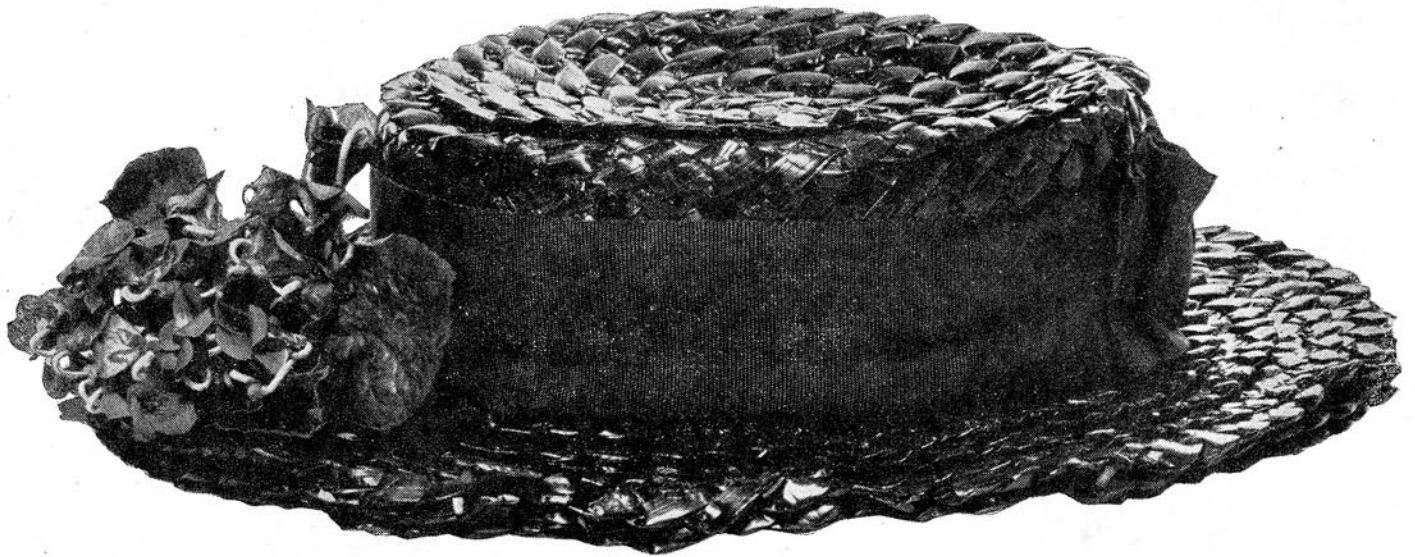
2nd Choice No.

Tick here if stereo 12" LPs required where available

Tick here if 7½ stereo tape leaflet also required

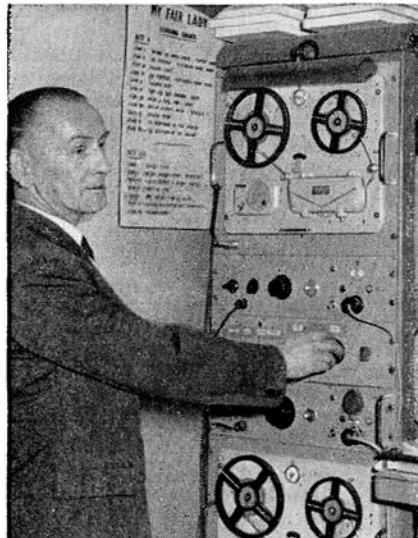
Mr/Mrs/Miss
(Block capitals please)

Address



**'I want to be a lady in a flower shop'
 - says Emitape**

And Emitape has said it (and much more) for *every one* of My Fair Lady's performances. Stagesound and Emitape supply the effects, from the sound of St. Paul's Bell in Act 1, Scene 1—to Eliza Doolittle's cri-de-coeur in the last act. Stagesound would not be without Emitape. There's no question of things *not* being all right on the night, so it's Emitape for them every time! Use Emitape—the choice of the experts.



E.M.I. TAPE LIMITED
 HAYES, MIDDLESEX. HAYES 3888

Stagesound Equipment
LONDON LTD
 at Theatre Royal, Drury Lane

the TAPE RECORDER

Editor ----- MILES HENSLOW
 Advertising Editor ----- Julian Berrisford
 News Editor ----- Alan Lovell
 Editorial Offices - - - 99 Mortimer Street, London, W.1
 Telephone ----- MUSEum 3967 to 3969



★
EDITORIAL

MEMBER OF THE
 AUDIT BUREAU
 OF CIRCULATIONS

IN November last, we wrote in this column about the plans that we had once proposed for the formation of a Tape Club, and we also mentioned that this idea had been dropped because of other events which occurred, and which would have made the whole idea too hazardous for the people who were then interested. We were, of course, concerned with the possibility of encouraging our friends to proceed with plans which might well have failed because of the formation of another London club. Indeed, two such ventures must, in our opinion, have divided the very membership that should have been united.

It is unfortunate that, in the meantime, those who were very interested in the plans that we put forward have since devoted their time, energy and enthusiasm to something quite different, and that they are no longer interested in the venture. That, however, does not in any way put a full stop to the idea, and we therefore outline publicly what we originally proposed privately, so that our readers may judge for themselves what we had (and still have) in mind. And we also announce that we have passed these details on to another group of people who may be interested in developing them. *It should be very clearly understood, however, that apart from the support which we and this Publishing House would naturally give to such a venture, we do not ourselves intend to be a part of it, or become financially associated with it, should it materialise; for this is not our line of country, and if it is to succeed it must be organised and run by people who understand what they are doing.* Briefly, then, our original proposals were as follows:

A club should be formed, with two distinct rates of membership for Town and Country members. It should be based on premises that could be found at a convenient place within the London postal area, where parking facilities are good, and where the astronomical rents of central London do not dictate an excessive membership fee. It should be large enough to include a number of small studios, a reading room and a lecture room, and possibly one fairly large studio for demonstrations and small recording sessions. All the small studios should be well and intelligently appointed and wired, so that members could hire them and be able to use them with any average equipment. There should also be a restaurant and bar for reasonably priced refreshments. There should be regular weekly lectures—visits by trained service personnel for the purpose of training members who wished to take up servicing, and for those who wished to learn something about the subject. There should be a wide range of equipment for temporary hire at nominal rates.

For members who required something more than the interests which even their own well-run local clubs could not provide, there should be weekly sessions for recording—Chamber music, Jazz, Soloists, etc.—properly organised, so that good material

CONTENTS

	Page
News from the World of Tape	55
News and Pictures from the Clubs	56
These Dealers Offer Good Service	59
Our Readers Write	61
Tape Recorder Service	
The Collaro Mark III and IV and Garrard Decks By H. W. Hellyer	62
Field Trials of the Dokorder PT-4K	65
Soft, for Art's Sake	
By Graham Balmain	66
Tape Recorder Workbench	
No. 32—Connecting Equipment By A. Bartlett Still	69
The Calibration and Use of Test Tapes (Part 1)	
By A. Tutchings	71
Sound and Cine	
By Richard Golding	73
Details of New Products	75
Equipment Reviewed	77
Classified Advertisements	84
Advertisers' Index	86

and good equipment could be made available in realistic circumstances. With these arrangements, the users of the small studios could experiment in comfort, and others could record "live", and gain experience from trained personnel in matters of microphone techniques, acoustics, etc.

Such a club would be devoted entirely and exclusively to the art of tape recording. It could prove of great use to manufacturers, since it would bring their customers into closer touch with the things that are all too often unnecessary problems. It could improve the understanding of maintenance and servicing. And, in its primary aim, it would enable the many enthusiasts to find a much wider field of interest for their work.

We do not invite correspondence at this stage, but we will most certainly reopen this subject, and will ask for indications of possible support, if and when we ourselves succeed in enlisting the active interest of the people who we hope may take up the idea.

COVER PICTURE

One of the many activities of the Radio Division of the Central Office of Information is to produce recorded tapes for transmission by radio stations in many parts of the world. The front cover this month shows a technician of the C.O.I. producing multiple copies of a recording for dispatch to the overseas broadcasting stations. The equipment comprises Leavers Rich recorders, E.M.I. tape, and S. G. Brown headphones.

(The photograph was supplied by kind permission of the Central Office of Information.)

NEXT MONTH

IN our next number we publish full advance details of the 1962 Audio Festival and Fair to be held at the Russell Hotel, London. Also in this number will be a further article on Tape Recorder Service and another by A. Tutchings dealing with recording characteristics for different speeds. The review section will be of particular importance for it includes a full technical report of the 2-track stereo Tandberg.

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).

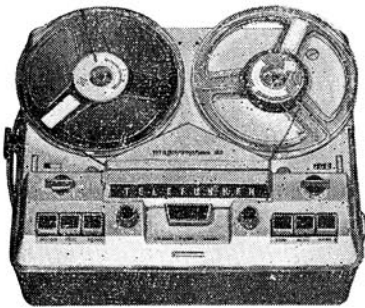
Here's the



range of

TELEFUNKEN

tape recorders



TELEFUNKEN MAGNETOPHON 95

Entirely new design in the Telefunken range with attractively styled case. Twin Track. Fully Portable. Three speeds: $7\frac{1}{2}$ " $\frac{1}{2}$ ", $3\frac{1}{2}$ " $\frac{1}{2}$ ", and $1\frac{1}{2}$ " $\frac{1}{2}$ ". Maximum Spool Size 7". Frequency response: 30-18,000 c.p.s. at $7\frac{1}{2}$ i.p.s.; 30-16,000 c.p.s. at $3\frac{1}{2}$ i.p.s.; 30-9,000 c.p.s. at $1\frac{1}{2}$ i.p.s. Special trick and "straight through" amplifier facilities.

59 gns (excluding microphone)

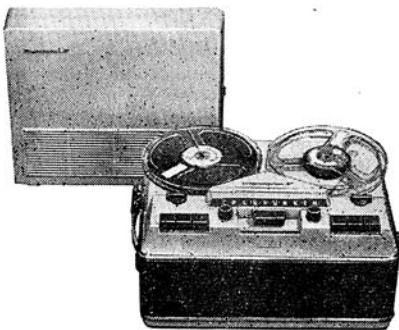


TELEFUNKEN MAGNETOPHON 96

This new FOUR-TRACK recorder has the same basic style and technical specifications as the Magnetophon 95, but offers all the advantages of the desirable four-track technique.

Playing time over 16 hours on 7" DP tape. Multiple transcription from one track to another. Facilities for playback of pre-recorded stereo tape through additional amplifier or radio.

69 gns (excluding microphone)



TELEFUNKEN MAGNETOPHON 97

The stereo tape recorder which provides not only the outstanding facilities of the four-track system with its manifold possibilities for transcribing and trick effects, but also the twin-channel stereo, four-track technique for recording and playback.

Speeds, frequency response and pool size same as Magnetophon 95. Extra speaker in the lid for stereo playback.

95 gns (excluding microphone)



75K-15

and of course

75K-15—Tape speeds $3\frac{1}{2}$ i.p.s. and $1\frac{1}{2}$ i.p.s.; frequency response of 60-16,000 c.p.s. and 60-9,000 c.p.s. Tone control; extension speaker socket; playing time of 6 hours on $5\frac{1}{2}$ " DP tape. 47 Gns (excl. microphone)

85KL—Tape speeds $7\frac{1}{2}$ i.p.s. and $3\frac{1}{2}$ i.p.s.; frequency response 30-20,000 c.p.s. \pm 3dB and 30-15,000 c.p.s. 6-watt push/pull power stage. Separate Bass and Treble controls. 79 Gns (excl. microphone)

TELEFUNKEN

Please send for illustrated literature to:
DEPT. T.R. WELMEC CORPORATION LTD.
147/8 STRAND, LONDON, WC2

NAME

ADDRESS



NEWS FROM THE WORLD OF TAPE



MR. A. R. RIDLEY of the Castleton Hotel, Paignton, Devon, at home with his recording and cine equipment. He had just recorded sound effects from his Grundig TK 1 on to the master tape on track 1 of the 4-track TK 24. When the picture was taken he was playing music from the TK 35 through the GMU 3 mixer unit on to track 3 of the TK 24. At the same time he is recording his commentary and controlling the volume of the music. With the Bolex Synchronat in operation while he is recording, Mr. Ridley is assured of perfect synchronisation throughout the film. Mr. Ridley also uses his Grundig equipment extensively for the entertainment of visitors to his hotel.

Export Order for WyndSOR

WYNDSOR Recording Company Ltd. announce that since Christmas they have received export orders for WyndSOR tape recorders to a value in excess of £80,000 sterling. One of these is believed to be the largest single export order ever received by a British tape recorder manufacturer. This means that until at least the beginning of May the WyndSOR factory will be working at full capacity production solely for export markets.

Mr. H. M. Creek, managing director of WyndSOR Recording Company, says that whilst he deprecates this decision from the home market point of view, he is sure it will be generally appreciated that it is vital to consider the national interest and to give these export orders priority.

Anyone having difficulty in obtaining a WyndSOR tape recorder should therefore write to the Sales Department, WyndSOR Works, 2 Bellevue Road, N.11, where every endeavour will be made to put them in touch with a stockist, although the scarcity has already become aggravated due to the seasonable increased demand.

Meanwhile the WyndSOR organisation is trying to make additional production facilities available to increase their output, and thereby alleviate the otherwise inevitable shortage there will be in the home market, and also to facilitate the early announcement of two new tape recorder models, now in a late stage of development.

New Name

THE Emitape Division of E.M.I. Sales and Service Ltd., will now trade under the new name of E.M.I. Tape Ltd., and all orders and communications should be addressed to: E.M.I. Tape Limited., Blyth Road, Hayes, Middlesex.

The Office Equipment Division of E.M.I. Sales and Service Ltd., has been transferred to an associated company: C. & S. Office Equipment Ltd., Fenwick House, 289/293 High Holborn, London, W.C.2, to whom all communications for office equipment, should in future be addressed.

WARNING TO READERS

DURING the past two or three months we have been receiving numerous telephone calls from people who have been canvassed for subscriptions to magazines, and who have in many cases paid out money for these subscriptions. The callers—usually young men and women—appear to be representing themselves as agents for a subscription agency with its head office in America. In some cases mention has been made of a branch office in Dublin. In all cases the agency has been described as a "High Fidelity" Guild, or Association, or some such.

This inclusion of the term "Hi-Fi" or "High Fidelity" has been the cause of the numerous telephone calls, because people who have waited for some time for tangible results have looked the names up in the London telephone book, and have called this office—either under the impression that we were connected with the scheme, or in the hope that we might be able to tell them more about it.

For all that we know, this may well be a perfectly bona-fide subscription agency; but one thing we do know is that it is in no way connected with *Hi-Fi News*, or *The Tape Recorder*, or this publishing house. And we therefore warn our readers that they should be on their guard against any such callers who may, by statement or implication, suggest that they are associated with us in any way.

The complaints—if they may be correctly called such—have come from many parts of the country. Some people have told us that they paid out money (as much as £8 or £9) as long ago as November and December 1961, but that they had so far heard nothing further from the agency.

The stories told by the callers have varied considerably in detail. Some have said that by collecting subscriptions for magazines they were to receive money to pay for University courses. Others have said that their payment would enable them to travel for education. One said that the money so earned would enable him to launch out in chicken farming. In some cases the callers have travelled in a car in groups: in other cases young men and girls have called singly.

It might be of help to others if readers with similar experiences would write to us, giving us details. It would be of even greater interest if we could learn of even one case where such a call, plus a payment made, had been satisfactorily concluded by the receipt of the goods ordered.

Editor.

Pre-Recorded Tapes Available

Readers will be interested to know that Teletape Ltd., 33 Edgware Road, London, W.2, carry a full stock of pre-recorded tape under the W.R.C. label.

★ ★ ★ ★ ★ THIS MONTH'S PLUM
★ **NEGRO SPIRITUALS** W.R.C. TLMP 12

(For those who like Negro Spirituals !)

... and a Stereo Plum

OLIVER W.R.C. STT 151

SELECTED BY "THE TAPE RECORDER"

NEWS AND PICTURES FROM THE CLUBS



Members of the West Middlesex Tape Recording Club seen preparing for a recording. Secretary, H. E. Saunders (third from right) in charge of operations. (Photo: Middlesex Advertiser and County Gazette.)

THE last meeting of the London Tape Recording Club opened with a talk on "The working and principal functions of a tape recorder", by Mr. Buttle. This was the main item on the programme, and Mr. Buttle held the interest of members for a full hour. After his talk the question and answer part of the programme was mainly devoted to elucidating some of the points that he had made.

Ken Blake, the chairman, produced an edited tape of what had been broadcast on the B.B.C. in the "Sound" programme, which was devoted to tape recording clubs. The last item was a short talk and demonstration on "How to solder a reliable joint", given by Godfrey Mousset.

Meetings are held monthly and details can be obtained from T. Devereux, 32 Windmill Lane, Southall, Middlesex.

THE Wakefield and District Tape Recording Club, which was founded in April 1959, was officially disbanded at an extraordinary general meeting held at the clubroom on January 19th. The Wakefield club has been responsible for an exhibition of tape recording in 1960 and the Wakefield Audio Fair in 1961. It was greatly regretted that the club had to disband, but membership had fallen in recent months, and although the Wakefield Audio Fair was a success—it brought forth only one new member.

It was considered not worthwhile continuing club meetings, and obtaining speakers and demonstrations, etc. The nucleus of enthusiastic members have formed a new group whose title will be decided later. This new group will continue to meet, and will have no committee, constitution or subscription. Its main purpose will be that of furthering the group's interest in tape recording by meeting informally, and also continuing to produce "Wakefield on Tape" and producing recorded programmes for hospitals. Details may be obtained from M. A. Storey, 331 Horbury Road, Wakefield.

THE meeting on January 25th of the Cotswold Tape Recording Society (Cheltenham), was devoted to a recording session. It has been found that these opportunities to aim a microphone at a live signal under experimental conditions are among the most popular of the activities of the society, besides being a useful source of material for the Hospitals' Service.

On this occasion members welcomed a group of young men, who play under the name of the Comets; three electric guitars with amplifying facilities of unimaginable power, piano and

drums. Peter Turner and Colin Woods shared the duties of "signal generator", first signalling to the recordists to start their machines, and then to the players to strike up. It has been found that these sessions call for a great deal of discipline and self-restraint if all are to have equal opportunities.

After the interval, the society was privileged to receive two artists who, though strictly amateurs, attain to virtuoso standards: a soprano, Betty Howse, accompanied by her husband, John, on the piano-accordion. It is greatly hoped that these modest and talented performers will visit the club again.

Further details may be obtained from P. D. Turner, Cave Cottage, Oakridge Lynch, Stroud, Glos.

INFORMATION and ideas galore were provided by Teletape Ltd. representatives for the North London Tape and Hi-Fi Club when they were hosts to members recently at their Marble Arch shop.

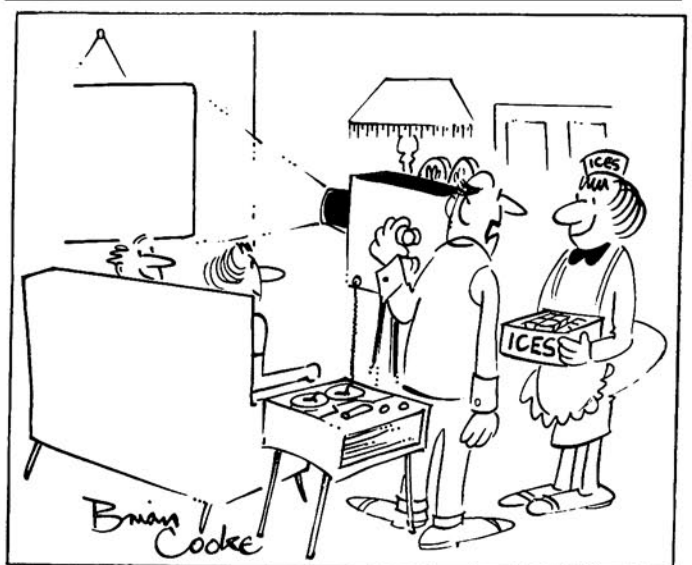
Mr. G. N. Tughan and Mr. W. Thomas, service manager, not only demonstrated a number of machines, different uses of stereo and pre-recorded tapes, but also presented members with ample refreshments to keep them going for the following day as well. Further details will be supplied on request from R. Colinson, 30 Ridler Road, Forty Hill, Enfield, Middlesex.

ARRANGEMENTS for the Walthamstow and District Tape Recording Society's running commentary on the Whitsun Carnival procession through the streets of Walthamstow are well in hand.

For the third year in succession, the Society are proposing to present to patients in the Connaught hospital who would otherwise miss Walthamstow's big day of Carnival, a pre-recorded description of the gay floats and capture the atmosphere of the day at the Town Hall before the 150-odd floats start on their five-mile journey through the streets.

A more comprehensive arrangement than usual is planned and the site being negotiated for at the busiest possible junction on the route, the corner of St. James' Street and High Street, should provide exceptional opportunities for "atmosphere" recordings with the market stallholders crying their wares in the background and the busy shopping crowds of a June Saturday afternoon all adding to the gaiety of the background.

The plans made include laying a telephone line from a pre-destined point to the "studio" fifty yards farther along the route,



"I'm sure that none of us are amused by your little joke, Emily . . ."

NEWS AND PICTURES FROM THE CLUBS

by which means advance information can be passed to the commentators. The whole of the work will be carried out on the High Street site and the tapes rushed back to the hospital for play-back on the internal headphone circuit. All material recorded will have been played back to the patients and the broadcast will have ended before the procession actually passes the hospital which is situated only a short way from the end of the processional route. Further information can be received from *K. Perks, 9 Third Avenue, Walthamstow, London, E.17.*

THE members of the **Cambridge Amateur Tape Recording Society** are looking for a workshop and clubroom suitable for soundproofing and converting into a studio and control room.

Arrangements are being made for publishing the 1962 club handbook which is due out in March. Contents will include the programme for the remainder of the year, annual reports and accounts and enrolment forms. The booklets will be distributed to local dealers to be passed on to customers purchasing tape recorders.

Meetings planned for the coming month include a lecture and demonstration by Mr. G. A. Briggs of Wharfedale Wireless Works Ltd. (March 14th) and a competition and play-reading contest (March 21st). The secretary *M. E. Renshaw, 6 St. Vincent's Close, Girton, Cambridge*, will supply further particulars on request.

