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

Vol. X No. 6 OCTOBER, 1955 By subscription only, £1 a year post free

Model

UNIVERSAL AVOMETER

20,000 ohms per volt *plus* AUTOMATIC Overload Protection

Produced in response to a demand for a high sensitivity version of the world-famous Universal AvoMeter, this model incorporates the traditional design features of its predecessors, so highly valued for simplicity of operation and compact portability.

It has a sensitivity of 20,000 ohms per volt on all D.C. voltage ranges and 1,000 ohms per volt on A.C. ranges from 100V. upwards. A decibel scale is provided for audio frequency tests. In addition, a press button has been incorporated which reverses the direction of current through the moving coil, and thus obviates the inconvenience of changing over test leads when the current direction reverses. It also simplifies the testing of potentials, both positive and negative, about a common reference point. A wide range of resistance measurements can be made using internal batteries, separate zero adjustment being provided for each range.

Size $8\frac{1}{8}'' \times 7\frac{1}{4}'' \times 4\frac{1}{2}''$
Weight $6\frac{1}{2}$ lbs. (including leads)

£23 : 10s.

The following accessories are available to widen still further the ranges of the instrument:—A Resistance Range Extension Unit to extend the limits of measurement from 0.025 ohm to 200MΩ a 10kV D.C. multiplier and a number of A.C. current transformers.

It is of importance to note that this model incorporates the "AVO" automatic cut-out for protection against inadvertent overloads.

D.C. VOLTAGE	D.C. CURRENT	A.C. VOLTAGE
2.5V.	50μA.	2.5V.
10V.	250μA.	10V.
25V.	1mA.	25V.
100V.	10mA.	100V.
250V.	100mA.	250V.
1,000V.	1A.	1,000V.
2,500V.	10A.	2,500V.

A.C. CURRENT	RESISTANCE	
100mA.	*First indication* 0.5Ω.	
1A.	*Maximum indication* 20MΩ.	
2.5A.	0—2,000Ω	using internal batteries.
10A.	0—200,000Ω	using internal batteries.
—	0—20MΩ	using internal batteries.
—		using external batteries.
—	0—200MΩ	using external batteries.

THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO. LTD.

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

AVOCET

A8/1

Three *money-making stars* from the

☆ DECCA range ☆

★ DECCA MODEL 66 four-waveband table radio receiver

A de-luxe radio receiver designed and built to an ideal. A high grade amplifier together with two speakers and separate bass and treble controls ensures that full justice is done to the superb quality of V.H.F.-F.M. transmissions (B.B.C. Home, Light and Third), and that the very best reproduction of long, medium and short wave A.M. transmissions is achieved. In addition, the handsome, walnut finished cabinet makes the set a piece of furniture which will enhance the appearance of any room.
Power Output—3 watts. *Mains Supply*—100-125 or 200-250 volts, A.C. only, 50 cycles. *Total Consumption*—60 watts. *Pick-up Input*—suitable for crystal pick-up. *Dimensions*—16″ high by 20″ wide by 9″ deep.
Price **39 gns.** (Tax paid).

★ DECCA MODEL DMC/D18
Console television receiver with VHF-FM

This de-luxe television receiver, elegantly presented in a bow-fronted console, finished in selected walnut, has full length doors to cover the 17-inch screen when it is not in use. Decca TV is noted for offering the highest all-round standard on every point of performance; the DMC/D18 has the added attraction of a V.H.F.-F.M. radio unit. Three positions on the 12-position turret tuning switch are pre-set for the B.B.C.'s Home, Light and Third F.M. transmissions, one position is spare, and 8 channels are therefore left for TV. There is a 10-inch P.M. speaker, and the set also has automatic anti-fade control.
Mains Supply—200-250 volts, A.C., 50 cycles; or 200-250 volts, D.C.
Dimensions—35″ high by 23″ wide by 20″ deep.
Price **108 gns.** (Tax paid).

★ DECCA MODEL RG103 four-waveband console radiogramophone

As well as normal long, medium and short wavebands, this model has a tuner for the reception of the B.B.C.'s Home, Light and Third transmissions on V.H.F.-F.M. The record playing equipment comprises a Garrard triple-speed auto-changer with a capacity of up to 10 records of any one size and speed; and Decca ffrr interchangeable magnetic pick-up heads with sapphire styli. Really first class reproduction from all these sources is assured by the high fidelity 5-valve audio push-pull amplifier with separate bass and treble controls, feeding one 10-inch P.M. and two electrostatic speakers. The well-proportioned bow-fronted cabinet is finished in hand polished walnut, and incorporates two record storage compartments with a total capacity of over 100 records.
Power Output—6 watts. *Mains Supply*—100-125 or 200-250 volts, A.C. only, 50 cycles. *Total Consumption*—100 watts. *Dimensions*—33″ high by 34¾″ wide by 18″ deep.
Price **102 gns.** (Tax paid).

All these models have VHF-FM radio

Hire purchase terms over 12, 18 or 24 months are available on all Decca models.

DECCA RADIO AND TELEVISION

1-3 BRIXTON ROAD, LONDON, S.W.9

HIGH FIDELITY plus HIGH VERSATILITY

Behind the new RCA High-Fidelity Amplifier stands over a quarter of a century's skill and experience in designing professional sound reproducing equipment. This Amplifier includes several exclusive features entirely new to audio engineering, thus making it many years ahead of its time both in design and construction.

The resulting performance will be found to give a new meaning to high-fidelity reception and a new realism to recorded music.

The RCA High-Fidelity Amplifier can be incorporated successfully into any existing home audio system. The versatility of its input and output facilities coupled with the wide measure of control afforded by the Pre-Amplifier means that it can be used in conjunction with most high quality audio equipment.

RCA High Fidelity

RCA PHOTOPHONE LIMITED

An Associate Company of Radio Corporation of America

LINCOLN WAY, WINDMILL ROAD,

SUNBURY-ON-THAMES, MIDDLESEX.

PRE-AMPLIFIER

Inputs—*Magnetic Pick-up.* B.78. 16 mv input for rated output. 300 c/s Turnover 6 DB Roll-off at 10 kc/s. A.78. 14 mv input for rated output. 500 c/s Turnover. 16 DB Roll-off at 10 K c/s. L.P. 13.5 mv input for rated output. 500 c/s Turnover. 12 DB Roll-off at 10 K c/s. Flattened LF at 50 c/s to + 13 DB. R.I.A.A. 11.5 mv input for rated output. 500 c/s Turnover. 14 DB Roll-off at 10 Kc/s. 3 DB Flattening at 50 c/s. *Crystal Pick-up* .35 volt with inbuilt equalisation from constant amplitude to constant velocity output enabling switched replaying characteristics to be accurately employed. *Radio/Tape* High Level 200 mv. Flat characteristic. Low Level 50 mv. Flat characteristic. *Microphone* 6.5 mv for rated output. Flat characteristic. *Mixer* Facilities for microphone input with radio/tape/gramo inputs. **Output.** 1.2 volts from cathode follower stage. **Tape Recording Output.** 1.2 volts cathode follower independent of monitoring. **Bass & Treble.** Plus and minus 14 DB at 50 c/s and 10,000 c/s. **Volume.** Twin ganged control giving correct gradation. **Low-Pass Filter.** Switched 10 K c/s, 7 K c/s, 5 K c/s and Flat. **High-Pass Filter.** Inbuilt attenuating below 20 c/s. **Filter Slope.** Variable to 35 DB per octave. **Power Requirements.** 375 v/7 ma. 6.3 v. 1 amp.

MAIN AMPLIFIER

Output. 12 watts rated. Peak in excess of 20 watts over 25-20,000 c/s. **Distortion.** Total harmonic less than .1% at 10 watts—700 cycles. **Noise Level.** 85 DB below rated output. **Damping Factor.** Variable from positive to negative values. **Frequency Response.** Within 0.2 DB 20—25,000 c/s. ±0.5 DB 10—60,000 c/s. **Feedback.** 40 DB total. **Output Impedances.** 4 ohms, 7 ohms. 15 ohms. **Input Voltage.** 1.2 v for rated output. **Ancillary Power Supplies.** 375 volts 45 milliamps, 6.3 volts 2.5 amps available for VHF Tuner, Pre-amplifier and Tape Reproducer amplifier. **Power Consumption.** 130 VA at full load. AC input 100/150 and 200/250 volts.

Price £48 0 0 complete

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

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

TWO TYPES AVAILABLE

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

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

200-250 v. A.C.

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

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- **N.E. ENGLAND.** Robert Hardman Ltd., 3 Queen Square, Leeds, 2.
- **NOTTS.** Robert Hardman Ltd., 3 Queen Square, Leeds, 2. Mansfield Factors (Electrical Supplies) Ltd., 50 Stockwell Gate, Mansfield.
- **LINCS.** Mansfield Factors (Electrical Supplies) Ltd., 50 Stockwell Gate, Mansfield.
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- **BEDS., BERKS., BUCKS., ESSEX (except S.W.), HERTS., HUNTS., E. OXON** Thompson Dizmond & Butcher Ltd., 5/9 University Street, London, W.C.1.
- **KENT.** H. E. Kettle Ltd., Knightrider Street, Maidstone.
- **SURREY AND SUSSEX.** John Street Manufacturers Ltd., 88 Springbank Road, Hither Green, London, S.E.13.
- **S. & W. ENGLAND.** Robshaw Brothers Ltd., 105 Commercial Road, Bournemouth.
- **REMAINDER OF ENGLAND.** Radio & Electrical Mantel Co. Ltd., Felgate House, Studland Street, Hammersmith, London, W.6
- **WALES.** Electrical Wholesalers (Shropshire) Ltd., Alexandra Road, Wellington, Shropshire.
- **CHANNEL ISLANDS.** Robshaw Brothers Ltd., 105 Commercial Road, Bournemouth.
- **SCOTLAND.** Bryterlite Electrical Co. (Glasgow) Ltd., 39-43 Robertson Street, Glasgow, C.2.
- **N. IRELAND.** Bryterlite Electrical Co. (Belfast) Ltd., 11 College Square North, Belfast.

10

McCarthy radio

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

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THERMIONIC VALVE & CATHODE RAY TUBE

FOR TELEVISION, RADIO, & INDUSTRIAL SCIENTIFIC APPLICATION

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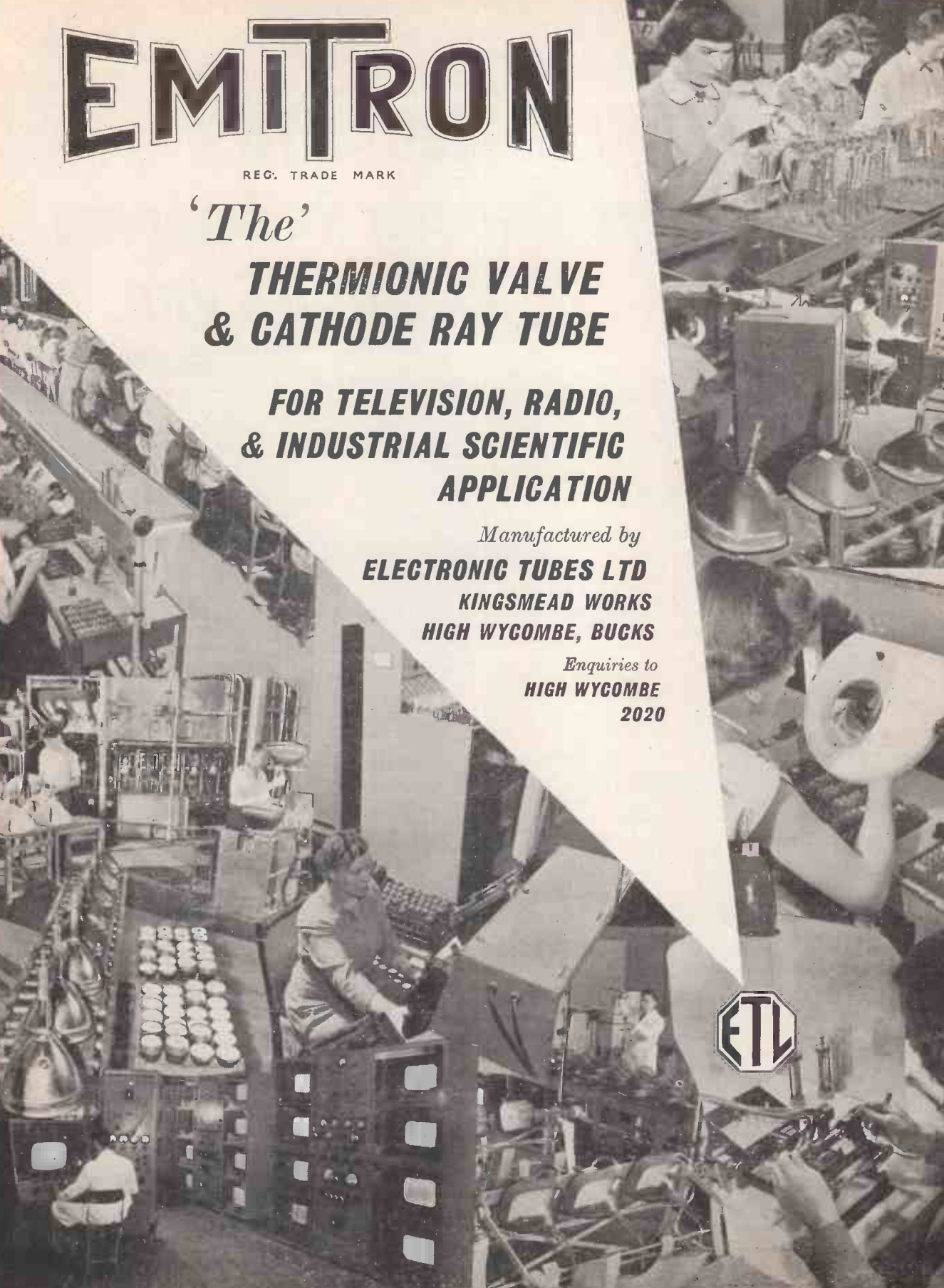

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In this issue:

Tele-opinion

WE SAY WELCOME TO THE ITA AND LONG LIVE THE BBC AND TO DEALERS IN THE TWO-PROGRAMME AREAS—

Sell a Second Set

CASTING a comparative eye over the programmes we have already seen on Commercial I.T.A. and Competitive B.B.C., and keeping in mind the shape of things to come in both spheres of TV entertainment, one thing becomes obvious—that there's likely to be some feudin' and fightin' in many thousands of viewing homes. The programme contractors of the I.T.A. have plenty to offer—but so have the B.B.C. What happens when members of the same family can't agree as to which programme they want to watch?

In the U.S.A. things are even worse. In New York, for instance, where there are seven stations on the air, the problem of programme choice is not only difficult—it is also dangerous, domestically speaking. When father wants to watch boxing and mother wants to see a film and junior wants to see Davy Crockett (or Superman) at one and the same time, then family relationships can become rather strained.

The solution is simple enough. Where there is a multiplicity of TV transmissions there is need for a multiplicity of sets. In other words, many families are going to find that they need an additional TV receiver to satisfy the viewing requirements of the household.

Thousands of American homes do, in fact, have more than one set. This is not necessarily ostentation, or the American Way of Life, or anything so subtle. It is simply a common-sense approach to the problem of preserving domestic harmony in this obsessive television age.

There are two ways in which the dealer can turn this interesting situation to his own advantage. First (and this applies particularly to dealers outside the London I.T.A. service area), people whose Band I sets are too old to be economically adapted for Band III reception may be persuaded to buy an additional two-band receiver. The time may come when they will need *both* programmes rather than a choice of either.

Second, in all areas dealers should not overlook the fact that, particularly among their wealthier customers, there may be a good selling market for a second set. Many people simply have not thought of it, and a word at the right time may start a train of thought resulting eventually in a TV sale.

This may represent only a small outlet for additional retail sales, but even so it should not be overlooked. During the next few years several thousand homes in this country will have more than one TV receiver, and the live dealer will make sure that he gets his share of those extra sales.

I.T.A. SALES LIFT

In spite of the credit squeeze and tighter hire-purchase control there is every reason to believe that Commercial TV will act as a stimulus to TV selling not only in the London area but throughout the country. It is too early yet to analyse the trend, but with interest in Band III programmes reaching a new peak much of the inertia that has typified public reaction to the new TV during recent months will be neutralised.

Dealers should make a point of familiarising themselves with the programme features of the AR-TV and ABC services, because in the long run it is programme content that sells TV. The functional aspect of television is the best selling angle of all.

Or, to put it another way, if existing Band III viewers love Lucy, then sooner or later everyone will want to love Lucy. And that kind of basic psychology boosts TV turnover.

SCOTTISH PROSPECTS

The I.T.A. are to be congratulated on the energetic and decisive manner in which they are tackling the tremendous problem of getting Commercial TV to the viewing public throughout Britain in the shortest possible time. With the Midlands and the North lined up for early next year, the Authority are now turning their attention to Scotland.

It is expected that a Scottish Independent TV service will be in operation by the spring of 1957. It has yet to be decided whether there will be one or two transmitters to cover the country.

Meanwhile the I.T.A. are expected soon to advertise for programme contractors to produce television programmes for the Scottish station.

I.T.A. COLOUR TV

The present I.T.A. station at Croydon will eventually be replaced by a permanent station in about two years time. It is likely that the temporary transmitter will then be used for colour television tests. Meanwhile the B.B.C. are continuing their research into colour transmission, and are expected to make further tests this month.

GOOD SHOW!

Once again it was a good Radio Show, despite the two lost days. And once again we were pleased to meet readers of B.R.T and exchange views and opinions. Those of you who came to Earls Court will recognise our stand in the picture, which was a focal point for visiting dealers and engineers.

SEE YOU AGAIN NEXT YEAR.

ROUND-UP OF THE MONTH'S NEWS AND VIEWS

Thorn Electrical to make TV Picture Tubes

THORN Electrical Industries, Ltd., acting in conjunction with Sylvania Electric Products, Ltd., of U.S.A., are to manufacture television picture tubes in a new factory now being built at Enfield. Cost of the tubes is expected to be about one-third less than that of existing types.

