British
RADIO AND
TELEVISION
Incorporating "The British Radio Maker and Exporter"

Vol. X No. 1 MAY, 1955 By subscription only, £1 a year post free

See Pages 36 and 37

AVO VALVE Characteristic METER Mk III

The AVO Valve Characteristic Meter Mark III offers the Radio Engineer far more than is generally implied by the words "a valve tester".

This compact and most comprehensive Meter sets a new high standard for instruments of its type. It will quickly test any standard receiving or small transmitting valve on any of its normal characteristics under conditions corresponding to a wide range of D.C. electrode voltages.

A new method of measuring mutual conductance ensures that the instrument can deal adequately with modern valves of high slope and short grid-base such as are commonly used in T.V. receivers.

PROVIDES all necessary data to enable Ia/Va, Ia/Vg, Ia/Vs, etc., curves to be drawn.

MEASURES mutual conductance up to 30mA/V.

DETERMINES inter-electrode insulation with heater both hot and cold.

GIVES direct measurement of "gas" current.

TESTS rectifying and signal diodes under reservoir load conditions.

COVERS all normal heater voltages up to 117V.

CIRCUIT improvements provide accurate setting and discrimination of grid voltage over the full range to 100V negative.

A relay protects the instrument against damage through overloading the H.T. circuits and also affords a high measure of protection to the valve under test.

The instrument is fitted with a hinged fold-over lid which protects the valve holders when not in use.

List Price
£60

A comprehensive Instruction Book and detailed Valve Data Manual are provided.

Regd. Trade Mark

THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO. LTD.

AVOCET HOUSE · 92-96 VAUXHALL BRIDGE ROAD · LONDON · S.W.1. *Telephone: VICtoria 3404 (9 lines)*

V.C.4.

PANEL JACKS & JACK PLUGS

Slender—handle type with screw terminals and end entry for flex. Designed for close grouping. List No. **P.38.**

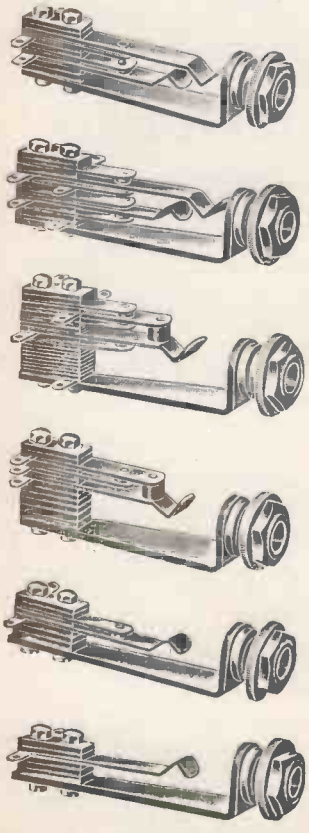
Unbreakable—manufactured in "P.V.C." Designed for use in hospitals, schools, churches, etc. List No. **P.38/P.**

Screened type for reducing capacitive pick up of (Electrostatic) interference from outside sources. List No. **P.500.**

Flat-head Jack-plug gives minimum projection from panel, side entry for flex. Bakelite insulation. List No. **P.215.**

Three-pole flat-head model (2 conductors plus earth or screen) Polished bakelite moulding. List No. **P.505.**

A VARIETY OF JACKS



DESIGNED TO CONFORM TO BS. 666

JACK-PLUGS Designed for use with headphones, microphones, loudspeakers, light-telephones, radio-extensions and intercommunication systems. Insulation is of the highest quality and metal parts are heavily plated. Manufactured to B.S.666. They are, within this standard, the smallest procurable.

JACKS The range of Bulgin Panel Jacks accepts standard Jack-plugs (*a selection of Bulgin types shown above*) and covers practically every conceivable requirement. All contact and switching-leaves are of "Post Office" high-grade nickel-silver with SILVER contacts. Insulation is of the highest grade bakelite S.R.B.P. sheet and P.V.C. The rust-proofed steel frame will not warp or twist. For full details on all Bulgin components, send for latest catalogue Ref.194/BTV. Free to trade.

MANUFACTURERS OF RADIO & ELECTRONIC COMPONENTS

THE CHOICE OF CRITICS BULGIN REGD. TRADE MARK

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Telephone: RIPpleway 5588 (Private branch exchange)

TELEQUIPMENT

offer their congratulations to

"BELLING - LEE"

on the opening of the Band III Experimental Television Transmitter at Croydon. This transmission will no doubt prove to be of enormous benefit to the Trade in general, and to Dealers in particular. We are proud to have played some part in making this enterprise a success.

A TELEQUIPMENT MONOSCOPE PICTURE GENERATOR

of the type illustrated has been supplied to Belling & Lee Ltd., to provide the video signal which feeds the 1 Kw. Experimental Channel 9 Transmitter. This equipment uses a G.E.C. type 1693 HKM Monoscope Tube which has been specially manufactured to provide the pattern which promises to become as well known throughout the Trade as test card 'C'.

NOW—the McCARTHY 7-Valve Bureau Radiogram at only 56 gns.

The radiogram you've been waiting for! McCarthy's Masterpiece! A beautiful walnut veneered cabinet with generous, easily accessible record space, houses this magnificent radiogram, with the superb tone.

TWO TYPES AVAILABLE

1 PP 7 with short, medium and long wave-bands and push-pull output.

2 FM 7 for F.M. areas; complete A.M. reception on short, medium and long wave-bands and F.M. reception over the whole of band II. Single ended output.

200-250 v. A.C.

At 56 guineas, this will be the Radiogram of the year! Make sure of *your* stocks to meet the demand.

- **N.W. ENGLAND.** Ernest Hathaway & Co. Ltd., "Sartor House," 37 Derby Street, Manchester, 8. Hardman & Co. Ltd., P.O. Box No. 23, Hardale House, Baillie Street, Rochdale. S. Hathaway & Co. (Liverpool) Ltd., 1/3 Pall Mall, Liverpool, 3.
- **N.E. ENGLAND.** Robert Hardman Ltd., 3 Queen Square, Leeds, 2.
- **NOTTS.** Robert Hardman Ltd., 3 Queen Square, Leeds, 2. Mansfield Factors (Electrical Supplies) Ltd., 50 Stockwell Gate, Mansfield.
- **LINCS.** Mansfield Factors (Electrical Supplies) Ltd., 50 Stockwell Gate, Mansfield.
- **MIDLANDS.** S. Hathaway & Co. (Midlands) Ltd., 50 High Street, Henley-in-Arden. R. A. Poole (London) Ltd., Cox Street, Coventry. R. A. Poole (London) Ltd., 40-42 St. James Street, Cheltenham. E. A. Wood. Ltd., 100 Aston Road, Birmingham, 6. E. A. Wood, Ltd., "Eltic House," 61 Belgrave Gate, Leicester.
- **KENT.** H. E. Kettle Ltd., Knightrider Street, Maidstone.
- **SURREY AND SUSSEX.** John Street Manufacturers Ltd., 88 Springbank Road, Hither Green, London, S.E.13.
- **S. & W. ENGLAND.** Robshaw Brothers Ltd., 105 Commercial Road, Bournemouth.
- **REMAINDER OF ENGLAND & WALES.** Radio & Electrical Mantel Co. Ltd., Felgate House, Studland Street, Hammersmith, London, W.6.
- **CHANNEL ISLANDS.** Robshaw Brothers Ltd., 105 Commercial Road, Bournemouth.
- **SCOTLAND.** Bryterlite Electrical Co. (Glasgow) Ltd., 39-43 Robertson Street, Glasgow, C.2.
- **N. IRELAND.** Bryterlite Electrical Co. (Belfast) Ltd., 11 College Square North, Belfast.

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McCarthy radio

Manufactured by FELGATE RADIO LTD., FELGATE HOUSE, STUDLAND STREET, HAMMERSMITH, LONDON, W.6.

THE NEW

Osram

KT55 output valve

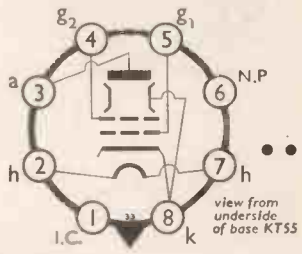
The new Osram KT55 beam tetrode will command widespread interest among designers of amplifier equipment. With a heater rating of 0.3A, 52V, it is intended for use in a series heater chain and is suited to either DC or AC/DC mains amplifiers.

Outstanding KT55 characteristic is its high power output (25 watts per pair) with minimum distortion at comparatively low H.T. voltage (200V) inevitable with DC mains amplifiers.

Robust and efficient, the Osram KT55 will form a popular companion-type to the well-known KT66.

Two valves, type KT55, will supersede the need for four valves, type KT33C, in AC/DC amplifiers required to deliver up to 25 watts at 200 volts.

KT55 List price :- 25/-
plus P. Tax 8/2



HEATER

I_h	0.3	A
V_h	52	V

TYPICAL OPERATION

Tetrode connection. Push-pull. Data per pair unless otherwise stated.

	QUIESCENT	MAX. SIGNAL	
$V_{a(b)}$	225	215	V
V_a	200	190	V
V_{g2}	200	190	V
V_{in} (g—g) (pk)		28.8	V
V_{g1} (approx.)	—20.5	—23.5	V
I_a	220	225	mA
I_{g2}	15	45	mA
R_k (per valve)	175	175	Ω
R_l (a—a)		2	kΩ
P_{out}		25	W
D		2	%
Z_{out}		9	kΩ

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, W.C.2

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In this issue:

Tele-opinion

Behind the Scenes with B.R.E.M.A.

A YEAR of intense activity, both in commercial and technical spheres—that was how M. M. Macqueen, chairman of B.R.E.M.A., referred to the year's work when speaking at the annual general meeting of the British Radio Equipment Manufacturers' Association at the Savoy Hotel, London, last month.

Mr. Macqueen said that in 1954 the radio industry, represented by the association, had its most successful year in history. At a conservative estimate, the industry's sales to the public during that year were worth £130 million, of which about £40 million went to the Exchequer.

Because of the fiscal policy of other countries there had been a fall of some 14 per cent. in exports of complete sets, but they had done well to keep the figure as low as this. Overall radio and electronic exports were up, however. In addition, invisible exports not shown in the statistics should be taken into consideration, such as exports of technical "know how."

TECHNICAL BACKGROUND

Details of the important part played in technical developments, both in the sphere of sound broadcasting and television, are contained in the 64-page annual report published by the association and circulated to members before the meeting.

The association has engaged in a considerable amount of behind-the-scenes planning in conjunction with the G.P.O. and the B.B.C., and it is expected that the I.T.A. will be a willing partner co-operating with the industry on the lines of the B.B.C.

B.R.E.M.A. was actively represented on the *ad hoc* Television Committee (a body comprising representatives of the G.P.O., B.B.C., I.T.A., and the industry) which examined the technical problems relating to the establishment of a television service in Band III. Among the questions which were considered were those concerning polarisation of transmitting aerials, receiver design, adaptor design, guard bands against interference from other services and the siting of transmitting aerials.

Throughout this preliminary period the industry pressed for test transmissions in Band III as distinct from those conducted by the B.B.C. which were more concerned with long-distance propagation. It is therefore of interest to note that the current Band III test transmissions are originated entirely by the industry.

The report suggests that Bands IV and V will be the subject of increased interest and study as broadcasting requirements expand. It is understood that the B.B.C. hope to be able to make propagation tests in these bands which will be of considerable interest to receiver manufacturers, and close liaison has been promised.

COLOUR TELEVISION

The B.R.E.M.A. approach to the study of colour television has been, in principle, that of receiver manufacturers, but there has been considerable liaison and co-operation with organisations, including the B.B.C., the I.T.A., and television transmitter manufacturers.

Extensive experiments have been and will be made using a variant of the American N.T.S.C. system modified to suit British 405-line requirements. The report states that the B.B.C. will transmit experimental signals of this type later this year.

The industry plan to produce prototype receivers for test purposes, and it is hoped that a number of different makes of receiver will be available to the B.B.C. so that a comprehensive appreciation of colour reception problems can be obtained during the tests. The report contains a detailed specification for a typical colour receiver on the basis of the prescribed transmission system. Results of such tests would not, of course, be available for a long time.

V.H.F. F.M.

A great deal of activity has been carried out by B.R.E.M.A. members in the technical field on the proposed v.h.f. f.m. service in Band III. Problems of interference between Band II and Band III transmissions have been, and are still being, considered. Planning of frequencies for the f.m. service was influenced by the assumption that the B.R.E.M.A.-recommended television i.f. of 34.65 Mc/s would, in time, be generally adopted.

So far as receiver band coverage is concerned, the association advised its members to provide for accommodation of the full band of 87.5 to 100 Mc/s in view of the fact that the B.B.C. plan includes the future use of channels above 95 Mc/s.

Experimental work continues on the design of v.h.f. f.m. receivers with particular emphasis on means of limiting oscillator radiation, and also on aerials and adaptors.

THE FUTURE OF BAND III

At the annual general meeting a letter (which B.R.E.M.A. was authorised to make public) was read from Sir Ben Barnett, G.P.O., to Admiral Sir Charles Daniel, chairman of the Television Advisory Committee, The letter confirmed a statement at the last meeting of the Television Advisory Committee about Post Office plans for the distribution of the eight channels eventually to be available for television in Band III. Subject to unforeseen developments, the Post Office proposes to plan the lay-out of Band III broadly in two groups (of four channels) each of which, the letter states, should give substantial national coverage.

NEW COUNCIL

At the meeting the existing council was re-elected without change, as follows: A. J. Balcombe Ltd., Bush Radio Ltd., A. C. Cossor, Ltd., E. K. Cole Ltd., English Electric Co. Ltd., Ferguson Radio Corporation Ltd., General Electric Co. Ltd., Gramophone Co. Ltd., Kolster-Brandes Ltd., Philips Electrical Ltd., Pilot Radio Ltd., Ultra Electric Ltd. Mr. M. M. Macqueen was re-elected chairman. No vice-chairman has yet been elected.

AUTHORITATIVE VOICE

A stable council, a comprehensive programme of activity, unremitting technical co-operation between member firms, and a keen and lively appreciation of the importance of the radio industry in vast developments that are taking place in the broadcasting scene in this country—all these characteristics underline the fact that the council members and officers of B.R.E.M.A., and the specialist committees associated with it, are indeed doing an excellent job of work in helping to mould the pattern of future broadcasting and bringing the industry to its rightful place in the country's technological affairs.

ROUND-UP OF THE MONTH'S NEWS AND VIEWS

B.B.C. at Northern Radio Show

THE B.B.C. Studio at the Northern Radio Show is designed with the twofold purpose of mounting both sound and television productions and enabling visitors to see what is going on as they file past the glass wall. There will be two viewing ramps alongside the studio giving a clear view of the interior. Looking down on the floor of the studio are separate control rooms for sound and television. Accommodation for audiences at the shows is severely restricted because of the number and size of productions, but the public will be able to enter the studio at various times during the day for the v.h.f. demonstrations which are to be held there.

Two days during the run of the exhibition will be devoted to sound broadcasts, the rest to television productions. North Region will not only have the opportunity of producing its own distinctive broadcasts (it is the chief source outside London of light entertainment for national sound programmes) but will also have the responsibility of mounting visiting television shows. It has a long experience of providing programmes to the television network and was the first region to have its own television studio.

A preview of the exhibition will be televised on the evening of Tuesday, May 3; this, unlike the rest of the shows, will be ex-network. The opening ceremony is to be broadcast on sound and television. Thursday, May 5, and Monday, May 9, are the "sound" days when various musical and variety shows will be broadcast, including such popular productions as *The Show Goes On* and Dave Morris in *Club Night*. Wilfred Pickles returns to his native north with his *Ask Pickles*, to be televised on Friday, May 6, and to take part in *Regional Night* on Tuesday, May 10.

The panel game *Find the Link* will also be produced in the studio, on Thursday, May 12, and on the concluding evening of the Exhibition—Saturday, May 14, *In Town To-night* will leave London for the first time. The "town" of the title will be Manchester, with John Ellison interviewing visitors to the city. This programme, as usual, will be "simulcast" on both sound and television.

The B.B.C. stand, close to the studio, will provide information about television and sound broadcasting, including v.h.f. One section will display the great variety of B.B.C. publications and another will be devoted to photographs of North Regional sound and television productions.

City Hall TV Avenue

Fifty-five different television receivers will be in operation almost all day in "Television Avenue" in the gallery of City Hall, Manchester, during the show. These will be in addition to the many sets working on the stands of the individual manufacturers.

Many of the models shown in the Exhibition will be new multi-channel ones, introduced since the National Show in London last Autumn, and now to be exhibited for the first time.

Makes of sets shown in Television Avenue inc'ude: Ambassador, Alba, Bush, Ekcovision, Cossor, Defiant, Decca, English Electric, Ferguson, Ferranti, G.E.C., H.M.V., Invicta, K-B, Marconiphone, Pam, Philips, Pilot, Pye, R.G.D., Regentone, Stella,, Ultra and Vidor.

NATIONAL RADIO SHOW BALLOT

At a ballot held in London on Wednesday, April 6, for stand space in the National Radio Show, to be held at Earls Court, London, from August 24 to September 3, all space was booked with the exception of a few demonstration rooms and minor stands.

"The demand for space surprised us and was a record one," a Radio Industry Council spokesman said.

All the leading radio and television manufacturers will be represented as well as manufactures of radiograms and record players, valves, components, aerials and other accessories. The B.B.C. will have more space than previously and all three Services will be exhibiting.

Technical Training Scheme—First Students ready for Industry

THE first of the students who entered three-year technical training courses started in 1952 are now about to enter the radio industry. The courses were organised by the Ministry of Education, following consideration of training problems by the Radio Industry Council's Technical Training Committee and the Radar Sub-Committee of Lord Hankey's Technical Personnel Committee, at five London and provincial centres.

These are the Bolton Technical College, Manchester Road, Bolton; the Coventry Technical College, The Butts, Coventry; and, in London, Northern Polytechnic, Holloway Road, N.7; Norwood Technical College; King's Hill, West Norwood, S.E.27, and E.M.I. Institute, Ltd., Pembridge Square, W.2.

The object of the courses is to provide students so well trained in the theory and practice of electronics that they will be able, on completion, to take their places at once as assistants to qualified research and development engineers.

Entry age is between 16 and 18 normally (although older candidates will be considered). While the appropriate examinations of the City and Guilds of London Institute, the Institution of Electrical Engineers and British Institution of Radio Engineers can be taken in the courses, the syllabuses are wide in their general scope in addition to giving specialised training in radio engineering and electronics, and they reflect to some extent the needs of the regions concerned.

Particular attention is paid to industrial electronic applications. In most cases, successful completion of the course carries a diploma.

AMPLION PRICE INCREASE

OWING to the recent wage award in the engineering industry, Amplion (1932) Ltd., announce an increase in the price of their Amplion alternative mains-battery portable receiver. The new retail price is: £18 18s., including purchase tax (batteries extra).

FOR ALL IN THE TRADE AND THE INDUSTRY

WOLSEY TELEVISION CHANGES HANDS

THE Gas Purification & Chemical Company, who control among other companies Grundig (Great Britain), Limited, and Grundig International, Ltd., have now acquired the whole of the original share capital of Wolsey Television, Ltd., and Plastics & Metal Products, Ltd.

H. S. Melly remains on the Board of both companies and is joined under an agreement with Grundig (Great Britain), Ltd., by A. E. Johnson, chairman, G. S. Taylor, managing director, and D. D. Mathieson, F.C.A.

Both the companies have for many years carried on business as manufacturers and erectors of television aerials and no change in policy is envisaged. However, it is the intention of the new board to extend the business considerably, especially in the f.m. and Band III fields.

The companies are co-operating with Grundig G.m.b.h. of Germany and the Majestic Radio Corporation of America with a view to making available to the English market the advanced techniques and designs developed by these companies in the f.m. field during the last five years.

Look and Listen with Strad

THERE have been major changes in the management of R.M. Electric Ltd., Team Valley, Gateshead, together with a new issue of shares in order to raise more working capital.

The company are introducing a completely new range of radio and television receivers, and have signed up Jimmy Edwards in connection with a forthcoming sales promotion campaign.

This artiste will be employed in certain areas in a concentrated advertising scheme, and showcards are being designed featuring him and the new slogan, *Look and Listen with Strad.*

A streamer in red, black, white and yellow, designed for window display in connection with the Northern Radio and TV Exhibition, has been issued to northern radio dealers. The streamer carries a valve silhouette in black on a yellow ground, upon which, in yellow and white, is: *Visit the Northern Radio and TV Exhibition. Manchester, May 4th-14th 1955.* This copy is continued in black on a white TV screen shape with the words, *. . . and come to us for your new set.* The design is completed by a red strip on the lower edge which carries the words, *Good sets fit Mullard valves and long-life TV tubes* in black and white. The purpose of the streamer is to draw public attention to the exhibition and to encourage sales of new equipment.

B.S.R.A. Exhibition

THE seventh private exhibition of sound recording, reproducing and audio-frequency equipment will be held on Saturday and Sunday, May 21-22, at the Waldorf Hotel, Aldwych, London, W.C.2, from 10 a.m. to 6.45 p.m. on May 21 and from 10 a.m. to 6 p.m. on May 22.

Admission is by catalogue, price 1s. 6d. at door, or 1s. 8d. by post from the Hon. Librarian, 3 Coombe Gardens, New Malden, Surrey.

BELCHER CATALOGUE

A SUPPLEMENTARY catalogue (No. B3) giving details of their Band III aerials, together with retail parts and installation price lists, is now obtainable from Belcher (Radio Services), Ltd. The company stress the need for dealers to persuade their customers to give authority for aerials to be erected during the coming months in order to avoid delays and disappointments which may arise when the I.T.A. station comes on the air.

Spin with the Stars

PYE, LTD., are presenting a new weekly programme on Radio Luxembourg to replace *People are Funny*, which is being rested until the autumn. For the past eighteen months *People Are Funny* has visited 52 towns throughout England, Scotland and Wales and been heard by an average weekly audience of 4½ million. Nearly 600 people have been awarded more than £10,000 worth of free prizes, including 87 television sets. The live audiences during the series have totalled over 100,000 people.

The new programme, called *Spin With the Stars*, features the latest Polygon record hits, introduced by Donald Sinden, accompanied each week by a guest artist, some of whose records he plays. *Spin With the Stars* is broadcast between 10.30 p.m. and 10.45 p.m. every Wednesday.

STOLEN SET

A GRUNDIG tape recorder, type TK819, serial 606-13092, was recently stolen from the premises of A. R. Bolton and Co., 72 Haymarket Terrace, Edinburgh, 12. Telephone: Edinburgh 62446. Dealers are asked to watch out for this instrument and notify the owner if it is identified.

Advance Phone No.

WE are advised by Advance Components, Ltd., that their correct telephone number is LARkswood 4366/7/8, not 4376/7/8 as advertised in the April issue of this journal.

Aerialite's new factory, situated at West End, Congleton, Cheshire, has been bought specially for the manufacture of television aerial equipment, converters, and electronic components.

These 'Nine*Star' T.V. features put Ferguson first again!

Ferguson announce an entirely new twin range of TV receivers. Both are full-range, high-gain models for reception of B.B.C. and I.T.A. programmes on Band I and Band III.

'NINE-STAR' SERIES

These receivers incorporating nine major technical advances are designed to give pin-sharp, rock-steady pictures, even under the handicap of heavy fading.

14" Table Model 203 ..... 67 gns. *tax paid*
17" Table Model 205 ..... 77 gns. *tax paid*
17" Console Model 235 (*with HaloLight*) ..... 94 gns. *tax paid*
17" Console Model 245 (*with HaloLight and with doors*) ..... 105 gns. *tax paid*

'NEW STANDARD' SERIES

For locations where reception is normal:

14" Table Model 204 ..... 63 gns. *tax paid*
17" Table Model 206 ..... 73 gns. *tax paid*
14" Console Model 214 ..... 73 gns. *tax paid*
14" Console Model 244 (*with HaloLight and with doors*) ..... 88 gns. *tax paid*
17" Console Model 236 (*with HaloLight*) ..... 90 gns. *tax paid*
17" Console Model 246 (*with HaloLight and with doors*) ..... 100 gns. *tax paid*

see FERGUSON first

Stand No. 16 Northern Radio Show May 4th-14th

THESE ARE THE 'NINE STAR' FEATURES

1. Patented new AGC circuit enables the set to receive signal inputs varying widely in strength, thereby eliminating the need to adjust a separate sensitivity control when switching from BBC to ITA.

2. Low time constant of AGC circuit virtually eliminates brilliance variations due to presence of aircraft.

3. New grey level interference suppressor remarkably reduces visual effect of interference on picture.

4. Special control simplifies adjustment of Ferguson electronic picture stabilising circuit.

5. A separate main switch avoids disturbing the setting of any other control.

6. 'Ferroxdure' focusing instantaneously adjusted by rotatable dome at rear of cabinet.

7. Improved ion-trap magnet with more uniform field reduces risk of astigmatism.

8. Special frame time-base circuit ensures positive interlace.

9. All models are suitable for non-synchronous supply mains.

THORN ELECTRICAL INDUSTRIES LIMITED · 233 SHAFTESBURY AVENUE · LONDON WC2

NEWS ROUND-UP
CONTINUED

Cellophane Wraps for Mullard Valves

A NEW valve carton wrapping system has been brought into operation by Mullard, Ltd. Valves will be cellophane wrapped in batches of six or twelve, according to size of carton.

The new system is designed to overcome, as far as possible, inconvenience and time waste. It will enable valve consignments to be unpacked and checked without the difficulties previously encountered due to the various types and the fact that each item amounting to less than a complete box of valves has to be packed loose.

The advantage of the new cellophane wraps will primarily be felt by those who normally order valves in large quantities. To obtain maximum benefit from the new system, they have only to order stock in multiples of six or twelve. A new type of availability sheet, to be issued at the end of March, indicates which valves are wrapped in batches of six and which in batches of twelve. There is, of course, no obligation to order in these quantities.

A special machine which automatically wraps the valves in cellophane packets has been installed at the Mullard Valve Service Department, Waddon, Surrey.

E.M.I. and CAPITOL

THE directors of E.M.I., Ltd., announce that the company has purchased 459,147 units of common stock of Capitol Records Inc. of U.S.A. This purchase represents 96.41 per cent. of the total of 476,230 units of the issued common stock.

Electran Price Reduction

THE Electran Coil Winding and Transformer Co. Ltd. announce a reduction in price of their radio transformers and chokes, etc. This follows recent re-organisation of management and staff. A new production programme has been planned, and deliveries can be made from stock. A current catalogue is available on request.

Five new vans specially designed for the carriage of TV sets have been bought by the transport department of Ferranti, Ltd. Each van is 6ft. 6in. high and 6ft. 6in. wide and has a platform length of 19ft. behind the driver, and their large capacity will facilitate the company's radio and TV delivery service.

NEW R.E.C.M.F. COUNCIL

AT a meeting of the new council following the annual general meeting in London on March 24, C. M. Benham, B.Sc., A.G.C.I., A.M.I.E.E. (managing director, Painton & Co., Ltd., Kingsthorpe, Northampton) was elected chairman of the Radio and Electronic Component Manufacturers' Federation in succession to W. F. Randall.

S. H. Brewell, M.B.E., M.I.P.E. (chairman and managing director, A. H. Hunt Capacitors, Ltd.) was elected vice-chairman. Hector V. Slade, M.B.E. remains honorary treasurer.

The new council consists of: Automatic Coil Winder & Electrical Equipment, Ltd. (R. E. Hill); British Moulded Plastics Ltd, (G. F. Carnell); Garrard Engineering & Manufacturing Co., Ltd. (Hector V. Slade); A. H. Hunt (Capacitors), Ltd. (S. H. Brewell); Multicore Solders, Ltd. (R. Arbib); N.S.F., Ltd. (K. Graham Smith); Painton & Co., Ltd. (C. M. Benham); Plessey Co., Ltd. (P. D. Canning); Standard Telephones & Cables, Ltd. (E. E. Bivand); Telegraph Construction & Maintenance Co., Ltd. (W. F. Randall).

Co-opted members: Morganite Resistors, Ltd., (E. T. Treganza); Truvox, Ltd. (K. Short.) The council may possibly co-opt another member later in the year.

R.T.R.A. Trade Directory

THE 1955 edition of the *R.T.R.A. Year Book and Radio Trade Directory*, just published, contains (for the first time in any publication) a list of radio and television retailers, both R.T.R.A. members and non-members, throughout England, Scotland, Wales, and Northern Ireland, numbering many thousands.

Other features, revised and brought up to date from previous editions, include the topographical list of R.T.R.A. members, members of the Northern Ireland Radio Retailers' Association, members of the R.T.R.A. Service Section, a Directory of Trade Addresses (manufacturers and trade services listed alphabetically), and a Directory of Wholesalers.

A few copies are available to bona fide manufacturers and wholesalers, price £2 10s. each, from the publishers, R.T.R.A., Ltd., 26 Fitzroy Square, London, W.1.

N. Ireland TV Boom

TELEVISION licence holders are increasing by over 1,000 a month in the six counties of Northern Ireland, the G.P.O. announced recently. At the end of February, there were 22,695 TV licences taken out. At the end of January the figure was 21,564. In January, 1954, there were 8,746 licences in force and by the end of the year the number had more than doubled at 19,867.

TAPING THE TIME SLIP

A Grundig tape recorder plays an important part in the new British atomic energy thriller film *Timeslip*. The recorder is used by American stars Gene Nelson and Faith Domergue (seen here in a scene from the film) to solve the mystery of an atomic scientist whose mind seems to be displaced in time. The same film company are also using a Grundig in their Scotland Yard thriller *The Blind G.I.*

IMPROVED BIB TAPE SPLICER

Multicore Solders, Ltd., Multicore Works, Maylands Ave., Hemel Hempstead Herts.

MULTICORE announce that an improved version of their *Bib* recording tape splicer is now available. It is referred to as the Mark 2 and incorporates two tape retaining clamps which, in addition to having extensions on them, providing an even easier releasing arrangement, are also fitted so that the clamp openings both operate identically towards the tape recorder. It is claimed that this makes tape splicing a quicker and simpler job without losing any of the virtually foolproof advantages of the original *Bib* product.

Improved Bib recording tape slicer

The company state that if an earlier model has already been bought and the user requires this latest modification, the work will be undertaken on receipt of the splicer, properly labelled with the owner's name and address, and a postal order for 2s.