DURING the last few months, members of the **Huddersfield Tape Recording Society** have recorded many of the popular singers, including Billy Fury, Eden Kane, Johnny Leyton and Cliff Richard. This was done with the kind co-operation of the local cinema manager and the managers of the artistes. The interviews will be included in a programme produced by the Huddersfield Hospital Broadcasting Association. Anyone with relatives or friends in hospital in this area are invited to send a message to the *H.H.B.A., 24 Queen Street, Huddersfield*, giving the name and ward number.

AT a recent meeting of the **Medway Recording Club**, a new committee was formed for the coming year, and Mr. P. Bocking was elected chairman. Meetings arranged for the next few months include, a talk on the correct use of microphones, using two recorders and tape exchanging. It is also planned to make outside recordings at this year's Farnborough Air Show.

Meetings are held every Monday (7.30 p.m.) at 23 Edwards Close, Wigmore, Gillingham, Kent, and further information can be received by contacting *Miss B. Ridden, 88 Broadway, Gillingham, Kent.*

A CONSIDERABLE number of people attended the opening night at the **Northampton Tape and Cine Club's** new premises on January 9th. Members from other local clubs including Bedford, Rugby, Coventry and Nottingham saw a programme which included a Stereo demonstration on tape and disc and a 16 mm film entitled "The March of Time".

A special feature of the evening was the opportunity for recording enthusiasts to record two bands, and those members that brought a recorder with them lost no time in finding the best positions for microphones.

On average, four new members join the club every meeting, but still more members are needed. Details are available from *R. C. Foster, 17 Shakespeare Road, Northampton.*

THE **Walsall and District Tape Recording Club** have, at last, found suitable premises for holding meetings, and new members are invited to visit the New Inn, John Street, Walsall. Club activities during the past month have included a visit to a local organist, to hear his recordings of recitals and amateur



Mr. D. J. Baverstock, a keen recording enthusiast, is anxious to form a club in the Hockley (Essex) area. Interested readers may contact him at 45 Chestnut Close, Hockley, Essex.

operatics, and also an open night where members had the opportunity of demonstrating tapes made on their own machines. Details of future meetings can be obtained on request from *Mrs. J. Walford, 41 Mill Road, Pelsall, Walsall.*

THE **Thornton Heath Tape Recording Club**, formed nine months ago, has made vast strides in their production of recordings compared with the early attempts. Meetings are held weekly at the Wilton Arms, Thornton Heath on Thursday nights, when normal club activities take place. During the last two months members have manned stalls at the local fête and bazaar, and have also entered a local group of musicians in the Crawley Tape Club Competition. This obtained for them the 2nd prize.

A hospital service has been formed and a personal message was recorded by Frankie Vaughan for the patients. It is hoped to extend this service to other hospitals in the near future.

New members will find plenty of interest at this club and they are invited to attend. *Mr. E. Bashford, 4 Doneved Road North, Thornton Heath, Surrey*, will supply further information.

TERRY DAVIS, a member of the **Rugby Amateur Tape Recording Society** was recently invited to demonstrate the synchronising of tape and film. Having dealt with this subject fully, he showed a test film to prove the difference in methods of optical and magnetic recordings. After the interval, the film taken by him during his continental holiday last year with a recorded commentary proved to members the difficult task of recording and filming at the same time.

Future meetings arranged include a members tape night (March 1st), a visit by Mr. L. W. Saunders and Mr. P. H. Wetherell of E.M.I. (March 15th) and a talk on mixing and superimposing by Peter Scott (March 29th). Further details can be obtained on request from *M. Brown, 219 Clifton Road, Rugby.*

AMONG the lectures arranged by the British Film Institute for March are some with special interest for Sound and Cine readers living outside London. For full details apply to the organising body.

Date	Subject	Speaker	Locale	Organisation
4	Analysis of "The Gunfighter"	Alan Lovell	Bexleyheath	Bexley Adult Ed. Centre.
16	The Imaginative Use of Sound	John Huntley	Midland Inst. Birmingham	Birmingham Film Soc.
22	The Swedish Cinema	Peter Harcourt	Attingham Park, Shrewsbury	Attingham Park Film Soc.
27	Film and Television	Tony Hodgkinson	Stafford House, Hassocks	E. Sussex Ed. Committee.

MR. G. WEST, 187 Oldham Road, Middleton, Manchester, is contemplating forming a tape recording club, subject to enough people being interested. Anyone willing to assist should contact Mr. West direct.

Great newcomer to the Greatest
range of Tape Recorders

STAR
VALUE
AT ONLY

27 GNS!

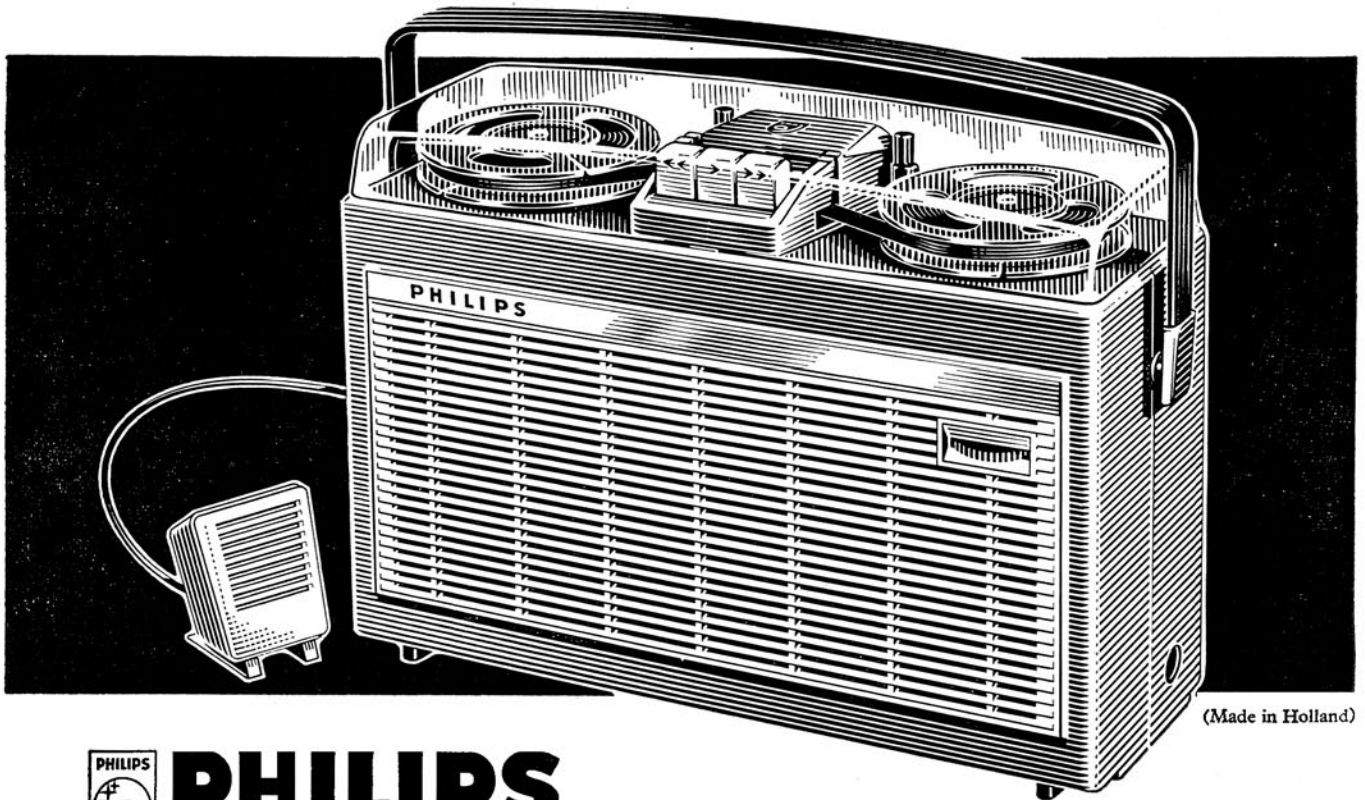
including
microphone, 4"
reel of L.P.
tape and radio
connecting lead.

Now the world's finest range of tape recorders gets a brilliant addition – the fabulous Philips 'Starmaker'. Combining snag-free ease of operation with revolutionary design and outstanding performance, it opens up a fascinating new world of exciting entertainment for the newcomer to tape recording.

Everything the 'Starmaker' does is governed *completely* by just six error-proof controls. It's got a whole host of other advantages, too: economical mains operation, 4-track recording and playback; 4 hours playing time on a 5" reel of double-play tape; fast winding and re-winding; moving coil microphone; *plus* brilliant reproduction from the 6½" loudspeaker.

The vertical design and lightweight compactness of this sleekly styled recorder make it exceptionally *portable*.

See the Philips Starmaker in operation and hear it play at your local Philips dealer. It will convince you that no other machine in its price range can give you such a marvellous performance.



(Made in Holland)

 **PHILIPS**
STARMAKER TAPE RECORDER

... the unique new mains 4-track machine

PHILIPS – THE FRIEND OF THE FAMILY

PHILIPS ELECTRICAL LTD., CENTURY HOUSE, SHAFTESBURY AVENUE, LONDON W.C.2

(PR3897)

THESE DEALERS OFFER GOOD SERVICE

IT is encouraging to note that the campaign for honest and efficient repairs, which the *Tape Recorder* inaugurated several months ago, is meeting with wide approval, both by our readers and responsible members of the radio-servicing fraternity.

A further list of dealers offering good service, plus some tributes from readers, can be seen below. It is evident that a fair section of the radio trade feels keenly about servicing. They take heed of such doughty champions as W. Norman Stevens, Technical Editor of *Radio & Electrical Retailing*, who says, in a trenchant article that appeared in *Mullard Outlook*, Jan. 1962: "... the rewards of service can be incalculably high. Good service, that is: trustworthy, honest, rapid and efficient service. It can make the customer a friend for life, enhance a business reputation, and promote untold goodwill."

But occasionally we see the other side of the coin. Readers tell us of sharp practice, overcharging, careless and incompetent repairs. It is not our intention to villify the radio trade, nor even to put the "black spot" on offending dealers. If we merely give an example, let that suffice.

Mr. W. J. Webber of Cardiff wrote to tell us that his Philips EL 3541/15B tape recorder was giving trouble. Although only a year old, it had started to build up a noise on playback, and was taken back to the shop where he bought it. After 3 weeks, he enquired, was informed that it had been returned to the makers and, as it was just out of guarantee, there would be a charge of £10 10s. 11d.

Unable to work because of bad health, Mr. Webber was perturbed. He could never afford to pay such a bill, so he asked that his machine be returned to him. When it eventually arrived it would not work at all, so he wrote asking if we could "suggest anything".

We certainly could—but it would not have been printable! We asked a friend, a local engineering consultant, to call and investigate. This was his report: "Machine has obviously never been returned to manufacturer."

"Recorder inactive because ECC82 valve fitted in place of ECC83. Correct valve fitted and further faults noted; recording weak and noisy, playback noisy, deteriorating when machine warmed up, loudspeaker rattling, braking erratic, several minor defacements. Connections to record head badly soldered."

"Record and playback faults due to misalignment of both heads. Loudspeaker rattle due to earth return lead disconnected and clamping nuts loose, the latter fault also causing crackling due to ineffective earthing of the loudspeaker support plate. Deterioration when warm caused by leaky C4, screen grid decoupling capacitor of EF86 valve. Heads aligned, brakes adjusted, bad connections resoldered, machine tested and demonstrated. N.B. microphone slightly below sensitivity, but owner records mainly direct from amplifier section of radiogram. Playback is through the external loudspeaker, plus a 10-inch unit in a separate cabinet, giving excellent quality."

Comment is hardly necessary, but we cannot refrain from quoting again Mr. Stevens' remark: "In all but the most bungling business, the inefficient engineer is quickly found out. There is no other trade so prone to expose inefficiency as the trade of radio service—and no other trade where its results can be so directly drastic."

Telemac, 45 Hopwood Street, Warrington, Lancs.

Dear Sir:—Reference your article in the December issue, we undertake repairs to all types of tape recorders on the premises, and carry quite a large stock of spares. Service personnel to date is two.

Yours faithfully,
J. McMiken, proprietor.

From: N. W. Angell, 16 Park Street, Chatteris, Cambs.

Dear Sir:—With reference to the Editorial in the December issue, I should like to inform you that I specialize in sales and service of "Ferrograph" tape recorders. I have had quite a number of years specializing on these machines and use several of them myself, professionally. I am, in fact, given all the

servicing of these machines for both the Isle of Ely and Huntingdonshire Education Committees. I carry, always, extremely good stocks of spares for all the models, and can normally carry out all repairs promptly on my premises, without having to return the machine to the manufacturers. The fact that I stock on spares could be borne out by the Ferrograph Company Ltd. This includes all mechanical as well as electrical components. I also have suitable test equipment for setting up the machines after overhaul and repair. I also am an appointed agent for Reflectograph tape recorders. I feel that your idea is a good one, and look forward to the results!

Yours sincerely,
N. W. Angell.

From: Radio Development, 26 & 28 Queen Street and 31 College Street, Belfast, 1.

Dear Sir:—Re your edition of the December issue of *The Tape Recorder*, we service and handle all makes of tape recorders, and are the official Irish Ferrograph agents. We carry normal spares for all makes of tape recorders. We have a regular service personnel of eight.

Yours faithfully,
F. Blaney, D. Howard, directors.

From: E. J. Nicholson, 31 Northwood Lane, Clayton, Newcastle.

Dear Sir:—In recent months there have been a number of letters and comments in articles in your magazine concerning the deplorable lack of interest which seems to be prevalent with certain dealers and manufacturers in dealing with customers' enquiries concerning their equipment. It is, therefore, with great pleasure that I write to you now to let you know of a personal experience which is all too rare it seems.

I have just purchased a Tandberg Model 3B recorder (the two track mono model), the choice being largely influenced by the fact that I had for some considerable time been conversant with the capabilities of this fine little machine from close contact with a Swedish tape friend who also has a similar model. On checking the machine over for frequency response, etc., against the manufacturers ambitious specifications I was rather disappointed to find that I was not actually achieving the desired results, the differences being quite small but nevertheless outside the specification.

As the machine was purchased outside my own district I decided to approach the main distributors for the Tandberg range in this country, Messrs. Elstone Electronics Ltd., Leeds. Several letters were exchanged with the latter firm, all of which were replied to by return of post with the utmost courtesy and with detailed comments by their service engineer. They even posted to me a trial replacement valve as at that time the original EF84 was considered as possibly faulty. Not only that, however, but they wrote to the dealer in this district asking if he could assist in service, if necessary, and following that I had a personal call to enquire if they could be of any service.

Let me hasten to add that the trouble was merely that in error I had been taking test measurements with a monitor speaker on load whereas tests on this model should apparently be made with no speaker in circuit. Upon correcting this, I immediately had the rather excellent results claimed by the manufacturers and indeed the tests gave figures infinitely better even than those claimed in the specification.

Having experienced some of the difficulties related by your other correspondents it is indeed refreshing to find such service as I have mentioned, both prompt and helpful, does exist and as a number of my friends appear to regard my own varied experiences in this field as a useful guide to themselves it is most gratifying to be able to pass on my unqualified recommendations where these are wholly justifiable.

With an excellent end-product and an unbeatable service such as I found in this case what more could one ask for? Spares for a continental machine, you may ask? ... forget it—Messrs. Elstone stock everything down to the last nut and bolt and normally supply within 48 hours.

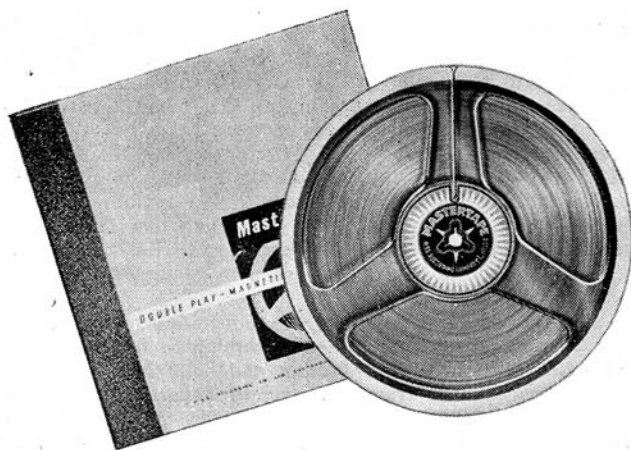
Yours faithfully,



*as perfect as
human skill can achieve*

The symmetry and perfection of an ancient Greek vase is a criterion for human skill and craftsmanship. In the field of high fidelity sound recording and reproduction no less exacting standards are required in the design and manufacture of fine magnetic tape.

Mastertape is the end product of nearly thirty years' research and development by a pioneer company in recording techniques. Mastertape is of a uniform quality and strength which the most discriminating connoisseurs approve. Mastertape is specially approved by GRUNDIG (GT. BRITAIN) LIMITED for use on their machines, as well as by many other leading tape recorder manufacturers. Those who really care for fine recording always insist upon Mastertape.



Mastertape

Obtainable from your local dealer or, in case of difficulty, write to the address below for your nearest stockist :
MSS RECORDING COMPANY LIMITED, POYLE TRADING ESTATE, COLNBROOK, BUCKS. TELEPHONE: COLNBROOK 2431

A MEMBER OF THE **BICC** GROUP OF COMPANIES

our readers write

. . . about hospital work

From:—K. Laraway, 17 Stone Fold, Rising Bridge, Baxenden, Accrington, Lancashire.



Dear Sir:—I have recently had the pleasure of having a tape played to me while in hospital and if it is possible I would like, through your columns, to offer my services to anyone who would like to send a tape to be played back to a friend or relative within a 30-40-mile radius. Yours truly.

. . . about echo chambers

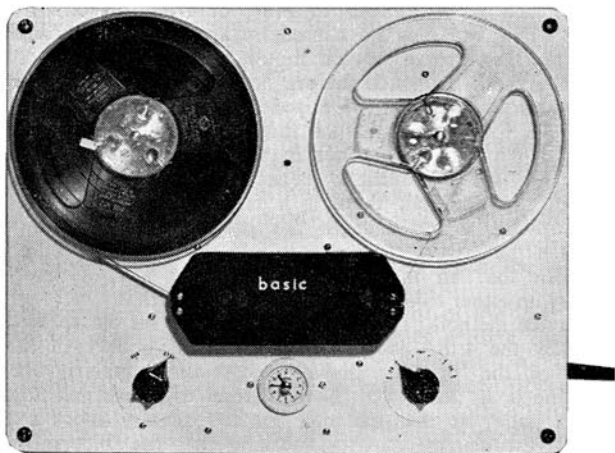
From: W. Edwards, 99 Great North Road, Potters Bar, Middlesex.

Dear Sir:—I am contemplating building an echo chamber in the unused cellar of a house. I have a number of long drain pipes which I intend to use, mounting a speaker in one end and a microphone in the other. I would like to hear from any reader who has experimented along these lines who could possibly assist me with the following (a) length of pipe required for $\frac{1}{2}$, 1 and $1\frac{1}{2}$ sec. delay, (b) diameter of pipe required (c) baffles. Yours faithfully.

. . . about a home-built deck

From a Reader.

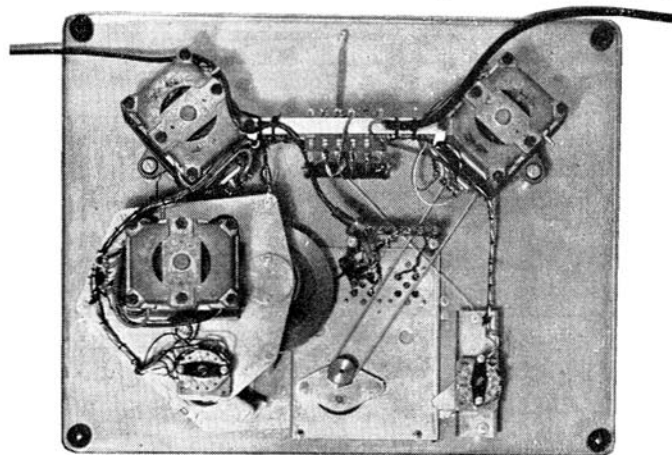
All tape mechanisms comprise a number of sub-sections, each with its own particular function. Many different mech-



anical principles have been used through the last decade to meet the requirements of each section, and these have been co-ordinated in numerous ways to produce a complete tape

transport. In most of them, at least one such principle has shown itself to be robust, reliable, easy to manufacture and assemble and to require little or no adjustment either at the factory or after prolonged use. It does not follow that these ideal principles must be expensive, in fact the opposite is true with an exception. For simple and reliable tape control 3 motors are essential, even so, this is only an extravagance when compared with a single motor device which must have less desirable features in some of its sub-sections resulting directly from the use of one motor.

A tape deck has been designed consisting only of ideal principles, so condensed by orientation and shape of components that only a few, of simple form are required. At the same time there is no loss of facilities such as choice of tape speed or foolproof interlock of controls to prevent tape damage or accidental erasure. The layout above the deck is pleasingly symmetrical with a tape position indicator in an easily viewed position at the centre front, made possible by lack of obstructing components in the path of its drive beneath the deck. The use of two rotary switches ensures precision control of the mechanism and its electrical switching. Attention has been given to the manual effort required to turn the switch knobs such that there is a light yet positive "feel" about them. The left hand switch is a Run-Stop control whilst the other is a 6-position mode selector on which fast wind, and play or record at either $7\frac{1}{2}$ or $3\frac{1}{4}$ inches per second is preselected. The design



includes much simplified and highly reliable spool braking, together with an improved and simplified method of ensuring good contact between the tape and the magnetic heads.

Because of the reduction in the number of parts beneath the deck there is ample floor space for directly fitting transistor units if desired. The maximum spool diameter which can be handled is 7 inches. Yours faithfully.

March with the times and take advantage of our TOP EXCHANGE allowances in obtaining an up-to-date Mono or Stereo Recorder.

New Model required	Allowance on TK8, TK20 or TK25	Allowance on Radios, Transistorised, etc.
Grundig TK60 Stereo...	£36	£10
Telefunken 97 Stereo...	£28	£10
Telefunken 85KL ...	£26	£10
Grundig TK35 ...	£23	£10
Grundig TK24 ...	£18	£10
Telefunken 76 ...	£19	£10
Butoba Portable ...	£21	£10

Compare our Exchange allowances, then write stating New Machine required, make and condition of Machine offered in Exchange, and we will forward a favourable allowance per return.