This was announced at a recent press conference in London by Jules Thorn, chairman of Thorn Electrical Industries, and Don G. Mitchell, president of Sylvania Products, Inc.

The new factory, the foundations of which have already been laid, will be ready towards the end of next year. Initially, a fully automatic production line for 21in. tubes will be installed similar to that used by Sylvania in America which is claimed to be the only one of its kind in the world.

Thorn's chief designer is currently in the U.S.A. studying plans for equipment, most of which will be built and assembled over here. When the new factory comes into operation the initial annual production of 21in. tubes is expected to be half-a-million.

Meanwhile, a new company is being formed in which Thorn and Sylvania have an equal holding. The company will not be a member of the B.V.A. The final price of the tubes will depend on production costs, but is expected to be about two-thirds of the cost of current tubes of equivalent types in this country.

Three markets for the Thorn-Sylvania tubes are envisaged, namely, supply to set manufacturers, supply to the trade for renewal purposes, and exports. As Sylvania already have a flourishing export market in Europe, it is likely that the new tubes will carry the trade name Sylvania.

Mr. Mitchell complimented the Thorn organisation, and the Ferguson division, on their enterprising and successful policy. He pointed out that Ferguson had produced and sold far more television sets than had Sylvania in the U.S.A.

On the subject of colour television, Mr. Mitchell stated that the recently formed Sylvania-Thorn Laboratories, Ltd., were investigating the problems involved, in particular the question of desiging and producing a colour picture tube at a reasonable price. Colour television in America had so far failed to catch on, he said. Of 25,000 colour receivers manufactured, only some 10,000 had been sold, the main obstacle being the high cost which was in the region of £300 per set.

Soviet expand Radio and Television

CONSIDERABLE expansion of radio and television production is planned by the U.S.S.R., according to a report in the *Financial Times*. The Soviet government is concerned because the industry has not yet graduated from the experimental stage in many products already mass produced in the West. Slow progress in electronics is regarded as a major obstacle to the modernisation of Soviet factories.

The *Financial Times* states that in 1954, total output of sound and television sets in the U.S.S.R., with a population more than four times that of Britain, was 3 million units—170,000 less than were produced by British manufacturers last year.

Production of television sets this year is expected to rise to 500,000 units—double the number made in 1954—while the U.K. produced 780,000 sets in the first six months of the year alone, and 1,205,000 in the whole of 1954.

The number of television transmitters operating in the U.S.S.R. has risen from three at the beginning of the year —Moscow, Leningrad, Kiev—to eight by now. Soon it will be nine.

Five other stations are under construction, and yet six more are to follow. Experimental colour transmission opened at the beginning of the year, and a colour transmission receiver with a screen of seven inches across is now available.

WAVEFORMS ADDRESS

WE regret that in our Radio Show Preview last month the old address of Telequipment, Ltd., was quoted in error. The company's new address is 313 Chase Road, Southgate, London, N.14.

Bud Flanagan, currently in the Crazy Gang Show, was presented with a Regentone automatic *Handygram* during the Radio Show by William Harries, managing director of Regentone Radio & Television, Ltd. The presentation was made "in appreciation of his long and notable part in entertaining the general public."

Granada order T.V. studio

GRANADA TV Network, weekday I.T.A. programme contractors for the Manchester area, have placed a large order for television studio equipment with Marconi's Wireless Telegraph Co. Ltd.

The equipment, which will be of the most modern type, is to be installed in a studio in the Granada Television Centre, now being built in Manchester. Plans for this centre were designed by Ralph Tubbs, who was responsible for the Festival of Britain Dome of Discovery, and by Reg. Hammans, until recently Head of the Television Unit in the B.B.C. Planning and Installation Department.

The Marconi equipment to be supplied includes five Mark III television cameras with 4½in. Image Orthicon pick-up tubes, vision and sound equipment for a central control room, telecine auxiliary equipment, and vision mixing equipment.

NEW ULTRA FACTORY

ULTRA ELECTRIC LTD. are building an additional new factory at Gosport, Hants., to meet the rapid growth in demand for their television and sound radio receivers. It will cover about 120,000 sq. ft.

At present Ultra's manufacturing floor space with the new research building totals about 175,000 sq. ft., plus 30,000 sq. ft. for the Engineering Division. When the new factory is opened in May next year, Ultra's total floor space will be about 325,000 sq. ft.

The latest-type television and radio set assembly line with overhead conveyors will be installed.

FOR ALL IN THE TRADE AND THE INDUSTRY

Servicing as a Career

THE publication of a new booklet *Radio and Television Servicing* by the Central Youth Employment Executive coincided with the opening of the National Radio Show at Earls Court.

The booklet which is fully illustrated describes the training, qualities required, opportunities of employment and avenues of promotion in this interesting occupation.

Service engineers, the booklet states, are employed in shops which sell and repair receivers, in organisations which repair them for the shops, by the manufacturers of receivers and other radio and electronic equipment and by the organisations which relay radio and television by wire into homes and places of work. Details of opportunities in Airways Corporations and other firms engaged in air transport are also described, whilst a reference is made to opportunities in Government Service.

Separate sections are devoted to basic training, training in systematic testing, apprenticeship, technical studies and wages and working conditions.

The booklet is intended primarily for boys who are about to decide what to do on leaving school, but it will also be of interest to parents, teachers and others who are concerned in helping young people to make a wise choice of career.

450,000 SAW GERMAN SHOW

SOME 450,000 visitors attended the German Radio and Television Exhibition which ended its 10-day run at Dusseldorf last month. The show which covered a floor area of 45,000 sq. metres, was supported by 238 exhibitors.

Biggest draw for the visitors was the television studio. A total of 25,000 people were in the audience during the 10 days of the exhibition.

LADY BARNETT OPENS DERBY RTRA EXHIBITION

Isobel Barnett, TV star of *What's My Line?* was fascinated by the life-size cut-out of herself on R.G.D. dealer George Hopkins' stand at the Derby R.T.R.A. exhibition. Lady Barnett opened the exhibition. Picture shows Lady Barnet with R.G.D. model *Three-Fifteen* a.m.-f.m. radiogram on the stand; also, left to right, David Hazard (Gordon and Gotch Advertising, Ltd.), Stanley Duer (assistant sales manager, R.G.D.), and Ron Jones (R.G.D. area representative).

TV Avenue at Local Dealer Show

SYLVIA PETERS, well known B.B.C. TV announcer, was guest of honour at the opening of Bentall's own 1955 Radio and Television Show at Kingston last month. The exhibition ran for two weeks.

In the "Television Avenue" 36 different mode's were seen working side by side. The accent this year was, of course, on Commercial TV and special display boards gave full details of I.T.A. programmes to be screened during the first two weeks of transmissions.

More than a dozen stands displayed the current radio and television ranges of many leading manufacturers including Philips, Decca, Pye, H.M.V., Roberts, Murphy, Ferguson, Bush, K-B, Vidor and Ever-Ready.

R.C.A. announce distribution policy

DISTRIBUTION of R.C.A. high-fidelity equipment manufactured by R.C.A. Photophone, Ltd., Lincoln Way, Windmill Road, Sunbury-on-Thames, Middlesex, is now being arranged directly through selected retail channels. Interested dealers are invited to contact the company.

The initial products comprise a pre-amplifier control unit and a power amplifier (described in *Around the Radio Show* in this issue). Other units, including f.m. tuners, loudspeakers, etc., will be made available at a later date to provide complete R.C.A. hi-fi systems.

Deliveries to currently established R.C.A. dealers will begin this month. The company advise that other retailers wishing delivery before the end of the year should conclude their agency arrangements at an early date.

FERGUSON ON PARADE

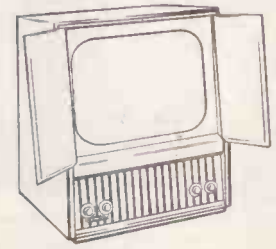
Before the Radio Show opened Ferguson held their own trade show at the Horseshoe Hotel, London. Picture shows the comprehensive range of Ferguson receivers exhibited and demonstrated.

Waiting for the big picture...

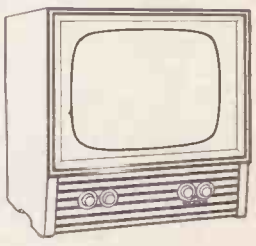
that FERRANTI will bring them

That's what many people are doing . . . saving up until they can buy a first-class Big Screen television set. That means, of course, that when they do come to you, they'll want to see a really good selection. This is the time to show them the Ferranti range, because there's just no other range like it for variety of Big Picture 13-channel models. The 14" Table model, three different 17" models and the new 21" Console—all direct viewing—and the two outstanding Projection models—the 20" Table and 24" Console.

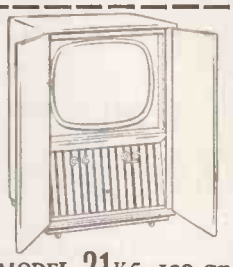
You've seen our powerful advertising campaign with its Big Picture theme in the National press—and so have millions of readers all over the country. Now they want to see these wonderful Big Picture models for themselves. It's *your* opportunity to take advantage of an attractive and certain market. You'll find that Big Pictures mean Big Sales. Order now and be ready to meet a growing demand.



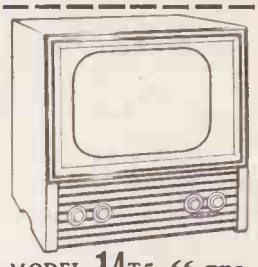
MODEL 20T5 95 gns.



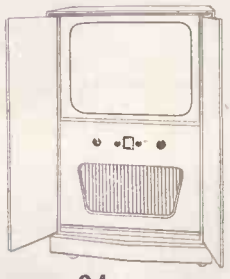
MODEL 17T5 78 gns.



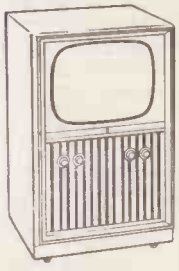
MODEL 21K5 129 gns.



MODEL 14T5 66 gns.



MODEL 24K4 125 gns.



MODEL 17SK5 85 gns.

Clearly FERRANTI for sight and sound

FERRANTI

NEWS ROUND-UP CONTINUED

Pinnacle market replacement valves

A COMPREHENSIVE range of replacement valves under the name of *Pinnacle* has been introduced by Pinnacle Electronic Products, Ltd., of 27a Howland Street, London, W.1. These valves, which will be distributed through wholesalers, carry a 12-month's guarantee and are retested to high standards before sale. A simple stock numbering system has been devised and wholesale lists are now available. Dealer and consumer literature in preparation.

NEW ON FERGUSON BOARD

Right—
S. T. Holmes

TWO new appointments have been made to the board of the Ferguson Radio Corporation, Ltd., a subsidiary operating company with the Thorn Electrical Industries organisation.

S. T. Holmes, well known in the industry as publicity manager of the Thorn group, becomes a director. Mr. Holmes has been closely associated with the activities of the organisation for more than 25 years.

Also joining the Ferguson board is W. T. White, who has graduated from production supervisor over a similar period to general works manager of the Electronics Division, and C. E. Payne, chief engineer of the electronics division since 1945.

G. D. Sparrow, chief of Thorn's Mechanical Development Division, who is at present in the U.S.A. in connection with the Thorn-Sylvania picture tube project reported on page 520, is appointed to the board of Manifold Machinery, Ltd., another Thorn subsidiary.

William Harries (right) managing director of Regentone, in conversation with Stephen Grenfell, star B.B.C. script writer, one of the guests at the annual Regentone cocktail party given to their wholesalers just before the opening of the Radio Show. The other guests in the picture (at left) are Mrs. Grenfell and Arthur Scott (B.B.C. personality). The party was held at Windsor Castle Hotel, London, and the guests were then taken to see the Crazy Gang at the Victoria Palace. A novelty of the show was that Regentone had booked an imitation poster site on the backcloth of one of the acts and inserted a real poster advertisement for Regentone products.

BREMA RETAIL SURVEY

High July Radio Sales

JULY retail sales of radio receivers (84,000) were 14 per cent higher than in June, while radiogram sales remained steady at 13,000, according to the monthly retail survey issued by the British Radio Equipment Manufacturers' Association.

There are a number of factors influencing the market, the survey states, which may have contributed to the increase in radio sales, notably the exceptionally fine weather which may have resulted in a rise in the demand for portable sets, and the increased supplies available to meet the demand for v.h.f./f.m. receivers. Publicity to forecasts of further restrictions on hire purchase is also likely to have boosted sales in anticipation.

Television sales increased by 5 per cent from the revised June figures to 61,000 in July. Again it is probable that rumours of hire purchase restrictions and publicity for the impending I.T.A. transmissions countered the normal seasonal fall.

The percentages of hire purchase sales of both radio and television receivers (41 per cent and 61 per cent) were higher than in June, while radiogram hire purchase sales remained the same (67 per cent).

MARCONI TV FOR AUSTRALIA

THE Australian national television service is expected to be inaugurated towards the end of next year on completion of the first two Government-controlled stations and studio centres at Sydney and Melbourne. Most of the equipment, worth more than £250,000, for the Sydney and Melbourne transmitting stations will be supplied by Marconi's Wireless Telegraph Co., Ltd.

The installation in each case will consist of an 18kW vision and 4kW sound transmitter, together with a 5kW vision and a kW sound transmitter as standbys; also the combining units for both main and standby transmitters, a twin transmission line, an 8-stack aerial for each station, and various ancillary equipment. For the Melbourne station, where the studio is to be connected to the transmitter by radio, a further order has been obtained for the centimetric vision links and the v.h.f. sound links required.

The main vision transmitters to be installed are of the same type as those which Marconi's are supplying to the B.B.C. for their new Crystal Palace station. Like all the latest Marconi vision transmitters, those to be installed at Sydney and Melbourne are designed to handle colour transmissions as well as the normal black-and-white.

Marconi's have also been awarded an order for two complete camera channels, with ancillary equipment, which, it is understood, are to be used for training purposes at Sydney and Melbourne.

The Australian Government stations will operate in Band I to a 625 line standard, and the sound transmissions will be frequency-modulated.

Birmingham R.T.R.A. Dinner

THE Birmingham and District R.T.R.A. Dinner and Dance will be held at the Grand Hotel, Birmingham, on November 23, from 7 p.m. to 1 a.m. Tickets, £2 each, are obtainable from the secretary, Lloyds Bank Chambers, 61 Villa Road, Handsworth, Birmingham, 19.

Around the Radio Show

HIGHLIGHTS OF THE 1955 NATIONAL RADIO AND TELEVISION EXHIBITION

reviewed by James Huxley

ALTHOUGH, due to the delayed opening caused by the strike, the total attendance at the Radio Show this year was some 74,000 less than in 1954, the number of visitors from overseas who came to Earls Court was a record. There were more than 4,400 foreign visitors from 98 countries, including Soviet Russia, as compared with 3,721 last year. These figures are even more significant in view of the almost simultaneous opening of the German Radio and TV exhibition at Dusseldorf, and demonstrate that overseas interest in British products is increasing, despite vigorous competition from elsewhere.

In all 247,243 people attended the Show as against 321,041 last year. Because of the strike two days of the exhibition period were lost, plus the Preview Day. It is reasonable to suppose that had the Show run for the full ten days last year's figures might have been equalled or perhaps exceeded.

By opening day, when most of the stands had reached completion, it became obvious that this was going to be one of the brightest and most colourful shows to date. Exhibitors were taking full advantage of the Radio Industry Council's decision to permit free choice of colour in stand design.

Full marks to **Philips** for what I considered to be the most imaginative and intriguing design. All three Philips stands made use of fanciful and elaborate figures, some illustrating the "Harlequin" theme of Philips publicity gimmick.

I hear talk that Ealing Studios are planning to use part of the Philips stands in a reconstruction of the Radio Show which forms the set of a British film project starring Benny Hill. F. T. Lacey, Ealing's Production Buyer, was particularly interested in the group of Philips "cherubs" which, suspended in the air above the stand, symbolised—I was told—the —Music of the Spheres!

Belling and Lee had their usual two-decker stand, and I was interested to note that the transmitting aerial for the G9AED experimental Band III transmitter at Litchfield was prominently on show—a reminder of the invaluable service which the company have rendered (and will continue to render) to the trade in helping dealers to carry out set conversions and Band III aerial installations.

The animated displays on the **Mullard** stand aroused a great deal of interest among visitors: the displays demonstrated the transmission and reception of a television signal and the operation of transistors.

A view of one of the Philips stands, showing the ingenious use of large cut-out figures combined with a general "futuristic" styling. This stand may be seen in an Ealing film starring Benny Hill (see text).

Perhaps the most ingenious publicity idea in stand design was **Pye's** striking demonstration of "13-channel TV." To see thirteen television sets, each with a different picture operating on each of the available channels in Band I and Band III, must certainly have been an eye-opening experience for visitors to the Show. An even bigger eye-opener was the transmitting set-up inside the stand where thirteen Pye industrial TV cameras were used to feed actual pictures of animated objects to the 13-channel transmitter that distributed the signals to the sets.

A studio of sorts is now a regular feature of the Pye stand. Last year's "Miss 3-D," model Sue Franks, this year became "Miss 13-channel" and made regular announcements on closed circuit from a small TV studio adjoining the 13-camera transmission room.

Also transmitting their own pictures to sets on the stand were **Peto Scott**, who were using a high-quality flying-spot scanner designed and built in their own research laboratories. Peto Scott are planning to produce TV transmitting and studio equipment on a commercial basis, and I understand that they will shortly be releasing a new competitively priced television camera for studio and professional use. All of which indicates that the company are keeping a shrewd and enterprising eye on the expanding TV equipment market at home and overseas.

Highlights

First for the unusual exhibits which are news or have a novelty value in their own right. Foremost among these, and possibly the "set that stole the show" (it was certainly the one which got the most publicity) is the new **Ekco** mains-battery portable television receiver, Model TMB272. This has a 9in. tube and a telescopic aerial, and is packed into a neat cabinet measuring only 10½in. × 13in. × 15in. Weight is 30lb. It works from either 230V a.c. mains or a 12V car battery, and provides switch selection of 13 channels in Band I and III together with v.h.f.-f.m. radio. Price will be about £60—release date, January.