PHILIPS BAND III ADAPTOR UNITS

Philips Electrical, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.

BAND III adaptors will shortly be available for all Philips television receivers in which the plug-in coil technique — as used for channel changing in Band I — is employed.

The adaptor will consist, basically, of a turret tuner similar to that incorporated in the current Philips range. Connection will be made via the r.f. valve holder (the r.f. valve being removed, for h.t. and heater supplies; for the signal input, connection will be made via the r.f. coil socket.

A dummy load coil replaces the existing oscillator coil; the aerial coil socket is not used. In the case of projection receivers it will also be necessary to fit a small heater transformer.

Modification kits consist of a tuner and the necessary mounting parts. In more recent models, the tuner will be fitted inside the receiver. Type numbers of the internal kits required for the sets concerned are:

Model	*Incorporating*	*Fitting No.*
1748U	tuner, type 7520/01	AT7521/00
1115U	,, ,,	AT7521/01
1446U–45	,, ,,	AT7521/02
1746–45U	,, ,,	AT7521/03
2337A	tuner, type 7520/02	AT7521/05
6027A	,, ,,	AT7521/06
1400A	,, ,,	AT7521/07

These are priced at 6 gns. each and order forms have been sent to all Philips dealers.

In earlier models, namely 1100U, 1101U, 1114U, 1115U, 1200U, 1229U, 1236U, 1238U, 1427U, 1437U and 1726U, the tuner will be enclosed in a box which is fitted to the outside of the cabinet. No price or availability date for this external type — No. AT7522 — has yet been announced.

Philips are not planning to manufacture adaptors for receivers which do not employ the plug-in coil technique. At a later date, however, they hope to assist set owners by recommending other types of adaptors, using the double superhet principle, at present on the market.

RONDEN BUREAU RADIOGRAM

Ronden Manufacturing Co. Ltd., 36 Boleyn Road, London, N.16.

THE Ronden radiogram is a competitively-priced instrument incorporating a 5-valve 3-waveband superhet radio receiver and a Collaro RC54 3-speed autochanger with *Studio* type "O" pick-up, retailing at 49 gns. tax paid.

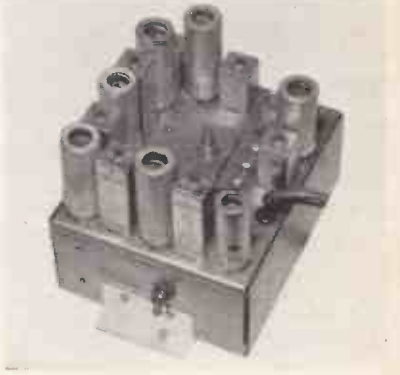
The receiver has an output of 4 watts to an 8in. p.m. loudspeaker, and covers the long, medium and short wavebands. The cabinet, designed in bureau style, is finished in figured walnut veneer, and measures 36in. by 34in. by 17in. Two door record storage is provided, the compartments housing more than 400 records.

DYNATRON F.M. TUNER

Dynatron Radio, Ltd., "The Firs," Castle Hill, Maidenhead.

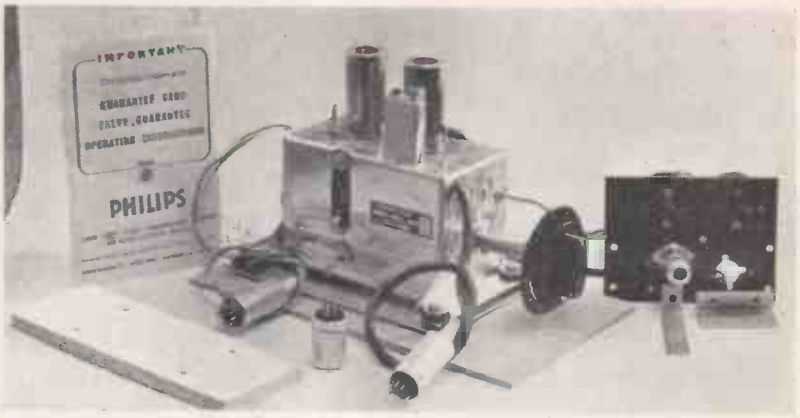
ILLUSTRATED is the new Dynatron v.h.f.–f.m. tuner, type FM1, designed to enable radio receivers and radiograms to be adapted for Band II (f.m.) operation. Seven valves are used, the stages being: r.f. amplifier, mixer, i.f. amplifier, 1st limiter, 2nd limiter, discriminator, separate oscillator and a.f.c. valve. Tuning range is 88–95 Mc/s, with three pre-tuned circuits, switch-operated intended for the Home, Light,

(Continued on page 25)



Dynatron v.h.f.-f.m. tuner, type FM1

The latest in Radio and TV Receivers and Accessories



The Philips Band III adaptor unit using plug-in coils

The Recording Tape with the most Sales Features

EMITAP

If you have confined your selling to the domestic market only, remember that Emitape also places you in a unique position to seek out and supply the needs of those engaged in special tasks where large quantities of the finest quality recording tape are essential. Look at the potentiality! Scientists engaged in research — technicians busy developing prototypes — doctors recording data — teachers in Special Schools where phonetic records of progress are important and teachers of music — all are rapidly realising that Emitape is the finest available Magnetic Tape for true-to-life sound recording. They are in excellent company, for Emitape is also used by ' His Master's Voice ', Columbia and Parlophone and the world's leading broadcasting organisations.

Special Features

- HIGH SENSITIVITY
- ANTI-STATIC
- P.V.C. BASE
- HIGH TENSILE STRENGTH
- FREEDOM FROM CURL
- EDITING LEADER AND TRAILER STRIPS

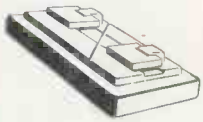
STAND 49
at the
NORTHERN RADIO SHOW

TAPE ACCESSORIES

GUMMED JOINTING TAPE AP.37 Price 6s. 6d.

WHITE P.V.C. EDITING TAPE 150ft. Roll AP38 Price 4s. 6d.

P.V.C. TAPE JOINTING COMPOUND AP.77 Price 4s. 6d.



MAGNETIC TAPE JOINTING BLOCK AP.46 Price 8s.

NON-MAGNETIC SCISSORS A.P.39 Price 16s.

Full particulars of Emitape and accessories obtainable from our wholesale distributors.

Manufactured and distributed by

E.M.I. SALES & SERVICE LTD.
RECORDING EQUIPMENT DIVISION
HAYES, MIDDLESEX Telephone: Southall 2468

Export enquiries for products mentioned in this advertisement should be addressed to:
E.M.I. INTERNATIONAL LTD., HAYES, MIDDLESEX, ENGLAND

BRAND NEW *Continued*

and Third B.B.C. programmes. Output is a 0.2V r.m.s. audio signal to feed pick-up sockets on amplifier or receiver audio stage. Mounting is simple, the unit being designed as a 3-way cube with single shaft operation for easy installation. Consumption 26 watts (h.t. 220V, 50mA; heater 6.3V, 2.5A).

A one-valve separate power unit is available as an additional item to supply power to the tuner where voltages are not already available.

Prices are: Tuner FM1—£23 17s. (£18 plus £5 17s. purchase tax); Power unit P1—£8 18s. 10d. (£6 15s. plus £2 3s. 10d. purchase tax). If the power unit is supplied separately, it is not subject to purchase tax.

NEW PORTOGRAM REPRODUCERS

Portogram Radio Electrical Industries, Ltd., Preil Works, St. Rule Street, London, S.W.8.

A RANGE of new models is introduced. Model A55 is an improved version of the A33 portable record reproducer, comprising a 3-valve amplifier, a 3-speed autochanger (Collaro RC54), and twin speakers (one 10in by 6in. and one 7in. by 4in., both elliptical). Independent bass and treble controls are fitted. The instrument, which can be converted into a floor model by means of a set of legs supplied for this purpose at an additional cost of £3, is priced at £37 15s. 6d.

Model HF65 is a high-fidelity console record reproducer, consisting of a 5-valve push-pull amplifier with a Collaro RC54 autochanger. Independent bass and treble controls are incorporated, and the switching includes an f.m. position designed for use with an f.m. unit supplied as an additional attachment. Twin 10in. by 6in. elliptical speakers are mounted on either side of the cabinet to take advantage of wall deflection if mounted in the corner of a room. Record storage space will accommodate 250 records.

Model TR100 is of more ambitious design, comprising a console record and tape reproducer, catering for the hi-fi music lover. The cabinet embodies a bass reflex inbuilt speaker and large storage space with capacity for 300 records and tapes. Provision is made for the fitting of an f.m. radio unit. The tape deck used in this instrument is the Truvox Mark III. Price not yet fixed.

There is also a small compact 10-watt amplifier suitable for p.a. work (type MB10) for operation on 110–230V mains or 6V battery. Facilities include mic-gram mixed inputs with independent controls and tone correction. The amplifier, which is housed in a robust steel cabinet, costs 25 gns.

NEW McCARTHY RADIOGRAMS

Felgate Radio, Ltd., Felgate House, Studland Street, Hammersmith, London, W.6.

THE latest McCarthy radiogram model is available in two types. Model PP7 has three wavebands (long, medium, short), while Model FM7 additionally incorporates a v.h.f.-f.m. band. Both types are available at the competitive price of 56 gns. (£44 10s. 6d. plus £14 5s. 6d. purchase tax).

The new McCarthy bureau-style radiogram

Both types are for operation on a.c. mains 200–250V. Model PP7 has a push-pull output stage feeding 8 watts to a high-flux 10in. p.m. loudspeaker. Model FM7 has seven valves and gives an output of 4 watts to a 10in. speaker. The i.f. is 460 kc/s on the a.m. bands and 10.7 Mc/s on f.m.

Both types incorporate a 3-speed autochanger. The cabinet, which is finished in walnut veneer, measures 33in. by 32in. by 15⅝in., and has a large illuminated dial with a visible area of more than 58 sq. in. The two pointers travel 9in. giving an extended scale.

The loudspeaker, gramophone motor and gramophone pick-up plug into the chassis, and the chassis slides into the cabinet. Two wing-bolts then fix it in position. The knobs are placed on the chassis beforehand. Thus, if the set requires service, it is very easy to remove the chassis.

New Portogram models: *left*—type HF65 hi-fi console record reproducer; *right*—type TR100 hi-fi console record and tape reproducer

NEW COLOURS FOR EKCO STROLLER

E. K. Cole, Ltd., Southend-on-Sea, Essex.

THE popularity of the Ekco *Stroller III* (Model MBP183) will be even further enhanced by the introduction of four new attractive colour schemes for this mains-battery portable receiver.

Apart from being available housed in the now well-established lizard grey rexine case, Model MBP183 can now also be supplied in the following new colours — Honey Tan, Heather Plaid, Admiral Blue and Polka Dot Red.

At this particular time of the year there is an automatic demand for this type of receiver and this demand will be further stimulated by an aggressive advertising campaign (which commenced just before Easter) and includes half-page insertions in a number of national newspapers.

There is no alteration in the price of Model MBP183, which is 19 gns. (tax paid).

(Continued on page 27)

ANTIFERENCE

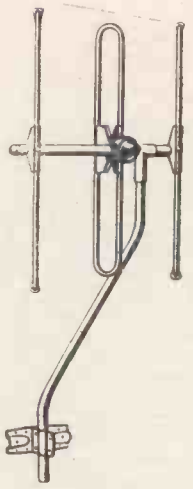
BAND 3 AERIALS

.... A comprehensive new range for every requirement

A complete new range is now available for the reception of Band III transmissions in Channels 8 or 9 and at prices that reflect the careful planning and thought that has gone into their construction! We illustrate only 5 of the 11 models available. Our wide experience gained from Antiference factories on the American continent has played a large part in the development of this completely new range of aerials designed for efficiency—with economy. All the fine features of the Antiference Band I range are incorporated in these models; they are easy to instal and are fully pre-assembled and aligned for peak performance on the Band III frequencies.

When ordering please quote Channel for which the aerials are required—e.g., CAT. No. 350/2D . . . (quote Channel reference here)

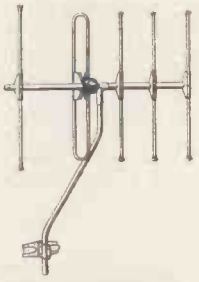
The ANTIFERENCE Band III range will be on display on Stand No. 6, Northern Radio Show, City Hall, Manchester from May 4—14.



Cat. No. 330/2D

Three-element array with cranked mast and universal surface mounting bracket.

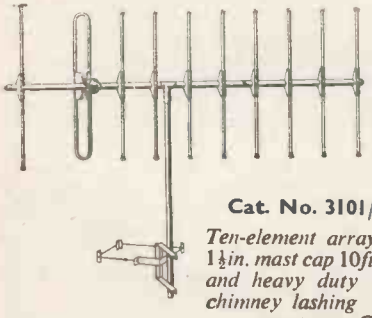
List Price **42/6**



Cat. No. 350/2D

Five - element array with cranked mast and universal surface mounting bracket.

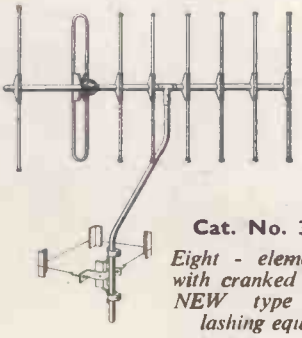
List Price **53/6**



Cat. No. 3101/6G

Ten-element array with 1½in. mast cap 10ft. mast and heavy duty single chimney lashing equipment type G

List Price **145/-**



Cat. No. 380/5D

Eight - element array with cranked mast and NEW type chimney lashing equipment.

List Price **83/6**

Cat. No. 350/1C

Five - element array with swanneck mast and "U" bolt grip for fitting to existing masts from ¾in. up to 2in.

List Price **52/6**

ANTIFERENCE LIMITED . BICESTER ROAD . AYLESBURY . BUCKS TEL : AYLESBURY 1467/8/9

DHB/2100

BRAND NEW *Continued*

B.S.R. 3-SPEED HI-FI GRAM UNIT

Birmingham Sound Reproducers, Ltd., Claremont Works, Claremont Street, Old Hill, Staffs.

THE new *Regent* HF100 high-fidelity gramophone unit is designed to replace older type units in existing radiograms. It plays 33⅓, 45 and 78 r.p.m. records of 7in., 10in. and 12in. diameter. The unit is built to the same high standard as the Monarch auto-changer.

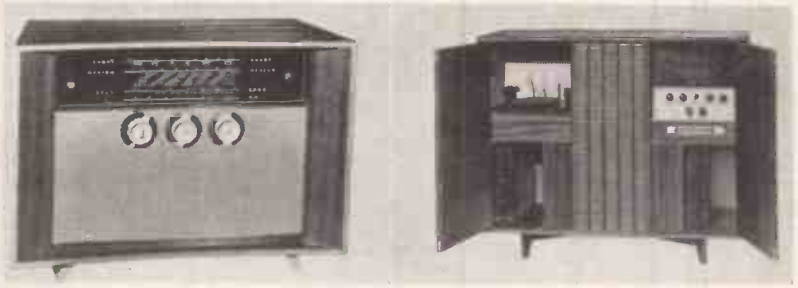
B.S.R. Regent HF100 hi-fi gram unit

Features include: plays all records, all speeds, all sizes; lightweight, high fidelity turnover crystal pick-up; dual cantilever mounted sapphire styli; simple and positive; automatically switches off after each record; fitted with anti-acoustic feedback suspension springs; simple voltage range adjuster for 200/250V and 100/125V a.c.; easily fitted to most modern radiograms.

FERRANTI A.M.-F.M. MODELS

Ferranti, Ltd., Moston, Manchester, 10.

TWO new instruments have been added to the Ferranti range — a table radio and a radiogram, both incorporating a v.h.f.–f.m. waveband. Model 045, the table set, is a 4-waveband 6-valve superhet with tuning indicator, for operation on a.c. mains, 200/250V, 50 c/s. The wavebands are: long, medium, short, and f.m. An internal dipole aerial is provided for f.m. operation, with provision for external aerial if required. Output is 5 watts via a pentode with negative feedback to a 10in. elliptical p.m. loudspeaker. The cabinet is french-walnut veneered, and has a large illuminated station name tuning dial. Dimensions of the set are: 23in. by 16¾in. by 9½in. Price 34 gns. (£27 0s. 7d. plus £8 13s. 5d. purchase tax).



New Ferranti a.m.-f.m. models: *left*—Model 045 table radio, and *right*—Model 1055 de-luxe radiogram

Model 1055 is a de-luxe a.c. autoradiogram designed for high-fidelity reproduction and having a frequency response of 40–12,000 c/s. It incorporates a Garrard RC90 3-speed record changer and a 12-valve 4-waveband superhet receiver covering long, medium and short waves, and the v.h.f.-f.m. band.

Output is push-pull (class AB1) giving 14 watts into a Goodmans *Audiom 50* 12in. p.m. loudspeaker housed in a specially designed acoustic chamber and a high-frequency 7in. p.m. speaker in a separate compartment.

The receiver circuit includes tone-compensating networks to ensure correct tonal balance at all volume levels and has scratch and rumble filters for gram operation. The plastic on-off knob has a built-in warning light which lights up when the mains are on.

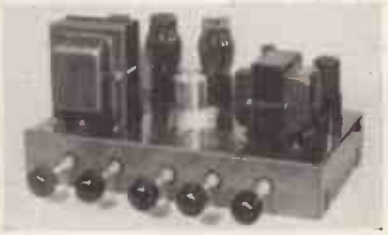
The cabinet is finished in selected walnut veneers and has ample record storage compartments. There is a large full-vision illuminated tuning scale with tuning indicator, and a separate scale for f.m.

Price of Model 1055 is 155 gns. (£123 4s. 4d. plus £39 10s. 8d. purchase tax).

TRIPLETONE MAJOR

The Tripletone Manufacturing Co., 147 *Merton Road, Wimbledon, S.W.*19.

LATEST addition to the *Tripletone* range of amplifiers is a push-pull model incorporating mic. preamplification, independent mic. and gram. colume controls allowing mixing, auxiliary power supplies via an octal socket, and independent, treble, middle and bass controls. These controls, when set at normal, allow continuously variable cut in the anti-clockwise direction and continuously variable boost in the clockwise direction. This flexibility enables the user to compensate for non-linear response from pick-up and/or speaker and enables all speeds of records to be played without switching.



The new *Tripletone Major* amplifier

Both mains and output transformers are fully shrouded and like the chasiss are finished in gunmetal grey stove enamelling. Price of the *Tripletone Major* is £14 10s. retail; usual discounts allowed.

NEW McMICHAEL TABLE RADIO

McMichael Radio, Ltd., 190 *Strand, London, W.C.*2.

NEWEST addition to the McMichael range is Model 155 table radio receiver, a 5-valve (plus tuning indicator), 4-waveband (including Trawler Band) a.c. superhet selling at 23 gns. tax paid. Power output is 3 watts to a 10in. by 6in. elliptical loudspeaker. The set has flywheel tuning and features a colourful illuminated wide-vision glass tuning scale. The cabinet, which is piano finished, measures 15⅜in. by 19⅜in. by 9½in.

McMichael Model 155 table radio

The company also announce that Band III adaptor units for their Model TM54B television receiver will shortly be available at the price of 6 gns. Units for the conversion of earlier McMichael TV models will be available later in the year.

(*Continued on page 29*)

BRAND NEW *Continued*

COSSOR TV TEST INSTRUMENTS

A. C. Cossor, Ltd., Instrument Division, Cossor House, Highbury Grove, London, N.5.

TWO new test instruments for television are announced by the company. Model 1321 is a *Telecheck* converter unit designed for mounting on a standard *Telecheck* instrument, extending its frequency range to cover the Band III television channel. Pattern generator facilities for picture time base linearity checks have been retained.

The converter operates by providing an external oscillator which, beating with the fixed oscillator in the 1320 *Telecheck*, provides an r.f. output in the range 155-225 Mc/s. Effective filtering circuits are employed to suppress unwantd sum and difference frequencies.

The converter is designed for permanent attachment to the standard *Telecheck* providing a neat, light and compact unit. Mounting is effected by four screws and the inter-connecting wiring is carried in a single insulating sleeve.

Model 1322 *Telecheck and Marker Generator* is a new instrument designed to facilitate alignment on Bands I and III. It comprises a frequency modulated alignment oscillator with internal crystal-referred frequency markers.

Alignment is carried out by using the instrument in conjunction with a cathode-ray oscillograph. Frequency modulation of the carrier injected into the television receiver is carried out electronically, the X-sweep voltage of the oscillograph being used to control this modulation. The response curves of r.f. — including turrets — and i.f. tuned circuits are displayed on the oscillograph producing the sweep voltage, the 10 Mc/s bandwidth of the f.m. sweep occupying the entire length of the trace.

The carrier can be set at frequencies between 5 and 225 Mc/s and can be fed into any suitable point between the aerial input of the receiver and the detector. The output from the television receiver, when fed to the oscillograph Y amplifiers, will provide a picture of the response curve of the tuned circuits under examination over a range of frequencies up to 5 Mc/s either side of the selected carrier frequency.

If a Cossor double beam oscillograph is used, it is possible to feed the vision output to one amplifier and the sound to the other, thus showing the response curve of both sections of the receiver and also any interaction effects which may be present. A wide range of output voltage is available, from 10 microvolts to 40 millivolts, adjustment being made by coarse and fine variable attenuator networks. Response curves are calibrated using the internal marker generator to produce accurate frequency pips on the trace.

The frequency range of the alignment wobbulator is such that it will cover all the carrier frequencies on which the vision and associated sound programmes in Bands I and III will be transmitted as well as any intermediate frequency that might be selected for a superheterodyne receiver, thus making allowance for future requirements.

New Cossor instruments: the type 1322 Telecheck and Marker Generator (*left*) and the Telecheck Band III converter

BELARK ALUMINIUM SOLDERING TOOL

The Belark Tool and Stamping Co. Ltd., 33 Sussex Place, London, W.2.

THE difficulty of soft soldering aluminium and its alloys has long been an obstacle to their wider use in various fields of industry. This difficulty lies mainly in the effective removal of the oxide film which is always present and prevents the solder from wetting the metal.

Belark aluminium soldering tool

Soldering with flux presents many difficulties, and it is often doubtful whether a lasting joint has been achieved, as traces of residual flux after soldering not scrupulously removed, would lead to subsequent corrosion. The soldering operation must be carried out at the exact prescribed temperature because overheating would lead to a break-down of the flux. To the fluxless processes belongs the ultrasonic method with its expensive equipment.

The most popular process among all methods is friction-soldering without flux, but being manually performed with a sharp tool or wire brush it is a slow and tedious operation.

The Belark electric soldering tool has now turned this method into a fast reliable process, capable of being performed by unskilled labour. It cleans and tins at the same time, and as no flux is used no precaution in heat-control is necessary. To cope with the high heat-conductivity of aluminium without pre-heating, the tool is fitted with a high-rated heating element to bring the tool up to 500 degrees C.

A small steel wire-brush located in the solder-bit vibrates and cleans the surface by mechanical means. A pool of molten solder around the solder-bit protects the spot from air, which would otherwise oxidise again immediately. As soon as the oxide film is broken up, the molten solder tins the surface. The joining operation can then be finalised either with the same tool or by any appropriate method.

The tool has many obvious applications in the radio and electrical industry where aluminium is predominatly used in chassis and components.

NEW MULTICORE PUBLICATION

Multicore Solders, Ltd., Multicore Works, Maylands Ave., Hemel Hempstead, Herts.

AT the 1954 R.E.C.M.F. Exhibition, Multicore Solders Ltd. exhibited a range of materials which had been developed in their research laboratories for printed circuit soldering. Since that time further research has been undertaken and additional products are now available.

The complete range at present offered by the company for the soldering of printed circuits is:

PC 1	*Multicore Abrasive Degreaser.*
PC 2	*Multicore Dip Cleaner.*
PC10	*Multicore Activated Surface Preservative.*
PC20	*Multicore Special Non-corrossive Liquid Flux.*
PC21	*Oil free Special Non-corrosive Liquid Flux.*
PC31	*Multicore Alloy for Printed Circuit Solder Baths.*
PC35	*Ersin Multicore 5-core Solder for hand soldering the printed circuits.*
PC38	*Special Multicore Alloy Service.*
PC40	*Multicore Anti-Oxidant Oil.*
PC50	*Multicore Finishing Enamel.*

All the products are dealt with in detail in Multicore publication PC101, copies of which are available on application to the company. The folder also includes much useful information on current processes for the preservation of printed circuits, before and after soldering.

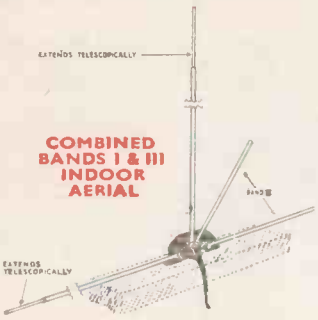
PLASTIC RADIO OR LOUDSPEAKER GRILLE

Barclay-Stuart (Plastics), Ltd., 25-27 Brunswick Street, Luton, Beds.

THE company are producing a new radio or loudspeaker grille of attractive design, moulded in original lengths of 16½in. by 1½in. which are then cemented together and cut to shape according to customers requirements. The grille is available in popular colours of gold and cream, but other colours can be supplied to order. Further details can be obtained from the company.

(Continued on page 31)

IN GREAT DEMAND—ORDER WITHOUT DELAY



WOLSEY "TWIN-LOFT"

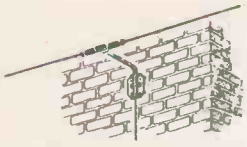
Patent Pending

A new combined loft or indoor aerial for two-station reception with one downlead. Band I range up to 20 miles; Band III range approx. 5/10 miles.
Band I rods are telescopic enabling them to be adjusted to the correct lengths for all Band I channels. Band III rods are of fixed size and receive all channels in Band III.
For use with 70-80 ohms co-axial cable only.

LIST **17/6**

(Packed in cartons of three)

F.M. AERIALS



FM/LW. Dipole with 2ft. 3in. stand-off arm and universal fitting wall bracket.

LIST **30/-**

FM/HL. "H" type with 4ft. 6in. cranked arm, die-cast bracket, and chimney lashing.

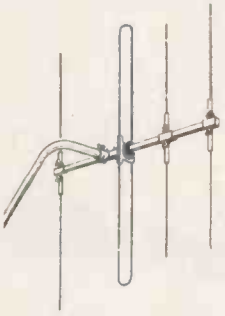
LIST **77/6**

FM/Y4. 4-element aerial for F.M. reception. With 4ft. 6in. cranked arm, die-cast bracket and chimney lashing.

LIST **97/6**

WOLSEY "QUICK-FIX" AERIALS for BAND III and F.M.

You can order Wolsey Band III aerials with confidence that they will give satisfactory reception in the areas for which they have been designed. They are the result of research, development and exhaustive field tests carried out since early last year, combined with our experience in the manufacture of Yagi arrays for export. There is no need to stock several types of Band III aerials, the Wolsey types illustrated provide for all areas within the anticipated range of Band III transmissions. Fully descriptive literature sent on request.



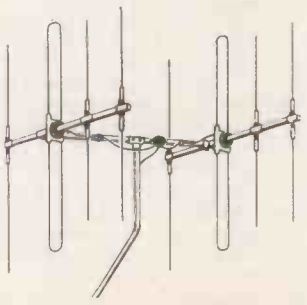
BAND III 4-ELEMENT ARRAY

Type Ref. **Y4.** This aerial is designed for use in the primary service area and fringe areas. By installing this model you can be sure of minimising ghosting in the primary service area, and it will provide adequate signal pick-up in the fringe areas.
Complete with 3ft. cranked arm, die-cast bracket, and single lashing equipment. For use with 70-80 ohms co-axial cable only.

LIST **77/6**

Aerial only affixed to special adjustable clamp for securing to existing installation. LIST **65/-**

Quote "A" for clamp for ⅜-1¼ in. dia. mast or arm. Quote "B" for clamp for 1¼-2 in. dia. mast or arm.



BAND III BROADSIDE ARRAY

Type Ref. **BAY4.** For extremely difficult areas where ghosting is particularly severe or the signal strength is exceptionally low, we very strongly recommend the Broadside Array consisting of two Y4 aerials in parallel with matching lines and splitter box.
Complete with 4 ft. 6 in. cranked arm, die-cast bracket and chimney lashing equipment. For use with 70-80 ohms co-axial cable only.

LIST **£7 15s.**

Aerial only affixed to special adjustable clamp for securing to existing installation. LIST **£6 5s.**

Quote "A" for clamp for ⅜-1¼ in. dia. mast or arm. Quote "B" for clamp for 1¼-2 in. dia. mast or arm.

The wide bandwidth of the above types gives efficient coverage of Channels 8 and 9 with the one aerial

WOLSEY CROSS-OVER UNIT WITH PRINTED CIRCUIT

Patent Pending

For linking separate Band I and Band III aerials (both 70-80 ohms) to receiver via one common downlead. Housed in die-cast, rubber sealed box.

1957—For exterior or interior mounting, on wall or wainscot. 15/6

1957A—For mast mounting, ⅜-1¼ in. dia. masts. 17/6

1957B—For mast mounting, 1¼-2 in. dia. masts. 17/6

WOLSEY TELEVISION LTD., 43-45 KNIGHT'S HILL, WEST NORWOOD, S.E.27

GIPsy Hill 2207 (4 lines). Telegrams Kwikfix, Westnor, London. Established 1934

BRAND NEW *Continued*

UNIVERTER BAND III CONVERTER

Iko Patents Ltd., 17 *Crisp Road, Hammersmith, London, W.6.*

THIS firm has designed a Band III frequency converter which is now being produced under licence by a number of manufacturers. The *Univerter* is a completely self-contained unit, comprising r.f. amplifier, frequency changer and i.f. amplifier, and incorporating its own a.c. power supply. Operation is simple, by a single-knob control functioning as mains/on-off, Band I and Band III switch.

A big advantage from both the dealer's and the customer's points of view is the fact that the *Univerter* can be installed and set up by the customer in a few minutes. No modification to the existing receiver is necessary, installation being simply a matter of inserting input and output leads and adjusting easily accessible trimmers. Another advantage is that this type of converter can be used on c.r.f. television chasses.

In use, the converter is by-passed for Band I so that the aerial is switched direct to the receiver, whereas on Band III the converter is switched in series with the aerial and receiver. Thus, for Band III the unit transforms the existing receiver into a double conversion superhet and, with the extra i.f. stage, provides a useful gain of about six times. On test, 10 miles from the Buelah Hill low power transmitter, a good test pattern was received with only a length of flex as an "aerial."

