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RADIO AND

TELEVISION

RETAILING

Vol. XII. No. 3

JULY, 1957



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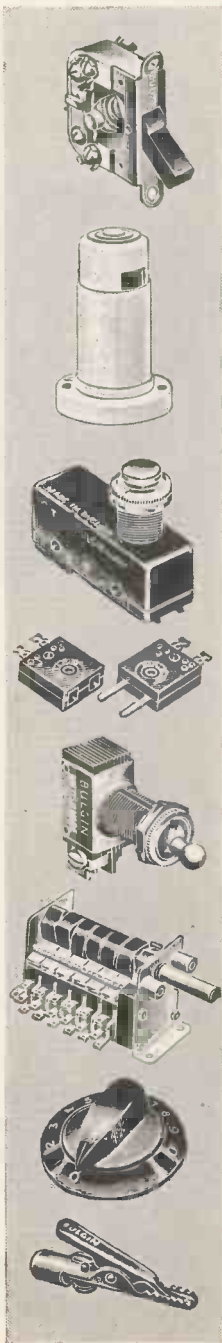


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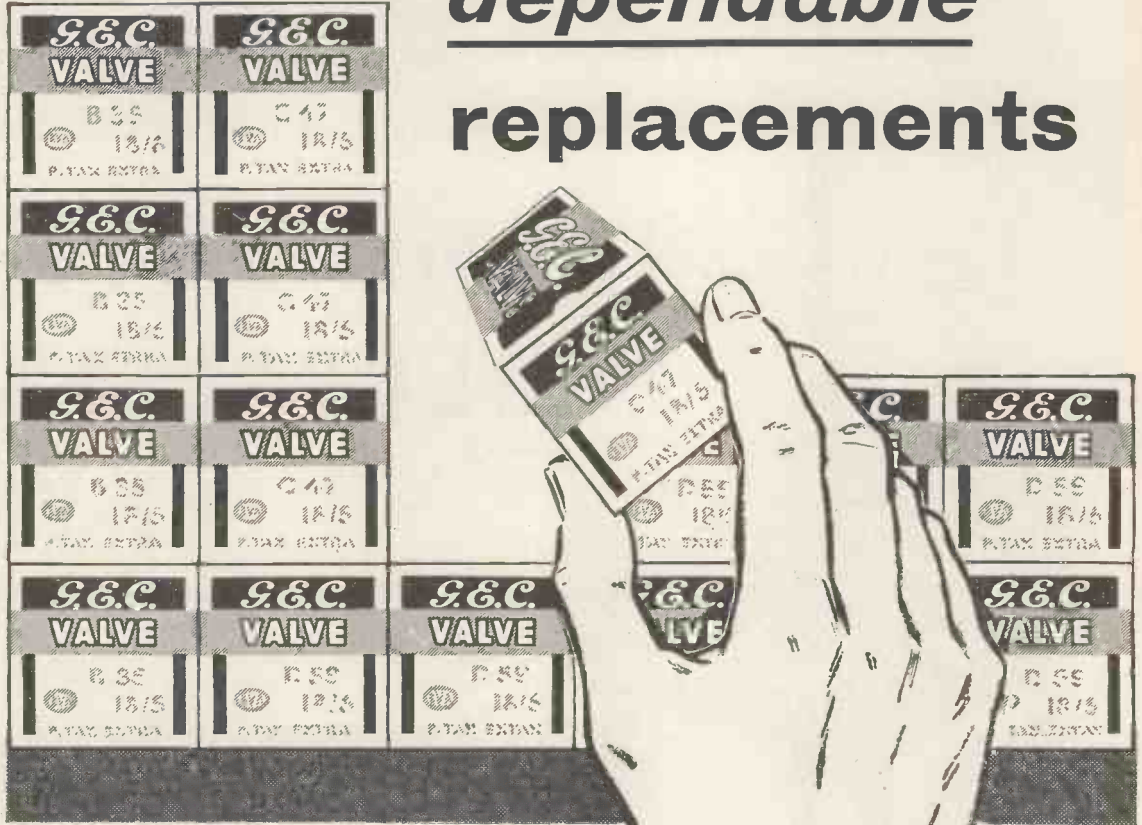
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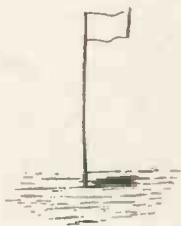
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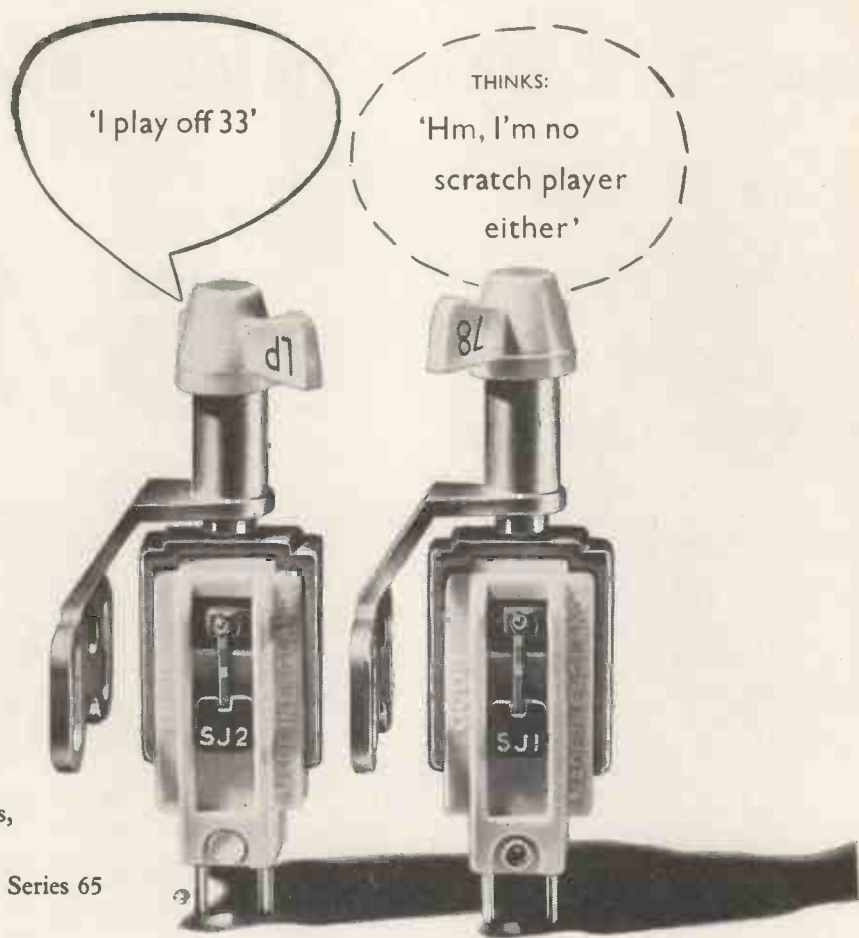
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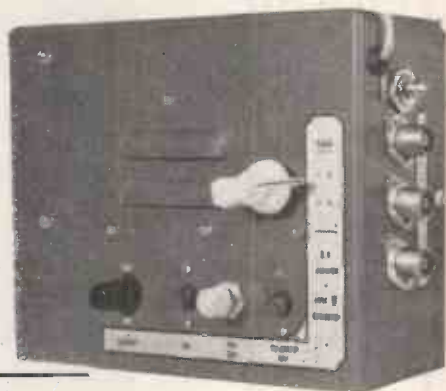
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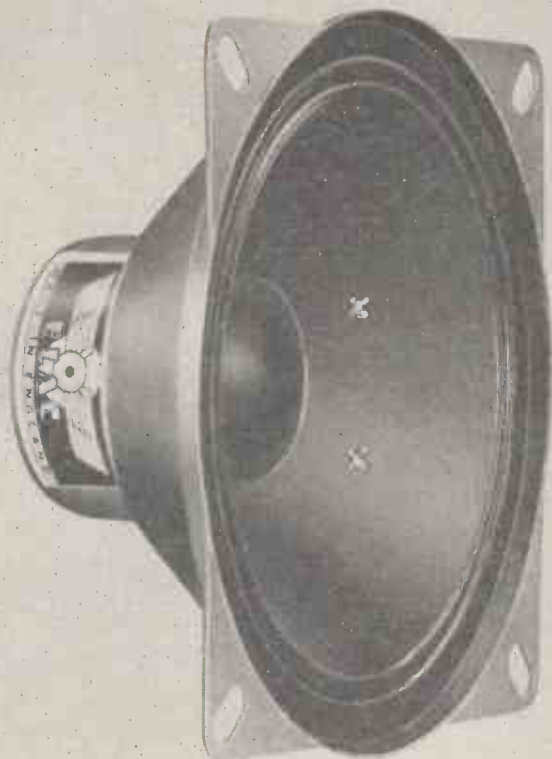
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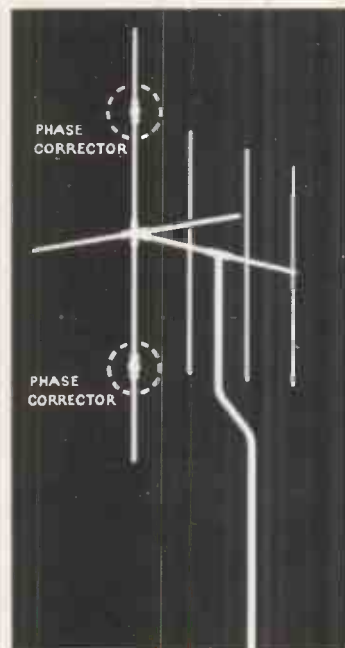
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Regentone

Announced last issue:

Regentone's amazing new table radiogram with TWO speakers, VHF/FM-AM reception, and a 4-speed automatic player—all compact in a beautiful walnut veneered cabinet and selling at 45 gns.! There is a suitable table as an optional extra, at 4 gns.

Its predecessor, the fabulous MULTI 99, was a great seller. Now the amazing 99/FM will take its place with even greater sales!

99/FM will be seen throughout the country. Regentone will give it a big boost. So advertise *yourself*. Let *everyone* know that you stock this magnificent new top-value top-seller. Use this free display material, and cash in on the energy Regentone are spending on the 99/FM. Get it **NOW!**



Give-away leaflets!
Catchy design—simply asking customers to pick up and read. They do a lot of your work for you!



Bright and powerful window bill measuring 7 ft. x 9 in. Just the job to capture the interest of passing customers!

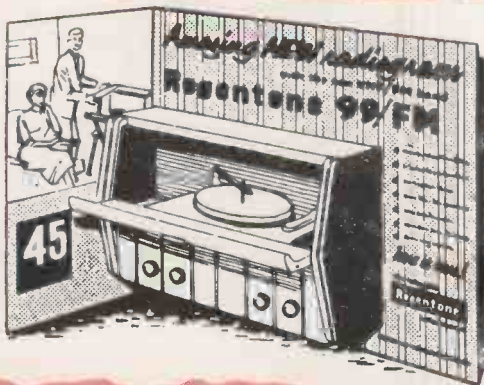
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help you sell the

99/FM
45
GNS.



List price £34. 2. 4. P.T. £13. 2. 8. Table 4 gns. extra. 6-valve superhet table radiogram. VHF/FM, long and medium bands. TWO speakers. Automatic 4-speed player. Large output. Fitted FM dipole and Ferrite rod AM aeriels. Walnut veneered cabinet 15½" high x 21½" wide x 15" deep. Table 19" high, optional extra. AC mains 200/250 volts.



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than ever

— and all for

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EXCLUDING MICROPHONE

TECHNICAL SPECIFICATION

Mains Voltages: Suitable for A.C. only, 110-125, 140-160, 190-210, 210-230, 230-250 50c/s. Consumption: Approx. 100 watts max. Mains Fuse: 110-125V 1.25A, 140-160V 1A, 190-250V 0.8A. H.T. Fuse: 100 m/a Surge Resisting. Valves: EF 86-ECC 81-ECC 83-3 x EL 95-EM 71-4 Metal Rectifiers. Recording Level Indicator: Magic Eye. Loudspeaker System: Three 7" x 5 1/4" Elliptical high flux permanent magnet moving coil units. Superimposition: Erase cut-out button for the superimposition of a further recording onto previously recorded tape. Amplifier Output: 6 watts approx. Sockets for: Microphone, Diode, Radio L.S./Gram P.U. Inputs, High Impedance Output, Extension Speaker Output, Grundig Distributor Speaker, Grundig Remote Control, Earth Connection. Tape Speed: 3.75 in. per sec. and 7.5 in. per sec. Frequency Response: At 3.75 in/sec 50-10,000c/s ± 3 db At 7.5 in/sec 40-15,000c/s ± 3 db. Wow and Flutter: 0.3% at 7.5 in/sec. 0.5% at 3.75 in/sec. Tape: Grundig (M.S.S.) Tape fitted with Automatic Stop Foils. Automatic Stop Switch: Electro Magnetic. Tape Length: 1200 ft. Position Indicator: Precision counter type position Indicator. Running Time per Tape: 30 minutes each track at 7.5 in/sec. (1 hour total), 60 minutes each track at 3.75 in/sec. (2 hours total). Fast Forward and Rewind Times: Approx. 2 minutes. Recording Sense: Top Track, left to right (British and International Standard) with immediate Track Change by press buttons. Amplifier: Can be switched to operate as low power P.A. Amplifier from any Input.

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- Socket for connection to Grundig Distributor Speaker.
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Plus three-directional reproduction,
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"Why  is best" series No.5

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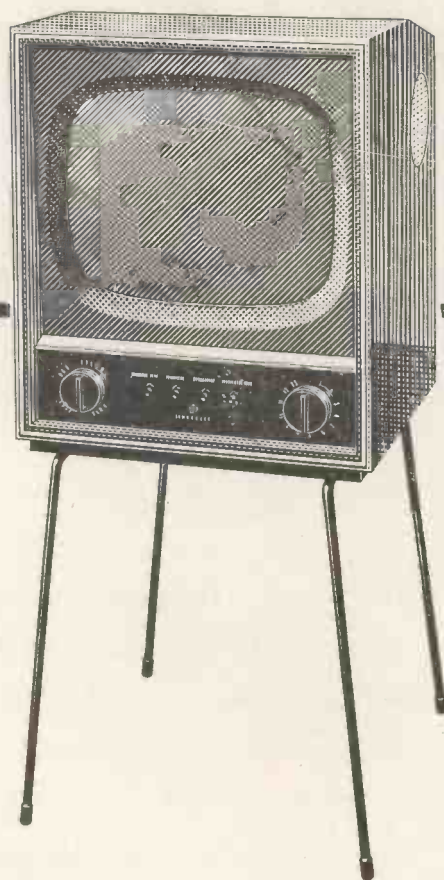


wins design award out of 3,500 products

On the 10th of May, the Robin Day designed Pye TV Receiver was awarded a certificate by the Council of Industrial Design, as one of the twelve outstanding designs of the year.

The twelve were chosen from more than 3,500 products by a panel of judges appointed by the Faculty of Royal Designers for Industry.

Pye Limited was the only manufacturer of Radio and Television to gain an award.



This is your cue for sales!

With widespread high class national magazine advertising, the full significance of the outstanding success of the Contemporary model will be brought home to millions of readers in Britain. Every model leaving Cambridge is backed by more than fifty years of scientific research. In design, technical excellence and sheer dependability, there's no finer value in Britain today. Most certainly — give pride of place in your windows to Pye Contemporary TV — but keep good stocks of all models. And stand by for results!



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British
RADIO AND

TELEVISION

RETAILING

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DAVID McILWAIN

Tech. Editor:
W. NORMAN STEVENS

Adv. Manager:
ROBERT C. CORNWALL

JULY 1957

TELE-OPINION

A Dangerous Occupation

THE contribution which any particular industry can make towards the prosperity of the nation's economy by an expansion of production, increased productivity, and competitiveness in world markets, is limited by the framework within which it has to operate and which is imposed on it by Government policy. The energy and resources of industry should be free to be concentrated on the achievement of greater efficiency and, by enterprise, the expansion of production for home and export markets. However, since the war, in their efforts to curb inflation, successive Governments have hampered the efforts of the radio and other durable consumer goods industries to gain these desired ends by arbitrarily altering at frequent and unpredictable intervals the terms on which trade can be conducted. By these interventions with the proper function of industry itself, they have rendered intelligent production planning and market forecasting a dangerous occupation.

In this forthright manner begins the twelfth annual report of the British Radio Equipment Manufacturers' Association, to which reference was made last month. The BREMA annual report is, indeed, one of the most important industry documents of the year, not only for its informed and comprehensive summing-up of industry activity throughout the year under review, but also for its outspoken comment on governmental economic policy and its effects on the industry.

During the first half of the year, the report continues, trade in domestic radio and television equipment was acutely depressed by the Government's measures to restrict credit generally and by the specific measures directed towards restraining the consumption of durable consumer goods by making the hire purchase regulations even more stringent and by introducing similar restrictions on rental transactions.

Hire purchase deposits were raised in February, 1956, from 33½ per cent to 50 per cent and, in the case of rental, nine months' payments were required in advance. Production plans, which have to be formulated at least six to nine months ahead, had been made in the expectation of a continued growth in demand, stimulated by the steps taken by the Government to extend the sound and vision broadcasting services.

Manufacturers were therefore faced

with the problem of adapting their production schedules to the immediate and drastic curtailment of public buying and the even greater reduction in purchases by the trade. Despite some recovery in sales during the second half of the year, manufacturers' total turnover at ex-works values was 20 per cent below that for 1955.

At meetings held with the Ministry of Supply and Board of Trade officials, the opportunity was taken to stress the disruptive consequences of the Government's budgetary and other fiscal manipulations

affecting adversely as it does the efficiency and productivity of the whole of this closely integrated industry and not only the domestic receiver section.

Here is a resume of other points in the BREMA report:

V.h.f.-f.m. radio.—During the year BREMA hope that it will be possible to evolve publicity and practical demonstrations in the various BBC regions, operated in conjunction with the industry and the trade. The association's v.h.f.-f.m. receiver servicing demonstrations have been extremely successful and have so far been attended by about 1,400 service engineers.

Alternative programmes.—Commenting on Band I and Band III television programmes, BREMA state that since the start of Independent TV there has been an increasing tendency for the two services (BBC and ITV) to compete on the basis of like programmes at identical times, thus leaving the viewers with no real alternative programme, but only alternative sources of a similar type of programme. It is stated that "the long-term interest of the industry is to secure the maximum TV coverage and receiver saturation. The nearer the alternative programmes come to satisfying all of the people some of the time instead of some of the people all of the time, the nearer the industry will be to achieving its target."

Industry exports.—The report stresses the difficulty of maintaining the level of exports year after year in domestic receiving equipment because additional outlets have constantly to be found to replace markets which have restricted imports. Domestic receiver exports during the year under review fell by no more than 3.5 per cent, but exports of sound equipment rose by 32.6 per cent.

Colour TV.—Plans are in hand for further colour television tests of other transmission

(continued on page 200)

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Service Data Sheets: R103 Pam 955 series; R104 Ever Ready "Sky Monarch"; TV106 Peto Scott 14187.

Independent TV in Scotland

will serve over 3 million

THE new transmitting station now being built by the Independent Television Authority at Black Hill, Lanarkshire, will provide a service for about three quarters of the population of Scotland. It is estimated that the reception area of this station will extend from Dundee to Dunoon and from Dunbar to Ayr.

By using an entirely new design of aerial array, the ITA has succeeded in beaming the highest possible power towards the most populated areas and over 3½ million people will be within the primary service area.

It is estimated that reception conditions will be as follows:—

Primary Area extending from Cupar to Greenock and from Dunbar to Cumnock. This area has a population of 3,310,000 and most viewers there unless they are situated in particularly unfavourable positions should receive a consistently satisfactory service.

Secondary Area with a population of 460,000. In this area a substantial proportion of viewers should receive a satisfactory service, but in a few unfavourably situated places reception may be poor.

Fringe Area with a population of 50,000 people. In this area acceptable reception should be secured in many locations although this service may be subject to some interference from time to time.

The Black Hill transmitting station will transmit towards the north-east, the most powerful Band III signal in the world. The effective radiated power will be 475 kilowatts towards Dundee, 200 kilowatts towards Ayr and 65 kilowatts towards the north-west and south-east.

It will use the highest mast yet constructed for the Independent Television Authority; this mast will be 750ft. high and as the site is 850ft. above sea level the top of the aerial will be 1,600ft. above sea level.

The station will operate on Channel 10 and the frequencies will be 199.7305 Mc/s for vision and 196.2395 Mc/s for sound.

The station building at Black Hill is now virtually complete and much of the equipment has already been installed. The mast has been erected to the 600ft. level and installation of the aerial array at the top should begin shortly.



Kolster-Brandes television equipment is being used extensively at Cell Barnes Barnes Hospital, St. Albans, Herts. This K-B Model MV30 receiver, pictured with two of the hospital's nurses, is one of six to be installed by dealer F. Jarvis of Catherine Street, St. Albans.

THORN-EMI FORM BRITISH RADIO CORPORATION

A NEW radio and television company, known as the British Radio Corporation, Ltd., has been formed to integrate the design, production and sales organisations of Ferguson, H.M.V. and Marconiphone following the recent merging of Thorn and E.M.I. domestic radio and TV interests.

The new company, which has a registered capital of £100,000, is owned jointly by Thorn Electrical Industries, Ltd., and Electric and Musical Industries, Ltd., and will have offices in the London area.

BSR

is now a
**Public
Company**



BIRMINGHAM Sound Reproducers, Ltd., has become a public company, following the placing of part of the company's issued capital by a City trust, permission having been obtained to deal on the London and Birmingham Stock Exchanges for the whole of BSR'S issued capital of £500,000 in 5s. Ordinary Shares.

A placing of 600,000 shares was arranged, the balance of issued capital remaining in the hands of the present directors.

Published comments at the time of issue referred to the progress of the company's main product, namely, the BSR *Monarch* autochanger; it was stated that almost two-thirds of production was sold overseas, mainly in dollar markets. A new plant is to begin production of a new 4-speed single record player for incorporation in lower-priced record playing equipments, and further factory extensions are planned both at Old Hill and in N. Ireland.

Chairman of the company (pictured above) is Dr. D. McLean McDonald, who founded BSR and, with members of his family, still retains a majority shareholding.

STOLEN SET

A Regentone Model B1 battery portable radio receiver, serial No. 9402, was stolen from the company's stand at the Scottish Radio Show. Any information regarding this set should be sent to the Glasgow police or to Regentone.

TELE-OPINION CONTINUED FROM PAGE 199

BREMA ANNUAL REPORT

systems, but these will depend on the suitability of Bands IV and V for TV broadcasting. "Should these bands prove unsuitable," the report adds, "then any choice of standards is eliminated and a system based on 405 lines would be the only practical one for the U.K."

Band III converters.—The report states that Band III converters which change the Band III signal to the local Band I frequency and feed into the aerial socket of a Band I set have caused a considerable amount of interference, which the GPO will not undertake to cure. BREMA members have been advised to advocate the use of the type of converter which gives an output at the i.f. of the Band I receiver.

Real radio and TV prices.—The report comments that, although the increasing complexity of radio and TV sets have necessitated increases in retail prices, their "real" prices have fallen, and the trend of retail prices of all types of domestic radio equipment has continued downwards.

Picture tube X-radiation.—The report states that, while the viewing public is safe from the

hazards of x-radiation from television picture tubes, factory and service personnel, and in particular laboratory and development engineers, may be subjected to significant doses. Steps are being taken to measure and control possible dangers from this source.

Line-phase modulation.—On a number of receivers having long time-constant flywheel circuits a displacement of picture is sometimes caused by line-phase modulation of the transmitted signal. The report states that as a result of BREMA representations the BBC have now modified their sync. generators to overcome this trouble, and the ITA are investigating the problem with a view to making modifications.

TV picture-tube sizes.—The report confirms the trend towards larger TV screens. Most popular size during 1956 was 17in., this accounting for 54 per cent. of all sales; 14in. sets totalled 34 per cent. Sales of 21in. sets were 7 per cent in 1956 as compared with 2 per cent the year before. 12in. sets made up 3 per cent in 1956 (as compared with 71 per cent in 1952).