Ekco tell me that the set is sensitive enough to operate satisfactorily on its 4ft. 6in. telescopic aerial within a 25-40 mile range of the transmitter. When necessary a conventional external TV aerial can be connected. Obvious uses for a portable TV set of this type are: in hospitals for viewing by patients, in hotels for hire to residents, in business houses and advertising agencies for monitoring commercial TV programmes, in caravans, yachts and houseboats, in the home as a second set, or in rural areas where no mains supply is available and low battery supply is essential. Also, of course, dealers can use the set for outside demonstrations and for testing reception conditions in customers' homes.

I also liked the new Ekco radiogram finished with a Warerite plastic surface which cannot be damaged, burned or scratched. One big advantage of the new type of construction is that models for export to overseas markets can be despatched in a "knocked-down" condition, saving about two-thirds shipping space per radiogram.

Ekco were also showing the Ediswan *Teleslot*, a coin-operated time switch designed by *The Edison Swan Electric Co., Ltd.*, to enable prepayment of TV viewing to be carried out either as rental payments to dealers, or for use in clubs, bars, hotels, etc. The *Teleslot* measures 3¾in. × 6¾in. × 5½in. and can be mounted anywhere adjacent to the receiver.

As soon as a coin is inserted the device shows how much viewing time has been paid for and connects the electricity supply to the set. The standard model accepts 2s. pieces only, but models can be supplied for other coins. Time ratio can be adjusted to suit the dealer's requirements.

Cheapest TV set in the show was the **Ferguson** Model 998—a 15-valve 12in. table receiver costing only 49 gns. tax paid. I was assured by Ferguson that although the present trend is towards bigger and bigger tubes (17in. now rapidly becoming standard), there is still a considerable demand for the 12in. set, and more than sufficient to justify a consistent production run.

Both **Ediswan** and **Mullard** were showing 27in. television picture tubes, at present being produced for export only.

One of the most fascinating exhibits in the Show was the comprehensive

The Regentone 3-in-1 radiogram-TV combination set, Model 173FM, with f.m. radio band incorporated.

The Ekco battery-portable television receiver, as it may be used in the office. Note built-in telescopic aerial. This (the set that "stole the show") costs £60.

display of printed circuits on the **T.C.C.** stand. Talking to F. H. (Freddie) Barnes, publicity and advertising manager of the company, I was surprised to learn the extent to which printed circuits have already established themselves as part and parcel of standard production technique in the industry. In addition to printed wiring, current methods include the printing of low value capacitors and low value inductances. In consequence the production of tuned units is not only now practicable but already being commercially exploited. I saw the new T.C.C. 35-45! Mc/s i.f. transformer—a compact unit in which the base is folded by a predetermined amount to give critical coupling magnetically between the circuits involved. Another type of i.f. transformer using capacity coupling is also available.

For Commercial TV aerials T.C.C. also make a neat crossover unit comprising printed filter circuits enabling the inputs of Band I and Band III aerials to be combined into a common downlead. This unit is already being used by certain manufacturers in their range of two-band aerial equipment.

Television

If Commercial TV was not present in person at the Show, at least the manufacturers were CTV-minded, and all television receivers exhibited were capable of receiving both Band I and Band III transmissions. Most stands demonstrated sets working on both the Band I and Band III signals that were being piped round the exhibition. Pye, as already mentioned, went eleven better by showing sets working on all 13 channels.

It was interesting to note the increasing trend towards larger and larger pictures. Last year 14in. was standard, with 17in. growing in popularity; this year the emphasis has shifted and there is little doubt that the 17in. set is now the most popular, with the 21in. screen making an impressive debut.

Among the manufacturers showing 21in. TV models were **Alba, Baird, Bush, Decca, Defiant, Dynatron, Ekco, English Electric, Ferguson, Ferranti, G.E.C., Invicta, Kolster-Brandes, Masteradio, Pam** and **Philips**. Some of the models shown were prototypes, but in the main destined for early production.

Many of the technical improvements in circuitry which were novelties a few years back are now standard practice on the majority of sets. Depending on the price factor, most models include some or all of the following facilities: automatic gain control of the vision signal (this is desirable in multi-channel sets to help equalise signals from different stations), flywheel synchronising, frame flyback suppression, black-spotter interference suppression, aircraft anti-flutter circuits and ion-trap protected picture tubes.

A recent innovation, electrostatic focusing, is featured in certain models by **Kolster-Brandes** and **H.M.V.** A useful device fitted to some receivers (*e.g.*, **McMichael** and **Marconiphone**) is a tunable filter connected in the aerial circuit designed to reject r.f. interference of the type associated with diathermy equipment and certain kinds of radio and radar transmissions.

What I call "viewing refinements" were represented by "Spot-Wobble," still available on certain *Ekcovision* models, and *HaloLight*, a luminous screen surround introduced by Ferguson. I also found plenty to indicate that manufacturers are taking the question of cabinet design very seriously with the result that most sets, whether table or console models, are losing the vaguely austere styling that predominated a few years ago. I particularly liked the experimental contemporary-style TV cabinets in light oak shown on the **English Electric** stand.

The **Baird** 21in. Model B21 is housed in a de-luxe walnut cabinet of somewhat unusual curved lines and full-length doors. Price £145. The **Pam** 755C console with full-length doors

". . . and this latest model is complete with everything—including the kitchen sink!"

embodies a similar chassis to their recently introduced 17in. receiver 754. It is priced at 127 gns.

The **Bush** 21in. console, TUG59, features the *Telepic* tuner, flywheel sync., etc., and is housed in a console cabinet with full-length doors. Price 138 gns. Another 21in. console was the **Invicta** Model 125, selling at 127 gns. **Masteradio** showed a 21in. set in contemporary styled cabinet with legs, featuring special deflector coil to ensure even focusing, tinted glass face plate, flyback suppression, etc. Model TE21C retails at 126 gns.

I noticed that several makers have re-introduced a pre-war fashion—that of combining a television receiver with a radio unit. Though various models have appeared since the war, it seems possible that the advent of f.m. may see an increase in this style of presentation. The McMichael C417FM uses a 17in. television chassis and a radio chassis similar to their Model FM55—a 6-valve a.m.-f.m. 3-band radio. Separate speakers are used for radio and television and each section is completely independent. Price 115 gns.

Baird exhibited their TV17BCR, which consists of their current 17in. television chassis and an a.m.-f.m. radio unit. Price £137. A more ambitious combination receiver I noted was the **Regentone** Model 173FM, which embodies a 17in. television receiver, hi-fi a.m.-f.m. radio chassis with push-pull output, and a 3-speed auto changer. Separate speakers are used for television and radio.

At 175 gns. tax paid, I thought this was a reasonably priced instrument, and I particularly liked the closing doors concealing the radio, gram, and TV screen, which shows that the manufacturers have designed the unit with an eye to its furniture aspect—always an important selling factor in the more expensive class of product. The TV section has a 17in. screen, and sound output is via a 10in. p.m. loudspeaker. The set contains built-in aerials for f.m.

The other 3-in-1 combination was shown by **Cossor**. Model 935 incorporates a 17in. TV chassis, a.m. radio unit and 3-speed changer. £183 15s.

Publicity conference—Norris C. Pratt, general publicity manager, and Charles R. St. Quintin, publicity manager radio and television (Philips Electrical) caught by B.R.T's candid camera in the Philips Dealer Centre at the Radio Show.

"They say the latest thing is a rear-projection, obtuse-angle, back view portable model with built-in self-releasing parachute for TV-minded mountaineers. . ."

Aerials and Aerial Equipment

As was to be expected the range of television aerials on show on the various stands was almost too comprehensive to assimilate. There is no lack of enterprise among the aerial manufacturers who seem to have the problem of Band I and Band III reception well and truly buttoned up—from the point of view of aerial design, anyway.

Generally speaking, there are four main categories of aerial types, overlapping to some extent. There are single band units for either Band I or Band III operation and combined two-band aerials, and these in turn are available in either indoor or outdoor types. The relatively small physical size of the Band III aerials means that more elaborate arrays can be squeezed into little space, and it is interesting to note that most manufacturers are featuring the Band III *array* (whether singly in a combined aerial) to provide maximum gain. The Band III single dipole is virtually a nonentity.

It would be impracticable to attempt to enumerate the many different types of aerials on display, and I have therefore concentrated on what might be called novel features of design, of which the newest and most interesting, perhaps, is the electronic-coupling technique employed by Antiference in their new *Hi-Lo* two-band units.

For the technically-minded some details of how the "electronic coupling" method works may be of interest. The Band I dipole and the Band III array (with or without reflector) can be regarded as two tuned circuits at resonance. For maximum transfer of energy between the two circuits there is a condition of critical coupling obtained by varying the spacing between the two dipoles. The Band III signal from the smaller dipole is transferred to the Band I dipole under this condition of optimum energy transfer with no direct connection whatever between the two aerials. The Band I element thus acts as a driven element for Band III purposes.

Coaxial feeder is connected to the Band I dipole and picks up both Band I and Band III signals. The arrangement is such that the entire combined aerial can be mounted on one rigid crossbar, with only one coaxial contact point, thus adding to robustness and (an important factor) ease and speed of erection.

There are at present five models in the *Hi-Lo* range, details of which are given elsewhere in this issue.

Telerection have an entire range of Band III aerials ranging in price from three-element array for loft mounting at 32s. 6d. to a double six-element stacked array with half-wavelength boom at £12 10s. The company are also marketing inexpensive conversion kits for attachment to existing aerials at 7s. 6d. and 15s.

The Multicore stand, where a demonstration of high-speed soldering on R.G.D. chassis was given.

Belling Lee, in addition to showing new Band III and combined aerials, had an interesting dipole adaptor designed to enable f.m. transmission to be received on a standard Band I TV aerial. I was also interested to see the Belling Lee QSL card which is sent in acknowledgment of reception reports of the G9AED signal. The company say they have had one report of the test signal on a *Doorod* at a distance of 12 miles, but they consider it to be a case of freak reception. Good reception reports have been obtained from as far away as Clacton (60 miles).

Wolsey's new range has a pleasing streamlined appearance mainly due, I think, to the "swept-back" delta-element design of the Band III arrays.

Aerialite, in addition to a comprehensive range of aerials for both bands, were showing their Band III converters, of which Model MC is particularly noteworthy in that it covers all the Band III channels by a continuously variable tuning control (price £10 17s. 6d.). A last-minute introduction was the Aerialite in-line combined Band I-III aerial for channels 4 and based on the firm's X-type Band I unit with delta-shaped Band III elements. Here again there is no direct coupling between the two aerials, mutual critical coupling being employed.

On the **Labgear** stand I noted an interesting range of Band III aerials, particularly their Model 303AF. This is a four-element wide-spaced Yagi which is fitted with a cranked arm and adaptor to enable it to be clamped of the existing Band I aerial mast from roof level. It can be clamped in any direction which is useful where the two transmitters are not co-sited. The Band I aerial does not have to be taken down and the elements of the existing aerial need not be scraped clean to make good electrical connection. The assembly time is very low due to an ingenious method of element attachment. It retails at only £2 10s.

The range of outdoor aerials for Bands I and III is based on a Band I dipole fitted with a Band III attachment and reflector. The design is such that no cross-over network is necessary, both signals being fed through a common 75-ohm coaxial feeder.

The Labgear indoor aerials depart from convention in using aluminium ribbed strip elements, adequately robust for loft fitting. Semi-folded dipoles are used for optimum matching. Model 301 (for Band III) is claimed to be one of the highest gain indoor aerials available and it costs only 19s. 6d. Model CO2 is a combined Band I/III aerial using a linear system coupling the two sections instead of the more usual cross-over network. It costs 27s. 6d. The Band I dipole acts as the reflector for the Band III section (consisting of a semi-folded dipole plus director).

Another interesting exhibit was the cross-over unit Model CN13, using a printed circuit. It will either combine the outputs of separate Band I and III aerials into a common 75-ohm feeder or will split the composite output of a single feeder into separate signals for sets requiring two inputs. Suitable for indoor or outdoor mounting on round masts or flat surfaces, the unit retails at 15s.

Antiference had this intriguing moving display to illustrate the simplicity with which their new Hi-Lo range of aerials can be erected.

Perhaps the most unusual aerial in the indoor range is the **Wolsey** *Hi-Q*—a table-top Band III aerial in the form of a rectangular loop, suitably mounted for standing on a flat furniture surface. Cost of this ingenious unit is 3½ gns.

Band III Tuners

All the television manufacturers are now producing Band III adaptors and converters for their earlier models, and a few firms are marketing general purpose tuner units. One of the latest, and one I liked greatly from the point of view of appearance and styling, is the **Regentone** converter—a self-powered, self-contained unit designed

"And this, our newest model, shows all thirteen pictures at once . . ."

to convert all eight Band III signals to the Band I channel in use. Controls comprise on-off Band I-Band III switch, coarse channel selector, fine tuning, and a contrast control for adjusting Band III gain. Price of the converter is £10 17s. 6d.

Another converter featuring a contrast control was the one shown by **Marconiphone**. This eight-channel unit requires no internal alterations and the receiver and converter can be switched on and off together. The contrast control has a range of about 20db, sufficient to provide good balance of Band I-Band III signals in average locations. Price is £10 17s. 6d.

General purpose converters were seen on several stands. **Aerialite** showed two models—TC3, a single Band III channel unit at £9 10s. and Model MC, a multi-channel (6-13) unit with continuously variable tuning at £10 17s. 6d. Both models have self-contained power supplies. The new C3 was noted on the **Channel** stand. Featuring nine-channel selection (one in Band I, eight in Band III), combined converter-receiver on-off switching, fine tuning control and gain control, it costs 10 gns.

R. MacPherson, publicity and sales manager of Peto Scott, adjusts the flying-spot scanner which was used to provide still pictures for the TV sets on the Peto Scott stand.

Converters were strongly featured by **Spencer-West**, all their models having self-contained power units. Model 30 (£8 5s.) is for simple conversion—one channel in Band I and Band III, with provision for a second Band III channel incorporated. It is fixed-tuned, but adjustment of oscillator is possible. Model 33 (£10 2s. 6d.) embodies a neutralised triode amplifier, feeding into a pentode mixer and double triode oscillator, switched to provide two Band III outputs.

A novel feature was the Type 32 two-station remote control panel and switch unit, which can be fitted internally or externally thus allowing the converter to be placed in any convenient position. It is so arranged that it can accommodate a single aerial feeder splitting into separate Band I and Band III outputs or separate Band I and Band III feeders switched to a single output. It is neutralised against Band I break-through on Band III. Selling at 25s., it is supplied as standard with the type 33 converter.

I also noted the neat and attractive *Adder* unit, a turret tuner for external mounting on the side of the receiver. It has a 13-channel selector switch and provides a range of i.f. outputs. At 10 gns. this should be a popular unit. Another attractively styled converter was the **Wolsey** unit, with recessed control knobs and covering channels 6-13. Price 9½ gns.

Valradio's tuner unit is probably unique in that it covers the three Bands, I, II and III, tuning being continuous over each step. A cascode r.f. amplifier is used in conjunction with a triode pentode frequency changer.

Sound Radio

A new stimulus to public interest in sound radio has been provided by the introduction of the B.B.C. v.h.f.-f.m.

service. Nearly all radio manufacturers are now producing receivers incorporating the f.m. band, which in most cases replaces the old short-wave band. The more expensive f.m. radio models designed to make the most of the additional quality that can be obtained (since the receiver's bandwidth can be "opened out" without danger of adjacent channel interference) tie in very well with the current interest in "hi-fi." These sets which cost upwards from 38 gns. usually contain multiple speakers or specially designed loudspeaker systems for optimum reproduction.

Philips Model 643A, for instance, has an 8in. double-cone speaker housed in a highly-polished wooden cabinet, and receives a.m. and f.m. stations. Price 48 gns. (tax paid). The Pye *FenMan II* is a multi-speaker table radio for a.m. and f.m. reception priced at 38 gns.

The Champion *Sonata* in the lower price bracket (it costs 30 gns.) is a 6-valve a.m.-f.m. set with three speakers. Champion, incidentally, were also showing their new f.m. converter (Model 835) which, at 16 gns. tax paid, enables any a.c. receiver to accommodate the new f.m. transmissions with only two connections.

F.M. Adaptors

F.m. adaptors designed for use with their own hi-fi radiograms were exhibited by Ferguson, H.M.V. and Dynatron. Also Kolster-Brandes were showing an f.m.-only receiver which can also be used as an adaptor to feed another set (Model FB10FM, 14 gns. tax paid).

K-B claim, by the way, that their 6-valve a.m.-f.m. radio, Model MR10, was the cheapest a.m.-f.m. receiver at the Show.

An interesting last-minute addition to the Pye exhibit was a two-unit a.m.-f.m. receiver in the *FenMan* series, comprising a preset f.m. receiver and a loudspeaker unit housing amplifier and power pack. Also noteworthy—a three-position preset f.m. tuner designed as a plinth for use with the *Black Box* hi-fi reproducer.

The new Pye two-unit f.m. receiver with separate corner loudspeaker unit for hi-fi reproduction.

Visitors to the Radio Show were able to test Ferranti radiograms by listening to a specially recorded disc jockey demonstration by Jack Payne, star of TV's *Off the Record* programme. Picture shows L. G. Hall, radio sales manager of Ferranti Radio, Ltd., and Jack Payne.

I was interested in the McMichael 255AC Special. This is a 6-valve, plus magic-eye, f.m.-long-medium waveband console with separate treble and bass controls housed in a contemporary type cabinet with side compartments for books, etc. It is designed to suit rooms installed with modern furnishings and sells at 45 gns.