The i.f. stage is continuously adjustable to suit both London and Birmingham frequencies. A sensitivity control enables the Band III output to be matched against the Band I signal so that on switching from band to band, the receiver controls need not be readjusted. The following is a list of manufacturers to whom a licence has been granted:

Denco (Clacton) Ltd.; Gillon Engineering, Camberley, Surrey; Dulci Radio, Willesden, N.W.2.; Kenton Laboratories, London, W.1.; Willmond Electronics, Hitchin, Herts.; T.V. Conversions Ltd., London, S.W.1.; Electronic Machine Co., Thornton Heath.

Retail prices will naturally vary slightly, due to differences in cabinet, etc., but on average are expected to be in the region of £10.

Univerter Band III converter in position on a TV set

One of the new Falcon radiograms

NEW FALCON RADIOGRAMS

John Street Manufacturers, Ltd., 88 *Springbank Road, London, S.E.*13.

TWO new models have been added to the range of *Falcon* radiograms manufactured by the company. Model 555 is a 5-valve 3-waveband instrument with 3-speed autochanger, selling at the retail price of 41 gns. tax paid.

Model 755 is a 7-valve de-luxe instrument with push-pull output, incorporating a 3-speed autochanger, selling at 45 gns. tax paid.

The *Bureau* models are being continued, and an f.m. version is now available.

NEW RADIOSPARES PRODUCTS

Radiospares, Ltd., 4–8 *Maple Street, London, W.*1.

MANY new lines are included in the April issue of the Radiospares catalogue which is now available on application to bona-fide members of the trade. A particularly useful item is the insulated single socket (illustrated) of the chassis-fixing type suitable for ¼in. plugs. The moulded part is in nylon, available in red or black. Length 6/16in., diameter 7/19in. The sockets, which are supplied in attractive boxes, cost 4s. per dozen.

The new Radiospares chassis-fixing insulated single socket

Other new lines include: a 100μF TV electrolytic with an improved working voltage of 450V; an exact replacement dropper (type R11) for Pye V4 and V7 television series; valve screening cans and bases to fit B7G and B9A (Noval) valveholders; and machined solid brass spindle extensions (for ¼in. diam. spindles) giving an additional 2⅜in. reach on standard volume control and wavechange switch spindles.

TRUCHORD CORNER REPRODUCER

Truchord, Ltd., 82 *Great Portland Street, London, W.*1.

THE new *Truchord* corner reproducer (illustrated) comprises a corner baffle of the bass reflex type with sand-filled front board, available in either walnut, oak or mahogany. A 12in. auditorium high-fidelity speaker of 15-ohm impedance is fitted as standard.

The amplifier, which is fitted to the top panel of the corner baffle, is the standard *Truchord* amplifier consisting of five valves with push-pull output stage giving maximum of 8 watts output. Negative feedback is employed and separate treble and bass controls are fitted. Distortion factor at 6 watts

(Continued on page 32)

Truchord corner reproducer

BRAND NEW *Continued*

is better than 20 per cent. The amplifier is substantially flat within ±1½db from 30 to 25,000 c/s. Speaker outlets for either 15 ohm or 3 ohm impedance are provided.

Retail price of the corner reproducer is 36 gns.

PYE TYPE 47 TV ADAPTOR

Pye, Ltd., Cambridge.

THE Pye, type 47, adaptor unit is intended to provide 13-channel reception for Models V4, VC4, V7, VC7, and VC7DL. The company are circularising owners of these sets, giving details of the adaptor, and enclosing a reply-paid post-card enabling them to order an adaptor if they wish. Sample adaptors are being distributed to Pye dealers.

The unit, which is compact and easy to instal, costs 6½ gns. The company plan to produce adaptors for earlier Pye models, and owners of the sets concerned will be circularised in the same way.

GRAYSHAW CAPACITY RESISTANCE BRIDGE

Grayshaw Instruments, Park Stable Yard, Leyton Road, Harpenden, Herts.

THE Grayshaw type CR50 is a competitively-priced capacity resistance bridge selling at £6 5s. 6d. net

Grayshaw type CR50 resistance-capacity bridge

Ferguson 323RG console radiogram

trade (plus 4s. 6d. carriage and packing). The instrument will measure capacitance from 10pF to 100μF and resistance from 1 ohm to 10 megohms in 14 ranges.

Indication of balance is given by a magic-eye fed from a high-gain pentode and values are given on a direct reading linear scale. The usual neon type leakage test is available for condensers. The instrument is housed in a heavy gauge steel case finished black wrinkle with an anodised aluminium scale.

Specially designed for bench use, with a sloping front panel for ease of reading. Sold complete with all valves and instructions ready for use from 200–250 volts a.c. mains.

NEW OSRAM VALVES

General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2.

TYPE approval has now been received from the B.V.A. by G.E.C. for two new Osram valves: DH719/EABC80 and B719/ECC85. Both are 6.3V indirectly heated valves, designed for use in f.m. and f.m.–a.m. radio receivers.

The DH719/EABC80, which has a list price of 13s. plus 4s. 3d. purchase tax, is a triple-diode-triode with one diode having a separate cathode. The B719/ECC85 has a list price of 17s. 6d. plus 5s. 9d. purchase tax, and is a double triode.

FERGUSON CONSOLE RADIOGRAM

Ferguson Radio and Television, 105–109 Judd Street, London, W.C.1.

A NEW console radiogram has been added to the Ferguson range. Known as Model 323RG, this instrument (illustrated) occupies only 2¼ sq. ft. of floor space, and is designed in bureau style. It incorporates a 5-valve 3-waveband superheterodyne receiver and a 3-speed autochanger with turnover-crystal pick-up.

Output is 3½ watts to an 8in. p.m. loudspeaker. A special feature is the 4-colour illuminated Perspex tuning scale, calibrated in metres, with station names, the colour-scheme being arranged to blend with the interior of the cabinet. The autochanger is in all-cream finish.

The cabinet is available in either walnut or mahogany veneered finish, and measures 33in. by 17¾in. by 17¼in. The interior and inside of the bureau lid are lined with light buff leathercloth. There is a bronzed metal handle. An illuminated warning on–off indicator is visible when the lid is closed.

For operation on a.c. mains 200–250V, 50 c/s. Price 53 gns. (tax paid).

PYE CONSOLE TV RECEIVER

Pye Ltd., Cambridge

PYE announce the release of a new television receiver — Model V14C. This attractive 14 in. set is housed in a console cabinet, fitted with castors, and finished in highly polished walnut veneers. It incorporates one 6½ in. loudspeaker. The controls are located on the front of the cabinet and are, left to right: volume/on-off and brightness (concentric), horizontal hold, contrast, vertical hold, station selector and fine tuner (concentric).

Pye V14C 14in. console TV

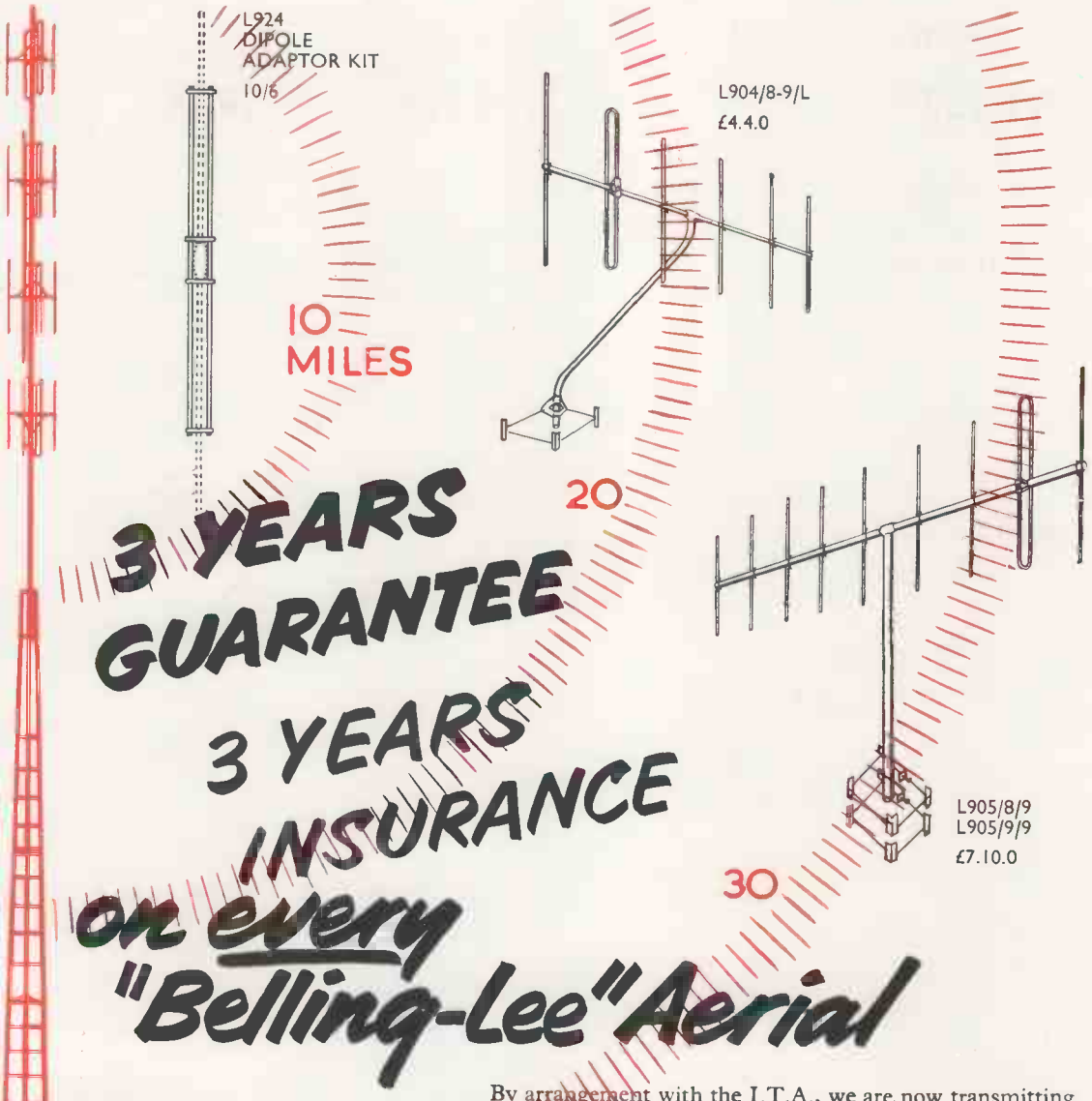
The dimensions of the new receiver are 33½in. high by 17¾in. wide by 19in. deep (including tube protection cover), and the specially tilted screen reduces reflections to a minimum. The retail price is 71 gns. (list price £55 15s. 3d., purchase tax £18 15s. 9d.).

(*Continued on page 89*)

MAY 4—14 1955

STAND-BY-STAND GUIDE TO THE NORTHERN RADIO SHOW

CITY HALL, DEANSGATE, MANCHESTER, 3



3 YEARS GUARANTEE
3 YEARS INSURANCE
on every "Belling-Lee" Aerial

By arrangement with the I.T.A., we are now transmitting a test signal from the Croydon station. This will be of great value in determining field strength and ghosting problems, and will enable band III aerials* to be erected and orientated well ahead of the commencement of the I.T.A. programmes. As manufacturers of almost half the television aerials sold in this country, we have provided this service as a contribution towards the success of commercial television.

* *"Belling-Lee" band III aerials are available in nine types, for loft, wall or chimney mounting. Every type has been proved on a local transmitter and is the subject of patents applied for.*

BELLING & LEE LTD
GREAT CAMBRIDGE ROAD, ENFIELD, MIDDX., ENGLAND

Stand-by-stand Guide to the
NORTHERN RADIO SHOW

CITY HALL, MANCHESTER, 3. MAY 4—14

Aerialite, Ltd.
Castle Works, Stalybridge, Cheshire.

STAND No. 46

The company are showing a full range of products of particular interest to the proposed Band III transmissions. The aerial types are sub-divided into three main groups: (a) Aerdaptors, (b) Separate Band III Aerials, (c) Composite Aerials.

The aerdaptors are for attachment to existing " H " and single dipole aerials and this includes one special type with auxiliary boom which may be swung to any position to give different directivity on Band III reception from that of Band I. Prices are: for single dipole 7s. 6d.; for " H " aerials 15s.; auxiliary boom model 30s.

The range of separate Band III aerials is recommended for attachment to existing Band I installations. There is a wide number of types including arrays only for 1in. or 2in. mast fixing; cranked arm models with wall or chimney lashings and drain pipe fitting models which are also suitable for end mounting on 2in. mast. The aerials have quick fitting attachments for the insulators and elements.

The composite aerial range includes types with single dipoles for Band I and folded dipoles with one or three directors for Band III. A filter box is used for combining the two arrays into a single down lead. Also there are models with " H " Band I arrays and 3- or 5-element Band III folded dipoles.

In all these models the feature is that the Band III array can be adjusted for different directivities from the Band I array. This is necessary in view of the fact that some stations for the I.T.A. will be located in a different position from the B.B.C. existing stations.

Other Aerialite products on show include: *Aeraxial* coaxial down leads, Band III convertors and pre-amplifiers, distribution units, and various types of radio and car aerials.

Ambassador Radio & Television Ltd.
Princes Works, Brighouse, Yorkshire

STAND No. 15

Ambassador are showing their new range of models for 1955. These were recently announced, and include 14in. and 17in. television receivers and a range of a.m./f.m. radios.

Corner styles continue to predominate in typical Ambassador styling and all receivers are fitted with turret tuners.

The a.m./f.m. receiver range includes a table model and a new version of the popular Ambassador bookshelf design, together with a 3-speed automatic radiogramophone.

Antiference Ltd.
Bicester Road, Aylesbury, Bucks.

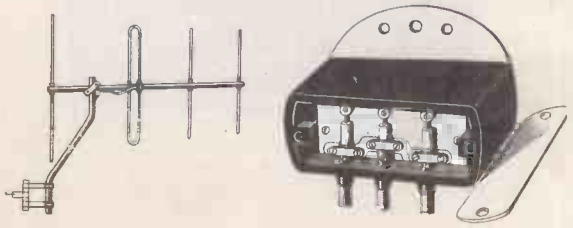
STAND No. 6

Many new models in the Antiference range of factory pre-assembled aerials are shown. All incorporate the exclusive " Snapacitor " principle which simplifies installation and eliminates metal-to-metal contacts which are prone to corrosion. The range of aerials covers all requirements for high and low band television reception and composite models for all-band reception.

The Band I television aerials include the normal X, H, dipole and multi-element types in addition to a de-luxe room aerial with two plastic-sleeved tuneable rods, and a high-gain loft mounting aerial with tuneable rods. Aerials for Band II f.m. reception include pre-assembled types for fitting to existing television aerial masts or for separate mounting. There are also telescopic indoor models for room or loft mounting.

Band III aerials suitable for channels 8 and 9 include models suitable as separate installation complete with their own mounting equipment, or with swan-neck mast and universal mast-grip bracket for adding to existing Band I aerial masts. There are also indoor types, telescopic, for room, loft or window-frame mounting.

Also on show are the new Addex Band III adaptors which can be simply fitted to existing Band I aerials to provide reception up to approximately 20 miles from the transmitter under favourable conditions. These add-on units (consisting of grip-on rod units and, where appropriate, reflector units with universal clamps) are simple to instal, no drilling of rods or booms being required. The same downlead is used and the Band I performance is unaffected.



One of the Aerialite range of Band III TV aerials (left) and the Aerialite filter box for combining two aerials in a single downlead.

Also exhibited is the Exstat anti-interference radio aerial equipment, incorporating Ferrite cored transformers and providing nose-free reception from 10–2,000 metres. There is also the telescopic Autex car radio aerial which can be easily fitted to any position on the car body-work. With single-hole fixing, an anti-shift locking device and a swivelling split-ball body providing angular adjustment greater than 180 degrees, this aerial is a versatile and easily-installed unit.

Plugs, sockets and other accessories complete the exhibit.

Arrell Electric Accessories and Permanoid, Ltd.
Vincent Works, New Islington, Manchester, 4

STAND No. 25

A comprehensive range of television downlead and h.f. cables is displayed, together with screened leads, microphone cables, connecting wires and many other types of cable. A recent introduction is an extensive range of multicore flexibles, from two to twelve cores, both screened and unscreened and featuring p.v.c. insulation and sheath.

Television aerials are also shown, ranging from multi-element fringe area arrays to simple dipoles. The unique insulator, both resilient and watertight, is an outstanding feature. The masts, spacer arms and elements are of high tensile aluminium alloy of stout gauge and all fixing brackets, cranked arms and lashing components are heavily galvanised to give full protection in all weathers.

A. J. Balcombe Ltd.
52-58 *Tabernacle Street, London, E.C.2*

STAND No. 13

Alba are showing a range of television receivers, including 14in. and 17in. models with turret tuning for two-band reception, and current radios including the Model 707 which was the first portable (mains or batteries) radiogram to be introduced.

There are additionally five new models. Model 3211 is the first Alba a.m.-f.m. receiver, a 7-valve 4-waveband circuit with magic eye indicator. Another a.m.-f.m. receiver is Model 6221 using the same radio chassis as Model 3211 but also incorporating a 3-speed autochanger record player. Model 3122 (18 gns.) is a new table radio receiver featuring a 3-waveband a.c.-d.c. circuit and similar to the Model

(Continued on page 38)

at the NORTHERN RADIO SHOW

TELEVISION

Model VT68DA (Left)

2 band, 14" table model with 13-channel Tuner Unit of the incremental inductance type designed as an integral part of the circuit. No additional tuning coils are required for specific stations — they are already there! One station selector control only. Up-to-the-minute A.G.C. system to cater for the widest possible signal strength variation between transmitters, besides counteracting picture fading and flutter. New Emiscope aluminised tube with dark screen filter for daylight viewing. The chassis including C.R.T., slides out of the cabinet in a single unit.

Price 66 gns. (Tax paid)

Model VT69DA

The new 17" table television receiver is similar in appearance to model VT68DA. It is housed in a handsome cabinet of walnut veneer with simple, forward facing controls.

Price 79 gns. (Tax paid)

Model VC68DA (Right)

Model VC68DA is the console version of the 14" table receiver. It incorporates the same technical features, including the new Emiscope aluminised tube. All models have inbuilt dark screen and special non-reflecting tube masks. Precision designed components in the C.R.T. gun and a stable permanent magnet focussing assembly insure sharply defined pictures at all times. Model VC68DA is finished in figured walnut veneer and is fitted with castors.

MARCONIPHONE

the **REAL** *thing*

RADIOGRAMS & RADIO

Model T36AB

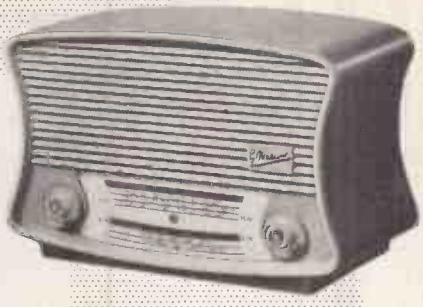
A compact and highly efficient mains/portable receiver in grey imitation lizard skin. 5 valve, 3-band superhet with inbuilt aerial.

Price, without batteries, £17.10.0 (Tax paid)

Model T37DA

A 5 valve, 3-band DC/AC transportable "Companion" set. Inbuilt aerial. Finished in maroon plastic with golden coloured controls.

Price £15.15.0 (Tax paid)



Model T38A

High quality 5 valve, 3-band AC superhet table receiver. Inbuilt aerial. Simple controls. Walnut veneer finish to cabinet.

Price £22.1.0 (Tax paid)

Model ARG40A (Left)

5 valve superhet radiogram in a beautiful console cabinet, with highly polished contrasting walnut veneers. Incorporates automatic 3-speed record player, with feather-weight pick-up having special turnover cartridge with separate styli for 78, 33⅓ and 45 r.p.m. records.

Price 55 gns. (Tax paid)

Model ARG41A

Similar to the ARG40A, but housed in a contemporary style cabinet, finished in straight-grained sapele veneer.

Price 57 gns. (Tax paid)

★ ***MARCONI-MEN***

will be supported by vigorous advertising in the National and Provincial Press

The Marconiphone Co. Ltd., Hayes, Middlesex.

MT49

RADIO SHOW PREVIEW

(continued)

3112 (designed to match modern furnishing schemes) except that the cabinet is in a more orthodox styling.

Model 6981 (54 gns.) is a new low priced a.c. radiogram in a solidly constructed cabinet of walnut veneer, with

Alba Model 3211 4-band radio

record storage space and pneumatic self-closing lid. The latest television receiver is Model T424, a 17in. console without doors using the current Alba television circuit with turret tuner (84 gns.). Prices are tax paid.

Belling & Lee, Ltd.

Great Cambridge Road, Enfield, Middx.

STAND No. 54 Combined aerials are shown for the first time, ranging from a *Lofrod* to an "H" with two 6-element Band III arrays mounted broadside, and are designed for use where co-siting of transmitters exists. *Diplexer* (two-way split) units, to avoid interaction between the two systems feeding into a common termination point, are not required.

Add-on Band III aerials are available for affixing to Band I aerials where it is impractical to fit an adaptor. Aerials with 3, 6, 9 or 12 elements are available for indoor or outdoor mounting where the transmitters are not co-sited nor in line, or for stacking to produce a highly-directional high-gain array. *Diplexer* units are necessary with these add-on units. Adaptor kits, effective up to 20 miles from a transmitter and not requiring *Diplexer* units, are available for adding to certain Band I aerials.

Also shown are Band I aerials for vertical and horizontal mounting, designed for areas where co-siting does not exist or where Band III programmes will not be available for some time. A wide range of f.m. aerials is being shown, including an f.m. version of the *Viewflex* indoor type and a 3-element fringe array. Radio aerials include the Skyrod 15ft. vertical connector (with or without the *Eliminoise* anti-interference equipment), the *Winrod* and the *Carod* automobile aerial.

Belling & Lee also exhibit a wide range of small accessories, such as aerial terminations, plugs, sockets, attenuators, fuse-links, thermally-operated devices, valveholders and printed circuit connectors designed for reliability and long storage-life. There are also distribution amplifiers for multi-point television or radio installations and mast-head pre-amplifiers for the improvement of the existing television signal in areas of low signal strength.

Interference filters for both Band I and Band III frequencies are on show, including the compact *Telefilter* which provides filtering on both television frequencies and on medium wavebands by a choke and capacitor system. There is also a range of industrial and domestic filters for h.f. interference suppression, and ignition filters for various types of vehicles is well represented by the *Sparkmaster* series.

B.B.C. EXHIBIT

STAND 56 — see page 16

Bush Radio Ltd.

Power Road, Chiswick, London, W.4

STAND No. 36 The TV receivers displayed on the Bush stand include an entirely new range having flywheel synchronisation, 13-switched channels and permeability tuning. There are table models and consoles with 14in. and 17in. tubes, most of which can be seen working either on the Bush stand or else in Television Avenue.

Details are available of the converter to enable sets to receive transmissions on Band III. This can be fitted to all models manufactured since June, 1950. The cost of this converter, exclusive of the dealer's charge for fitting (which will vary according to the particular model concerned) is £5 15s. net.

Bush are introducing two table receivers for the reception of v.h.f. f.m., the VHF41 and the VHF54. The current radiogramophone, the RG46, is already equipped to receive the v.h.f. service as well as medium and long wave. It is

Belling-Lee combined Band I and Band III aerials. Left — type L913/L, and right — type L912/L

BRITISH RADIO AND TELEVISION

92 Fleet Street, London, E.C.4

STAND No. 39 A warm welcome awaits readers of this journal at Stand 39, where *British Radio and Television* will be featured, and back numbers, Test Reports, binders, and James Huxley's "Essential Servicing Data" will be available. A member of the staff will be present to answer enquiries and discuss trade matters.

a 7-valve receiver with 3-speed gramophone motor and is for a.c. mains only. Other radio models are represented with table receivers for d.c.–a.c. mains and a mains–battery portable.

E. K. Cole Ltd.

Ekco Works, Southend-on-Sea, Essex.

STAND No. 53 All the *Ekcovision* receivers displayed incorporate a 13-channel turret tuner for two-band reception. Features common to all receivers include aluminised tubes optical filters, and automatic picture and sound control. The least expensive model is a 14in. tube table receiver which provides a picture measuring 12in. × 9in.

The range of 17in. receivers includes a table model (T231); a floor-standing version (TC208) which has the additional feature of flywheel synchronisation; and Model TC248, a console receiver which incorporates "spot wobble."

Ekcovision, Model TC209, a 17in. console receiver—incorporates a turret tuner which not only provides switch selection of alternative television programmes, but also v.h.f.–f.m. broadcasts.

Among the radio receivers a new model is the latest version of the Ekco *Radiotime*. This combines a Smiths self-starting electric clock with a 5-valve radio tuning on long and medium waves. It provides alarm facilities and also automatic time-switching for both the radio and any electrical appliance (up to 1,250 watts), for which a socket is provided.

Model U195 is a compact 4-valve receiver giving switch selection of four pre-tuned stations, while Model U199A is a 5-valve receiver providing switch selection of three pre-tuned stations, in addition to tuning on long and medium waves. Model U245 is a 5-valve table receiver for long and medium wave reception.

The mains battery portable receiver (Model MBP183) is now available in a choice of five delightful colour schemes. A newly styled table auto-radiogram, Model TRG249 incorporates a 3-speed gramophone and a 3-waveband radio unit.

The new Ekco a.m.–f.m. receivers include Model U243, an inexpensive 6-valve receiver which incorporates a tuning indicator and covers long and medium waves as well as the f.m. band. Model A239 is a high-grade a.m.–f.m. receiver designed to take full advantage of the better reception of the forthcoming v.h.f.–f.m. transmissions.

Ekco radio receivers designed for installation in cars of any make or year are being exhibited. In addition to specially styled versions for certain cars, a de-luxe receiver with push-pull output is available. Car radio aerials and speakers are also displayed.

A. C. Cossor Ltd.

Cossor House, Highbury Grove, London N.5

STAND No. 17 Turret-tuned two-band television receivers and a.m.-f.m. radio receivers are featured prominently by Cossor. Three a.m.-f.m. receivers are shown. Model 523 (The "Melody Master") is a table radio with 6 valves and self-contained aerial in a walnut veneered cabinet. Model 522 is a 6-valve radiogram with substantially the same chassis but incorporating a record unit handling automatically up to ten 7, 10 and 12in. discs, standard and long-playing, unmixed. The latest Model (524—the "Melody Maker") a table model in a plastic moulded cabinet.

Cossor standard a.m. radio is represented by the modern versions of the "Melody Maker"—Model 520 being the latest de-luxe edition, incorporating a 5-valve chassis, self-contained aerial, 8in. sensitive speaker and housed in a walnut veneered cabinet. Also on show is the "popular" version, Model 501, in a moulded cabinet.

Of the television receivers there is Model 937, a 17in. table receiver, a 21-valve model with turret-tuning, flywheel sync, automatic contrast control, for a.c.-d.c. mains, in modern walnut cabinet. Two other models have the same specification and they are the 939F, a console with full-length doors, the cabinet fitted with smooth-running castors, and the other is the 938F, a 14in. table receiver.

In the de-luxe class there is the 935—a three-in-one model incorporating a 17in. turret tuned television receiver, an all-wave radio receiver and auto-changer record unit handling up to ten 7, 10 and 12in. discs, long-playing and standard, unmixed. The cabinet, on smooth-running castors, incorporates ample record storage space.

Decca Record Company Ltd.

1-3 Brixton Road, London, S.W.9

STAND No. 9 & 23 In addition to the current range of models, Decca are showing two new models—the RG/100 and RG/103 radiogramophones, incorporating f.m. tuning. The RG/100 is a 7-valve automatic 3-speed radiogram including coverage of a.m. short, medium and long wavebands and the f.m. v.h.f. band.

The high quality amplifier feeds into separate speakers—a 10-in. high-flux p.m. cone speaker for bass and an electrostatic unit for treble. Output is 3 watts. Separate bass and treble tone controls are provided. An internal resonant f.m. dipole is fitted which is adaptable as an a.m. shortwave internal aerial. An internal Ferro-rod a.m. aerial is fitted. All types of records can be played on the Garrard RC111 autochanger, fitted with a turnover crystal head. A pull-out hopper-style record storage compartment is incorporated in the walnut-finished cabinet, individually adjustable to the various sizes.

Decca Model DM14 table television receiver

Model RG/103 is a 9-valve de-luxe radiogram incorporating a comprehensive tuner unit providing coverage of the f.m. band and short, medium and long wave a.m. bands. The 5-valve audio push-pull amplifier section drives a high-fidelity speaker system consisting of a high-flux p.m. 10in. speaker for bass and two electrostatic speakers for treble. Output is 6 watts. The provision of internal aerial is similar to the RG/100. The record player section incorporates a Garrard 3-speed autochanger with Decca interchangeable heads. The hand-polished, bow-fronted cabinet is finished in walnut and includes concealed compartments on either side of the speaker which provide storage space for over 100 records.

Amongst the current models are four 12-station television receivers—the 14in. table model, DM14 incorporating an 18-valve circuit and 6in elliptical speaker; the three 17in. models, DM17, DMC17 and DMC/D17, being table, console and double-door console receivers respectively. Amongst the sound reproducing equipment is the well-known Deccalian Model 81, the Deccamatic 11 and the high-fidelity triple-speed record reproducer Panatrope, the cabinet of which is fitted with "domes of silence".

Edison Swan Electric Co. Ltd.

155 Charing Cross Road, London, W.C.2

STAND No. 47 *Bring the world into your home with Ediswan Mazda valves and television tubes* is the theme of the main display feature of this stand. The "little house" which has featured in much of the latest Ediswan publicity material appears complete with television aerial. Beneath the house is displayed a full range of Ediswan Mazda television tubes including 21in. and 27in. rectangular types.

Another feature shows the complete story of a television tube, from its design through development, production and distribution until it reaches the individual user.

A further display features an extensive selection of Ediswan Mazda television and radio valves divided into their various ranges and grouped under their applications. Included in this display are six new valves for television Band III "turret tuners" and f.m. radio receivers.