FOR ALL IN THE TRADE AND THE INDUSTRY

3M TAPE PRICES CUT

THE Minnesota Mining and Manufacturing Co. Ltd., makers of *Scotch Boy* magnetic recording tapes, announce that the retail price of the acetate based No. 111A and the No. 150 extra-play polyester tape will be reduced as from July 1.

Down from 35s. for a 7in. reel to 27s. comes No. 111A, which is now claimed to be the lowest priced recording tape on the British market. But the company state that the high standard of the 3M product will be maintained.

The new price for *Scotch Boy* No. 150 will be 50s. for a 7in. (1,800ft.) reel, as compared to 54s. This tape, with its polyester base and superior magnetic coating, will be no dearer than competitive long-play p.v.c. tape.

Prices are reduced pro rata for other reel sizes in No. 111A and No. 150, but the prices of *Scotch Boy* No. 111V (with a p.v.c. base) and No. 120 (high output, acetate base) will remain unchanged.

Manchester K-B Depot

THE area served by the K-B Manchester depot for the delivery of radios, radiograms and television receivers has now been extended. It will now supply the following additional areas:—

West Riding of Yorkshire (with the exception of York, Selby, Goole and Thorne), Cheshire, Flintshire, Denbighshire, Caernarvonshire, Anglesey and the towns of Glossop and New Mills in Derbyshire.

A Manchester K-B service depot is not yet in operation, and orders for service spares should still be made to Footscray.



NEW MULLARD SEMICONDUCTOR PLANT

THE first stage of a long-term project for the establishment of a completely independent manufacturing centre for semi-conductor devices has now been reached at the Mullard factory site at Millbrook Trading Estate on the outskirts of Southampton. It is believed that the plant is the only one in the country which is being built specifically for this purpose and when complete it will be the greatest single mass-production unit for semi-conductors.

It will operate as a self-contained centre containing research, development and application laboratories and will have its own tool room, drawing office and a well-stocked technical library. Basic research will continue to be undertaken at the central Mullard research laboratories.

So far, only about a third of this new plant has been completed and the present staff is about 400, which includes 60 graduates, of whom six are women. Amongst the graduates is the remarkably high number of 12 Ph.D's. When the plant is completed there will be employment for between 1,500-2,000 people.

Although the building is still not finished, production is already proceeding, due to a special form of construction which has been devised to enable each section to be occupied as it is completed.

Production of semi-conductors is, at present, still undertaken elsewhere in the company, but this will be centralised

at the Southampton factory in due course. The Mullard semi-conductor production programme is based on an estimated output of several million devices of all kinds for 1958, of which a considerable proportion will be transistors.

FM challenge to Industry

THE director-general of the BBC, Sir Ian Jacob, threw out a challenge to the radio industry in a speech to the Radio Industries Club of Scotland in Glasgow recently.

He said the industry had been slow in developing portable v.h.f. sets and car radio v.h.f. sets. He had seen good German portable v.h.f. sets five years ago, and there should be many in the market in Britain by now.

Sir Ian said the BBC had been ready to build v.h.f. transmitters immediately after the war, but had been prevented from doing so by financial policy of successive governments.

On television, Sir Ian Jacob stated the BBC would have brought television within range of 93 per cent of the people in Scotland later this year. He said: "We do not intend to stop there."

Complete coverage of Scotland would be impossible, but as a public service the BBC did not regard any minority as being unimportant just because they were too small to have commercial value.

Referring to the coming of commercial television in Scotland, Sir Ian Jacob said the BBC had been "facing the bowling," so far as television in Scotland was concerned, for five years.

Its rival was in the pavilion with his pads on, and was making a great song about how many runs he would score. Sir Ian said: "We shall see. If anybody can give a better service than the BBC good luck to them."



Pam dealers at the recent London meeting, which was addressed by N. A. Twemlow. This was one of a successful series of dealer meetings, organised by Pam (Radio and Television), Ltd., at centres throughout Great Britain and Ireland, at which Mr. Twemlow introduced the company's five new models and announced future plans to the trade.

NEWS ROUND-UP CONTINUED

TV & Radio Sales Up—BREMA

RETAILERS' sales of radio and television sets and radiograms were higher all round in the first four months of this year than in the corresponding period of 1956, according to the monthly retail survey of the British Radio Equipment Manufacturers' Association—radio sets by 21 per cent, television receivers by 20 per cent and radiograms by 42 per cent.

Retailers' sales of television receivers during April were 66,000 an increase of 6 per cent on April, 1956, but a decrease on the previous month of 16 per cent.

Sales of radiograms were 14,000 the same as in April, 1956, but a decrease of 30 per cent on March this year.

Radio receiver sales at 78,000 showed an increase on April, 1956, of 20 per cent but a decrease on the previous month of 6 per cent.

The proportion of hire purchase and credit sales, 53 per cent, for both radiograms and television receivers in March, fell to 50 per cent and 52 per cent respectively in April.

For radio receivers the percentage rose from 33 per cent to 35 per cent.



At the Savoy Hotel last month a special celebration was held to pay tribute to film critic Jympson Harman of the *Evening News* who has completed 51 years with one newspaper. Highlight of the occasion was the presentation to "Jymp" by Sir Michael Balcon of Ealing Studios of a Grundig York radiogram fitted with remote control—one of the first off the production line. The York was chosen by the Film Industry Publicity Circle, who organised the function, as an example of fine radiogram design. Picture shows (left to right) Jack Hawkins, "Jymp," Sheila Sim and Dulcie Gray admiring the radiogram.

New Siemens Edison Swan Company

MERGER NOW COMPLETE

(Pictured at right is the managing director of the new Siemens Edison Swan, Ltd., Dr. J. N. Aldington.)



FROM July 1 Siemens Brothers and Co., Ltd., and The Edison Swan Electric Co., Ltd., are to merge into a single new manufacturing and selling organisation known as Siemens Edison Swan, Ltd. The new company is a member of the Associated Electrical Industries group, whose chairman is Viscount Chandos. Lord Chandos is also chairman of Siemens Edison Swan, Ltd., itself.

The managing director of the new company is Dr. J. N. Aldington, B.Sc., F.R.I.C., F.Inst.P., M.I.E.E., F.I.E.S. Dr. Aldington joined Siemens at Preston in 1923 as an analytical chemist in the lamp works factory. In due course he became head of the Lamp Research Laboratories and in 1949 was elected to the board of Siemens Lamps and Supplies, Ltd., becoming managing director in 1952. In January 1956, when the Siemens Ediswan organisation came into being he became its managing director.

The new company will own and operate factories from Sunderland and Spennymoor in the north to Woolwich in the south and Lydbrook on the Welsh border. It will make a wide range of products, from telephone exchanges to cathode-ray tubes, and from cables to electro-medical appliances.

There will be some 20 regional offices covering the British Isles, and taking over the work of about double that

number which were formerly operated by the two separate companies.

The main interests of Siemens Edison Swan will fall under the headings of telephone and telecommunication equipment, radio and television valves and cathode-ray tubes, cables, marine equipment, batteries, domestic electrical equipment, etc.

For administrative purposes the company has been divided into 18 Product Divisions, each specialising in a particular type of equipment. Each of these divisions in its turn has a top management of three—chief engineer, manufacturing manager and sales manager.

All research is to be co-ordinated in a new research centre in Harlow New Town, and the first three blocks are now under construction. Director of Research is Dr. T. E. Allibone.

The Siemens Edison Swan organisation employs about 21,000 people and uses some 4 million sq. ft. of factory space.

65,000 visit Scottish Radio Show

PUBLIC ATTENDANCE at the Scottish Radio Show totalled 64,978.

"It would have been good to have reached 100,000," said Mr. G. B. Campbell, acting secretary of the Radio Industry Council, "but while public attendance—largely owing to the fine weather, we think—was disappointing, dealers came in good numbers from all over Scotland and the North of England and there were many even from as far away as London and South Wales.

"The business results of the Show, therefore, should be satisfactory and we also believe that the exhibitors have been able to fulfil one of the main purposes of the exhibition—to give thousands of viewers and listeners advice about what they must do to take advantage of the coming commercial television service and the B.B.C.'s v.h.f. sound radio service."

High-fidelity sound reproduction was stated to be one of the successes of the Show, the Whiteley demonstrations being well attended.

"Scotland has not yet taken to 'hi-fi' in a big way," Mr. H. W. Read of Whiteley said, "but there is considerable interest and the exhibition has enabled me to put a thousand interested people in direct touch with the dealers who are pioneering the equipment in Scotland."

It was quite clear from the editorial publicity, as shown by the cuttings displayed in the Press Room at Kelvin Hall, that the impact of the Show went far beyond the people visiting it.

While exact comparisons are still to be made, it is believed that the Scottish Radio Show received more editorial publicity than any other R.I.C. exhibition outside London.

Telerection to the rescue

AT the recent Bath and West Show at Swindon, there was some doubt as to whether I.T.V. reception would be possible. However, when Claude E. Barkham, Ltd., electrical, radio and television engineers responsible for the provision of sets on The Electrical Contractors Association Stand, called in Telerection's Installation Service, their fears proved groundless, and with the aid of the Double Delta 6 aerial, perfect reception was obtained throughout the whole of the Show.

Messrs. Claude E. Barkham, Ltd., and Telerection, Ltd., were also responsible for TV and v.h.f. reception on the BBC stand.

Grundig Publicity

PRESS and public relations work, which have hitherto been handled by an outside consultant, will in future be managed direct by the publicity and advertising department of Grundig (Great Britain), Ltd., from 39 New Oxford Street, W.C.1.

There are almost daily developments in the field of tape recording, and Grundig plan to make available to the press all newsworthy items relating to the use of tape recording in commerce, industry, education and the world of entertainment.

The new press relations department will also handle stories concerning all Grundig products including the *Stenorette* dictating machine and the range of table radios and radiograms.

Aerialite Lectures

AERIALITE, Ltd., plan to hold television aerial lectures in the TWW service area on July 10 at the Park Hotel, Cardiff, July 11 at the Grand Hotel, Bristol, and July 17 at the Rougement Hotel, Queen Street, Exeter. The lectures, which will start at 3.30 p.m. and 7 p.m., will be given by Peter Jones, the company's chief designer. Other members of the design and technical staff will be present to give individual advice on conversion problems.

Allen Components Distribution

ARRANGEMENTS have been made for Direct TV Replacements to handle the sole distribution of the complete range of Allen components used in home constructor receivers, including the "Teleking," "Wide-angle Viewmaster" and the "Supervisor."

Immediate delivery of all r.f., i.f. and timebase components is offered.

JULY, 1957

MARCONI INSTRUMENTS EXTEND FACTORY



The growing demand for test equipment manufactured by Marconi Instruments Ltd. has made it necessary for the company to provide this 22,000 square feet extension to the factory at Longacres, St. Albans, Herts. Besides considerably expanding their sales in the home market in recent years, the company have made big advances in the export field and now have distributors in 68 countries. The new building, which is now being built, will comprise two bays, each of 40 feet span and 260 feet in length, plus an annex with a floor area of approximately 800 square feet. The building will house a centralised Engineering and Development Unit, including the main Drawing Office and Model Shop, providing maximum efficiency and convenience of operation.

Norman Rose Catalogue

NOW available is the latest 1957-8 catalogue published by Norman Rose (Electrical), Ltd., 53 Hampstead Road, London, N.W.1. This is a comprehensive 30-page booklet listing the company's wide range of radio and television components and accessories, including aeriels. Copies can be obtained by bona-fide applicants using trade letterheading.

SOBELL SERVICE

RADIO and Allied Industries announce that their service department is now wholly concentrated at Slough.

The telephone number is Slough 24541, and the address: Radio and Allied Industries, Ltd., Service Department, Wexham Road, Slough, Bucks.

No further service requests are being handled from Hirwaun.

● briefs

Tape Recorders (Electronics), Ltd., 784-788 High Road, Tottenham, London, N.17, report that a quantity of tape recorders were stolen from their van on June 13. Serial numbers are: *Sound* tape recorders 00724, 02382, 02158, 00672, 00666, 02401 (110V), 02707, 02697, 02506, 02501, 02594, 02748, 02751, 02756, 02753, 02759, 02719. *Sound Cadet* tape recorder 53901.

The Mullard educational film, *Mirror in the Sky* (the story of Appleton and the ionosphere), was recently televised by Associated-Rediffusion in their *Outlook* programme. The film was seen by ITV viewers in the South, Midlands and the North.

A world congress on Commercial Television will be held in London on September 18. Thirty countries will be represented, and 70 American television editors will attend.

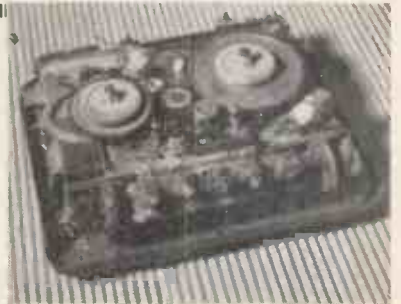
Methods of increasing productivity in industry is the theme of the third biennial Production Exhibition to be held next year from May 12 to 21 in the Grand Hall, Olympia, London.

Some 203 packing cases of equipment were sent to Poland last month by Marconi's Wireless Telegraph Co., Ltd., who were exhibiting at the Poznan Fair. Highlight of the exhibit was a complete television studio and associated equipment.

Ten Shilling Bargain

TEN SHILLINGS for a dictating machine in perfect working order—this is the unlikely price paid recently by a Bristol man for a Grundig *Stenorette*. Admittedly, appearances were very much against the machine, which had been sold as scrap after a severe fire which gutted the Walthamstow warehouse of Petter Radio & Electrical Supplies Ltd.

Purchased by a salvage dealer, the *Stenorette* passed through several hands until it was eventually sold for ten shillings in Bristol. The new owner, curious to see what would happen if he replaced the mains lead and tape, and plugged in, was delighted and surprised to find that it worked perfectly. Although the outer case and push buttons had been melted away, he continued to use it daily in his office until a Grundig representative heard about it and offered to buy it.



Back at the factory, the *Stenorette* was tested by Grundig engineers who discovered that despite the severe damage caused by fire, water, exposure, and mechanical shock, the efficiency of this robust machine was in no way impaired.

It is now installed in a place of honour in Grundig's West End showrooms.

a profit-spinner from Peto Scott!

A New 17" T/V

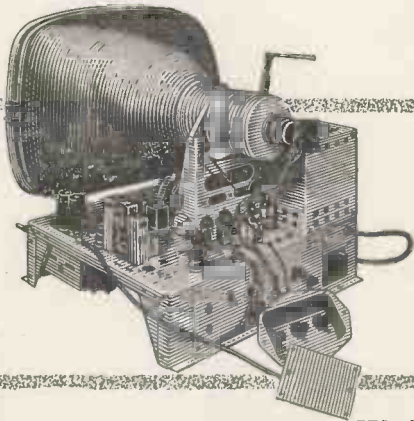
turret tuned
to BBC and ITA

Sell the new PETO SCOTT 17in. receiver—and offer your customers the finest value in television today!

- ★ Unmasked screen gives *maximum* picture area.
- ★ Mullard aluminised C/R tube and valves.
- ★ Highest quality components guarantee dependability.
- ★ Front speaker.
- ★ Soak-tested for four hours—your assurance of reliability.



It's TOP value in T/V!



EASY MAINTENANCE MEANS A PROFITABLE DEALERSHIP

All Peto Scott receivers are designed for easy economical maintenance which cuts servicing costs to a minimum. Clever design allows for easy access to all components without removing the chassis from the cabinet and to make servicing even simpler. Peto Scott receivers still incorporate tag panel assemblies. Life Long components and easy handling make Peto Scott a service man's dream. This is one reason why the Peto Scott dealership is profitable.

Write for details NOW!

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First in Television 1928
and Still Ahead Today*

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Making the most of

DISC BUSINESS

by M. A. QUALES



GRAMOPHONE records have become a lucrative line of business. Radio dealers, by virtue of their close association with the means of reproduction, enjoy a good measure of the public's confidence. In the sale of discs we have a ready-made market.

But, for success, a specialised approach is needed. Musical tastes are legion, varied, and often quite unexpected. Sudden crazes flourish and die, almost before our orders are completed. Quite obviously, the small dealer cannot afford to stock a comprehensive range of records. His problem lies in what to stock, how to sell it, and the way to publicise his wares.

One rule must be stressed—forget your own tastes. If you would rather settle quietly to hear a string quartet than cut a rug to the latest jazz, your sales will suffer if you show it. You will be labelled a “square,” and your shop ignored by the greatest potential buyer, the teenager.

If on the other hand, you are a real “gone guy,” then stressing the fact may succeed in your losing the support of the “classical fan.”

It is not enough to be impartial. We must meet hep-cat and highbrow on their own levels—and that means studying the market.

The broad division of the platter trade is “popular” and “classical.” However, what is popular to the student of the fugue may still seem too deep for the average person with an ear for a tune, and positively ancient to the “hot clan.”



BEST SELLERS

The best guide to popular music is the published list of best sellers. Each record company issues regular statistics of the progress of their latest discs. Several newspapers and magazines feature a “Record Corner,” comparing the various current issues. The radio, programmes, particularly the commercials, spotlight these “races for fame” enabling us to follow a tune up the Hit Parade and cash in on expected demand.

If one's record sales are large enough to merit a separate staff it is good practice to employ a keen youngster who can follow the vagaries of public taste. The average teenager is remarkably knowledgeable about current “idols” and their “hits.”



THERE IS LITTLE DOUBT THAT THE EVER INCREASING INTEREST IN SOUND EQUIPMENT AND HIGH FIDELITY REPRODUCING EQUIPMENT IS LARGELY STIMULATED BY THE BOOM IN GRAMOPHONE RECORDS. BUT SELLING SOUND EQUIPMENT IS ONE THING, AND SELLING RECORDS ANOTHER. THIS ARTICLE, SPECIALLY WRITTEN FOR BRTR, OUTLINES MANY OF THE FACTORS THAT HAVE TO BE CONSIDERED BY THE DEALER WHO WANTS TO MAKE THE MOST OF DISC BUSINESS.

There is always a steady market in Top Twenty tunes. As these may be recorded by several different artistes, and ridden to sudden prominence by that modern cheer-leader, the disc jockey, it is wise to keep abreast of popular taste . . . and cater for it.

That does not mean that one should ignore the steady market of “disciples.” Many customers ask for the latest recording of X or Y and will buy it, whether their idol is rendering a Tin-Pan-Alley flash-in-the-pan or rending a classical aria.

Summed up, thus far, we need to follow:

- (a) The popular song.
- (b) The popular star.
- (c) The current trend, i.e., bop, blues, rock 'n roll, calypso, etc.



CLASSICAL FIELD

The classical field can also be divided into “popular,” “traditional” and “special.” There is, for example, a steady demand for the music of Beethoven and Tchaikovsky, simply because it has become familiar to the concert-goer and radio listener. Such works as *The Moonlight Sonata*, *The Nutcracker Suite* and Dvorak's *New World Symphony* can be called, without depreciation, “popular classics.”

But care is needed in stocking the less active sales lines in discs, as in everything else.

Once again, a study of published statistics and informed criticism is

necessary, for tastes in classical records are even more rigid than in popular platters.

There are, for example, ten current recordings of Tchaikovsky's *Pathetique* of which three are relatively best-sellers, two only interest the technical purists and one is virtually a non-starter.

Expert guidance is not always available, but in most districts a musical appreciation group will be found. Better still is a local Gramophone Society, of which there are a great number in Great Britain. These enthusiasts will be pleased to assist in catalogue preparation and record classification and are usually a fertile source of ideas and advice.

Where no such local body exists, there is an ideal opportunity for the enterprising dealer to inaugurate a music group. Don't be afraid to take the plunge—the teacher of music at the nearest grammar school will welcome you with open arms!

Most large public libraries have a record lending section. The librarian is often a mine of information on the tastes of the music-loving public. His guidance is also useful in the task of compiling a catalogue.



RECORD CLASSIFICATION

Classification of records can be a perplexing business. Much depends on local tastes. Systems of classifying stock should be kept elastic until the prevalent whims are ascertained.

For example, in a locality where jazz enthusiasts abound, it would not be sufficient to lump all “popular” discs into a single category. One should distinguish between “pop” and “jazz classic,” Dixieland, progressive jazz and swing. Afro-Cuban styles, too, have a substantial following . . . and the calypso, like Topsy, is still growing.

The safest method is to classify records by *Title*, *Performer* and *Style*.

The title heading covers all tunes and selections and can be listed alphabetically. A looseleaf folder of index sheets is very useful in this respect. Many sales are gained by being able to say, “Beelzebub, by Jackie Jones? No sir, but Tom Smith has an excellent version on Exophone. I'll put it on for you.”

Performer covers vocalists, instrumentalists, ensembles and orchestras, and once again it is an advantage to be able to reply to a query by citing a parallel recording.

Style is the greatest bugbear. Some sections are obvious, others may appear to fall between two stools. Experience will be the only guide as to classification of style. A loose framework, such as: popular jazz, light

ballad, light orchestra, swing band, military band, operatic (light and classical), popular classic, chamber music, modern classic and "specials," will do to start with. Later, one can sectionalise more exactly.

In the Special category will come such things as spoken verse, language tutors and children's records. There is a surprising demand for some of these out-of-the-ordinary discs.

A dealer who has a large enough business may even consider opening a Children's Corner. The old sales adage, "Catch the kids and their parents will follow," applies equally well to the task of selling records. There are quite sufficient children's records published to make such a venture worth a trial.



LISTENING BOOTHS

This brings us to the question of presentation. An ideal record salon or department will have "listening booths," where prospective customers can hear their chosen records without disturbing others. Nothing is more surely calculated to scare away worthwhile business than a cacophony of different melodies blaring down the High Street.

Relay more on sight than on sound for attraction. A sure-fire gimmick is the operating record-player or the disembodied auto-changer working in the window. The action of the complicated mechanism catches the idle eye.

One method, mentioned before in these pages, is to suspend the auto-changer deck, raise the platform arm (or switch to constant "reject"), set the cartridge to neutral and allow the arm to swing across the turntable mat and initiate the auto-trip action. The appearance of perpetual motion never fails to arouse interest.



SPINNING SLOGAN

Another method is to allow a slow-running turntable to operate below eye-level, bearing a painted disc on the mat. A short slogan, large enough lettered to be easily read, is a good attraction by virtue of its movement.

A further method is the suspension of a light framework bearing a scroll or small placard, resting at the base on the revolving turntable. One of the 16 r.p.m. models is most suitable for the purpose. The framework should be roughly conical, but not too symmetrical in outline. A corkscrew effect is easy to attain and the "rising spiral" motif is extremely effective.

Motion inevitably attracts attention

when operating mechanism is set in the midst of a static display. Dealers who are able to construct "mobiles" may like to experiment with light discs painted to look like records on the balance arms.



INTRODUCING AUDIO

If sufficient space is available, it is advisable to "lead-on" from records to associated equipment. The ultimate is a complete Audio Sales section. A display of record players and 'grams is the logical outgrowth of the record department. Not so obvious, but still congruent, is the rest of the audio chain: pre-amplifiers, mixers, a.f. amplifiers and reproducer systems.

An attraction that has proved itself at several Radio Shows is the illustrated audio chain. Starting from the record, the various stages are picked out by arrows or spotlights and a symbolic "hook-up" shown on a blackboard. The more complicated the system is made, the better. If possible, "show the works."

Styli, attractively mounted, make an impressive display. Although these items are small, they can be set against a plain background, brilliantly illuminated, with a magnifying glass and a slogan such as, "delicate workmanship for sound quality."

The juxtaposition of an ancient gramophone and the most elaborate modern record player is a useful gimmick.



TAPE RECORDING

Tape recording should not be regarded as a rival to the disc, from the sales point of view. Properly handled,

the display can incorporate both, to the advantage of each.

A customer buying records has, presumably, access to the means of playing them. He would be interested in the possibility of hearing his own recordings. Very few people seem to be aware of the transfer service from tape to disc. Weddings, christenings, official functions and informal parties can be added to the enthusiast's collection of records.

A potential market for the astute dealer lies hidden here. There are several firms specialising in tape disc transfer at reasonable cost, who are glad to accept a dealer's agency. All that is needed is a good tape recorder, a little sales talk and some enthusiasm.

A member of the staff, with an aptitude for social gatherings, could be "built-up" as "our record reporter." Very seldom will people look askance at the offer of a personal record.

The advantage is, of course, that tape can be played back and edited to suit the customer.