**"TRANSTRONIC ELECTRONICS", "Pinjarra",
Pinewood Grove, New Haw, Weybridge, Surrey.**

by H. W. Hellyer

TAPE RECORDER SERVICE

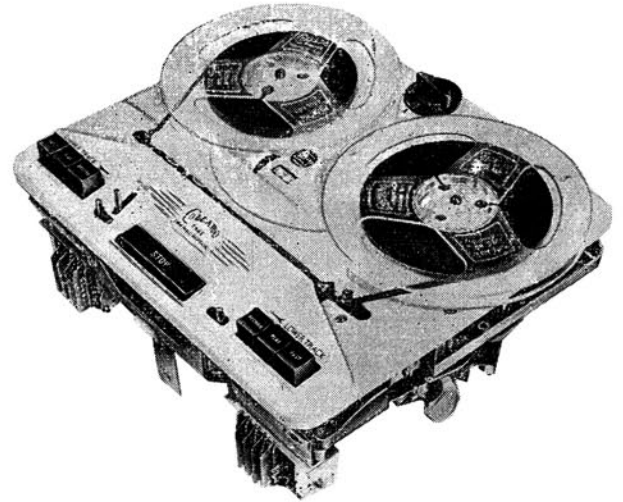
No. 3 THE COLLARO MARK III & IV, AND GARRARD MAGAZINE DECK

IN the previous article, the modern version of the Collaro tape deck was discussed. A final comment was that its present form was a great improvement on previous marks. All the more reason to employ a little space on those previous models, for they enjoyed wide sales and are likely to be met quite often by the service engineer.

Totally different in conception, more ambitious—perhaps too ambitious—the *Mark III* and *Mark IV* decks became very popular when tape recording captured the public's imagination, a few years ago. They then represented an effective compromise between the "novelty" instrument and the "heavy engineering" of the high-price range. There were very few truly portable models on the market. Consequently, such equipment as the *Sound A20* met with wide acclaim, and gives good service.

The original *Mark III* deck has two motors and a very large flywheel, on which the capstan is directly mounted. Drive to the flywheel is via an idler wheel to the capstan of each motor, engaged by the selector mechanism. As the machine is intended to utilise each track of a twin-track tape without the necessity of removing the spools (maximum 7 in.), there are four heads, two upper track, tape travelling from left to right, and two lower track, right to left.

A large "Stop" key neutralises the drive and applies braking, which consists of double felt pads at each spool hub. As the change from one track to the other requires a reversal of



position, but this must be retained when the alternative track is used. Two lugs on each side, limiting the travel of the operating bar, need to be bent in the correct sequence if any adjustment is to be made. Typical procedure is as follows:

(a) With machine disconnected from supply, depress lower-track (R.H.) "Play" button.

(b) Check for 1/32 in. clearance of brakes from R.H. spool drum. If less, bend the lug adjacent the pivot on the diagonal operating bar, nearer the bar.

(c) Press the "Stop" button, then the L.H. "Play" button. Check that clearance of the R.H. brakes is still 1/32 in. If less, bend the lug that will be found above the brake mechanism, i.e. adjacent the brakestop secured by two cross-headed screws.

(d) Repeat procedure for L.H. brakes. Finally, check that the "Stop" button applies both brakes securely.

Brake tension is balanced by the aid of two springs just below the operating bar. It is not advisable to attempt adjustment by alteration of the tension of either of these springs.

Another common fault that may be the result of maladjustment is "judder" of either drive mechanism when the machine is switched from *Rewind* to *Play*, or from one track to the other. This can also be caused by an idler pulley fouling the step on the capstan of the motor pulley, and a quick visual check should be made before looking deeper for the fault. The stepped pulley can be raised or lowered by releasing a pair of 2 BA grub screws in the fan boss, and the idler is locked by a 4 BA self-locking nut in the centre of the cam that is used for speed selection (beneath the deck, adjacent each motor). In addition, there is a large pulley, used for rewind fast driving, which engages the portion of the motor pulley between the largest (15 i/s) step and the fan boss. Thus it can be seen that an incorrect adjustment of any of these three factors on either side will affect tape transport.

Correct method of adjustment is, first to set the speed change cam, by the 4 BA locknut, until there is about 1/16 in. clearance of the bracket above the "riding" pillar, when the machine is set to 3 1/2 i/s. Then to reset to 15 i/s and adjust the motor pulley so that the idler contacts slightly above centre of the largest diameter. After checking that the underside of the idler pulley does not foul the other diameters when running free or engaging, check the position of the rewind idler, adjusting to the correct height as necessary. Tighten all locking screws, check fan blades.

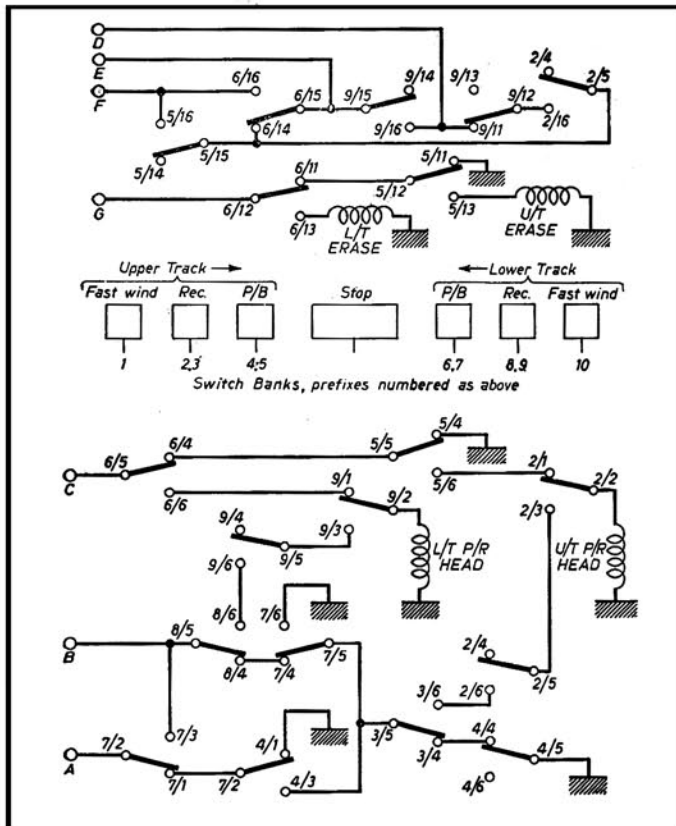


Fig. 1. Schematic of switch wiring of the Sound Model A20 tape recorder, contacts being shown in the relaxed (stop) position.

flywheel rotation, it can be seen that a "standard" fault on these models is tape spillage, often caused by erratic braking. Correct adjustment is to allow 1/32 in. clearance in the "Play"

Premature engagement of the idler wheels with the flywheel or motor pulley sometimes causes a similar symptom of erratic action. This may be noticeable especially in the 15 i/s position. The cause is often a slight distortion of the idler release lever. This will be found near the side edge of the top plate of the deck; one on each side. These levers, shaped like a pointing finger, are held by two screws, allowing a small adjustment. With the machine switched off they should nearly contact the withdrawal levers, which run from the horizontal control bar beneath the head plate to a point near the spool hub. The withdrawal lever is easily bent, and may have been displaced, allowing the release finger to ride beneath it at the higher speed. The inner end of the finger should be bent upwards to obviate this.

As usual, the most alarming symptoms can be caused by the simplest faults: spools that rub the top-plate, for example. Adjustment for spool level is by means of two 4 BA hex-headed screws in a triangular plate on which the spool carrier is mounted. These can be reached with a flat spanner with the top cover in position. Care should be taken, as the outer screw tilts the spool forward and outward while the inner screw tilts the spool backward and inwards. When replacing the cover, ensure that the central screw is the short one, as this is directly over the moving control plate.

Pinch wheel pressure is adjustable by a screw-head cam which will be found beneath the pinch wheel swivel lever, and is revealed when the machine is switched to *Play*. Correct pressure is obtained when a pull on the tape tends to turn the flywheel, without slip. A steady, gentle pull is needed.

One of the jobs that causes a frown is electrical testing of the switching circuit. At first sight, this is rather complicated; but it readily breaks down into a function sequence, as can be seen in fig. 1. Here we find the switches in their neutral position as employed in the *Sound A20* tape recorder. To give an example of circuit tracing, suppose the upper track is to be played back. The second button from the left is depressed, actuating switches two and three. (See footnote—correction).

Referring to the U/T P/R head, the circuit is now via 2/2, 2/3; 2/5, 2/6; 3/6, 3/5 and thence to connection B. At the same time the U/T erase head is open-circuited, as switch No. 5 only comes into action on *Record*. It will also be noted that connections D and E are short-circuited via the various switches during playback and E and F during *Record*.

Mechanically, these switches present little difficulty. One possibility is of the interlock bar fouling the tie bar. The latter will be found beneath the deckplate, with a spring to assist its return to central position at rest.

Footnote.

In fig. 1, Rec. and P/B buttons have been transposed. The Record buttons are the inner pair, switches 4/5 and 6/7.

Garrard "Magazine" Tape Deck

This is another deck that has found a wide use in machines of the "popular" range. And a quick look at the design and engineering should demonstrate that the term *popular* is not necessarily derogatory. The "Mag-deck" is another instance of ingenious simplicity, and, as such, gives the service engineer very little of a headache.

The complete layout of top and bottom, including the magazine itself, is shown in fig. 2. This is well worth studying, for it illustrates several unconventional features. For example, there is no "braking", in the usual sense. Instead, the spools are locked in the cassette, quite firmly, even when the plastic cover is opened, until lever U is raised. In action, rod T, actuated by the movement of lever P, raises lever U when the machine is switched to *Record*, *Play* or *Wind*.

Another feature is the constant engagement of the idler wheel A with the flywheel B, the drive motor S coming into play immediately when the tape recorder is switched on. Despite some head-shaking when this design first appeared, there have been none of the expected faults due to "flatted" pulleys: rather surprising, considering the trouble that can be experienced with other machines that have been left in an operational position by their owners. However, the pulley is sprung into position, and weakness at this point will lead to erratic running.

Except for the necessity to depress the safety button H on

Record, the mechanical functions performed by movement of knob E to *Play* or *Record* are identical. Briefly, a shaped cam, represented by F, is mounted on spindle G, the latter being suitable for the mounting of switch wafers for electrical selection of function. This cam swings the main lever on pivot K so that the tape guide assembly L and pinch wheel M moves inward. Some small adjustment of the pinch pressure is possible by a set screw altering the tension of spring W. Check this if wow is reported. Correct tension should be when slip is possible as the end of the leader is reached, to reduce the possibility of tape breakage.

The same action moves lever P, releasing the brake, as previously described. This also locks the cassette to the main deck and moves lever Q, which actuates switch R. The purpose of this switch is to bring in motor C, either at half-power for

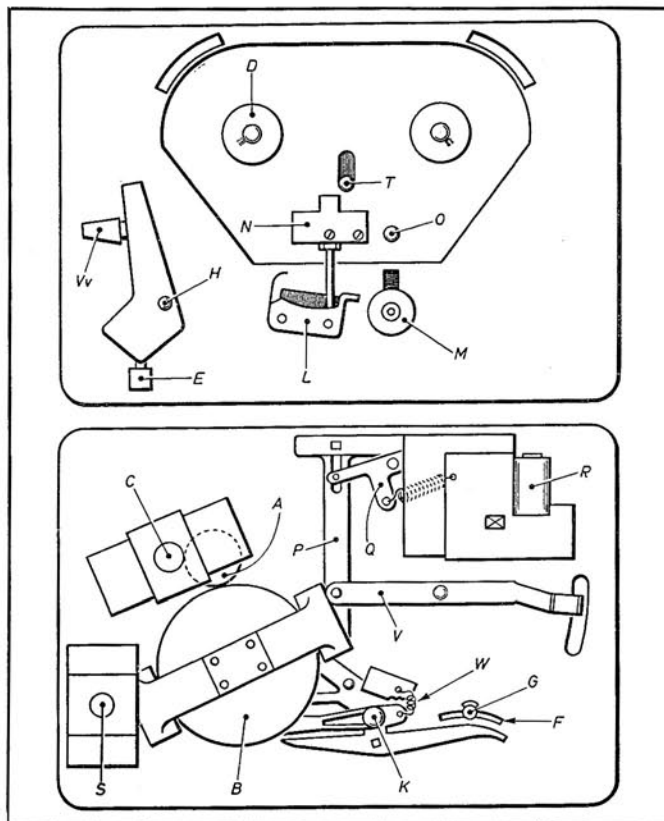


Fig. 2. The Garrard Magazine tape deck showing views of deck layout and underside of deck

take-up or full power for fast wind. The last action is obtained by full movement of lever P, in response to the swing of lever V as knob Vv is brought downwards. A safety arrangement prevents this action during *Record* or *Play*. The lever Q now takes switch R to its second position and the brake is released in the same way.

Clutching, in the normal sense, is unnecessary, but there is a friction disc on the feed spool spindle, hardening of which could lead to the usual minor troubles. Head alignment is also "built-in" by this simple but effective method of construction, and provided the cassette seats properly on the spool hubs (check the splines) there should be no difficulty in ensuring correct tape transport. Two-gap heads are provided, and the cassette is turned over for lower track to be used (upper track working being used), thus fast rewind is not needed.

Electrically, there are six connections from the deck, and the R/P head can be connected for either high 70,000 ohms, or low 17,500 ohms, impedance. Since the first release of this deck there have been additions, such as a digital clock counter (designed by Smiths) which mounts on the take-up spool and a braking modification if the deck is intended to be used with individual spools. These are in the nature of accessories, however, and do not alter the basic description.

SAGA
Tape
Records
are
best
value,
best
sound
and
best
repertoire
in
Tape
Records

*

Be
SAGA cious
buy
SAGA
Tape Records

"... So good that I did not believe them!..."

This is what the 'Tape Recorder' says about our three new releases.

"THREE tapes from Saga this month, "Dancing and Dreaming"* (STG 8041); "Silk, Satin And Strings"† (STG 8045); "Favourite Show Tunes"‡ (STG 8044). The first two of these were so good that I did not believe them . . ." " . . . the first of our new monthly "Plum" awards goes without hesitation to Saga for "Silk, Satin and Strings." It is one of the best 3 3/4 i/s recordings of light music that I have heard in a long, long while. The quality of both the programme material and the recording are excellent. If you have yet to sample a tape record, make this "Plum" your introduction. "Dancing And Dreaming" is very nearly as good, and may well out-sell the "Plum" selection on account of its programme content . . ."

SAGA TOP '16'

BEETHOVEN
 Symphony No. 6 in F major 'Pastoral'
 STG 8027 32/6
 Stereo 7 1/2 i.p.s.
 STF 4009 84/-

DVORAK
 Symphony No. 5 in E minor 'New World'
 STG 8029 32/6
 Stereo 7 1/2 i.p.s.
 STF 4006 84/-

GRIEG
 Piano Concerto in A minor
 STG 7017 25/-
 Stereo 7 1/2 i.p.s.
 STE 3001 63/-

PROKOFIEV
 Violin Concerto No. 1 'Tchaikovsky' 'Romeo & Juliet'
 STG 8020 32/6

RIMSKY-KORSAKOV
 'Scheherazade'
 STG 8001 32/6

TCHAIKOVSKY
 Symphony No. 6 in B minor 'Pathetique'
 STG 8003 32/6

CAESAR PLAYS
 Caesar Giovannini, piano
 STG 8054 32/6
 Stereo 7 1/2 i.p.s.
 STE 3054 63/-

'DATE WITH DON'
 Don Lorusso, Electric Organ
 STG 8050 32/6

MAD ABOUT TRAD
 Pee Wee Erwin Band
 STG 8061 32/6

JAZZ SESSION
 Lucky Thompson Quintet
 STG 8046 32/6

KEN COLYER JAZZMEN
 STG 8070 32/6

MUSIC FROM THE FILMS
 London Variety Theatre Orch.
 STG 7022 25/-

PIANO CONCERTO
 No. 5 in E Flat 'Emperor'
 STG 8028 32/6

SIDNEY BECHET QUARTET and KID ORY CREOLE JAZZ BAND
 STG 8064 32/6

WEST SIDE STORY—
 Highlights, Leonard Bernstein
 STG 8022 32/6
 Stereo 7 1/2 i.p.s.
 STE 3005 63/-

RE-PERCUSSION
 Dick Schory Ensemble
 STG 8047 32/6
 Stereo 7 1/2 i.p.s.
 STE 3051 63/-

MONO 3 3/4 i.p.s. unless otherwise shown

* All packaged in attractive colourful Pictorial boxes.

* SAGA RECORDS use **SCOTCH** tape exclusively.



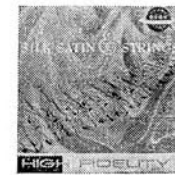
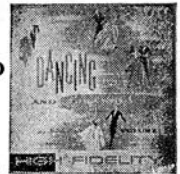
Saga Records Ltd., 127 Kensal Road, London W.10

Some SAGA Highlights

DANCING AND DREAMING* VOL. 1

STG 8041

Jay Norman Quintet 32/6



SILK SATIN AND STRINGS †
 STG 8045

Caesar Giovannini Orchestra 32/6

FAVOURITE SHOW TUNES ‡ VOL. 1

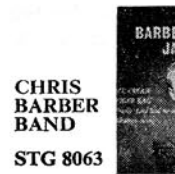
STG 8044

Sorkin Strings 32/6



OLD TIME DANCING
 STG 8042

Harry Davidson Orch: 32/6



CHRIS BARBER'S JAZZBAND

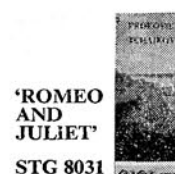
STG 8063

With the Lonnie Donegan Group 32/6



T FOR TROMBONE
 STG 8048

Jack Teagarden Band 32/6

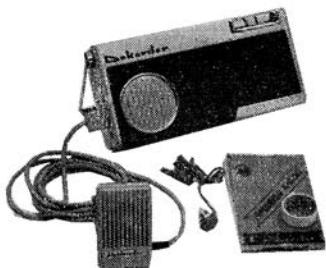


'ROMEO AND JULIET'
 STG 8031

Nutcracker Suite

32/6

FIELD TRIALS OF BATTERY PORTABLES



★
**THE
DOKORDER
PT-4K
BATTERY
RECORDER**
★

Manufacturer's Specification: Two track International Standards. **Tape Speeds:** $3\frac{1}{2}$ and $1\frac{1}{2}$ i/s. **Frequency Response:** ($3\frac{1}{2}$) 200-7,000 c/s; ($1\frac{1}{2}$) 200-3,500 c/s. **Wow:** 0.7 per cent. **Playing times** ($3\frac{1}{2}$) 16 min.; (L.P. tape) 21 min.; (D.P.) ($1\frac{1}{2}$) 32 min. (L.P.) 43 min. (D.P.). **Rewind Time:** $3\frac{1}{2}$ min. **Microphone Input:** 10 Kohms; **Output:** 120mW. **Battery Complement:** five 1.5 volt cells. **Recording level and battery life meter, Dimensions:** $8 \times 4 \times 2\frac{1}{2}$ in. **Weight** 2.8 lb. without batteries and tape. **Price:** £51 19s. 6d. **Accessories supplied:** microphone, telephone adaptor, earphone, recording lead, leather carrying case, tape and spare reel and splicing tape. **Manufacturers Denki Onkyo Co. Ltd., 25, 3 Chome, Nishirokugo, Otta-ku, Tokyo, Japan. Distributors:** V. L. Dewitt Ltd., 24-26 Hampstead Road, London, N.W.1.

It was only a short time ago that the Japanese "invasion" of Britain began with the import of portable tape recorders and transistor radios. This caused many manufacturers in this country to reach for their typewriters and submit long letters of protest to the Government. The main argument was that workers in Japan were paid far less than their counterparts in this country which thus lead to imported goods retailing for substantially lower prices. This of course may be true, but we believe that prospective customers are now becoming more critical when purchasing equipment and that demonstrations are now a necessity rather than an exception. Price verses quality is now resulting in a major swing to the latter. One important fact must not be overlooked, with Britain's entry into the Common Market many new recorders will appear adding still further to the complicated task of buying a recorder.

First Impressions

After this preamble, readers may be wondering where I am heading for. Well it all started when a Japanese recorder was sent to this office—the Dokorder PT 4K—a portable tape recorder costing 49½ guineas. A price range where there is a definite gap in this country. First impressions always count, and one could not fail to be impressed by the presentation of the machine and its accessories. Everything was laid out in such a manner that a prospective buyer would be half way to buying the machine before it was demonstrated. The contents included: tape recorder, black leather carrying case, microphone, telephone adaptor, earphone, recording lead, splicing tape and a comprehensive instruction booklet.

It was observed when removing the machine from its case for a closer inspection that great care had been taken in the design of this portable. The case, constructed of an alloy material, measures only $7\frac{1}{8} \times 3\frac{1}{8} \times 2\frac{3}{8}$ in. and weighs only 3 lb. Reels of up to $3\frac{1}{2}$ in. can be fitted and these are secured to the spindles by holding pins allowing the machine to be held in any position without displacing the spools. Tape threading is clearly indicated by a black arrowed line inscribed on the deck. Two speeds are provided, $3\frac{1}{2}$ and $1\frac{1}{2}$ i/s. The change being affected

by removing the large capstan, underneath which is a smaller capstan for the lower speed. Adjacent to the idler wheel is a holder for the removed capstan, ideal for the absent-minded recording enthusiast.

The machine is operated by five 1.5 volt penlight cells (leak proof advised), which are housed in a small metal container, which can be removed in a few seconds. It is essential to follow the manufacturer's diagram when inserting new batteries, as the correct polarity of the batteries must be observed. Recording and playback is controlled by three press buttons, situated on the top right-hand corner of the machine. A switch fitted on the microphone allows the machine to be operated remotely when necessary. Of special interest is the battery life and recording level indicator. This shows the state of the batteries on playback and the recording level on record. Coloured portions indicate fully charged batteries and over recording.

Rewinding the tape is simple and efficient, taking approximately $3\frac{1}{2}$ minutes. At the same time as the rewind button is moved the head cover containing the pressure pads is automatically opened.

Outside Recording

After reading the instruction booklet (always recommended by manufacturers, but very seldom put into practice by the general public), the machine was prepared to record a series of sound effects for a proposed documentary. A visit to the local High Street on a Saturday afternoon was called for, and with the small dynamic microphone fitting comfortably in the palm of the hand the recording commenced. Footsteps on concrete pavements and the incessant noise of passing cars were faithfully recorded and even the local housewives out delivering the news of the past week contrived to find their way on to the tape, although this was not planned. A visit to the vast supermarket made the recording meter swing wildly towards the "overload" area, but a small alteration to the volume control restored it to its rightful position. Various other recordings were made for future use and these were played back first on the machine's own internal speaker ($2\frac{1}{2}$ in.) and then on a semi-professional machine (fifty pounds heavier and fifty pounds dearer!) using a Wharfedale PST 8 speaker enclosure. Every sound issued from the speaker compared favourably with the original effect.