A display of industrial and transmitting valves includes photocells, photo-multipliers, vacuum thermal delay switches and the 13.E.1, a new beam tetrode d.c. control valve of exceptional performance. A comprehensive selection of Ediswan Clix radio, television and electronic components includes: plugs, sockets, panels, valve and c.r.t. holders, screening cans and retainers.

Laboratory equipment on show includes three stabilised power supply units, one of which is specially designed to supply photo-multipliers, a low-frequency oscillator, portable electrical recording equipment and a self-contained industrial servo control unit.

The Ediswan *Loudspeakerphone* intercommunication equipment will be displayed and demonstrated. Metal-glass seals, radio accumulators, radio and television feeder cables and a 5-amp Tungar battery charger for home or commercial use complete the exhibit.

E.M.I. Sales & Service Ltd.

Hayes, Middlesex

STAND No. 49 The chief features of this exhibit are the magnetic recording tape and lacquer recording blanks. Prominently featured is the new Emitape 77 and 88—a high quality recording tape for professional or general use; the same tape, in fact, which is used for the recording of H.M.V., Columbia and Parlophone records, as well as for the recently released H.M.V. and Columbia tape records.

Outstanding features are high sensitivity; marked anti-static characteristics, and freedom from curl—thus ensuring uniformity in recording and reproduction. Additionally, the p.v.c. base gives high tensile strength and yield point, very low elastic elongation and longitudinal temperature co-efficient, and negligible humidity expansion. An important feature is the high degree of sensitivity uniformity. Both types are manufactured under the same conditions but every reel of the 77 tape undergoes a special Pen Test examination throughout the whole length to ensure a level of sensitivity not exceeding $\pm$0.5db on a 1 kc/s signal and an overall variation from reel to reel not greater than $\pm$ 1db. Both types are available over a range of five sizes of spools covering all professional and domestic hub machines.

Two new introductions now shown for the first time are a 3in. spool and leader strip—made of white p.v.c. and packed in 150ft. lengths for tilting and identification of recorded tapes. A comprehensive range of editing and jointing accessories is also exhibited.

The "Emidisc" lacquer blanks are noted for free cutting and low background noise, allied to excellent frequency response and anti-static properties. The lacquer coating used has a constant thickness of 0.006in. over the whole recording surface and is specially evolved for maximum frequency response, low noise level and good wear. Emidisc blanks are available in four grades from 6in. to 17½in.

Also shown is the No. 17 pick-up, designed for professional use and the high-fidelity user wanting

(Continued on page 41)

RADIO SHOW PREVIEW

(*continued*)

the highest reproduction quality. It has a unipivot oil-damped suspension offering negligible resistance to horizontal and vertical movement. For a constant recorded velocity, the frequency response is sensibly level within 30–12,000 c/s (with 78 r.p.m. stylus) or 30–10,000 c/s (with microgroove stylus). The sapphire stylus is cantilever mounted and easily interchangeable.

English Electric Co. Ltd.

Marconi House, Strand, London, W.C.2

STAND No. 22 In addition to the established range of 17in. table and console television receivers, the A23 Rotamatic tuner is being shown—the adaptor for single channel receivers. Featured prominently are the four new-21in. television models, all consoles.

Model C45 (115 gns.) uses 14 valves, 4 germanium crystals, metal rectifier and barretter control for the heater circuit. It incorporates Rotamatic turret type 12-channel tuning. The loudspeaker is front facing and is a 10in. × 6in. elliptical unit with a high flux density. The cabinet, of selected sapele veneer, has a high gloss finish and the speaker fret is in "quaker grey" material to harmonise with the tube mask.

Model C45FM (120 gns.) has a similar specification but is fitted with a switch assembly operated by the television channel selector control to permit reception of the v.h.f. f.m. Home, Light and Third Programmes which are receivable on dial positions 10, 11 and 12, with the television vision circuit automatically cut out.

Models C46 (125 gns.) and C46FM (130 gns.) are similar receivers except in the matter of cabinet design. Folding doors are provided to cover the tube face when not in use. These four receivers are for use on a.c. or d.c. mains supplies (200-250 volts) and the 21in. tube, running at 15kV, provides a screen area of 185.5 sq. in. Prices include purchase tax.

English Electric Model C45 console TV

Ferguson Radio Corporation

105–109 *Judd Street, London, W.C.1*

STAND No. 16 A new Ferguson range of high-gain, turret-tuned, table model and console television receivers is on show. These new receivers are in two groups, *i.e.*, 21-valve *Nine Star* models having many new technical features to ensure perfect reception even under bad conditions, and a *New Standard* series of 18-valve receivers for operation in all areas where reception conditions are normal.

Both the *Nine Star* and *New Standard* models are suitable for non-synchronous supply mains and have separate mains switches to avoid disturbing the settings of other controls. The Ferroxdure focusing assembly has been redesigned and all models use the new PCL 83 triode pentode valve for audio amplification and output.

Additional design features of the *Nine Star* models include a patented new a.g.c. circuit, long time-constant flywheel synchronisation, variable grey spot suppressor, and a special frame time-base circuit to ensure positive interlace.

Radio

Models 356 (4-valve, 3-waveband superhet) and 325 (5-valve superhet) have been retained. 356A is for operation on a.c. mains, 356U for a.c.–d.c. mains and 356B for operation with dry batteries. Models 325A and 325U are for a.c. or a.c.–d.c. mains operation respectively with twin cursors for the selection of home stations by wavelength and overseas stations by frequency. Model 329A is a separate version of the 325A designed to receive v.h.f.–f.m. transmissions.

Two radio models for the export market are also on show.

Radiograms

Most recent of Ferguson radiograms is Model 323RG, exhibited for the first time. Occupying only 2¼ sq. ft. of floor space the 323 is a bureau model, in a choice of either walnut or mahogany veneers, for the smaller home. It has a sensitive 3-waveband receiver and 3-speed autochanger with turnover crystal head.

Model 400RG which had a special appeal for the connoisseur is now succeeded by Model 401RG which, while retaining the features of the earlier model, has the facility to receive v.h.f.–f.m. transmissions. It has magic-eye tuning and an illuminated on–off indicator panel. The Ferguson "500"—a high-fidelity luxury instrument—is now joined by Model "501" which incorporates facilities for the reception of v.h.f.–f.m. transmissions.

Ferranti Ltd.

Moston, Manchester, 10

STAND No. 29 Six new models are shown on the Ferranti stand. Model 045 is a 6-valve table receiver for a.c. mains operation, having four wavebands—short, medium, long and f.m. A built-in f.m. dipole is fitted with provision for external aerial.

Ferranti Model 445 bureau radiogram

The output stage, incorporating negative feedback, delivers 5 watts to a 10-in. elliptical p.m. speaker and the walnut veneered cabinet is set off by a large illuminated dial.

Model 1055 is a de-luxe a.m.-f.m. autoradiogram, incorporating a 12-valve 4-waveband chassis with push-pull output delivering 14 watts into a 12-in. Goodmans speaker and a separate 7in. treble unit. Both speakers are specially housed. For record reproduction, a Garrard RC90 3-speed changer is incorporated.

The other four new models are the 345F (a.m.-f.m. autoradiogram), 555 (a.c.-d.c. mains transportable radio), 855 (portable battery receiver), 955 (a.c. mains-battery transportable radio).

The television display includes four different picture sizes ranging from 14in. to the 24in. (diagonal) projection models. Of special interest is the 20T4, designed to meet the need for a really large picture in table model form—a projection receiver, it gives a flat-faced picture of 20in. diagonal. Another interesting feature on the stand is a display showing two types of Band III tuner units for converting earlier Ferranti 5-channel receivers into 13-channel receivers.

Garrard Engineering and Manufacturing Co. Ltd.

Newcastle Street, Swindon, Wilts.

STAND No. 3 A wide range of the company's gram units and accessories is on show, including the newest addition, the Model 301 transcription motor which is

(*continued on page 42*)

RADIO SHOW PREVIEW

(*continued*)

designed for the high-fidelity market. The unit has an extremely low wow and flutter figure and is equipped for dual voltage ranges of 100 to 130V and 200 to 250V, with a suppressor condenser fitted to avoid switch clicks. Each of the three nominal speeds (33⅓, 45 and 78 r.p.m.) is adjustable by ±2½ per cent. by means of a specially designed eddy current brake. Price is £19 plus £6 3s. 6d purchase tax.

Garrard type 301 transcription motor

The range of Garrard changers, types RC90, RC80M, RC110 and RC111 are on show, as are the single record players Models T and TA. These are all 3-speed automatic changers. An addition to the range of replacement styli is the Garrard GC2/1 and GC2/3 diamond styli.

A 3-speed spring gramophone motor is exhibited for the first time, also a range of electric motors designed to be extremely quiet and steady, suitable for driving sound recording and reproducing mechanisms as well as other applications.

The General Electric Co. Ltd.

Magnet House, Kingsway, London, W.C.2

STAND No. 37 & 43 The full range of G.E.C. radio receivers, radiograms and two-band television receivers will be on show on Stand 37. Several new models make their appearance and there is a selection of Band III adaptors. One new model is the BC5842 table radio with inbuilt aerials and covering both the f.m. band and the medium and long wave a.m. ranges.

Also included is a compact mains portable, the BC4644 (15 gns.), housed in a moulded polystyrene cabinet and suitable for room to room portability. The BC5445 (20 gns.) is a transportable table radio in a plastic cabinet with a finish simulating a wood grain. Model BC4444 (18 gns.) is an attache-case portable for mains-battery operation.

Two new radiograms incorporating a.m.-f.m. radio receivers and fully automatic 3-speed record changers capable of handling mixed record sizes are on show. There is also the latest version of the BC7443, a 3-speed table auto-radiogram (39 gns.) which will handle 7in., 10in. and 12in. records mixed in any order.

Amongst the television receivers are the current models, BT1746 (65 gns.) and BT2645 (77 gns.), 14in. and 17in. table models. Also shown are three new 17in. console receivers with similar specification but offering a choice of alternative cabinet styles and are a preview of the models to be released later in the season. Also shown is a prototype 21in. table receiver which has been used for development tests on larger screen types of receiver. All models are available in fringe area version, equipped with fly-wheel line sync.

On the smaller stand (No. 43) the Osram 912 high-quality amplifier is on show, in conjunction with a G.E.C. metal-cone speaker in a special octagonal cabinet. With an audio frequency range of 9 octaves (30 c/s to 16 kc/s) it delivers an output of 12 watts and has been so designed that it can be readily assembled by the home constructor.

Grampian Reproducers Ltd.

The Hanworth Trading Estate, Feltham, Middlesex

STAND No. 26 Grampian are showing a comprehensive range of amplifiers, loudspeakers, microphones, etc., suitable for both mobile and permanent p.a. installations, a new pressure unit (type SP25) for projector loudspeakers with a power handling capacity of 25 watts, and a new a.c. mains/12-volt battery operated amplifier with an output of 25 watts, suitable for mobile p.a. work.

Also showing is the Grampian version of the Mullard 5-10 amplifier, which conforms with the Mullard specification but incorporates a number of variations. The control panel is made as an entirely separate unit so that it may be mounted in the top of the cabinet, provision is made for plug-in equalisers for the matching of various types of crystal pickups and the power supply is ample for feeding an f.m. radio tuner unit. The list price of the amplifier, complete with one plug-in equaliser unit is £21.

The Gramophone Co., Ltd. (His Master's Voice)

Hayes, Middlesex

STAND No. 35 A new range of two-band television receivers is being shown, in which special attention has been paid to ease of tuning and freedom from major adjustments when changing from one band to the other.

Among the new features are: tilted anti-reflection filter screen; dust-sealing mask giving full picture area over the whole of the tube face; all main controls (new dual type with large knobs for easy handling) at the front; new front-facing slot loudspeaker 8in. wide; new rectangular aluminised *Emiscope* tube; electrostatic focusing; high efficiency line-scanning and e.h.t. generator unit completely sealed for long life and reliability.

Standard models are: 1840 (14in. table), 1841 (14in. console), 1842 (17in. table), 1843 (17in. console with fold-back doors) and 1844 (17in. console). De-luxe models, similar to the standard models but in special walnut-veneered cabinets with warm diffused brown mask and matching gold-filled plastic panel and knobs, are: 1845 (14in. table) 1846 (17in. table). The current fringe area models now re-designed for two-band reception are: 1828A (14in. table), 1830A (17in. table), 1831A (17in. console with fold-back doors).

Radio Receivers

The new range of f.m. receivers includes: Model 1128—a.m. f.m. receiver for a.c. mains, covering long, medium and v.h.f. bands, in a neat plastic cabinet with Ferrite internal aerial for long and medium waves. Model 1251—a de-luxe 6-valve (plus tuning indicator) table receiver for a.m. and f.m., covering the long, medium and v.h.f. bands. Features are a wide (10½in.) floodlit tuning scale; simple controls; 10½in. elliptical speaker.

Model 1252 (external) is a self-contained f.m. unit in polished wooden cabinet for use with a.c. receivers with pick up inputs. It incorporates its own tuning arrangements and power supply. Model 1252 (internal), as above, but in chassis form for the adaptation of current and certain post-war H.M.V. radiograms.

Current Models

The present range of H.M.V. radio receivers, radiograms, record reproducers and players are also prominently featured on the stand, special emphasis being given to Model 1127—an ingenious clock-controlled radio which switches itself on and off automatically and will also switch on a light, a kettle or similar appliance.

In the range of radiograms, an entirely new model is the 1620—a 5-valve, 3-waveband console a.c. radiogram, 3-speed, 8-record autochanger and a novel push-pull output circuit arrangement. The polished cabinet also provides record storage.

Models 1617B, 1618B, and 1619B now incorporate a new and improved 8-record auto-changer, and a pick-up with a new turnover crystal cartridge covering an extended frequency range. Equalising circuits for 78 and microgroove records are separately switched, and an auxiliary (tape) input position is also provided.

Other items on the stand include: the C102H portable gramophone; the SR1 mains interference suppressor; and an efficient indoor TV aerial.

Invicta Radio Ltd.

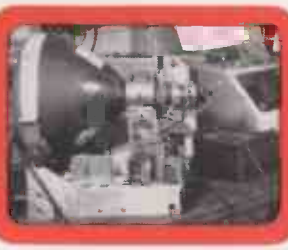
100, *Great Portland Street, London, W.1.*

STAND No. 19 Invicta are exhibiting their full range of products including television, radio-gramophones, radio receivers and portables. All television receivers are designed for 13-channel operation. Programme selection is by means of a 12-position switch.

The four models featured will be: Model 122T at the lower end of the price scale—this is a 14in. table receiver housed in a rexine covered cabinet; Model 118T—a console model fitted with doors, and Model 119T—a table model.

Invicta are also showing a converter unit designed to give existing Band I receiver owners the facilities for reception of the new Band III transmissions. The converter is housed in a bakelite

(*Continued on page 67*)



James Huxley's

SERVICE DEPARTMENT

No. 5

THIS TECHNICAL SECTION IS INDEPENDENTLY STAPLED SO THAT IT CAN BE REMOVED AS A COMPLETE UNIT FOR EASY FILING

This ALUMINIZED Picture tube gives

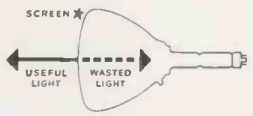
★

60% brighter pictures more contrast extra tube life

AN Ediswan Mazda aluminized picture tube gives a picture 60% brighter and more contrasty than is possible with an ordinary tube. In addition, Ediswan aluminizing protects the screen from ion burn and, *with the new Ediswan ion trap tetrode gun to protect the cathode*, tube life is increased.

Ediswan production methods, which include the special in-line vacuumizing system, ensure a higher, more uniform standard of lasting efficiency.

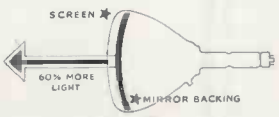
★



WITHOUT ALUMINIZING

Without aluminizing, tubes waste half their light.

To counteract this the brilliance must be increased and tube life is shortened.



WITH EDISWAN ALUMINIZING

Ediswan aluminized tubes have a mirror backing to the screen. All the light is thus thrown forwards, giving brighter, clearer pictures and extra life.

EDISWAN

MAZDA

ALUMINIZED CATHODE RAY TUBES

THE EDISON SWAN ELECTRIC COMPANY LIMITED

155 Charing Cross Road, London, W.C.2 and Branches

Member of the A.E.I. Group of Companies

RV9

TECHNICAL GEN for SERVICING MEN

Edited by James Huxley

HELP YOURSELF

to all the technical gen in this feature, which is your feature, presenting details of faults encountered by engineers in current radio and television sets, and explaining how those faults were diagnosed and overcome. The aim of this feature is to guide

AND HELP

all in the radio and TV trade. If you have come across any unusual fault in a set recently, write and tell James Huxley, "British Radio and Television," 92 Fleet Street, London, E.C.4. All published contributions are paid for, and your contribution may help

OTHER ENGINEERS

Slipping Dial Drives

Useful Cord Hint

Reading in the January issue about a tip for dealing with slipping dial drives prompted me to record my own particular method. It has several advantages over the previous method in that it does not entail removing the drive cord, does not require time to set and does not introduce backlash which sometimes results from packing the drive spindle with tape.

The method consists simply of grinding a little resin to powder with a screwdriver or other suitable tool and then applying it to the affected part of the drive cord with thumb and forefinger. The resin should be of similar type to that used by violinists to make the bow grip the strings of their instrument, and it can be easily obtained from any musical instruments shop.

This method has been found to be quick and completely effective in every case.—V.D.C., Bristol, 5.

Ferranti 14T3

Broad Black Bar

Customer complained of a black bar about 2in. deep appearing across the screen after about two hours running. This occured every time the set was used. Instructing the customer to switch on at 9 a.m., we called round at 11 a.m. and sure enough the black band had appeared. Hum was discounted and a faulty tube diagnosed. A sharp tap on the neck of the tube proved it guilty and a new c.r.t. corrected the fault.—R.E.J., Llanrwst.

Pye P76F

Insulation Damage

The complaint on this receiver was no medium or long wave signals, although the short wave and trawler bands were o.k. Investigation showed that the aerial and mixer grid circuits were in order yet a check at the oscillator grid proved that the oscillator section was also working satisfactorily. It was then thought that the oscillator circuit must be well off frequency but checking the few components common to medium and long wave ranges brought no success.

WHEN SENDING IN REPORTS TO JAMES HUXLEY FOR TECHNICAL GEN . . *please write (or type) on one side of the paper only, leaving space between the lines for editorial use and add a rough sketch where possible.*

Then, inspecting the set for a mechanical fault, it was found that the medium and long wave oscillator coils (which are mounted adjacent to each other) were making physical contact. Separating them cleared the fault. The insulation must have rubbed off the wire due to mechanical vibration, causing a partial short circuit which lowered the inductance of both coils.—R.A.B., Birmingham, 8.

Ever Ready G

Medium Wave Crackles

This receiver was the subject of a number of faults. After replacing a burnt-out bias resistor and a blown h.t. electrolytic, signals were inaudible with loud crackling on medium waves. Shorting the bottom end of the frame to ground brought up the signals. It was discovered that there was a positive voltage on the a.v.c. line and faint sparking was noticed in the wavechange switch also switches the h.t. positive line. H.t. was leaking from this section to the frame section. A new switch and a new a.v.c. diode load restored things to normal R.E.J., Llanrwst.

Beethoven Radiogram

Loud Audio Hum

A Beethoven table radiogram had a loud hum with no signals on all wavebands, but only a slight hum on gramophone with normal reproduction. The chassis was removed and a faulty h.t. connection was discovered to the primary of the second i.f. transformer. After re-soldering this connection and replacing the chassis, the hum was still present as previously. Removal of the chassis again showed that the repaired connection was now bent back and shorting to chassis.

A thorough check then showed that the actual cabinet was the culprit. A sliver of wood was sticking up from one of the bolt holes in the cabinet so

(Continued on page 47)

The Editor does not necessarily endorse the views expressed by contributors to this feature

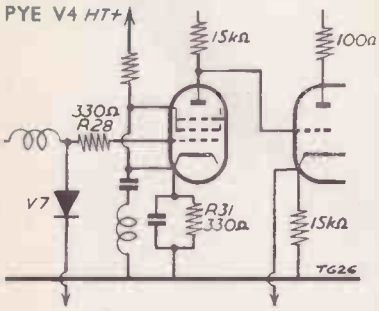
that when the chassis was inserted in the cabinet it passed over this piece of wood which then pressed on the i.f. lead thus straining the connection.

This is not the first time this sort of trouble has been experienced in this particular receiver.—J.K., Rutherglen.

Pye V4 Series

Faulty A.P.C. Circuit

The receiver in question went off with a plop on vision, sound remaining o.k. On examination it was found that R28 was badly burned and fell to pieces when touched. It seemed that some h.t. had found its way to the grid of V5 and sure enough the valve had a screen-to-grid short.



A new valve was fitted together with a new R28 but still no picture. A careful check revealed that the a.p.c. was in full operation and blocking off V4, and this was eventually traced to R31 which had gone low and was causing the anode voltage to drop at the anode of V5 and subsequently at the cathode of V9A. This is a critical voltage feeding the a.p.c. gating diode.

A new resistor was fitted and the picture was then normal.—N.K., London, W 5.

Ferranti T1325

Transformer Trouble

Symptoms were picture folding up to about 2in. high after being on about an hour, but there was a portion of picture showing at normal height. Checking the frame blocking oscillator transformer under both conditions revealed that the secondary winding was going down in value from 1,100Ω to 950Ω. This fault has occured on two of these models in for service.—R.E.L., Worthing.

Ultra Coronation Twin

Low Filament Voltage

Here is an interesting fault on this model, applicable to several other battery/mains receivers. It concerns an intermittent failure of the oscillator section of the IC2 when 7.5V l.t. battery drops slightly. After routine checks, it was noticed that the filament voltage of the IC2 was slightly low even on a new battery. The fault was eventually traced to the output valve. One section of the filament circuit was dropping 1.6V and the other section 1.9V showing that the filament had obviously gone high. Replacement of the 1P11 cured the fault.—H.J.G., Harrogate.

Bush AC34

Persistent Crackle

One of these receivers exhibited a persistent crackle on all wavebands, which was controllable by the volume control. It sounded like an h.t. leak somewhere and in fact one was found across the contacts of the wavechange switch to the contacts that switch in the gramophone sockets.

The ideal cure, of course, was to fit a new wavechange switch, a long and tedious job. It was found, however, that the gram sockets were not used, so we removed the short screened lead from the gramophone contacts on the switch to the junction of the 100kΩ resistor and 0.01μF capacitor mounted on the chassis near the volume control. Perfect results on radio were obtained.

This type of fault is very prevalent in many makes of receiver to-day and is always characterised by the harsh crackles produced in the speaker; so much so that on hearing it many service engineers immediately start examining the wavechange switch. But the other day we wasted a lot of time in this way only to discover that some faulty EF41's can produce exactly the same kind of crackle!—G.R.W., Liverpool, 9.

English Electric T40

Insulation Fault

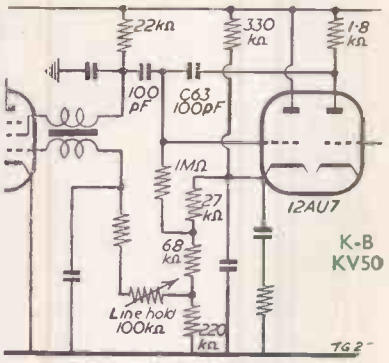
The fault was weak sound and vision. On removing the bottom cover of the receiver, a 10kΩ, 1 watt, resistor was seen to be running very hot. A short circuit inside the 13-channel tuner unit was suspected as the resistor in question is the h.t. feed for the tuner unit valves. Component tests produced no obvious fault and then it was noticed that a ceramic connection block on the metal frame of the tuner had decreased to a mere 3kΩ resistance. This ceramic block takes the form of a feed-through. As no apparent reason could be seen for the breakdown in insulation, the wiring was modified to by-pass the connecting block and the 10kΩ resistor replaced. The receiver then functioned normally.—R.A.W., Stourbridge.

Kolster Brandes KV50

Erratic Line Hold

One of these sets came in with the complaint that the line-hold control needed frequent adjustment. Sure enough after the set had been running about an hour the line frequency started to vary.

A voltage check was made and it was found that the positive potential to which one end of the line-hold control is returned was varying in an erratic manner. A glance at the circuit showed that this potential is derived from one half of a 12AU7 which functions as a.f.c. triode.



A check on the grid of this valve showed that this voltage was also varying in a similar manner, and C63 which is a 100pF condenser was found to be leaking. Replacement of this component cured the trouble.—A.T., Welling, Kent.

Ferguson 988T

Vision Det. Change

Engineers may be interested in the method I adopt when dealing with faulty vision detectors in these receivers. As I dislike removing the final i.f. transformer to replace the crystal rectifier, I make sure it will not happen again by fitting a valve rectifier. The valveholder hole in the chassis by the i.f. transformer is not suitable for a B7G holder with normal spacing, but a B8A holder fits quite well.

A Mullard EB41 is used and the heater chain is broken in the i.f. circuit. The crystal detector and the 10pF shunt capacitor across the secondary of the final i.f. transformer are removed and the secondary is wired direct to the

(Continued on page 49)

nearest anode of the EB41. The unused electrodes of the valve can all be earthed together with the internal screening of the valve. The cathode associated with the anode used is connected up to the input to the v.f. amplifier valve in the same way that the crystal was connected. The i.f. transformer will require slight re-tuning.

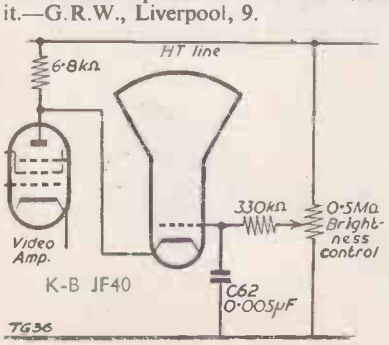
Although this may appear to be a lot of extra (and unnecessary) trouble, I think that it is justifiable on the grounds of the better life to be expected from the valve detector.—R.V.A., Birkenhead.

K-B JF40

Uneven Brightness Here is a most unusual effect on this television receiver. Picture quality was normal in every respect, except that the brightness level varied from left to right so that if the brilliance was adjusted to optimum in the centre of the picture, it was too dark approaching the left-hand side and too bright approaching the right-hand side. Sound was normal.

Without an aerial connected, the raster could be adjusted to black on the left and peak white on the right. Obviously it was a fault closely allied to the tube itself and at first care was taken to ensure that the picture centring arrangements had not become mis-adjusted.

No amount of adjustment could do more than slightly improve the overall brilliance level and so the tube voltage supplies were checked. They were normal. After some time it was found that by paralleling another capacitor across C62 the overall brightness became normal, it then being obvious that during each line scan the grid voltage of the tube had been varying and that the capacitor C62 had stabilised it.—G.R.W., Liverpool, 9.



Ekco TU169

Picture Upside Down One of these sets recently came to us with the complaint that the picture was upside-down and the picture height had shrunk to approximately one inch. This fault was found to be due to the resistance of the frame oscillator transformer primary winding having increased from 158 to 50,000 ohms.—R.S., Belfast.

Alba 324

Two Intermittents The first of the new Alba 13-channel receivers we sold was returned after three days with the complaint of varying brilliance. Tests showed that, intermittently, the brilliance level altered and we concentrated on the video amplifier stage. It was found that the anode load resistor (4.7Ω 1W) of this valve had a high-resistance connection to the h.t. line although the connection appeared to be good. Resoldering cured the trouble.

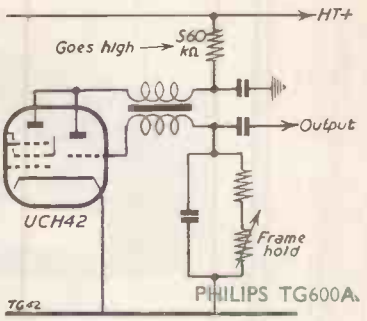
Another of these sets had intermittent vision, the picture sync disappearing. This was traced to the 2nd vision i.f. stage where, due to the positioning of the components, the h.t. feed (470Ω) resistor at the point where it crossed the EF80 valveholder to the screen grid occasionally shorted to the anode of the valve. The abnormal change in control grid voltage of this valve was found to be due to the a.g.c. circuit, and tended to be a red herring when making tests.—R.V.A., Birkenhead.

Murphy V176C

Two Frame Faults This set sometimes suffers from frame slip due to a poor contact on the valveholder of the 6D2 frame clipper rectifier VII. It is located between the two thyratrons on the front vertical chassis. Replacing the defective valveholder is an awkward job as it is a big chassis to remove. There is, however, an alternative remedy.

Since only one section of the 6D2 double-diode valve is used, the remaining diode is wired in parallel. Pins 1 and 5 and pins 2 and 7 are joined together. The job is quickly done and the frame sync will be improved.

Another frame fault on this chassis is when the frame hold is only obtained at the end of the travel of the control. This is due to the 150kΩ resistor between the h.t. line and the top of the hold control going high. It is situated on a tagboard near the 6K25 line oscillator valve and is of 0.35 watt rating (10 per cent.). It is advisable to replace with a 1 watt resistor to obviate any further trouble.—R.V.A., Birkenhead.



Philips TG600A

No Frame Lock The fault on this receiver was that the correct frame scan sweep frequency was unobtainable. On checking the anode decoupling resistor of the UCH42 frame oscillator, it was found to be abnormally high. In three service cases for the same complaint this resistor was found to have risen in value from 560kΩ to between 1–2MΩ. It is located on a tag of the multi-point socket at the rear of the chassis.—K.M., Leeds, 9.

Ferguson 998T

High Grid Leak The complaint was—Vertical white line on screen. At first we didn't believe this, but when the set was switched on the line was there. However, by turning up the brightness control, a very faint (but otherwise perfect) raster was revealed. Quick replacement of the PL91 and PY81 had no effect and just as attention was being directed to the line output transformer we suddenly thought about the PL81 grid leak. On test, it read practically infinity. Replacement restored the raster to normal.—E.A.T., London, E.6.

Cossor 938

Fall In Quality When switched on, the receiver reproduced sound after the usual warming-period, but quality and volume deteriorated about the same time that the line whistle became evident. When the raster appeared, no sign of video modulation was present.

A common fault in an early stage of the receiver was suspected and all the valves in the sound and vision stages were changed. This produced no improvement so attention was turned to the biassing arrangement which in this receiver, being a 13-channel model, incorporates an a.g.c. system.