Arousing interest in tape recording need not prejudice disc sales. There is a mistaken feeling of rivalry in the trade on this subject. Whereas the virtue on which tape recorders sell is their ability to be used over and over, the chief sales point for discs is their permanence.

Customers may be reluctant to store a reel of tape, with its potential recording time kept dormant, but will jump at the chance of an equivalent i.p. disc. A profitable conversion service could be set up on these lines, catering for the tape recorder owner.

Other offshoots, not to be ignored, are the various recording accessories, such as storage racks, albums, record polishers, patent lifters and so on.

It is not enough just to satisfy the customer. We must anticipate his needs, perhaps even foster them. Selling records can be a step in that direction.

Add BRTR volumes to your library

ANNUAL BINDERS

for British Radio & Television Retailing

are available from stock to hold a complete volume of this journal firmly in book form. The binders are robust and durable, finished in dark red cloth with gilt lettering on the spine. The bound volume opens flat like a book, and copies, once inserted, cannot fall out, but individual copies can easily be removed if desired.

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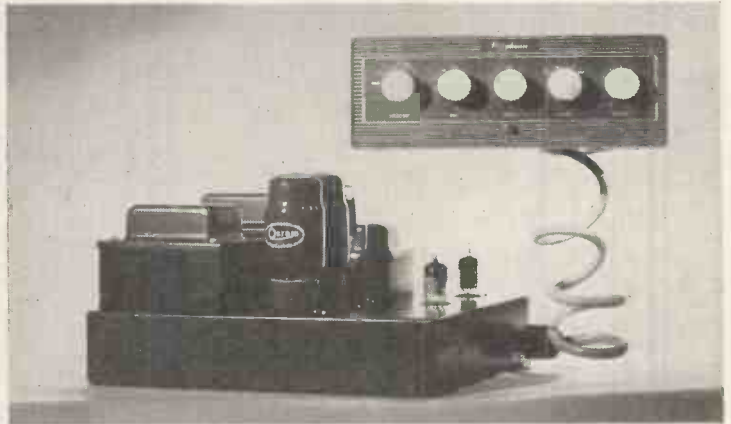
Sound proof-

Exhaustive research, fine engineering and individual workmanship have produced this new standard in amplifier performance... hitherto obtainable only in the laboratory.

AMPLIFIER model 2001 and PRE-AMPLIFIER model 2001A

Flat from 2 to 100,000 cycles, hum and noise 90dB below full output. This amplifier has a total distortion of only .05 per cent. Uses both positive and negative feedback to achieve distortion-free reproduction. Power output 25 watts continuous. The pre-amplifier has inputs for AM-FM Tuner, tape recorder, microphone and gramophone as well as a compensator for record characteristics. Continuous adjustable bass and treble controls. Automatic attenuation control for various cartridge characteristics.

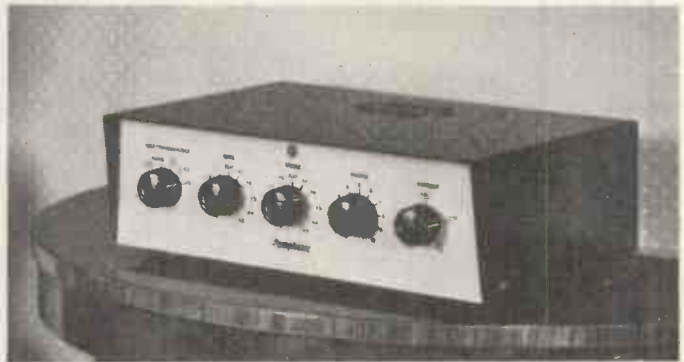
Price complete 40 gns



INTEGRATED AUDIO AMPLIFIER model 1004

This model is expressly designed for home use and provides the highest quality reproduction of speech and music. The selector switch gives a choice of three correction networks, which between them cover the majority of recording characteristics. Separate bass and treble controls. The output of the amplifier is brought to a socket at the back providing both 3½ and 15-ohm loudspeaker matching connections. A rumble filter is automatically switched into circuit. Provision is made for a plug-in pick-up attenuator providing the use of all types of high output pick-ups in addition to the magnetic and moving coil patterns.

Price 25 gns



In High Fidelity



for sound—NATURALLY!

★ Technical leaflets giving full specifications of these and other Pamphonic Ab-Fi models are available.

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The Incorporated Advertising Managers Association recently held their annual dinner-dance at the Park Lane Hotel, London. Here President Clive Barwell (left) and Mrs. Barwell receive E. G. Fielding of Vickers and Mrs. Fielding. Mr. Barwell is general publicity manager of Mullard, Ltd.

At the annual general meeting of the Plymouth Radio and Television Retailers Association, held at the Duke of Cornwall Hotel, Plymouth, W. T. CLYNE, was appointed as chairman of the Association, and F. J. BENNETT (Saltash), as secretary and a member of the council.

LEONARD BENNETT has been appointed technical secretary of the Radio and Electronic Component Manufacturers Federation. Mr. Bennett, who served in the Signals Branch of the Royal Air Force during the last war, has since held administrative and technical posts in industry.

T. C. STANDEVEN has been appointed sales manager of McMichael Radio, Ltd. Although Mr. Standeven is new to the radio industry, he has had



T. C. Standeven,
Sales Manager,
McMichael
Radio



extensive commercial experience in other fields. He will be located at the Langley Park headquarters of the company. W. D. WISEMAN continues as assistant sales manager.

Radio and Allied Industries announce the appointment of two Sobell area managers. R. M. S. PARKES will cover the Northern Area, and A. F. L. AVERY the Southern Area.

H. A. LEWIS, M.B.E., T.D., B.Sc. (Eng.), A.C.G.I., M.I.E.E., A.M.I.I.A., has been appointed managing director of E.M.I. Sales & Service, Ltd., in succession to the late E. J. Emery. He will, in addition, operate as commercial director of E.M.I. Electronics, Ltd. Mr. Lewis became personal assistant to Mr. Emery in July 1956, and was appointed a director of E.M.I. Sales & Service, Ltd., last December.



H. T. MOTE announces that he has disposed of his retail interests in the group of radio and television retail shops trading as Signal Service, and all associated directorships, in order to devote the whole of his time to the Brayhead group of companies, particularly on electronic projects. The Brayhead group, who already have extensive commitments, are rapidly expanding their activities in the electronic field and Mr. Mote's appointment has been made to assist in this development.

BRIAN BROMWICH has been appointed chief press officer of The General Electric Co., Ltd., in succession to D. C. Rogerson, who has been appointed deputy publicity manager (engineering).

Telerection of Cheltenham announce the appointment of A. F. MOIR as their new Scottish area representative. Before transferring to the sale side of the trade, Mr. Moir had twelve years practical experience as a radio and television engineer, since when he has had considerable experience as a representative, both in the retail and wholesale trade. His address is: "St. Margarets," George Street, Montrose.

After 17 years as chief press and broadcast officer in the Public Relations Department of the GPO, SIDNEY R. CAMPION has now retired. His successor is W. S. G. SMELE, aged 45, of the Treasury Press Office, who has had wide experience in staff journalism and in the Government Information Services.

Pilot Radio, Ltd., an ounce the appointment of G. R. DIGGLES as representative for Lancs., Cheshire and North Wales. Mr. Diggles lives at 232 Oldham Road, Ashton-under-Lyme.

B. D. TUCKER, export manager of Antiference, Ltd., last month visited Holland and Belgium where sales of the company's specially designed export range are increasing. During his visit Mr. Tucker was able to follow up many new inquiries received during the Component Show in April.

F. WISE, managing director of the Birmingham Sound Reproducers, Ltd., Australian factory, arrived by air from Australia last month for policy discussions on the future expansion of the Australian subsidiary of the B.S.R. organisation.

Printed Circuits, Ltd., an associate company of the Millett Levens Group of Stirling Corner, Barnet-by-Pass, Borehamwood, announce that S. G. BUTTON, A.M.Britt.I.R.E., has been appointed chief engineer in charge of their Electronics Division.

Kolster-Brandes, Ltd., announce the appointment of H. C. MORGAN as representative for the South Wales and



H. C. Morgan,
Sales
Representative,
Kolster-Brandes



Hereford territory in succession to the late Mr. T. W. Cowden. Mr. Morgan's address is 30 Porthkerry Road, Barry, Glam. Tel.: Barry 1033.



... and now MISS PRINTED CIRCUIT, elected on the stand of Printed Circuits, Ltd., at the recent I.E.A. Exhibition at Olympia, London.

James Huxley's

No. 31

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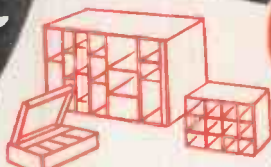
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B31C

PRINTED CIRCUIT TECHNIQUE

BY P. H. FARDEY

THE origin of the general term "printed circuit" cannot be identified precisely, but the first definite development work in this classification was carried out during the early part of the last World War. The need for a method of producing large quantities of electronic equipment for military purposes provided the incentive for considerable development work in this field.

Dr. Paul Eisler was responsible for a great deal of the preliminary work in printed circuit techniques and the large scale production methods used today are due largely to him. During the war considerable thought was given to the many possible applications of printed circuits, but none were adopted on any large scale in this country.

The first practical application was carried out by the Americans, who made use of a particular technique in the design of a proximity fuze for mounting in an anti-aircraft shell. It was not until after the war that large-scale commercial use was made of printed circuits, and here again a great deal of the production engineering methods were developed on the other side of the Atlantic.

It had been long evident that conventional methods of manufacturing light commercial and industrial, electronic and electrical equipment, had almost reached the limit of exploitation. The need for producing new equipment at competitive prices coupled with improved performance, and at the same time to combat rising costs, led manufacturers to look farther afield for production ideas.

New Outlook

It was here that the idea of printed circuits, which had been lying idle for several years after having only too brief a consideration, provided the much needed answer. Many problems (some apparently unsurmountable) presented themselves at the outset, but most of these have now been solved, leaving the way quite clear for the adoption of the new method.

It was obvious from the very beginning that a completely new outlook was necessary, and that a printed circuit could not be treated as just an additional component calling for a

few design modifications. A new conception of design and layout was necessary, and it had to be adopted not only by the equipment designers but by the production engineers.

It soon became evident that printed circuits offered advantages to large and small manufacturers alike, although in order to couple the technique with automation, considerable capital expenditure would be called for.

Many of the advantages of the printed circuit are obvious, but others become apparent only with familiarity and usage. The principal advantage to the manufacturer is one of economy, achieved by several means. The first point, although not necessarily the

Now that radio and TV receivers and record players using printed circuit technique are coming on to the market, the service engineer will be seeing this method of wiring with increasing frequency.

In order to familiarise readers with this relatively new technique and what it involves, B.R.T.R. has commissioned this important new series of articles.

The author, who is an engineer in the Printed Circuit Division of The Telegraph Condenser Co., Ltd., will provide an all-round conception of the new field, dealing with most aspects from the design considerations, the actual manufacture, applications, associated techniques and notes on repair techniques for the service workshop.

dominant consideration, is that of labour costs, for a considerable saving can be effected by the use of this new method.

Many of the detailed assembly operations normally carried out by several persons can be replaced by a single, rapid operation: namely, by use of "dip-soldering." Another advantage is the elimination of many assembly faults with a consequent saving in the amount of intermediate inspection required.

The performance of equipment incorporating printed circuits can attain high degrees of consistency, due to identical component layout and disposition, regardless of the quantity produced. Printed circuits lend themselves admirably to high frequency circuit layouts, such as TV and f.m. radio applications, since conductor strays are maintained constant and rigidity of the assembly is assured.

This new technique also lends itself to miniaturisation, in that wiring layouts requiring high degrees of precision can be produced in large quantities at low cost with a very high degree of reliability and at the same time introducing considerable weight saving factors.

One of the most important features is the saving in material costs. In conventional radio and TV layouts it is usual to employ a metal chassis stamped out to accommodate the components. The printed circuit, in addition to providing the wiring layout, can be machined to accommodate the components, thus dispensing with the metal chassis, wire, insulating sleeving, tag-boards, etc., resulting in a lighter and cheaper assembly.

Furthermore, printed plates require small storage space, and in the event of an assembly line being held-up for a particular component part, the job can more readily be laid to one side.

Design

Given a particular circuit arrangement for application to the printed circuit technique, it is first of all necessary to establish a few basic requirements such as the overall dimensions, availability of components and a rough layout usually

determined by the position of controls and loudspeakers, etc. A prototype model can be made up without a printed circuit by securing ordinary copper conductors to a bakelite sheet on which the components are mounted. This arrangement allows considerable flexibility, and unlimited modifications can be carried out to establish the best layout for optimum performance.

Having established the most suitable layout, compatible with assembly considerations, the prototype assembly is passed to a draughtsman for the preparation of the master-drawing from which the printed circuit will eventually be produced.

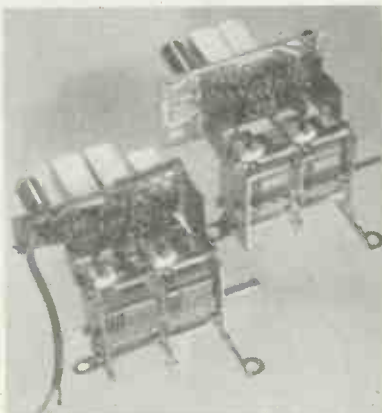
Without going into the details of the many possible types of layout, it is hoped that some idea will be provided by the illustrations.

In order to allow as much detail and as good an outline as possible, a scale of at least two to one is used in the preparation of the master-drawing. A photographic print of the drawing is made, from which either stencils or further plates are produced, depending upon the process to be used in the actual production of the printed circuits.

Single-coat Method

The most economical process is the printing technique, in which the printed pattern is produced on a copper-clad laminate by means of modern screen or offset litho printing methods. It is possible to produce quite a large number of circuits in a single printing operation depending upon the size of the circuit.

The object of the printing operation is to impart the image of the required layout, using a special ink which acts as an acid resist. The plate is then subjected to one of the etching processes most suited to the particular material and application, with the result



Conventional and printed circuit versions of an f.m. tuner, using the point soldering method. (McCarthy Radio, Ltd.)

that all of the copper, with the exception of that covered with acid resist, is removed.

It is then necessary to remove the resist by use of special solvents, and also to take certain chemical precautions to prevent further corrosive action.

Where a high degree of precision and extremely fine definition is required, it is usual to employ one of the two principal photographic methods for producing the printed circuit, both which are very much more expensive than the printing method.

The first photographic process is known as the "single-coat" method, using standard commercial photo-resists, in which an even coating of emulsion is applied to the copper-clad laminate. After the emulsion is dry, a negative of the design to be reproduced is placed on the top of the copper plate.

Due to the photo-sensitive nature of the emulsion most of the process has to be carried out in low light to prevent premature exposure. The plate and negative are then placed under high intensity illumination for a specified period and the emulsion exposed through the transparent portions of the negative, hardens; the protected emulsion remains unaffected.

After removal from the light source, the copper plate is immersed in a photo-resist remover, and the emulsion protected by the dense part of the negative is removed, leaving the required design imprinted on the copper. The copper plate is then subjected to etching and subsequent processes.

Double-coat Method

The second photographic process involves the use of a double protective coating. The first coat consists of a cellulose lacquer applied evenly over the whole of the copper surface, this lacquer acting as an acid resist. The second coat consists of an image-forming emulsion applied evenly on the

top of the cellulose lacquer. This top coat is based on an ammonium dichromated solution of albumen or fish glue.

The copper plate is then exposed as before, the illuminated image causing the emulsion to harden under the incident light, leaving the remainder soluble. The soluble emulsion is removed, leaving the image of the printed design on the top of the cellulose coating, and it only remains to apply a solvent to the unprotected cellulose for the image to be reproduced on the copper itself. The etching and other processes are then carried out.

These processes can be used to reproduce printed patterns to extremely high degrees of accuracy, it being possible to work to dimensional limits of the order of 0.001 in. Dimensions can also be controlled by accurate enlarging and reducing photographic equipment.

The photographic methods are necessary only in very special applications, such as in the manufacture of printed circuit process control patterns or other high definition requirements.

Other Processes

There are numerous other processes most of which involve printing the conductors on to whatever base material to be employed. The conductors may be imparted on to the base material by die-stamping, chemical deposition, printing, painting, spraying, etc.

The processes associated with some of these alternative methods are usually more involved than the printing and photographic methods but for certain specialised applications this extra cost is justified.

One such application is the deposition of silver and other solutions on to a rectangular high permittivity ceramic plate, to form a device known as a "Couplate." This device is used for r.c. coupling in radio circuits, and may contain two capacitors of up to about 0.01 μ F and one or more resistors, usually above 100,000 Ω , in an area of something like one sq. in. and a thickness of under $\frac{1}{16}$ in. Wire terminations are usually brought out along one edge of the plate.

These "Couplates" and other such similar devices are fired at temperatures usually in the order of 700 to 800 degrees Centigrade, for bonding the silver capacitor electrodes, and the resistive carbon-resin solutions are heat-treated at somewhat lower temperatures for stability purposes. These plates are generally covered in a protective dipping compound after soldering the terminations.

We will now limit the considerations to the metal-foil technique devised by Dr. Eisler, the properties of conductors and the printing of certain components, such as capacitors and inductors.



A selection of printed circuit inductors, including a multiple winding type.

Printed Conductors

Although the width of a printed conductor may vary from 1/64th in. upwards, the thickness will be governed by the conducting foil which is usually in the order of 0.0015 to 0.003 in.

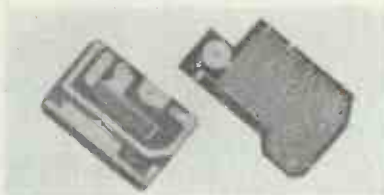
It is possible to replace the conducting foil with one of appreciable resistance, which can be printed to form a low dissipation resistance and, by the use of a suitable sliding contact system, may be used as a rheostat suitable for light-current control applications.

Conductors arranged to form switching or connecting contacts are usually plated with rhodium or other metals to improve their wearing properties when subjected to mechanical friction and to reduce contact resistance. Skin effects at high frequencies can be diminished by silver plating, but this is necessary only in special cases.

The current carrying capacities of printed conductors are sufficiently high to cater for most electronic and radio requirements, a current loading of 2 amperes on a 1/16th in. strip conductor producing a temperature rise of less than 5 degrees centigrade. For higher current densities it is necessary only to widen the conducting strip to limit the temperature rise.

One advantage of the strip conductor is that the heat dissipating properties are good, due to the larger surface area for a given cross-section, as compared to a conventional circular wire conductor. Coupling between printed conductors is also low due to the proximity planes having a minimum cross-section governed by the foil thickness.

Just as there are certain minimum conductor widths which can be produced



Typical printed circuit capacitors.

readily by the printing technique, there are certain minimum conductor spacing requirements, of a similar order (1/32 in.). It is preferable to employ one of the photographic methods when working to closer requirements.

Printed Inductors

Printed inductances usually take the form of a flat spiral, although alternative shapes are used, generally to the detriment of the Q-factor. The range of inductance conveniently adaptable to the printing technique is from less than 0.05 to about 5 μ H, coils above this value tending to become physically too large.

The Q-factors obtained from printed coils are comparable to many of the more conventional types of winding, lying usually in the range of 50 to 200. The advantage of printing the coils lies not only in stability, but in the close tolerances attainable.

There are several ways of making the inductance adjustable, one method being to introduce a disc of high permeability material (such as iron-dust or ferrite) into the field of the coil mechanically or to introduce a high permittivity material so that the distributed capacitance is varied and

hence the effective inductance, without materially altering the Q-factor of the circuit.

Coil arrangements may be printed singly, with or without tapings, or in multi-wound form such as in printed r.f. transformers. An application for a very much larger printed inductance is that of the frame aerial, where size is usually not of paramount importance.

Printed Capacitors

Printed capacitors may take two principal forms, depending upon the type of base material used. With the rigid base laminated material such as phenolic or other resin bonded mediums, the capacitor electrodes usually take the form of adjacent parallel copper strips, the dielectric being formed partially by air on one side and by the base material on the other.

This base material is the principal consideration governing the dissipation factor of the capacitor, the permittivity of the base material being usually appreciably higher than that of the surrounding air. The practicable range of capacitance obtainable, using this form of construction, is from less than 0.5pF to 30pF, physical sizes becoming too large above this value.

Capacitors using the parallel strip or blade construction can be made variable by the introduction of a high permittivity material to the upper surface.

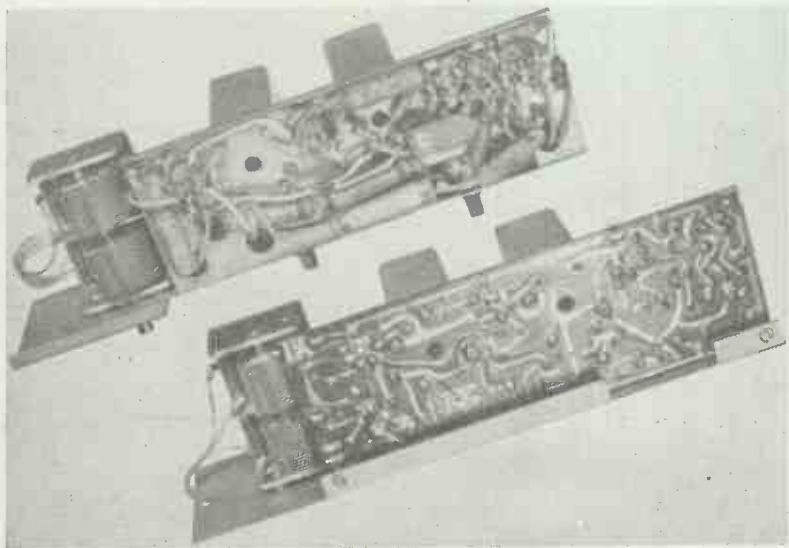
Flexible Construction

An alternative form of construction involves the use of thin flexible base materials (such as resin-impregnated fibre-glass cloth), the capacitor electrodes being formed by copper patterns on both sides of the flexible material. The base material then constitutes the total dielectric, neglecting strays, and the dissipation factor will depend entirely upon the properties of the base and copper bonding medium.

The range of capacitance obtainable from this construction is from about 1pF, up to several hundred. The capacitance will be determined by the area of the copper electrodes, the permittivity and thickness of the base material.

The consistency of the results obtainable will depend principally upon the thickness, as the other two factors can be controlled to close limits. It is necessary to allow wider tolerances in the manufacture of printed capacitors of this type, because the results are less consistent than with the parallel strip or blade construction. This capacitor has the disadvantage of not being readily adjustable, although greater capacitance per unit area is obtained.

Where printed components are to be applied to dip-soldering techniques, due allowance must be made for the alteration in values caused by the solder effectively thickening the copper film.



Conventional and printed circuit versions of a portable receiver, assembled using the dip soldering method. (Masteradio, Ltd.)

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TECHNICAL GEN for SERVICING MEN

Edited by James Huxley

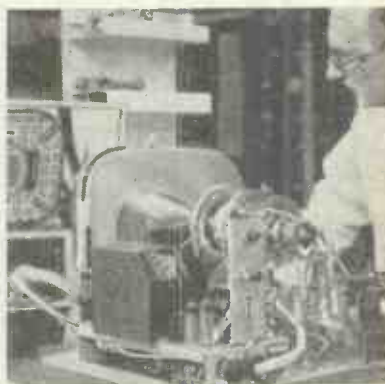
HELP YOURSELF

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 Retailing," 46 Chancery Lane, London, W.C.2. All published contributions are paid for, and your contribution may help

OTHER ENGINEERS



Pye FV4C, FV4CDL

Figure Eight Raster The picture had an unusual shape of figure eight on a.c. mains, but when operated from d.c. mains the picture was normal, showing that 50 c/s a.c. ripple was breaking through on vision. There was no trace of hum on sound.

The normal procedure was adopted; smoothing, reservoir and decoupling capacitors and metal rectifier were all tested but found satisfactory. Valves were checked for heater-cathode leakage to no avail.

It was then decided to try replacement one by one of all valves in the receiver. When V22 (line output, PL81) was replaced, it cured the fault and restored normal operation on a.c. mains. The original PL81 valve was kept on long soak test but showed no fault.—E.L., Long Eaton.

Ferguson 373

F.M. Instability This radiogram was brought in with intermittent operation on f.m. and it was found that, on tuning past the 89 Mc/s point on the dial, there was a "pop" and everything went microphonic. This could only be cured by tuning up towards the h.f. end of the band and then tuning back to the 89.1 Mc/s Light Programme which was then received satisfactorily.