Other newly introduced a.m-f.m. models I noted include the Bush VHF54, an 8-valve 3-band table model with inbuilt f.m. aerial. Price 32 gns. An a.c.-d.c. version, the VHF55, costs 33 gns. The Baird Model 301 is a smart 7-valve 3-band table set in contemporary style cabinet with an amplifier response of 60-12,000 c/s. Price £31.

Another new model noted was the R.G.D. *One-Twelve*, a 7-valve four-band set with piano-key type push-button selection, internal a.m. and f.m. aerials and a 10in. × 6in. elliptical speaker. Price 32 gns.

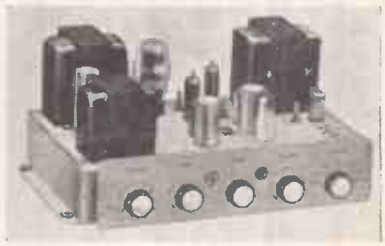
Hi-Fi

Before mentioning any specific items of hi-fi equipment, I ought to say that I took the trouble to hear the various demonstrations of high-fidelity reproduction that were taking place at the Show. I never remember so much hi-fi in such a small place in such a short time!

First and foremost I ought to mention the two demonstrations of sound in three dimensions which were put on by H.M.V. and G.E.C. Both were starkly impressive and proved, to my mind, that two ears are better than one—in other words, the perspective and orientation provided by true stereophonic reproduction (which corresponds to the natural binaural functioning of the ears) does, in some indefinable way, add immensely to the realism of the music or sound being reproduced. A curious psychological effect that I noticed was an irrestible urge to look in the direction the sound seemed to be coming from; this probably illustrates the close cerebral relationship between hearing and sight in the brain.

H.M.V. and G.E.C. have got something here, and H.M.V. have sufficient confidence in the pulling power of their *Stereosonic* tape records to market them as a commercial proposition. The first release of 3-D tapes takes place this month. At present the reproducing equipment for the tapes is costly (around £250), but there is little doubt that as sales increase, so will prices decrease, and in the foreseeable future new and less expensive units will be available to bring this new experience in sound reproduction into more and more homes.

My own personal view is that dealers who want to make the most of this potentially vast market should strive to arrange demonstrations. The proof of the pudding, in the case of 3-D recording, is in the hearing!



The new Pye high-fidelity amplifier, Model HF5/8, which has an output of 5W and a frequency response of 2-50,000 c/s.

Two items in the G.E.C. demonstration intrigued me greatly—the real-life sounds of train and engine noises at Watford Junction, and the incredible shriek of a jet aircraft flying past at low level. After this I returned to the relative silence of Earls Court ground floor.

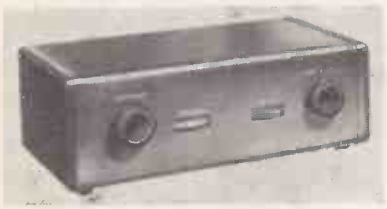
I made a point of hearing the demonstration of hi-fi on the Goodman's stand as I wanted to hear the new *Axiom* enclosures in action. These cabinets, designed in neat contemporary style, embody a new system of acoustic loading, and are available in four styles for use with the *Axiom* and *Audiom* range of speakers in combinations of one, two or four units.

Main feature of these cabinets is that the volume of enclosure required for a given speaker is approximately two-thirds that of the conventional reflex cabinet. Goodmans tell me that these enclosures have a bass response down to 20 c/s, with no objectionable resonances above this frequency.

Pye, of course, made a special feature of hi-fi, the *Black Box* being prominent among an impressive array of units. New items on show included an amplifier which, Pye tell me, has a frequency response from 2–160,000 c/s combined with an output of 25W, price £29 8s. This is Model HF25, the *Provost*. Model HF5/8 has an output of 5W with a frequency response of 2–50,000 c/s.

The "unit" system is, of course, no novelty to connoisseurs but the breaking down of high quality equipment into separate sections seems to be gaining more widespread appeal. Pye, for instance, also show the trend in their f.m. and a.m.-f.m. tuner units. These have an 8-valve circuit, the f.m. version having three crystal controlled pre-set positions and the 3-band version (f.m., long and medium) is continuously variable with separate pre-set gain controls for a.m. and f.m.

Another pointer to future ideas in hi-fi was the prototype v.h.f. radiogram and tape recorder combination console shown by **Ekco**. It incorporates automatic time switching arrangements by means of which unattended f.m. broadcasts may be recorded for later replay.



Regentone's new Band III converter unit, covering the eight Band III channels.

New to the Radio Show were **R.C.A. Photophone, Ltd.**, a British associate of the well-known Radio Corporation of America. The company have had long experience in producing professional sound equipment, principally for the cinema industry, but now they are entering the domestic market with the R.C.A. high-fidelity amplifier which, priced at £48 complete, gives an output of 12 watts with a frequency response substantially flat from 10–60,000 c/s (±0.5db). The equipment comprises a power amplifier and a preamplifier control unit, and will be available this month.

R.C.A. Photophone will be distributing their hi-fi equipment through accredited dealers, and interested dealers are invited to contact the general sales manager, W. P. Rowley, at the company's premises at Lincoln Way, Windmill Road, Sunbury-on-Thames, Middlesex

Philips have introduced a complete hi-fi system in unit construction form, each item being designed as a unit of

The Philips *Novosonic* range of hi-fi equipment comprising an a.m.-f.m. receiver-adaptor, triple loudspeaker unit, record changer and amplifier and record storage cabinet, designed in unit construction.

furniture, and all three units combining to form a complete hi-fi installation of handsome finish and appearance. The units consist of an upright cabinet containing amplifier and player or changer unit, a similar cabinet containing three loudspeakers (two double cone and a 5in.) and a smaller cabinet (designed to stand between the others) with record storage space on which may be placed an a.m.-f.m. radio unit for connecting to the hi-fi amplifier. Prices not yet announced.

Grams and Radiograms

Interest in records and equipment for playing them has shown no sign of diminishing. **Trix** were showing their improved range of *Trixette* gramophones, including the *Playdisc* model which incorporates a 3-speed non-auto gram unit. The control knobs are external so that adjustments can be made without lifting the lid, and incidentally, all sizes of records can be played with the lid closed. It embodies a 6in. × 4in. elliptical speaker.

Other Trix models having more powerful amplifiers and separate bass and treble controls are available, housed in cases of new design.

Portogram have produced an obvious winner in their low-priced *Babygram*, a compact 3-speed record reproducer with built-in two-valve amplifier selling at only 11 gns. tax paid. Output is via a 7in. × 4in. elliptical speaker. The instrument, which has a tone control in addition to volume/on-off, is built into a robust lightweight laminated wood cabinet covered in leather cloth of various designs and colour, contrasting with the ivory-finished motor and control fitments. For operation on a.c. mains.

Radiogram development and production has undoubtedly been influenced by the coming of v.h.f.-f.m., and most models now incorporate the new band. Nor is an a.m.-f.m. radiogram necessarily expensive. **Both Ferranti** and **Regentone** were showing models at 59 gns. tax paid. The Ferranti instrument (Model 355) has a 6-valve chassis covering three wavebands, including f.m., giving 5 watts output via a 10in. p.m. speaker. Regentone's ARG79 is a 7-valve four-waveband set with 3-speed changer and 10in. speaker.

Alba have a 62 gns. a.m.-f.m. radiogram using a 7-valve chassis (including magic-eye) with output via an 8in. × 5in. elliptical speaker. Another 62 gns. model with twin speakers was exhibited by **Cossor**. The **R.G.D.** *Three-Fifteen* radiogram has four wavebands and a 7-valve chassis. Output is 3 watts into a 10in. speaker. Price 65 gns. tax paid.

Perhaps the cheapest a.m.-f.m. console radiogram in the show was that on the **Champion** stand—a 3-speed 3-waveband model of the bureau type, with three loudspeakers, priced at 54 gns. tax paid. And next in price order the **Defiant** model at 57 gns.

In the dearer price range where radiograms have been specifically designed to make the most of the improved audio quality obtainable from the f.m. transmissions, there is a very wide range, from the Kolster-Brandes Model LG40 (88 gns.) to the Ferguson Model 501, a 13-valve luxury radiogram with 14 watts push-pull output feeding two speakers (12in. and 5in.) (245 gns.)

Radiograms without f.m. are available in a wide range of prices. Cheapest floor model, so far as I could see, was the new Alba 6991 Bureaugram, a 5-valve 3-waveband model with 3-speed changer and 8in. matched speaker, priced as low as 47 gns. Models at 49 gns. were shown by **Regentone, Masteradio, R.G.D.** and **Sobell**. Above these figures prices varied widely depending on circuitry and styling.

I noticed a wide selection of table radiograms—about ten in all by different manufacturers, and in addition, two completely portable radiograms shown by **Champion** and **Decca**.

(Continued on page 532)

I was impressed with the compactness and general neat appearance of the **Marconiphone** TARG44A which struck me as a good proposition at 42 gns. It has a 3-speed autoradiogram, featherweight pick-up with turnover cartridge and incorporates an a.m.-f.m. 6-valve radio unit feeding into a 10½in. elliptical speaker. It has inbuilt a.m. and f.m. aerials. Among the same price group were the **Masteradio** RG356 *Mastergram* (38 gns.) with 3-band a.m. radio section and the **McMichael** *Clubman* (40 gns.).

Test Equipment

I should imagine that many service engineers examined the new **Taylor** Model 94A waveform generator with a good deal of interest. Covering the ranges of 20–40, 40–80 and 175–215 Mc/s, it features full synchronisation with line and frame pulses, half-line interlacing signals and blanking signals with a porch waveform.

The "Function" switch gives nine positions—(1) a 3-step graduation in the form of 15 sets of three graduations, (2) a 5-step graduation in the form of three sets of 5, (3) 750 c/s sound, square wave, and horizontal bars, (4) grid pattern for definition, vertical and horizontal bars, 1.5-4.5 Mc/s, (5) grid pattern, horizontal and vertical bars, for linearity, smearing and ringing check, (6) fully synchronised black raster, (7) fully synchronised white raster, (8) vertical bars for line linearity and hum checks (9) unmodulated carrier.

Provision is made to incorporate frequency modulation of Band III r.f. for TV f.m. sound alignment and the instrument can be pre-set to any alternative transmission standard without equalising pulses. Pre-set controls are provided to facilitate resetting after valve replacements. This easy-to-use instrument, housed in the standard Taylor cabinet, is provisionally priced at £60 list.

With Band II already in service and Band III imminent, service engineers no doubt spent a good deal of time at the Show looking at v.h.f. test equipment. Among the instruments we noted particularly were the **Airmec** multipurpose *TeleVet*, which combines the functions of pattern generator, a.f. and r.f. signal generators, oscilloscope, wobbulator, a.c. and d.c. valve voltmeter and e.h.t. voltmeter. It seemed to me to be a most admirable all-purpose piece of equipment—and it weighs only 25 lbs.

Cossor, of course, had their usual comprehensive range of oscilloscopes and also showed their Model 1324 f.m. alignment generator which, with an oscilloscope, may be used for all f.m. alignment procedures, including examination of the discriminator curve. The *Telecheck* TV alignment generator was also shown.

Among the wide array of test equipment shown by **Avo**, I noticed their new Mark III signal generator, a moderately priced (£29) instrument covering 150 kc/s to 220 Mc/s (a.m. only) in six bands.

The new Regentone, Model HG4F, portable electric gramophone—price 11½ gns., tax paid.

Channel and **Telequipment** both had their well-known pattern generator models on show and on the latter stand I was interested to see a monoscope unit—identical to that being used by Belling & Lee's G9AED station.

Tape Recorders and Reproducers

Developments in tape recorders include better frequency response at the slowest tape speed of 3¾in./sec. The new **Simon** Model SP2, for example, covers 50–7,000 c/s at this speed, and 50–12,000 c/s at 7½in./sec. The improvement in quality is coupled with more ambitious design and output, larger speakers being employed even in the transportable models.

The *Editor* tape recorder, shown by **Tape Recorders (Electronics), Ltd.**, now appears in a hi-fi version incorporating two speakers, one a 10in. in a detachable lid. This company were exhibiting the widest range of recorders at the Show, including the 26 gns. *Playtime* model which plays back through an external amplifier or radio set, and the inexpensive *Playtime Plus*—a complete recorder costing only 35 gns.

Strictly up-to-the minute is the new **Rudman Darlington** *Reflectograph* Series 100 recorder embodying a dry battery operated playback amplifier incorporating four transistor stages, thus considerably improving signal-to-noise ratio and reducing hum to an extremely low level. It has no provision for a power output stage, being designed for use with a high-quality amplifier and speaker systems or direct feeding into an oscilloscope. The separate record and playback units deliver an equalised output of 300mV peak. During recording, power is drawn from the mains but on playback the mains is used only to drive the tape mechanism.

It includes the established *Reflectograph* continuously variable tape speed and inching control for rapid inter-reel tape shuttling. During recording, monitoring may be carried out either via the main amplifier or through headphones from the transistorised pre-amplifier. Price is £105 10s.

I believe, incidentally, that **Portogram's** console tape reproducer is unique in that for the first time it combines a four-head tape deck with a 3-speed record changer plus amplifier and multiple speaker system; it will also accommodate an f.m. tuner.

★ Show Briefs

An interesting demonstration of the E.M.I. Stroboscope featured a leaflet mounted on a disc spinning at 1,500 r.p.m. The blurred impression appeared to stop dead when the flashing stroboscope was switched on. The device was calibrated up to 6,000 revolutions per minute.

* * *

Two "newspapers" were distributed to the public during the exhibition. First: Pye's "Radio Express—a clever imitation of the "Daily Express" style and layout featuring Pye 13-channel TV, the Pye People are Funny *programme, and various digest items of TV interest. Some 100,000 copies have been distributed. The other paper was the "Belling-Lee Bulletin," produced in newspaper style, giving information on TV aerials and aerial installation problems, and news about the G9AED transmitter.*

* * *

A party of 70 American newspaper TV correspondents visited the Radio Show as part of a comprehensive tour of the British TV scene on the eve of the opening of Commercial TV. They were entertained at Earls Court as the guests of the Radio Industry Council.

On the Radio Society of Great Britain stand an amateur television station was shown in operation, also a considerable amount of amateur-built radio communications equipment.

* * *

At this year's show the Radio Industry Council did something they have never before attempted—the control of two television programmes simultaneously over closed circuit. Other services handled by the control room included the sound programme on p.a., and the v.h.f. broadcasts channeled to 45 points in the Show.

* * *

Closed circuit programmes on Band I and Band III channels were seen on about 500 television sets scattered throughout the Show. There were 175 different models on view, including eleven projection receivers. Most popular size was 17in., followed by 14in. There were only two 12in. receivers on show (Ferguson and Bush).

* * *

Overseas visitors to the Show were presented with a lapel badge featuring a T.C.C. printed circuit on the reverse side.

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PRESENTS THE FINEST RADIOGRAM VALUE IN THE INDUSTRY

Year by year Ferguson expands its range of Radiograms—and expands also its dealers' business in this big, growing and profitable market. This year Ferguson breaks all previous records with a programme of 11 fine sets—from high fidelity table model to luxury reproducer. Here is a selection of these winning sets.

326RG BUREAUGRAM 5-valve 3-wave superhet in a lovely bureau-style cabinet, with good record storage space. 3-speed auto-changer, 8" moving-coil speaker. **69 gns. tax paid.**

375RG BUREAUGRAM as above, but including VHF/FM reception. **75 gns. tax paid.**

327RG CONSOLE RADIOGRAM 5-valve 3-wave superhet in a graceful Console cabinet. 3-speed auto-changer, 8" moving-coil speaker. **49 gns. tax paid.**

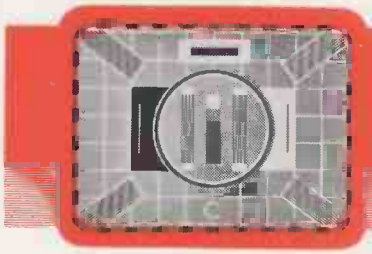
401RG HIGH-FIDELITY FOUR-BAND RADIOGRAM 9-valve superhet for both AM and FM reception, with 6-watt negative feedback output and dual bass and treble speakers. **95 gns. tax paid.**

...fine sets these FERGUSON's

THORN ELECTRICAL INDUSTRIES LTD, 233 SHAFTESBURY AVENUE, LONDON WC2

Thorn

Issued with British Radio and Television, October, 1955



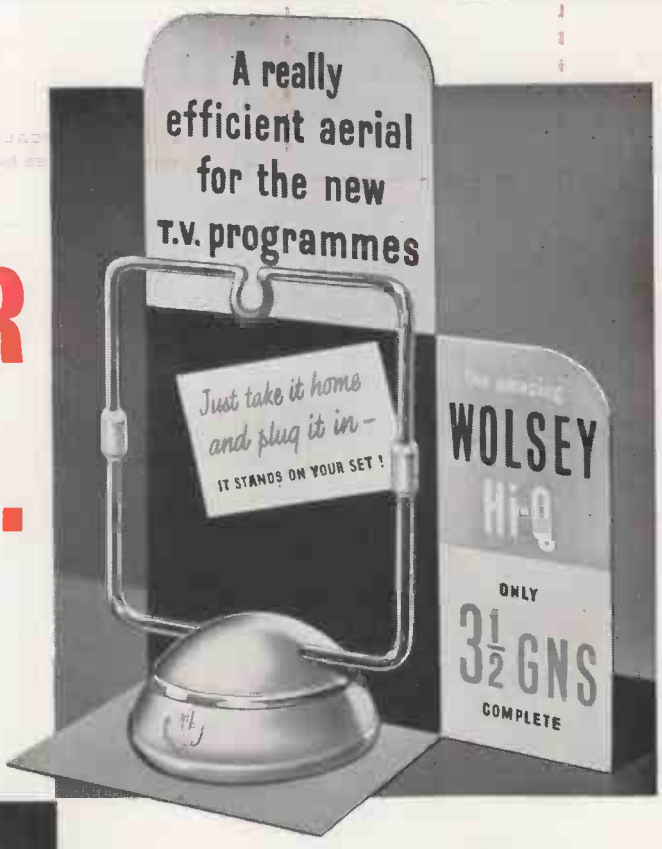
James Huxley's SERVICE DEPARTMENT

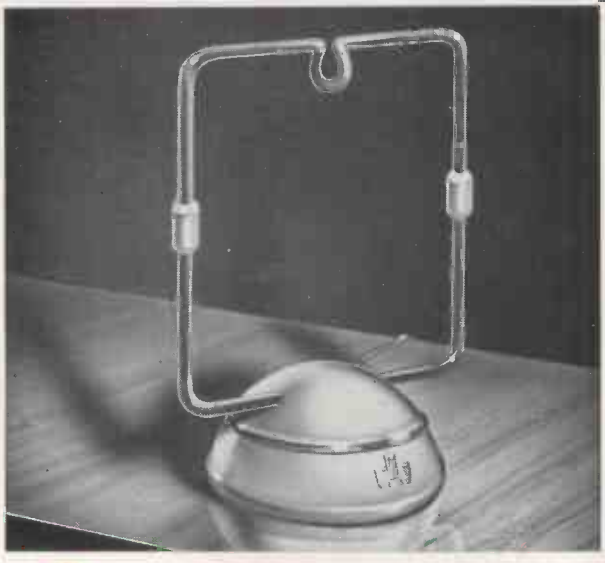
No. 10

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

STRAIGHT FROM YOUR COUNTER . .