As a final test, serious music was recorded at the highest speed from an FM tuner using the recording lead provided. This was reasonably good, but there appeared to be a considerable amount of background noise due to the DC bias erase method. Nevertheless, there are quite a few mains machines that would do well to measure up to the Dokorder.

One small plea to the manufacturers on behalf of the serious amateurs and semi-professionals is that although it is appreciated that $3\frac{1}{2}$ i/s and $1\frac{1}{2}$ i/s provided excellent playing times, the speed of $7\frac{1}{2}$ i/s is still recognised by many as necessary for good quality. A capstan could be produced for this machine quite easily with very little alteration in price, and to many it would be a wise and much welcomed investment.

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

“soft—for art’s sake”

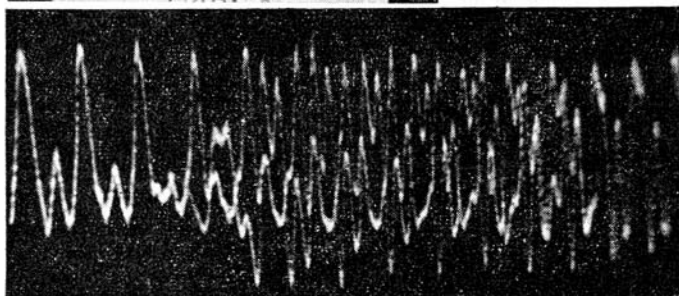
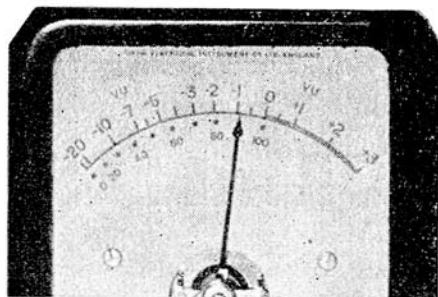


Fig. 2. The small photo above illustrates a VU (Volume Unit) meter. Below it is a waveform trace from Mrs. Dale's Diary taken from an oscilloscope.

BUT loud—as the early disc recordists used to say, “for goodness sake!” They had, of course, to contend with a surface noise which surely bore the adjective “background” only by extreme courtesy; we are in the fortunate position of having a small range of choice in the matter. Nevertheless, modern standards of reproduction demand accurate control of the signal modulation level on tape as a necessary technical condition for making good recordings. As we saw last month, too low a signal level leads to an unnecessarily high background noise and too high a level causes undue harmonic and inter-modulation distortion.

Indicators are necessary

Almost all tape recorders are therefore fitted with some kind of modulation indicator which shows at least when the recording input is at or near the maximum permissible level, and should preferably also cover a fair range below this point. To coin a motto for a new industry from an old source: “Let your modulation be known unto all men.” Actually, you can be fairly certain nowadays that the absence of an indicator means one of two things: either the presence of an automatic volume control, such as is incorporated in some dictating and reporting machines to keep the user out of trouble; or that having one would not make much difference to the overall results anyway. Not every machine which *has* one is worth it, of course, but it is reckoned to be a good selling point in borderline cases.

Waveforms

To business; and immediately to what may seem yet another red herring, but is not. Before we can understand how well various kinds of indicators work we must know something about what they are trying to measure, the programme waveform itself. The photograph shows such a waveform, which represents the electrical output from a radio tuner over a small fraction of a second, as displayed on the screen of a cathode ray oscilloscope. The way in which the output amplitude—the height of the trace—varies as we move along in the horizontal (time) direction corresponds to the way the sound pressure varied at the studio microphone.

As I pointed out last month, and as you will see from the photograph, programme waveforms are neither pure, simple or steady in amplitude. Fig. 1(a) shows the waveform of a pure tone, which would also be steady if there were space enough to put in a few more cycles of equal amplitude. This “sinusoidal” waveform can be produced by tuning forks, electronic oscillators and one or two flute-like musical instruments (approximately) but

MEASUREMENTS AND METERS

very rarely occurs naturally. The other illustrations in fig. 1 are of waveforms which are fairly simple, but not “pure” in the present sense.

Obviously we have to measure whatever appears at the output of our recording amplifiers, whether simple or complicated, pure or complex. But what to measure? One obviously measurable quantity is the amplitude of the voltage or current waveform. ($P + P'$ on the waveform in fig. 1(a), for instance) which we might perhaps read on a suitably marked oscillograph screen. This is, very roughly, what a “magic eye” does in conjunction with some appropriate circuitry; instead of a scale mark to show maximum modulation, there is the point at which the two bright areas meet.

There are two other quantities which are conveniently measured: the average value and the r.m.s. (root mean-square) value. The r.m.s. value, by far the best-known and most-quoted of the three, is basically an indication of the heat produced by the current in any pure resistance through which it passes—the volume control across the output of the radio tuner, for example, or the fixed resistance in series with a recording head. Paradoxically, the r.m.s. value is also the one which is actually *measured* least of all, for it *can* only be truly measured, you see, either by actually heating up a resistance and measuring the heat produced (e.g. as in thermocouple or hot-wire meters), or by using even more elaborate instruments which respond in other ways to the square of the current. (See footnote 1.) True r.m.s. measurements are generally impracticable in audio programme work and are, in any case, not the best for the purpose, as we shall see later.

Average Measurements

What passes for a r.m.s. “measurement”—well enough in most cases where simple waveforms are involved—is usually the reading from a rectifier-moving-coil meter whose scale has been marked in r.m.s. values. But such a reading is fundamentally an indication of the *average* value of the waveform; the basic instinct of a moving coil meter is to respond to the *average* value of the current passing through the coil. In this case the coil “sees” the original waveform with alternate $\frac{1}{2}$ -cycles inverted by the rectifier much as is shown by the dashed curve in fig. 1(a)—a “pulsating d.c.” to whose average value the movement can respond (see footnote 2).

Now none of this would matter one jot if we could only be certain that the waveform we wanted to measure had always the same shape, for each particular waveshape is characterised by a particular and definite relationship between the peak, r.m.s. and average values. For example, referring to the table under fig. 1, you will see that a pure sinusoidal waveform has an r.m.s./peak ratio of 0.71, and average/peak ratio of 0.64 and an r.m.s./average ratio of 1.11. *Always*. This is why moving-coil meters used for mains voltage or current measurements can confidently be scaled in r.m.s. values even though they are actually responding to the average value; the mains waveform is invariably sinusoidal.

Programme Measurements

Similar meters can obviously be used in any other situation where the waveform is sinusoidal. Or, for that matter, where any kind of waveform is present provided its r.m.s./average ratio is known; either the meter can be re-scaled or a suitable correction factor applied. And, in general, *any* kind of meter can be used to find *any* value of *any* waveform, provided always that the relevant correction ratio is known for each waveform encountered.

What, then, are we to do with the kind of waveform in the

“soft—for art’s sake”

—by GRAHAM BALMAIN

photograph, the kind of input our tape recorders were made for? It varies in character vastly, rapidly and continually, and none of it looks much like anything in fig. 1 or any other imaginable simple waveform. Back to square one, apparently! What to measure? Many heads have been scratched over this problem, especially in broadcasting organisations, and two main lines of thought have emerged. It is probably best to approach them by considering why the obvious method failed.

The obvious solution was just to connect a conventional a.c. rectifier-voltmeter across the recording amplifier output and thus measure the average value. This proved unsatisfactory for two reasons. The first can be seen by looking at fig. 1 yet again; the waveforms there have been drawn so that their average values are all at the same level. However, their peak values are very different indeed, and as you may remember from last month’s discussion of distortion it is the peak of the waveform which will first enter the overload region and suffer distortion. Signal waveforms can be much peakier even than any of these, so evidently an average measurement will not help much in controlling peak levels. The second reason is the inherent laziness of most mechanical meter movements. The majority need at very least 200 milliseconds of steady signal before they will give a reasonably true reading, which is about 195 milliseconds longer than the shortest appreciable signal peak lasts.

The VU Meter

One school of thought then argued thus: “Suppose we accept the limitations of average-reading meters and construct for this purpose a standard instrument whose mechanical response to changes in sound level corresponds roughly to the reaction of the human ear to them. A deflection will then be proportional to the average energy in the associated sound. We still have an average-reading meter, but, since the input to the broadcasting systems for which we are designing it is usually peak-limited or compressed into a limited dynamic range at some stage, we shall know the peak/average ratio of the programme material and consequently we shall know what average reading to aim at to avoid overloading our transmitters on peaks.” The result was the VU meter, shown in fig. 2 (see footnote 3).

Now this is fair enough as long as the signal is compressed and its peak/average ratio known, although even then the ratios are liable to differ quite considerably according to the kind of programme. That for speech may be as much as 20dB, for instance, and that for full orchestral music as little as 8dB, so much still depends on the programme engineer’s experience. But the VU meter has been widely adopted for use in systems where no compression or limiting is used, among them being tape machines used for live recording, of course. In my view, the VU meter is much less than satisfactory for amateur use unless the recordist is very experienced with it.

Peak-Reading Meters

The other school of thought maintained that the logical way to prevent overloading on peaks was to measure them directly, and considerable effort was directed towards finding the most suitable dynamic characteristics and developing reliable circuits. Measuring peak values is easy enough in itself; the signal, or an amplified version of it, is made to charge a capacitor through a rectifier and the peak voltage thus stored can then be used to drive a d.c. meter amplifier. The practical problem is to choose dynamic characteristics such that the programme engineer can read all significant peaks accurately, and go on reading a succession of such peaks without eyestrain.

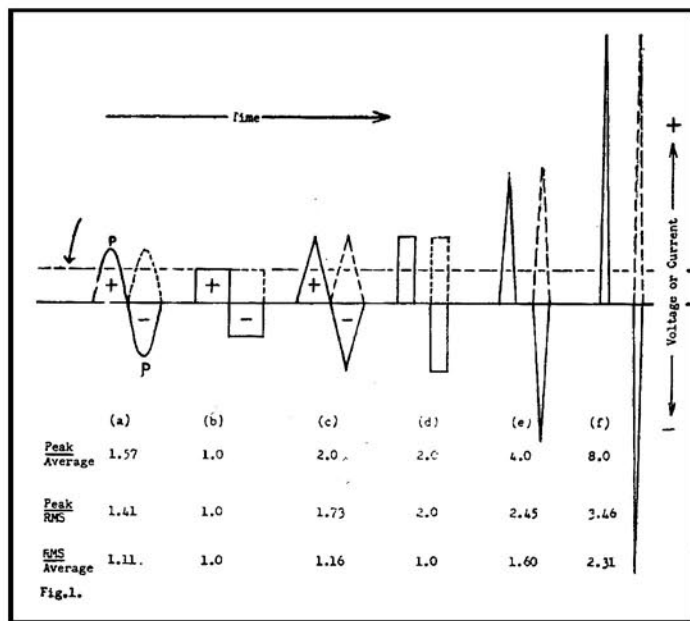


Fig. 1. Characteristic ratios of simple waveforms, drawn with equal average values, Rectified $\frac{1}{2}$ c/s shown dashed, as for current through A.C. moving coil meter.

The B.B.C.’s solution was (and is still) to arrange that peaks lasting for 5 milliseconds or more are fully registered by a fast-rising meter circuit, but that the pointer should thereafter fall slowly at about 8dB per second, which gives the engineer time to read the peak comfortably without masking subsequent changes in average level too much. Peaks lasting below 5 milliseconds register progressively less as they get shorter because, as I pointed out last month, distortion of peaks becomes less obtrusive below this value.

My colleague, Bartlett Still, has unwittingly saved me the trouble of describing the principles of peak-reading circuits in detail by doing just that in *Tape Recorder Workbench* last month, so I will do no more than point out why the rise- and fall-times of his circuits differ from those quoted above.

The main reason is that the B.B.C. have been able to use a very nice (but expensive) fast-acting meter in their circuit. It cannot by itself rise fast enough to catch a 5ms peak, of course—the storage capacitor takes care of that—but it still has to rise fast enough to catch up with the stored voltage before the latter decays significantly; the capacitor must be discharged some time, and obviously the slower the meter movement rises the slower must the rate of discharge be.

Fast Up—Slow Down

However, this doesn’t matter too much in most amateur and domestic applications, and it is possible to use cheaper and slower instruments so long as the discharge time is increased suitably. Bartlett Still’s meter falls at roughly 3dB per second, if my calculations are correct, and other published circuits show fall-rates as low as 1½dB per second. This latter would be about the minimum tolerable even for domestic use. His magic eye circuit, on the other hand, has a fall rate of over 30dB per second, which serves to bring out two of the magic eye’s main advantages. The first is the inherent alertness of the device; there is no mechanical inertia in an electron beam—none that we need worry about, that is—so it has to be slowed down to a visible rate of response or it would be more useless in its peak-fluttering way than the ordinary average-reading voltmeter is in its lumbering fashion. The second is that, given equal time-constants, it is easier to see when the two bright areas of a magic eye meet than when a pointer reaches a certain scale mark.

You will gather from this that, unlike most professional engineers, I like eyes. Not indiscriminately, of course; their major disadvantages are the small range covered below the peak indication—only about 10dB except on one or two older types



SEE
ALL
MAKES

Hear all makes. At the Tape Recorder Centre showroom you can see, hear and compare them *all*, on the spot. The country's leading specialists in tape recording are there to give you unbiased help in choosing from the country's largest stocks of equipment. At The Tape Recorder Centre there is the model best suited to your needs (and your pocket). And everything else for tape recording, office dictation and hi-fi, plus excellent HP terms. See all makes, hear all makes, at

THE
T **R**
C **TAPE**
RECORDER
CENTRE

Philips
Elizabethan
Grundig
Ferrograph
Stella
Vortexion
Brenell
Ampex
Tandberg
etc

82 High Holborn, London WC1. Tel: CHA 7401 ● 75 Grand Parade, Harringay, London N4. Tel: FIT 2316

which cover about 20dB—and their short effective “scale length”, though even this has been improved on the newer miniatures. But they are certainly better than plain voltmeters and can even improve on the so-called “peak” meters which adorn some of the cheaper recorders. If your capital is limited, a good magic eye in a well-designed circuit is highly recommended. Nevertheless, if you can afford it, a good peak-reading meter is better and a B.B.C. peak programme meter better still. With the editor's permission, I may describe a P.P.M. circuit which is not too hard on the pocket in a later article.

The next article in this series will deal with frequency and wavelength in tape recording, partly to point out the controlling influence of wavelength rather than frequency in the process, and partly to prepare the ground—remote though the relationship may seem—for the subsequent article on unconventional playback heads which I threatened some months ago.

Footnotes

(1.) Even though the measuring instruments used in light-current electronic work are mainly average-reading moving coil types, *r.m.s.* calibrations persist as a hangover from power engineering, where the supply company must assess the total electrical power used by consumers in their lamps, heaters, ovens and so on. Power consumed is most conveniently calculated as *r.m.s.* supply voltage \times *r.m.s.* current drawn (the domestic electricity meter performs this multiplication automatically) or alternatively as (*r.m.s.* current)² \times load resistance; hence the necessity for using a meter whose deflection is proportional to current² if a true *r.m.s.* measurement is needed. However, there is little justification for using *r.m.s.* measurements in audio work; the only reason it persists is the influence of several generations of engineers and instruments accustomed to expressing voltages and currents in *r.m.s.* values.

(2.) Without a rectifier, a moving-coil meter would not indicate at all at audio frequencies because of the mechanical inertia of its movement; the alternate positive and negative current $\frac{1}{2}$ -cycles follow so rapidly compared to the time needed to overcome this inertia that they effectively cancel each other. The whole process is analogous to two men trying to move a car. If one stands at each end and they push alternately in opposite directions, the car will get nowhere (although it might perhaps rock to and fro slightly). If they both push alternately at the same end, the car may eventually start moving. This is not the best way of doing the job, of course, just as passing pulsating d.c. through an average-reading meter is not the most efficient way of using the instrument or measuring the current.

(3.) The VU (volume unit) meter itself is designed to be fed from a 300 ohm source impedance (e.g. a terminated 600 ohm line output) and to deflect to 0 VU when the average power in the termination is 1 milliwatt. Although basically a rectifier-moving-coil meter, the total series resistance is so low that the non-linear forward characteristic of the rectifier makes the response something near a square law. It is thus more an energy- or power-reading instrument than a current-reading one. The scale is marked in VU, each of which is numerically equal to 1dB when the instrument is measuring steady, pure tones.



Semi-Permanent BINDERS for Tape Recorder

Keep your copies
clean and ready for
easy reference.

ORDER VOL 4 NOW
Price 15/- post free

From:
99 Mortimer Street,
London, W.1.

... tape recorder workbench

No. 32. CONNECTING EQUIPMENT By A. Bartlett Still

ONE of the very satisfying things about having a regular series such as this is that there are many opportunities to be of help to individual readers. I am not infallible, of course, and every so often a letter sent to me, or sent to the Editor and passed to me by him, contains a problem that I do not succeed in answering correctly first time. The fault may lie in myself, the letter may not contain *all* the relevant facts, or it may be that the equipment concerned is just that little bit different.

I have not attempted, ever, to classify the queries I get in any way, but if I did I feel sure the largest group, by far, would contain problems concerning the connection of a tape recorder to other equipment for record or replay. I think this is because the manufacturers will not get together on signal levels and produce standards. Let us suppose that we have a tape recorder with a “Hi-Z” output socket, and amplifying equipment, the control unit of which has a “Tape Replay” input socket. (Some control units have a corrected tape input for direct connection to a tape head, but that is another story.) One might reasonably suppose that all that is required is a screened lead with suitable plugs between the two.

The tape recorder output may be, according to manufacturers' figures that I have been able to obtain, anything from 200 mV to 1,500 mV, these probably should be halved for mean programme level. If we now look at the input requirements of a number of control units, via the tape-replay socket, we find a range from 20 mV to 500 mV. Again these figures should be reduced for mean programme conditions, and also considering that not many people run a 15-watt amplifier flat out! I think it is fair to say, then, that on the one hand we range from 100 to 750 mV, and on the other from 8 to 200 mV, or thereabouts.

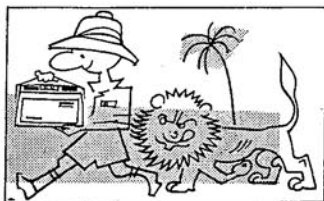
It will be readily seen that we are faced with three possible alternatives. If we are lucky the two units will be compatible and all will be well. Many of my readers will, in fact, have been happily replaying through their amplifier, and they are doubtless wondering what all the fuss is about. But this is not always the case. Considering one extreme, an output of 700-800 mV would prove to be rather an embarrassment to an amplifier requiring only 10 or so. The result would probably be that the tape recorder gain control would have to be turned down to an extent that considerably worsened the signal/noise ratio, giving a high hum and noise level in the amplified output. In the opposite case both tape recorder and amplifier would be set to full gain without adequate output being available.

The two extreme cases that I have instanced are such as to make it obvious that something is not right. The veriest beginner will be asking himself, or someone else, how to set about correcting the trouble. There will, in addition be a “fringe” condition wherein trouble is not immediately apparent, but that is not giving the best possible performance in terms of distortion and signal/noise ratio.

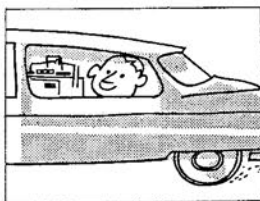
In the example where insufficient output is available from the tape recorder there is little or nothing that I can suggest that will remedy the state of affairs. In my opinion the manufacturers of both recorder and amplifier should be approached for suggestions, since either more output must be obtained or greater sensitivity achieved. Any suggested modification may be carried out in the home workshop, or by a dealer, but if it has the maker's blessing it may be tackled with confidence.

Problems at the other end of the scale are more numerous, but also more easily solved. The introduction of a simple resistive attenuator will bring the signal level to the right region and allow the operation of both pieces of equipment at optimum conditions. This is obviously an advantage when considering a tape recorder whose signal/noise ratio and distortion factor must both be considered as limiting factors in the performance of the whole set-up. So far so good. The snag, it seems there always must be one, lies in the fact that if it is to be just right, “Simple Resistive Attenuator” is a misnomer to the uninitiated.

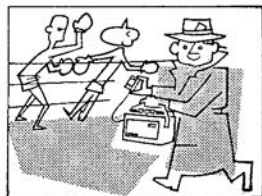
Simple it is, in that two resistors may be all that are required, but there will be a number of factors that go to determine the value of each. And I shall try to explain these next month.



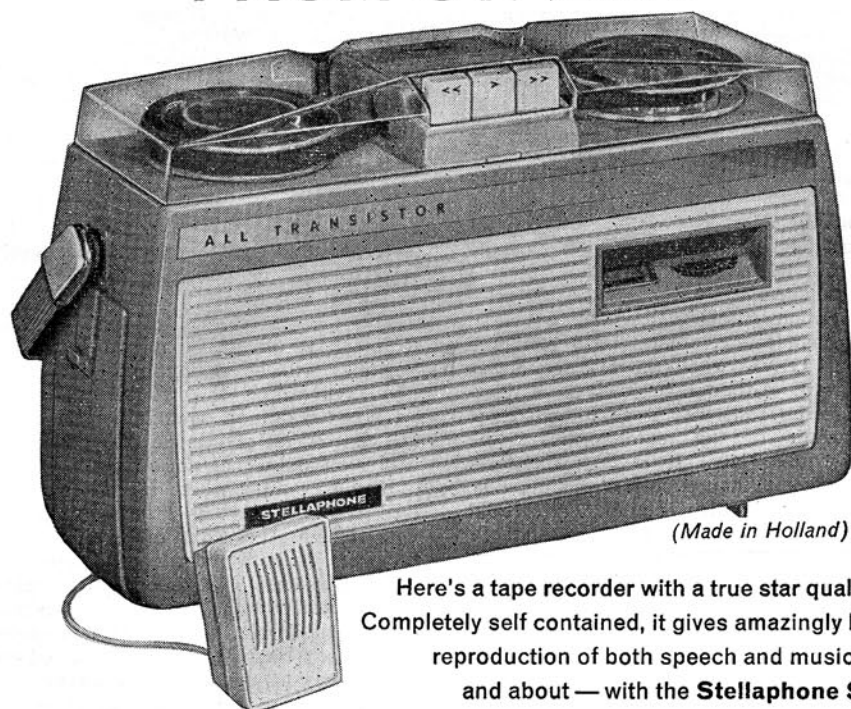
operates



anywhere!