It was felt that the instability might be due to too tight coupling between L4 and L5 because when the lead-out from L4 was moved towards L5 the same effect was produced.

Moving this lead-out wire from its original earthing point to another point

on the chassis (which reduced the number of turns on L4 from $2\frac{1}{2}$ to about 2) cured the trouble. This altered the tuning slightly but this was compensated by a slight adjustment of the tuning slug core.—H.W.G., Folkestone.

Philips 1756U

Poor Frame Hold Frame hold was poor and the frame jittery. Sync pulse from separator appeared to be normal except for a slight but rapid variation of amplitude which coincided with jitter on the screen. The sync separator stage was checked and nothing abnormal found.

It was then noticed that if the set was tuned slightly off towards the "sound end," sound signals varied the sync pulse. So, with the set tuned spot-on and a tone signal injected into the aerial socket, the base train of attenuated line pulses below the frame sync pulse was

magnified on the 'scope. Tone ripple was revealed.

This proved to be the fault—sound signals leaking into the sync separator stage. Adjustment of the sound rejector S28/C49 cured the trouble, C49 having been found to be drifting. Incidentally, this fault did not show the usual sound-on-vision symptoms, but it did cause a slight bending of verticals.—W.D.G., Prestwick.

Ekco A274

V.H.F. Radio Fault Trouble on this f.m. receiver was intermittent operation and noisy reception. On checking around the oscillator circuit of V1B (ECC85), it was found that by touching the oscillator coil at either end with a metal screw-driver, the oscillator would stop and could only be brought back by touching the centre contact of the two 6pF capacitors connected across the coil.

On replacing the two capacitors, the receiver functioned normally and could not be made to stop by the method described. On checking the two discarded components, one of them showed a leakage of several kΩ.—P.T.N., Malvern Link.

Alba T304

No Frame Sync This fault was experienced in two of these sets within a week. The first time it caused a lot of trouble. The fault was a continuously rolling frame. The sync feed capacitor C29 was OK, as was the ECL80 (V8A) and as there was no oscilloscope to hand to check the sync pulse, the following procedure was then taken.

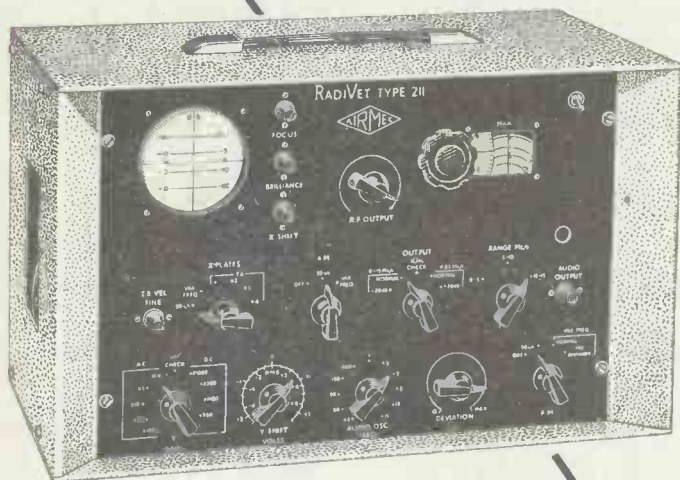
(continued on page 217)

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.

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

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TECHNICAL GEN

Continued

Anode voltage of the sync separator V7 (EF80) was checked and read 200V instead of the normal 100V. The anode supply was cut at the junction of R28 (5.6kΩ) and R27 (33kΩ), but there was still 200V on the V7 anode. The cause was found to be the line sync feed capacitor C24 (39pF) which had developed a dead short.

The same trouble has been experienced on Model T301 and doubtless less the same could happen on T394 and other similar receivers.

Another fault on these models takes the form of black lines across the screen due to metalising strip earthing the tube coating not making good contact. The trouble is most conspicuous when brilliance is turned up and down.—C.C., London, E.5.

Regentone TT7

Line Drift Hint Much as we dislike doing "unofficial mods," it does seem necessary to carry them out when experience proves that they cure a recurring fault.

Several of these models showed signs of severe line drift after a couple of months working. At first we made the normal alterations, replacement of the PCL82 line oscillator, adjustment of the preset line drive capacitor, and opening of the link across R58, the 47kΩ in series with the line hold (as in

each case the drift was such that the line hold control had to be locked fully clockwise).

After a while we discovered that the symptoms reoccurred. The worst offender was put on the bench and careful tests were made.

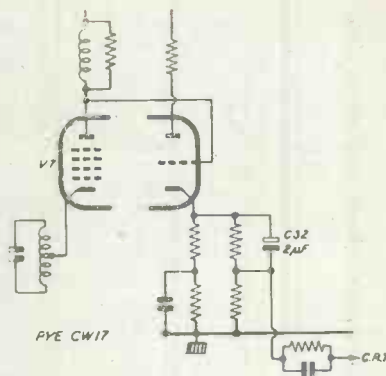
The line sync circuit was cleared of culpability and attention returned to the blocking oscillator itself. Experimenting with the values of the components in the coupling circuit, we hit upon a solution. C56, a 500pF capacitor was paralleled with an additional 200pF, and the line held securely. This has been done in several subsequent cases and has proved successful.

Since then I have heard that this modification has become official. A further modification is to replace the PCL82 with a PCL83 and change wiring of base. Note that the drive control must be readjusted after the valve replacement.—H.W.H., Bargoed.

Pye CW17

Very Poor Definition On Test Card C, definition was poor and there was smearing of the black portions on the card, especially of the black rectangle, the smearing being to the right of the object. The fault was due to poor low frequency response and after checking round the video amplifier stage, the trouble was found to be due to C32 (2μF) being o/c.

This capacitor is in the cathode feed to the c.r.t. and the lower frequencies were attenuated by the resistor R33, which was effectively unbypassed by C32.—H.F., Belfast.



Decca DMC/18

No TV Sound This combined TV and v.h.f. radio receiver operated normally when the turret was turned to Light, Home or Third, but on switching to either Band I or Band III television channels, the TV sound came through for a few seconds and then the set went dead.

On removing receiver back, the set was switched to the Light Programme and it was noticed that the heaters were functioning correctly, but on turning to the TV channels the heaters of all valves went dead.

An ohmmeter check showed that the heater chain was OK on v.h.f. but o/c on TV. The circuit diagram revealed that on v.h.f., the tube heater was shorted out by means of a wafer switch which also cut off h.t. supplies to the scan circuits and tube circuits. On switching to TV, the tube was brought into circuit and the h.t. circuits completed.

The cause of the trouble was then soon located and found to be an o/c tube heater which, of course, caused an o/c heater chain on TV only.—S.B.P., Newcastle-upon-Tyne.

Bush T36 *EIT*

Elusive Picture Fault One of these sets gave endless trouble owing to the extremely intermittent nature of the fault. The picture would suddenly go to peak white for a time and then return to normal. The difficulty was a familiar one—the fault frequently occurring in the customer's home but not in the workshop. A grid-cathode short was suspected in the c.r.t. and this was checked while tapping the neck, but to no avail.

After an extended soak test in the workshop, however, the fault eventually occurred. It was soon found that the brilliance was controllable, thereby ruling out the tube possibility, but the contrast wasn't. The receiver was actually working flat out at maximum gain in the fault condition. A quick

(continued on page 223)

RECEIVER

SPOT

CHECKS

No. 24 MURPHY V240 and V250

Poor Contrast: If alignment is satisfactory, check V7, V8, V9, decoupling capacitors for o/c and C77 for o/c.

Poor Definition: If alignment OK, check L30 for o/c and picture quality control for o/c or misadjustment.

Poor Sync: If both line and frame sync is weak, check V11A, T4 primary for o/c and C63 for leakage. A heavy leakage, or o/c, in C63 will result in the complete loss of sync.

Poor Line Hold: Check C64 for s/c. Check T4 primary and secondary for s/c turns.

Poor Frame Hold: Check C66, C68, C69, C71, C74 for o/c, s/c or leakage. Check C72 for leakage, R104 and R110 for h.r.

Low Frame Amplitude: If

accompanied by cramping or folding at bottom, check C83 for s/c and C84 for o/c. If height reduced one side only (trapezium distortion), check L33, L34 for o/c. If accompanied by non-linearity at top of picture, check L33, L34 for s/c turns.

Excessive Height: Check C81 for s/c, C83 for o/c and C79 for leakage. If also folding at bottom, check C84 and C79 for s/c.

Vertical Lines: (At left hand side.) Check C95 for o/c and check adjustment of C96.

No Sound or Vision: Check F1, F2 and L39 for o/c. Check C101, C99 for s/c. Check for o/c in V11 heater chain. Check V5, V6 for defect or poor connections.

No Sound: Check V1, V2, V3, V4 for defect or poor connections. Check also for loose chassis fixing screws.

Loss of Highlights: (Partly negative picture.) If vision interference limiter is set OK and operates normally, check for low emission c.r.t. or video stage limiting.—E.C., Hillingdon.

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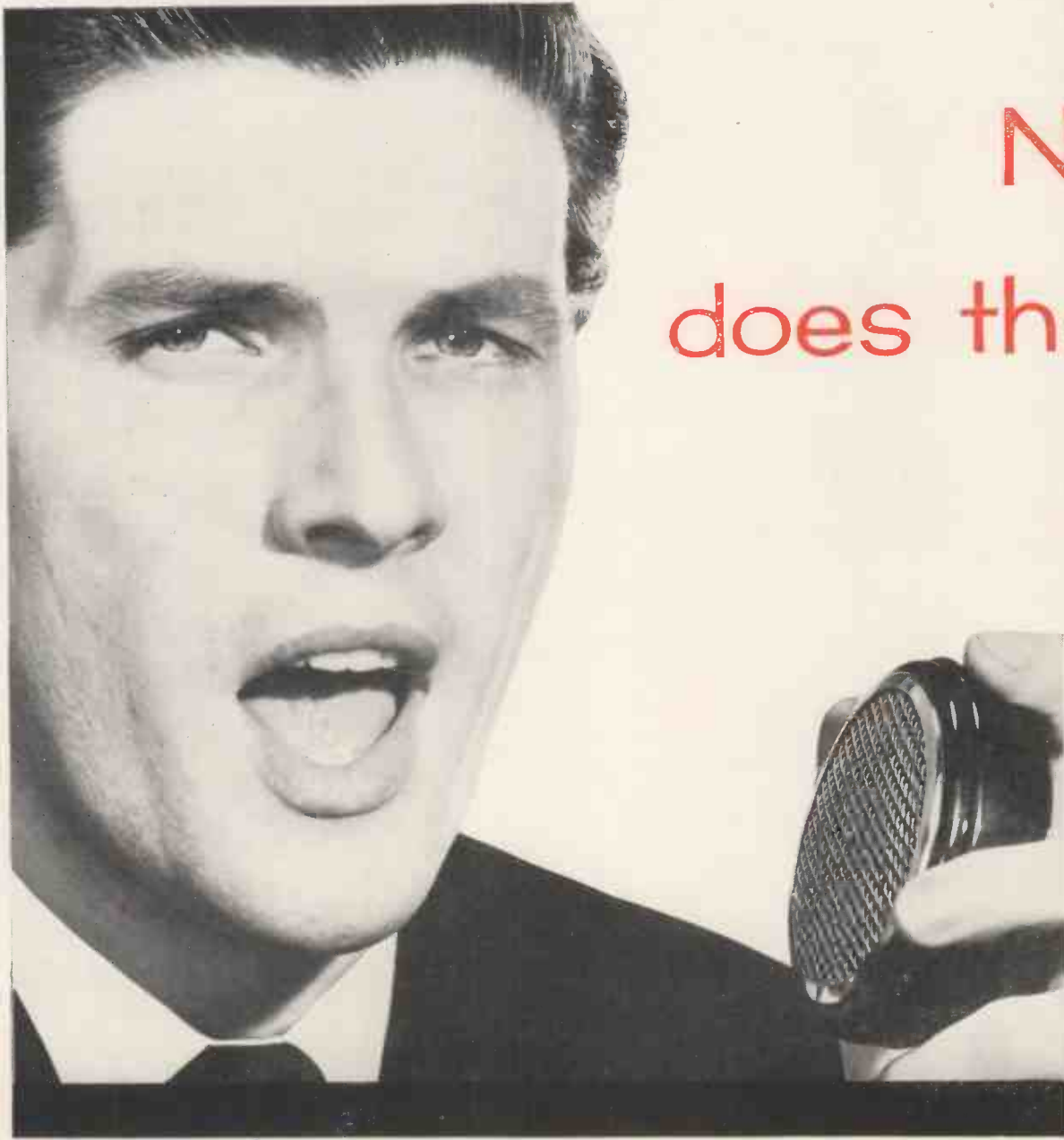
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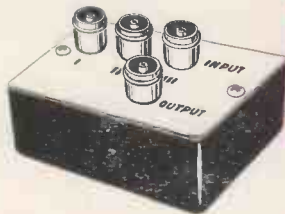
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Tri-lead Triplexer. Part No. 211 is a three-band filter which is primarily intended either to combine the signals from separate Band I, II, and III aerials for use on a receiver with a common input socket, or to separate the signal from a combined aerial for use on receivers with separate input sockets. Retail 13/6d. each.



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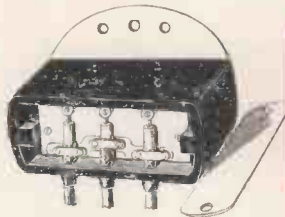
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Band I/II/III Triplexer. Part No. 199 is particularly suitable for multi-point installations for it enables three inputs to be combined into one outgoing lead. It has four coaxial sockets and is designed for 75-ohm coaxial cable. Retail £1.10.0d.

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TECHNICAL GEN

Continued

test revealed that there was no a.g.c. voltage present.

In this model the a.g.c. is derived from the sync pulses and the fault was traced to an intermittently o/c sync feed capacitor (C36, 0.1µF).—V.D.C., Bristol, 5.

Alba T321/324

Vision Flare Trouble The symptoms of apparent overloading has been encountered three times on this range of receivers and, in each case, the cause has been "further back" than we would have at first suspected. Sound was unaffected but vision flared intermittently.

A high grid reading at the tube base misled us, but eventual testing of feed voltages showed that the video anode was much lower than its rated 175V, and varying with picture brightness content.

The GEX34 crystal detector and the compensation circuit were exonerated and, finally, we turned our attention to the output side of the video circuit. R23, 22kΩ, had gone high (and, in one instance, was o/c). It is advisable when carrying out this repair to replace the 47pF capacitor across R23 which may have become damaged.—H.W.H., Bargoed.

Philips 1746U

Poor Frame Hold On this 17-in. table model the picture would start rolling after a while. A fault in the frame timing circuits was suspected but when the frame hold control was operated it was

found that the lock was extremely weak.

This led to investigation of the sync circuits rather than the generator. It was also noted that the line lock was reasonable so the sync feed arrangements to the frame time base was the basis of the investigation. All these were checked but found to be in order.

The waveform of the frame pulses was found to be of low amplitude and distorted, so attention was turned to the operation of the sync separator itself. In this case it is the pentode section of the ECL80. The valve itself was unsuccessfully substituted and then routine voltage checks made on the various electrodes. This revealed that there was no voltage on the screen. Further testing showed that the screen feed resistor (1MΩ) was open circuit. Replacement restored the positive lock.—V.D.C., Bristol, 5.

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Ferranti 17T4

Vision Fades Out With this receiver, the vision faded out after a while, leaving normal sound. First tests when the fault came on were fruitless, the snag being that the picture did not fade to a great extent, the contrast level just dropping somewhat and then increasing again.

It was decided to connect up a meter to various d.c. potential points in the



Brainless Bertie

Bertie had a little lamp,
Its flex was frayed, and so,
Everywhere that Bertie went
Some fuse was sure to blow.

Feste

vision circuit in turn and see if any change occurred when the fault came on. It was found that the cathode volts of the 1st vision i.f. valve varied with the fault, thus indicating a change in anode current.

This valve is controlled by the a.g.c. system and further voltage checks showed that it was in fact the a.g.c. voltage that was fluctuating. In this receiver the a.g.c. is obtained mainly from the sync pulses, but also part of the control voltage is obtained by rectifying the sound carrier in a similar way to an ordinary broadcast receiver. The cause of the trouble was found to be an intermittent W5G metal rectifier.—V.D.C., Bristol, 5.

Ekco Stroller

Poor Mains Operation The DK92 frequency changer was replaced for o/c filament, but the receiver then worked normally on batteries but not on mains. The potential drop across the new DK92 filament was 1.25V and the metal rectifier was immediately suspected and tried but the results were the same.

Filament ballast resistors were checked and the switching in the filament circuit was tested for a possible high resistance contact. All these were in order, however, so the voltage across the other valve filaments was checked. This was found to be in order.

It then became obvious that the filament of the new valve was low resistance and that although the correct current was flowing through the chain, the required voltage was not being developed across this filament. Another new valve confirmed this belief, the voltage rising to 1.4, and the set functioning correctly on mains and battery.—V.D.C., Bristol, 5.

Cossor 937

Noise on Sound The complaint was intermittent noise on sound, but removal to the workshop on several occasions for extended soak tests did not result in the noise appearing. The customer's installation was checked and found OK, and loan receivers left while the

(continued on page 225)

SERVICE BRIEFS

Philips 1446U: A simple modification which has been found to improve the line hold on this model is to shunt the line hold control with a 390kΩ resistor and replace the existing 270kΩ series resistor with one of 390kΩ.—R.R., Mansfield.

Cossor 937 Series: Trouble was intermittent hum on sound which could be stopped by switching to another channel and back again. But the trouble recurred after ten minutes: The hum varied in intensity as the sensitivity control was advanced, indicating an a.g.c. line fault. Trouble was eventually traced to a 0.1µF on the a.g.c. line going o/c intermittently. (C29, in the unscreened section of the i.f. strip).—B.P.J., Kings Teignton.

Bush DAC90A: Trouble was bad hum even with volume turned down. By connecting a 0.1µF across C23 (a.f. coupling) the hum vanished. It was then seen that pins 3 and 4 of the output valve were used as anchor points for C23, R13 and R14. These pins are shown in the valve manual as internal connections and rewiring the components to a separate tag board cured the trouble.—R.R., Sheffield.

Marconiphone VT68DA: Symptoms were complete loss of line sync; frame locked reasonably well. After checking the sync separator stage, and TC4 in particular, tests were resumed on the video stage. In disconnecting all but the h.t. and sync connections the cause was revealed. The coupling components R38 (47kΩ) and C38 (4µF) were both faulty, the leakage in C38 taking most of the line pulses to chassis.—E.K., Stanley.

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TECHNICAL GEN

Continued

other was away did not exhibit the symptoms. Eventually the fault came on in the workshop and proved to be due to sound instability.

It stayed for a few moments during which a few tests were made, and then disappeared again and refused to come back. Having heard the fault, and a decoupling component being suspected of going intermittently o/c, each of the decoupling capacitors on the h.t. rail, heater line, etc., were nipped off while the set was working to see if the fault could be produced in this way.

However, not one of these produced an effect anything like the fault. The screening cans of the i.f. coils were isolated from chassis, to indicate if perhaps a poor earthing connection to one of the cans was responsible, but again no effect resembling the fault was forthcoming. It was then found that the fault could be produced by altering the position of C35, the 2nd i.f. screen and anode decoupler. This was repositioned, and the fault cleared.—V.D.C., Bristol, 5.

Aerial Installation

Anti-ghost Hint Sometime when installing a TV aerial, ghosting troubles can be considerable. But before a more expensive approach is made to clear the trouble, a simple expedient can be tried. This, however, is only possible in areas of high signal strength and where an indoor aerial is adequate.

The experiment is simply to reduce the physical length of the aerial. With aerials of the semi-flexible type, the vertical rod can be split at its screw joint and the aerial will not be wasted if this portion is taken off.

This type of simple aerial is omnidirectional and ghosting can be very

severe. If, however, the length is reduced, the ghosting signal will be attenuated much more than the wanted signal. While the idea is unorthodox, and has limited application, at times it can provide an answer to strong ghosting in areas of high signal strength.—W.McC., Glasgow.

Decca DM4C

Maker's Wiring Fault This is an interesting example of how a TV receiver can pass through a manufacturer's test whilst being incorrectly wired. The customer's complaint was that the gain of the set would occasionally drop right down and in this condition the interference limiter control had to be used as a "contrast" control.

Investigation of the video strip brought to light a blob of solder in the grid can of the first video i.f. valve, shorting the a.g.c. line to chassis. Removal of the solder left the symptoms permanently on.

Further investigation found this was due to incorrect wiring, the screen grid of the first video i.f. valve being fed from the centre tap of the interference limiter potentiometer.—J.P., Gloucester.

Alba 4551

An Odd Fault This radiogram came in for servicing with intermittent slow motor-boating at half volume. As the fault

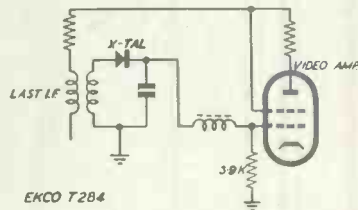
appeared on both gram and radio, the trouble was obviously somewhere in the audio section. However, voltage readings and valve replacements yielded no clues and the decoupling components were checked and rechecked—all to no avail.

The fault, when it was eventually traced, proved to be extremely curious. A gramophone needle had dropped down and was wedged between the speech coil and the magnet of the speaker and was thus restricting the movement of the cone.—R.E.G., Barking.

Ekco T284

Crystal Diode Failure

The receiver came back from the customer a few days after installation with the complaint of intermittent picture. A visual examination showed that the grid leak resistor (3.9kΩ) of the video amplifier was overheating. The valve was checked and found to have an intermittent screen-to-control-grid short-circuit.



Replacement of valve and resistor seemed to be the cure, and the set returned to the customer. A few days later the same symptoms reappeared. When the set was again examined the trouble was finally traced to the vision crystal diode detector which had also suffered as a result of the valve failure.

This crystal diode is not visible on the chassis and is incorporated inside the last video i.f. can. When removed, the original was obviously burned-looking.—T.G., Glasgow, S.2.

K-B LVT30

Unusual Focus Fault

After a set had been returned to the customer a complaint developed in which focus had to be reset a few times each evening. On test, focus drifted enough in half an hour to take the sharpness out of the raster. The e.h.t. and line output circuits seemed OK and a faulty tube was suspected. As it is easy to change a tube on this set, a new one was tried—but without improvement.

The only thing left—the focus magnet—was examined while adjusting the lever, and by chance the trouble was found. The magnet bears against two strong springs on a cam and the focus control moves the magnet against the springs while the control lever itself is prevented from moving too freely by a rubber sleeve bearing against the focus housing.

A smear of grease was the trouble. It was allowing the springs to push the focus lever just enough to affect the raster. Cleaning and tightening the rubber sleeve cured the fault. Apparently, the trouble started when the cabinet back was first removed as we found it could be fitted so that the focus lever was held in the slot in the cabinet back. Another simple one that caused a panic!—H.C.H., Swansea.

Queer Customers

We have all had experience of careful customers' letters, giving us precise and detailed instruction on how to reach their house. But we had one recently that was even more explicit than usual.

We were told to come after dark, to park the van well out of sight around a nearby corner, and to walk to the door and enter without knocking.

The instructions and their veiled innuendos created an atmosphere such that we felt almost like secret agents taking part in a carefully planned and highly dangerous mission.

But, alas, there was no mystery. Our customer explained to us afterwards that her neighbour was always boasting about his television set and she did not want him to know that her set had gone wrong. Hence the cloak-and-dagger approach. We felt, at the same time, a huge relief and keen sense of disappointment.—G.L.M.