(Display Units supplied free to every Stockist)





. . ON TO THE SET !

(Your customer takes it home and simply plugs it in. Suitable for **ALL** *sets)*

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The WOLSEY Hi-Q

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Let's get started on Band III

AN ENGINEER'S VIEW OF COMMERCIAL TV PROBLEMS

PART TWO

by

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

ALTHOUGH before the introduction of the two-band receiver one or two manufacturers favoured a relatively high sound and vision intermediate frequency, the trend now is for all receivers to have a vision i.f. of 34.65 Mc/s and a sound i.f. of 38.15 Mc/s. Such a sound-vision i.f. relationship means, of course, that the receiver's local oscillator is arranged to work above the signal frequencies.

The reason for a vision i.f. of this somewhat critical value was explained in *Tele-opinion* in the December, 1954, issue of this publication. To recapitulate briefly, it was pointed out that this choice of frequency reduces the possibility of pattern interference due to oscillator radiation of receivers working on Bands I, II and III, and interference of similar nature due to self-generated harmonics in the receivers themselves. Mention was made of one isolated case resulting in a possible 1.85 Mc/s pattern in the fringe areas on Channel 12.

The recommendations of a Panel consisting of the B.R.E.M.A. and the G.P.O. regarding the use of this frequency appear to be observed by almost all manufacturers of current TV receivers. This is a considerably different proposition from receivers of earlier design which possessed a diversity of i.f's and which, as a consequence, often incited pattern disturbances of some magnitude between themselves, particularly in fringe areas where two Band I stations were receivable with little to choose between their field strengths. One can well imagine the panic that would result if the same procedure were adopted now that three bands are operational.

As it is at present, however, we must still seriously consider the possibility of pattern interference resulting from radiating local oscillators of old style receivers which have been converted or adapted to receive the I.T.A. programmes.

Band III adaptors

It is now—tentatively, at least—considered that the difference between the terms "converter" and "adaptor" lies in the fact that the converter frequency changes the incoming Band III signals to the acceptance frequency of the Band I receiver.

For instance, so that the unit may simply be connected direct to the aerial terminals of a Band I receiver without the necessity of altering the receiver in any way, a converter nearly always embodies its own power-pack and features a switch for changing over from a Band I station to one or two stations in Band III.

COMMERCIAL TV is now a reality, and the next few months are likely to see a considerable increase in servicing and maintenance problems on Band III for dealers and engineers who, until now, have been mainly concerned with conversion and installation. In this series the author discusses some of the complications which the dealer and servicing man are likely to encounter.

The adaptor, on the other hand, uses, in the main, a similar circuit to the converter but frequency changes the Band III signals to correspond to the receiver's sound and vision i.f's. The majority of adaptors are produced by manufacturers and use a stipulated design which is suited mainly for their own particular sets.

Essentially, the circuit of adaptors of this kind is more or less the same as the front-end of a two-band receiver which was fully described in last month's article.

In some cases the adaptor replaces completely the existing front-end of the Band I receiver, and when this is so facilities are also provided on the adaptor to permit the reception of Band I programmes. In other words, the inclusion of this kind of adaptor completely modernises a Band I set and brings it into line with current two-band models.

Most manufacturers are producing Band III or two-band adaptors for use with their receivers of two, three and four-year vintage. It is, of course, impossible to use an adaptor with a t.r.f. receiver, and this is where the converter comes in, but we shall deal with this later in this series.

Output coupling

Several methods are adopted for coupling the i.f. output from the adaptor to the receiver's i.f. channel. Where an entirely separate Band III adaptor is used, such as in the Pilot TV87 receiver, the adaptor's i.f. output is taken to a buffer valve in the receiver, which is already incorporated and wired in parallel with the normal first i.f. amplifier valve.

When the Band III adaptor is not connected to the set, its power-connecting socket on the receiver is short-circuited so that h.t. is conveyed to the Band I front-end section; moreover, no screen voltage is present on the Band III i.f. stage valve.

When the Band III adaptor is plugged in the appropriate socket, however, its incorporated "band switch" performs the function of h.t. changeover, so that on "Band I" position h.t. is removed from the adaptor and the screen of the Band III i.f. valve, and on "Band III" position h.t. is applied to the adaptor and Band III i.f. valve but removed from the Band I front-end section. This arrangement is shown diagramatically in Fig. 1.

The main feature of this system is that, since the i.f. stages are pre-aligned to cater for the additional loading of the Band III buffer valve, the problem of band selection is resolved simply by h.t. changeover, and in order to facilitate immediate changeover all valve heaters are constantly energised.

The input circuit of the Band III i.f. stage, or buffer stage, is tuned to match the i.f. output of the adaptor, and also arranged to provide a correct impedance match.

Quite a number of single-band receivers which were designed twelve months or so before the commencement of Band III feature plug and socket facilities for readily installing a Band III adaptor without the necessity of altering the receiver's wiring in any way.

Where the adaptor is designed to replace the original front-end section of a Band I receiver, the existing r.f. and frequency changer stages are sometimes completely removed and the i.f. output from the adaptor taken to the first i.f. valve.

This output may be taken direct to the grid circuit across a suitable matching resistor placed in the low-impedance end of the coil as shown in Fig. 2.

Sound pick-up

Clearly, this system is no good if the sound pick-up coupling precedes the first i.f. valve or grid circuit. If the sound pick-up is taken from the anode circuit of the frequency changer or mixer valve, then it is necessary to alter the function of this valve and make it into a low-gain i.f. amplifier stage.

This permits the adaptor's i.f. output either to be coupled into a suitable coil connected in the grid circuit of this modified stage, or coupled to the grid direct from the output coil in the adaptor.

The circuit of Fig. 3 shows how a typical self-oscillating frequency changer stage may be modified. The oscillator coil and tuning components are shown in dotted lines connected in the screen-grid circuit. This section is removed, as is also the link between the cathode and chassis. Biasing is applied to the valve by means of R2 and associated decoupling capacitor C1, and screen voltage is applied through R3 and decoupled by C2.

The grid damping resistor R1 is probably already existing in the circuit, but the i.f. coupling coil L1 will need to be installed and adjusted to tune flatly over the sound and vision i.f. spectrum.

By using a coil such as L1 a rise in i.f. gain is realised from this extra stage, and this, of course, is most desirable in Band III fringe areas. If extra gain is not warranted, however, the i.f. link from the adaptor may be connected direct to the control grid circuit.

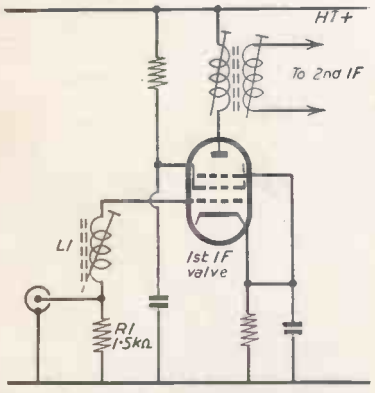


Fig. 2. A simple method of coupling the i.f. output from an adaptor to the receiver's i.f. channel.

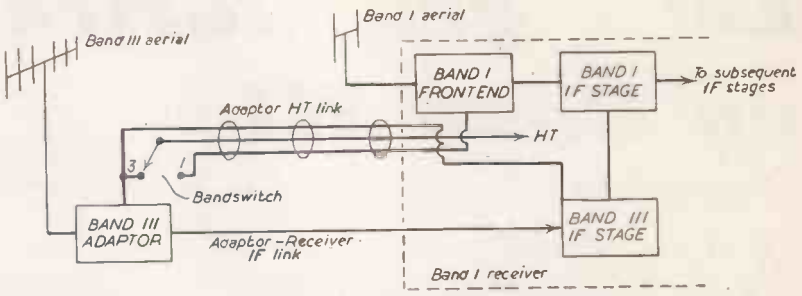


Fig. 1. Showing the method of coupling the Band III adaptor to the Pilot TV87 series receivers.

In receivers which employ a separate oscillator valve, the modification is not so difficult. Here, it simply involves removing the oscillator valve, disconnecting the coupling from the r.f. amplifier to the mixer valve, and altering the mixer grid circuit to take the adaptor's i.f. output.

Adaptor installation

Since, in these cases, the adaptor will be two-band, the existing Band I tuning and r.f. sections may be removed from the receiver; the r.f. and oscillator valves should also be removed, for their place in the heater circuit is taken by the valves in the adaptor (double-triode cascode and triode-pentode frequency changer valves are now produced with various heater ratings, making them suitable for 0.2, 0.3 amp. and 6.3 volt heater lines). H.t. is applied to the adaptor from the set's h.t. line through short inter-connecting cables.

Some of the adaptors which are designed for specific receivers pick-up their h.t. and l.t. supplies from one of the disused valve holders in the receiver, and for this purpose a special plug, corresponding to the valve base, is connected to the end of the adaptor's power supply cables.

Detailed installation instructions are supplied with all commercial adaptors, together with all the sundry items necessary for receiver modification. A template facilitating drilling and cutting the receiver cabinet to cater for the adaptor is also supplied, and K.B., Ltd., even supply a kit of tool drills, specially suitable for cutting the veneered cabinet without damage, with their adaptor kits.

A few commercial adaptors fix external to the receiver cabinet. The G.E.C., for example, have some of their adaptors built on a wooden base plinth which is styled to match the receiver cabinet.

Although adaptor installation instructions intimate that the job can be completed within a certain time, this does not generally follow for the first two or three adaptions.

For this reason, it is a good idea to assign one or two engineers solely for adaptions, as opposed to putting the work on the service department as a whole. In this way the normal work can be catered for, and the engineers performing the adaptions become extremely proficient after a short while.

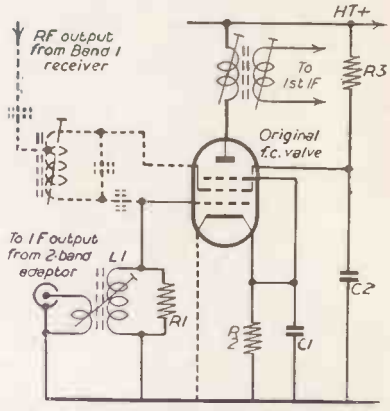


Fig. 3. Showing a method of altering a Band I frequency changer stage to take the i.f. output from a two-band adaptor.

Channel selecting arrangements

Adaptors of the nature described are often known as "tuner units." This is because the complete front-end tuning of the receiver is under their control. Although the presentation of the actual tuning arrangements may differ considerably between units, it helps to bear in mind that the basis circuits have much in common with the front-end circuit described in detail in last month's article.

There are three general modes of tuning; the most popular, and probably the most efficient is the turret

arrangement in which one set of coils is provided for each channel in both bands. The coils are located in spring clips around the turret or drum, so that when the turret is rotated the contacts on the appropriate coils locate on to a contact panel providing the necessary connections to the valves and circuit.

On tuner units of this type it is general practice to provide all the five sets of coils corresponding to the channels on Band I, and two sets of coils corresponding to Channels 8 and 9 on Band III. The coils are pre-aligned at the factory by means of altering the turns spacing and adjusting brass tuning cores.

Coils not provided for may be obtained from the manufacturers when they are required—sometimes only one set of coils in Band I is provided to correspond to the area in which the receiver is operating.

Some makers adopt a modification of this principle, and one maker uses three sets of coils located on a slide, so that when the slide is altered in position the appropriate coil sets are brought individually into circuit.

Incremental inductance tuners

Method two features a series of small coils mounted around the contacts of Yaxley-type rotary switches, the switches being arranged to tap along the series of coils, so that a correct deviation of inductance to correspond to the channels in both bands is applied across the circuit. Such are known as "incremental inductance tuners," they are used in the Pye, Pam and Invicta series receivers, and were fully described in *TV on Band III*, published in *B.R.T.* in May, 1954.

Method three is something after the style of a normal wavechange switch arrangement in a broadcast receiver. Here, a two-position rotary switch permits band changeover. On "Band I" position the normal five-channel tuning system is brought into operation, while on the "Band III" position the Band III coils are brought into circuit and these are continuously tunable over Band III.

It is only necessary, therefore, simply to pre-tune the Band I and Band III coils to correspond to the local channels, when immediate changeover can be made by operating the switch.

G.E.C. use a variation on this arrangement by providing facilities for selecting two pre-set stations in Band III. In this case a three-position rotary switch is employed.

TO BE CONTINUED

points of view

Letters to the Editor

The Editor welcomes letters on subjects of general, technical or trade interest, but does not necessarily endorse the views or opinions expressed by correspondents.

To the Technical Editor,

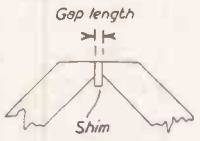
Dear Sir,—In Part 3 of your *Servicing Audio Equipment* series dealing with tape recorders (August issue) there are one or two small inaccuracies in the paragraph on Head Wear on which I should like to make the following observations:—

Recording engineers now generally refer to the "gap length" of a head (*i.e.*, the length in the direction of tape travel). This is more accurate than "gap width," and avoids confusion with the "track width" which the head traces on the tape.

The effective gap length does *not* generally increase with head wear, and certainly not for the reason implied in your Fig. 3. This effective length, which may be anything from 1.1 to 2 or even 4 times the actual physical length, depends critically on the accuracy of head assembly and the finish of the pole-ends and -faces.

So, since a reasonably fine tape will tend to slowly polish the faces, the effective gap length should improve rather than worsen. In fact, the finish on certain modern heads is already such that no improvement in this way is possible, and some low quality tapes may even roughen the pole faces. Only in this case would wear tend to lengthen the effective gap by worsening the intimate contact necessary between head and tape.

Your Fig. 3 is in some respects misleading, and any head constructed on these lines would perform poorly. The pole ends, shown there at an angle, must be absolutely parallel. To achieve this, the poles are usually assembled with an accurate non-magnetic shim between them. After asesmbly the pole faces must be lapped to remove any irregularities from the working surface of the head.



The pole tips themselves are almost invariably tapered, and not "sawn off" as there shown. This ensures the maximum possible concentration of field at the front of the gap.

The accompanying diagram may give a more accurate impression of the construction of heads found in modern equipment.—G. C. Balmain, Research and Development Dept., M.S.S. Recording Co., Ltd.

Misleading Meter Indications

CONTINUED FROM PAGE 554

affects both linearity and amplitude and gives misleading results.

The measurement of voltages fed via high-impedance sources is the most general way in which meters can give incorrect readings and cause erroneous conclusions. The cathode video feed to the c.r.t. is in most cases applied via a high-value resistor paralleled by a condenser of about 0.1μF, but immediately a meter is connected to the cathode of the tube the current taken by the meter causes an extra voltage drop across the feed resistor so that the reading is many volts below its real value.

The higher the ohms-per-volt resistance of the meter the less current it will take, and the more closely to the correct figure it will indicate. For maximum accuracy only the infinite impedance valve voltmeter will show the true working voltage.

Many manufacturers use a fixed potentiometer method of feeding the c.r.t. from the video amplifier stage. This system has the advantage that aircraft "flutter" is minimised and the heater to cathode potential is substantially reduced. In the Alba T392 and T492 series, for example, we find that two resistors of 100 kilohms and 220 kilohms are joined in series and connected from the anode of the EF80 video amplifier to chassis with the cathode of the c.r.t. fed from the junction of the two resistors, the 220 kilohm resistor forming the lower leg of the fixed potentiometer.

As soon as the voltmeter is connected from chassis to c.r.t. cathode, its own internal resistance is placed in parallel with the 220 kilohm resistor. Assuming that the resistance of the meter is 2,000 ohms per volt when set to the 150 volt range, its value of 300 kilohms in parallel with the 220 kilohm resistor produces an overall resistance value of some 130 kilohms—almost 50 per cent of normal.

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R.F. OUTPUT 1 μV to 100 mV

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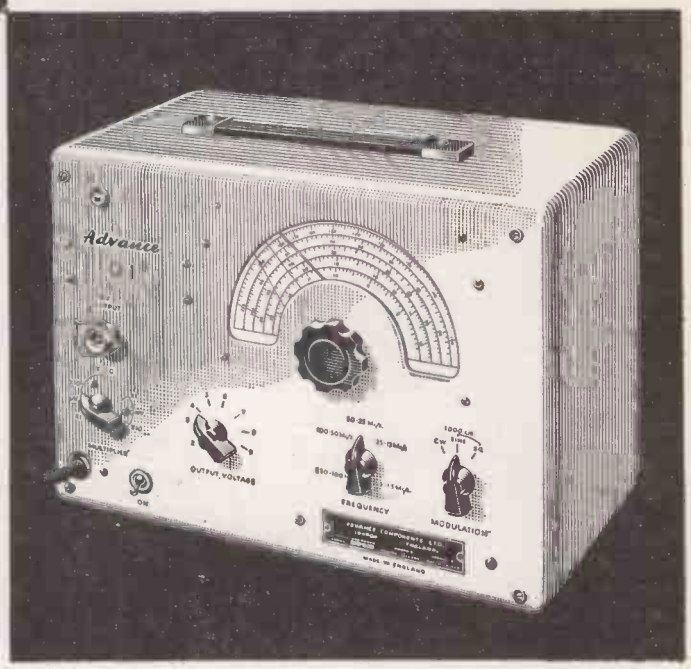

This "Advance" V.H.F. Signal Generator covers 7.5 to 250 Mc/s, a range that embraces Bands 1 and 2 *and also the impending Very High Frequency Television Transmissions on Band* 3. Moreover, this instrument is available at a price well within the reach of every service man. In the traditional "Advance" manner, this instrument is designed for simple operation and with a versatility that not only fulfils present needs, but anticipates the even more exacting requirements to deal with the television test problems of tomorrow.