A NEW **BATTERY** TAPE RECORDER FROM STELLA



(Made in Holland)

Here's a tape recorder with a true star quality!
Completely self contained, it gives amazingly life-like
reproduction of both speech and music. Get out
and about — with the **Stellaphone ST470**.

● High quality recording and playback anywhere in the whole wide world—completely independent of mains power ● All transistor ● Weighs eight pounds only ● Works even while being carried ● Transparent lid allows play when closed with 3" reels: protects tape, leaves controls quite accessible ● Up to 2 x a full hour's sound on 4" double-play tape ● One constantly maintained tape speed. ● Runs economically on six one and a half volt batteries. **25 gns.** (with microphone, tape and reels)

Optional extras: Imitation pigskin carrying case with shoulder strap 45/-,
EL 3766 Power unit for alternative operation off AC mains £5.0.0.

Stella
The ideal companion

STELLA RADIO AND TELEVISION COMPANY LIMITED
ASTRA HOUSE · 121/3 SHAFTESBURY AVENUE · LONDON W.6.2

THE CALIBRATION AND USE OF TEST TAPES

PART I ————— By A. TUTCHINGS

IN my capacity as reviewer of tape recorders for this magazine, test tapes are part of my stock in trade. Without them it would be extremely difficult to separate the record and replay characteristics of a recorder, or to measure the signal noise ratio and peak recording level. From time to time readers write asking for definitions of some of the terms used in the reviews. Some typical questions are: What do the letters C.C.I.R. and N.A.R.T.B. stand for? How can a recording characteristic be defined as a time constant of so many microseconds? How is the level on a tape measured, and what is the difference, if any, between Maxwells, Milli Maxwells, Lines, Lines per square centimetre and Gauss? What is Surface Induction? What exactly do we mean by Root Mean Square Alternating Flux Density? As you can imagine, it is not possible to answer these questions in a few words, and so, with recording standards being reviewed and new recording characteristics suggested and likely to be adopted in the very near future, this seems to be a good time to clear the air.

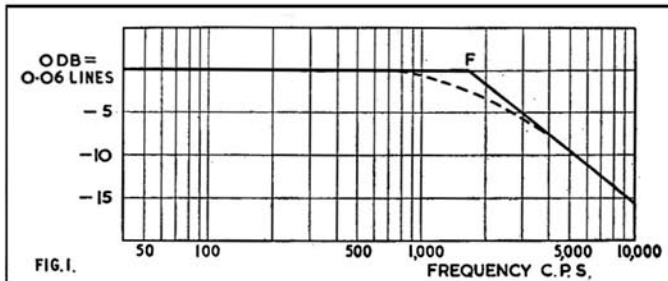
Some Standards

Let us take the easy ones first! C.C.I.R. stands for Comite Consultatif International Radio communication, an international committee which deals with the standardisation of all kinds of recording characteristics, disc, film and tape, so that recorded programmes may be freely interchanged and played on any equipment equalised to these standards in Europe and in this country. N.A.R.T.B. are the initials of the National Association of Radio and Television Broadcasters in the U.S.A. who have adopted slightly different standards for use over there.

In both organisations there are Standards and Recommendations. The standards are quite rigid and are meant for use on professional equipment, and they are mainly limited to the higher tape speeds of 30 i/s, 15 i/s and $7\frac{1}{2}$ i/s. The $3\frac{1}{2}$ i/s recommendation has been fairly universally adopted, but $1\frac{1}{2}$ i/s and 15/16 i/s recording characteristics have not yet settled down, and are not likely to, until more recorders using these very low speeds come on to the market. Further discussion on standards will be shelved until we have waded through a few more basic definitions.

Flux

If tape is passed over a full track head at a speed of 30 i/s and the current in the head is reversed thirty times per second, and if the current through the head is sufficient to

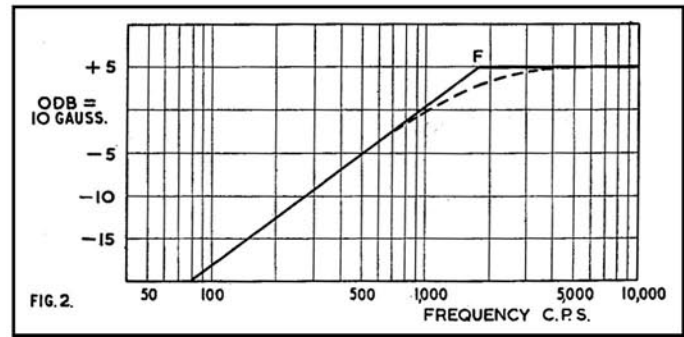


saturate the tape, then a series of alternating magnets will be recorded on the tape in the form of a square wave flux pattern. Each elementary magnet will be one inch long by one quarter inch wide and will maintain a flux which will depend on the thickness, density and magnetic characteristics of the magnetic oxide used to coat the tape.

If the specifications of a number of modern tapes are examined it will be found that the Remanent Flux for fully saturated tape varies very little from sample to sample, and is in the order of 0.6 Flux Lines per $\frac{1}{4}$ in. tape, with top and bottom limits of 0.5 and 0.7 lines. It may also be expressed as 0.6 Maxwells.

This flux will remain constant as the magnets are made shorter, until the magnet length becomes comparable to the thickness of the magnetic oxide, then mutual demagnetisation of adjacent poles will occur and the flux will fall. Another contributory factor is that very short magnets only exist on the surface of the oxide, so that the volume of magnetic material contributing to the maintenance of the flux is reduced. Thus a logical recording characteristic, which allows maximum flux on the tape at all frequencies, may have the form shown in fig. 1. Note that this characteristic is plotted in terms of Flux, where the flux remains constant up to a turnover frequency F, and then falls 6dB per octave at higher frequencies.

Now test tapes are not, of course, recorded at saturation level, but the example given above introduces the idea of an



alternating flux. In the case of a square wave the Peak and Root Mean Square values are the same, but in practice a sinusoidal change of flux is recorded on the tape and the r.m.s. level is about 20dB, or 10 times less than the saturation level. Thus the flux on a typical test tape would be 0.06 lines for all frequencies below the turnover frequency. This method of expressing the recording characteristic is used exclusively on the continent.

Flux Density

In this country we prefer to think in terms of flux density or number of flux lines leaving or entering the oxide surface per square centimetre, because it is the rate of change of flux which determines the voltage output of the recording head. As the frequency rises, and the magnets get shorter, there will be more of them per unit tape length so that, up to the turnover frequency, the flux density will be proportional to frequency and the open circuit voltage of a perfect playback head will rise 6dB per octave.

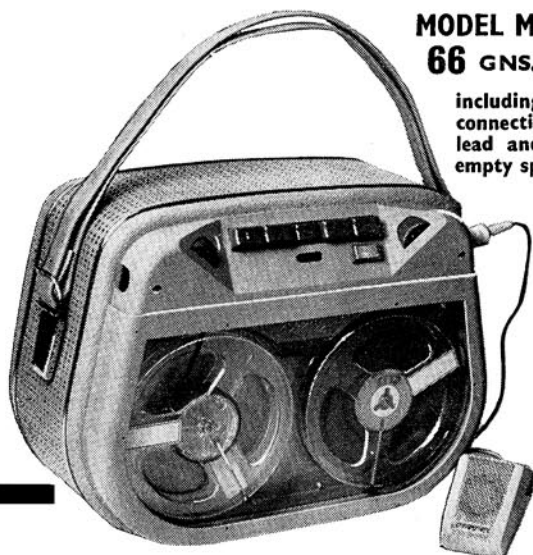
Beyond the turnover frequency the rate of change of flux will remain constant as the rise in density is exactly cancelled by the fall in flux. Thus fig. 2 represents the alternating flux density or Surface Induction method of plotting the recording characteristic. The level on the test tape is usually specified at 1 Kc/s as 0dB, and the surface induction at other frequencies in dB's above and below the 1 Kc/s level. Figs. 1 and 2 show different ways of presenting the same recording characteristic.

Recorded Level

We have seen that saturation flux at low and middle frequencies is in the order of 0.6 lines for most contemporary tapes, so that the maximum flux density for a frequency of 1 Kc/s at $7\frac{1}{2}$ i/s can easily be calculated by dividing the flux by the area of a half wavelength magnet of full tape width; this gives a saturation flux density of approximately 100 lines per sq. cm. Modern tapes show recorded waveform distortion in the order

BUTOBA

TRANSISTOR BATTERY MAINS RECORDER



MODEL MT5
66 GNS.

including
connecting
lead and
empty spool.

"The Butoba looks so good, is so cleverly designed, performs so well. that your reviewer had to be firm with himself to keep his superlatives within bounds."

* Mr. John Borwick, Technical Editor of a leading tape recording magazine.

- Two speeds, $3\frac{1}{2}$ and $1\frac{1}{2}$, with frequency response of 50 to 13,000 cycles at $3\frac{1}{2}$, i.p.s., giving true mains machine high fidelity.
- Very high quality playback through large-sized 7" x 5" internal speaker, with full 1.2 watts output (not just milli-watts).
- Adjustable Treble Control operative on playback and record, giving high fidelity from widely different sound-sources.
- Monitoring facility, with magic eye and 'phones, off mike or radio/gram. recordings.
- High sensitivity level—no lack of gain with this machine.
- Very low background noise level—lower than on many mains machines, 40dB.
- Playback through radio or amplifier, with or without recorder's speaker operating.
- "Buy-anywhere" normal flashlight U2 batteries—not special radio-type batteries. Life up to 50 hours with standard cells.
- 5" reels of tape can be used, giving 4 hours, with d.p. tape on $1\frac{1}{2}$ r.p.s.
- Interchangeable Mains converter for home use or use with car battery.
- Prompt service facilities.
- Designed and engineered by an old-established firm which for years has produced precision clocks and watches, then clockwork tape recorders, and now, for the last five years, all-battery recorders. This valuable experience has culminated in the unique Butoba MT5.

Full details of the machine and accessories from :

DENHAM & MORLEY LTD.,
Denmore House, 173-175 Cleveland Street,
London, W-1 Tel. EUSton 3656-7

THE USE OF TEST TAPES—(continued)

of 3 per cent. at a level about 8dB below saturation; this corresponds to a flux density of 40 lines per sq. cm.

It can also be shown that most random noise, including speech and music, has a normal (Gaussian) amplitude density distribution with a crest factor of about 4, i.e. peaks of 12dB above the r.m.s. level occur only infrequently. It is therefore convenient to record test tapes at a level 12dB below peak (3 per cent.) distortion level so that the test tones have the same r.m.s. levels as normal programme signals. Thus the 1 Kc/s tone on a $7\frac{1}{2}$ i/s test tape is recorded at an r.m.s. flux density of 10 lines per sq. cm. or 10 gauss.

The above calculation gives a rough idea of the desired level on a test tape, but it is necessary to be able to measure the absolute level to an accuracy of about 1dB, and to be able to maintain this level on production tapes within limits of plus or minus 1dB. The absolute level on a tape may be measured by means of a conducting loop placed against the oxide surface of the recorded tape see fig. 3. If the conducting wire is very

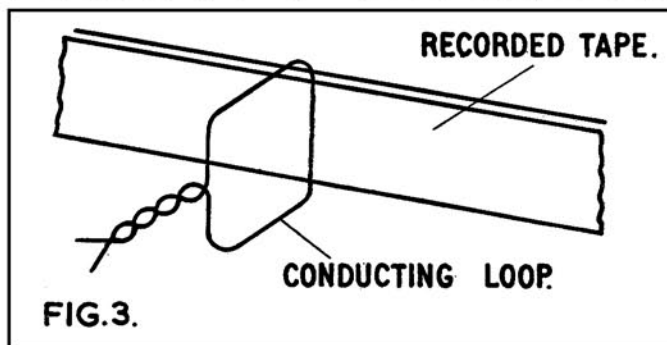


FIG.3.

thin compared to the spacing of the magnet poles on the tape the e.m.f. generated by the loop $E = vwB$ where v is the speed of the tape, w is the width of the tape and B is the surface induction of the tape at the frequency under test.

This method does not affect the flux distribution from the tape and provides an e.m.f. which can be very simply related to the surface induction of the tape when it is *not* in contact with a magnetic head. The flux pattern is, of course, considerably modified when a conventional head is brought into contact with the tape, but, with modern high coercivity tapes, the effect is constant over a very wide range of recorded wavelengths, so that any temporary distortion of the flux distribution must be considered as part of the characteristic of the head under test.

If the head output is to be a true measure of the alternating flux density on the tape the width of the recorded track must be appreciably wider than the pole face width of the head. Two track test tapes are therefore recorded with tracks extending from the outer edge to the centre of the tape so that any slight vertical misplacement of the head will not give a false reading. In Part 2 we shall discuss recording characteristics for different tape speeds.

A. Tutchings

AUDIO LEARNING

USE YOUR TAPE RECORDER OR GRAMOPHONE FOR SELF-IMPROVEMENT

Here are a few of the tapes and discs issued by
Educational Recordings Ltd.

SLEEP LEARNING MIND MANAGEMENT SELF-HYPNOSIS
PRACTICAL HYPNOTISM SAFE SLIMMING POSITIVE PERSONALITY
"PERSONAL" RECORDINGS

INTERESTING BROCHURE

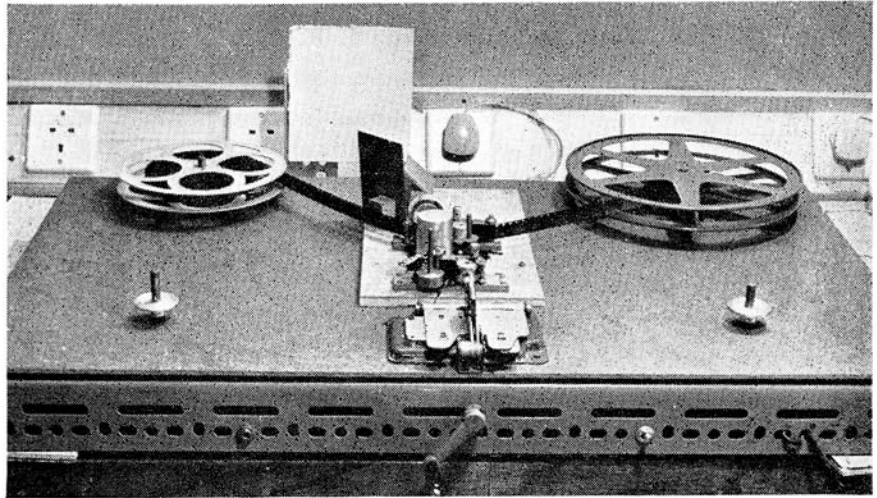
describing our full range of helpful recordings gladly sent post free under plain cover and without obligation. Write now!

To EDUCATIONAL RECORDINGS LTD.
Dept. 13, 21 Bishops Close, Church Lane, London E.17

SOUND and CINE

by R. GOLDING

The photograph shows the magnetic sound editing section of the editing bench. As is plainly visible here the optical system and the sound head form one unit mounted on a separate piece of board. The system of mirrors needed to bring the picture upright on the white card screen was found by trial and error. The magnetic coated film has been removed from the bench in order that the film sprocket, and film guide may be seen to advantage.



THE story of Laurie Hickman, one of this year's "Ten Best" entrants, is rather similar to that of many among the thousands of cine-amateurs in this country. After years of still camera work his collection of transparencies suddenly meant nothing to him when he got the cine-bug. His first step was very practical, for he joined a club to find out something about film-making before ever he bought his first item of equipment. Now, theoretically, this is the thing to do; but it hardly ever works out, as Laurie discovered. The general reason for this is that while there are many clubs to be found all over the country, the number of club films in the making are relatively few, and the chances of joining a club and being taken immediately into a production even fewer.

The cine-club is a great social thing and the film shows and discussions are very valuable, but most members prefer to remain lone workers when it comes to actual filming (and this is evident when we examine competition award lists). This is understandable for we all want the satisfaction of having made it ourselves apart from the fact that, privately, we all consider our ideas and technique to be superior to the next. There is also the human attitude that if we have paid out some large sums of money on equipment we want to get full credit for using it.

Exceptions to the rule

There are exceptions to this, of course, and these are to be found in every club. These exceptions, however, usually find themselves enrolled into a committee where they are expected to do everything—publish newsletters, organise film shows and competitions, raise money, sweep up and make the tea—everything in fact but make films. The club film is usually launched by the man, essentially a lone worker, who would like to make a more ambitious film than he has done to date, but who lacks finance and equipment. He is joined by new members seeking experience, and by old members seeking to use their equipment. The cameraman owns the camera, the sound engineer the tape recorder and so on. The members without equipment taking their place in the team as continuity, make-up, scene painters and actors. The result is usually not very exciting. It is, however, usually quite enjoyable and quite necessary to give purpose to the very existence of the club.

It was this sort of set-up that Laurie met; but although there was no immediate vacancy for a new Hitchcock, advice on buying equipment was readily forthcoming, so before long he found himself the owner of what was regarded as 16 mm basic documentary film-making equipment, a *Bolex Reflex*, a *Fi-Cord* tape recorder and a silent *Specto* projector. The choice of projector was dictated by (first) budget, and then the half promise of the loan of a 640 for the final transfer; for it's a big step to take, especially during the first year, to lay out great sums on equipment when one's filming policy has not yet been clearly formed.

So Laurie went off on holiday to Morocco, armed with *Bolex* and *Fi-Cord*, to make his first documentary. His many years in journalism had prepared him for the rare and exciting; his

thousands of transparencies had given him a sense of composition and selection, and he had fifty rolls of *Kodachrome* on which to chance his arm. All he had to do was learn how to use the *Bolex* as it should be used. When he returned there were but three weeks to go to the "Ten Best" deadline. The 5,000 ft. of colour film had to be cut down to a reasonable length and main themes and interlinking themes had to be chosen. The task of discarding perfectly good material (and I have seen nearly all of it at various times)—over 4,000 ft.—to give power and coherence to the finished film was a colossal task. Laurie tried several versions in a final 800 ft. length before accepting the final shape and then, with only a few weeks to go before acceptance day, a striped copy had to be made and a sound transfer effected.

The facilities of the club were inadequate for this last rush job for everybody seemed to be getting ready for the "Ten Best", so Laurie was forced to hire a tape recorder at £4 per week and then to go to a professional recording studio for the transfer to striped film. Naturally Laurie is a little disappointed with his first year of club life for the transfer cost him far more than had been budgeted—he refuses to say how much—but it is the sort of thing that must be expected with the best of clubs. The sound recording side is usually the weakest part of any club film and the reason for this is not hard to find but as sound is becoming more and more important to the amateur film in general, committees, sooner or later, must begin to give it the attention it deserves.

Amateur Magnetic Sound Editing Bench

One club secretary who realises the importance of sound, but rather prefers to build up his own equipment in his own home than use sound equipment owned by the Grasshopper Group is Leslie Morris, and his new house at Highgate now boasts a small room kept exclusively for sound editing. The reason for this is that Leslie's last film documentary on Greece consisted of some very long and involved sound editing sessions that had to be wedged in between other members' wants. The result of this is a very good looking 16 mm editing bench which contains a magnetic sound reader and viewer constructed after the I.T.V. system of a horizontal bench and turntables and made for Leslie by that well-known sound boffin—Keith Raven.

The film viewer follows the normal arrangement of lamp, prism and mirrors, while the sound side employs a magnetic head and amplifier. The gears and supporting apparatus beneath the bench are mainly old Meccano parts and the whole machine cost only a few pounds to make up. The action is manual, that is to say that a small handle to the front of the bench is geared to wind both picture film and magnetic film at the same speed. The manual operation is found to be quite satisfactory, and fairly good reproduction can be obtained by winding the handle at a constant speed. With striped or coated film this is easier to obtain than with optical film, but the installation of motor and slipping clutches to take out film and sound paths is being considered.

(continued on page 74)

BRITISH DESIGNED • BRITISH DESIGNED



KEEPS
FAITH
WITH
SOUND

LUSTRAPHONE MICROPHONES are available in a range of ribbon and dynamic models to suit the requirements of professional and domestic users for mono and stereo reproduction. Finely designed models . . . British designed and made for reliability.



ROOM 149

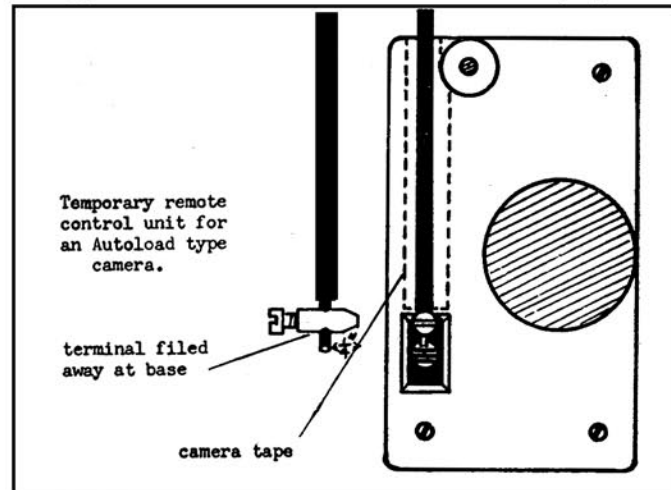
BOOTH 6

LUSTRAPHONE LTD

ST. GEORGE'S WORKS
REGENTS PARK ROAD
LONDON, N.W.1
PRI 8844

My recent paragraph on converting an *Autoload* to reflex viewing has brought some rather interesting comments from other magazine camera owners. A need for some form of remote control is expressed, especially while shooting titles, for it is not possible to fit a cable release to most makes.

A quick and easy way, without having to tap into the camera body, is to fit a lug or a terminal from an ordinary electric switch on to the end of a short cable release (cost—a few shillings) and to fasten the cable to the camera body by means



of camera tape. The action will be to push the release button in the required direction and the lug or terminal may be set so that the continuous release is not affected. In my diagram the cable is attached above the release button for normal running. For stop motion the cable can easily be set under the aperture and taken along the base of the camera for a short distance.

For those who would prefer something more substantial I would recommend a letter to Burgess Lane, Thornton Works, Chiswick, London, who specialise and, indeed, take a delight in solving such cine problems.

Sound Alphabet

Dubbing: means to re-record from existing material. Dub, dubbing and dupe are all nouns used to indicate the duplicated recording itself.

Erase Head: is a device used to neutralise the magnetic pattern on tape or stripe by placing it in a strong magnetic field, thereby removing the existing sound. This can be in the form of either an energised head fed from the oscillator in circuit or a separate permanent magnet.

Feedback: refers to the accidental or unintentional mixing of signals from more than one input, i.e. speaker and microphone.