The circuit includes an 8A8 triode-pentode fed from the cathode of the 6AL5 video detector, the anode of the pentode being connected via a 0.001μF

(Continued on page 51

capacitor to a small rectifier, the output voltage of which is then fed to the various i.f. and r.f. valves.

It was ultimately found that the rectifier was faulty, since a new one maintained sound volume and quality and also produced a first class picture. On an ohm-meter, the faulty rectifier did not have a bad forward/reverse resistance but it was obvious from the symptoms it caused that after a minute or two of use in the receiver its rectifying properties broke down.—G.R.W., Liverpool, 9.

Vidor 429

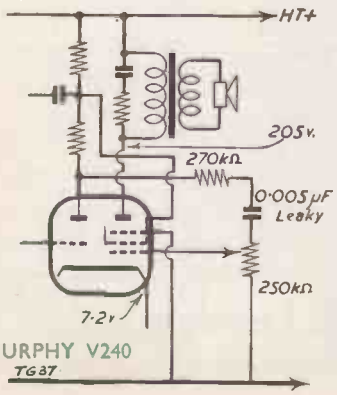
Sleeving Causes Short

The following fault is typical in receivers of this type. The receiver is rendered inoperative due to the auto bias resistor burning out. On replacement, the set may work satisfactorily for a time and then an intermittent short circuit in the h.t. line may develop. The location of the trouble is the lead from the 2μF decoupling capacitor, mounted on the chassis, which passes through the chassis. The systoflex sleeving becomes frayed and the h.t. shorts to chassis. A heavier type of insulation material will prevent a re-occurence of this trouble.—H.F., Belfast.

Murphy V240

Poor Sound Quality

Several of these models have come in for service with the complaint of poor quality on sound. The receiver uses an ECL80 triode-pentode as first audio amplifier and output stage. The pentode grid is fed from the volume control via a combined tone compensating and d.c. blocking series circuit of a 270kΩ resistor and coupling capacitor of 0.005μF. The capacitor, which is of metal tubular type develops a leak—usually of around 2MΩ—which drives the pentode grid positive and causes the distortion usually associated with such conditions.—H.F., Belfast.

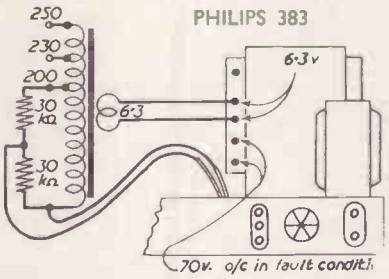


Philips 383 Series

No Contrast Control

When checked, the receiver was working at full gain and the contrast control was ineffective. In this set the control varies a negative bias applied to the suppressor grids. This bias is obtained from a winding on the mains transformer, which is rectified by one of the diodes of the EBL31 valve. The a.c. winding was found to be open circuit.

As only a 70 volt a.c. supply was needed, it was decided to use another small transformer. After a few tests, a standard 6.3V heater transformer was used; by feeding the low-voltage side from the heater supply of the receiver, it produced 140V between common and 200V taps. Two 30kΩ ½W resistors were then fitted across this output



giving 70 volts from centre to either end. This was applied to the wires removed from the receiver mains transformer, and the contrast control worked normally.

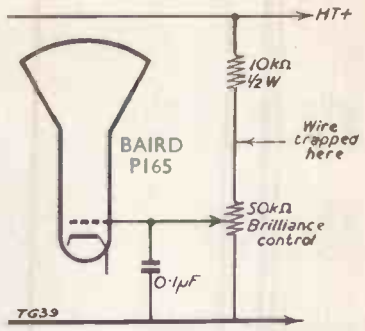
Should this particular fault symptom occur, it is a simple matter to check the winding in question as the connections are easily accessible at the rear of the mains transformer towards the back of the receiver as shown in diagram.—R.G.D., London, S.E.6—

Baird P165

Short To Chassis

The following interesting fault has recently been encountered on this model. The set came into the workshop with the complaint of no sound and a collapse of the frame scan. Checking with an ohmmeter proved that there was an h.t. short circuit.

Inspection of the wiring eventually revealed the cause of the trouble. The p.v.c. wire which supplies h.t. to the brilliance control via a 10kΩ resistor had become jammed between the



chassis and the cabinet. The p.v.c. insulation had been pierced by the chassis in such a way that the h.t. was shorting out. Replacing with a new length of p.v.c. wire naturally restored sound and picture to normal.—R.W., Wirral.

Ferranti 129

Low & High Resistors

The trouble was that the line frequency was incorrect (four pictures and a bright band at the left-hand edge of the picture) and the width of the picture was reduced about an inch. Testing revealed that R76 and R77 (line coil damping resistors) had altered in value from 68kΩ each to 10kΩ and 50kΩ respectively. The replacement of the faulty components cured the trouble but the sound was noted as distorted with very pronounced sibilants.

Suspecting that the fault would be in the sound noise suppression circuit, R43 was checked and found to be high in value, having risen from 470kΩ to 10MΩ. Replacement cured the fault and the variable noise suppressor control then functioned normally.

Both of these faults have occured on several of these models.—R.E.L., Worthing.

Ekco 17-in.

No Brightness

The fault symptom was no brilliance but satisfactory sound. Removing the back of the set and making a rough check for e.h.t., a small spark could be drawn from the U25 anode. Suspecting the lack of efficiency-diode boost voltage, the U301 was changed—with discouraging results. Upending the set for a visual check on components, it was noted that in the line time-base section three of the leads running to the base of the line output valve were badly placed. Moving one of these leads with a screwdriver caused a frying noise to be heard. It was found that the lead was adhering to the 0.5μF condenser connected between the h.t. rail and the top end of the line output transformer. On

(Continued on Page 57)

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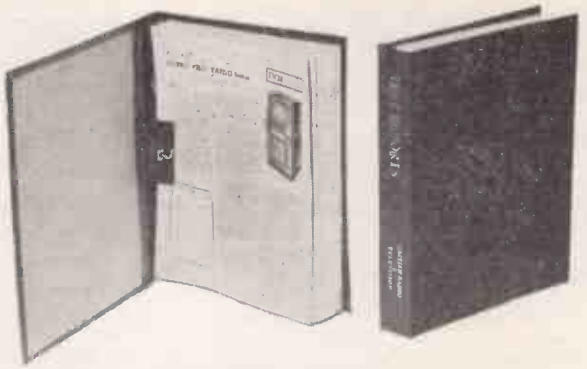

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pressing the condenser, brilliance returned; on releasing the condenser, brilliance disappeared. Replacing the 0.5μF condenser put things back to normal.—D.G.W., Farnborough.

K-B HF40

Frame Scan Fold Customer complained of picture folding over at the bottom of the screen. Testing showed that the frame amplitude and height control circuits were in order except that the 6BW6 frame amplifier anode voltage was about 30 volts low. This valve is fed from the same line as the 6BW6 sound output valve.

When the sound output was disconnected, the fold disappeared and good frame scan was possible. The sound output transformer was suspected and was found to have a fault in the primary winding which read 200 · instead of 500. A new transformer was fitted and the trouble disappeared.—R.G.F., Roxburg.

Masteradio TD4T

Loss of Sound Signal The complaint on this set was that at varying intervals the sound signal would drop to very nearly zero. During the first service call, no trouble arose and a general check revealed nothing to give any indication of possible reasons for the trouble condition. Nearly two weeks passed and the customer called again. This time the set was obliging and the sound disappeared almost immediately.

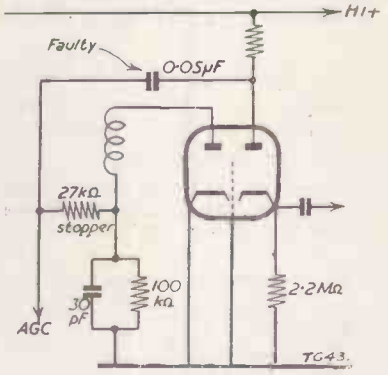
The false bottom of the receiver was removed and on attempting to find the faulty stage by electrical disturbance, the sound reappeared. After a short while it was found that movement of the long tag strip at one end caused sympathetic volume variation.

The trouble was finally pinned down to a 0.05μF capacitor coupling the demodulated a.f. signal from the diode load resistor (100kΩ) to the noise limiter anode. A replacement cured the trouble.—K.M., Leeds, 9.

Write to James Huxley

on Service Department matters, and pass on all the hints and tips and dodges that you have found useful in dealing with day-to-day service problems. Articles on all subjects of technical service interest are welcomed. All published contributions are paid for.

MASTERADIO TD4T



Ekco TS113

Channel Conversion Here is a simple and quick method of converting this particular receiver from channel 1 (upper side band) to channel 3 (lower side band). All that is necessary is to change all the 13 dust cores for aluminium cores and then re-trim. All the coils are well damped and so they can be trimmed for maximum response with quite good bandwidth. Although the response curve obtained is not perfect, a good picture can be received with no break through of sound on vision. In some cases it may be necessary to fit a pre-amplifier.

A fault often encountered on this receiver is pulling on whites. Several of such cases were found to be due to the sync separator valve (SP61) being faulty or the coupling capacitor between the v.f. amplifier and sync separator slightly leaking.—R.E.L., Worthing.

Pye MV30 Series

Cure For Drift These sets sometimes develop a picture drift to the left that cannot be counteracted by the shift magnets. Some sets have come in with the focus magnets jammed hard against the tube in an attempt to centre the picture. A quick cure for this trouble is to discharge a charged-up capacitor (100 or 250μF, 275V wkg.) across the line scan coils. If this does not move the picture back, recharge and discharge the capacitor across the coils in the reverse direction—it will move then. Repeat this until the picture will not move any further and then re-centre in the normal manner.

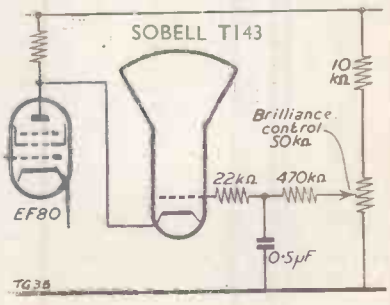
Insulated leads should be used on the capacitor, the case of which must be kept away from the chassis on insulated material. The action of this treatment is to counteract the developed residual magnetism in the scanning coils.—R.V.A., Birkenhead.

Sobell T143

No Line Scan One of these receivers came in for service with the complaint "Sound o.k.—no picture," and it soon became obvious that the line output valve was not oscillating. In this receiver a rather unusual line oscillator arrangement is used in which the triode of an ECL80 valve is coupled in a reflex manner to the actual PL81 line output valve.

Substitution of both these valves failed to stimulate oscillation and so after checking voltages and the line output transformer windings for continuity, attention was directed to the components linking the two valves.

Ultimately the faulty component proved to be C27, a 100pF (3kV wkg.) capacitor connected between a tapping point on the line transformer primary and the grid of the associated triode. After fitting a replacement, good pictures were obtained but it was found that the brightness control had to be almost at the end of its travel before adequate brilliance could be obtained and even then it was not up to standard.



Temporarily shorting the control grid and cathode of the c.r.t. produced full brilliance so that the tube fluorescence was not defective. It was purely a matter of relative tube voltages, it being discovered that while the cathode voltage of the c.r.t. was normal, the grid voltage was low. Further testing showed that the cause was an increase in value of R53 from 470kΩ to almost 700kΩ. A replacement completely restored the black to full brilliance range of the brightness control.—G.R.W., Liverpool, 9.

FM and the SERVICE ENGINEER

PART TWO

IN THIS TWO-PART ARTICLE THE TECHNICAL ASPECTS AND PROBLEMS OF THE NEW F.M. SERVICE ARE DISCUSSED AND ANALYSED FROM THE VIEWPOINT OF THE SERVICING MAN

by Gordon J. King, A.M.I.P.R.E.

WE have seen that an f.m. signal can be handled by wide band r.f., frequency changer and i.f. stages in an identical manner to an a.m. one. We must now concentrate our attention on what happens to an f.m. signal on arrival at the detector stage.

This stage has to perform the function of converting the frequency modulated carrier to an audio frequency. Essentially, this is done by first converting the f.m. carrier to an equivalent (so far as the audio content is concerned) a.m. one, and then demodulating this by a conventional diode detector in the normal manner.

The section dealing with the conversion of the f.m. carrier to a.m. is known as the "discriminator stage." In its simplest form this makes use of the sloping side of a response curve of an associated tuned circuit. This is shown diagrammatically in Fig. 4.

Here it will be seen that the f.m. carrier is allowed to correspond to a frequency which is slightly off the tuned circuit's resonance frequency. The frequency swing of the f.m. carrier as it is modulated within the deviation limits then moves the carrier up and down the sloping side of the response curve giving rise to a fluctuating voltage across the circuit as the frequency of the f.m. carrier varies according to the modulation.

Clearly, then, the resulting amplitude fluctuations of voltage across the tuned circuit could be demodulated in the normal way and amplified at a.f. to produce a signal from a loudspeaker. The whole process, of course, simply boils down to de-tuning an ordinary (v.h.f.) a.m. receiver slightly off the nominal frequency of the f.m. carrier.

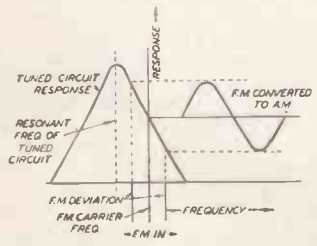


Fig. 4—Diagram showing how detuning can be used to convert frequency modulated signals into amplitude modulated signals.

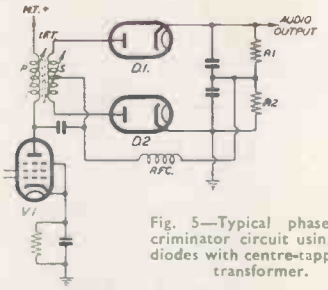


Fig. 5—Typical phase discriminator circuit using two diodes with centre-tapped i.f. transformer.

This is not a recommended method of f.m. detection, since, apart from introducing distortion as the result of the non-linear side of a normal response curve, it would not reap the full advantages of the f.m. system is securing freedom from interference.

Moreover, it would not be very easy to tune accurately and its output would be considerably less than what it would give on an a.m. signal.

A much more efficient and practical discriminator is shown by the circuit at Fig. 5. As is characteristic of most discriminators, it will be observed that two diodes are used and that the secondary of the associated i.f. transformer is centred-tapped.

Its mode of operation depends upon the fact that a 90 degree phase difference occurs between voltages across the primary and secondary windings of an r.f. or i.f. transformer at the resonant frequency. This condition is shown vectorially in Fig 6.

This shows that the voltage across one half of the secondary winding (Es/2) will lead the voltage across the primary winding (Ep) by an angle of 90 degrees, and that similarly, the voltage across the other half of the secondary winding (minus Es/2) will lag Ep by the same angle.

Under this condition, then, equal but opposite voltages will be applied to both diodes—D1 and D2—since the centre-tap of the secondary is returned to the diode load resistors R1 and R2. Both resistors are of equal value. Therefore, both diodes conduct equally and the voltages across the load resistors are of similar magnitudes, these representing Ed1 and Ed2 in Fig. 6.

We can clearly realise from this, then, that the resulting voltages are added in opposition, and resolve to provide zero potential from cathode to cathode.

Now when the frequency of the carrier rises and falls at a rate equal to the modulation frequency, the balance will be disturbed, and a potential fluctuating to the pattern of the modulation frequency will develop across R1, R2, the magnitude of this potential depending on the extent of deviation.

We shall probably be able to realise this better when it is known that when the frequency of the signal rises or falls about the resonance frequency of the

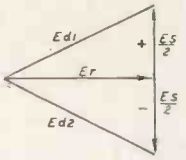
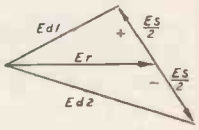


Fig. 6—Vector diagram of the phase and voltage distribution of the circuit of Fig. 5 when the input frequency equals the i.f.

transformer, the 90 degree phase difference is no longer preserved; the voltage across one half of the secondary winding will swing towards the phase of the voltage across the primary winding, while the opposite effect will occur so

Fig. 7—Vector diagram of the circuit of Fig. 5 when the input frequency no longer equals the i.f.



far as the phase relationship of the voltage across the other half of the secondary winding is concerned. This again is shown vectorially in Fig. 7, which clearly reveals the out of balance diode voltages—Ed1 and Ed2.

The limiter stage and "ratio detector"

The foregoing type of discriminator (phase discriminator as its function implies) does not possess a limiting feature so far as amplitude disturbances of the carrier wave are concerned. It is for this reason that an additional limiter valve is generally used to chop off any noise pulses before the carrier is applied to a discriminator of this kind.

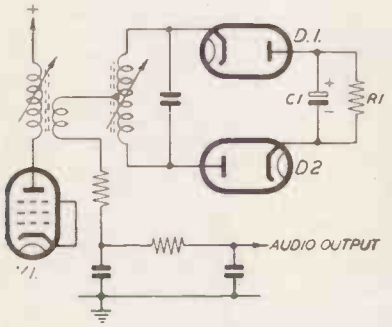


Fig. 8—Circuit diagram of the more popular "ratio detector".

The limiter stage is a very simple arrangement usually—not unlike the sync separator stage of a television receiver. The working conditions of the associated valve are arranged so that it has a short grid base. That is to say, it should be what is colloquially known as a "straight" pentode and not of the variable-mu type.

It should also have suitable (generally relatively low) anode and screen voltages and an accurately computed control-grid time-constant (capacitor and resistor). Working under these conditions the applied amplified f.m. signal pushes the valve into anode current saturation and thereby makes it insensitive to amplitude fluctuations of the signal.

There are several f.m. detectors which produce automatic limiting, rendering an additional valve unnecessary. The best known of this type is the "ratio detector." The circuit is shown in Fig. 8, and from this it will be noticed that it closely resembles that of the previously considered discriminator.

This is really superficial, for closer examination will reveal that one diode is reversed and that an electrolytic capacitor shunts the load resistor R1. This means that the output voltage across the load resistor is the sum instead of the difference of the two diode outputs. The action of the electrolytic capacitor maintains a constant value of output voltage over a period of time—that is long compared with the duration of noise pulses.

It is this action which provides the circuit with an inherent limiting feature which holds the output steady, despite any sudden amplitude changes of the f.m. signal.

The multi-grid f.m. detector

Another form of f.m. detector which also features automatic limiting is shown in Fig. 9. Here will be seen that the circuit is evolved round a multi-grid valve V2. This is generally known as a "nonode," and in this country comes under the designation of EQ80.

The action of the valve is quite simple to follow. The first and second grids are both held at constant potentials—the same as with a pentode. Grids three and five must also be at a positive potential before the valve will pass current. Now it will be seen that grid three is connected to the secondary of the i.f. transformer and that grid five is connected to the primary, via C1.

Therefore, when the i.f. transformer is at resonance, the third and fifth grids will be in receipt of voltages having a phase angle between them of 90 degrees. From this it will be clear that any change in current in R1 (the anode load resistor) will be solely the function of the phase difference of the voltages at the grids concerned.

We have already seen that this phase difference varies in accordance with modulation, so it is easy to realise that the valve will convert changes in frequency to changes in amplitude. It is rather unfortunate that this valve requires a somewhat large f.m. signal to incite efficient limiting.

Current features of f.m. receiver design

It has been—and still is—one of the problems of designers of f.m. receivers to keep the price of such receivers

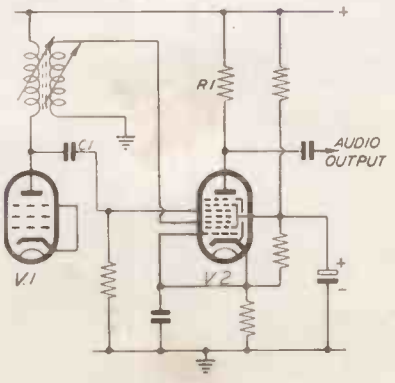


Fig. 9—Circuit of a multi-grid f.m. detector.

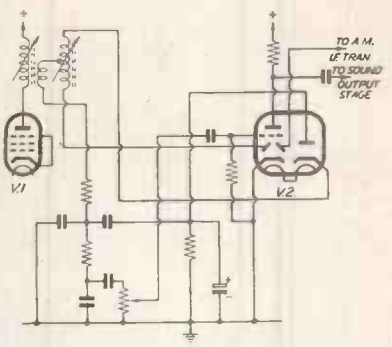


Fig. 10—A triple diode and voltage amplifiying valve used in a composite a.m.-f.m. receiver as ratio detector, a.m. detector and a.f. amplifier.

within the pocket of the average listener. This problem is being solved in various ways so that even to-day composite a.m./f.m. receivers are only a little more expensive than their older style a.m. only counterparts.

One solution to this problem was in the ratio detector which cut out the limiter stage, and which, incidently, appears to be the more popular f.m. detector of the moment. A further reduction in expense resulted by the introduction of the triple diode and voltage amplifying valve (the Mullard EABC80).

This forms the f.m. equivalent of the more well known "double diode triode" and also features an additional diode that can be used solely for a.m. detection in composite receivers. The triode section is generally employed for amplifying the a.f. part of the f.m. signal after it has been detected, as is usual practice in a.m. receivers.

A circuit section of this kind is shown in Fig. 10, where V1 is the f.m. i.f. amplifier valve, and V2 an EABC80 or equivalent. It will be seen that two diodes in the valve, both with separate cathodes, are used in a ratio detector circuit. The remaining diode is taken to the a.m. i.f. transformer, and signal detection on this service is achieved in the normal manner, a ganged switch providing the change-over from a.m. to f.m., both from the i.f. and detector aspect.

Operation of the f.m. tuner unit

In composite receivers the f.m. tuner is generally contained within a small metal box conveniently situated at the r.f. end of the chassis. The circuit of this section is rather specialised and makes use of a double-triode valve (ECC85 or 6AQ8) arranged in a circuit after the style of Fig. 11.

Here can be seen that one section of the triode takes the form of an earthed

grid r.f. amplifier, the aerial signal being applied to the cathode, via the bias resistor and by-pass capacitor C1 R1 After amplification, the signal is developed across the anode coil L3 and the associated tuning capacitor C2.

The other triode section operates as a frequency changer (oscillator and mixer), the oscillator coils being L4 and L5. The anode winding L5 is tuned by C4, this being ganged to C2 and effectively geared down to provide band-spreading over the entire f.m. band.

The intermediate frequency output is developed across L6 and conveyed to the i.f. stages via the coupling coil L7. L6 and L7 is really an i.f. transformer having a tuned frequency in the region of 10 Mc/s (10.7 Mc/s being a typical value.) The reason for such a high frequency i.f. is, of course, to facilitate a relatively wide pass-band.

It appears general practice, at present anyway, to convey the signal to the tuner unit via low impedance feeder (75 ohm television feeder), coaxial is sometimes catered for, but with the Cossor Type 523 and 522 FM twin feeder is stipulated.

We would point out that coupling between the r.f. section and the frequency changer takes place through a low value capacitor C3.

F.m. i.f. amplification and a.m.-f.m. changeover

The circuit at Fig. 11 shows how, in composite receivers, the a.m./f.m. changeover is accomplished and how the f.m. i.f. is selected. When switches S1, S2 and S3 are in the a.m. position, the a.m. aerial tuning and oscillator circuits are arranged conventionally around the a.m. frequency changer valve V1 (triode hexode). Additionally, a switch, connected at point X in Fig. 10, disconnects the h.t. from the f.m. frequency changer valve, and switch S3 short-circuits the i.f. transformer L1 L2.

I.f. transformer comprising coils L3 and L4 is tuned to a conventional a.m. i.f. in the region of, say, 465 kc/s, the output of which is conveyed in the normal way to the i.f. amplifier valve. Similar switching is arranged on the second i.f. transformer so that the a.m. output is eventually applied to the a.m. detector diode in the triple diode triode valve.

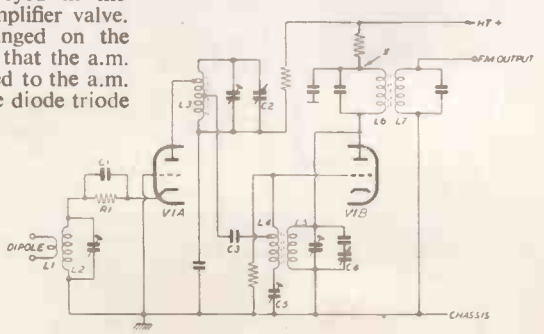


Fig. 11—Circuit diagram of a typical f.m. tuner unit.

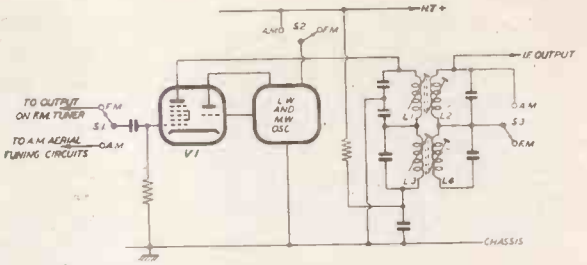


Fig. 12—Circuit illustrating how a.m.-f.m. changeover is achieved in a composite receiver.

When the switches are in the f.m. position things are somewhat different First the f.m. frequency changer is brought into circuit, the a.m. aerial tuning circuits are disconnected, the a.m. oscillator circuits are switched off and the short-circuit is taken from L1 L2.

A similar switching action takes place in the i.f. amplifier, and the i.f. output is transposed from the a.m. diode to the remaining two diodes which are connected in a ratio detector circuit.

The f.m. signal, at intermediate frequency, thus passes through V1 hexode, which now operates as an f.m. i.f. amplifier. The 10.7 Mc/s signal appears in its anode circuit, and is developed across L1 L2 which constitute the f.m. i.f. transformer. The fact that the a.m. section of the i.f. transformer remains in circuit is of little consequence, since its impedance at 10.7 Mc/s is negligible. The f.m. i.f. signal thus passes on through the receiver as described above.

Concluding remarks on f.m. service

It is hoped that this article will provide assistance to the service engineer and endow him with an insight regarding faults that may arise in f.m. equipment. In this respect, most will almost certainly agree that the problems we are liable to meet will be focused on the f.m. tuner unit and the f.m. detector—the remaining circuits, excluding, perhaps, the switch gear, are unlikely to present undue problems as they follow normal practice.

So far as the a.m./f.m. changeover switch is concerned, each switch element needs to be local to the relating circuit. To cater for this Plessey, Ltd., have designed a special slide-switch, which, generally being ganged to the wavechange rotary switch, extends the entire length of the chassis.

Alignment of the f.m. section of a composite a.m./f.m. receiver is more involved than pure a.m. alignment. If optimum quality and maximum interference suppression is to be achieved, f.m. alignment will almost certainly demand the use of a wobbulator and oscilloscope.

Because slight de-tuning is liable to occasion unnecessary distortion, most f.m. receivers embody a magic-eye tuning indicator, and it is also feasible that receivers will later be built using a form of "automatic frequency control" circuit to bring the tuned frequency back to normal should a slight drift in local oscillator frequency occur.

As the result of damping of the first tuned circuit, mainly due to the very high frequencies adopted for f.m. transmissions (Band 2, embracing the frequency spectrum between 87.5 and 100 Mc/s), the first coil is generally fixed tuned and responds equally throughout the entire f.m. band.

Precautions against oscillator radiation

Since it is general practice to arrange the f.m. oscillator to work above the signal frequency, special precautions must be taken to ensure that the oscillator does not radiate, either directly or through the aerial. The reason for this is because the second harmonic of the oscillator falls in Band 3 (the alternative television band).

Oscillator radiation is avoided by careful screening of the f.m. tuner unit, by using one of the special valves for the tuner which embodies an effective screen between the two triode sections, and by carefully balancing out any residual radiation by means of a neutralising capacitor (C5 Fig. 10) which is generally contained in the f.m. tuner unit.

TV Disturbance Testing

DETAILS OF A SHORT-CUT METHOD TO SPEEDY TELEVISION FAULT ANALYSIS AND DIAGNOSIS

Part 4 — by D. Wayne

THE e.h.t. and cathode-ray tube control circuits have already been considered in earlier parts of this series, and it is assumed that they are working normally, so that a blank unmodulated raster is seen on the screen. Also, the sound circuits are o.k. If the aerial is connected to the set and it is found that sound can be heard, but that no picture appears on the screen, although the raster can be controlled in brightness and focus, a fault in the vision receiver is indicated.

It is important to note that since sound is being received the front end of the receiver — that is, those stages common to both sound and vision — must be o.k. The fault, therefore, lies between the point of sound separation and the cathode-ray tube.

As in the audio tests already described, the first check is intended to determine definitely whether the trouble is before or after the vision detector stage. With the chassis removed from the cabinet (or the cabinet lying on its side to expose the inspection panel) the cathode of the vision detector diode should be touched with a small screwdriver, the finger resting on the blade. If the following circuits are working normally a 50-cycle hum pattern will appear on the screen, visible in the form of a broad black-and-white band across the face of the c.r.t.

Note that in some circuits the detector is reversed so as to provide a video signal of opposite polarity. In such a case the anode will be on the v.f. input side, and this electrode must be touched with the screwdriver to produce a hum band on the screen. The two circuit arrangements are illustrated in Fig. 1.

If no hum bands are created by this test it is necessary to go backwards a stage to the cathode-ray tube itself, using the test lead with the 0.01μF condenser to couple in a 50-cycle signal from a convenient heater point. The lead should be connected between the heater line and either the grid or cathode of the tube, depending on the method of modulation employed.

The result should be a hum band on the screen. If no result is obtained then it is reasonable to suspect the tube itself (faults such as o/c cathode or grid can and do occur).

On the other hand, a visual indication of hum will prove that the fault must lie between the tube and the vision detector — which means a meter check of the video stage. Since only a few components are involved in the normal v.f. amplifier location of the trouble should be a simple enough matter (Fig. 2).

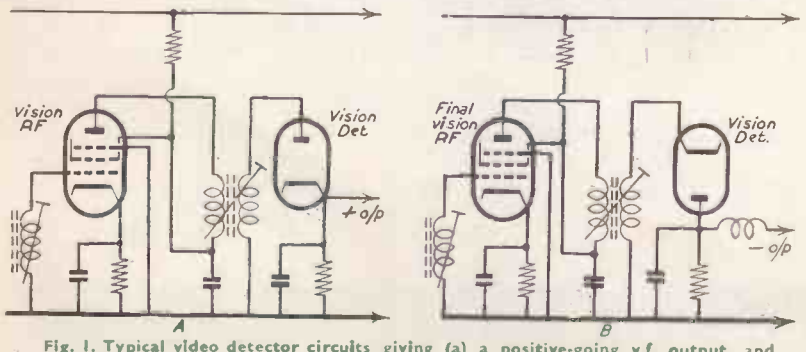


Fig. 1. Typical video detector circuits giving (a) a positive-going v.f. output, and (b) a negative output signal, due to reversal of the diode detector.