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GD

SERVICE WITH A GRIN — by H. W. HELLYER

"It's probably only a wire come loose . . ."

THERE must be very few radio servicemen who have not heard that classic phrase. No doubt it greeted Signor Marconi when he first popped in to adjust his neighbour's catswhisker. And hardly less frequent is that hoary old gem:

"*But it was going all right last night!*"

I sometimes wonder why customers *will* dwell at length on the time at which their television failed, yet dither like a witness under cross-examination when asked to describe the symptoms that occurred. The dear old intermittent fault which vanishes at the serviceman's approach like toothache at the surgery door—how much easier it would be to locate if Mrs. Jones spared as much loquacity on explanation as she would in describing her "twinges."

Yet which is the more tiresome, the vague complaint of things not quite shipshape or the kind of crib one customer made?

"*—a pop and a fizzle and a crackle and a flash,*" he said, waving his hands like an Italian tenor. Investigation showed that his aerial plug was loose!

But even that description is not so vivid as the common one that proclaims an e.h.t. failure.

"*It's just like frying chips.*" And by golly, it is!

The complexity of modern apparatus has overawed many set owners and given rise to another stock remark.

"*I'm really afraid to touch it.*"

It is not only the dear old ladies who fear that their receiver will explode if they alter a manual control. One client I visited had been putting up with chronic sound-on-vision for several months, blaming the B.B.C.

"*They're awfully noisy in the studio nowadays,*" she confided, "*dropping things behind the scenes and making the cameras shake.*"

"I'm really afraid to touch it."

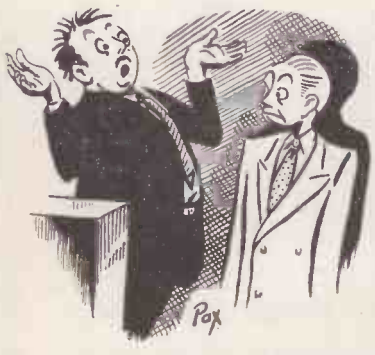
When I demonstrated that a touch on the fine oscillator tuner would cure her trouble she was horrified.

"*Oh, but I never go near it, except to switch it on,*" she exclaimed.

However, we all know the other kind of customer, not so timid, who will call for help when it seems all aid is past.

"*It isn't as if we fiddle with the thing,*" he observes virtuously as you eye the chewed heads of screws, the large blobs of tinman's solder and search for the missing i.f. slug. The willing novice who "has a go" himself usually provides repair men with a steady income. Many the set which has landed on my bench looking as if a hurricane had hit it!

There is another pet phrase which will be familiar to many a harassed dealer. It is usually the battle-cry of some warlike Amazon more concerned with appearance than efficiency.



. . waving his hands like an Italian tenor

"It isn't as if we fiddle with the thing"

"*I must have a NEW set,*" she declares brandishing a fistful of brochures. "*Brand new, mind, not one that's been in somebody else's home.*"

She gets her new receiver, unpacked in her presence (with all the attendant worries of the initial "setting-up"), and proceeds to criticise it. Apparently, a combination of all the leading makes would just—but only just—suit her. However, she'll give it a trial.

The "trial" is apt in more ways than one. She tries everything in the shop, including the dealer's patience. The sets proceed to and from her house with monotonous regularity — and each one must be NEW. When finally forced to choose, she questions the engineer installing it.

"*Is this really a reliable model? I'm paying good money and I don't want any old thing.*"

But woe betide the dealer should her final choice "go wrong." She will descend on the showroom breathing fire, accusing all in sight of having swindled her, demanding another new set.

And the irony of it is that the trouble is probably only a wire come loose!

She will descend on the showroom breathing fire . . .

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

OTHER ENGINEERS

Ferguson 968T

Melted Insulation Due to the extensive use of thin polythene insulation on the wiring of this series of receivers, engineers are likely to come across a similar fault to that experienced with the above model. The complaint was that there was an intermittent failure of the frame scan.

As this receiver uses a multivibrator type frame oscillator the two ECL80 valves were first checked, but were found satisfactory. It was then decided to check the charging capacitor C45 (0.1μF) but on proceeding to disconnect it for a leakage test the movement stimulated normal frame scanning operation.

It was found that the polythene insulation on the lead of the adjacent capacitor C43 (0.02μF) had melted and was making connection with the screen of the sync separator portion of the ECL80. Re-dressing the leads cured the fault.—N.M., London, N.17.

Pye V7

Fixed Grid Voltage The fault was uncontrollable brightness. The cathode follower valve V9 was substituted without improvement, so the voltages on the c.r.t. were checked with the following results: the grid was 185V instead of varying from 0-125V, the first anode read 280V instead of 452V and the cathode was at 180V instead of 127V. As a further check, the resistance readings on the c.r.t. were taken and it was found that on the grid the reading was 10kΩ instead of 100–115kΩ. The fault was then soon traced to C30, which had gone open-circuit.—R.R., Mansfield.

Bush TV33

Reverse Action Contrast One of these models—a new receiver—recently came back for service with the complaint that the contrast was very weak and operated in reverse. Subsequent tests with a valve voltmeter revealed a positive voltage on the grid of the valve on which the contrast worked (2nd vision and sound i.f. valve, V4—EF80). Incidentally, it is interesting to note that no deflection at this point could be obtained when using a standard multimeter, due to the damping effect.

Changing the suspected leaky capacitors C20 and C24 in the coil can containing L14 and L15 improved the reception, but it was necessary also to change the damaged anode decoupling resistor R18 (which is tucked away some distance from the actual valve) to restore the set to normal working conditions. This fault can occur on any of the current Bush models as the receiver chassis is the same.—J.H., Higham Ferrers, Northants.

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.

C.R.T. Hint

Clearing Internal Short With some cathode-ray tubes which have heater/cathode short circuits it is not practicable to fit an isolation transformer, but the following method stands a good chance of clearing the trouble. First charge up a 100μF electrolytic capacitor of about 450 volts wkg. and apply the charge via p.v.c. leads between the heater and cathode of the tube. The short-circuit will clear completely if the operation has been successful; the system is usually successful in about half of such cases.—R W., Birkenhead.

English Electric 16T18 Series

Intermittent Short Some of these receivers use a barreter to control the heater supply while others use the standard type of ballast resistor. It has been found on a number of sets using the barreter, the complaint being "set completely dead," that the barretter was open-circuit. On one of these, the mains line fuse was in order but

(Continued on page 547)

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

the barretter o/c. A d.c. resistance check of the whole heater chain failed to reveal any fault and so a new barretter was fitted and the receiver switched on. After about two minutes, the barretter glowed up very brightly and before the set could be switched off had gone o/c.

On re-examining the heater chain sequence it was seen that the second valve was the line generator (an EF80) which had its cathode connected direct to chassis. On test, this valve showed poor heater-cathode insulation; a replacement cured the trouble. Obviously the valve developed the breakdown when the heater potential was applied but cleared itself on cooling.—M.A.H., Exeter.

Ekco T221

Slow Picture Fade The complaint was that the picture faded after about half-an-hour. After two hours on soak test the fault became apparent, together with a change in frame scan speed. All the components in the frame oscillator circuit were checked and were found to be satisfactory except C104, the frame flyback suppression coupling capacitor. It showed a slight leakage. On replacement, normal brilliance and frame speed were obtained.—G.H., Newcastle.

Collaro RC54 Autochanger

Two Common Faults Two common faults are "not switching off after last record" and "switching off as last record is dropped." The first can be remedied by a slight adjustment of the auto-stop lever at point A in the diagram and, if necessary, point B. Usually the record balancing arm drops and actuates the auto-stop lever a fraction of a second too soon.

On one model it was found that the pawl attached to the auto-stop catch would stick in the position shown, when actually its own weight should pivot it. It had to be thoroughly cleaned with switch cleaner, its inner edges smoothed with emery cloth, before it would swing free; to make it a positive movement, a big blob of solder, weighing a few grames, was applied to the point indicated. This effected a complete cure and it should be emphasised that the slightest film of oil on this pivot will cause it to stick.—N.B.R., Stoke-on-Trent.

Ferguson 991T

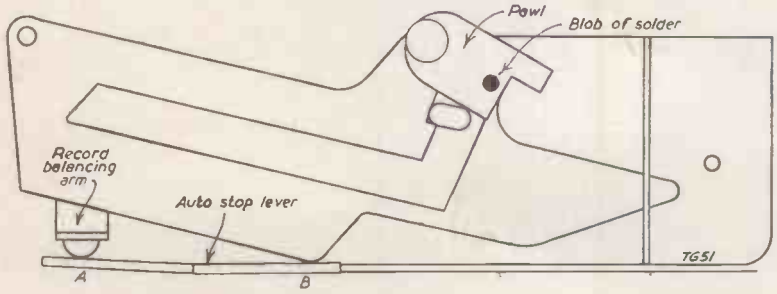
Sound On Vision The fault was intermittent sound on vision after about two hours running. A careful check proved that the oscillator was not drifting and that the sound rejectors were stable. Removal of the video modulation to the tube revealed that the raster only was being modulated with sound. The temporary replacement of C54, the line time-base oscillator decoupling capacitor, cured the fault.

The reason for sound-on-vision from this cause was that C51, the decoupling capacitor for the sound i.f. and a.f. section, was in the same can and the common negative tag was going o/c internally thereby coupling the sound section to the line time-base.—K.H., Bristol, 2.

H.M.V. 1824

Elusive Line Fault Trouble was no e.h.t. On test, the characteristic 10 kc/s note could be heard and it could be varied with the line-hold control. The line sawtooth waveform could be seen on the grid of the line output valve and the voltages appeared to be normal. Yet no spark could be drawn from the anode of the N152.

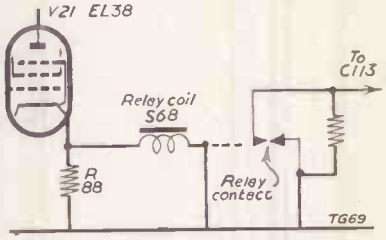
Everything pointed to a faulty line output transformer, but on substitution the only difference was that the line output valve was getting slightly hot. The fault was eventually traced to a defect in the coaxial cable which connects one side of the line scan coils to the cathode of the U153 efficiency diode. The outer braiding, which is connected to h.t. positive, had pierced the inner wire and was thus shorting out the boost capacitor C53 and other line output components.—J.N.H., Paisley.



Portion of Collaro autochanger mechanism referred to in text.

Philips 383A

Distorted Picture The owner complained of a severely distorted picture; contrast and sound were normal. On test it was found that the relay was not closing promptly and, when closed, bad distortion set in with a picture taking on almost an S shape. The line output stage smoothing capacitors were checked and the output valve (EL38) substituted without improvement. Referring to *B.R.T.* Test Report TV20 and the notes on the relay adjustments, the relay was re-set; this again brought no improvement.



Philips 383A line output stage cathode circuit.

An insulation check on the relay revealed the fact that one turn of the relay solenoid coil had slipped during manufacture and was lying outside the coil cheek and touching the relay frame. This coil (S68) is connected in parallel with the bias resistor R88 in the line output valve cathode circuit. With most of the winding being shorted out, distortion was being introduced by the EL38. Re-insulating the coil cleared the fault.

It is interesting to realise that this fault had developed after nearly four years' use. The slight movement of the relay contacts, when switching the receiver on, had slowly but surely rubbed through the enamel covered wire.—J.A.M., London, W.12.

Valve Fault

Heater Chain Fault This interesting valve fault was actually experienced on a Pye VT4 but it could equally well occur on some other receivers. The trouble was lack of sound and vision; on inspection it was noticed that, after switching on, all valve heaters and the c.r.t. heater were normal but within a few seconds the c.r.t. heater dimmed down and

(Continued on page 549)

finally became cold.

At first I thought that the trouble might be an internal s/c in the c.r.t. but realised that this could not be so because although the sound receiver appeared to be lively no signal was actually coming through. Examination of the valve next to the c.r.t. in the heater chain (V32) solved the problem.

This valve had an intermittent cathode heater s/c which caused the c.r.t. to be by-passed to chassis.—H.H.M., Petersfield, Hants.

Portadyne AG50

Inter-acting Fields This radiogram was brought in with the complaint of loud mains hum. After removing the set from the cabinet, the smoothing circuits were examined and a faulty common earth connection found, but after remaking this connection the hum persisted. It was then noticed that the hum appeared immediately—before the valves warmed up—and the trouble was finally traced to interaction of fluxes between the mains transformer and output transformer.

Repositioning of the output transformer to the cone supporting bracket of the speaker effected a complete cure. This is probably applicable to all models in this series.—P.J., Rayleigh, Essex.

Vidor CN4225

No Frame Scan Several of the above models have been serviced for the same fault—no frame scan, or intermittent frame scan. In each case the trouble has been due to the earthing lead from the frame output transformer breaking off at the adjacent chassis earthing tag because it was pulled too tight when assembled at the factory. There is some flexing of the chassis noticeable in the region of the frame output transformer and a slightly longer lead to allow for this obviates the trouble.—F.J.M., York.

Pye VT4

Double Triode Fault The complaint was no sound and only a third of the raster visible at top of screen; operating the brightness control shifted raster up and down. First concentrating on clearing the faulty sound section it was noticed that for the first few seconds background noise came through but quickly disappeared. It was then seen that the ECC82 (V9), which acts as cathode follower in the a.p.c. circuit and as white spot suppressor, was getting red hot.

The valve had a heater/cathode circuit in the cathode follower section and a replacement cured both sound and vision faults. The curious raster effect was doubtless due to hum introduced by the faulty valve into the vision circuit.—K.U., Co. Durham.

G.E.C. BT1746, etc.

Barretter Goes O/c The set was completely dead—no sound, no vision, no raster. Investigation showed that no reading could be obtained through the heaters and, after removing the can, it was found that the barretter was o/c. As this is unusual, the replacement barretter was fitted with some trepidation. However, since everything seemed to be normal, the receiver was switched on.

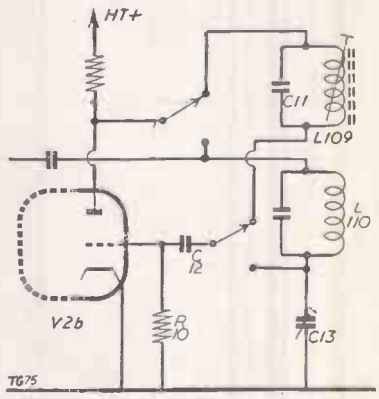
The barretter lit up normally, but as the valves warmed up it began to dim. Sound appeared, but when the e.h.t. whistle appeared the barretter began to glow brightly again and it continued to get progressively brighter. The set was hurriedly switched off, but on test no fault could be traced.

It seemed that the trouble was connected with the line valves and since the N339 has previously given plenty of trouble this was changed. On replacement and running the set again the barretter again glowed abnormally bright. Then the U329 boost diode was replaced—and this cleared the fault, although the original valve did not give any cause for being suspect.

Referring to the service manual it will be seen that the U329 is the first valve in the heater chain after the barretter and this no doubt accounts for the failure of the barretter. We have since had several of the above receivers with the same fault and replacement of the U329 has cleared the trouble in each case.—H.H., Blackburn.

Ferranti 14T4 Series

Oscillator Drift This fault, which may be experienced with receivers embodying two-band tuners (14T4, 17T4, 17K4, 17SK4), exhibits itself as a tuning drift causing vision-on-sound or weak sound about 30 minutes after switching on. Where this trouble occurs it can be cured by replacing C11 (15pF) by a 6.8pF negative temperature coefficient capacitor in parallel with a silvered mica 10pF capacitor.—J.G.H., Glasgow.



Ferranti 14T4 oscillator stage.

Philips 1800

Frame Scan Fault The vertical scan would barely lock and was of insufficient amplitude. The electrode voltages on V23 were incorrect, but the reason was not at first entirely obvious. If the circuit diagram is consulted it will be seen that the bias for V23 is derived from the anode circuit of the noise suppressor. The resistors R124 and R125 form a potential divider to supply the correct bias voltage. It was found that R124

(Continued on page 551)

SERVICE BRIEFS

Baird P1812, etc.: *A stock fault of "No picture; Sound o.k." is failure of the screen feed resistor to the line oscillator. Value is 4kΩ 5W and it can be replaced without removing chassis from cabinet.—B.H., Bristol.*

Ferguson 992/998: *Several cases have come in for "no raster" and in each case it was low anode 1 volt due to a leaky 0.01μF efficiency diode smoother—located on tag strip outside line output stage screen on underside of chassis.——D.C.F., Ilford.*

Cossor 927: *The cure for inability to lock frame time-base is often replacement of the germanium rectifier.—A.A., Bo'ness.*

Invicta 119: *In unpacking a new stock model it was found that the picture was normal but the sound could not be varied at all by the volume control. The makers had fitted an EF80 instead of an ECL80 for the sound output stage!—B.P.J., Walsall.*

H.M.V. 1807: *On several of these models, severe line pulling was not due to a fault in the sync separator circuits but to a faulty 0.001μF cathode by-pass capacitor in the time-base.—A.A., Bo'ness.*

(100kΩ) had gone unduly high in value. Replacement restored correct working conditions for V23.—R.C., Derby.