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ANGLE

PART 4

THE COMING OF THE F.M. V.H.F. BROADCASTING SERVICE HAS REVOLUTIONISED HI-FI LISTENING IN THE HOME. THIS SERIES OF ARTICLES WILL DISCUSS THE PART F.M. PLAYS IN HIGH-QUALITY REPRODUCTION.

~~~~~ by Gordon J. King

AS has previously been intimated, full benefit of the f.m. system of broadcasting is possible only by feeding the f.m.-derived hi-fi a.f. signals to an amplifier and loudspeaker system which are able to do them full justice. This must not be viewed in a derogatory sense in relation to the more "domestic" composite a.m.-f.m. receiver or f.m. only receiver.

Indeed, such equipments are capable of excellent results on the new service and the quality of reproduction and the signal-to-noise (interference) performance are far superior than ever possible on the medium-frequency a.m. system.

It is extremely unlikely that there will ever be such a condition as "complete fidelity" (100 per cent faithful to the original), but, viewed relatively, the table f.m. radio of today is surely a hi-fi version of the equivalent receiver of a few years back.

## THREE FACTORS

Similarly, the f.m. tuner-cum-high-quality amplifier-and-loudspeaker is considerably "Higher-Fi" than even a modern set. It would seem that three factors are fully involved in this hi-fi business.

(1) A variable which is purely psychological and which is a function of the listener, (2) the time position in the field of electronics, and (3) the relative factor.

It is not here intended to dwell too much on the theory of relativity, but it seems to be impossible to define with any degree of accuracy the misused term "hi-fi." Indeed, the layman might well be excused in believing that hi-fi is a form of "liquid make-up," having no association whatever with sound reproduction!

It seems pointless to stipulate that hi-fi equipment must approach some arbitrary technical standard. Such a standard set today would be hopelessly out-of-date tomorrow. Tomorrow, to-day's achievements will appear grossly inadequate.

Hi-fi should be considered essentially as an ambition and not as a fact which can be resolved into some technical standard. It should be remembered that hi-fi is a means to an end and not an end in itself.

A remarkably satisfying illusion of the real thing is created by hi-fi equipment, about that there is little doubt, but the difference between the width

of the gap which separates the real thing from reproduction secured by way of "super" hi-fi equipment and the width of the gap which separates normal "everyday" reproduction from the real thing is still curiously small!

## HI-FI EQUIPMENT

The standard of reproduction now to be expected after many years of progressive electronics, irrespective of its title, demands an amplifier of very low distortion. The amplifier must have an adequate power output rating of, at least, 8 watts.

Not that this output will be exploited to any large extent during a musical work, but it is essential for the distortion to remain at a low level during the course of loud transient passages

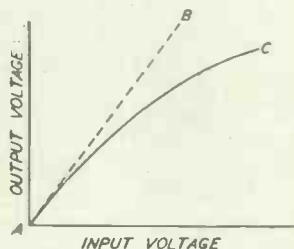


Fig. 6. The curve A—C shows non-linearity of the input voltage/output voltage characteristic. Line A—B shows the ideal linear characteristic which can never be achieved in practice.

when the input signal will push the amplifier up to its full output figure.

A linear frequency response is also essential, of course, and should extend from some 20 c/s up to ten times the frequency of the highest fundamental musical note (approximately 40 kc/s). The human ear cannot hear frequencies above 18kc/s (this depends on the age of the listener to a large degree), but a wide band-width ensures good transient response and endows the equipment with that feature of "attack" which is abso-

lutely essential for serious hi-fi endeavours.

It is interesting to note that the Pamphonic Type 1002 amplifier has a power output of 25 watts and a frequency response which is essentially linear from 2 c/s to above 100 kc/s! On the same amplifier, the harmonic distortion is approximately 0.05 per cent at 15 watts at 1 kc/s.

## HARMONIC AND INTERMODULATION DISTORTION

The fact that on any amplifier the input voltage/output voltage characteristic is slightly curved as shown at Fig. 6 promotes harmonic and intermodulation distortion. The degree of distortion is somewhat governed by the amount of curvature of the characteristic.

With modern equipment an input signal of, say, 100 c/s would produce at the output an amplified version of the same signal plus a very small ratio of the second harmonic at 200 c/s, a very small ratio of the third harmonic at 300 c/s, a fourth at 400 c/s and so on.

Also, the non-linear characteristic will cause mixing of signals at various frequencies and thus give rise to spurious tones which are not present in the original signal. The effect is much after the style of frequency conversion in a superhet receiver.

Here, of course, the mixer valve is purposely arranged to operate in a non-linear manner, and the input signal is mixed with the oscillator signal to produce the i.f. signal.

With an a.f. amplifier in receipt of, say, two signals, one at 100 c/s and the other at 1,000 c/s, there will thus be produced at the output a series of sum-and-difference frequencies. Since these frequencies are purely spurious and not simply harmonics of the original they are considerably more disturbing to the listener.

Moreover, since the amplifier is generally in receipt of complex sound waves made up of a considerable number of pure sine-waves, one can well imagine the abundance of spurious frequencies created by the equipment.

On good quality equipment, of course, the strength of the spurious signals so created is but of a very small ratio of the strength of the actual signals.



## TRANSIENT DISTORTION

A transient, such as a crash of a cymbal, produces across the speech coil of the loudspeaker a voltage pulse such as that shown at Fig. 7 (a). In order to reproduce a transient faithfully, therefore, the pulse should cause the loudspeaker cone to move from its position of rest at A to point B.

On reaching B it should remain steady for the time period BC, after which it should return to its original position at D.

Transient distortion occurs when the cone follows the waveform shown at Fig. 7(b). From this it will be seen that on reaching B the cone overshoots and tends to go into a damped oscillation about B. The oscillation may die out before the time period BC expires, but will reoccur again at D.

The effect is caused by kinetic energy acquired by the cone and speech coil during its rapid movement from A to B and from C to D. The resulting distortion is noticeable by the "hangover" effect following a percussion sound.

On modern equipment the distortion is considerably alleviated in two ways. One way is by acoustic damping of the loudspeaker by its loading in a specially designed enclosure, and the other way is by the introduction of feedback in the amplifier circuits.

## DAMPING FACTOR

The amplifier damping factor is the relationship between the impedance of the loudspeaker and the source impedance. The judicious application of negative and positive feedback to the main amplifier permits the virtual impedance as "seen" by the loudspeaker to have a value considerably below that of the impedance of the output terminals. Usually the impedance of an amplifier is in the region of  $15\Omega$ , but a high damping factor, given by feedback, means that the amplifier impedance from the viewpoint of the loudspeaker is much less than  $15\Omega$ —it might well be less than half an ohm.

Clearly, then, the low virtual impedance of an amplifier with a high damping factor shunts the speech coil of the loudspeaker and quickly dissipates the oscillatory energy during transient signals, which, as we have already seen, would otherwise result in unnatural vibration of the cone at its resonant frequency.

It will be recalled that in early television receivers a resistor was often used to damp the oscillations in the line scanning coils and line output transformer during the line flyback period. The principle here is exactly the same as that appertaining to damping of the loudspeaker.

Some amplifiers feature a variable damping control which permits ready selection of the damping factor best suited for any particular type of loudspeaker system, as some systems require more damping than others, particularly systems which are not adequately damped from the acoustic aspect. The Pamphonic 1002, for example, has such a control which covers from 20 to infinity. This means that the virtual amplifier output impedance can be taken right down to zero ohms!

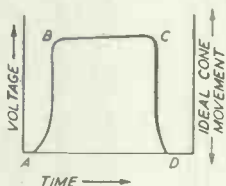
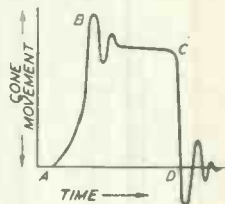


Fig. 7A (left). A voltage pulse due to a transient developed across the loudspeaker speech coil, showing ideal cone movement.

Fig. 7B (right). The movement of the cone giving rise to transient distortion when the speech coil is insufficiently damped mechanically and electrically.



## QUALITY OF EQUIPMENT

That one gets what one pays for is true also for hi-fi equipment, and this applies not only to the amplifier but also to the loudspeaker system. Excellent amplifiers are available at a cost of about 30 gns., but obviously these cannot be expected to be capable of the same performance as those costing in the region of 50 gns.

Another thing which is not always fully appreciated is that a good amplifier can only give its best in association with a loudspeaker of matching goodness. The converse is also true, of course. It is pointless using a 50-gn. amplifier with a 10-gn. loudspeaker system.

Loading of the loudspeaker unit is a science in itself, and of recent years extensive development has resulted in loudspeaker systems of very high quality, although, sad though it may be, the loudspeaker still represents the weakest link in the chain between the studio and listener.

Vented chambers, providing adequate loading to lowest frequencies encountered in music, are now extremely popular. A treble unit, providing wide-angle diffusion of high frequencies, is also often embodied in the system.

## TONE CONTROLS

To help combat adverse room acoustics, a room-matching control is featured on the Pamphonic range of hi-fi loudspeaker systems. This switch enables individuals to adjust the tonal balance according to the room, location of the loudspeaker and to their own particular likes in music response.

Also to aid in this respect, hi-fi amplifiers incorporate efficient tone

control circuits which can be adjusted over a wide range of bass and treble responses. The bass is often continuously variable from minus 14dB to plus 13dB at 40 c/s, and the treble continuously variable from minus 15dB to plus 12dB at 10 kc/s. Equalising filters are also necessary to suit the various recording characteristics of disc records.

The general noise and hum level of hi-fi equipment must be very low indeed. A figure for noise and hum is

generally given in amplifier specifications. Minus 90 dB relative to the full output of the amplifier is a very satisfactory figure, for even with the ear close to the loudspeaker noise of any kind is barely perceivable. A noise figure of minus 60-70 dB is generally satisfactory.

In conclusion, it should be stressed that it is of upmost importance to secure the correct degree of de-emphasis at the output of an f.m. tuner before the f.m.-derived a.f. signal is passed on to the hi-fi amplifier. On the radio channel, the amplifier tone controls should be set approximately to the linear position for proper response. Proper de-emphasis cannot be obtained simply by reducing the top response of the amplifier by means of the appropriate tone control.

FM-DERIVED  
HI-FI  
(concluded)

AUDIO  
ANGLE

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first year with  
this issue

Among the interesting features, specially written by popular B.R.T.R. contributors, to appear in the near future are articles on gramophone pick-ups, pick-up equalising networks, and an important new series on

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# C.R.T. TESTER and REJUVENATOR

A practical article for the service engineer, describing a simple-to-build instrument which will find a ready use among the ancillary equipment on the work bench.

by J. H. DAVIES

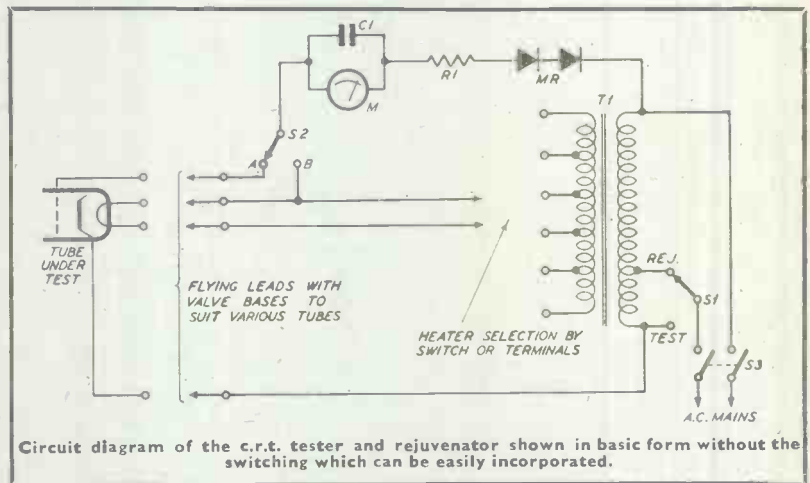
THE instrument about to be described is a cathode ray tube tester and rejuvenator, built for use in the writer's TV service department. Although this simple little device is not intended as a serious rival to the commercial instruments available, it is felt that the circuit has all the basic essential tests of a professional model and as such should be of interest to other engineers.

Even if all the components have to be bought at normal retail prices, the total cost of the tester should not be much more than 70s. The materials required for the unit are listed below.

## LIST OF COMPONENTS.

|    |                                                                               |
|----|-------------------------------------------------------------------------------|
| R1 | 4.7k $\Omega$ , 1 watt                                                        |
| C1 | 0.1 $\mu$ F, 350V                                                             |
| M  | 0-50mA meter                                                                  |
| MR | Metal rectifier, DRM2B or similar                                             |
| S1 | Single-pole, double-throw switch                                              |
| S2 | Single-pole, double-throw switch                                              |
| S3 | Double-pole, single-throw switch                                              |
| T1 | Filament transformer giving heater voltages of all tubes likely to be tested. |

Valve Bases: One each Octal, Duodecal, Mazda Octal, B9A  
For heater voltage selection, a further switch may be used—single-pole, 6-way if all recommended voltages are catered for.



Circuit diagram of the c.r.t. tester and rejuvenator shown in basic form without the switching which can be easily incorporated.

reading will rise slowly for about 20 seconds, when a steady reading will be obtained. The current should then be switched off, or the Test-Rejuvenate switch returned to Test, before the reading begins to fall again, indicating that little cathode coating remains.

When the original model was being constructed, a transformer with the necessary selection of tappings was not immediately available and so a multi-ratio transformer was used. This gave the required voltages by moving the two leads around the various tappings.

The only disadvantage was that this necessitated the use of terminals and spades for voltage selection instead of the quicker and more efficient operation of a single pole 5- or 6-way switch which would normally have been used.

The recommended secondary windings are: 2, 4, 6, 3, 7.3, 10.3 and 12.6 volts. The Test tapping on the transformer primary should correspond as nearly as possible to the local supply voltage and the Rejuvenate tap should be 20 per cent lower (i.e. 250V and 200V.)

Tests covered by this instrument are as follows:—

1. Grid current (emission).  
Grid-cathode shorts.

2. Cathode leakage.  
Cathode shorts.
3. Rejuvenation in cases of low emission only.

Rejuvenation is effected by raising the heater voltage by 20 per cent, at the same time maintaining a potential of approximately 100V between grid and cathode. This "boils off" the corroded surface of the cathode, leaving a new surface for further use.

With both switches set to Rejuvenate and the tester switched on, the meter

Where inter-electrode shorts are indicated, these can often be removed by switching the instrument to Rejuvenate and tapping the tube neck gently with a screwdriver. It may well be found that optimum results in this direction are obtained at one particular heater temperature.

The table below shows an analysis of test conditions and their interpretation according to the setting of switch 1 and the milliammeter readings. Switch 1 is, of course, set to the Test position during these tests.

| Switch Position | Meter Reading | Conclusion          |
|-----------------|---------------|---------------------|
| A               | Above 12mA    | Grid-cathode short  |
| A               | 5-12mA        | Normal emission     |
| A               | Below 12mA    | Low emission        |
| B               | Any reading   | Cathode-heater leak |

## A Sea of Designers

**M**Y favourite critic in the Sunday papers is the one who weekly takes up the cudgels to belabour some star or studio. Nothing pleases him. One feels that he must have been trapped between a cortege of canoodling couples and sat upon a half-full ice-cream carton. In no uncertain manner he tears the show to pieces.

We do not always agree with his views—indeed, a castigation in his caustic column is likely to send me cinemawards in search of the film he turned down! But the virile lambasting appeals to the “little man” in most of us.

The same can be said of the scribes who pass comment on things radionic who dig at designers and production staff in these columns, now and then. It's rather like biting the hand that feeds us, but the film critic thrives on it, so let's have a bash!

What is the first, worst, most awkward job of all? No prizes for correct answers. After a tedious half-hour repairing a dusty, dirty, hole-in-the-corner set we pack up our toolbox, gulp down the dregs of our tepid cup of tea, check that there's just time to get to the next call, when the dear little old lady, who's been standing by, quietly watching us work, casually mentions the fly on the glass.

I sometimes think there is a special species of insect whose sole aim in life is to creep behind implosion guards and wave its pedipalpi at the harassed engineer.

Removing a chassis for cleaning can be a hazardous enterprise. There are those receivers (let us not name names) which require the attentions of a jobbing plumber and a page of “connection notes” for dismantling. One, in particular, I recall. We had completed the repair and given the set a



He must have sat upon a half-full ice cream carton.

facelift; all that remained was replacement of bottom and back.

Unthinkingly, we tipped the cabinet upside-down to fit the awkward screws in the base. It was not until we had delivered the precious load and were demonstrating it to the customer that we noticed a chain of exclamation marks detracting from Sylvia Peters' charm. It was wood shavings, previously trapped between the glass and the mask, until we had performed the fatal somersault.



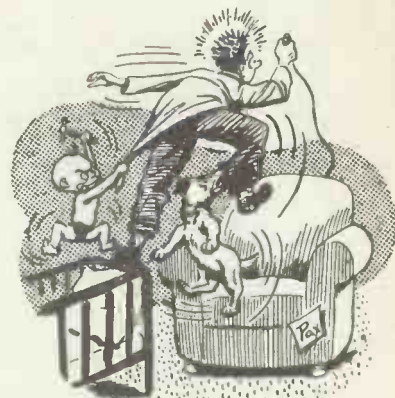
The dear old lady casually mentions the fly on the glass.

Another type of set, whose makers are justifiably proud of the “serviceability” of a companion model, can be removed from the cabinet, complete, in a couple of minutes. There are only two snags . . . the first is that for many would-be minor tests this semi-stripping process is still necessary; the second is, that having done the disinternment, we are very little better off.

To get at the inside of the l.o.t. screened can is a major feat of safe-breaking and as for removing the loudspeaker, or the turret tuner. . . .

Of course, there is the other sort of set: undo two screws and the face of the tube is ready for cleaning. Unfortunately, as we remove the second screw, the armour plated glass usually slides from its clamp and catches us smartly on the corns.

What is the next-worst bugbear? Undoubtedly the e.h.t. rectifier. For too long we have been burdened with



When one has to negotiate a couple of armchairs, a vicious dog and an occupied playpen.

the necessity for making off beautifully soldered joints in an inaccessible corner, or bending the lead-off wires so close to the pinch that either the glass of the valve gives way or a healthy corona is encouraged.

However, the EY86 is creeping quietly onto the domestic scene. We extend a grateful welcome, but wonder how many of the models that take their bow next month will retain the hot-iron horrors.

Almost too prolific to be mentioned, are the legion of minor annoyances, designers' peccadilloes and production short-cuts. On one model, a routine setting-up adjustment can only be done with the tenderest portion of one's wrist half a millimetre away from an almost incandescent mains dropper. On another, a certain valve can be reached quite easily with the second knuckle hazardingly near the live contacts of the on/off switch.

Oh yes, I know! Plugs, etc., should be disconnected before working within the set. But, quite honestly, how many servicemen observe these precautions? It's easy when the plug and socket is at the back of the set, but not conducive to rapid servicing when one has to negotiate a couple of armchairs, a vicious dog and an occupied playpen to reach the plug.

The subject of drive cords should be grist to the mill of any carping critic—that's me, this month—and the book has yet to be written giving details of the many and varied convolutions that the backroom boys have dreamed up. But the general process nowadays, I grudgingly admit, tends toward simplicity. Not that that helps when, as in one portable, the engineer has to dismantle the drive cord and pulleys just to clean the dial.

Well, I've taken up arms against my sea of troubles, but do not presume to hope that by opposing, I shall end them. A pretty fine pickle we servicemen would be in if we had to conceive and deliver as well as doctor our radionic pups.

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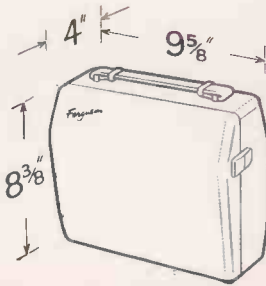
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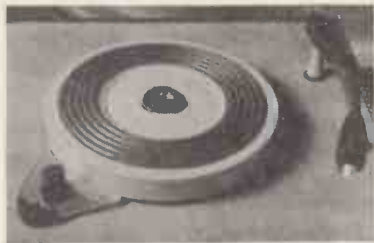


## BSR TU9 GRAM UNIT

*Birmingham Sound Reproducers, Ltd.,  
Monarch Works, Old Hill, Staffs.  
Tel.: Cradley Heath 69272.*

THE latest BSR gram unit, type TU9, is a 4-speed turntable unit and pick-up operating at 78, 45, 33½, and 16 r.p.m. It has an independent on-off switch which automatically disengages the jockey pulley in the "off" position. A 45-r.p.m. record adaptor is permanently fitted to the turntable and can be raised and lowered as required.

The unit has an 8in. diameter turntable, and is suitable for operation on 200-250V, 50-cycle a.c. mains. Models for other voltages and mains frequencies are available.



The new BSR type TU9 4-speed gram unit.

The pick-up arm is completely separate, but is ideal for use with the TU9 turntable, and is fitted with a specially designed mounting which virtually eliminates acoustic feedback. The pick-up is fitted with the BSR *Ful-Fi* crystal cartridge, type TC8H, designed to meet the increased demand for a high-output turnover type cartridge for use with low gain amplifiers now popularly used in portable record players. Stylus pressure can be adjusted easily and quickly.

## ALBA TV WITH FM RADIO

*A. J. Balcombe, Ltd.,  
Tabernacle Street, London, E.C.2.  
Tel.: CLERkenwell 1322.*

THE company have introduced a range of television receivers incorporating v.h.f.-f.m. radio giving Home, Light and Third programme positions on the turret tuner. Model T744FM is a 17in. table receiver selling at 74gns. (tax paid) and the console version Model T724FM, sells at 85gns. (tax paid). There is also a 17in. de-luxe console

## The latest in Radio and TV Receivers and Accessories



Three new Regentone models (left to right): Model 58C 17in. console TV; the "low-line" a.m.-f.m. radiogram, Model ARG81; and the "Two Five" hi-fi 4-speed record player.

with full-length folding doors priced at 99gns. (tax paid).

Finally, there is the Alba 21in. table TV which can easily be converted to a console by the addition of optional legs. This model is priced at 96gns., and the set of four optional legs costs an additional 2gns.

## NEW REGENTONE PRODUCTS

*Regentone Radio and Television, Ltd.,  
Eastern Avenue West, Romford, Essex.  
Tel.: Romford 5991-7.*

AT the Scottish Radio Show Regentone exhibited a number of new additions to their television, radio and radiogram range. Prominent among them is the new Model ARG81 radiogram, with a styling that features the new "low line" and blends successfully both contemporary and Continental trends. It incorporates a 6-valve 3-waveband a.m.-f.m. chassis, and output is via a 10in. speaker. Built-in aerials cater for a.m. and f.m. reception. The gram unit is a 4-speed autochanger with sapphire styli in a turnover head. The cabinet measures 40in. wide, 17in. deep and 28in. high. For operation on a.c. mains 200-250V. Price 59gns. (tax paid).

The new 17in. television receiver, Model 58C, is housed in console cabinet of modern design, finished in dark veneers, with gilt trimmings. The set uses an electrostatically focused c.r.t. and incorporates a low-noise turret tuner, automatic picture control, frame flyback suppression, and noise limiters for sound and vision. Controls and speaker are front mounted. For operation on a.c.-d.c. mains, 200-250V. Price 75gns. (tax paid).

The new Regentone portable radiogram, Model PRG1, incorporates a 2-waveband (l.w. and m.w.) radio unit with 5in. p.m. speaker, and a 4-speed autochanger. The circuit has 4 valves plus metal rectifier. The cabinet of the PRG1 is covered in two-tone leatherette, with a plastic handle. For operation on a.c. mains, 200-250V. Price 32gns. (tax paid).

Model *Two Five* is a new high-fidelity

4-speed auto recordplayer giving an output of 5 watts through two speakers—an 8×5in. elliptical bass unit, and a 3in. treble unit—with crossover network. Separate bass and treble controls are provided. The circuit uses three plus one valves with push-pull output. The case is finished in two-tone leatherette. For operation on a.c. mains, 200-250V. Price 29gns. (tax paid).