Vision R.F. Stages

After ascertaining that the v.f. stage is functioning normally by touching the video side of the detector diode and observing the resulting hum bands on the screen, it is necessary to trace forward through the vision receiver, employing disturbance tests until the faulty stage is located. The procedure is the same as for the sound circuits, but instead of a crackle in the speaker spots and flashes of light are seen on the screen, indicating that transient artificial signal voltages are reaching the cathode-ray tube from the point of disturbance.

For these tests on the r.f. portion of the vision receiver (a typical circuit is shown in Fig. 3) it is necessary to have the contrast control at maximum, with the raster brilliance turned down so that

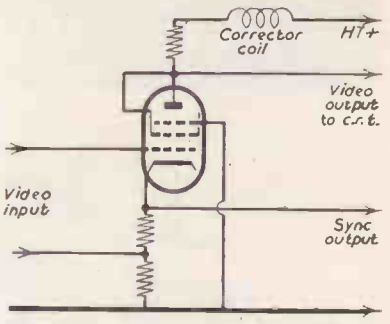


Fig. 2. Basic circuit of a v.f. amplifier giving both sync and video output.

the scanning lines are only just visible. Transient modulation will then be most clearly seen.

As with the sound receiver, a small screwdriver (with finger touching the blade) may be used to tap the grid pins of the r.f. amplifiers, working from the detector stage towards the "front end" of the set. Better still, the test lead previously described (comprising a 0.01μF condenser with crocodile clips attached to extended end-wires) may be connected by one clip to the h.t. line, the other clip being used as a probe to touch the grid pins in succession.

The momentary charging current of the condenser at each contact will provide a well-defined voltage change which, acting as a signal, will produce a definite flash on the screen, indicating that the subsequent stages are working correctly. Between each test the condenser should be discharged by touching the crocodile clips together.

Interchanging Valves

When a stage is reached where disturbance testing produces no corresponding visible flashes on the screen the usual servicing techniques may be applied to isolate the faulty component.

The quickest check for any valve is substitution, and it should be remembered that in a television receiver the interchanging of identical valve types situated in entirely different circuits is often an infallible method of showing up a fault.

For instance, if the symptoms are "no picture — sound o.k.," then cross substitution of valves in the vision and sound strips will result in "picture o.k. — no sound" when the faulty valve is transferred to the other circuit.

The same device can be used in other parts of the circuit, provided the valve types correspond. Thus the line and frame oscillator valves (if identical) can be exchanged to pin down a scanning fault, or alternatively a sync. diode can be changed with a vision or sound detector diode where synchronising is faulty. In many sets the sound output valve is of the same type as the frame output, and a useful cross-check is thus available.

The Aerial Circuit

Tracing forward to the front end of the set, the terminus of operations is, of course, the aerial socket, and if

drawing the screwdriver blade across the aerial connection produces flashes on the screen, then probably the fault is in the aerial circuit.

It should be noted that it is possible for sound to be received from a faulty aerial even though no picture is obtainable. Fortunately, aerial checks are fairly straightforward.

Before setting out to examine the installation it is often useful, in areas of high signal strength, to connect a substitute aerial to the set. Normally, a few yards — or even a few feet — of wire will be sufficient to provide a signal of some kind, though the sensitivity and contrast controls of the receiver will need to be adjusted. If a picture appears on the screen with this temporary substitute aerial then the aerial installation requires attention.

Common faults in the aerial system are: *Feeder*—Wires detached in attenuator junction box; coaxial inner broken in aerial plug; strand of outer braiding shorting to inner conductor inside plug; coaxial inner broken somewhere in the external run due to random movement in winds caused by insecure fixing and cleating; conductors of twin feeder shorting due to weathering of insulation on sharp angles and stonework. *Aerial*—Corrosion of feeder connections to centre of dipole due to weathering; coaxial inner broken at centre of feeder in wind; strand of outer braiding shorting to coaxial inner at dipole centre.

Superheterodyne Receivers

Step-by-step testing of the i.f. stages is carried out in the same manner as for a straight receiver, but if it is found that the i.f's are free from fault attention must be concentrated on the local oscillator and the r.f. stage.

Even when the oscillator is inoperative the receiver will still be able to pick up static and interference via the aerial, producing characteristic spots on the screen (and mush on the sound). This may be misleading at first, but it should be remembered that transient noise voltages are made up of a multitude of higher harmonics, some of which will fall within the i.f. pass-band, thus reaching the video and audio circuits without the aid of the oscillator stage.

The presence of this static, with the aerial connected, is a sure indication that the r.f. and *mixer* stages are operating, though the oscillator itself may be dead. On the other hand, the complete absence of static would point to a fault in the mixer or r.f. stage, the oscillator probably being o.k.

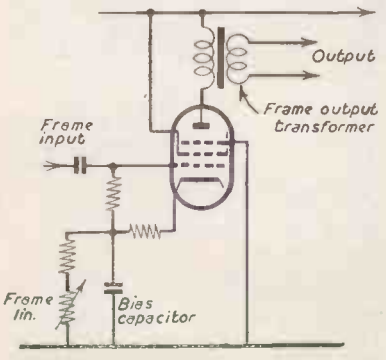


Fig. 4. Frame output stage, showing conventional position of the linearity control. Faulty linearity may be due to failure of the bias decoupling condenser.

Before getting out the test-meter a quick check for the oscillator (which is invariably a triode) is to short its grid to chassis with a screwdriver. If the valve is oscillating a flash will be seen on the screen (or a click heard in the speaker) as the negative bias voltage is shorted out. No click or flash — no bias — no oscillations. A typical oscillator circuit with auto-bias arrangements is shown in Fig 5.

Linearity Troubles

Among other types of fault which have not been covered in previous articles are problems of linearity. Gradual distortion of the top of a picture, taking the form of cramping, or compression, is often an indication that the frame output valve is deteriorating. The best check is substitution.

Amplitude faults can usually be traced to the oscillator. The sudden appearance of non-linearity in the frame circuit may indicate bias trouble in the output stage, a common fault being failure of the electrolytic bias by-pass condenser (Fig. 4). If this goes o/c heavy negative feedback is set up, which will probably affect both amplitude and linearity.

The quickest check is to place another condenser in parallel with the original, observing the effect on the screen.

If the electrolytic is short-circuit, however, then the cathode bias resistor is shorted out, and the stage is operating without bias. Since the cathode must therefore be at earth potential a quick test is to short the cathode to chassis with a small screwdriver. No change in picture form shows that no change has occurred in cathode potential — in other words the condenser is in fact s/c.

Similar tests may be applied to the line output stage — but it should be remembered that drastic alterations in the operating conditions of the line output valve may seriously affect e.h.t., thus obscuring the symptoms of non-linearity.

Intermittent Faults

Biggest problem for the average television service engineer is the intermittent fault which only shows up for

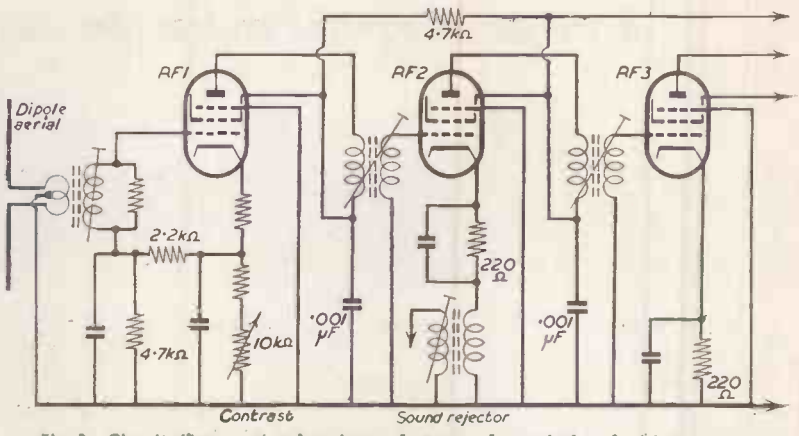


Fig. 3. Circuit diagram showing three r.f. stages of a typical t.r.f. vision receiver.

brief spells occasionally. It is not proposed to deal exhaustively with this subject now, as it will be covered in a future article.

Points to remember when dealing with intermittents are: During the period when the breakdown is "on" try to identify the circuit or circuits involved by careful analysis of the symptoms. With the aid of a small "crackle hammer" (a cube of sponge-rubber impaled on a stick) tap valves and components in the suspected circuits, watching carefully for transient symptoms; check for dry joints, intermittent valve seating, partial shorts in wiring, and resistors which are "dis'd" internally.

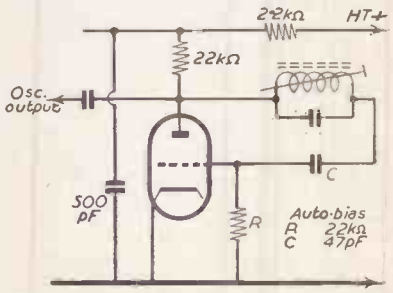


Fig. 5. Typical local oscillator stage as used in a well-known commercial receiver.

When it is possible to make the fault come and go at will the battle is practically won — but careful metering of voltages and currents in the suspected stage when the fault is on and off is the surest way of isolating the responsible component. "Soak testing" — running a set continually until the awaited breakdown occurs — is not the best way of tackling intermittents, but it is often the only method of obtaining a clear-cut indication of the breakdown symptoms — especially when the receiver has been brought into the workshop with only the owner's description of the trouble as a guide.

Final Thought

Logical analysis is often better than a service manual.

From Repairman to Service Engineer

by John D. Burke

who, as an American TV repairman, came to work in Britain as a TV service engineer, and here records his views on transatlantic differences in TV service.

AS a stranger to the British TV servicing scene there were a variety of things that impressed me when I came over here from New York, U.S.A., a couple of years back to work as a service engineer. At that time I made a note of the more striking differences between American and British techniques and methods, and the past two years have made little change to the truth of those first reactions. British engineers might be interested to see their trade through the eyes of an American repairman.

There was, and still is, a shortage of top skilled men, so that I was at work less than two weeks after landing. The pay, though it has increased steadily with the growing demand for TV service, is lower than in the U.S. It is, however, sufficient to live quite comfortably.

Working hours generally average 44, and most shops close about 6 p.m. But, just as in the U.S., many small shops and individuals work all sorts of hours to take advantage of restricted TV programme times. Working conditions are good; a large number of shops I have visited, and the one in which I work, have very congenial atmospheres.

From a technical point of view there are certain factors in the British TV system which modify considerably the methods and aims of working. For instance, although there are a number of TV stations transmitting in Britain, all carry the same programme (apart from occasional local regional transmissions). Although the stations operate on different channels, the servicing man only needs to give the customer satisfactory reception on one (or two when Commercial TV comes on the air). In certain U.S. cities sets may be required to give satisfactory reception on half-a-dozen different channels.

The signals are transmitted with vertical polarisation. Antennas are installed vertically and in most cases do not need to be directional. Antenna installation is generally much simpler than in the U.S.

TV signals have positive-going modulation (in the U.S. it is negative-going). As the sync pulses are located *below* video level instead of above, severe noise has little effect on picture lock, and simple sync circuits can be used.

With the British 405-line standard and a video bandwidth of 3 megacycles, there is very little problem of alignment, and sets can and do have fewer i.f. stages than in U.S.

SIMPLER DESIGN

In general, British TV receivers are much simpler in design than American sets. No headaches are created by having to satisfy users who expect good reception on many different channels, and antennas do not get out of orientation as a result of wind. As the hours of transmission are only half of what many stations give in the U.S., breakdowns occur less frequently, picture tubes last longer, and there is less pressure on the repairman to provide speedy service. Amazingly enough, my shopmates say that 30 per cent of the sets sold by this concern have not required any service at all for the past three years.

Since the five British TV channels in Band I are relatively low in frequency, most sets do not have a fine-tuning control to take care of oscillator drift, and the oscillators are stable over long periods. The position with Band III will, however, be different.

While valve failures are quite as common as in the U.S. so far as failures other than heater burn-outs are concerned, it is surprising that heaters burn out rarely. One reason is the common use of series heaters incorporating the "Thermistor" type of heat-compensating series resistor in the chain.

TUBE COSTS HIGH

For various reasons, some of them economic, the rebuilt picture tube is not widely used in England. Furthermore, picture tubes still carry only a six-month guarantee, and are sold with heavy purchase tax added. Still—the public pays quite readily.

A much higher percentage of repair jobs are taken into the workshop than is the case in the U.S. Very often the whole cabinet is taken. I was pleased to note that many of the small TV consoles are fitted with rolling casters.

Over here there are no cut prices for TV sets, and there is no discount selling. All dealers get list price, and only authorised dealers, prepared to render service on the sets they sell, are able to obtain sets from the manufacturers. No "TV fix-it" books have been sold to the British public (although books are available telling how to build your own radio or TV).

I have seen only a few advertisements offering cut-rate repair service, and these were nothing like the "dollar plus parts" so common in the U.S.

I like the idea of being called a "service engineer" instead of a "repairman." A certain respect goes with the title and I find the situation better than the "pushing around" we repairmen get in the States.

It is amazing how many differences are possible in the design of electronic equipment. For example, the triode cathode-ray tube, so common in Britain, is hardly used in the U.S. Another surprise—the use, in some sets, of metal rectifiers for dampers, and, in one case, a set which used no damper at all yet gave good linearity.

Strange also is the large number of sets using the horizontal sweep amplifier valve as the horizontal oscillator also. I only recall seeing that arrangement in one American set.

ODDITIES

Other curious facts (to an American): a much lower rate of failures in e.h.t. rectifiers than I have been accustomed to; the general practice of having only one v.f. stage; the huge number of valve types of all different sizes, shapes, characteristics and designations (the job of keeping a stock of valves on hand is at least four times as difficult here as in the U.S.); and, finally, such oddities as a radio set having two diodes in its audio output valve (just as if a 50L6 had the detector and a.v.c. diodes included in its structure!).

. . . as good as an extra Service Engineer ?

Well, not quite! But the Mullard High Speed Valve Tester saves so much time that each Service Engineer is twice the man he was. Check these features for yourself:—

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MVM 315B

RADIO SHOW PREVIEW

(*continued*)

cabinet of attractive design, and will retail at 9 gns.

The new radiogramophone Model 59 is a neat console receiver finished in contrasting veneers. The gram unit plays both standard and long playing records, and the radio section covers long, medium, short and the new f.m. band. A table model radio receiver is also available, this is Model 37.

Model 26 *Vicki* is a battery portable receiver which utilises the new printed circuit technique, and is available in different colours. It is priced at 11 gns. (tax paid).

Kolster-Brandes, Ltd.
Footscray, Sidcup, Kent

STAND No. 14 Highlight of the K-B stand is the 21in. TV console, Model LFT100, claimed to be the first mass-produced direct-view receiver in this country. All K-B new models use a 13-channel turret tuner covering Bands I and III, incorporate the "Contromatic" feature, giving automatic gain and automatic frequency control.

The K-B television range is: Model LFT100—21in. console with doors and front controls (148 gns.); Model LFT50 17in. console (88 gns.); Model LFT60—17in. console with full-length doors (106 gns.); Model LVT50—17in. table set (78 gns.); Model LVT30—14in. table set (65 gns.). All prices tax paid.

All receivers use mirror-backed tubes, have flat-faced rectangular distortionless pictures and are well-known for their high quality cabinets. The K-B multi-channel adaptor is in production, so that the earlier models may be modified to receive Band III programmes. Price is 6 gns. excluding fixing charge.

In the radio field, with the emphasis on frequency modulation increasing, the K-B range of f.m. receivers is of special interest. Prices are only little more than standard models. The outward appearance of these models is almost identical to the standard models.

Model KR20FM is a 6-valve a.c. receiver with long, medium and f.m. bands, internal f.m. aerial, an 8in. speaker and greatly improved sensitivity (26 gns.); Model LR10FM is a 6-valve f.m. version of the low-priced model with internal f.m. aerial (£24 10s.).

The standard range retains Models FB10 (the *Magic Midget*), LR10 and LR15, its a.c. d.c. counterpart. A newcomer is MP151, named *Rhapsody*, a battery-mains handbag portable available in two shades, deep chrome green and burgundy red (17 gns. less batteries).

Two K-B radiograms now include an FM band and Model LG40 is retained. It is fully automatic, playing 10in., 12in. or 7in. records, includes push-pull output and bass tone control and has a record compartment (88 gns.). Also retained is Model LG30, a 5-valve a.c. superhet with three wavebands and crystal turnover pick-up. It plays 7in., 10in. or 12in. records, standard or long-playing (63 gns.). Its FM version, LG30FM, has long, medium, short and f.m. bands and an internal f.m. aerial (67 gns.). All prices tax paid.

Kolster-Brandes Model MP151 (*Rhapsody*) mains-battery handbag portable radio.

McMichael Radio, Ltd.
190 *Strand, London, W.C.2.*

STAND No. 28 TV sets on show include 14in. and 17in. alternative programme table models and a de-luxe 17in. console model that includes a separate 3-waveband radio receiver, the TV and radio circuits being completely independent. The company state that their current series of models has proved so reliable that no changes in design are contemplated during the coming year.

A wide range of radio receivers is displayed, including models for a.c. and a.c.–d.c. operation. Model 354 is a versatile a.c. d.c. mains-battery portable. For the new v.h.f. f.m. service there is a 5-valve table radio, a de-luxe console radio, and a bureau-style radiogram developed from Model 554 shown at Earls Court last year.

The Marconiphone Co. Ltd.
Hayes, Middlesex

STAND No. 38 The two new 1955 television receivers are given pride of place on this stand. They are 14in. and 17in. table models incorporating a tuner unit of the incremental inductance type with built-in coils for all 13 channels, with the channel selector and fine tuning control at the front of the cabinet.

Features of these 17-valve receivers include flat-faced aluminised tube, inbuilt dark screen and special non-reflecting mask, stable preset p.m. focusing system, special vision a.g.c. circuit which obviates major adjustments when the set is switched from one band to the other and various suppression circuits including a wide-range tunable filter for diathermy interference. For a.c. or d.c. mains, these receivers are priced at 66 gns. (VT68DA) and 79 gns. (VT69DA).

Three distinctive radio receivers are featured. Model T36AB is a "go-anywhere" portable for battery or a.c. mains operation. It has five valves and a Ferrite rod aerial and. tunes m.w. and l.w. In grey imitation lizard-skin case with an unusual combined tuning control and scale it is priced at £17 10s. tax paid.

Model T37DA (the "Companion") is completely transportable, the a.c.-d.c. mains lead being the only external connection, and is housed in a maroon plastic cabinet with gold coloured knobs. Price: 15 gns., tax paid. Model T38A is a 5-valve 3-waveband superhet with built-in aerial and large well-lit multicoloured tuning scale and providing powerful reception. For a.c. mains it costs 21 gns., tax paid.

Two radiograms are shown. Model TARG39A is a table model in a compact walnut veneered cabinet and featuring a 3-speed 8-record auto-changer catering for all types of records, a featherwight pickup with turnover head, and a felt-lined lid. The radio section embodies a 5-valve 3-waveband superhet. Price: 36 gns., tax paid.

Model ARG40A is a console model for a.c. mains in a highly-polished walnut veneered cabinet. Features a powerful 5-valve superhet, built-in aerial, wide well-lit tuning scale, large high-sensitivity p.m. speaker and autochanger facilities as in the TARG39A. Output is 4 watts. Price: 55 gns., tax paid.

Mullard Ltd.
Century House, Shaftesbury Avenue, London, W.C.2.

STAND No. 20 The Mullard stand has been specially designed to appeal to everyone. For those interested in the inside of their receiver, there are representative selections of Mullard valves and television tubes. For those who would like to see a practical demonstration of electronics, there is the well-known electronic gold ball.

Another interesting feature is a giant model of a Mullard television valve, 20 times actual size and with the glass envelope removed to show the intricate electrode system. Captions explain the function of each part. Leaflets are available which explain some of the complexities of radio and television.

For the quality reproduction enthusiast, a chassis built to the Mullard 5-valve, 10 watts high-quality amplifier circuit is on view, and the book of this circuit is obtainable.

Multicore Solders Ltd.
Multicore Works, Maylands Avenue, Hemel Hempstead, Herts.

STAND No. 50 Only a few of the 400 different specifications of *Ersin Multicore* solder will be exhibited, but the new 5-core solder is prominently displayed. This is claimed to be faster and more effective than the hitherto standard 3-core solder, and contains five cores of a new Pentacol derivative non-corrosive flux specially formulated for extreme soldering speed. It is particularly effective for the jointing of extremely oxidised components. It is being displayed in conjunction with Ferranti Ltd., by practical demonstrations of the assembling, wiring and

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soldering of i.f. strips which will later be incorporated in actual receivers. During the course of the exhibition, some 15,000 solder joints will have been made.

Seen for the first time at a public exhibition is the new *Bib* recording tape splicer, a tool which enables recording tapes to be jointed and edited professionally. Made from nickel-plated brass, it includes a razor cutter which fits underneath. It is simple to use and is equally useful for jointing tapes which have been cut for editing purposes or those which have been accidentally broken.

The *Bib* wire stripper, now fitted with 4BA and 6BA spanner holes in the handles, is also shown. This three-in-one tool will strip insulation from most thicknesses of wire (adjustment being carried out by a small disc), cut wires and split extruded plastic flex.

Other items on this stand include solder slugs, pellets, rings and preforms in a wide range of sizes and in standard tin/lead alloy, with or without flux cores; liquid flux in various constituencies; a complete soldering process for printed circuits developed by the Multicore company; and new and special types of *Ersin Multicore* solders for engineers and research chemists of electronic manufacturers.

Murphy Radio Ltd.

Welwyn Garden City, Herts.

STAND No. 55 Murphy are showing a full range of radio and television receivers and a radiogram. All the television receivers incorporate a 12-position turret tuner, with a duo-triode cascode r.f. amplifier and triode-pentode frequency changer, and are for operation from a.c. or d.c. mains, adjustment being by means of a rotary switch.

The fringe area models (suffixed "A") all have gated a.g.c. on sound and vision, black spotter circuits and fly-wheel line sync. The 14in. range consists of the models V240 (standard table receiver), the V240A (fringe area table model) and the V240C (console model). The 17in. (rectangular) range comprises: the V250 (standard table receiver), the V250A (fringe area table model) and the V250AD (a fringe area console model with doors). All the television receivers incorporate separate r.f. gain controls to maintain constant picture and sound levels when switching from channel to channel.

Amongst the comprehensive range of radio receivers is the A242—a 9-valve, 4-waveband table receiver for a.c. mains, incorporating the f.m. band and housed in a french walnut veneered cabinet of semi-baffle design, trimmed with gold anodised aluminium. A four-position tone control switch is fitted and a separate calibration scale is provided for each waveband. There is also an a.c.–d.c. version of this receiver and additionally a new radiogram.

Other radios include a low-cost transportable model (the U198—£13 10s.) covering medium and long wavebands and housed in a maroon plastic cabinet with large easy-to-read dial; a small table model (A192—£17 10s.) covering long, medium and short (or, alternatively, Trawler) wavebands in a chocolate brown plastic cabinet with louvred speaker aperture; a mains-battery portable (BU183—£18) in a leathercloth covering with ivory plastic trim to the edges and speaker fret, with carrying strap; and a battery portable (B229—£19 15s.) incorporating a 6-valve superhet circuit, covering medium and long wavebands, in a black leathercloth casing, fitted with a flip-up tuning scale.

Pam (Radio & Television) Ltd.

295 Regent Street, London, W.1

STAND No. 31 Pam take the opportunity of introducing their new seasons' models for 1955 and continue their policy of making table TV sets with doors. The new range consists of four TV sets, four radio receivers, a radiogram and record reproducers. All TV sets cover the 13 channels on Bands I and III and are for a.c.-d.c. mains.

Pam Model 700 (*Pixie*) portable radio with printed circuit chassis

Model 750 is a popular priced 14in. table TV incorporating automatic picture control and a black screen for reducing light reflection. The compact cabinet is finished in walnut veneers. Model 751 is a 14in. de luxe table set using the same chassis but housed in a high quality walnut veneered cabinet fitted with doors.

Model 752DL is a luxury 17in. table receiver incorporating a.p.c., twin speakers and a dark screen. The cabinet is of very high quality. The receiver is designed to provide optimum picture quality, particularly in districts where the signal strength is weak. Model 753C is a de luxe 17in. console version with full length doors, using the same chassis.

The four new radio receivers include Model 700 (the Pam Pixie Portable), a battery receiver using a printed circuit chassis. The lightweight receiver is housed in a cabinet finished in turquoise blue rexine with black diamond pattern.

Model 701 is a 7-valve a.m.–f.m. receiver including magic-eye tuning and featuring two built-in aerial systems for f.m. and a.m., a three-position tone control and fly-wheel tuning. The a.m. section includes a short-wave range.

Model 702RG is a 6-valve a.m.–f.m. radiogram utilising a 10in. high-flux density speaker and incorporating a three-position tone control and ample record storage space. It has the same frequency coverage as Model 701.

Model 703 is a 5-valve a.c. receiver with four wavebands, in a modern cabinet, featuring fly-wheel tuning. Model 955U is a similar receiver but designed for a.c. and d.c. mains supplies.

There is also a range of high-fidelity record reproducers.

Philips Electrical, Ltd.

Century House, Shaftesbury Avenue, London, W.C.2.

STAND No. 34 & 38 On show is a wide range of radio and television receivers, and Philips *Minigroove* and 78 r.p.m. records. Making their debut are a 21in. console TV receiver, a new console projection TV model, and an f.m. radiogram.

Model 2157U is a new console television receiver incorporating a 21in. tube. Model 2347A is a console projection receiver with tuner, giving a picture size 18in. × 13½in., for operation on 200–250V 50 c/s mains. It incorporates a 10in. p.m. loudspeaker, electro-magnetic focusing with constant current focus valve, and automatic picture brightness control. Cabinet dimensions: height 42¾in., width 22¾in., depth 23¼in.

Other TV models in the current range include: Model 1446U—a 14in. table set with multi-programme tuner (66 gns.); Model 1746U—a 17in. table set with tuner (78 gns.); Model 1747U—a 17in. console with 10in. p.m. speaker and multi-programme tuner (110 gns.). All prices include purchase tax.

Radio

Model 342A, the *Music Maid* is a 5-valve radio receiver and clock combined. It has four pre-set stations, three on the medium wave and one on the long wave. It is for operation on a.c. mains only, 200–250 volts 50 c/s. In addition to being an orthodox radio, it is designed to perform the following functions: (i) it acts as an ordinary alarm clock; (ii) it will switch the radio on at a pre-set time; (iii) it will switch the radio off and on again at a pre-set time.

There is also a socket for a 5-amp 3-pin plug for the attachment of any electrical appliance using up to 1,000 watts at the lowest voltage and 1,200 watts at the highest voltage. The controls can be pre-set to operate this outlet independently of, or in conjunction with, the radio. The cabinet is in maroon and cream plastic. Price: 22 gns. (tax paid).

Philips Model 342A (*Music Maid*) clock radio

Model 543A is an a.m.–f.m. table radio for operation on 200–250 volts a.c. It has four wavebands covering long, medium, short and f.m. A rotatable ferroceptor is provided for long and medium wave reception, with a built-in dipole for receiving f.m. stations. The latter acts as a plate aerial on the short wave.

There is a double-cone 7in. speaker, and the receiver is mounted in a plastic cabinet with push-button wave change controls. Price: 30 gns. (tax paid).

Model 643A is similar to Model 543A, but has an 8in. double-cone loudspeaker and magic-eye

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(*continued*)

tuning indicator, and housed in a handsome wooden cabinet. Price: 42 gns. (tax paid).

Other radio models include: Model 523UB—a mains battery portable (22 gns.); Model 141U—the *Handiset*, a 5-valve, 2-waveband transportable weighing 7lb. (15 gns.); Model 341A—a table radio in a plastic cabinet (19 gns.). All prices tax paid.

Radiograms

On view for the first time is Model 653A a.m.–f.m. console radiogramophone. It incorporates the Philips *Featherweight* pick-up with sapphire and diamond styli and automatic record changer. The radio side is a high-quality receiver with long, medium, short and f.m. wavebands. A built-in f.m. dipole, rotatable ferroceptor for long and medium wavebands (the latter acting as a plate aerial on the short wave) and an 8in. double-cone loudspeaker are among the instruments special features. This model is an addition to the Philips *Diamond* range of radiograms, all of which incorporate a diamond-stylus pick-up. Other models in this range include: Model 644A—the *Fidelio* console radiogram (85 gns.) and Model 544A—the *Orpheus* console radiogram (66 gns.).

Pilot Radio, Ltd.

Park Royal Road, London, N.W.10

STAND No. 21 Pilot are showing several new models, including a range of television comprising a 14in. and 17in. table set and a 17in. double-door console. The 17in. table TV has, as an optional extra, a special stand converting it to a console.

All television models are for a.c. mains 180-250V, 50 c/s, and have the following features: built-in turret tuner for 13-channel reception, with coils fitted for all five channels in Band I and channels 8 and 9 in Band 2; flywheel sync; automatic gain control; frontal speaker behind Tygan facing; duo-optic filter (front-glass and c.r.t. face); two concentric controls; cabinet finished in walnut veneers.

The three television models are: TV94—a 14in. set in contemporary style cabinet with 6½in. × 4in. elliptical speaker (69 gns. tax paid); TV97—a 17in. table set with 6½in. × 4in. speaker (80 gns. tax paid); DDC97—a 17in. console receiver with double-doors, mounted on castors, 8in. speaker (105 gns. tax paid).

Pilot are also showing their range of radio receivers and radio gramophones. Models include: the *Little Maestro*, a 5-valve superhet portable for a.c.–d.c. mains in brown or cream moulded polystyrene cabinet (£15 10s.); the BM90 3-way portable for a.c. d.c./battery operation in attache-type case finished in leathercloth (£18 10s. excluding batteries); Model 85 and 85U, a 5-valve 3-waveband radio (£18 gns.); Model 754, a 4-waveband (including Trawler) set (23 gns.); Model X754, a de-luxe version of the 754 with magic-eye tuning and piano-finish cabinet (26 gns.). All prices tax paid.