Cossor 916 Series

Curious Shaped Raster A curious fault in one of these models took the form of a triangular-shaped raster, about 2in. along the base and 2in. high, the bottom right-hand corner tailing off into a "whisker" and a wavy line running vertically down from the apex. As there was also a hum on the sound channel, a common fault was indicated, and a check was made on the h.t. decoupling. It was found that C59 (part of a 100+60μF electrolytic) was very low; replacement restored matters to normal.—K.M., Leeds, 9.

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

Bush TUG 34A

Intermittent Frame The receiver came in with an intermittent fault in the frame time-base, the symptoms being cramping at the top and the appearance of fly-back lines for about two inches on the top. The fault condition would appear at any odd time and always disappeared before any real checking could be undertaken. Eventually, however, the trouble was traced to a 0.1μF capacitor (C9 in service manual) mounted on top of the frame output transformer going intermittent open-circuit.—D.C.J., Minehead.

Philips 1114U

Loss Of Height This receiver came in for service with intermittent frame amplitude, the picture height suddenly decreasing about 2in. top and bottom. The fault took some time to develop and when it did the frame output valve was replaced, without success. Checking around the output stage then revealed an intermittent open-circuit cathode capacitor (C66) on the frame output valve. It could be provoked into the fault condition by lightly tapping it.—H.F., Belfast.

Pye VT4

Wrong Line Speed Several of these models have come in for attention with the complaint of incorrect line speed. In each case the fault has been traced to C96 (0.1μF) which had lost capacitance. Although replacement provides a complete cure it should be remembered that L21 must be retuned to 8,500 c/s in accordance with the instructions given in the maker's service manual.—G.H., Newcastle.

Roberts CR

Unusual Rectifier Fault The receiver worked normally on batteries but with mains operation only a loud hum could be heard. Smoothing capacitors were checked by substitution but did not clear the trouble. It was then noticed that the common negative grid bias resistor (R12,3900Ω) was running warm and starting to smoke. A meter check showed that there was about 30 volts across it and the h.t. line was lower than normal.

This, of course, indicated that the receiver was taking excessive current but checking the h.t. line for leaks produced no results. The metal h.t. rectifier was then disconnected and the bias resistor stopped smoking. Closer examination revealed a leakage of a few thousand ohms between the rectifier element to its fixing bush, thus placing a large a.c. voltage across the bias resistor.

Low efficiency rectifiers are fairly common but this is the first fault of this type that we have encountered.—B.A., Oxford.

Ekco T221

Capacitor Failure A recently sold Ekco T221 receiver failed after approximately one week's running. The complaint was no vision (sound was o.k.) accompanied by a distinct smell of something heating up. On removing the bottom panel with the set inverted there was no obvious sign of overheating but the smell persisted. An inquisitive finger, however, was rather blistered on touching the servo control VR1, which is mounted vertically under the chassis.

This control is fed direct from the h.t. line and so a check was made on components at the bottom end. These consist of the vision i.f. transformer, two 3pF capacitors. The fault was found to be a s/c in the 3pF capacitor coupling the primary to the secondary of the i.f. transformer. Replacement cured the trouble which could, incidentally, have been caused by either of the two small capacitors.—A.B., Colchester.

Pilot TV84

No Frame Lock The fault was the inability to lock the frame, the picture having frame jitter. On inspecting the chassis it was found that the 2-watt 27kΩ resistor R29 had been overheating and had increased its resistance. This was replaced, together with a new decoupling capacitor C25 which may possibly have been at fault although it showed normal on the bridge. No further trouble has been encountered.—S.H., Wigton.

G.E.C. BT1746

Time-Base Trouble A fairly common fault on this receiver is an insulation breakdown between the line and frame scan coils, resulting in anything from very low e.h.t. to corona flashes on the screen. In one such instance, however, the symptoms were rather unusual—the U329 booster diode became red-hot as soon as the receiver warmed up.

Insulation tests showed an intermittent leakage to chassis from the line output stage but this cleared while testing. The receiver was switched on again and a spark from the vicinity of the frame output stage provided the clue to the fault. Normally a scan coil fault only upsets the operating conditions of the line output stage as the frame coils and frame output transformer secondary are isolated. But in this case one of the leads to the frame transformer was breaking down to chassis and shorting the h.t. through the U329 valve.—C.A.F., Clydebank.

Ultra 814, 815

Some Typical Faults With reference to the remarks of F.A.S. (August, '55, *B.R.T.*) we find that frame non-linearity (cramping at the bottom when the height is increased) is invariably caused by the 470kΩ h.t. feed resistor going high. This resistor is extremely critical and when measured has usually increased to about 520kΩ.

A rather misleading fault on the above sets can be caused by C8 (100μF) which, when faulty, makes the picture behave as though there was no sync. If the holds are adjusted as carefully as possible it can be distinguished from a normal sync fault (usually caused by C32, 7pF) by the very faint hum bar which will be now apparent.—R.G.H., St. Annes-on-Sea.

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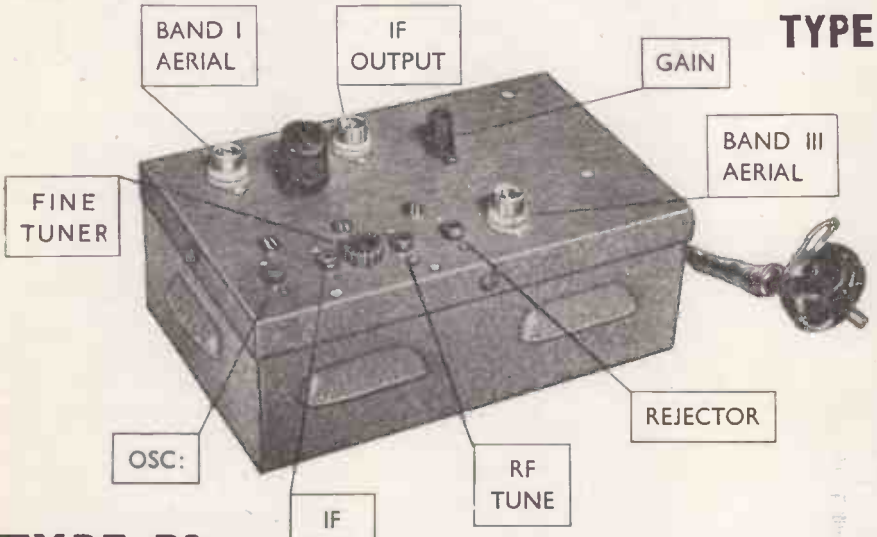

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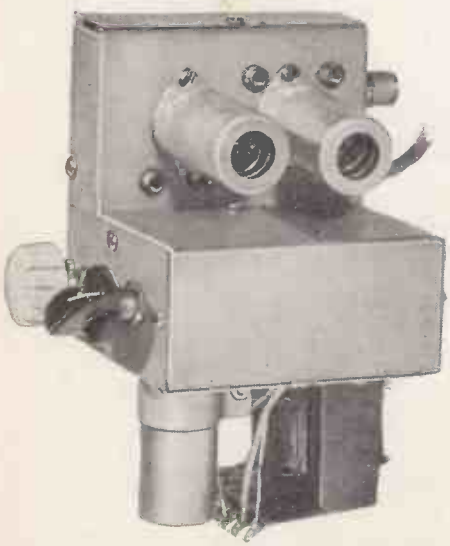

TYPE P3C ALL CHANNEL TUNER

Specification as for Type P2T.

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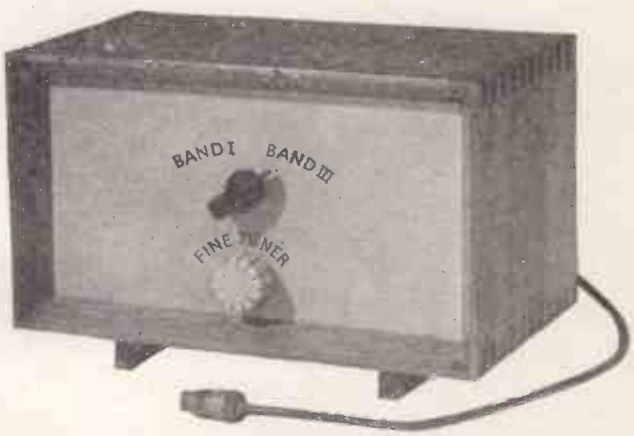

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Misleading Meter Indications

While the test-meter remains unquestionably the service engineers main indispensable tool, it can under certain circumstances give rise to misleading conclusions if the readings are not intelligently interpreted. This article explains how and why.

BY GEORGE R. WILDING

IN the course of normal radio and television service work it is often found that the application of a voltmeter to certain points in the circuit of a switched-on faulty receiver may partially or completely remove the symptoms of a fault. In such a case it is, of course, the meter's own internal resistance or capacity which has bridged an open-circuit resistor or capacitor and is acting as a "replacement" component.

In many cases, particularly in the field, the service engineer "stabs" his voltmeter, set to an appropriate range, across a suspect high value resistor as a speedy way of checking it, particularly if it is of megohm value and difficult to measure with any degree of accuracy on the resistance range of the meter.

This can usually be done with complete success, and as a rapid means of testing has much to commend it, but what we are concerned with in this article is those instances where the application of a meter apparently cures the fault but in fact merely alters the conditions producing the symptoms. In this way the meter indication can be misleading and give rise to much fruitless work.

Case in Point

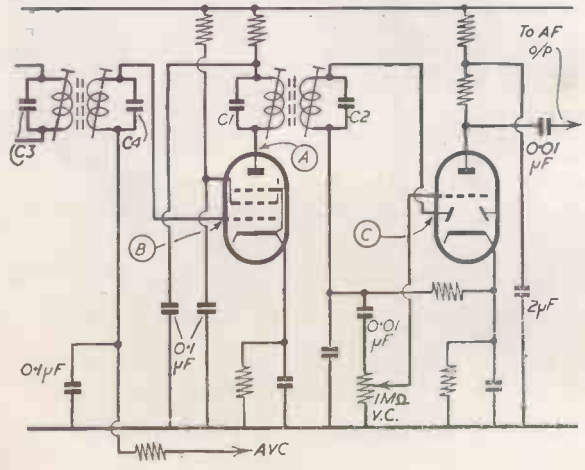
An all-dry battery portable, for example, was giving only mediocre results even with a new combined battery and four new valves. The service engineer did not have the appropriate service sheet to hand but traced the cause of the trouble to the DAF91 diode detector and a.f. amplifier stage, where he found what he considered to be an incorrect screen voltage.

As is usual in this type of receiver normal anode and screen voltages are very low, but on connecting the meter to the screen pin on the valveholder volume and tone had improved considerably.

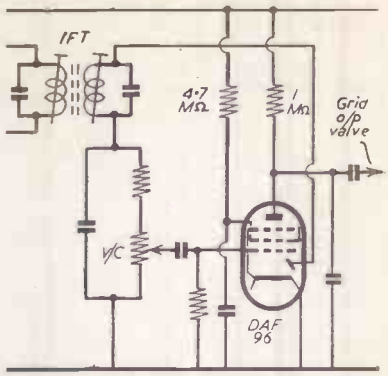
He came to the conclusion that the value of the screen-feed resistor was incorrect, deducing that the application of the meter would naturally lower the applied voltage by an appreciable amount.

The real cause of the trouble, however, was that the anode resistor had "gone high," thus lowering the anode voltage to well below normal and, in this particular case, appreciably below the screen voltage. By connecting the voltmeter between screen to chassis the screen voltage had also been lowered and thus the correct relationship between anode and screen volts had been restored.

In other words, by applying the meter to the screen circuit a great increase in gain had been realised although the true fault lay in the anode circuit.



Basic conventional i.f. amplifier and diode detector circuit. An increase of gain when meter test prod is applied to points A, B, or C is almost certain indication that the associated fixed i.f. trimmer has reduced capacity.



Typical detector-a.f. stage of all-dry portable (Vidor CN420A). If anode load goes "high," application of meter to screen will reduce Vs and cause apparent increase of gain.

A.V.C. Troubles

If the a.v.c. circuit of a receiver is not up to standard, distortion can occur on strong signals; but if in the course of fault location a meter is connected to any point early in the receiver, so reducing gain, it will appear that the insertion of the meter at that point has directly removed the distortion.

For instance, a radio came into the workshop for repair which, in addition to its labelled complaint of "Humming noise," was very distorted on Droitwich and the local regional station. The owner of the receiver was very surprised to hear it on our aerial as in his own home no distortion was present.

The answer lay in the fact that the a.v.c. circuit of the receiver was virtually inoperative. On an efficient aerial the signal overloaded the i.f. stages on strong stations, but on the customer's indoor aerial where the signal input was very much less the need for a good a.v.c. system was obviated and distortion did not occur.

By putting the test prod almost anywhere in the grid circuit of the frequency changer it was possible to remove the distortion. In this part of the circuit the meter reduced gain not only by reason of its internal resistance but also because of its self-capacity, which caused mistuning of the input circuits.

Using Capacity

The internal self-capacity of a voltmeter can be very useful at times. When tracking loss of gain in a superhet, for example, if the application of the test-prod to the live end of each i.f. transformer winding results in increased volume it can be reasonably assumed that the fixed value picofarad trimming capacitor paralleled across the winding has lost capacity or is open-circuit.

The "live ends" of the i.f. transformer windings are most easily accessible at the anode of the frequency-changer, the grid and anode of the i.f. amplifier, and the anode of the diode detector.

Due to the loading of the diode detector, the secondary of the last i.f. transformer is not so selective as the other windings; even so the effect of the extra capacity put across the circuit by the meter will be immediately appreciated.

This self-capacity can also lead to incorrect diagnosis, however. Recently, for example, the writer was investigating a mild form of instability in a modern type of a.c. all-wave superhet. The instability and tendency to oscillate increased as the volume control was advanced, while at all times the background noise was very "hissy."

Valves were all perfect and we reached the logical conclusion that somewhere in the circuit a decoupling condenser was at fault. But on removing the chassis it was found that the application of the meter prod to the grid pin of the output pentode almost completely removed the instability *although there was no condenser in this grid circuit.*

It then became apparent that the instability was caused by h.f. voltages getting into the l.f. circuits and that the capacity of the meter across the high-impedance output grid circuit was acting as an inefficient but effective by-pass condenser. In addition the internal resistance of the meter was to some extent reducing the value of the input signal and thus in turn reducing gain. It was, however, the capacity and not the resistance of the meter that was the prime factor in removing the instability.

As there was no capacitor in the output grid circuit, it was obvious that the trouble must lie in an earlier stage where the r.f. decoupling must be at fault. And, in fact, the trouble was eventually traced to the diode detector circuit where we found that one of the 80pF i.f. by-pass capacitors was completely open-circuit.

A.F. Coupling

When the application of a voltmeter to the grid of an output valve reduces the degree of distortion that may be present it is always worth while considering whether the grid coupling condenser has poor insulation, even though no apparent positive voltage indication is seen.

Assuming, for instance, an anode voltage of only 150 volts on the preceding valve and a value for the output valve grid resistor of 500 kilohms, it follows that with a coupling condenser leak of 50 megohms a positive voltage of 1.5 is applied to the grid of the output valve—sufficient to cause considerable distortion.

If, however, a 1,000Ω/V meter set to the 100 volt range is connected from grid to chassis, the effective resistance in the grid circuit becomes the reciprocal addition of meter resistance and the grid resistor value, *i.e.*, some 83 kilohms.

Instead of 1.5 volts positive being applied to the output grid there is now only a quarter of a volt which, of course, is hardly discernible on the 100 volt range of the meter.

TV Testing

When investigating inadequate height or poor linearity in a frame scanning circuit and, as is often the case, it is suspected that a resistor has increased in value, it can sometimes be misleading to connect a meter or even an appropriate value resistor across any suspected component. Even if such a test does produce an increase of height or an improvement of frame form, this does not of necessity prove that the paralleled resistor has increased in value as it may be employed in a negative feedback network. Any increase or decrease in the percentage of negative feedback operating in the circuit noticeably

CONTINUED ON PAGE 541

Radiant screen

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There are a hundred-and-one convincing reasons for the consistent quality and long life of Mullard Picture Tubes. But to describe them all would take a book or a full length film*. One feature, however, is all important—the fluorescent screen. This has been the subject of years of research by Mullard scientists.
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For details of the big Radiant Screen Advertising Campaign see the August issue of the Mullard Outlook.

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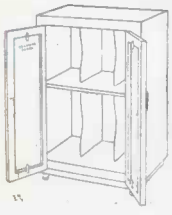

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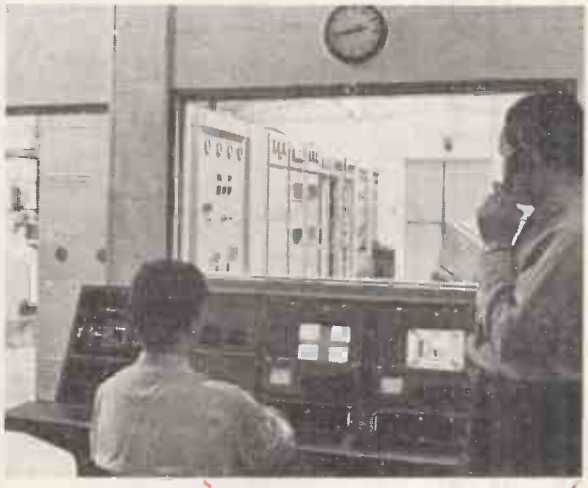
BAND III TOPICS

Welcome I.T.A.

THE STORY BEHIND SEPTEMBER 22—THE DAY WHEN THE ARRIVAL OF COMMERCIAL TV MADE BROADCASTING HISTORY IN THIS COUNTRY

COMMERCIAL TELEVISION, for months a subject of speculation and controversy, has shed its mantle of mystery and is now a thing of material aspect. Whatever our views, independent TV has arrived. For our part we welcome the newcomer—for the participation of the I.T.A. means more business for all concerned in the industry—from the component manufacturers to the service engineers.