Finally, there is a new 6-valve a.m.-f.m. table radio, Model A156, covering l.w., m.w. and v.h.f.-f.m., with separate f.m. tuning, push-button wavechange, and built-in aerials. The set is housed in an attractive walnut-veneered cabinet measuring 20×14½×9½in. For a.c. mains, 200-250V. Price 29gns. (tax paid).

## K-B MINOR RADIOGRAM

*Kolster-Brandes, Ltd.,  
Cray Works, Footscray, Sidcup, Kent.  
Tel.: Footscray 3333.*

ILLUSTRATED is the new *K-B Minor* radiogram, Model OG10, a low-priced instrument for a.m.-f.m. reception which was first introduced at the Scottish Radio Show. It incorporates a 7-valve receiver for a.c. mains operation and uses a BSR 4-speed changer



K-B "Minor" 4-speed a.m.-f.m. radiogram, Model OG10.



Continued

unit with turnover crystal pickup. Built-in aerials are provided for both a.m. and v.h.f. wavebands.

A tapped compensated volume control is fitted, and output is via a 9 by 5in. elliptical speaker. Price 49gns. (tax paid).

Also new is the K-B Model OV30 17in. table television receiver which can be converted into a console model by fixing optional legs. This 13-valve instrument, which is based on the design of Model NV40, but with fewer valves, is priced at 69gns. (tax paid).

K-B have also introduced their first combined radio-TV receiver Model NF70FM, which has a v.h.f.-f.m. position on the turret tuner. The set uses a 21in. 90-degree scan, mirror-backed picture tube, and is housed in the same cabinet as the K-B Model NF70. Price 107 gns. (tax paid).

### MONEY SPINNER RECORD SELLERS

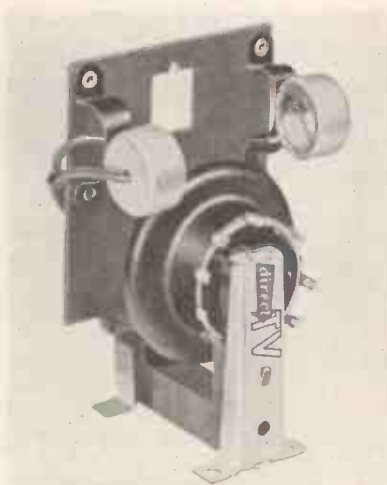
*IM Master Products,*  
112-116 New Oxford St., London, W.C.1.  
Tel.: MUSEum 7878.

THE company have introduced a new record demonstrator, the *IM Money Spinner*, intended for use in the dealer's record department. The demonstrator is a sturdy unit comprising a high-quality amplifier, 4-speed playing deck and loudspeaker, housed in a cabinet of contemporary styling with an acoustic hood.

Apart from their economy in space requirements, the *Money Spinner* units



Imhof's "IM Money Spinner" record demonstrator.



New lines from Direct TV Replacements: (left) line output transformer, type L1331, for certain Pye and Invicta sets; and (right) the new Direct TV Replacements television capacitor kit.



can be arranged and rearranged easily and quickly, thus offering the dealer a variety of showroom layouts with a minimum of time and labour. For example, the units can be placed back-to-back in the centre of the showroom, or can be sited singly, using the back of the acoustic hood as a display panel, apart from the general wall position.

Each unit has a pilot lamp governed by the on-off switch, and the volume control is concealed so that it can be preset to the required level and not touched by the customer. Finish is in grey paint, with metal legs in matt black, and the acoustic hood in mist-green. The deck surface is in blue-grey Warerite.

Price of the *IM Money Spinner* is £45 plus £13 purchase tax; h.p. or credit terms are available. Further details may be obtained from the company.

### DIRECT TV PRODUCTS

*Direct TV Replacements, 134-136 Lewis-*  
*ham Way, New Cross, London, S.E.14.*  
Tel.: TIDeway 3696-2330.

THE company have produced a line output transformer, type L1331, which is a direct replacement for Pye Models V4 and V7, Pam Models 908, 952 and 958, and Invicta Models T118, 119 and 120. The transformer uses nylon spacers to isolate completely the corona cups from the main panel. Connections and fixings are exactly as the original.

The transformers are individually boxed and labelled, with a list of all equivalent models clearly shown. Trade price £1 16s. 5d.; retail price £2 12s.

Also new is the Direct TV Replacements capacitor kit, which contains capacitors common to many television sets, capacity and voltage ratings having been selected from types which the dealer or distributor is less likely to

stock. The kit includes: 60+100 $\mu$ F 275V h.t. smoothing, 500pF 4kV, 100pF 6kV, 47pF 2kV line compensation and isolation types, 0.001 $\mu$ F 20kV, 500pF 20kV e.h.t. smoothing. The e.h.t. capacitors, rated at 20kV, will act as emergency replacements in most sets, including the later 21in. models. Trade price £1 5s.; retail price £1 17s. 6d. The case is supplied free.



The Amplion "Riverside" battery portable radio.

### AMPLION RIVERSIDE BATTERY PORTABLE

*Amplion (1932), Ltd., 175-179 Crickle-*  
*wood Lane, London, N.W.2.*  
Tel.: SPEedwell 1156.

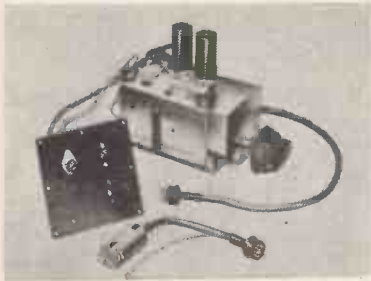
THE *Riverside* battery portable radio incorporates a 4-valve superhet circuit using a printed circuit chassis and employing low consumption valves. Two wavebands are covered (l.w. and m.w.), and output is via a 5in. p.m. speaker. Weight of the set is 5lb. without batteries.

The receiver is housed in an attractive



attache-style case finished in a two-tone colour scheme with gilt fittings. The control panel is in gilt thread pattern with tuning dial and control knobs in white durable plastic. Price of the *Riverside* portable radio is £13 10s., tax paid, less batteries.

An a.c. mains power unit is available for this model. Appropriate sockets are provided to enable the battery leads to be plugged straight into the unit, so converting the set from battery to mains operation. The power unit is available only to Amplion appointed dealers, and retails at £2 19s. 6d.



The new Brayhead plug-in TV turret converter.

### BRAYHEAD PLUG-IN TURRET CONVERTER

*Brayhead (Ascot), Ltd., Full View Works, Kennel Ride, Ascot, Berks.*  
Tel.: Winkfield Row 427-8-9.

THE new Brayhead turret converter is designed for simplicity of installation, as it will plug in to the majority of Band I receivers in current use, and in most cases no soldering is required. The converter is supplied with a comprehensive instruction booklet which lists more than 600 television receiver models of standard i.f. ranges, and gives precise plug-in installation instructions for each individual model by means of an ingenious cross-reference system. The maker's claim that the booklet is so comprehensive and straightforward that the converter can easily be fitted by even an inexperienced apprentice.

The converter is designed around the Brayhead turret tuner as supplied to a number of leading set manufacturers for incorporation in their production receivers. It is supplied with any two sets of detachable moulded segments on which the r.f. transformers, aerial and oscillator coils are mounted. Additional segments are available for all channels in Bands I and III.

The circuit consists of a double-triode cascode r.f. amplifier (with means of introducing a.g.c. voltage from the main chassis), transformer coupled to a triode-pentode oscillator-mixer stage. A separate filament transformer is obtainable for use when supply voltages are low.

Pre-set gain controls are provided for each band. These, together with the

aerial socket, are mounted on a special panel which can be fixed in any convenient position on the back of the receiver.

Three ranges of converters are produced with i.f. outputs to suit the majority of receivers in common use, and in addition each range is available in either series or parallel heater wiring. Gain on Band I is given as greater than 42db, and on Band III greater than 40db. Valves used are (series model) PCF80 and PCC84, and (parallel model) ECF80 and ECC84.

Supplied with the converter is the Brayhead adaptor, a simple tuned matching device designed for ease of installation. There are 11 types of adaptor which, together with the six available types of converter, enable conversion of most receivers to be readily accomplished.

Price of the converter is £7 7s. retail, and the adaptor sells at 12s. 6d.

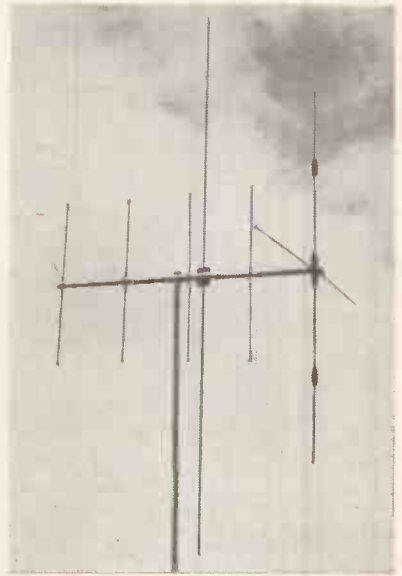
### TELERECTION HIMAX TRIPLE BAND AERIALS

*Telerection, Ltd., Antenna Works, St. Pauls, Cheltenham, Glos.*  
Tel.: Cheltenham 55960 & 4028.

IN their new range of *Himax* phase-corrected triple-band aerials, first shown at the Scottish Radio Show, Telerection have added a Band II f.m. dipole, thus providing a range of aerials covering Bands I, II and III.

The range starts with a phase corrected single dipole—the *Himax One*—which can also be used as an indoor aerial. Then follows the *Himax Four*, *Five*, *Six* and *Eight* consisting of a single dipole on Band I with 4, 5, 6 and 8 elements on Band III. The *Himax Five D*, *Six D* and *Six R*, and *Eight D* and *Eight R* all have 2 elements on Band I (either a director or a reflector) with the specified number of Band III elements. All *Himax Triple Band* aerials have f.m. elements (Band II) attached.

The Band II elements are held in a



The "Himax 5D," for Bands I, II and III. This is one of the new Telerection range of triple band aerials.

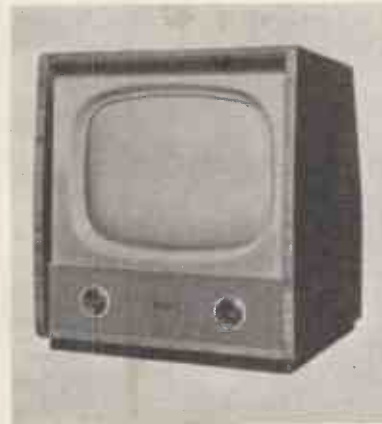
specially designed *Himax* insulator which enables all Bands to be received via one downlead.

### NEW PILOT MODELS

*Pilot Radio, Ltd., 31-37 Park Royal Rd., London, N.W.10.*  
Tel.: ELGar 7353.

A NEW fringe area television receiver, Model TV110F, has been added to the Pilot range. This is a 17in. table set featuring improved circuitry with additional valves to provide higher sensitivity, housed in a cabinet of modern design finished in contrasting veneers.

Features include: flywheel sync-  
vision a.g.c., turret tuner for all chan-



New releases from Pilot are this 17in. table TV receiver, Model TV110F (left) and the "Cavalier" record reproducer, Model RC112.



Continued

nels, flyback blanking, and two sensitivity controls—one for Band I and one for Band III. Noise suppression is provided on both vision and sound.

Price of Model TV110F is 74gns. (tax paid).

Also new is the Pilot *Cavalier* record reproducer, Model RC112, which incorporates a 3-valve amplifier giving 5 watts output via a 9×5½in. elliptical speaker. Separate bass and treble controls are provided, and the amplifier is corrected for recording characteristics. The gram unit is a 4-speed Collaro autochanger.

The *Cavalier* is housed in a case of modern styling, finished in black, dove grey and white, with gilt fittings, and speaker grille in gold-speckled black-and-white tygan. Price of Model RC112 is 28gns. (tax paid).

### ULTRA TWIN FOR 1957

*Ultra Electric, Ltd.,  
Western Avenue, London, W.3.  
Tel.: ACOrn 3434.*

THE Ultra Twin mains-battery portable radio continues during the 1957 season with a number of new features, mainly in styling. The cabinet, in a new colour, has bright metal decorations, and a new type of carrying handle which lies flat when not in use is fitted. The tuning scale has been changed to the "large name" type.

The set now uses low-consumption valves for battery economy, and mains-battery change-over is automatic. Price of the 1957 Twin remains unchanged at 17½gns. (tax paid).

### NEW INVICTA MODELS

*Invicta Radio, Ltd., 100 Great Portland Street, London, W.1.  
Tel.: LANgham 5742-3.*

LATEST Invicta television receiver is Model 138, a 17in. table set for fringe area reception, incorporating a 17-valve chassis. The cabinet has a solid light beech frame with a mahogany veneered top, and a front panel of bird's eye, maple. Price of Model 138 is 76 gns. tax paid.



New from Philips: two tape recorders (AG8108 on left, and AG8109 on right) and a new a.m.-f.m. car radio, Model X61V.

A new table radio receiver is Model 16—a 5-valve, 2-waveband (i.w., m.w.) set with built-in frame aerial, using printed circuit construction. The set is housed in an ivory-coloured plastic cabinet with red feet and control knobs, and is designed for operation on a.c.-d.c. mains, 200-250V. Dimensions: 9in. high×12½in. wide×5½in. deep. Price 13½ gns., tax paid.

### CHAMPION DEBUTANTE

*Champion Electric Corporation,  
Champion Works, Newhaven, Sussex.  
Tel.: Newhaven 500-1-2.*

THE *Debutante*, Model 868, is the latest addition to the Champion range of record players. Priced at



The Champion "Debutante" record player, Model 868.

17gns. (tax paid), the instrument contains a 3-speed gram unit and an amplifier giving an output of 2 watts via two speakers (5in. p.m. and a high-frequency electrostatic). A continuously variable tone control is fitted.

The case, which has a carrying handle, is finished in two-tone rexine, available in a variety of colours, and measures 15½×14×6½in. For operation on a.c. mains 200-250V.

### PHILIPS TAPE RECORDERS

*Philips Electrical, Ltd., Century House,  
Shaftesbury Avenue, London, W.C.2.  
Tel.: GERrard 7777.*

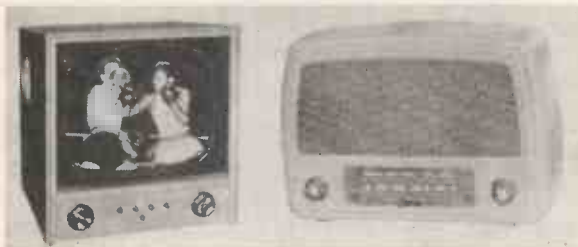
TWO new tape recorders are announced by the company. Model AG8108, replacing the existing *Recordergram Major* (AG8016), is a portable twin-track model housed in an attractive grey washable plastic carrying case with a removable lid. It weighs 30lb. and is supplied complete with a 7-in. 1,800-ft. reel of long-playing tape giving up to six hours recording time from one reel, spare take-up reel and a high quality moving coil microphone. Price 62gns.

This instrument is suitable for operation on a.c. mains and has three tape speeds—7½, 3½ and 1½in./sec. All controls, with the exception of tone and volume, are push-button operated. There is a 5in. speaker with sockets for an extension speaker.

Other features include a built-in programme indicator (rev. counter); tape interrupter button allowing for intermittent stop-start of tape; provision for playback through an external speaker or radio set, or for feeding a high-fidelity amplifier; connecting cable for recording directly from radio or gramophone pick-up; "magic eye" recording level indicator; automatic stop at end of reel.

Model AG8109 is a restyled and more elaborate version of the *Recordergram* (AG8107) and sells at the same retail price of 39gns. The six-position main control knob operates amplifier, fast wind, fast rewind, playback, recording, and switches the instrument on and off.

There are separate controls for tape interruption, recording volume (microphone), recording volume (radio/pick-up), playback volume and tone. Tape speed is 3½in. per second. The speaker is a 6×4in. elliptical type and there are sockets for an external speaker. The grey two-tone washable plastic case has a removable lid.



The Invicta Model 138 17in. table TV (left) and a new printed circuit table radio in ivory-plastic cabinet, Model 16.

(continued on page 243)

# Salesmanship for Radio and TV Dealers

PART TWO



## ESSENTIALS OF SALESMANSHIP

THE whole idea of salesmanship has its critics, and most of them are, nevertheless, stout defenders of our economy, our whole system, to which salesmanship is essential. This confused thinking can be important to the salesman himself, because it tends to sap his confidence. Far from his services receiving the appreciation that they should, he may from time to time find something in the nature of an attack being made upon his very function. No-one, under such circumstances, can feel at his best unless he is aware of the real situation.

We all have needs, which must be satisfied, and they cannot, at least in full, be satisfied without our doing something ourselves to satisfy them. We must consume and, before we can consume, we must produce what is to be consumed.

Division of labour has such enormous advantages that obviously it was early realised that one person should make only shoes and boots, another only build houses, another only make furniture, and so on. Further subdivision was introduced, so that one person would only make part of the shoe, perhaps only part of the shoe lace, and so on.

It was then necessary for someone to make the person who wanted shoes aware of where and from whom they could be obtained and, further, make sure that the people making the shoes could dispose of all they made to people who would pay for them. This is the role of the salesman.

Without him people who wanted shoes would not be shod, and shoemakers would be left with pairs of shoes instead of obtaining money with them to enable them to buy other things they needed.

### Finding Customers

Employment, prosperity and progress depend on consumption—in other words, on finding customers for all the pairs of shoes—and, more, they depend on stimulating greater production.

For it is said the present day processes of selling stimulate consumption artificially. So they do, and so they should, or our standard of living would never rise.

The standard of living is a material thing, based on greater consumption and production of material things. And the salesman plays a leading part in the raising of the standard of living by helping to increase consumption and so, in turn, stimulating production. If it were the other way round, and consumption declined, employment

### A NEW SERIES . . .

covering the theory and practice of selling, creating sound customer relationships, and maintaining goodwill, written specially for B.R.T.R. . . .

by Richard Curran

would drop, and there would be a recession and then a serious slump. Thousands and perhaps millions of people would be in want.

### Stimulation

At a particular moment in the existence of an economy it might be that salesmen are required, for instance, to stimulate consumption of home produced articles rather than imported ones (this is true at the present time) or to concentrate on stimulating saving for a short period (in this case insurance and other salesmen have the most socially important task).

But basically, it is the salesman, with his task of ensuring that what is made is sold, and increasing the volume and quality of both production and consumption from his middle position, who has the vital role in the economy. Without him, the producer and the consumer would not meet and both would be in an impossible position.

Unless receivers were sold on a very large scale, there could be no broadcasting, sound or vision. Programmes could not be produced for a few people only in each town—it would not be economically possible. Thus, by selling, the salesman plays an essential part in not only making these great industries feasible and providing livelihood for all the workers employed in the factories, but is responsible for enabling all of us to appreciate and enjoy the benefits of radio and television.

### Influencing Minds

Salesmanship, basically, is a matter of bringing people to buy. It is, therefore, a matter of influencing people's minds. We are in the realm of psychology. Unfortunately, psychology is a subject about which little is really known, and much of that little is not directly useful to the salesman.

Thus, the position is one in which the most essential subject is still so much in its infancy that not a great deal of help can be obtained from it. Even so, what aid the salesman can receive should certainly not be ignored; and he should never forget that, whether much less is known in that field than he likes or not, it is the basis of his profession.

Through psychology, the salesman soon learns that what he is selling is not only, nor perhaps primarily, a cabinet of wood or plastic enclosing a quantity of intricate electrical equipment. Few customers know much about wireless or television. They do not understand discussions of varying technical refinements; often they go only by what "looks nice"—and their faith in the salesman who recommends for them one thing rather than another.

What then, do these people want? Good reception, freedom from interference, reliability? Yes, all that is true; yet basically they expect to receive that from any set, especially if it has a well known name, purchased from any retailer.

What else do they expect, consciously or unconsciously, to obtain? Why do they purchase one set rather than another, go to one retailer in preference to his competitor?

The satisfactions they seek are likely to be more intangible, more peripheral. They buy a good looking set because its appearance in their living room gives them a feeling of pride, adds to their conception of their status, impresses others who visit them.

They buy from a particular shop because they encounter there a friendly atmosphere which makes them feel pleased with themselves, understood, their egos subtly encouraged.

People will only, willingly, do what they want to do, and the salesman's primary task is to find, in terms of the sale to be made, drives and desires in the mind of the prospect which can be identified with the object to be sold.

(continued overleaf)

Once the salesman is validly talking about what the customer actually wants — which may be to obtain, for example, a feeling of pride—he is well on the way to accomplishing the sale. Yet he may never mention, in so many words, the actual desire on the part of the prospect on which he is playing, and it may be important that he never does put it into words.

### Empathy

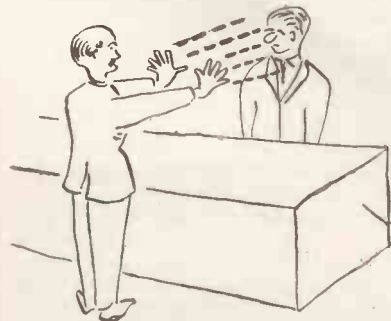
To operate at such a level it is obvious that the salesman must be able to enter into the feelings of the customer. He must know what is going on in the prospect's mind at every moment of the sale. The quality of being able to enter into another's mind in this way is called empathy, and it is an essential attribute of the successful salesman.

It is something which is quite different from sympathy. While sympathy is feeling with another person, empathy consists in knowing intellectually how another person feels.

The salesman, then, should learn as much as he can how other people's minds work, especially in relation to their desires, needs and basic drives. He should know how to harness them to the product which he is selling, and he should realise, by means of empathy, what is going on at each moment in the mind of his customer, and constantly and subtly adjust his approach in the light of this knowledge.

One of the important things for the salesperson to realise is that people are not always and perhaps not primarily guided by reason. It is because of emotions, of feelings, that a prospect will decide to buy one thing or another or at one place or another, in many cases.

Among fundamental human drives which are raw material for the salesman are the fundamental acquisitiveness which exists in people—a desire which can often be usefully aroused; the instinct of fear; the desire for comfort (which is a powerful help in selling all kinds of accessories as well as an aid in



Salesmanship is a matter of influencing people's minds.

selling sets); the instinct of sex (which is used a great deal in salesmanship but not in a direct way); the gregarious instinct, which includes the desire to keep up with the Joneses; the desire to lead (which sometimes encourages people to buy something new or something of higher quality); the desire to imitate, which accounts for a number of television sales.

### Basic Differences

While people are basically alike—or mass production would not be practicable—they also have certain basic differences which are important to the salesperson. Later, some of the main variations in basic personality will be discussed in detail. But it is obvious that the salesperson will deal differently with prospects according to their class, income level, education, and, in some cases, occupation.

So far, as we have said, though a great deal has been written about psychology, not a great deal of it is of much value to the salesman—it is not sufficiently practical. An interest in psychology as such is a good hobby for the salesperson, but he will have to rely for the most part on his own observation of people, constantly trying to discover to their motives and deduce from the reasons why people react in a particular way some of the basic facts about their personalities.

The salesman's powers of persuasion, of influencing the prospect's mind, should always be used with sincerity, and to the advantage of the customer. For the salesman is performing a service: he is assisting someone to satisfy his or her needs.

The persuasion is necessary to do so, granted, but it should be directed at what will be in the best interests of the person with whom he is dealing. In that way, satisfied customers, who will recommend others and who will themselves return again, are made. There is no virtue in persuading someone to accept what he or she will afterwards be disappointed with.

### Confidence

Fundamentally, the salesman should be, and appear to be, someone in whom the prospect will immediately have confidence. Thus the salesperson who is careless of his dress is at a disadvantage. An unshaven cheek, untidy hair, uncleaned finger nails, dirty shoes, an unpressed suit, do not inspire confidence.

On the other hand, overdressing, and anything which might suggest eccentricity, should be avoided. People are attracted to others who conform to all the ordinary demands of society, who are, in fact rather like themselves, and not to people who show in their appearance a desire to be different.

Again, the demeanour of the salesperson is important. He should not



Division of labour has enormous advantages . . .

slouch, nor should he stand like a sergeant major. He should not show lassitude, lounge and "leave himself about." He should be all attention, alert and brisk, without overdoing any of these qualities.

His voice is his tool, and he should cultivate a pleasant tone and a clear delivery. A course of lessons in elocution is not a mistake for the young salesman, though he should beware of artificiality.

If his voice is a tone or two too high or low he should practise changing it, and he should never allow himself to mumble or to talk too loudly.

### Courtesy

Simple politeness is another essential. Courteous manners are easily come by and they cost nothing. What in everyday life are just pleasant refinements—the punctual please and thank you, the opening and closing of doors for other people and so on—are part of the salesperson's stock in trade.