A v.h.f. f.m. band is included in Models T91 and T92 (the T92 also embraces the Trawler band). Cabinet is in contemporary style. Radiogram Model RGA101, also has an f.m. band, and magic-eye tuning. In other respects it

Pilot Model TV97 17in. table TV

is similar to the Pilot radiogram, Model RGA100, which is a 7-valve 3-waveband luxury instrument in a bureau-style cabinet finished in walnut veneers, with 3-speed autochanger and accommodation for more than 120 records. (Price 72 gns. tax paid).

Pye, Ltd.

Radio Works, Cambridge.

STAND No. 18 Pye are showing their range of 13-channel television receivers, all of which incorporate black-screen, auto sync, and automatic picture control refinements. In addition there is a comprehensive range of radio receivers, including the well-known Pye portable series. With the opening of the new f.m. service, the company are introducing a range of a.m.–f.m. radio models.

Pye hi-fi is also featured, special prominence being given to the *Black Box*, which is available in two cabinet styles, and in autochange and single-player models. Other hi-fi equipment includes amplifiers and special loudspeaker systems.

Radio Gramophone Development Co., Ltd.

Eastern Avenue West, Mawneys, Romford, Essex

STAND No. 27 New additions to the R.G.D. range are exhibited—seven in all—including the "Three-Fifteen" (an a.m./f.m. radio), the "One-Twelve" radio and the "Five-0-Five" automatic record reproducer. A wide range of products is shown, among them the "T-Ten" and the six-valve "One-Ten" table radios.

The new television receivers—the 1756T (table model) and 1756C (console)—are both adapted for 13-channel reception, having 17-valve circuits and two-stage amplifiers with negative feedback. Both, also, have the exclusive Syncrolock—a newly devised circuit that maintains a rigid line lock when the noise level is intense.

One of the new radiograms is the a.c. console model the "Three-Twelve" which has three wavebands and is fitted with a three-speed mixer changer. The gram unit, operating at 78, 45 or 33⅓ r.p.m., will accommodate up to ten 12in., 10in., or 7in. records in any order. The pickup is of the high fidelity turnover crystal type with sapphire styli. The receiver is a five-valve superhet with delayed a.g.c. and negative feedback giving 2½ watts undistorted output.

Regentone Radio and Television Ltd.

Eastern Avenue West, Mawneys, Romford, Essex

STAND No. 52 Five new models are included amongst the large selection of radios, radiograms, TV receivers and portable electric gramophones. New additions to the Handy-Gram range are two portable gramophones—one a single player, the other with an autochanger—both models fitted with 3-speed gram units and built-in amplifiers and available in either wooden or flexo-fibre cases.

Two radiograms—a console model and a bureau type—and a table radio complete the new models on display. The bureau radiogram ARG89 is fitted with a 7-valve superheterodyne unit and a fully automatic 3-speed record changer. It has ample storage space for records. Like the 7-valve console model ARG79, the receiver covers both the f.m. band and long, medium and short wavebands on a.m. ranges, selection being by means of a 5-way push-button switch. A magic-eye indicator is fitted.

Features include Ferrite rod aerials for local station reception on long and medium waves, a folded dipole on the cabinet back for local

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R.G.D. Model 1756C 17in. console TV

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(*continued*)

reception of f.m. signals and provision for external aerials. The ARG89 and ARG79 both have a fully-automatic record changer to accommodate 7in., 10in. or 12in. records, mixed in any order. Starting, stopping or rejecting are controlled by a knob and the unit automatically switches off at the end of the last record. The pickup is of the high-fidelity turnover crystal type with permanent sapphire styli.

The new a.m.-f.m. table radio—the A155—also on show, employs a 7-valve superheterodyne circuit with full a.g.c. on all bands. It covers the f.m. band in addition to normal short, medium and long wave ranges. It has a specially selected 10in × 6in. elliptical high-flux speaker.

H. C. Slingsby, Ltd.

89, 95 *and* 97 *Kingsway, London, W.C.*2.

STAND No. 100 Of interest to dealers is the Slingsby television truck, which will be demonstrated on the stand. Specially designed for handling highly-finished receivers the equipment consists of a light metal tubular truck with patented tensioning device, two straps and a protective felt apron. A light metal skid enables the loaded truck to be pushed easily into a van by one man and off-loaded in a similar manner. Steps and stairs are easily negotiated, up or down.

Sobell Industries Ltd.

Langley Park.

STAND No. 30 The new range of Sobell sets covers radio receivers in both plastic and wooden cabinets, a table radiogram and three console radiograms. In addition to amplitude modulated receivers, two designs for frequency modulation are included. All models are for a.c. mains 200–250 volts. The radio designs have provision for external loudspeakers and gramophone pick-up. The radiograms have provision for external loudspeakers and for muting the internal loudspeakers. Large "slide-rule" type scales with flywheel tuning are used on all models.

The television designs include three table models and two console types. They all embody turret tuners, increased sensitivity, automatic picture control, flywheel suppression, sound and vision noise suppressors and other improvements.

Stella Radio and Television Ltd.

*Oxford House, 9-15 Oxford Street, London, W.*1

STAND No. 24 Stella are showing a representative selection from their current range of products, including two table television receivers, a portable record player, and two table radio receivers.

Model ST6414U is a table model with a 14in. rectangular tube, for operation on 200-250 volts a.c.-d.c. 50 c/s. The receiver is fitted with an all-programme tuner for Bands I and III, selected by the turn of a switch. Fine tuning and pre-set sensitivity control for each channel is incorporated.

Stella Model ST106A 3-band table radio

Picture size, 11½in. × 8½in.; cabinet in sapele veneered wood; dimensions, 19½in. × 17¼in. × 19¾in. Price 68 gns. (tax paid).

Model ST6417U is the 17in. tube version of this receiver, giving a picture size of 14in. × 10½in. Cabinet dimensions are 18½in. × 21⅜in. × 19¾in. Price 79 gns. (tax paid).

Radio

The two radio models are the ST105U and the ST106A. The ST105U is a portable a.c.-d.c. set in a plastic cabinet with a neat moulded carrying handle. It has five valves and covers two waveband (long and medium) with built-in loop aerial. Price: 16 gns. (tax paid).

Model ST106A is a 5-valve 3-waveband table radio for a.c. mains only, housed in a moulded cabinet with a plastic tuning scale. The set covers long, medium and short waves and has a built-in plate aerial. The circuit is designed for high sensitivity and selectivity on all bands.

Final item on view is the Model ST50A portable record player incorporating the Stella *Petal Touch* pickup and plays all speeds and standard sizes of records. The playing head carries twin sapphire styli for both long playing and ordinary groove records. It weighs only 7lb. complete and can be used with most radio receivers working off 110/200–250 volts a.c. 50 c/s. The player is housed in a neat blue travelling case. Price: 10 gns. (tax paid).

Taylor Electrical Instruments Ltd.

419/424 *Montrose Avenue, Slough, Bucks*

STAND No. 12 A comprehensive range of test equipment is exhibited by Taylor, including two new models in hammer-finished cases. These are the sweep oscillator 92A and the valve tester 45C. The sweep oscillator covers a frequency range from 3-250 Mc/s, the deviation being controllable from 2 to approximately 15 Mc/s at all frequencies.

The valve tester is an improved version of the previous Models 45A and 45B and accommodates practically all British, Continental or American valve types. It also provides means for testing c.r.t's by means of an adaptor. Other items on show include the electronic test meter 171A, an accurate valve voltmeter covering a.c. voltage from 1-250V and d.c. voltage from 1-1,000V, and extendable to 25kV by means of an external adaptor. Resistance ranges extend to 1,000 megohms. The r.f. probe supplied enables voltages at frequencies from 10 c/s to 200 Mc/s to be measured.

Also exhibited is the signal generator 57A, covering from 100 kc/s to 240Mc/s, thus including both Band I and Band III television service frequencies. Another recent introduction is the r.c. oscillator 191A which provides both sine and square wave outputs at frequencies between 10 c/s and 100 kc/s, the output level being maintained constant within ±1db throughout the entire range.

Telerection Limited

Antenna Works, St. Pauls, Cheltenham, Glos.

STAND No. 44 Telerection exhibit a comprehensive range of TV aerials, f.m. aerials and ancillary equipment. The Band I range includes the new rotable multi-positional indoor aerial and three and four-element fringe area arrays incorporating the well-known delta matching system.

Also showing is a range of f.m. aerials including single dipoles, H type, Paravex and three and four-element arrays with delta matching. There is also a complete range of Band III aerials and adaptors including conversion kits for use with existing single dipole and Paravex aerials, conversion kits for use with existing H type aerials (fitting both ½in. and ⅜in. elements), a dual band head attachment for converting an existing H type aerial into a dual-band array and dual-band aerials for Band I/Band III incorporating only one downlead.

Among the separate Band III aerials are high gain Yagi arrays consisting of 3, 4, 6 and 9-elements with folded dipoles (there is both an indoor and outdoor range of these types), also double and triple stacked arrays.

Ultra Electric Ltd.

*Western Avenue, Acton, London, W.*3

STAND No. 32 Ultra are exhibiting a complete range of television, a.m./f.m. and a.m. receivers and a new radiogram. One console model and three table television receivers are shown, all equipped to receive Band III programmes by switching. The new a.m./f.m. *Ultragram* is shown for the first time. It features a three-speed autochanger, separate bass and treble controls and a featherweight pickup of the turnover crystal type with sapphire stylus. The walnut veneered cabinet has provision for record storage.

The popular *Ultra Twin*, an a.c./d.c./battery portable, is now also available

(*Continued on page 74*)

RADIO SHOW PREVIEW

(continued)

in a new presentation known as the *Twin De-Luxe*, with sliding doors to cover the controls and loudspeaker grill when not in use.

The Ultra range of radio receivers includes the *Troubadour*, an a.c./d.c. receiver with inbuilt aerial, and a new a.m./f.m. table model on show for the first time.

The range of television receivers includes the VT814 and VT815, both 20-valve tunable receivers with wide-angle aluminised tubes and daylight viewing filters and two-band switching. Model VT917 uses a 17in. rectangular aluminised c.r.t. and features a.g.c. on sound and vision. For use on a.c. or d.c. mains it incorporates band-switching. Model WT917 is a console version.

Vidor, Ltd.

West Street, Erith, Kent.

STAND No. 33 Two new models are being shown in the TV range, both featuring built-in tuner units selecting one channel in Band I or two channels in Band III. Model CN4228 is a 14in. table set and Model CN4229 a 17in. table set.

An extended range of radio receivers is being featured. Six models are on show. They are: CN431 *Marquisa*—an all purpose transportable which operates on a.c. or d.c. mains, or battery; CN430 *Lady Anne*—new for 1955, this a.c. mains or battery portable features power and tone with less battery consumption; CN429 *Lady Margaret*—a handbag size battery portable in the attache style, weight only 6½lb. complete with batteries, Size: 8in. × 8in. × 4in.; CN426 *Henley*—a 4-valve attache portable for a.c. mains or battery operation; CN420 *Regatta*—an economic portable because of its large capacity batteries.

Vidor are also featuring three completely new upright models including a mains receiver which operates on the new f.m. frequencies. CN433 is an upright 4-valve battery-operated superhet transportable with low consumption valves, featuring a ferrite rod aerial and gives high sensitivity throughout its operating frequencies on medium and long wavebands; CN434 is a 5-valve upright a.c.–d.c. mains transportable superhet; CN435 is an a.m.–f.m. table model for a.c. mains operation, comprising a 7-valve superhet with a 5-watt output, and a 10in. elliptical speaker.

Waveforms, Ltd.

Radar Works, Truro Road, London, N.22

STAND No. 45 Among the test instruments featured on this stand is the *Radar* dual-band signal generator, type 405, first shown at the 1954 National Radio Show. It provides a choice of five fully interlaced and perfectly synchronised test patterns in addition to plain black or white level rasters, all strictly to British Television Standards. The generator gives complete coverage of both Bands I and III, with vision and sound r.f. signals independently adjustable for frequency. Both signals can also be used simultaneously, an important factor when checking for sound-on-vision or vice-versa.

Television signal generator, type W90, provides a variety of synchronised test patterns to British TV standards. The r.f. outputs are calibrated by means of an accurate attenuator in conjunction with an r.f. output meter. Both vision and sound r.f. signals may be used simultaneously and are independently adjustable. The complete video signal is available as a positive or negative-going waveform and in addition, all the synchronising waveforms are brought out to sockets in order that the instrument may be used as the master unit for flying spot scanners and monoscope equipments.

The type W90A TV signal generator is a dual-band version of the W90 covering both Bands I and III.

Other exhibits include the *Radar* cathode-ray tube tester and reactivator, and the *Radar* "Kilovolter," which measures e.h.t. voltages from 3 to 30 kV.

Whiteley Electrical Radio Co. Ltd.

Mansfield, Notts. (*London Office*: 109 *Kingsway, W.C.2*)

STAND No. 7 The complete range of Stentorian High Fidelity Loudspeakers and a new 12-watt Quality Amplifier will be prominently displayed. It will be on continuous demonstration in conjunction with the Stentorian range of High Fidelity Loudspeakers, which will be housed in ready-to-assemble Bass Reflex Cabinets.

The WB12 Amplifier, with separate preamplifier tone control unit, is attractively styled and finished in hammered gold, incorporating technical details to satisfy the most critical user. Employing the most recently developed valves, it has a special low-noise input circuit feeding the double triode phase splitter and a push-pull output stage using a specially designed Whiteley Output Transformer providing 26db negative feedback, with a substantial degree of amplification. Switched pick-up matching and recording characteristic selection are incorporated in an extremely flexible preamplifier tone control unit, which is compact and easily mounted.

Also of interest is the new television trolley table fitted with 2in. wheels (retailing at 82s. 6d.), record storage cabinets, "Viewmaster," and "Soundmaster" units, and a wide range of components and a special section devoted to the Stentorian range of extension loudspeakers.

J. E. Wildbore, Ltd.

6–12 Peter Street, Oldham, Lancs.

STAND No. 42 The *New Marlboro'* television table, veneered and supplied in standard colours — light and medium — is fitted with collapsible legs and features extra wide plates and a solid frame in the interests of solidarity. It is made in three sizes: 18in. × 20in. for 14in. television receivers, 20in. × 24in. for the average 17in. set and a special model (24in. × 24in.) for the larger type of receiver.

All Wildbore television tables are fitted with a safety edge. The respective prices for the above-mentioned models are: £3 19s. 6d., £4 7s. 6d. and £4 16s.

Index to Exhibitors

The General Electric Co., Ltd., have appointed **TIMOTHY ELLIS** an assistant secretary to the company. Mr. Ellis, who is now 36 years of age, was educated at Repton and the Royal Military College, Sandhurst, and was gazetted into the Light Infantry in 1938. He took part both in the Dunkirk evacuation and in the Normandy landings and was twice wounded on active service during the war. During 1947–48 he served in the Sudan. On retiring from the Army with the rank of Major he joined the G.E.C. in 1949 and has worked in the Secretary's department for the past five years.

L. A. WOODHEAD, *general manager of Cossor Instruments, Ltd., recently visited New York to attend the I.R.E. Exhibition and is touring other North American cities to investigate electronic instrument requirements and promote the sale of British equipments.*

The Radio Gramophone Development Company (R.G.D.) have appointed a former R.A.F. pilot, **ROY N. JONES,** as their representative in Sales Area 2 comprising Staffordshire, Shropshire, Worcestershire, Radnorshire and Herefordshire.

Before his appointment, Mr. Jones was Midland Area representative for Wolsey Television, Ltd., and is well known in that area. In 1941 he joined the Royal Air Force and became a pilot. He left the Service in 1949 as a Flight-Lieutenant.

GEORGE STONE, who was formerly a manager with the Alexanders Stores, Ltd., group in Scotland, latterly at Great Western Road, Glasgow, has been appointed manager of the new Pooles Central Warehouse radio and furnishing store opened in Sauchiehall Street, Glasgow.

C. J. BENNETT *has joined the outside sales staff of Pilot Radio. He will cover the territory of Berks, Hants, Sussex and parts of Surrey and Oxford.*

L. KEARTON PARKER has joined Winston Electronics, Ltd., Hampton Hill, Middlesex, as chief sales engineer. Aged 39 years, he was telecommunications consultant to the Telephone Manufacturing Company, Ltd., from 1952 to February, 1955, after being a member of the staff from 1945. He is related to the "preaching" Kearton of Yorkshire West Riding and to Cherry Kearton the famous big game photographer.

The 1954 Radio Industry Council Premium Awards for Technical Writing were presented to prizewinners in London recently. Picture shows (left to right, front) G. R. Gibbs, E. J. Kaye, B.Sc. (Eng.). A.C.G.I., J. M. M. Pinkerton, M.A., Ph.D., and E. H. Learnarts, all from J. Lyons and Co.; (left to right, rear) D. H. Towns, J. F. Field (S. E. Scottish Division, British Electricity Authority), R. M. Hadfield, B.A. (Pye, Ltd.), and H. S. Jewitt, B.Sc. (Eng.), (Decca Radar, Ltd.), seen after the awards were presented to them by G. A. Marriott, vice-chairman, Radio Industry Council.

E. K. COLE, chairman and managing director of E. K. Cole, Ltd., has recently returned home after completing an extensive overseas business tour covering the West Indies, South and Central America, U.S.A. and Canada. Mr. Cole met many of his company's distributors, agents and customers in the towns he visited, which included Kingston, Caracas, Barranquilla, Bogota, Panama, Mexico, New York and Montreal. While in the U.S. he also investigated the progress of colour television and visited the plants of some of the prominent manufacturers of radio and television receivers.

Cossor announce another addition to their sales force in **C. R. JONES,** working the Northamptonshire, Warwickshire and Worcestershire areas. A veteran of the Eighth Army, Mr. Jones was at one time with Sterling Cable Co., Ltd., one of the Cossor group of companies.

Picture shows (left to right) R. Newton, R. H. Gardner, A. A. M. Turnbull, and Prof. G. W. Howe, principal speakers at the annual dinner of the Scottish Section of the British Institute of Radio Engineers held in Glasgow and attended by 70 guests. All spoke of the coming era in which electronics would play an increasingly important part in the worlds of science, industry and all branches of social progress.

RAYMOND H. GARNER, *principal of the School of Engineering at Burnbank, Hamilton, has been elected chairman of the Scottish section of the British Institution of Radio Engineers.*

Stan Seymour has joined Regentone Radio and Television Ltd., as sales representative for the Southern Area.

New chairman of the Bexley, Kent, Chamber of Commerce, is 39-year-old Francis E. Santucci, partner in the firm of James Francis, radio, TV and electrical retailers of Welling, Kent. Mr. Santucci served six years with the Royal Artillery during the war, and is a keen gardener.

Kenneth Page, formerly with Plessey, joins Grundig (G.B.) Ltd., as representative. His area includes the south-eastern counties.

British Insulated Callender's Cables, Ltd., announce the appointment of **R. H. STEEDS** *as Regional Manager (Scotland). He will work from their Glasgow Office.*

Ferranti, Ltd., announce that their representative **A. L. BARNES** has changed his address to: 44a Aughton Road, Birkdale, Southport, Lancs. Mr. Barnes represents the company in the Isle of Man, the Wirral, and parts of Lancashire.

New Test Tables for Thermionic Valves

The instruments in the new G.E.C. valve test table are mounted in 4 and 6-inch Bakelite cases which are readily removed for servicing.

DEPENDABILITY over a long period is the most important requirement in many thermionic valve applications today. For example, microwave radio television links, repeaters for submerged cables and automation equipment for industry are typical applications where long-life valve reliability is essential.

A new test table for thermionic valve measurements of this kind has recently been put into service at the Wembley Research Laboratories of The General Electric Co. Ltd. Developed by research staff of the M.O. Valve Co. Ltd. working in the G.E.C. Research Laboratories, it provides precise information on valve performance over long periods of time, and is an essential unit in assessing the quality of valves for these new applications.

Layout of the Table

The arrangement of the table can be seen clearly in the illustrations. Since most life test samples consist of four valves, the test table is provided with four valve sockets of each type. These sockets are located in a panel to the right of the operator.

The valves under test are plugged into this panel, and filament and h.t. volts are applied to them through a "warming" circuit to bring them to working temperature. Push-buttons arranged in banks on the extreme right of the operator, are used to transfer each valve in turn from the "warming" to the test circuit, while the others continue warming.

The instruments on which the readings are indicated and arranged in a banked semi-circle in front of the operator who can, therefore, read them all with a minimum of head and body movement. The controls, with the exception of the push-buttons already mentioned, are operated by the left hand, so that the right hand is free to record the readings obtained and select the appropriate test connections.

The grouping of the controls has been carefully worked out so that the knobs and keys used in any particular test are adjacent to one another. Consequently the general arrangement of the controls conforms with the normal sequence of measurement procedure.

The new valve test table developed at the G.E.C. Research Laboratories, Wembley, has been designed so that all instruments can be read from one position with minimum of head movement, this reducing operating fatigue.

Design of the Instruments

The instruments used in the test table are 6 in. and 4 in. bakelite-cased units finished in a beige colour, specially calibrated for this work. All the larger instruments are multi-range units, the majority having four ranges which may be switched either manually or automatically.

Push-buttons placed immediately below each instrument (Fig. 2) select the range, and relays carry out the switching sequence when automatic range changing is used. Each instrument, with its associated push-buttons and relays, is mounted on a steel plate which fits into one of the square apertures let into the table case.

A dust cover at the back of the plate encloses the switches and relays, connection to the main table wiring being effected through a flexible plug and socket cable at the back of the box. This arrangement results in an instrument which can be readily removed for servicing (Fig. 2).

The range on which an instrument is operating is indicated by an illuminated disc immediately above the scale marking. These range indicators consist of $\frac{1}{4}$-in. diameter perspex rods aligned so that the face ends of the rods register with holes in the scale plates.

The other ends of the rods project through the back of the instrument cases and are illuminated selectively by small lamps. These ends are engraved with a multiplication factor corresponding to the ranges they indicate. The engraved figures are filled with opaque wax and appear dark against an illuminated background when viewed from the front. To render the indicators less noticeable when not in use, the face ends of the perspex rods are covered with translucent white cellophane.

(Continued overleaf)

This is one of several innovations intended to reduce operating fatigue and make the instruments as easy as possible to read. For example, while finely divided scales, knife-edge pointers and anti-parallax mirrors confer a high intrinsic accuracy, they may cause visual fatigue in an operator using them continuously, and consequently slow down the testing procedure or lead to inaccuracy. Accordingly, a new type of instrument face has been developed for the test table, in which the somewhat lower intrinsic accuracy is more than offset by the greater visual clarity.

All non-essential markings, including outer division arc lines have been removed from the instrument scales, and the colour and brightness balance between scale, case and surround have been arranged so that the pointer, the item of greatest interest, is the most prominent object in the field of view.

In addition to the instruments mentioned above, the table incorporates a mirror galvonometer for measuring gas current. This covers a range from 5 millimicroamp to 50 microamp and is displayed on a horizontal scale immediately in front of the operator (fig. 2).

Power Supplies and Measurements

The test table is operated from a 230V, 50 c/s regulated mains supply. Power for valve anodes and screen grids is derived from two stabilised power units which deliver up to 250 mA at 350V, these units, together with other equipment, being housed on two telephone-type racks situated in the rear of the table (fig. 3).

The valve test table is designed for ease and speed of maintenance. All components and wiring are readily accessible, and servicing and replacement is easily effected, as shown in the photog raph.

A third unstabilised power unit is available which has a maximum output of 500 mA at 500V. The d.c. heater power unit is capable of supplying up to 4 amp. over the voltage range 1 to 80 volts. Other supplies include those for grid bias, heater-cathode insulation measurement and for mutual and conversion conductance.

Intercommunications, Maintenance and Accessibility

Interconnections between power supplies, meters and controls are made through a system of fixed cable forms which lead to a double row of tag-blocks mounted at the rear of the table. The leads from each unit terminate at the tags which in turn are connected together by jumper wires.

This has proved to be a highly flexible system and enables alterations to the connections between the various units to be carried out quickly, without disturbing the permanent wiring.

RADIO AND TELEVISION DIGEST

★ Topicalities from Everywhere ★

A Pye outside broadcast van of the type recently ordered by Associated-Rediffusion, Ltd., through their technical advisors Central Rediffusion Services, Ltd. Two vans of this type, together with extra equipment, have been ordered from Pye by Granada TV, Ltd.

★TV AT THE TOWER

Following a Ministry of Works decision that they were not in keeping with the character and dignity of their surroundings, the multiplicity of individual TV aerials on the living quarters at the Tower of London have been replaced by a central aerial system, installed by E.M.I. The aerial is invisible from any part of the ground.

Two "ring mains" of feeder practically encircle the whole of the Tower, making TV available in all the living quarters and the Officers' and Sergeants' Messes. Nearly half a mile of lead-covered cable was used, all carefully concealed, which involved digging up two roads. As the only available supply at the Tower is d.c., a rotary converter was installed to feed the main distribution amplifier in the top of Waterloo Barracks.

The amplifier is a four-stage unit providing an output of 2 volts r.f. so that even allowing for the inevitable attenuation of the feeder, a good signal is now available all over the Tower.

★SABOTAGE AT NICOSIA

Early in April saboteurs dynamited the 20kW Marconi transmitter of the Cyprus Broadcasting Station at Nicosia, putting it completely out of action. An emergency plan rushed into action at Marconi's Chelmsford works enabled a replacement 2kW broadcasting transmitter to be tested and packed ready for transit within 48 hours of the receipt of the news, thus ensuring an early resumption of the broadcasting service. The transmitter, accompanied by Marconi engineers, flew from Croydon Airport the following day.

★OVERSEAS BRIEFS

The thousandth miles of submarine cable made in the new Cable & Wireles factory at Bukit Chermin, Singapore, has been completed. Built at a cost of £232,000, it replaced the old factory which was opened in 1887. It is capable of manufacturing about 800 nautical miles of submarine cable annually.

One of the largest shipments of its kind in the world has recently been sent on its way when 5,000 Raytheon television sets were loaded en route for Cartagena, Columbia, from the Raytheon company in U.S.A.

Singapore's first radio-controlled taxicabs have recently appeared on its busy streets. A local firm is using a fleet of 25 vehicles equipped with Marconi v.h.f. sets and a further 25 are being similarly equipped. The 50-watt headquarters station is installed in one of the city's new skyscraper hotels.

An interesting radio link, believed to be the first commercial u.h.f. time-sharing system to link two continents, has been installed by Standard Telephones & Cables to handle telephone traffic between Algeciras on the Spanish coast and Ceuta in Spanish Morocco, 32 km distant.

The Marconi radio beacons serving the rocky and precipitous Portuguese coast are to be augmented by four duplicate equipments by the Portuguese Lighthouse Department. The units consist of 20-watt beacons, designed for automatic working, with a normal range of about 50–75 miles.

★RADIO AIDS SALVAGE

An interesting new application for mobile radio-telephone equipment is being operated from Battersea where Phillips, Mills & Co., Ltd., have started the first part of a scheme for the radio control of vehicles collecting waste paper from all parts of Greater London. When the scheme is in full operation a fleet of forty vehicles, fitted with Pye radio-telephone equipment, will be used.

★PEACEFUL ATOMS

In industry, radio isotopes are finding wider application in inspection and process control and in other fields are being used with increasing frequency especially in hospital and surveying work. Britain is now a major source of the world's supply of radio isotopes as aids to industry, health, agriculture, geology, etc., and some figures recently published from Harwell show the amazing increase in their demand both at home and overseas. The first set of figures shows the number of orders received during four particular years:

	1947	1949	1951	1954
Home	135	2,714	6,486	9,692
Abroad	nil	280	2,523	6,694

The second set of figures shows how the demand has increased in this country and is a break-down of groups:

	Hospitals	Universities	Industry	Govt.	Others
1947	5	36	nil	25	69
1954	4,881	810	1,471	469	2,061

★1955 MEDAL WINNER

The Television Society's Silver Medal, instituted in 1948, for rewarding outstanding artistic achievement in tele-

E.M.I. engineers are here installing the new central hidden television aerial installation at the Tower of London which replaces the previous heterogenous growth of individual aerials.

vision has this year been presented to Glyn E. Daniel, Ph.D., who for the past two years has conducted the programme *Animal, Vegetable and Mineral.* Daniel, who is Director of Studies in Archeology and Anthropology at St. John's College, Cambridge, follows the previous recipients of the medal: George More O'Ferrall, Algernon Blackwood, Annette Mills, Joan Gilbert, Eric Robinson, George Cansdale and Donald Smith.

★FACTS FROM THE U.S.A.

Three new U.S. v.h.f. television stations have started test operation, bringing the on-the-air total to 427, of which 114 are u.h.f. One of these new stations is at Fairbanks, Alaska, which already has one station with which it is to compete. The population? 5,771!

During 1954 1,383,486 *u.h.f.-equipped TV sets were produced, or* 19 *per cent. of total TV production of over* 7 *million. As these figures do not include strips, external converters or internal conversions made outside the factory, it is estimated that there are now more than* 6 *million sets which can receiver u.h.f. transmissions.*

Five of the new R.C.A. portable radios feature *Impac* plastic cases, guaranteed for 5 years against breakage.

An idea of the damage caused by the saboteurs at the Nicosia broadcasting station may be obtained from this shot taken inside the wrecked transmitter room. A temporary 2kw transmitter was flown out to Cyprus on April 6 to maintain the broadcasting service.

The General Manager of the company estimates that the industry will sell 1½ million portables this year.

★NEW PYE O.B. VAN

During the past year Pye have supplied outside broadcast vans to Morocco, Belgium, Switzerland, Luxembourg, Canada and Denmark, and now follow up by producing their largest o.b. van for the Bavarian State Broadcasting Station in Munich. With provision for three camera chains and standby equipment to enable it to work independently of the main station, the operating cabin is a complete TV control room with all necessary mixing facilities for sound and vision and has a comprehensive air conditioning system. A new and interesting feature of this van, which measures 30ft. × 8ft. × 10½ft., is the method of defrosting the double glazed windows by fine electrically heated wires running through the glass.

Stereosonic Tape Records

H.M.V. INTRODUCE DOUBLE CHANNEL SOUND REPRODUCTION FOR THE HOME

AT a special demonstration on April 4, H.M.V. launched their new *Stereosonic* (two channel) sound reproduction system. The notion of reproducing sound in such a way that the listener can use the natural function of the two ears to give a sense of direction is not new—the first known example of binoral sound reproduction being an experiment at the Paris Opera House in 1881—but the new system is the culmination of 25 years' research behind the scenes at E.M.I.