Flutter: is an effect caused by quick variations in the speed of the sound recording apparatus resulting in frequency alterations in the higher registers. A form of distortion similar to wow.

Guide track: is the original recording made when the picture film was shot, possibly on location. It is used to guide the actors at a post-recording session and to help them with pace and inflexion.

Hum: is strong interference which is sometimes caused by the incorrect positioning of the power line. Can sometimes be removed by the simple reversing of mains connections.

Impedance: refers to the ohms rating of the input or output of any electrical component. When connection is made between any two such components the input and output impedances must match.

Induction motor: is the electric motor commonly used in most home projectors and tape recorders and its speed is mainly dependent on the mains supply frequency.

Key sounds: are main sound effects that can indicate locale or period quite simply, i.e. a train whistle, etc.

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.

★

**DAIWA
DE-30
THREE-SPEED
RECORDER**

★

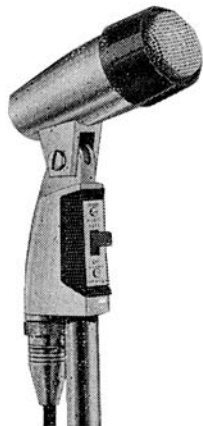


PIANO key controls, three speeds and a digital counter are three of the features on the new Japanese Daiwa DE-30 tape recorder. Frequency response claimed is 70-11,000 c/s at $7\frac{1}{2}$ i/s. The machine will operate at any voltage from 100-125 volts and 200 to 245 volts, 50 or 60 c/s. Seven-inch reels can be fitted and tape speeds of $7\frac{1}{2}$, $3\frac{1}{2}$ and $1\frac{1}{2}$ i/s give playing times of 1, 2 and 4 hours respectively. A 6 x 4 in. speaker handles the 2 watts output. Other features include: tone controls; instant stop/start button; safety lock; separate inputs for microphone and radio and monitoring. The price of the Daiwa recorder is £46 14s. 6d. (approx.). Sole agents: Cromptons (Manchester) Ltd., 29 Minshull Street, Manchester, 1.

★

**SHURE
SONADYNE II
DYNAMIC
MICROPHONE**

★



THE new compact microphone, the Sonadyne II, recently introduced by Shure Electronics Limited, features variable frequency response enabling the user to select the best microphone characteristic for the application.

The microphone, designated Model 540S, has a high output dynamic element with a frequency response of 60-10,000 c/s. The list price is £16 13s. 4d.

Further information is available from the manufacturers: Shure Electronics Ltd., 84 Blackfriars Road, London, S.E.1.

★

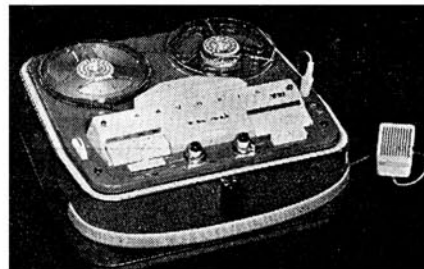
Tape Height Adjusters

THE Tape Height Adjusters described in the article "Common Tape Faults" in the December issue of the *Tape Recorder* caused considerable interest, as a result the author has had these produced from drawn brass and finished in nickel plate. The price is 15s. per pair, post free, from Rawson and Panton Ltd., 107a Lion Road, Bexleyheath, Kent.

★

**GRUNDIG
TK40
FOUR-TRACK
RECORDER**

★



THE TK 40 introduced by Grundig (Gt. Britain) Ltd. has been designed with the keen amateur in mind. It is a four track, three speed ($7\frac{1}{2}$, $3\frac{1}{2}$ and $1\frac{1}{2}$ i/s) with facilities for mixing, superimposing, and synchronised superimposing. A remote control can be easily fitted if required. Sockets are provided for recording from microphone, radio, radio tuner, telephone adaptor, and gramophone pickup. Outputs provide for the connection of an extension speaker, monitor amplifier, extension amplifier and magnetic heads fitted to cine projectors.

Many new features are incorporated including multi-disc clutches, which are adjusted so that the tape moves gradually at the start. A pressure tape fitted to the pressure roller arm ensures a uniform contact between the tape and head. A retractable tape cleaner is also fitted. On fast wind and rewind it is possible to "inch" the tape. The technical specification quoted reads: Frequency response $7\frac{1}{2}$ i/s 40-18,000 c/s, $3\frac{1}{2}$ i/s 40-15,000 c/s, $1\frac{1}{2}$ i/s 40-9,000 c/s; Wow and flutter 0.1 per cent. ($7\frac{1}{2}$), 0.12 per cent. ($3\frac{1}{2}$), 0.2 per cent. ($1\frac{1}{2}$); Signal to noise ratio 50dB. The price is £78 15s. Manufacturers Grundig (Gt. Britain) Ltd., 39/41 New Oxford Street, London, W.C.1.

★

**COSSOR
CR 1603
FOUR-TRACK
RECORDER**

★



COSSOR Radio and T.V. Ltd. have increased their range of tape recorders, with a single-speed four-track recorder giving a playing time of 6 hours with a $5\frac{1}{2}$ in. reel of D.P. tape. Housed in a two-tone green polystyrene cabinet this new machine is priced at £29 8s. It weighs only 11 lb. and has a tape speed of $3\frac{1}{2}$ i/s.

With this machine, the C.R. 1603, it is possible to record from the microphone, radio or gramophone pickup and play back through a radio, amplifier or extension speaker. A moving coil meter indicates the recording level, which can be adjusted while the tape is stationary.

The recorder is supplied with a 5 in. reel of long-play tape, an empty 5 in. spool, a sensitive moving coil microphone and a screened connecting lead. Reels up to $5\frac{1}{2}$ in. diameter can be used. Other details include: Frequency Response: 80 c/s-13 Kc/s. Power Output: 1 watt. Signal to Noise Ratio: better than -36dB. Loudspeaker: 4 in. diameter. Microphone: moving coil. Dimensions: 12 x $10\frac{1}{2}$ x 6 in. Manufacturers Cossor Radio & Television Ltd., 233 Tottenham Court Road, London, W.1.

EVERYTHING YOU'VE WANTED!

Here, for the real enthusiast, is a new tape recorder to make your dreams come true. Not only does its performance meet the most exacting standards; but it has also brilliant operational refinements which make it a delight to use. Please study some of the highlights of the specification below and then try a TK.40 for yourself. We are proud of it, and are sure you will be too.



STAR FEATURES

Three tape speeds

1½, 3¾, 7½ i.p.s.

Frequency response

60 to 10 Kc/s at 1½ i.p.s.
60 to 15 Kc/s at 3¾ i.p.s.
60 to 18 Kc/s at 7½ i.p.s.

Wow/Flutter

± 0.1% at 7½ i.p.s.
± 0.12% at 3¾ i.p.s.
± 0.2% at 1½ i.p.s.

Four-tracks

Selected by positive piano-type keys.

Signal to noise ratio

Better than 50 db at 7½ i.p.s.
Better than 45 db at 3¾ and 1½ i.p.s.

Pressure sling

This, unlike the conventional pad, is flexible and maintains even pressure over the whole surface of the head. It gives better H.F. response and minimises "drop-out" effects.

Multi-disc clutches

In addition to the normal slipping clutches the TK.40 embodies additional multi-disc clutches to remove excessive tape strain. Using *double-play* tape you can switch immediately from fast-forward to fast rewind or vice versa without tape breakage or stretch.

Inching

Fast-forward and rewind are controlled by a slider actuating a progressive clutch. Inching is thus unusually easy and accurate. A lock position is also provided.

Cine-socket

To connect magnetic heads from a cine projector to the TK.40 to record sound films or play back from them.

Built-in tape cleaner

Retractable, and press-button operated.

Indicator re-set

The digital indicator is provided with a button for immediate zero re-set.

Automatic stop

At the end of the tape.

Remote control

An adaptor is available.

Mixing facilities

For microphone/pickup and microphone/diode.

Monitoring

Through loudspeaker when required.

Synchronous recordings

Output for monitor amplifier provided.

Superimposition

Push-button provided for adding effects or commentary to existing recordings at will.

GRUNDIG

Ask your Grundig Approved Dealer for a demonstration or write to us for an illustrated leaflet.

TK40

75 GUINEAS

(INCLUDING MICROPHONE)

GRUNDIG (Great Britain) LIMITED NEWLANDS PARK, LONDON, S.E.26.
(Electronics Division, Gas Purification & Chemical Company Ltd.)

GS.301

EQUIPMENT REVIEWED

★
**E.M.I.
 VOICEMASTER
 FOUR-TRACK
 RECORDER**
 ★

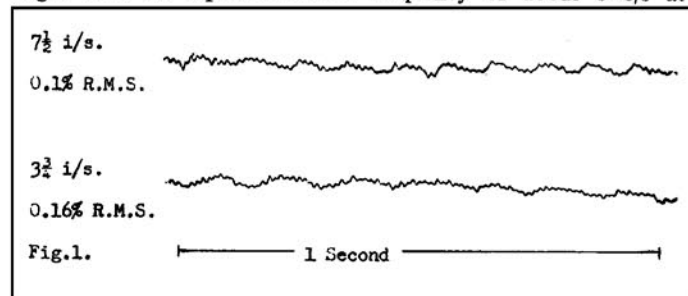


Manufacturer's specification: Total playing time using recommended thickness tape (E.M.I. 99): 7 in. spool (1,800 ft.) $7\frac{1}{2}$ i/s—3 hrs. 12 mins., $3\frac{3}{4}$ i/s—6 hrs. 24 minutes. Spooling: fast spooling in either direction approx. 90 secs. for 1,800 ft. Dynamic range: 45dB unweighted referred to fully modulated tape. Record and replay characteristic to C.C.I.R. recommendations. Overall frequency response: $7\frac{1}{2}$ i/s—60 to 15,000 c/s $3\frac{3}{4}$ i/s 60 to 10,000 c/s both plus or minus 3dB. Power output: 4.5 watts for 10 per cent. dist. into 3.5 ohm load. Wow and flutter: less than 0.15 per cent. R.M.S. at $7\frac{1}{2}$ i/s, less than 0.3 per cent. R.M.S. at $3\frac{3}{4}$ i/s. Oscillator frequency 65 Kc/s. Internal speakers: lower register—9 $\frac{1}{2}$ in. by 4 $\frac{1}{2}$ in. elliptical, upper register 2 $\frac{1}{2}$ in. round. Price £68 5s. Manufacturers: **The Gramophone Co. Ltd., Hayes, Middlesex.**

THIS is a rather large machine with modern styling and with the amplifier placed adjacent to the deck, rather than under it in the normal manner. Advantage has been taken of the large internal volume of the cabinet to fit a pair of matched speakers: an elliptical one for the bass and a small round tweeter for the high note response. It is a four-track recorder, and three double quarter track heads are fitted, together with separate record and replay amplifiers, so that the signal may be monitored a fraction of a second after recording as in most professional recorders.

The record-level indicator is an edge reading moving coil meter, scaled in dB, and marked into white, grey and red sectors to indicate medium, high and overload recording levels respectively. Switching facilities are also provided for cross recording from one track to another with superimposed speech or music via the microphone input, so that quite ambitious sound tracks may be compiled with earphone or speaker monitoring of the combined track at the instant of recording.

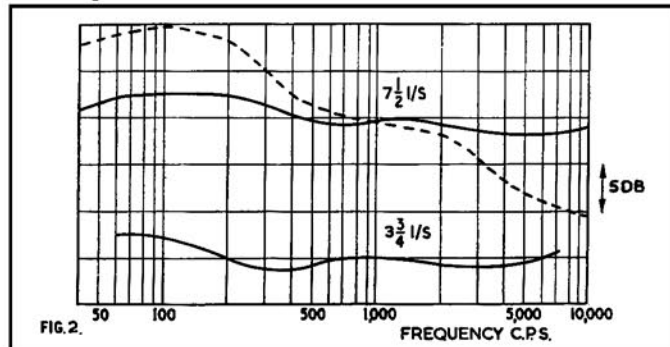
Wow and Flutter: The fluttergrams of **fig. 1** show that short term speed variations are well within the specification, with only a slight wow at capstan rotation frequency of about 6 c/s at



$3\frac{3}{4}$ i/s, and 12 c/s at the higher tape speed. The $3\frac{3}{4}$ i/s tape speed was within 1 per cent. of the nominal speed, but the

$7\frac{1}{2}$ i/s speed was nearly 6 per cent. low. The capstan bearings seemed a bit tight and it is possible that the speed would be O.K. after running in.

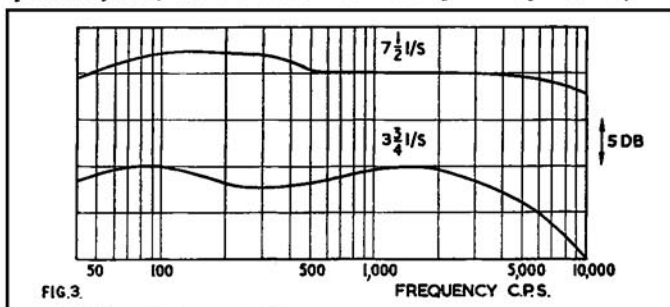
Playback Only Responses: 100 and 200 microsecond test tapes were played and gave the solid line curves of **fig. 2**. This shows that the playback responses are to C.C.I.R. recommendation within plus or minus 2dB. The dotted curve illustrates the



effect of the tone controls. It was noticed that the effective range of the treble control was compressed into the last few degrees of anti-clockwise rotation. The responses shown are for the low level output.

Record Play Responses: The overall record play responses at the two speeds are shown by the curves of **fig. 3**. The $7\frac{1}{2}$ i/s response is very close to that of the test tape; the $3\frac{3}{4}$ i/s response falls slightly at high frequencies but stays within the specification up to about 6 Kc/s.

Signal Noise Ratio: This is the weakest feature of this machine—both valve noise and hum are much higher than they should, or could, be. Hum and noise on the top track was 25dB below test tape level, and that of the bottom track only 20dB down. Most of the hum was lost due to low note cut-off in the internal speaker system, but the valve hiss was unpleasantly audible, and



was at least 6dB higher than bulk erased tape noise. Examination of the playback amplifier circuit diagram shows that a grid stopper R2, having a value of 1 megohm, is fitted between the head and the grid of V1. So far as I can see this serves no useful purpose whatsoever, indeed it probably generates thermal noise and may be the prime cause of the trouble. I would guess that it is a draughtsman's error that has been "built in", and that it should in fact be 1K!

Another source of recorded noise is slight magnetisation of the record head due to switching transients in the record amplifier. If the machine is switched to record, and the record head degaussed without further switching, the recorded noise is a simple hiss, but if the switches are operated in the normal fashion a low pitched "grumble" is added due to head magnetisation. Further random operation of the switches may cancel or aggravate the trouble—it all depends on the polarity of the switching transients. Another complaint, which affects the overall signal noise ratio, is that a level only 8dB above test tape level can be recorded without marked distortion; this corresponds to

Looking for
professional
sound fidelity
at standard prices?

You've found it on

irish[®] ferro-sheen[®] PROCESS PROFESSIONAL RECORDING TAPE

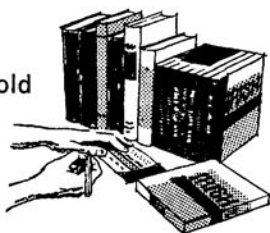
The exclusive Ferro-sheen process produces a mirror-smooth tape with five distinct advantages.

1. Exceptional high frequency response, due to intimacy of contact between tape and heads.
2. Minimum head wear.
3. Freedom from head contamination by oxide build-up.
4. Considerable reduction in background noise.
5. Minimum drop-outs.

NOW!

in 23 carat gold

**SIGNATURE
BINDING**



A beautiful new way to title your tapes.
Free Signature Tape binding with every
5", 5½" or 7" reel.

Distributors

A. G. FARNELL LTD.

HEREFORD HOUSE,
VICAR LANE, LEEDS 2.
Tel. Leeds 35111.

Manufactured by Orradio Industries Inc., U.S.A.
A division of AMPEX CORPORATION



SOUTH LONDON TAPE RECORDING AND HI-FI CENTRE

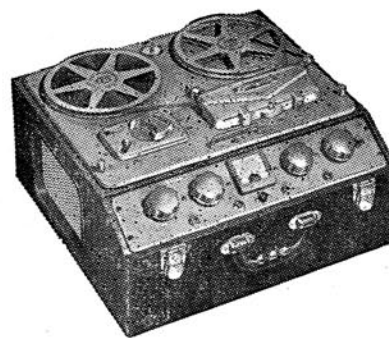
**RENOWNED
PART EXCHANGE SPECIALISTS**

and appointed agents for:

FERROGRAPH 4AN	81 gns.	SONY STEREO S21	124 gns.
FERROGRAPH 422U	110 gns.	TANDBERG Series	110 gns.
FERROGRAPH 808	105 gns.	BRENELL MK 5	64 gns.
REFLECTOGRAPH "A"	105 gns.	PHILIPS STEREO	92 gns.
VORTEXION WVA	£93.13.0	TRUVOX R7	82 gns.
BRENELL MK 5 "M"	89 gns.	SIMON SP5	93 gns.
		REPS R10	59 gns.

If you have outgrown your present tape recorder or hi-fi equipment and would like to own a more advanced machine, as used by professionals and serious tape recorder enthusiasts, contact us today for a free quotation.

We have thousands of satisfied customers throughout the British Isles. We also hold a large stock shop-soiled and second-hand machines at bargain prices. Ask for list.



FERROGRAPH 4AN, 81 gns.

Also in Stock:—

TRANSISTOR-BATTERY
Grundig TK1 ... 29 gns.
Minivox B ... 23 gns.
Butoba MTS ... 49 gns.
Philips EL3585 ... 24 gns.
Stuzzi ... 59 gns.

Tuners
Amplifiers
Microphones
Transcription Units
Speakers
Pick-ups

THE BEST NO INTEREST TERMS

20% DEPOSIT
BALANCE
12 MONTHS

18-24 MONTHS
TERMS
AVAILABLE

FREE SERVICING—FREE DELIVERY—FREE TAPE OFFERS—200 MACHINES ON DISPLAY—OUR MAIL ORDER DEPARTMENT WILL DEAL WITH YOUR ENQUIRY BY RETURN. WRITE—PHONE—CALL FOR A QUOTATION ON YOUR MACHINE. A LARGE SELECTION OF USED TAPE RECORDERS. TELEPHONE: BALHAM 7710

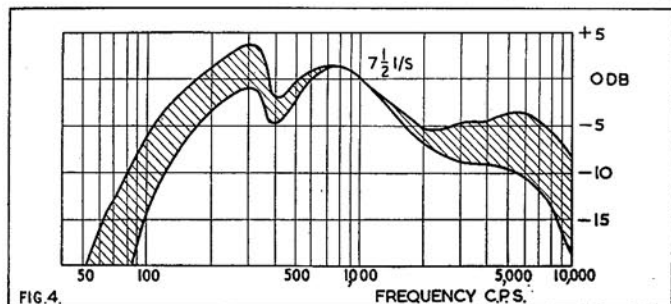
REW

EARLSFIELD LTD. 266 UPPER TOOTING ROAD, LONDON, S.W.17
100 yards from Tooting Broadway underground station: Opposite Tooting Market

EQUIPMENT REVIEWED—(continued)

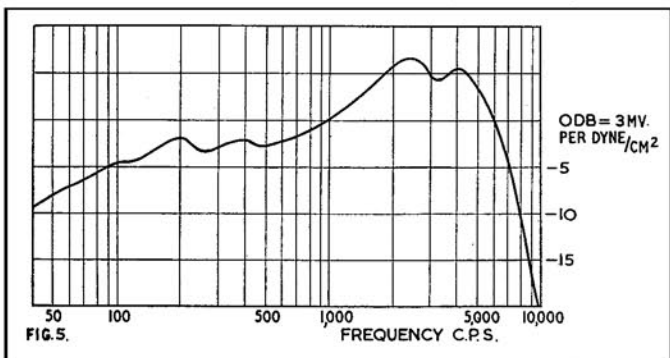
the start of the grey sector on the indicator, if the level is turned up to the 12dB point, or the edge of the red sector, then the waveform is visibly distorted due to tape, amplifier or head overload.

Acoustic Response: The overall response from tape to loud-speaker output was checked by playing a White Noise test tape containing 25 one third octave bands of filtered white noise and measuring the speaker output with a calibrated microphone one foot from the front of the cabinet at a position midway



between the two internal loud speakers. The response at extreme positions of the tone controls is indicated by fig. 4. Between 2 and 4 Kc/s the output varied with the position of the test microphone indicating that both speakers were radiating in this range and that interference effects were responsible for the variations.

Microphone Response: The microphone response was measured because recorded voice quality sounded rather better than that expected from the acoustic response of fig. 4. The

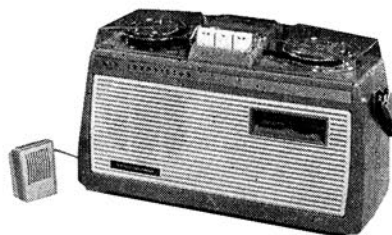


curve of fig. 5 shows why—the high note response rises slightly in the middle top range so that the overall air to air response is sensibly level from 100 c/s to about 7 Kc/s.

Comment: Despite the poor measured signal to noise ratio, the results on the internal speakers are pretty good as judged subjectively. I think this is in part due to the tape monitoring facility which allows the highest possible level to be placed on the tape so as to overcome the background noise. Nevertheless if the dynamic range could be improved this would be a really excellent recorder with facilities not normally obtainable at this price. One final criticism: the tape loading path is far too cluttered by the movable guide and pause control knob and, although the rear dress cover for the heads can easily be removed, access to the front of the heads for cleaning, degaussing, or tape editing is not possible without a major operation.

A. Tutchings

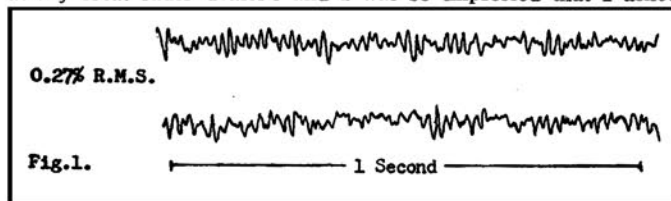
This review was submitted to the manufacturers for comment, but due to postal delays, the reply has not reached this office. However this will be printed next month.