What sort of a person is the salesman? In a sense, this is a trick question, for there are many types of successful salesperson, and one does as well as another. On the other hand, for the youngster to try and copy the personality of another, older salesperson, is a great mistake.

One cannot successfully abandon one's fundamental make-up, and to try to do so merely creates a completely false and bogus effect which everyone will sense and dislike immediately.

Thus the salesperson must always strive to build on his own fundamental personality rather than to try and change it.

### Character Traits

Even so, certain basic character traits can be discerned in most good salespeople. They are interested in other people and they are extrovert—that is, they have outward looking personalities, they like mixing with others, they enjoy the give and take of conversation and

social life, in contrast to the introvert, who is a solitary.

The salesman has—must have—confidence in himself. He has neither a mass of inferiority or superiority feelings but is quietly and surely self confident. He has a stable belief in his own identity, his position in life and his realistic, achievable aims and desires. He is full of commonsense, and the prospect should feel this, and that the commonsense is being used on his (the prospect's) behalf.

Generally the salesperson should be urbane; but while some customers prefer the suave approach, others prefer a more informal one. He should certainly have poise, which should be as unshakeable as possible, he should have great tact and apparently endless reserves of good temper.

Because the salesman, in a sense, always works on his own, alone with the customer of the moment, he should have initiative and self reliance. His decisions must be his and he cannot keep referring back to anyone at all. He must be able to reply on himself.

### Accuracy Counts

He should be accurate. In conveying knowledge which he possesses it is helpful if he has a positive pleasure in getting things right. Misinformation is a considerable source of annoyance to prospects. If inaccuracies are made plain before the sale is completed, the prospect will lose confidence; if not discovered until after the sale is made, the reputation of the shop will suffer badly.

A real enthusiasm for the type of product he is selling is a great help. Keeness is infectious. The salesperson who is really interested will convey that interest to the prospect without effort, will enter into and share the prospect's own interest.

The salesperson should like material things, have a real sense of the pleasures and advantages they bring. He should enjoy life and the good things in life, if possible not only wanting them for himself but also for others.

For he is dealing with and encouraging people's wants. He meets people at the point at which they are feeling a want and expressing it, and he should be able to enter into the prospect's attitude of mind. He should be able to help the feeling of "wanting something" to grow and flower in the prospect's mind.

He should have a fairly strong personality—be a nice chap but one with whom liberties could not safely be taken. Without in the least appearing to do so he should at the opening of the sale quietly and surely take the initiative and retain it all through, except for occasional deliberate short lapses. He should always retain control of the sale, from first to last.

# saleswise

BY MERCUTIO

## A COLUMN OF COMMENT AND NEW IDEAS AND PRACTICAL TIPS ON DISPLAY AND SELLING

**LET'S START** with a window idea—particularly suitable for a corner window, or any smallish window with a reasonable amount of depth. This is strictly eye-catching and prestige, designed to draw more people's attention to the shop, identify the products sold, and give an impression of quality.

First, the rectangular shape of the window is converted to a circle or maybe an oval by masking the glass. Or a simple alternative would be to use hanging curtains drawn back with cords.

Next, a borrowed window dummy is needed, preferably a model of a girl (because that secures more passer-by interest). Suitably dressed, she sits or stands next to a particularly attractive radiogram or television set.

The background can be as simple as you like—hanging drapes or a plain screen or back panel would serve—or the corner of a living room might be suggested. An Axminster carpet might be used for the floor.

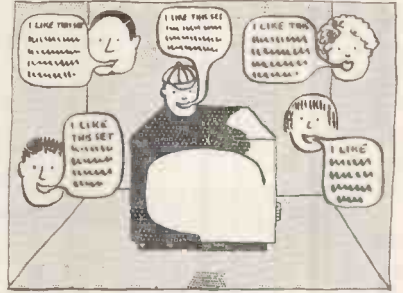
The display should be carefully lighted, with use of spots to get as dramatic an effect as possible. A show-card is not necessary, but if it is decided to have one it might contain the firm's slogan, if one exists, or perhaps just the name of the shop and, underneath, *Radio and Television*.

**YOU HAVE A SET** with several good features and you want to push it. One way, but more of a "prestige" way, would be by a window display like the one suggested in the first item above.

Here's another, more hard selling window idea. Surround the set by cut-



A simple prestige window, making use of a dummy.



A "selling" window, with a "family" stating their reasons for liking a particular set.

outs of cardboard or hardboard, suspended from the ceiling or standing on the set or the floor.

Each cut-out consists of a face and a "balloon"—as in a cartoon—in which the wording begins, "I like this set because . . ." and goes on to give one of the reasons—the price, the famous maker and so on.

The faces can be very freely drawn: dots for the eyes and a couple of lines for nose and mouth would be quite enough—the intention is to convey an idea, not to achieve exact representation; Cartoon type faces with bulbous noses would do very well.

One face could be dad's, one mum's, and so on to produce a family, and the balloon wording might be preceded by the phrases: "Dad says:", "Mum says:", to make the things quite clear.

It's an idea which could be simultaneously adapted for local press advertising to increase the impact.

### IT'S ALWAYS A GOOD THING

if a firm has a happy staff—it not only makes for a nice atmosphere but also has a very close bearing on the satisfaction or otherwise of customers.

What many large firms have found, especially abroad, is that it pays to go to a little trouble to please the wives of members of the staff, too.

For example, a proprietor may give his salesmen a Christmas bonus—but how about a small gift, perhaps a box of chocolates, for their wives, too?

Such little attentions have a way of spreading goodwill, too, among a wider circle. It's the kind of thing a wife will talk about to acquaintances. It all helps to build up that pleasant attitude to the shop itself which is such an important factor of good will.

# THEY'RE NEW...

## MODEL 551

A gay compact new Cossor 'Melody Portable' with a proved printed circuit. Four Cossor miniature valves; two wavebands, long and medium; 5in. moving coil speaker; internal Ferrodyne rod aerial; leatherette cabinet. In two-tone colour combinations of grey/black or tweed green/dark green. Weight: 6 lbs. with batteries.

**12½**

GNS.  
Tax Paid



# THEY'RE GAY...

## MODEL 552

Another new Cossor 'Portable'—slim, sleek and super-light. Proved Cossor printed circuit of extreme sensitivity; two wavebands, long/medium; four Cossor miniature valves; 5in. moving coil speaker; frame aerial incorporated in lid; leatherette cabinet. In two-tone combination coral/grey. Weight: 5½ lbs. with batteries.

**13½**

GNS.  
Tax Paid



# they're **COSSOR** of course!

Two more **Printed Circuit** 'Melody Portables'...

Cossor leadership in printed circuits brings you the big money-makers . . . and at the right time! These two new Cossor Portables are really 'going places' this summer: *they'll be going here, there and everywhere with every customer who wants lightest, brightest, most efficient portables ever made!* Write for particulars.

**-FOR  
BIG SALES  
NOW!**

COSSOR RADIO & TELEVISION LTD., COSSOR HOUSE, Highbury Grove, London, N.5.

T69

# The Dangers of Colour TV

"STOP ALL THE USELESS PROPAGANDA"

URGES C. O. STANLEY

A great deal is being said about colour television, and it is significant that both in this country and the U.S.A. optimism has slowly been giving way to caution and even pessimism. Many observers, studying the American colour TV scene, have found cause for criticism and anxiety, but few have taken the trouble to assess the impact (if that is the word) of colour television in terms of the entire U.S. radio industry and trade.

C. O. Stanley, chairman and managing director of Pye, has just done that. He recently returned from America where he spent some time trying to draw a conclusion on whether it was right for us in this country to abandon the 405-line system for colour in favour of 625 lines.

It is interesting to note that after he had been only two days in America, C.O. realised that the problem of 625 versus 405 lines was unimportant compared with the economic situation that has arisen in connection with colour television in the U.S.A.

In a forthright statement, pulling no punches, C.O. had this to say about TV and colour TV in America:

"Firstly, one soon observed that the profit margin on ordinary black and white television sets had completely disappeared. Admittedly there were one or two companies like Zenith and Magnavox still making profits, but in the main the bulk of the large companies had suffered in a most extraordinary fashion from the immense fall in values. A great many, such as Philco, Admiral and Emerson were being talked about as being in 'a very difficult situation.'

## Collapse of Market

"Undoubtedly the collapse of the market has been due to colour television. Americans have a habit of over-producing. The fall in margins on black and white television receivers is due to the incorrect handling of portable television sets, which started the rot, and this being followed by companies with multiple interests deciding to come out of television—firms such as Columbia, Raytheon, etc.

"Obviously they had to dispose of their stocks, which they did at very low prices and this quickly brought the price level of the standard black and white receiver down by as much as 25 per cent to 30 per cent. Immediately the big companies with very large stocks of standard black and white receivers were placed in an untenable position and they quickly threw their stocks on to the market as distressed merchandise.

## Colour TV

### Topics

by W. J. CLARKE, B.Sc.



"While this was going on R.C.A. was pumping everything it could into propaganda on colour television and its network outlet, N.B.C., was putting out three hours of colour programmes a day. The result was that intending purchasers, persuaded that colour television was just around the corner, would only buy the very cheapest black and white sets.

"Very quickly a new low level of about 160 dollars for a black and white receiver was established. It then became clear that in a short time the public would be prepared to pay only about 10 per cent for more for a colour television receiver than for a black and white one. Thus the price they were prepared to pay was under 200 dollars while the market price of a colour receiver was 500 dollars.

"A situation has now arisen in which there is virtually only one manufacturer in the market, R.C.A., which has made 102,000 colour sets in the last year. Three years ago Sarnoff budgeted for an annual production of colour receivers during this period of over 6 million.

## Severest Setback

"It is not necessary to go into detail to appreciate that this is the severest setback that the American television industry has ever had. After viewing the situation, undoubtedly the price of a receiver is the important factor—and the American public will almost certainly refuse to pay more than 300 dollars for a colour receiver whatever inducements it may be offered. However that is not the real answer.

"On investigation it appears that people on the colour television network



Many experiments in colour television have been and are being made in this country and elsewhere, but the biggest and most important experiment of all is taking place in the U.S.A., where colour TV has been launched, rightly or wrongly, as a functioning public service. Is American colour TV a success or a gigantic flop? What can we learn from America's mistakes? In this article we present conflicting views on this controversial and topical subject.

trying to receive compatible black and white pictures a long distance from the transmitter, disregarding the source, find the quality is bad (full of dots and distortions).

"In fact it has been so bad that affiliates have been forced to ask the network to stop sending out compatible colour, as it was affecting their audiences, while for some stations at a considerable distance from the network originator, reception of colour transmissions on a black and white set is so bad that the fringe area is practically completely removed.

"It is also quite clear that reception of the black and white transmissions on an existing colour set is very inferior.

"Another aspect has also entered into the colour problem and that is that the expectation of the standard of servicing required for the colour television receiver is far above the servicing capacity of the country.

"It has now become a hoary joke that the down-payment on a house-trained television development engineer, who is a vital accessory to the operation and maintenance of any colour television receiver in the home, is more than most families can manage.

"It is a serious lesson to our industry in this country to stop all the useless propaganda that goes out about colour television, and for the time being to regard colour as a laboratory secret."

★

## Optimism Unabated

It is perhaps to be expected that R.C.A., chief backers of U.S. colour TV, continue to express confident optimism in the future of colour. The chairman and president of R.C.A. made the following statement in his annual report to the shareholders of the company.

"Colour television continued to advance in 1956 with public interest stimulated by the R.C.A. Victor line of new and simplified 21-in. colour sets.

"Regular colour programming on N.B.C. was increased during the year and is being further increased in 1957.

More programmes should result in more sales of colour TV sets and stimulate growth of the industry.

"There is every indication that 1957 will bring increased activity in colour television—more colour programmes will be broadcast and more people will buy colour sets for their homes. Also, colour television will expand in many fields of usefulness in addition to broadcasting; for example, medical, industrial and educational TV as well as for closed-circuit theatre-TV, sales presentations, and inter-department store shopping.

"Expansion of colour television in 1956 increased the sale of R.C.A. colour transmitting and studio equipment. By the close of the year approximately 490 TV stations were on the air and 242 of them were equipped for network colour programming. Many of these stations were completely R.C.A.-equipped.

"Colour television is proving that it can provide greater and more interesting service to the public and develop into a profitable business for broadcasters, manufacturers, distributors and dealers and a rewarding medium for advertisers.

"R.C.A.'s goal for colour television in 1957 is to step up production and sale of colour sets, to increase the number of colour programmes on the air, to attract sponsors to the new medium, and to encourage others in the industry to enter the field."

★

## Objective View

While it is evident that there is no gloom or despondency in the R.C.A. house (at least, none that the shareholders can discern from the annual report), it is nevertheless a fact that colour TV is not selling in any appreciable amount. Independent confirmation of C. O. Stanley's views on this problem are given by William E. Evans, manager of the television laboratory at the Stanford Research Institute, California, in a recent address given to the Pacific Coast on Electronics of the Security Analysts of San Francisco.

Talking objectively about the entire television scene, Mr. Evans said:

"At the present state of the art, by no means all of the problems in obtaining consistently good colour pictures are in the receiver. Right now there is available in the San Francisco Bay area an average of only about 2½ hours of colour programmes per day.

### Highly Variable

"Unfortunately, they are highly variable in colour quality. Live network shows are usually excellent. Live

local shows often have almost as good colour, though understandably they are not as lavishly produced. Remote pickups are frequently not very good because present colour cameras are just too big to transport easily and too touchy to adjust in the field. Films and kinescope recordings, which are often annoyingly poor in monochrome, are usually closer to unbearable in colour.

### Growing Pains

"These are strictly temporary growing pains, however, not basic troubles. We can expect improved and more consistent quality from the live shows with improved cameras, and as more and more of the delicate control functions are taken over by automatic equipment.

"Video tape recorders are considered to hold the best promise for providing high-quality storage of colour television programmes. For those of us on the West Coast who are supplied with so many delayed telecasts of eastern shows, it will be a tremendous boon when someone comes out with a commercially practical colour tape recorder. R.C.A. and Ampex are currently vying for this particular prize.

"Predictions of when the American public is going to start buying colour receivers have been so in error that most of the experts have stopped guessing. It is no secret, however, that sales of the early 800 to 1,000 dollar colour receivers to the so-called "Cadillac trade" were way below the estimates and hopes of R.C.A., who have carried the lion's share of the merchandising load to date.

"The magic figure below which colour sets should be priced in order

to sell has long been predicted as 500 dollars. While at least three colour receivers have been available at just below 500 dollars since midsummer, this apparently has not greatly changed the sales rate. I believe it is far too early to label the whole effort a failure, as some people seem quite willing to do.

### Little Incentive

"Attaining the 500 dollar price has meant seriously trimming the dealer markup; and with a very real shortage of service technicians with enough skill and experience to properly set up colour sets even in their own showrooms, there has been little incentive to actively promote colour at the local dealer level—certainly not as long as monochrome sets keep moving. As a result, not many people know what the sets do cost these days.

### No Meteoric Rise

"I don't think one should look for a meteoric rise in colour sales to match our recent experience with monochrome. Bear in mind that black and white television was an entirely new medium; colour television is merely a premium product in an already established field.

"But with monochrome television rapidly approaching the saturation level, with many of the living room "first sets" nearing the replacement age, and with the tremendous added entertainment value of a good colour presentation, it seems to me foolish not to expect a very healthy growth of colour television in the next five years."

continued opposite

## MARCONI COLOUR TV VECTORSCOPE



This versatile test instrument has been produced by Marconi's Wireless Telegraph Co. Ltd. as an aid to the correct setting up of colour television coding systems of the N.T.S.C. type, and for the measurement of amplitude and phase relationship in a colour signal at any point in a television distribution system.

A further application lies in the monitoring of actual colour camera signals, since its display gives an objective indication of the hue and saturation of the colour components. It can thus help in matching the characteristics of colour cameras and prove useful as an aid to programme directors in choosing colours for costumes and backgrounds.

The use of the Vectorscope in colour television is analogous to that of the normal oscilloscope employed as a waveform monitor on black-and-white television.



## A Use for Colour

Whatever the prospects for colour TV as an entertainment medium, there is no denying its potentialities in other fields, particularly in its closed circuit applications.

Recent demonstrations at the Royal College of Surgeons in London showed how colour television can aid medical teaching. During the demonstrations, which were organised by Smith, Kline and French Laboratories, the London manufacturing chemists, surgical operations were televised in close-up from the operating theatre of St. Bartholomews Hospital and transmitted to a congress of British and French surgeons three-quarters of a mile away at the College.

The colour pictures were viewed on a large screen 8ft. by 6ft. A surgeon

commented: "I have seen this done in the United States. Colour gives great depth, almost three dimensional. It's beautiful."

The technique will enable hundreds of doctors, surgeons and medical students to observe in close detail operations that normally can, because of the limitation of space in operating theatres, be seen only by a few.

## Colour Vectorscope

The extensive amount of research work which is taking place into colour television techniques has underlined the need for specialist test equipment for use in that field.

To this end, Marconi's Wireless Telegraph Co. Ltd. have produced a new test instrument known as a *Vectorscope*, which is specially designed to

a 7in. speaker. The cabinet is of metal finished in dark grey lacquer, with a chrome plated escutcheon. Price 49gns. (tax paid).

## GRUNDIG ELECTRONIC MIXER UNIT

Grundig (Great Britain), Ltd.,  
Kidbrooke Park Road, London, S.E.3.  
Tel.: LEE Green 8541.

Latest addition to the range of Grundig accessories is an electronic mixer unit providing the facility for mixing up to three microphone inputs and one additional channel. A built-in pre-



Grundig electronic mixer unit, type GMU-3.

amplifier enables a total of four separate inputs to be independently mixed, and a magic eye recording level indicator ensures the correct degree of modulation.

The unit is mains operated and is to be known as the Grundig type GMU-3 electronic mixer unit. It is possible to use all past and present Grundig tape recorders with this mixer together with most high impedance microphones.

The GMU-3 will meet the wide demand for a mixer of this type providing the user with a means with which to give his tape recordings a final professional touch. Retail price 16gns.

display the chrominance component of the N.T.S.C. type of colour television signal. The instrument is illustrated on the facing page.

The chrominance information is carried on a sub-carrier which is modulated in amplitude, representing the colour saturation, and in phase, representing the hue. The display is presented on a cathode-ray tube, the radial distance of the spot from the centre indicating the amplitude modulation or saturation, while the phase or hue is displayed as the angle subtended from a fixed phase reference on the screen.

When used in conjunction with the colour bar test signal, the Vectorscope produces a pattern of bright dots corresponding to the tips of the various colour vectors and a pattern of lines corresponding to the transitions between the colours. "Boxes" indicating phase and amplitude tolerance limits are drawn on a transparent scale.

## JV RADIO BAND III TV CONVERTER

J.V. Radio and Television, Ltd., Brunswick Works, Brunswick Road, Cattedown, Plymouth. Tel.: Plymouth 64797.

THE company's range of Band III television equipment has been augmented by the addition of the JV Mark V converter. This is a single-channel 2-valve converter selling at the competitive price of 7gns. (£4 18s. trade). The unit is housed in a bronze-hammertone finished case, and can be fitted to the back of a television receiver.

This model does not replace the existing multi-channel converter marketed by the company, but is intended for the customer who needs a cheaper version of a 2-stage converter.

## EVER READY LEAKPROOF BATTERY

The Ever Ready Co. (Great Britain), Ltd., Hercules Place, Holloway, London, N.7.  
Tel.: ARChway 3030.

EVER READY have introduced a new 1½V leakproof battery, type LPU2, of similar inner physical construction to the standard U2, but having greater capacity. The outer leakproof jacket comprises a plated steel top and bottom cap and a laminated plastic sleeve, high-gloss vinyl-coated for added protection and improved finish. Price of the LPU2 cell is 10d., and it is available packed 12 to a carton, 144 to a fibre-board case.

## MY LADY CATHERINE

VIDOR announce an additional bright new colour combination for their portable radio *My Lady Catherine*. The new colour scheme is in Cambridge blue and light grey with primrose yellow scales and trim. The price remains unchanged at 11½gns.

(MORE BRAND NEW ON PAGE 254)



Continued  
from p. 236

Supplied with a 600ft. reel of tape, spare take-up reel and a sensitive crystal microphone, the instrument weighs 23lb. complete. There are facilities for mixing speech and music and for monitoring.

Dimensions: 15½ × 13 × 8in. Weight: 30lb. complete. Price 62gns. (tax free).

## Car Radio

Philips have also introduced what they claim to be the first a.m.-f.m. car radio to be launched in this country by a leading manufacturer. Known as Model X61V, the receiver employs seven valves and rectifier, and covers three wavebands—long, medium and f.m. Push buttons are used for station and waveband selection, and there is an outlet socket for operating the *Philishave* dry shaver.

A separate power supply unit is provided, and the set can be adapted for 6- or 12-volt operation. Output is via