Researchers in 1929 realised that the use of headphones (though simplifying some problems) was impractical and that two loudspeakers fed from two microphones spaced at ear distances were not capable of producing the required result. Normally, the ear locates the sound source below about 1,000 c/s by the phase difference of the sound waves. The ear receiving the sound in phase advance indicates that the source is towards that side of the head, the amount of phase difference indicating the degree the sound is "off centre." The listener distinguishes whether the sound is in front of or behind him by moving the head. At frequencies above 1,000 c/s, where the dimensions of the head act as a shield, the ear depends more on the differences of *level* of the sound. For steady sounds, phase difference is often too ambiguous at the higher frequencies to use as an indication of direction. For transient sound, however, time of arrival is a very critical test of direction.

Early Methods

The late A. D. Blumlein realised that it was necessary to convert the outputs of the two microphones into two different sorts of outputs having the correct amplitude difference for feeding the speakers. In this way, the effective time of arrival of the sound at the two ears could be made to simulate what happens in natural hearing, even though each ear could hear both loudspeakers. While this effect could be approximated by widely spaced microphones, modern methods use two close-spaced microphones comparable to single microphone technique, thus simplifying problems of studio balance and acoustics.

In 1933, E.M.I. successfully made a single groove record containing both recording channels by using a complex cut involving both lateral and hill-and-dale recording. This method, however, was not practical with modern long-playing records as the high standard of reproduction could not be obtained. Magnetic tape, however, offered a recording and reproducing medium inherently free from many of the disadvantages of discs, including bandwidth limitations.

In the H.M.V. *Stereosonic* system, the stereophonic effect is operative over the whole frequency range. Boominess is due to lack of stereophonic definition in the low frequencies and this definition is fully restored in the new system enabling the listener to discriminate between the original sound of, say, the double bass and the reverberation of this sound in the studio.

The Stereosonic System

The system uses two independent channels from recording studio to listener. The two channels are put on to two tracks on a ¼in. magnetic tape and replayed through two identical sets of amplifiers feeding two loudspeakers, the spacing of which depends on the size of the room. The *Stereosonic* reproducer gives good results using any form of stereophonic tape, including those made by using spaced microphones. Using H.M.V. tapes, a full field of sound is obtained, stretching across between the two loudspeakers; the sound from a solo instrument intended to be in a central position is heard from a position mid-way between the speakers. The realism of the sound is apparent at any position in the room, although the exact position of the sound source is reproduced with complete accuracy only over a listening area near the centre line between the two speakers.

An important feature is that the listener can obtain an apparent increase in dynamic range; the reason is not yet fully understood. The fortissimos for a given sound level appear to have a greater volume of sound compared to the normal single sound source, while the pianissimos can be reduced to a lower level with reasonable discrimination and clarity. A greater degree of reverberation is permissible on the recording than would be permissible with single channel recording.

The *Stereosonic* recording provides the listener with a sound picture of the studio which is tied up with the characteristic which permits a more reverberant recording to be made, but it is thought that a dimensional sound picture of the studio is more satisfactory — that is, if the studio is large and reverberant, the source in the studio can be placed and is no longer lost in the reverberation.

Reproduction Equipment

The reproducing equipment is housed in two identical consoles. One contains the tape deck and controls, the two pre-amplifiers, one main amplifier and one loudspeaker system. The other contains an automatic record mechanism for all types and speeds of disc records, the second main amplifier and a duplicate loudspeaker system.

The tape playing deck is designed for ¼in. tapes at a speed of 7½in./sec. and embodies a new dual-track head. A three-position switch selects *Stereosonic* reproduction on both speakers, single channel reproduction on one or both speakers. In addition to volume, bass and treble controls (giving approx. 12dB

(Continued on page 90)

These two consoles comprise the Stereosonic reproducer system for the home and give stereophonic quality from the new tapes, single channel reproduction of a high standard from normal tapes and all types and speeds of disc records.

A proved Seller

RONDEN
FOR INCREASED SALES

ONLY
49 GNS.
TAX PAID

SELLS ON SIGHT AND SOUND
•
CREDIT TO ANY ROOM
•
FELTED COMPARTMENTS
•
ULTRA MODERN DESIGN
•
TWO DOOR RECORD STORAGE

RECORD STORAGE
Two door record compartments to house over 400 records.

CABINET
Beautifully finished in figured walnut veneer, highly polished. Size 36in. x 34in. x 17in.

TECHNICAL SPECIFICATION

CIRCUIT
5 valve superhet, S.M.L. Bands.

OUTPUT
4 w. at under 5% distortion.

A.V.C.
Provides compensation for fading, controls reception from too powerful stations, fully operative on all wave bands.

VALVES
B.V.A. 6K8-6K7-6Q7-6V6-6X5 (Brimar).

TUNING SCALE
Large and floodlighted with transluscent figuring, lettering in three colours; stations and wavebands clearly indicated.

CHASSIS
Robustly built of cadmium plated steel, 12in. x 7in. x 7¾in.

LOUDSPEAKER
P.M. (Elac) 8-inch, 3 ohm.

TRANSFORMERS
Heavily laminated and insulated. I.F. Transformers are dust iron cored, permeability tuned.

RECORD PLAYER
Collaro R.C.54, plays any size or speed of record, Studio "O" P.U.

RONDEN MANUFACTURING CO., LTD.
36 BOLEYN ROAD, LONDON N.16. CLISSOLD 7361.

CHANNEL BAND 3 CONVERTORS

ANNOUNCING

OUR NEW IMPROVED
TWO-PROGRAMME
BAND 3 TV CONVERTOR
TYPE C.1.

This redesigned new-look model incorporates several exclusive features, including

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BRAND NEW *Continued*

PHILIPS VARIABLE TRANSFORMERS

Philips Electrical, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.

A NEW range of variable transformers which, it is claimed, incorporate all the features so popular in the firm's previous models, is introduced by the company. Like their predecessors, the new type are toroidal-wound auto-transformers with a central control knob, and can provide an output continuously variable from zero up to 20 per cent. above input voltage. Ratings are 260VA to 2080VA in single units.

Once more there are separate types for bench use and for panel mounting, the former having metal casings with vent holes for air cooling, and the panel vent holes for air cooling, and the panel-mounting pattern being supplied without casing. Both types are more compact than the original models.

Some patterns can also be reverse mounted (with the brush carrier away from the mounting panel) if required.

NEW INVICTA A.M.-F.M. RECEIVERS

Invicta Radio, Ltd., 100 *Great Portland Street, London, W.1.*

TWO new a.m.–f.m. radio receivers are announced by the company. Both have four wavebands (short, medium, long, and f.m.), and incorporate a 6-valve a.c. chassis with flywheel tuning and built-in aerials.

Model 37 is a table radio housed in a highly polished wood cabinet of continental style, measuring 16in. by 7in. by 10½in. high. Price 27 gns. (£21 9s. 3d., plus £6 17s. 9d. purchase tax).

Invicta Model 37 a.m.-f.m. radio

Model 59 is an automatic record-changer radiogramophone incorporating a *Monarch* changer. Cabinet dimensions: 28in. high, 24in. wide, 20in. deep. Price 59 gns. (£46 18s. plus £15 1s. purchase tax).

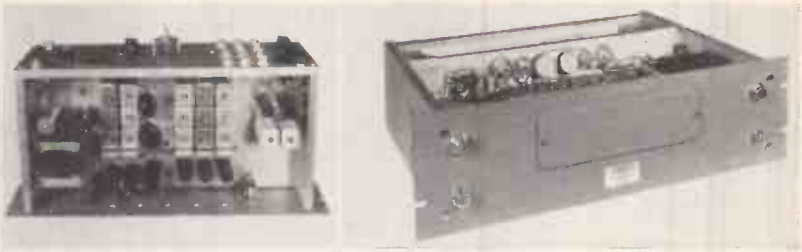
Both receivers are for use on a.c. mains 200/250V, 50 c/s. Long waveband 1000–2000m, medium 186–521m, short 24–51m., f.m. band 87–102 Mc/s. They have a built-in *Ferrite* aerial for long and medium wave and a built-in aerial for f.m.

Invicta Model 59 a.m.-f.m. radiogram

NEW PLESSEY PRODUCTS

The Plessy Co., Ltd., Ilford, Essex.

A NEW addition to the extensive range of commercial telecommunications equipment manufactured by Plessey is a new two-tone adaptor, type PG96. This unit is designed to operate teleprinter equipment on the two-tone principle for both sending and receiving. Very flexible input and output arrangements are provided to enable the unit to be used under a wide range of operating conditions.



New Plessey products: *left*—internal view of the 5-channel preselector; *right*—the 2-tone adaptor unit

The unit consists of two sections: the receiver, or converter, and the sender, or generator. In the convertor, the mark and space frequencies of the incoming signal are separated by means of band-pass filters and are then amplified and rectified. The two voltages obtained are connected in series opposition and used to trigger an Eccles-Jordan relay consisting of two cross-connected valves with two stable states, either valve conducting while the other is biased beyond cut-off.

The stable state adopted is determined by the voltage applied to the grid of one of the valves and thus by the output of the filters. An output is obtained from the anode circuit of each valve, corresponding to "space" and "mark" inputs.

The unit incorporates its own power supply and will operate on inputs of 105, 115, 200/250V a.c. 50–60 c/s. Power consumption at 230V a.c. 50 c/s is 70 watts.

The two-tone adaptor has been designed for tropical use and an ambient temperature of 0°C. to 55°C. The unit, which weighs about 30lb., can be mounted on a standard 19in. rack.

Preselectors

Two new pre-selectors, the PV98 and PV98A, are also announced by the company. They are designed for use in conjunction with a single channel fixed frequency h.f. receiver, such as the Plessey PR53A, PR53C or PR51C, to provide switched selection of any one of five pre-set crystal-controlled channels in the frequency range 2.7–27 Mc/s.

Both pre-selectors comprise an r.f. stage, a crystal-controlled h.f. oscillator and a mixer, giving a low impedance coaxial output at a fixed frequency of 2.1 Mc/s. The r.f. stage is tuned by pre-set circuits and the oscillator stage crystal controlled, the appropriate circuits being selected by a single five-position rotary switch manually operated from the front panel. Alternatively, the selector switch may be motor-driven from the rear, thus permitting remote control.

Additional facilities are available on the PV98 for operation from external oscillators. The tuned circuits are mounted as plug-in units, six ranges being provided to cover the band.

Two pre-selectors and two receivers may be connected to form a dual-diversity combination, the receiver outputs feeding a conventional path selector or diversity switch unit. Each pre-selector contains an in-built power supply; operating from 50–60 c/s a.c.

(*Continued on page 90*)

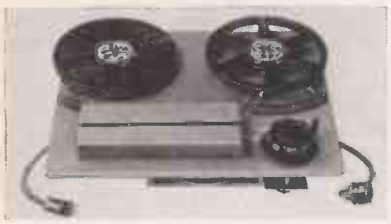
BRAND NEW *Continued*

M.S.S. RECORDING PRODUCTS

M.S.S. Recording Co. Ltd., Poyle Close, Colnbrook, Bucks.

THREE new products are introduced by the company: a new tape mechanism, a high-class tape console, and a 3-speed disc recorder. The advent of pre-recorded tapes and the steadily growing demand for a simple mechanism of high performance has led to the production of the type "D" tape mechanism. Tape speeds of 7½ and 3¾in/sec. are provided, using spools up to 8½in. in diameter. The three-motor driving system is stable and gives a minimum of wow and flutter. An all-mechanical braking system ensures simplicity of operation and freedom from faults.

The type "D" console equipment is designed for the connoisseur who wishes to enjoy to the full the possibilities of pre-recorded tapes, or who wishes to make recordings for himself. The unit combines the new "D" mechanism with quality amplifiers giving an extended frequency range and a minimum of distortion. The output of the amplifier is in keeping with the design of the loudspeaker system.



M.S.S. type "D" tape mechanism

The 3-speed disc recorder, type LED/3, will make high-quality disc recordings at 78, 45 or 33⅓ r.p.m. Variable groove spacing is provided and microgroove recordings to nearly 200 threads to the inch may be cut with ease. To overcome the inherent high frequency losses which occur when recording and reproducing a record at slow speed and at small diameters, an automatic radius corrector, type RCM/12, actuated by the movement of the cutter arm can also be supplied.

NEW AUDIO OUTPUT PENTODE

Mullard Ltd., Century House, Shaftesbury Avenue, London, W.C.2.

THE Mullard EL34 is a new audio output pentode with a rated anode dissipation of 25 watts. In view of its high sensitivity, high power output, low distortion and modern construction, it should find wide application in all classes of audio work. It can be used in amplifiers with output powers ranging from 11 watts (single valve) to 100 watts (push-pull) and is equally suitable for domestic amplifiers and public address equipment.

X-ray photo of the new Mullard EL34 output pentode showing the absence of cross-overs in the electrode leads

The EL34 has a mutual conductance of 11 mA/V, which gives it high sensitivity. It is a compact octal-based valve of cylindrical shape (seated height 98mm, diameter 38mm). It has a heater rating of 6.3V, 1.5A. The high maximum anode voltage of 800V permits operation in push-pull fixed-bias circuits with an output powers of 100 watts at 5 per cent. total harmonic distortion. For domestic amplifiers, a pair of triode-connected EL34s in push-pull give an output of 14 watts at less than 1 per cent. distortion with an h.t. of 430V, or 16 watts at 3 per cent. distortion with an h.t. of 400V.

For P.A. purposes, two EL34s connected as pentodes with cathode bias give 35 watts output with a line voltage of 375V.

The EL34 is of single-ended construction. In order to enable high anode voltages to be used without flashover, a special manufacturing technique is employed. The valve envelope is completely of glass, with a pressed-glass foot, clamped into a metal ring which unites the glass and the plastic material of the octal base.

Stiff wire leads projecting from the pressed glass foot line up exactly with the pins in the octal base, without crossing over. This reduces the risk of flashover, and provided that the valveholder itself can withstand the high tension, anode voltages up to 800V can be used.

STELLA BAND III ADAPTORS

Stella Radio and Television Co. Ltd., Oxford House, 9-15 Oxford Street, London, W.1.

STELLA are shortly to market Band III adaptors for their television receivers which employ the plug-in coil technique (as used for channel conversion on Band I). It is not proposed to offer adaptors for sets which do not embody this principle.

Basically, the adaptor will consist of a turret tuner — as incorporated in the present range — and connection will be made via the r.f. valve holder (the r.f. valve being removed) for h.t. and heater supplies. A connection will be made via the r.f. coil socket for the signal input. A dummy coil will replace the oscillator coil.

Modification kits, comprising a tuner and the necessary parts for mounting, will be priced at 6 gns. Order forms have already been circulated. In more recent models, the tuner will be fitted inside the cabinet. Type numbers of the internal kits required for the models concerned are as follows:—

Model	*Incorporating:*	*Fitting No.*
ST8317U	tuner, type ST600/01	ST601/00
ST8314U	,, ,,	ST601/01
ST6414U/45	,, ,,	ST601/02
ST1481A	tuner, type ST600/02	ST601/04

In models ST1500U and ST9212U the tuner will be mounted in a box which is fitted to the outside of the cabinet. This fitting — type ST602 — is not yet available and no price has been announced.

Stereosonic Tape Records (*continued from page 84*)

lift or cut at 50 and 10,000 c/s respectively) there is a balance control to centralise the sound image between the two speakers as required by the room acoustics.

The four-stage pre-amplifiers provide initial amplification, equalisation for the recording characteristic (C.C.I.R. standard), tone control and cathode-follower output. The main amplifiers each deliver 10 watts maximum with not more than 0.25 per cent. total distortion at 8 watts and a noise level at least 55dB down to 10 watts. The speaker system in each console comprises a wide angle electrostatic ribbon delivering a sound output equivalent to 10 watts in the bass speaker, and a 13½in. elliptical speaker with very low fundamental resonance, totally enclosed in a 3½ cu. ft. critically damped enclosure, the overall resonance of the whole system being 47 c/s.

The bass speaker cuts off at 6 kc/s, at which frequency the high-note speaker takes over, thus eliminating the capacitative or inductive components required in conventional cross-over systems. The speaker gives a high-note diffusion over an arc of 60 degrees included angle, and this makes an important contribution to the stereophonic effect of the reproduction.

The two consoles shown in the illustration are, of course, prototype models and no definite price has yet been fixed. When the equipment becomes available in the Autumn it is expected that the total cost of the consoles will be between £200 and £300.

G9AED in Band III

THE STORY BEHIND THE BELLING-LEE EXPERIMENTAL BAND III TV STATION NOW TRANSMITTING TEST SIGNALS FROM BEULAH HILL, LONDON

General view inside the transmitter building of the Belling & Lee channel 9 transmitter. The *Telequipment* waveform generator is on the extreme left.

ON Tuesday, March 29, another television milestone was reached when the first signals from the experimental Belling & Lee transmitter at Beulah Hill, near Croydon, were radiated. The entry in the log book at station G9AED signified the first-ever television transmissions in this country on Band III, channel 9. The still picture of the test card, soon to be a familiar sight, has served as a sharp reminder that Band III regular transmissions are just around the corner, and dealers within the service area have been galvanised into action.

During the week between the first transmissions and the official opening on April 5, enthusiastic dealers telephoned through to the Enfield works to report reception and the response was so overwhelming that at times the switchboard was completely jammed.

Reports poured in, not only from all over the London area but from Gravesend and Rochester in the east, Waltham Cross in the north, Amersham in the west and Sevenoaks and Redhill in the south. Reception varied between excellent and weak, but the important point is that at that time the transmitter was running at only quarter-power. Since then, the station has increased its output to the full rated power of 1kW e.r.p. and the reports of reception have been consolidated and extended so that reception is possible throughout the whole of the primary service area of the proposed I.T.A. station on the same site.

An engineer at the control desk of G9AED adjusting the uncorrected signal from the waveform generator. The picture as transmitted can be seen on the second monitor screen.

Recent reports have come in from Hastings and Northampton, both well outside the estimated service area of the *high power* I.T.A. Channel 9 transmitter and are a good augury of things to come. The reception in Hastings, described as quite readable though with some flutter and interference, is particularly interesting since this is a poor reception area for Band I transmissions due to the shielding effect of the Downs. Again, the reports from Reigate and Redhill are encouraging since this district is in a pocket under the shadow of the North Downs. Many reports have come in from the Amersham-Chesham district, on the edge of the estimated primary service area of the I.T.A. station. Northampton, where signals were said to be reasonably good, is outstanding in that it is over 60 miles from Beulah Hill!

Not a Fair Picture

Belling & Lee wish to stress that the test signal is intended for the use of dealers in setting up and aligning Band III aerials, receivers and adaptors, to enable them to tune up the equipment and to eliminate or reduce ghost images. The general public should not be encouraged to believe that the transmission is indicative of the sort of signal which will eventually be radiated by the I.T.A. station, which will have an effective radiated power of some *sixty times* the present experimental transmissions. Thus, many areas receiving only a weak signal, with perhaps heavy interference and "noise," will present a false and unfair impression on the general public.

The experimental station at Beulah Hill was originally conceived by Belling & Lee as a practical means to study propagation problems and characteristics on the frequencies involved and also to ascertain the potential nuisance value of ghosting and if this interference would be more severe than that experienced on Band I frequencies. The company was granted permission to erect the low power station on Channel 9 and to operate it until such time as the I.T.A. wish to commence their own experimental transmissions. Such a move was, of course, greeted with enthusiasm by the radio industry and by the I.T.A. who offered to put part of their site at the disposal of Belling & Lee for the erection of the pilot station.

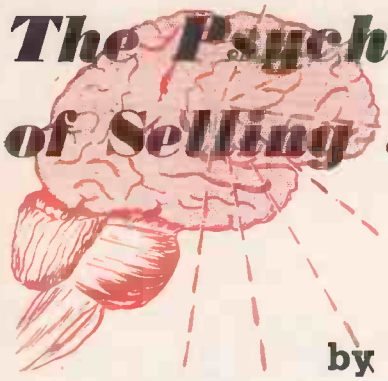
This valuable concession enabled the company to radiate signals from the exact location of the I.T.A. transmitter so that aerials could be accurately aligned well in advance of the preliminary commercial TV transmissions. Aerials erected and correctly positioned now will not need any further attention when the I.T.A. station commences operation. Incidentally, Belling & Lee wish it to be stressed that the pilot station at Beulah Hill is in no way connected with the I.T.A., who are simply acting as hosts, the full cost of the station (estimated at around £10,000) and its maintenance and operation being borne by Belling & Lee.

Built in Three Months

The complete transmitter (except for the waveform generator supplied by Telequipment) was engineered by six of the company's research department staff and was not started until January of this year! The mechanical

(continued on page 96)

The Psychology of Selling



Part 3
MOTIVATION

by H. J. Campbell

IN previous parts of this series we have been dealing with things outside the mind. We have considered the role of the senses in their response to external stimuli, and we have looked into the kinds of happenings that affect our attention. Now we go inside the mind and talk about motivation. We can start with a definition—a motive is an internal factor or condition that tends to initiate or sustain activity.

This has rather startling implications—which, by the way, are well confirmed by experiment. It means that if you were deaf, dumb, blind, and couldn't touch, taste or smell, you would still have motives—albeit of a vague and ill-defined kind. If you were, in the exact meaning of the word, senseless: if you had no contact at all with the environment, you would nevertheless be motivated.

This means, of course, that there is something within us—inborn—that prevents our staying static. This "something" gives rise to elementary, ill-defined activity. Our contacts with the environment, which increase with age, modify and modulate the fundamental inborn activity, until we get the more complex but clearly defined motivation of the normal adult.

The important principle from the radio sales point of view, that arises out of all this, is that all sane, adult activity is motivated. Only in the immature, the insane and the inhuman is activity spontaneous.

In other words when a customer comes into your shop and asks to see, say, a record player, you may be sure that there is an internal factor driving him to such behaviour. If not, you are dealing with a madman.

In the field of motivation study applied to sales techniques, psychology and psychiatry combine. If you are to be a successful dealer, you must have some knowledge of both these sciences.

You must know as a psychologist that your customer is motivated. You must know as a psychiatrist that he may not be aware of his motivation. Motivated activity ceases when a goal is reached. But that does not mean that the particular goal reached is the goal that was originally sought for.

The negative side of this is important to you. Undoubtedly you have had customers come in and ask to see something. You have shown it to them, they've mumbled a bit and then turned it down. And they've gone away. And you've lost a customer. You have not been able to supply a goal for the customer.

★ what is a goal?

What is a goal? A goal, according to the best psychologists, is an end state at which sustained activity ceases.

Your successful sales are examples of this. A customer says he wants a television set. You show him several. He selects one, signs the papers and walks out satisfied. His sustained activity "buying-a-TV-set" has ceased. He will not walk down the street and buy another one.

With the customer you failed to satisfy it is different. When he goes disappointedly out of your shop his "buy-something" activity does not cease. He hasn't reached his goal. He will go from dealer to dealer until—when he finds one who knows a bit more psychiatry than *you* do—his need is satisfied. Then and only then will his sustained activity cease.

The point of this is that as soon as you get a customer who shilly-shallies over the television sets (or any other line, naturally) you are showing him, you must suspect at once that he doesn't really want a TV set.

You must also realise that he does want something. And you must do your best to find out (i) why he doesn't want a TV set, and (ii) what exactly he does want. You may be able to change his mind about (i) or you may be able to supply (ii).

As a concrete example, a man's wife may have nagged him to buy a TV set, but he is convinced either that he cannot afford one, or that he has no use for the thing. Nevertheless, he'd like to stop his wife's nagging. He'd like to buy her *something* in the radio line that he can afford and that he can derive pleasure from himself.

★ he who hesitates

This is the kind of fellow who will find something wrong with every TV set you show him. Ordinary sales techniques are wasted here. How to deal with him? If he seems an intelligent kind of chap, you might try the direct approach and say "Look, do you *really* want a television set?" He will probably grin a little sheepishly and say something about the wife's being rather keen on it, but he's not so sure himself.

If he doesn't seem to be the intelligent type that would be amenable to the direct approach, you might try suggesting that perhaps a good radio might fit the bill. In any case, you must use your native commonsense, plus your knowledge of human nature, combined with some of the principles of psychology.

There are all sorts of possible approaches; you must decide for yourself which you will use. You can accept the customer's motivation and try to satisfy it. Or you can attempt to change the motivation by stirring up other internal factors that conflict with the original motive, are stronger, and which set up a new motive which you know you can satisfy.

It is possible to convince a man that his wife *should* have a television set. It is also possible to convince him that she would be happy with something else. Strangely enough, both these things may be true, so complex are human motives.

No discussion of motivation would be adequate without a consideration of tensions. It has been said that life is just one damned thing after another. It would be truer to say that life is one long series of tensions and attempts to relieve them. When all tensions go, so does life.

(Continued on page 96)

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Psychology of Selling (*continued*)

The great distinction between live things and dead things is that the live ones have tensions. The well-integrated person accepts the fact of tensions, lets them make his life interesting and gets his pleasure from relieving them rather than by avoiding them.

★ question of pleasure

Your job as a radio salesman can be put in these fundamental terms—your role in life is to relieve tensions in your customers. The release from those tensions is pleasurable, and *you* will be associated with the pleasure. The customer will come back. That is the psychological basis of all successful selling. Unsuccessful selling is based on the principle of *building up* tensions in the customer!

So, remember that every person who comes into your shop is motivated, that motivation implies tensions, and that the only way to sell is to relieve those tensions. Intelligent introspection will help you in this.

Study your own tensions, see *how* they are relieved when you buy toothpaste or some such thing. And then study how different people require their tensions relieved in different ways.

★ complex motives

Now let us move on to a study of more complex motivation. This is bound up with the idea that people do not always do things for the apparent reason, but for some more fundamental non-apparent reason. You might think, for example, that when someone spends a pound on food, they do it to appease the tension of hunger.

However, Thorndike, the American practical psychologist, had suspicions that this was not the case. He looked into the matter and discovered that of each of the twenty thousand million dollars spent annually on food in the States, only fifty-two cents went to appease hunger.

He gives the following figures to show how much of each dollar goes on satisfying the various other motives:—

Hunger	52.0
Sensory pleasure ...	19.5
Social needs	14.0
Protection	6.0
Comfort	3.0
Others	5.5
	100.0

Many people think that Americans are much like other peoples. If this is true, then about half the money *you* spend on food is not spent to satisfy hunger! Makes you think, doesn't it? If this kind of motivational complexity is involved in our buying of something as vital as food, what ramifications of motive characterise our buying of such non-vital things as radios, TV sets and tape recorders?

No one knows, of course; the investigation has never been carried out. But we would be fools if we thought that more than half of the money spent on these things is spent to satisfy a desire for listening to "What's My Line"! The proportion must be considerably less than half.

We must be realistic. We must accept the idea—even though it is not, as in the case of food-buying, a proven fact—that when people buy our wares, they are buying release from a whole host of different tensions, satisfying a host of different needs, behaving according to many different motives.

Only by understanding and accepting this idea will you be saved from making your sales technique oversimple. Unless these ideas are firmly in your mind, you might well make the mistake of trying to sell a radio as though the customer only wanted a radio! That way you will, of course, sell a few radios.

But you will sell far more radios—and far more of all your other lines—if you bear in mind that people are not as simple as they seem, that their behaviour is not as straightforward as it appears, and that their need for your wares is tied up with all the other personal and social needs of their lives.

G9AED

continued

assembly was carried out by two of the department's model makers and an apprentice. The mast and hut (which measures 20ft. × 12ft.) were erected by the company's installation department and the transmitting aerial atop the mast was designed and made in the research department and was not commenced until the end of January. Naturally the equipment is not designed so that in the event of a breakdown a stand-by equipment can be brought into circuit—the time factor alone would not allow such refinements. Nevertheless, elaborate precautions and a good supply of spares avoid serious trouble in this direction.

The test card is designed mainly to determine the effects of ghosting and this was fully described in the April issue of *B.R.T.* Results so far obtained tend to show that reflections are not likely to create any insurmountable installation problems on Channel 9, but the Belling & Lee research van is at present making an exhaustive study of the position and the best means to eliminate or reduce ghost images at these frequencies.

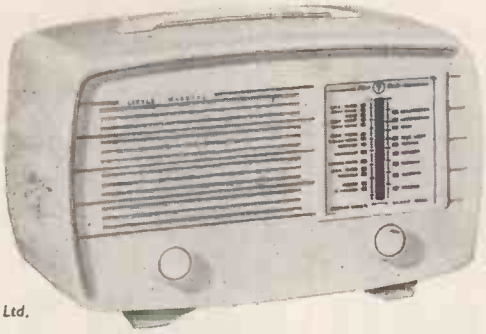
So far as signal strength is concerned, good reports have been received as far distant as 30 miles but in built-up areas and naturally sheltered locations reception is likely to be poor, with a good deal of "noise." Although the position will obviously be greatly improved when the I.T.A. station with 60 kW e.r.p. goes on the air, it is clear that high-gain directional arrays will be needed in many locations to obtain satisfactory reception.

The temporary transmission on quarter-power provided a field strength of 200μV in the W.1. district of London, which was increased to 4mV on full radiated power. This compares with the 10mV of the B.B.C. Band I transmissions. It is estimated that when the I.T.A. high power station goes on the air, the field strength at the edge of the primary service areas will be about 2mV, and 250μV at the edge of the secondary area. Thus, for rough comparison purposes it will be seen that the early quarter-power signals from G9AED produced a field strength in the West End of London similar to that expected in the fringe area of the I.T.A. station.

At the official opening of the Belling & Lee station, Mr. E. M. Lee announced that in his opinion a summer selling campaign for Band III aerials is needed and that the period of May to August should be considered as a Band III aerial installation period by the trade. Distribution of Belling & Lee Band III aerials has now commenced and will be speeded up as the requirements of different areas have been ascertained.

To accompany the radiation of the test card, a 600 c/s audio tone has now been added on the sound frequency. This will not only enable dealers to align receivers and adaptors but will permit the engineers to make an announcement should at any time the video transmitter break down. Transmissions are still made daily from 10 a.m. to 12 p.m., except on Saturdays, Sundays and public holidays, but an afternoon period is under consideration.

Although nothing definite has been settled it is possible that when the Croydon I.T.A. station begins transmissions the Belling & Lee station may be moved to the Midlands to provide a pilot service of a similar nature prior to the starting of I.T.A. transmissions in that area.



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