★
**STELLA
ST 470
BATTERY
PORTABLE**
★

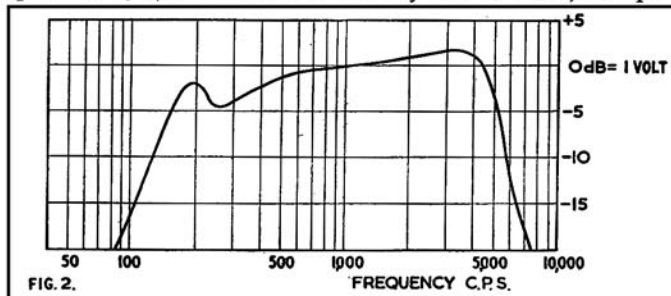
Manufacturers' Specification: Tape speed 1 1/2 i/s. Fast wind: 300 ft. of tape in 115 seconds. Fast rewind: 300 ft. in 90 seconds. Standard International track positions. Frequency response: 120 to 5,500 c/s ±3dB. Batteries: six U2 1 1/2 volt torch batteries. Current consumption: 120 mA. Battery life: approx. 20 hours. Meter record level indicator and battery check. Sensitive cardioid moving coil microphone. Mic. Gram. and Radio input sensitivity: 0.3 millivolts across 2,000 ohms. Line output: 1 volt across 1,000 ohms. Dimensions excluding handle: 7 1/2 in. by 12 in. by 4 1/2 in. Weight: 8 lb. Price with microphone, tape, spare spool and input-output lead: £26 5s. Optional extras: imitation pigskin carrying case with shoulder strap £2 5s., power supply unit to operate from A.C. mains, as alternative to batteries £5. **Stella Radio & Television Co. Ltd., Astra House, 121-3 Shaftesbury Avenue, London, W.C.2.**

A FIELD trial of the Philips equivalent of this machine was reported in the August issue of this magazine, just as it came on the market. I recently had the opportunity of hearing one at my local radio dealer's and I was so impressed that I asked



the editor if it would be possible to borrow one for further tests. These tests have fully confirmed my opinion that the S.T.470 is a thoroughly outstanding little recorder. Styling is unusual in that the reels and tape controls are placed on top of the machine so that, at first glance, it looks rather like a portable radio. As will be seen later, the shallow cabinet and large flat baffle area makes good use of the 4 in. internal speaker. The gain control is placed adjacent to the meter type record level indicator, which also measures the battery voltage when switched to playback.

Wow and Flutter: Fig. 1 shows the fluttergram or pen recording of the instantaneous speed fluctuations from the steady mean speed of 1 1/2 i/s. The flutter is mainly due to the 3,000 r.p.m.



motor which causes the 50 c/s flutter shown. The integrated r.m.s. reading remained steady at 0.27 per cent. and wow was extremely low. The ear is very tolerant of high frequency flutter in programme content, and reaches its maximum sensitivity at about five cycles per second. The relatively high capstan and flywheel speed renders the machine insensitive to normal movement, and the fore and aft swing applied when walking and carrying the recorder by its handle has no audible effect, even

(Continued on page 81)

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

TAPE RECORDER COVERS



Smart, waterproof cover to give complete protection to your tape recorder. Made from rubberised canvas in navy, wine, tan, grey and bottle green with white contrasting pipings, reinforced base, handy zip microphone pocket and name panel.

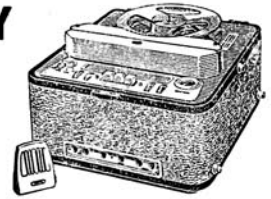
Grundig TK.1	...	49/6	Philips EL3515	...	57/6
" TK.5	...	55/-	" EL3541/15	...	57/6
" TK.8	...	63/-	Cossor 1601	...	57/6
" TK.14	...	59/6	" 1601	...	63/-
" TK.20	...	52/6	Stella ST455	...	63/-
" TK.24	...	55/-	" ST454	...	57/6
" TK.25	...	55/-	Saja MK 5...	...	57/6
" TK.30	...	60/-	Stuzzi Tricorder	...	58/-
" TK.35	...	63/-	Saba	...	63/-
" TK.50	...	60/-	Wyndor Viscount	...	55/-*
" TK.55	...	63/-	" Victor	...	60/-*
" TK.60	...	75/-*	Elizabethan Princess	...	60/-
" TK.830/3D	...	63/-*	" Avon	...	60/-
" Cub	...	35/-	" Escort	...	57/6*
Telefunken 85	...	60/-*	" Major	...	63/-
" 85	...	65/-	" FT.1	...	66/-
" 75/15	...	55/-	" FT.3	...	75/-
" 76K	...	55/-	Fi-Cord	...	52/6
" 95	...	69/6	Korting (4 track stereo)	...	63/-
Philips 8108	...	57/6	Harting Stereo	...	66/-
" 8109	...	63/-	Fidelity Argyle	...	55/-
" EL3538	...	63/-	Walter 101	...	55/-
" EL3542	...	63/-	Simon SP4	...	63/-*
" EL3536	...	70/-	Clarion (with strap)	...	52/6
			Brenell Mk.5	...	77/-
			" 3 star	...	69/-
			Minivox C...	...	61/-
			Robuk RK.3	...	67/6
			Ferroglyph	...	80/-
			Sony 521	...	80/-

A. BROWN & SONS LTD.
24-28, GEORGE STREET, HULL Tel: 25413, 25412

YOURS FOR ONLY

29 GNS
CASH

made to sell at 89 gns.



RENTALS 6/3 weekly reducing. Initial deposit £4.1.0. No more to pay for 3 months. Minimum period 9 months.

HIRE PURCHASE Deposit £8.4.0 and 24 monthly instalments of 31/-.

This Puratone snip is—like a London omnibus—a double-decker, and completely portable. Precision built to exacting specification, it was priced to sell at 89 gns. Puratone Price—29 gns.! Reproduction—B.B.C. studio quality. Also available on H.P. or rental. Call, phone or write today—while limited stocks last!

- ★ Includes Mike and one 7" Reel and Tape.
- ★ 2 speeds—7½" and 3½" per second.
- ★ Frequency response—60-12,000 C.P.S.
- ★ Weight 30 lbs. Size 13½" x 11½" x 7½".
- ★ Output 2.5 watts. Usable as amplifier.
- ★ Three capacitor start motors.

PURATONE
with 'Hey Presto' service

KINGSTON 62/64 Fife Road KIN 9558 CROYDON 44 High Street MUN 2271
FINCHLEY 117 Ballards Lane FIN 8693 ILFORD 7 Ilford Lane TRE 7122

18 Months to Pay

	Deposit	18 Monthly Payments	Cash
	£ s. d.	£ s. d.	Gns.
MAINS 2-TRACK			
Truvox R82	11 11 0	2 11 4	55
Brenell 3 Star	12 4 0	2 14 0	58
Reps R.10	12 8 0	2 15 1	59
Brenell Mk. 5	14 4 0	2 18 11	64
Telefunken 85KL	17 19 0	3 12 3	79
Ferroglyph 4A/N	18 1 0	3 14 6	81
Brenell 5 Type "M"	18 10 0	4 2 2	88
Simon SP/5	19 11 0	4 6 10	93
Reflectograph "A"	22 5 0	4 17 6	105
4-TRACK MONAURAL			
Grundig TK24	11 11 0	2 11 4	55
Brenell 3 Star	12 4 0	2 14 2	58
Philips EL3542	12 8 0	2 15 1	59
Stella ST455	12 8 0	2 15 1	59
Truvox R84	12 8 0	2 15 1	59
Elizabethan Major	14 5 0	3 0 0	65
Reps R10	14 10 0	3 4 5	69
Grundig T.K.40	15 15 0	3 10 0	75
4-TRACK STEREO/MONAURAL			
Korting MT 157	17 17 0	3 19 4	85
Telefunken 77K	17 17 0	3 19 4	85
Philips EL3536	19 12 0	4 5 7	92
Telefunken 97	20 0 0	4 8 8	95

WHAT?

What type of Tape Recorder, among all the machines now on the market should I buy? What are the various characteristics, for instance, of a Grundig TK40, a Simon SP/5 or a Telefunken 97 and other recommended machines?

WHERE?

Where can I see all the leading makes demonstrated? Where can I go for unbiased help and advice, where technical points are patiently explained, where the service is willing and friendly, and, above all, where purchase terms are the most reasonable?

- ★ INTEREST FREE terms
- ★ FREE INSURANCE COVERING YOUR PAYMENTS IN THE EVENT OF SICKNESS OR UNEMPLOYMENT
- ★ FREE DELIVERY
- ★ PART EXCHANGES

9 Months to Pay

	Deposit	9 Monthly Payments	Cash
	£ s. d.	£ s. d.	Gns.
MAINS TWIN-TRACK			
Argyll Minor	2 6 3	2 6 3	22
Grundig TK14	3 13 6	3 13 6	35
Elizabethan TT3	4 2 0	4 1 11	39
Reps R10	6 3 11	6 3 11	59
Spectone "161"	5 2 11	5 2 11	49
Telefunken 95	6 3 11	6 3 11	59
4-TRACK			
Stuzzi	2 16 6	2 14 6	26
Philips StarMaker	2 16 9	2 16 9	27
Argyll 4-T	3 4 0	3 4 0	29½
Elizabethan FT1	3 11 5	3 11 5	34
Philips EL3541	3 11 5	3 11 5	34
Stella ST 454	3 17 9	3 17 9	37
Sound	4 15 0	4 14 6	45
Elizabethan FT3	4 15 0	4 14 6	45
BATTERY			
Clarion Mk. 1	1 19 11	1 19 11	19
Minivox "C"	2 8 4	2 8 4	23
Philips EL3585	2 10 5	2 10 5	24
Clarion Mk. 2	2 16 9	2 16 9	27
Grundig TK1	3 1 0	3 0 11	29
Optacord Battery/ Mains	4 15 0	4 14 6	45
Ficord 1A	6 3 11	6 3 11	59
Stuzzi Magnette	6 3 11	6 3 11	59
Bucaba MT5	6 18 8	6 18 8	66

Open all day Saturday—
Friday 6.30 p.m.

THE RECORDER CO.

If unable to call, write for free brochure or send deposit now for quick delivery.

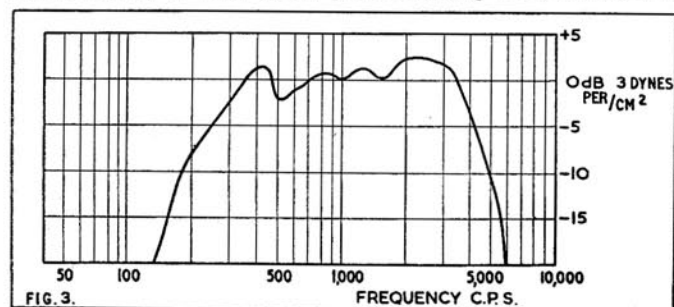
(Dept. R) 188, WEST END LANE, WEST HAMPSTEAD, LONDON, N.W.6.

Telephone: SWI 4977

when recording a pure tone. Only when it is twisted on its axis fairly violently is there any marked disturbance.

Record Replay Response: Fig. 2 indicates the overall record replay response from microphone input to line output. The high note response is well maintained to 5 Kc/s, and the low note response falls sharply below the speaker resonance at 190 c/s. The response is well balanced about the centre frequency of 1 Kc/s. A test tape was used to determine the recording characteristic used and this was found to be 200 microseconds. There is no C.C.I.R. recommendation for a tape speed of $1\frac{1}{2}$ i/s, but many recorders have adopted 100, 200 and 400 microseconds as the recording characteristics for $7\frac{1}{2}$, $3\frac{1}{4}$ and $1\frac{1}{2}$ i/s. The difference between 200 and 400 microseconds is only 6dB, or plus and minus 3dB about 1 Kc/s, so that music recorded on the home recorder and played on the portable may sound slightly rounded, and speech or sound effects recorded on the portable and played on the home recorder may be slightly "top heavy", but the tone control on the static recorder will restore the balance. Full peak recording level can be placed on the tape without distortion, and 12dB above test-tape level is recorded on pure tone with the meter needle just above the red sector of the indicator.

Signal Noise Ratio: Motor and transistor noise is 40dB below test-tape level, or 52dB below peak recording level. Erased and



biased tape noise is 36dB below test tape level, or 48dB below peak. This very satisfactory dynamic range allows one to under record slightly if loud peaks are expected, without the background noise obtruding. Mechanical noise from the recorder is low, and, by making use of the directional polar response of the microphone, can be eliminated altogether.

Acoustic Response: The acoustic response of the speaker and cabinet combined with the electrical response of fig. 2 was obtained by feeding bands of filtered white noise into the radio input and measuring the speaker response at a distance of one foot from the front of the cabinet by means of a calibrated microphone. This response is shown in fig. 3. Once again the response is well balanced about the centre frequency and covers the range 200 c/s to 4,000 c/s smoothly without peaks or dips.

Microphone Response: The free air axial response of the microphone is shown in fig. 4. This is an excellent microphone response by any standards and the response is equal to that obtained from units costing almost as much as this complete recorder. It is called a cardioid microphone in the specification, but it should more accurately be called a pressure gradient unit, as both sides of the

(Continued on page 83)

LOTHIAN TAPE TO DISC SERVICE

All tapes should be recorded at either $3\frac{1}{2}$ or $7\frac{1}{2}$ ips—Twin track only, or $7\frac{1}{2}$ or 15 ips—Stereo.

If recorded at other speeds than above or on four track machines, a re-dubbing charge of 10/- per hour's recording will be made.

PRICES

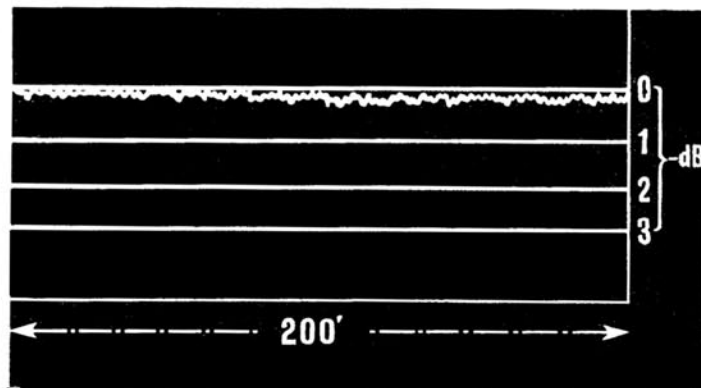
7" Std. 45 rpm	3½ mins. per side	— 17/6d.
7" EP 45 rpm	6 mins. per side	— 21/-
7" LP 33½ rpm	9 mins. per side	— 25/-
10" LP 33½ rpm	15 mins. per side	— 29/6d.
12" LP 33½ rpm	22 mins. per side	— 37/6d.

Where customer's tapes have to be edited, an extra charge of 7/6 will be made.

Tape to Tape Dubbing

12/6d. per hour plus price of tape used.

JEFFREYS, AUDIO HOUSE, 23 Earl Grey Street, Edinburgh, 3 Tel. FOU 8363



This is an outline . . .

of the penrecording made by
F. C. Judd, A. Inst. E., Technical Editor
"Amateur Tape Recording"

On Doubleplay Polyester 'ELECTRONIC WORLD' TAPE

Mr. Judd's other test findings include:-

Maximum drop-out, on any grade, less than 1.5 dB. Uniformity of output; Double Play Polyester ± 0.25 dB; Long Play Polyester better than ± 0.5 dB; Standard Play Acetate ± 0.5 dB. Noise level measurement recording and erase tests: Satisfactory in every way, even on a domestic tape recorder.

DE VILLIERS (Electronic World) LTD.

16d Strutton Ground, London, S.W.1

STANDARD PLAY (Acetate base)

3in. spool	175ft.	4 spools for 18/-	☐
		or 48/- dozen	
4in. spool	300ft.	4 spools for 25/-	☐
5in. spool	600ft.	2 spools for 25/-	
5½in. spool	850ft.	15/- per spool	☐
7in. spool	1,200ft.	17/6 per spool	

LONG PLAY (Polyester Base)

3in. spool	225ft.	4 spools for 22/-	☐
		or 60/- dozen	
4in. spool	450ft.	2 spools for 20/-	☐
5in. spool	900ft.	2 spools for 33/-	
5½in. spool	1,200ft.	22/6 per spool	☐
7in. spool	1,800ft.	29/- per spool	

DOUBLE PLAY (Special polyester base)

3in. spool	375ft.	4 for 36/-	☐
		or 100/- per dozen	
4in. spool	600ft.	2 for 27/6	☐
5in. spool	1,150ft.	25/- per spool	
5½in. spool	1,750ft.	33/- per spool	☐
7in. spool	2,400ft.	42/6 per spool	

I enclose remittance for £ s. d.

Name

Address

BLOCK LETTERS PLEASE

Mail only, cash with order

FAMOUS BRAND AMERICAN TAPES

FIRST GRADE QUALITY. FITTED WITH LEADER TAPE AND STOP FOIL.

BRAND NEW AND GUARANTEED

5 in. Std. Play, 600 ft.	13/-
5 in. Long Play, 900 ft.	16/6
5 in. Double Play, 1,200 ft.	32/-
5½ in. Long Play, 1,200 ft.	19/6
5½ in. Double Play, 1,800 ft.	37/-
7 in. Std. Play, 1,200 ft.	21/-
7 in. Long Play, 1,800 ft.	28/6
7 in. Double Play, 2,400 ft.	47/-

SYNCHROTAPE BRAND TAPES

3 in. Long Play, 225 ft.	4/9
5 in. Std. Play, 600 ft.	12/-
5 in. Long Play, 900 ft.	16/-
5½ in. Std. Play, 850 ft.	15/6
5½ in. Long Play, 1,200 ft.	18/6
7 in. Std. Play, 1,200 ft.	19/-
7 in. Long Play, 1,800 ft.	27/-

BRAND NEW AND GUARANTEED

PLEASE ADD POSTAGE

SEND FOR FULL LISTS

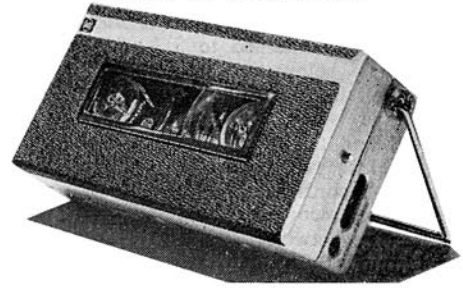
G. W. SMITH & Co. (RADIO) Ltd.

3-34 LISLE STREET
LONDON, W.C.2

Telephone: GERrard 8204/9155

[HOURS OF BUSINESS — 9 a.m. - 6 p.m. THURSDAY 9 a.m. - 1 p.m.
OPEN ALL DAY SATURDAY

MAGIC IN MINIATURE



DONALD ALDOUS says: "Highly commended for its purpose" ("Audio & Record Review", October 1961)

Dokorder

THE SMALLEST PRECISION TRANSISTORISED
TAPE RECORDER

WITH ALL THESE FEATURES:

1-touch Push Button controls; 2½" dia. built-in Speaker; 3½" Standard Spools; Double track recording; 2 speeds—3¾ and 1½ i.p.s.; Size 7½" × 3¾" × 2¼"; Weighs only 3 lb.

Powered by 5 pen cells (Every Ready D14 or U7) Mains Adaptor available. **INDISPENSABLE FOR OUTDOOR RECORDING!**

MODEL PT4-H (With Camera Release Remote Control). Hand Rewind. £43-10
MODEL PT4-K "Kari-Korder". Motor Rewind. 49 gns.

Both supplied complete with Microphone (fitted with Stop/Start switch), Earphone, Telephone Pick-up, Radio Cord, Tape, Batteries, Leather Case and Shoulder Strap, Splicing Tape, Polishing Cloth and Instruction Book. Foot Switch optional.

Sole Distributors:

SAMUEL LEWIS (CITY) LIMITED, 200a, Upper Thames Street, London, E.C.4.

Sole Importers:

THE GOSHO COMPANY LTD., Stone House, Bishopsgate, London, E.C.4.



Bib

Approved by the manufacturers of the incomparable Ferrograph Recorders whose decks are drilled and fitted to accept the incomparable Bib Splicer.

RECORDING TAPE SPLICER

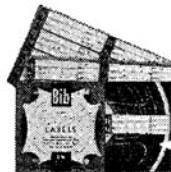
Gives you a professional touch! This handy precision tool lets you edit tapes quickly and accurately—with no tape wastage and no post-editing clicks. The Bib Tape Splicer can be mounted directly on the tape deck. It uses all your odd lengths of tape, and pays for itself in tape saving over and over again. Bib value at 18/6!

18/6



TAPE REEL LABELS

For identifying recorded tapes. Self adhesive—for typing or writing. Space provided for title, composer, date, speed and type of tape. 24 in a packet for 2/6d.



AT YOUR DEALER'S NOW!

In case of difficulty, send remittance to: **MULTICORE SOLDERS LTD.**
MULTICORE WORKS, HEMEL HEMPSTEAD, HERTFORDSHIRE

M 11

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

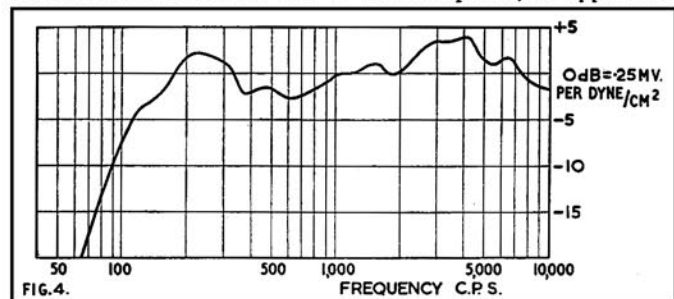
VALRADIO LTD.
Dept., TR/C.,
Browells Lane,
Feltham, Middlesex
Tel. Feltham 4242



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

NAME _____
ADDRESS _____

diaphragm are open to the sound field and the polar response is more like that of a ribbon microphone than anything else. Due to phase delay in the path to the rear of the diaphragm, the zeros are displaced from the sides of the unit towards the rear, so that the angles for zero output are about 45 degrees on either side of the rear face of the microphone; an appreciable



response is obtained directly from the back. As mentioned earlier, a knowledge of the polar response is useful in eliminating unwanted sounds or motor noise. The microphone should be placed upright on the weighted base and never laid on its back, as this obstructs the rear entrance and cuts the bass response.

Comment: As readers will have gathered, I am wildly enthusiastic about this little recorder. I think it is excellent value for money. It is a useful adjunct to a large static home recorder, and even if this recorder has a speed of $1\frac{1}{2}$ i/s you need have no qualms about re-recording from the line output of the S.T. 470. The connecting lead is fitted with an internal resistor so that recordings may be made from a radio tuner or the extension speaker terminals of a radio set or recorder, but, as is usual with a good microphone, recordings made via the microphone from the acoustic output of any good quality speaker are much better than we have been taught to believe possible. Finally a word of praise for the really comprehensive instruction book. It is really worth reading.