## CORRECTION

Last month in describing the range of *Expert* high-fidelity sound equipment the prices of the units were inadvertently quoted as tax paid, whereas they were, in fact, list prices only. The correct breakdown prices of the units concerned are:

*Expert* master playing desk with Garrard 301 transcription motor—£56 10s. list plus £23 15s. 6d. tax; *Expert* standard model with Collaro transcription unit—£48 5s. list plus £20 6s. 1d. tax; *Expert* junior model with Collaro 4/564 unit and Studio "O" pickup—£20 list plus £8 8s. 4d. tax; *Expert* moving-coil pickup with diamond stylus—£11 5s. list plus £4 14s. 6d. tax.

**TELEVISION** sells television. How? It sets people talking. It is an interest, almost a hobby, which an increasing number of people are adopting. Whatever the situation, TV seems to fit in somewhere.

A mother took her children to London for the day recently. They were to see all the sights, including Buckingham Palace. While they stood outside, her small boy quivered with excitement. "Cor, look Mum," he called out, "A real Murraymint."

Excavations in Doncaster drew a crowd of onlookers. A small group pressed nearer as an expert brushed the soil from an almost perfect set of teeth in a well-preserved skull. Then someone in the back began to sing: "I wonder where the yellow went. . . ."

A young couple had owned a television set for some time, but had only received the BBC. They called in two electricians to convert the set for ITV. One man worked on the roof, fixing the aerial. He could talk to the man inside by means of a portable telephone. Their conversation confused their clients—until they saw their first evening's ITV programmes. "A little more Omo," the man inside would call out—"A little less Omo. . . ."

On April 30 the Independent Television Authority invited applications for a contractor to provide programmes for the first of its 1958 stations, on the Isle of Wight.

The station will be erected in Chiller-ton Down, and will extend ITA programmes to more than two million people in the South of England. The area will cover a rough half-circle, stretching along its base from Wey-mouth through Ventnor to Brighton, and reaching Newbury in the north.

It will be some time before the whole of Southern England is covered by ITV. Stations will be necessary in the south-west and south-east, and they are not expected to come into operation until 1959 or 1960.

The Authority expects to open the station in the late spring of next year. By then, their TV services will be available to some 40 million people— or 80 per cent of the total population of England.

At present there are about 3,300,000 ITA homes. The rate of increase is between 160,000 and 170,000 a month. If this is maintained, it is expected that ITA should reach nearly 5 million homes during next winter.

About 1-million Band III viewers enjoyed their "natural break" more than usual on a Saturday evening recently. At the end of the "64,000 question," a block of commercials was screened by ABC to their Lancashire, Yorkshire and Birmingham networks. Each region received a different block of spots.

## BAND III COMMENT

by TELLEX

### Television sells television

For Yorkshire the sound and vision were wrongly synchronised, with the result that viewers were exhorted to clean their teeth with sausages, give champagne to their cats and lubricate their cars with beer.

All the advertisers, who spent over £3,000 to advertise their products, were given another showing later in the week-end.

Says Howard Thomas, Managing Director of ABC: "I suppose a technical fault was inevitable sometime. We have to show 600 advertisements in a week end, over three different transmitters."

Independent Television companies seem to be quicker off the mark than the BBC. A-R's decision to introduce a schools' broadcasting service last December was followed up within five months. It began early in May, and seems to be having some success.

ABC beat the BBC, by a short head, to the 25 Alexander Korda films which will be seen in the autumn. They will be shown every Saturday from September 15, and each will last two hours. They include: *The Private Life of Henry VIII*, *Lady Hamilton*, *The Drum*, *The Shape of Things to Come* and *The Scarlet Pimpernel*.

All these were made by top-ranking directors, such as Rene Clair, Julien

Duvivier, Robert Flaherty and, of course, Sir Alexander Korda.

The use of film in television programmes is considerable, and cannot be ignored. There isn't enough time or material for the production of live shows. Sometimes programmes are specially filmed for television, or old cinema films are presented, such as the Korda series.

The general opinion seems to be that Independent TV companies present more than half their programmes on film. But this isn't true. Take ABC, who provide week-end viewing in the north and Midlands. An average Saturday has some six hours' live broadcasts, and four filmed. And the coming months should see more live programmes, with longer outside broadcasts on sport.

Similarly, a typical Sunday offers some five hours' live TV, in 9½ hours' viewing.

Granada, who provide weekday programmes in the north, reckon to put out about two-thirds of their material live, and Associated Rediffusion just over half. ATV give Midlanders more than three-quarters of their programmes live in the week, and two-thirds to Londoners over the week-end.

The BBC claims three-quarters live programmes, stating that they never exceed 25 per cent filmed material, and most weeks have far less. At a time when critics deplore and TV officials apologise for the use of film, this should be one mark up to the BBC. But, in fact, a glance at the viewing figures will show that the masses continue to show a marked preference for commercial TV. Which proves what?

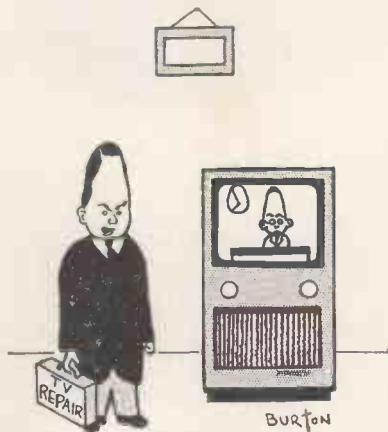
As a rule advertising rates drop during the summer months. This applies to the press, cinema, radio and—in America—very forcefully to television.

In this country, TV does not need to consider any adjustment, because the market is still expanding rapidly. Current estimates reveal an expectation of good audience ratings. Why? Retailers continue to sell TV sets in encouraging numbers; each month sees more sets converted to Band III; and a new station in Scotland opens at the end of August.

Associated Television have been studying the question of summer viewing. Their survey shows that spending does not stop in the summer and thus justify curtailment of advertising. On the contrary, the July-September quarter of the year shows higher retail expenditure than any other quarter except the fourth, which includes Christmas.

Like ATV, Associated Rediffusion maintain that "every day in summer is a shopping day."

For Londoners' weekday entertainment they are presenting at least 12 new shows this summer.



"Well—what's wrong with the picture . . .?"

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| 88/9<br>★ 99/12  | "Continental"<br>.. | 5 3/4" dia.<br>.. | 850'<br>1200'  | 1. 8.0<br>1.15.0 |
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This aerial means new, profitable over-the-counter sales without the problems of installation and maintenance.

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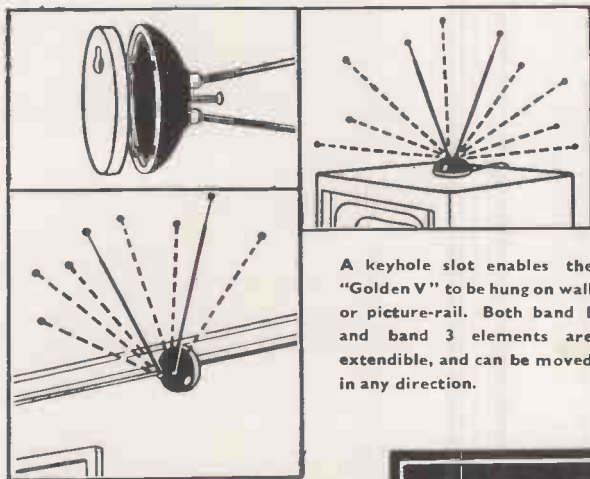
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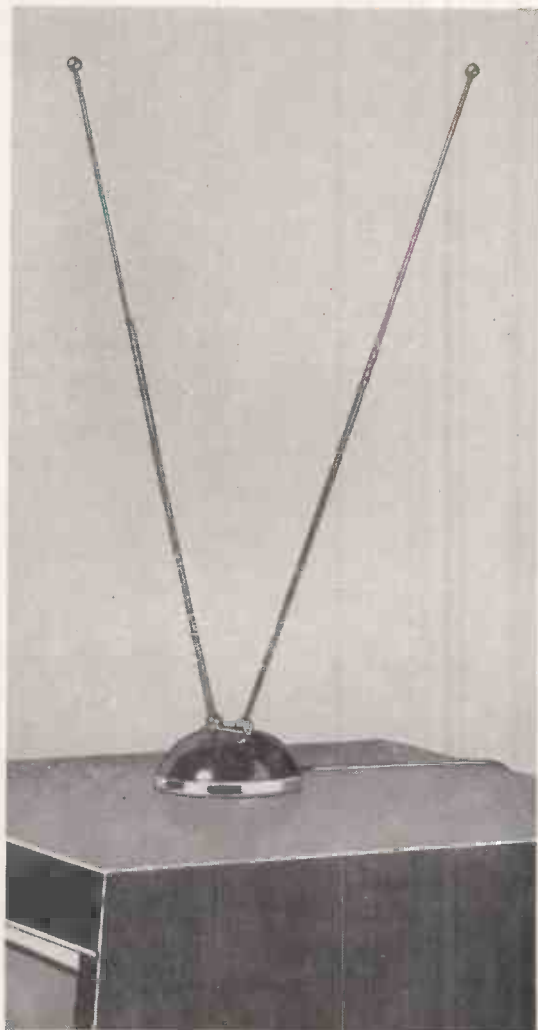
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# V

### for BBC/ITV



A keyhole slot enables the "Golden V" to be hung on wall or picture-rail. Both band 1 and band 3 elements are extendible, and can be moved in any direction.



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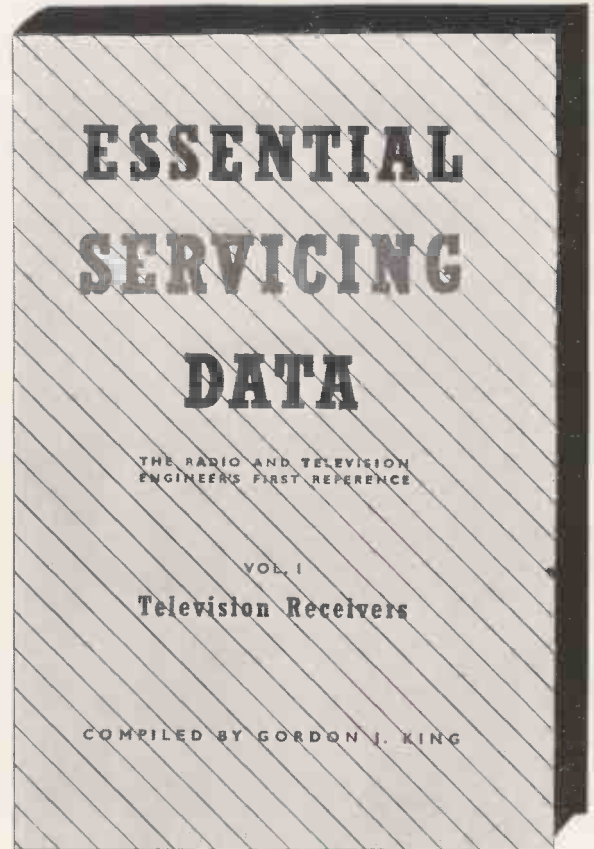
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Please send me.....copy/ies of ESD, Vol. I, for which I enclose a cheque/P.O. for £..... I am a *bona fide* member of the radio trade.

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PHILCOmatic Television, with its FULL Fringe Performance and spectacular technical features, is now available in an elegantly contemporary table cabinet. Let your customers see PHILCOmatic TV in action and they'll choose it first time on its peak performance, outstanding appearance, and sheer compelling value. It's a certain sales-success!

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**PHILCO** range  
of latest designs –  
greatest value . . .

The most complete line in the industry will create a sales sensation throughout the country. Watch out for the latest in TV . . . Radio . . . Record Players . . . they'll be PHILCO.

**Intensive large-scale  
National and  
Provincial Advertising**

and local co-operative campaigns will tell everyone about the PHILCO range and the service you can give them as a PHILCO Dealer. Link up with this advertising — look to your PHILCO stocks and ask for showcards and leaflets. There's big business ahead for the PHILCO big-business Dealer.

# This is the new



This is truly "technicians' television"—engineered not only for unprecedented sales success but to meet with *your* expert approval. Brilliant picture and sound quality, the absolute minimum of 'knob-twiddling' and unmatched reliability for the viewer; minimum maintenance, simple servicing, first-class sales-figures and infinite goodwill for you! *And these are beliefs which RGD is to back and back heavily.*

**67gns** TAX PAID  
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- 17" True-dimensional Mullard Electrostatic Radiant Screen cathode ray tube for dramatic depth and detail
- Turret tuner with close control of picture 'noise'
- Automatic picture control—all-area anti-fade device
- In-built automatic focusing
- Automatic vision and sound interference suppression
- Improved all-angle picture quality
- 14 valves, 3 semi-conductors—24 functions in all
- Craftsman-built Continental-style cabinet finished with hand-selected veneers



# Deep Seventeen

*Into this set—basic price only 67 gns. tax paid—RGD have built technical selling features found, if at all, only in far more expensive sets.*

*What has been built around the “Deep-Seventeen” is of even greater significance.*

*It is a new conception of the dealer-manufacturer relationship . . .*

**R·G·D**

— and this is the

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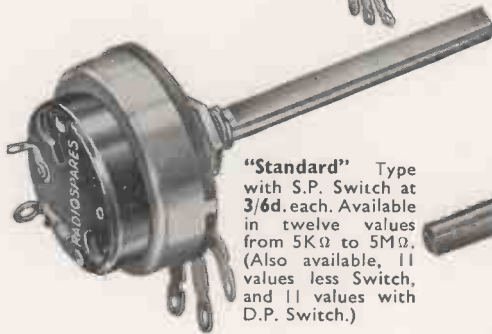
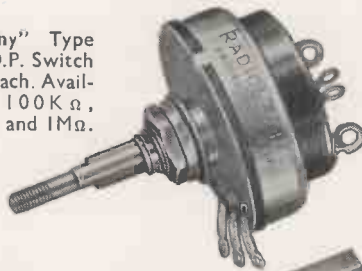
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# Financial Review of the Industry

★ A SURVEY OF  
FINANCIAL PROGRESS  
IN THE RADIO AND  
TELEVISION INDUSTRY  
by  
M. DUFFY

## T.C.C.

THE 24th annual general meeting of The Telegraph Condenser Co. Ltd. reviewed business for the financial year ending December 31, 1956. The chairman recalled the prediction of the previous year that there was little likelihood of the record results for 1955 being repeated, and pointed out that this forecast had been correct as trading profits had fallen from £595,700 to a little over £460,000.

He considered, however, that these results could not be considered unsatisfactory in view of the effect of hire purchase restrictions on domestic electronic devices, and increased manufacturing costs which had not been passed on to customers.

He reported that during 1956 the completion of additional manufacturing facilities at the Bathgate factory had enabled the management to expand the production of certain of the company's products, and to relieve the congestion which existed in some of the older workshops. Except for a few months during the summer, the productive capacity at both the Acton and the Bathgate factories had been fully employed.

On the export side, although the company had suffered a small overall reduction in turnover during 1956, it was gratifying to note that the demand for their products in overseas markets did not suffer to any appreciable extent. The company was described as being well represented in these markets, and there was every reason to hope that they would maintain their turnover in spite of intense competition.

In this connection it was stated that since the end of the financial year they had entered into arrangements to commence the manufacture of certain types of capacitors in Canada, for the purpose of supplementing the range which they presently exported to that country, and of improving their service to their customers.

Looking forward to the current year the chairman said that they had started it with a reasonably satisfactory order-book, in spite of the setbacks which industry had suffered as a result of current economic conditions and events arising from the situation in the Middle East. Second, there was no cause to be dissatisfied with the volume of business transacted during the opening months.

The outlook, however, was regarded with considerable caution. It was anticipated, therefore, that shareholders

would not expect them to do more than express the view that there were good prospects of a reasonable year's trading provided that the situation did not deteriorate either at home or overseas.

## PLESSEY

About the same time, the Plessey Co. Ltd. and the Philco Corporation of America announced that they had jointly formed Semiconductors Ltd. It was stated that the new company, which was expected to begin production of transistors early in 1958, would manufacture, under Philco patents, a similar range of transistors to that developed in Philco's research laboratories in the U.S.A. The new concern was to have an initial paid-up capital of £500,000, 51 per cent of this total to be held by Plessey and 49 per cent by Philco.

Market circles recalled that trading profits for the Plessey Co. had been steadily on the upgrade for some years past, the figure for the financial year ending June 30, 1956, having been returned as the new high level of £1,958,000 against £1,890,000 for 1955. General reserve in the consolidated balance sheets for 1956 was returned as the appreciable total of £1,785,000, creditors as £2,000,000, debtors as about £2,500,000 and stocks and work as some £3,975,000. First registered in 1925, the concern did not become public until 1937.

It was also recalled that the Philco Corporation dated back much farther, having been incorporated as the Helios Electric Company in 1892, but that at present it operates a total of twenty-six manufacturing plants with a total capacity of 6,100,000 square feet of floor space; further, that it now has eleven subsidiaries, these consisting of distributing, finance and service companies, in various parts of the U.S.A., and in Britain, Brazil, Mexico and Colombia.

In April of the current year the stockholders voted to increase the authorised debt limit from 25,000,000 to 50,000,000 dollars. Some comment also centred round the 1956 net sales figure of 347,900,000 dollars against 373,300,000 for 1955.

## MULLARD

About the same time it was also rumoured that the shares of Mullard, the English subsidiary of the Philips Incandescent Lamp Works Holding Co., Eindhoven, Holland, might be offered to the public. The latter company was

registered in 1920 in the Netherlands. Net profits for some years past have been steadily increasing.

The company was formed to keep the control of the operating company in Dutch hands by the acquisition of a majority of preference and ordinary shares. The holding company's priority shares can only be held or controlled by Dutch nationals.

The official statement for 1956, which was issued in May of 1957, reported that nearly all divisions of the company had contributed to the profit increase, but that the rise in the sales of television sets and associated products had been particularly steep. Exports from the Netherlands rose 14 per cent over those for 1955, attaining an index of 264 compared with a level of 100 in 1950. Exports to European countries rose by 10 per cent and those to countries overseas by 21 per cent.

## EVER READY

The annual report of Ever Ready (Ireland) Ltd. for the financial year ending March 31, 1957, quoted a trading profit £21,200 against £14,500. This, in turn, compared with £24,800 for 1955 and £34,400 for 1954 (the latter figure was a new high level). The chairman stated that in recent months the cost of one of their chief raw materials had advanced considerably, and was causing the directors a good deal of concern. They hoped, however, that savings anticipated to result from improved methods of manufacture would offset the increased cost of raw materials.

## DECCA

The Decca Record Co. came into the news as a result of the announcement that they would, as from May 1 last, issue in Britain new gramophone recordings by the American RCA group. The initial releases will for the first time in this country bear the RCA label. It was also stated that since 1901 the RCA American recordings have been issued in this country under the HMV label, and that E.M.I. retain the right, for twelve months, to issue recordings made prior to May, after which time Decca will acquire to the entire catalogue.

## BSR

A further step forward in the financial history of the industry was taken when Birmingham Sound Reproducers Ltd., makers of *Monarch* record changer, were converted into a public company, with application made to the London and Birmingham Stock Exchanges for a quotation in the £500,000 worth of 5s. Ordinary shares, the only class of capital, neither the company or any of its subsidiaries having any mortgages, debentures or other loan capital outstanding.

(continued overleaf)

## Financial Review

— continued

This concern was first incorporated as a private company in October, 1932, to acquire from Dr. D. McLean McDonald the business of manufacturing electronic equipment founded by him in 1932 at Blackheath, near Birmingham.

The principal activity of the company since 1952 has been the manufacture of automatic record changers, gramophone units and gramophone pick-ups. The company's output is supplied mainly to the leading manufacturers of radiograms, record players, and other sound reproducing equipment for incorporation into their products.

Of the company's current production, approximately 37 per cent is sold to U.K. manufacturers, a further 45 per cent is exported to the U.S.A. and Canada, and the balance is exported to other countries, including Western Germany, South Africa, the Benelux countries, France and Italy.

In each year since 1952, the com-

pany's production of record changers has substantially increased and its programme for 1957 provides for an increase in output of some 50 per cent compared with that for 1956. The directors are satisfied that this increased production will be fully absorbed by the BSR's customers.

A new plant has commenced production of a four-speed single record player for which it is anticipated that there will be a considerable demand for incorporation in lower-priced record playing equipment.

The company's subsidiaries include B.S.R. (Australia) Proprietary Ltd., incorporated in Australia, Discus International Ltd., incorporated in Bermuda, Discus Corporation, incorporated in Illinois, U.S.A., The Discus Corporation incorporated in New York, U.S.A., B.S.R. Ulster Ltd., incorporated in Northern Ireland and Discus Ltd., incorporated in Canada, this latter being in voluntary liquidation.

Mass production of automatic record changers is carried on in a factory of about 85,500 sq. ft. at Lone Moor Road, Londonderry, Northern Ireland, which is rented from the Ministry of Commerce on two leases expiring in March 1972 at an aggregate rental of £2,450 per

annum, subject to revision on April 1, 1961.

Combined profits, after depreciation, for 1956 were returned as a little over £386,000. This was the highest point in a steadily firming trend which began in 1949 when the corresponding figure was some £23,400. The directors recently stated that on the basis of the trading results for the first four months of the current financial year, and the present state of the order book, they were of the opinion that, subject to unforeseen circumstances, the profits will not be less than £350,000 for the financial year ending December 31, 1957.

The company is under the chairmanship of Dr. Daniel McLean McDonald who started the firm with £301 in 1932. Ten years later he qualified as a doctor but never practised medicine, already having an engineering degree.

The business has become the second biggest maker of record auto-changers in the world, and could sell fifty per cent more than its total production in America alone. The news that the shares of this company were being made available to the public was noticed by a leading City commentator under the title: *Just What the Doctor Ordered.*



Continued  
from p. 243

### NEW MULLARD AUDIO PENTODE

Mullard, Ltd., Mullard House,  
Torrington Place, London, W.C.1.  
Tel.: LANgham 6633.

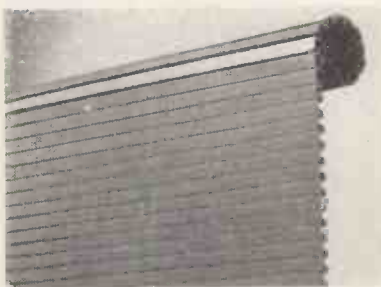
THE Mullard UF86 is a low-hum, low-microphony pentode with a heater rating of 12.6 volts at 100mA. Its characteristics are virtually identical with those of the *World Series* pentode type EF86. Used in circuit with other Mullard 100mA valves it makes possible the design of compact, economical a.c.-d.c. equipments having signal-to-noise ratios approaching those of the best a.c. equipments.

For example, a UF86 feeding two UCL82 triode-pentodes, and with a UY85 half-wave rectifier, would form the basis of an inexpensive push-pull amplifier giving a sensitivity of 10mV for 7 watts output at a low distortion level, and a signal-to-noise ration of 55db.

### PLASTIC ROLLER SHUTTER

National Plastics (Sales), Ltd., Avenue  
Works, Walthamstow Ave., London, E.A.  
Tel.: LARKSwood 2323.

ILLUSTRATED is a plastic roller shutter recently introduced by the above company. The shuttering is



The National Plastics flexible  
roller shutter.

extruded in u.p.v.c. (unplasticised polyvinyl chloride) which is comparatively inexpensive and has a wide range of colours. The shutters are already available in  $\frac{1}{2}$ in. slats, and are suitable for a wide range of applications, such as radio and TV sets, cabinet doors, roll tops, etc., and the pastel colouring is particularly suitable for kitchens, bathrooms and nursery use.

Wider slats,  $\frac{3}{4}$ in. and 1in., are already in course of tooling up and will be available later for other applications.

### EMI TRANSPORTABLE PROFESSIONAL RECORDER

E.M.I. Sales and Service, Ltd.,  
Hayes, Middx.

Tel.: SOUTHall 2468.

THE introduction is announced of the new E.M.I. Model TR51 professional tape recorder, which follows on the well-known TR50 Model widely

used by broadcasting authorities and recording companies. The TR51 incorporates new features giving improved response and monitoring facilities. It is housed in one compact rexine-covered wooden carrying case, and with the lid open the tape deck, control panel and sockets for external connection are readily accessible.

It is designed as a two-speed instrument in four versions: TR51A—full track at 15 or  $7\frac{1}{2}$ in./sec.; TR51B—full track at  $7\frac{1}{2}$  or  $3\frac{3}{4}$ in./sec.; TR51C—half-track at 15 or  $7\frac{1}{2}$ in./sec.; and TR51D—half-track at  $7\frac{1}{2}$  or  $3\frac{3}{4}$ in./sec.

The equipment is mounted as a single assembly in a metal frame which can easily be withdrawn from the carrying case for servicing purposes.

Overall frequency response (referred to 1 kc/s) is: at 15in./sec. within  $\pm 2$ db from 50 c/s to 15kc/s; at  $7\frac{1}{2}$ in./sec. within  $\pm 2$ db from 50 c/s to 10 kc/s; and at  $3\frac{3}{4}$ in./sec. within 2db from 50 c/s to 7 kc/s.

The lid of the case is detachable and permits the use of the new 8 $\frac{1}{2}$ in. spool, as well as the standard 5 and 7in. spools.

### EVER READY WALL CHART

NOW available from The Ever Ready Co. (Great Britain), Ltd., is their 1957 price list covering their comprehensive range of dry batteries for portable radio receivers, torches, cycle and pocket lamps, hearing aids, as also for electronic and photoflash equipment.

An added feature this year is the range of *Batrymax* power pack batteries which have been developed for transistorised radio receivers and record reproducers.

This clearly visible wall chart is printed in three colours and also carries an up-to-date battery replacement list. Supplies are now available from all Ever Ready Depots.



# POWERFLEX PACKS PUNCH

Powerflex is the new Grampian reflex horn incorporating the well-known SP.25 driver unit, made to be *heard*—distinctly—over the noisiest background. The unit is constructed from the best quality aluminium, it is compact, sturdy and completely proof against weather and corrosion. Guaranteed lasting performance under the most adverse conditions. With steel mounting bracket incorporating the new Grampian "Ever-lock" holding device.

The Powerflex horn may be supplied separately from the SP.25 driver unit and is also suitable for use with the SP.1 unit.

## TECHNICAL DATA

Low frequency cut-off—  
160 c.p.s.  
Air column 40in.  
Dispersion 85 degrees  
Horn diameter 19½in.  
Length 15in.  
Weight (nett) 6 lb.  
Thread Sizes: To suit driver units SP.1 and SP.25/1 (or SP.25A to order).

### Complete

with SP.25 driver unit **£15-0-0**

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| 1T4 ... 7/-  | 7B7 ... 8/-     | EABC80 ... 7/6 | KTW61 ... 6/6     |
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| 3Q5 ... 9/6  | 7C6 ... 8/-     | EB91 ... 6/6   | PCC84 ... 8/-     |
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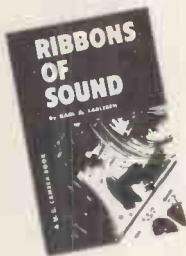
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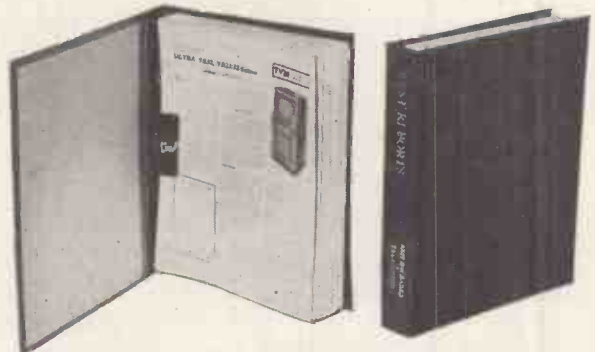
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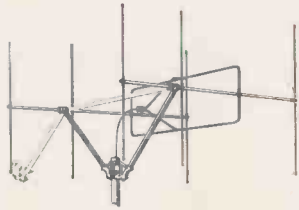
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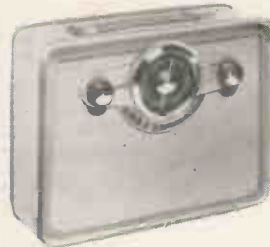


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