A. Tutchings.

This review was submitted to the manufacturers who returned it without comment.

Ferrograph

(Appointed Dealer)



Geoffrey V. Smith

AMPEX and Ferrograph
Tape Recorders—see and hear these fine instruments at Nussound's London Showrooms, where we display a representative range of high quality Recorders and Audio equipment. You are cordially invited to visit us.

IT PAYS TO DEAL WITH A SPECIALIST.

Accessories For Your **Ferrograph** The Nusound "Numix"

The "NUMIX" is a convenient mixer which enables a Ferrograph user to mix and fade at will two programmes, from microphone and radio/radiogram. Alternatively, speaker output sockets from power amplifiers can be used. Any combination of two programmes is possible with the Nusound "NUMIX" device.
Price: £4.7.6. Radio Lead complete 7/6.



Write for leaflet on "NUMIX" and "MONITOR"

NUSOUND RECORDING COMPANY
35 CRAVEN STREET, TRAFALGAR SQUARE,
LONDON, W.C.2. TELEPHONE TRA 2080

— 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 Requirements and Services Available
Estimates Free Personal Service

Custom High Fidelity

371 Green Lanes, Palmers Green, London, N.13 Tel. PALmers Green 5228

**LASKY'S
RADIO**

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

LEONARD G. FRANCIS PRESENTS . . .

SHEEN TAPE RECORDER CENTRE LTD.

SPECIALISTS IN TAPE RECORDERS AND ACCESSORIES, ETC.,
YOUR CENTRE FOR FRIENDLY HELP—SALES AND SERVICE

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

Showrooms Open until 7 p.m.
PROSPECT 0985
(Next to Mortlake Station S.R.)

— Country and Provincial —

BOURNEMOUTH

NATIONAL RADIO SUPPLIES

66 Holdenhurst Road,

Bournemouth

Tape, Hi-Fi & components

Tel. 25232

H. D. KIRK

Stereolectrics
LIMITED

Specialists in High Fidelity
150 HIGHER BRIDGE STREET

Phone: 23093

BOLTON

CANTERBURY

FERROGRAPH—REFLECTOGRAPH
FI-CORD — SIMON — PHILIPS ETC.
TAPES ALWAYS IN STOCK ACCESSORIES

GOULDENS, 36, High Street.

Telephone: 4034

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

— **YOUR TAPE DEALER** —



FOR ALL LEADING
AUDIO EQUIPMENT

call, write, or telephone

hampstead HIGH-FIDELITY

91a Heath Street, Hampstead, London N.W.3 Telephone HAMPstead 6377

EXETER—DEVON

FILDEWS • 99 FORE STREET
EXETER
PHONE: 74161/2

We cover the whole of Devon—Dorset—Cornwall and West Somerset with Tandberg—Brenell—Phillips—Grundig, Tape Recorders etc. Main Ferrograph distributors for area.

FARNHAM, SURREY

- ★ Stockists of all the leading makes of High-Fidelity Equipment
- ★ Comparative Demonstrations
- ★ Cabinet Manufacturers and Designers
- ★ Personal service and satisfaction guaranteed
- ★ Specialists in custom-built Hi-Fi Equipment

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

Tape Recorder Centre (Halifax)

Yorkshire's Leading Tape Recorder Specialists

Comparative Demonstrations Daily • Official Telefonken Service Agents
Hi-Fi Stockists

SOUND INSTALLATIONS

30 King Cross Street, Halifax Phone: Halifax 66832

LEICESTER

ALL YOUR HI FI REQUIREMENTS

Speakers by: H.M.V. QUAD LEAK ROGERS
TANNOY MORDAUNT LOWTHER W.B.
WHARFEDALE GOODMANS.
Tape: FERROGRAPH REFLECTOGRAPH GRUNDIG
SIMON BRENNELL

Record Department: ALL LABELS-PARASTAT SERVICE.

LEICESTER CO-OPERATIVE SOCIETY LIMITED, High Street, Leicester. Tel: 20431

MANCHESTER

See the sound SPECIALISTS for your New Tape Recorder

Stockists of FERROGRAPH, PHILIPS, BRENNELL,
GRUNDIG and other well-known makes

LANCASHIRE HI-FI LTD.

Home Music Centre — 8 DEANS GATE
(near Grosvenor Hotel) **MANCHESTER**

**TAPE
RECORDERS
and HI-FI**

The Largest Electrical store in the North



158, NEW BRIDGE STREET,
NEWCASTLE UPON TYNE 1
Telephone: 29866

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. The rate is 6d. per word with a minimum charge of 7/6d. Box numbers may be used for an extra charge of 1/6d. The trade rate is 9d. per word, plus 2s. for a box number, conditions on application. Send replies to box numbers, c/o "The Tape Recorder", 99 Mortimer Street, London, W.1.

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 April issue must arrive not later than March 1st.

For Sale

Pre-recorded tapes. Unique complete catalogue listing all makes, mono, stereo. 7½ and 3½ i/s including World Record Club tapes. Call for free copy or send 1s. mailing fee. Dept. T.R.3 Teletape Ltd., 33 Edgware Road, W.2. PAD 1942.

Accessories for your Ferrograph recorder The "Numix" and "Monitor" units, write for lists, tel' or call.—Nusound Recording Co., 35 Craven Street, Trafalgar Square, W.C.2. Tel.: TRA 2080.

Tape/Disc/Tape transfer, editing, duplicating. 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 branded LP tapes 35s. Sound News, 10 Clifford Street, London, W.1.

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

Ask your dealer for American Ferrokinetics "Brand Five" recording tapes. The best tape value!

Hi-Fi for you: Amplifiers, recorders, mixers, etc. Built to your own requirements. Fully guaranteed. Estimates free.—Harmel Electric, 81 Ram Gorse, Harlow, Essex. Tel.: Harlow 25589.

Recording Tape. See my advertisement on page 81. Nobody has yet asked for his money back.—Villiers.

Find that review you want—get a copy of the index to volumes 1 & 2 Tape Recorder. Price 2s. each posted.

Now ready Bound edition of Volume 2 Tape Recorder. Handsomely bound in black buckram, hand stitched. Price 46s. each post free from The Tape Recorder, 99, Mortimer Street, London, W.1.

Repairs and modernising of Tape and Gram equipment. New heads, Amplifiers, etc., fitted by Experts. Prompt service. Specialised Hi-Fi equipment built to order for private or Studio use.—Harding Electronics, 120a Mora Road, London, N.W.2. GLA 1770.

"Brand Five" American Tape. Standard Play 5 in. (600 feet) 16s., Long Play 5 in. (900 feet) 18s. 6d.; 5½ in. (1,200 feet) 23s. 6d.; 7 in. (1,800 feet) 35s. Sent by return. Post Free!—Watts Radio, 54 Church Street, Weybridge, Surrey

All makes of tape recorders repaired or modified. Miniflux heads supplied. Audio installations built to your specification by John C. Latham, Deimos Ltd., 8 Corwell Lane, Hillingdon, Middx.

Free of all faults and 100 per cent. tested. New top-quality PVC and Polyester LP recording tape. 200 ft. LP 3s., 600 ft. PVC 9s. 900 ft. LP or PVC 11s. 6d. 1,200 ft. LP or PVC 16s., 1,800 ft. LP 23s. Refund guarantee, post and packing 1s. per spool. N. Walker, 28 Linkscroft Avenue, Ashford, Middx.

Truvox R2 Recorder 65 gns. 3½ in and 7½ i/s. Stick Microphone, tape, etc., £25. Ring Bovingdon 3183, 7-10 p.m.

Two MSS Disc Recorders 78/33½, Amplifier, P.U., L.S., Blanks, etc. £50. Would exchange for Tape Recorder 15/7½. Phone: Harrow 9446.

Bargain, Uher 3-speed 15/16, 1½, 3½ recorder as reviewed in Feb. issue. Excellent condition with remote control mike, fast speed erase, remote foot control and special carrying case. Reason for selling, interested in their 2-track stereo. £51. Also Ferrograph for sale.—M. Le Veue, 1 Bushey Road, Plaistow, E.13. GRA 0051.

Grundig TK 35, almost new, in perfect condition, 49 gns. 62 The Drive, Feltham, Middlesex.

FREE H.P!

**YOU PAY CASH
PRICE ONLY—NO
INTEREST CHARGES**



**WE HAVE THE BIGGEST SALES IN THE COUNTRY! WHY?
BECAUSE WE GUARANTEE YOU THE BEST TERMS.**

They include:

**DEPOSITS FROM ONLY 10% ★ 2 YEARS TO PAY ★ SPECIAL FREE OFFERS ★
12 MONTHS FREE SERVICING—NO LABOUR CHARGES ★ FREE DELIVERY ANY-
WHERE IN UK. ★ NO PURCHASE TAX ★ COMMISSION PAID ON SALES YOU
MAKE FOR US ★ 15% INTEREST PAID ON YOUR DEPOSIT ★ SPECIAL
CUSTOMER DISCOUNTS ★ ALL TAPES, MICROPHONES & ACCESSORIES ALWAYS
IN STOCK ★ and lots more besides.**

As THE APPOINTED MAIN AGENTS for ALL the best makes, our Mail Order Department specialises in orders by post with thousands of sales throughout the whole of England, Scotland, Wales & N. Ireland—order from us wherever you live—You get cheaper terms, faster delivery, better service from us.

Nearly 500 machines in stock—dozens of different mains, battery & stereo models—both new & second-hand—on permanent demonstration in our showrooms. Open to 8 p.m. FRIDAYS & 6 p.m. SATURDAYS.

If you want proof of how you can actually save money by buying from us, write, phone or call in NOW for free brochures and full details of our terms:

HOWARD

TAPE RECORDERS

218 HIGH STREET, BROMLEY, KENT. RAVensbourne 4477 & 4000

CLASSIFIED ADVERTISEMENTS — (continued)

For Sale

At Electrical and Radio Supplies, 29 New Street, St. Neots, Huntingdon, your Tape Recorder and Hi-Fi repairs receive the personal attention of the proprietor, D. G. Frost, Assoc.Brit.I.R.E. Telephone: St. Neots 236.

REEVES of BIRMINGHAM for

Sales or Service on all quality recorders and audio equipment. Over 14 years' specialist knowledge at your disposal. Service agents to Government departments, leading Manufacturers and Industry. Retail showrooms open for personal demonstrations.

REEVES SOUND SERVICE,
416 Moseley Road, Birmingham, 12.
Telephone: Calthorpe 2554.

Stuzzi Magnette cost £72; reconditioned. Perfect condition except for slightly cracked case, £40 o.n.o. Box No. (London) 289.

E.M.I. T.R.50 Professional Tape Recorder, mint condition, bargain, £50. Box No. (London) 291.

Heathkit 16-watt Stereo amplifier model S-33. New, works checked. Best offer over kit price. Phone: RUI 4610.

T.R.51C. First-class condition, £100. Telefunken Stereo Magnetophon 77 in portable case, as new, £45. Wearite deck 4A, Armstrong PABO-3 plus power unit. New and unused £50. Box No. (Leics.) 290.

Fi-Cord High Fidelity portable tape recorder complete with Gramplan DP4/M microphone, 3 sets rechargeable batteries and charger unit. Stethophone earpiece, dozen spare long-play tapes unused. All brand new and cost over £80. First offer of £50 secures. Phone, write—L. Greene, c/o 33/35 Lancaster Gate, London, W.2.

Make the most from your hobby. Exceptionally constructed and useful 4-valve 4-channel mixer for use with Ferrograph. One high and 3 low level inputs. Wide facilities, £21. Harper, 74 Bedford Road, N.2.

Wanted

All volumes "Tape Recorder" and "Hi-Fi News". Offers with price to: Victor, 109 Lijsterbeslaan, Rijswijk, Holland.

Grundig TK25 or Grundig TK30 must be in first-class condition. Please send full details to—Mr. Evans, 206 Bow Common Lane, Burdett Road, Bow, London, E.3.

Personal

Your Recorder can make worthwhile, worldwide friends! Join in "Worldwide Tapetalk", 35 The Gardens, Harrow.

Tape to Disc

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

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, Barkingside, Ilford, Essex. Telephone: CRE 8947.

Quality Service, quantity discount, printed labels/covers. Audio equipment supplied; callers welcome. MJB Transcription Service, 7, High Street, Maidenhead. Tel.: 230.

Tape to disc recording service. All speeds. Photographic sleeves with all recordings. Details from E.R.S., 162 Shirland Road, London. W.9.

you'll be glad you chose
gevasonor
magnetic tape

Ask your dealer for free descriptive leaflet



GEVAERT LIMITED
BRENTFORD · MIDDIX.

YOUR TAPE DEALER

PETERBOROUGH, NORTHANTS

Tel: 5545

CAMPKINS RECORD SHOP

RECORD TAPE AND HI-FI EQUIPMENT SPECIALISTS

NEW ADDRESS

15 LONG CAUSEWAY
(IN CITY CENTRE)

LARGE STOCKS

HAMILTON ELECTRONICS

HIGH FIDELITY TAPE RECORDERS **35 LONDON ROAD**

TEL. 28622

SOUTHAMPTON

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 Worthington 5142

ADVERTISERS' INDEX

	Page
B.A.S.F. Chemicals Ltd.	88
A. Brown & Sons Ltd.	80
City & Essex Tape Recorder Centres ...	47
Denham & Morley Ltd.	72
Dokorder ...	82
R. E. W. Earlsfield Ltd.	78
Educational Recordings Ltd.	72
E.M.I. Tape Ltd.	52
Francis of Streatham ...	87
Garrard Engineering Co. Ltd.	49
Gevaert Ltd.	86
Grundig (G.B.) Ltd.	76
Hampstead High-Fidelity ...	84
Heathkit ...	48
Howard Tape Recorders ...	85
Geo. Jeffreys Ltd.	81
Lustraphone Ltd.	74
Magnograph ...	79
M.S.S. Ltd.	60
Multicore Solders Ltd.	82
Nusound Recording Co.	83
Phillips Electrical Ltd.	58
Puratone ...	80
Rapid Recording Service ...	65
The Recorder Co.	80
Reps Tape Recorders Ltd.	87
Saga Sound ...	64
G. W. Smith & Co. (Radio) Ltd.	82
Soundcraft Ltd.	46
Stella Radio & Television Co. Ltd.	70
Tape Recorder Centre Ltd.	68
Transtronic Ltd.	61
Valradio Ltd.	82
D. Villiers ...	81
Welme Corporation Ltd.	54
World Record Club ...	50-51

Two Years Guarantee

NOT MASS PRODUCED BUT VIRTUALLY HAND-MADE FOR RELIABILITY AND CONSISTENTLY HIGH STANDARD OF PERFORMANCE

R10 SPECIFICATION: 2 or 4 track version. 10 watts push/pull output.

Record Replay Responses—

7½ ips. 40–16,000 C.P.S. } ± 3 dBs.
3½ ips. 40–10,000 C.P.S. } At optimum
1½ ips. 50–6,000 C.P.S. } bias setting.

Signal/Noise ratio—

half track 50 dBs at 3½ ips.
quarter track 45 dBs at 3½ ips.

Modified Collaro Studio Deck. Microphone and Radio/Gram inputs each with separate gain controls for mixing. Separate bass and treble controls. ± 12 dBs at 50 cycles and 12 k/cs. Adjustable monitor volume control independent of record level. Peak signal lever meter 2¼ in. square. Bogen heads. Record safety device. 600 ohms Cathode follower output. Two per cent total harmonic distortion on peaks. 200/250 volts 50 cycles or 100/120 volts 60 cycles. Valve line up: 3 EF86, 2 ECC83, 1 ECC82, 2 ECL86. Metal rectifier, contact cooled.

Prices: 2 Track 7" spools 59 gns.
4 Track 7" spools 69 gns.



Fully illustrated literature available on request to—
REPS (TAPE RECORDERS) LTD.
118 Park Road North, South Acton,
London, W.3 Phone: Acorn 4141

FRANCIS OF STREATHAM

● TAPE RECORDERS AT 169/171

Brenell Mk. V Model M ...	88 gns.	*Tandberg Mono, 3B ...	76 gns.
*Brenell Mk. V ...	64 gns.	*Telefunken 85 KL ...	79 gns.
Brenell 3 star ...	58 gns.	*Telefunken 95 ...	59 gns.
Brenell 3 star stereo ...	89 gns.	*Telefunken 96 4 Tr. ...	69 gns.
Cossor 4 Tr. 1602 ...	37 gns.	*Telefunken 97 Stereo ...	95 gns.
Cossor 4 Tr. 1601 ...	59 gns.	Truvox Series 80/2 Tr. ...	55 gns.
Elizabethan FT.1 4 Tr. ...	34 gns.	Truvox Series 80/4 Tr. ...	59 gns.
Elizabethan FT.3 4 Tr. ...	45 gns.	Truvox R7 ...	82 gns.
Elizabethan 'Popular' ...	24 gns.	Veritone 16 ...	91 gns.
Elizabethan TT3 ...	39 gns.	Uher Universal ...	79 gns.
*Elizabethan Major ...	65 gns.	*Vortexion WVA ...	£93.13.0
*Ferrograph 422 or 424 ...	110 gns.	*Vortexion WVB ...	£110.3.0
*Ferrograph 4AN ...	81 gns.	*Vortexion C Stereo ...	£148.10.0
*Ferrograph 4AN/S ...	88 gns.	Wyndor Heron ...	25 gns.
Fidelity Argyl Major ...	28 gns.	Wyndor Victor ...	45 gns.
Fidelity Minor ...	22 gns.	NEW 4-TRACK MODELS BY PHILIPS, COSSOR, STELLAPHON AS ADVERTISED.	
Grundig TK14 ...	35 gns.	BATTERY PORTABLES	
Grundig TK 24 ...	55 gns.	Philips Portable ...	24 gns.
*Grundig TK60 Stereo ...	128 gns.	Butoba ...	69 gns.
*Harting HM8 Stereo ...	86 gns.	Grundig TK1 ...	29 gns.
Korting MT 157 4 Tr. ...	85 gns.	Clarion ...	19 gns.
Philips 4 Tr. 3541 ...	34 gns.	Clarion Twin Set ...	8 gns.
Philips 4 Tr. 3542 ...	59 gns.	Clarion Phonotrix ...	39 gns.
Philips 4 Tr. Stereo 3536 ...	92 gns.	Minivox C ...	23 gns.
*Reflectograph 'A' ½ Tr. ...	105 gns.	Fi-Cord ...	59 gns.
*Reflectograph 'B' ½ Tr. ...	115 gns.	Stella ...	25 gns.
Reflectograph 'D' Deck ...	75 gns.	Stuzzi Memo-Cord ...	25 gns.
Robuk ...	36 gns.	FACTORY-FRESH BATTERIES ALWAYS IN STOCK	
*Simon SP5 ...	93 gns.	*Microphone extra	
Simon SP4 ...	95 gns.	WE SPECIALISE IN	
Sony Stereo ...	75 gns.	● Tape to disc service	
Sony ½ and ¼ Track ...	124 gns.	● Tape copy service	
Stellaphone 4 Tr. ...	37 gns.	● RECORDER HIRE SERVICE	
Stellaphone 4 Tr. ...	59 gns.		
Stuzzi 4 Tr. Junior ...	26 gns.		
Stuzzi Tri-Corder ...	63 gns.		
*Tandberg Series VI Stereo ½ or ¼ Track ...	110 gns.		

LEADING STOCKISTS OF EQUIPMENT FOR TAPE, DISC and RADIO . . . and NO EXTRA FOR CREDIT TERMS

- ★ Minimum Deposit
- ★ No Interest or Service Charges on H.P. up to 18 months
- ★ Free Service during Guarantee Period

Prices subject to alteration as announced by manufacturers.

● MICROPHONES AND MIXERS

Grampian DP/4 Dynamic	£8. 0.0
Lustraphone LD/66	£4. 2.6
Lustraphone VR/64	
Ribbon	£7.17.6
Lustraphone LFV/59	
Dynamic	£8.18.6
Simon 'Cadenza' Ribbon	£10.10.0
Reslo Ribbon or Dynamic	£9.12.6
Reslo Cardioid	£10.12.6
AKG Stereo	
Dynamic D.88	£19.19.0
TSL 3 Channel Mixer	£2. 2.0
Grundig Mixer	£16.16.0

Also in stock microphones by ACOS, FILM INDUSTRIES, TSL, G.B.C., TELEFUNKEN
ALL WALGAIN PRODUCTS

● TAPES & ACCESSORIES

Standard, Double Play and Long Play in all sizes by all leading makers.
● Pre-recorded Tapes by Columbia, H.M.V., Saga etc.
Bib, Bond and Romagna splicers. Matching transformers. Plugs, sockets, etc.

AT OUR HI-FI DEPT. AT 181 Streatham High Road

- **STEREO AND MONO AMPLIFIERS** by Quad Walgain Rogers Leak Dulci Armstrong
- **TUNERS** by Quad Rogers Leak Dulci Armstrong
- **LOUDSPEAKERS** by Quad G.E.C. W.B. Wharfedale Goodmans Tannoy Audistatic Mordaunt Leak
- **MOTORS, PICKUPS**, by Garrard Tannoy Shure Goldring Lenco Connoisseur Decca Stereo Philips Ronette All-Balance. B&O Ortofon SME

All types of Diamond and Sapphire styli, stereo and mono. Microlifts, Garrard SPG3, Acos Dust Bug.

CABINETS
Record Housing Leak 'Southdown'

Please note our only addresses as below

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

exciting
new
idea
in tape storage



BASF Tape Library Box

Here's the new, easy and inexpensive way to store and protect recording tape—the BASF way! BASF Tape Library Boxes will house three tapes (or 8mm films) in swivel-open cassettes. Made from tough, rigid Polystyrol plastic, the boxes not only provide a perfect quick reference library, they protect your tapes from dust and damage. BASF Tape Library Boxes are only obtainable containing either 1 LP tape or 3 LP tapes. The boxes come in 3 sizes—for 5", 5½" and 7" spools.



Tape Editing Made Easy

The BASF Cutter Box is an accessory kit to delight every tape enthusiast. Contents include—semi-automatic splicer, tape clips, splicing tape, leader tape, automatic stop foils, etc. Packed in attractive, rigid plastic boxes. Only 52/6.

If you have difficulty in getting either the Library Box or Cutter Box, ask your usual dealer to order these for you.



Magnetic Recording Tape
for **Authentic Sound**

BASF CHEMICALS LTD 5A Gillespie Road London N5