General view of the transmitter hall seen from the control room.

But how many radio men, immersed in the problems of aerial installations and set conversions, absorbed in assessing the largely unknown quantities of ghosting, interference—and, perhaps, of the type of programme material—how many realised the sort of high pressure work that was necessary to ensure that the first programmes went out on September 22?

The behind-the-scenes story on the transmitter construction is one of hustle. The completion of the station on time was a feat of no mean merit, the greatest difficulty being one of available time.

It was not until February that the station site was cleared for construction of the tower and transmitter buildings. Despite this, the station was built and the equipment installed and made operational in the remarkable time of seven months. The erection of the tower posed several problems, partly due to shortage of materials and partly on account of the limited space available But the tower was completed to schedule, without felling a single tree in the small station compound.

Race Against Time

With the buildings and tower completed, the equipment was installed and such was the fight against time that the Marconi engineers volunteered to sacrifice their summer holidays to enable completion on schedule. By September 4, the vision and sound transmitters, and all ancillary apparatus, were installed and test signals being radiated.

Thus came the historic day of September 13, when the station was officially opened by the Mayor of Croydon. Nine days later the first full-scale programme service began.

The station has been designed by Marconi's Wireless Telegraph Co. Ltd., in collaboration with I.T.A. engineers. The present transmitters are to be augmented by two further transmitters and though the basic design will be similar there are a few variations. The description which follows is based on the full production versions.

Vision Transmitter

The vision transmitter consists of a 2kW transmitter driving an amplifier which provides an output of 7.5–10kW. The complete transmitter gives a peak output of 10kW under vestigial sideband conditions at any chosen channel in the upper frequency band of 170–216 Mc/s. Air cooling is used throughout and all components and valves are generously under-run to secure long life and high reliability.

A transmitter control panel provides for normal day-to-day operation of the transmitter, which may thus be brought up on power from the control desk. A c.r.t. monitor provides for waveform examination, the final amplifier is metered for voltage and feed, and black level control and calibrated input attenuator are also provided on the control panel.

The drive circuit is crystal controlled, the crystal itself being oven controlled and operating at a sub-multiple of the output frequency (at around 5 Mc/s). The crystal oscillator and associated frequency multipliers and stabilised power supply form a complete unit with an output of about 15 watts at the operational frequency. Long-term stability of better than 0.0002 per cent permits off-set carrier operation of two adjacent transmitters on the same channel.

The first and second triode r.f. amplifiers work in single-ended ground-grid circuits using coaxial lines as circuit elements. The final, modulated, amplifier is an air-cooled tetrode in a single-ended coaxial line circuit.

The output signal from the control desk is bridged across the input of two units—a clamp pulse generator and a correction unit. The former produces a clamping pulse which will remain correctly timed in the presence of noise pulses on the incoming signal, positive or negative going, up to 1.5μS duration. The second unit stretches the sync pulses, clips them to a standard level and applies pre-correction to compensate for transmitter non-linearity. Signals are clamped by pulses from the clamp pulse generator and the output is fed to the preamplifier.

Here the signal is amplified and since the input is correctly clamped the black level is maintained in the succeeding stages by d.c. restoration. A signal is obtained via a probe in the aerial feeder, rectified and fed to the final clamping and black level feedback unit. The amplitude of the sync pulse in the signal thus derived is used to maintain the black level constant; the signals are also clamped by pulses from the clamp pulse generator.

The final amplifier and modulator is fed from the final clamping stage through an input cathode follower, the whole circuit being directly coupled to maintain the constancy of

Artist's impression of the I.T.A. Midlands station at Lichfield now under construction.

black level. A cathode follower stage feeds a normal shunt regulated amplifier, followed by a cathode follower stage in order to supply the large reactive current demanded by the stray capacitance appearing at the modulation terminals of the amplifier.*

Aerial Array

The present transmitters are feeding into an 8-stack aerial array, the installation providing an e.r.p. of approximately 60kW. By the end of the year the existing transmitters will be augmented by the two further Marconi transmitters of about the same power outputs. This will raise the e.r.p. to the region of 120kW.

NEW AR-TV STUDIO CENTRE

WEMBLEY Film Studios, which in January were still being used by the film industry (for the shooting of the film *The Ship that Died of Shame*), are being converted by Associated Rediffusion, the London weekday programme contractors, as a permanent television studio centre.

The site, just under 2½ acres, will eventually consist of five studios with a master control system designed specifically for commercial television. Compactness is the keynote of this design, which it is said will be the most up-to-date of its kind in the world.

Highlights are: full remote control of all telecine facilities, comprehensive lighting control panels for single handed operation, permanent viewing galleries for visitors overlooking the studios, and special equipment for achieving artistic effects of the inlay and overlay type and for the quick display of captions and slides.

Central Rediffusion Services, Ltd., are responsible for the new centre as a whole, while the design of the technical areas and the supply and installation of TV equipment has been carried out by Marconi's Wireless Telegraph Co., Ltd. Once again, the story is one of hustle. The work includes the installation of nearly 20 miles of sound, vision and control cables and has been completed in record time—said to be quicker by half than any other comparable scheme in the world.

(Continued on page 565)

Progress at Lichfield

WORK began on levelling the site and excavating the foundations for the building and the mast two months ago. The transmitting equipment is being built by Pye Ltd., and the mast and aerial system by Marconi's Wireless Telegraph Co., Ltd.

The transmitter will start on high power with an effective radiated power of 144kW or more. This may be increased later to 200kW or even more. Signals will be transmitted from a high gain aerial which will be carried on a 450 foot self-supporting tower. As the site is 500 feet above sea-level the total height of the mast above sea-level will therefore be 950 feet.

Associated Broadcasting Co., Ltd., will supply the programmes to be transmitted from the Lichfield station on Monday to Friday. The I.T.A. have appointed Associated British Cinemas (Television), Ltd., as week-end programme contractors for the Midlands.

Service Area of the Midlands I.T.A. Station

THIS map shows the areas in which reception of the I.T.A.. Midlands television station at Lichfield will be possible when the transmitter comes on the air in January or February next year.

Provided that the correct type of receiving aerial recommended for the various localities is used and the appropriate conversion of single channel receivers to obtain the alternative programmes is made, reception conditions in the zones are expected to be as follows:

INNER UNSHADED ZONE (PRIMARY SERVICE AREA)

Most viewers in this area, unless situated in specially unfavourable positions, for example, immediately behind high ground, or screened by high buildings, will receive a satisfactory service.

SHADED ZONE (SECONDARY SERVICE AREA)

Within this zone a substantial proportion of viewers will receive a satisfactory service, but there will be some local areas in which reception conditions will be poor.

OUTSIDE THE SHADED ZONE

Some favourably situated viewers will be able to obtain a reasonable service.

The map shows that the estimated Primary Service Area extends from the transmitter out to some thirty miles to the west (near Wellington); for about 35 miles to the north (near Matlock); for about 35 miles to the east (near Market Harborough); and for over 50 miles to the south (in the Vale of Evesham).

The estimated Secondary Service Area brings into range places some 50 miles distant from the transmitter in the west (between Shrewsbury and Oswestry); some 45 miles distant in the north (near Bakewell and Chesterfield)and in the east (near Grantham and Oakham), and nearly 60 miles in the south (near Gloucester and Cheltenham).

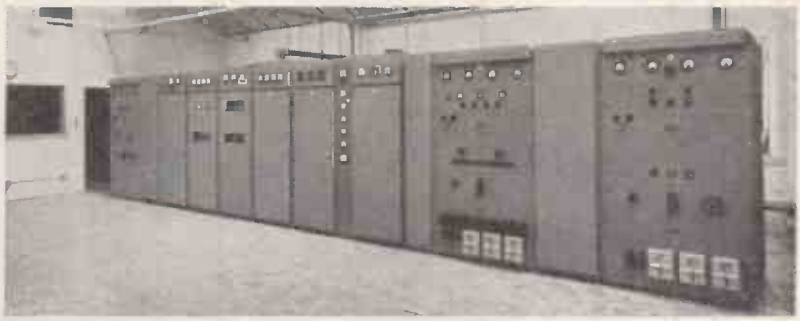
BAND III TOPICS —Continued

Layout

A three-deck layout has been evolved with the technical area isolated from the programme and visitor traffic, with direct and rapid contact between studio personnel and the master equipment room staff. The technical area is mainly on two floors.

The ground floor comprises viewing rooms, camera control rooms, lighting control rooms, sound locks, technical stores and workshops. The first floor houses vision, sound and camera control rooms and three announcer's rooms. The second floor has the master equipment room, a lighting control room and a lighting equipment room, both for remote control of studio lighting.

AR-TV had 21 cameras in operation when transmissions started on September 22. They are Marconi Mark III cameras, 4½in. for studio and 3in. for O.B. work, similar to those recently supplied to the B.B.C.



The I.T.A. Croydon transmitter, comprising the Marconi 2kW sound transmitter, 10kW vision transmitter, and power supply units. A further transmitter will be installed towards the end of the year.

Telecine

E.M.I. flying spot telecine equipment is installed and there is also some American R.C.A. telecine equipment in which the projectors throw their outputs on to a small Vidicon camera via an optical multiplexing unit. On this equipment, also, miniature slides and small opaques can be shown after the fashion of the epidiascope. A unique system enables any of the telecine equipments, once loaded, to be entirely operated from a remote control position.

G.E.C. book 36 CTV Spots

THE General Electric Co., Ltd., have booked 36 week-day spots for the first six months of commercial television. Various domestic products, from Osram lamps to refrigerators, will be featured in these spots, which are of varying duration, lasting from 60 seconds to 15 seconds.

The wide range of products to be featured has inevitably led to considerable variation in treatment, and the company has evolved three main presentation methods, each suited to a particular group.

Radio and television receivers are introduced informally after a brief description of some spectacular and interesting G.E.C. achievement in another field, such as the lighting of the Grand Mosque at Mecca.

Household appliances will form the subjects of "documentary" style demonstrations. Osram lamps will be featured in cartoons. The radio and television spots have been produced by Greenly's, Ltd., the household appliance spots and the Osram cartoons by W. S. Crawford, Ltd.

In all three types of spot the highly individual characteristics of the new medium have been borne in mind, and sincerity, authority and naturalness have been the first essentials.

Personalities

Personalities appearing in these spots have been chosen for their sincerity and natural manner; they had to put their viewers at ease as well as carry conviction.

Symbols and Slogans

All the G.E.C. spots, regardless of duration or product, will open and finish in a standard way. Viewers will see an atomic pattern at the centre of which is a small dot which will grow larger and become recognisable as the world rotating on its axis. As the reverse side turns towards the viewer, he will see the letters "G.E.C." on the back. The sphere then becomes oval and the words "Everything Electrical" will appear beneath. The oval, enclosing the letters "G.E.C.", with the words "Everything Electrical" underneath is also featured at the end of the spot.

The television receiver spots are particularly interesting in that a large percentage of the viewers will naturally possess a receiver already. These spots will, therefore, emphasise the improved styling and picture quality available with the latest models.

EKCO ON FIRST NIGHT OF COMMERCIAL TV

E. K. COLE, LTD., were the first radio company to use commercial television in this country.

On the opening night—September 22—at approximately 9.30 p.m., the first Ekco "Spot" went on the air to cover Ekcovision, featuring in particular the new 21in. tube console Model TC268. The well-known Ekco guard and his phrase—*Best Way to All Stations*—which was used with great success in the Ekco Radio Show advertising campaign, was also incorporated in the "Spot."

The second Ekco commercial appeared on Wednesday, September 28, at approximately 7.15 p.m., and dealt with Ekco radiograms.

These Ekco "Spots" are the first of a weekly series; one of the outstanding features is the arresting visual and aural link between each "Spot."

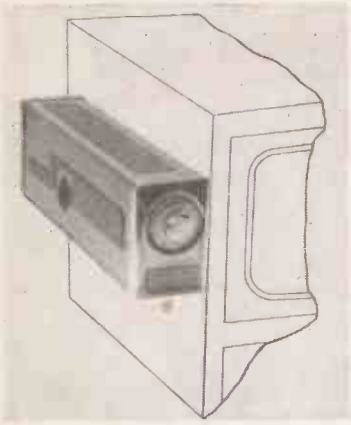
The latest in Radio and TV Receivers and Accessories

New Ferranti models: (left to right) 21in. TV console; Model 355 a.m.-f.m. radiogram; Model M55 a.c.-d.c. transportable radio.

ADDER 13-CHANNEL CONVERTER

Spencer-West, Quay Works, Great Yarmouth, Norfolk. Tel.: Great Yarmouth 3009-4794.

THE Spencer-West Type 39 converter unit, known as the *Adder*, is designed to convert any make of television receiver into a 13-channel type, and is expressly designed for attachment at one side of the receiver (see illustration). The channel selector switch is mounted at the end of the unit so that it is accessible from the front of the set. Finish is in enamel and chromium plate, with anodised fittings and perspex indicator scales.



The new Adder 13-channel converter in position on set.

The unit has a built-in power supply, and consists of a cascode r.f. amplifier followed by a mixer stage. Band switching is effected by a 12-position switch. Dimensions of the unit are 11in. × 3½in. × 2½in. Price £10 10s.

FELGATE D.C.-A.C. ELECTRONIC INVERTER

Felgate Radio, Ltd., Felgate House, Studland Street, Hammersmith, London, W.6. Telephone: RIVerside 8141.

THIS new electronic inverter is primarily a power source to run a.c. equipment from 200-250V d.c. mains. It was designed mainly for radiograms (where it can be inconspicuously housed inside the cabinet), but can also be used for most kinds of a.c. apparatus needing a power of between 25 and 78 watts.

Basically the unit consists of a 50 c/s valve oscillator driving a six-valve push-pull power amplifier, provision being made for connecting the inverter to an external switch, a useful feature when the inverter is fitted in a radiogram. Price of the unit is £9 trade.

NEW FERRANTI MODELS

Ferranti, Ltd., Moston, Mancheser, 10. *Tel.: FAIlsworth* 2271, 2071.

NEW Ferranti models shown at the Radio Show include a (20in. diagonal) table projection TV set, a 21in. direct-view console TV, an a.m.-f.m. table radio, two a.m.-f.m. auto-radiograms, and an a.c.-d.c. transportable radio.

Model 20T5 is a 13-channel table projection TV with a 20in. diagonal picture, incorporating a 23-valve chassis. Sound output is via a 7in. × 4in. elliptical speaker. For operation on a.c. mains, 200-250V. Price 95 gns. (tax paid). Model 21K5 is a luxury 21in. console receiver with doors, tuning to 13 channels, for operation on a.c. or d.c. mains 200-250V. Circuit is an 18-valve superhet, sound output being via an 8in. p.m. loudspeaker. Price 129 gns. (tax paid).

Model 255 is a 6-valve a.m.-f.m. table radio having three wavebands (l.w., m.w., and v.h.f.) with built-in aerials. Output is 5 watts to a 10in. elliptical speaker. Cabinet finished in walnut veneer. Price 24 gns. (tax paid).

Model 335 is a 6-valve a.c. superhet radiogram with three wavebands (including v.h.f. f.m.) A 3-speed autochanger is fitted, and output is 5 watts to a 10in. speaker. Cabinet is finished in walnut veneer. Price 59 gns. (tax paid). Model 455 is a bureau-style radiogram incorporating an 8-valve chassis covering long, medium and v.h.f. wavebands. The push-pull output feeds 10 watts to twin 8in. speakers. A tone-compensated volume control is fitted. Price 79 gns. (tax paid).

Model M55 is a new a.c.-d.c. 5-valve transportable radio covering long and medium waves, housed in a neat moulded cabinet. Output is 3 watts via a 5in. speaker. Price 13½ gns. (tax paid).

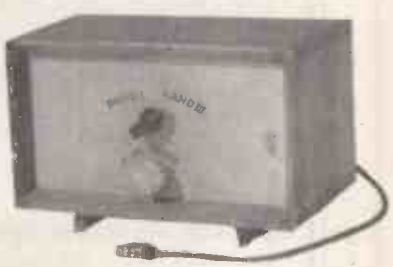
CATHORA CONVERTERS

Cathora, Ltd., 44 *Bavaria Road, London, N.*19. *Tel.: ARChway* 1044.

FOUR Band III converters are being produced by the company. Type P2T has been in production for several months and comprises a cascode amplifier followed by a self-mixing oscillator, giving high gain coupled with adequate bandwidth (4.5 Mc/s.). Fine tuning control and gain control are fitted. A special feature is that the unit is tunable over the entire Band III range, and may be set to any intermediate frequency within Band I. Dimensions are 7in. × 4in. × 3in., and the unit may be mounted within reasonable proximity to the receiver.

Type P3C is a multi-channel tuner of improved design, scheduled for production early in October. It will eventually supersede type P2C. New features include separate adjustment of sound and vision channels. The unit feeds an i.f. of 45 Mc/s into the receiver's input circuit, the bandwidth being around 6 Mc/s. Two types of i.f. are contemplated in order to cover both upper and lower sideband receivers. The unit is suitable for use in any part of the country but will initially be aligned for the London station.

(Continued on page 569)



The Cathora type P3C multi-channel Band III tuner unit.

BRAND NEW *Continued*

Type P3 is similar to the P2T and is intended for mounting internally in sets where the manufacturer has not made provision for the fitting of a converter. It is supplied with mounting brackets and template for rapid installation. The fine tuning and bandswitch controls protrude on extended shafts through the side of the cabinet. It can be supplied with or without power pack and is of small dimensions. For use with a.c. receivers.

Type P4C is an a.c.-d.c. converter with built-in power supply specifically designed for use in areas of low d.c. mains. It will be available early in 1956.

All products are covered by a 12-month guarantee (valves are covered by a separate B.V.A. guarantee). The company have initiated an installation service to the trade, details of which may be obtained on application.

ANTIFERENCE HI-LO TV AERIAL RANGE

Antiference, Ltd., Bicester Road, Aylesbury, Bucks. Tel.: Aylesbury 1467-9.

SOME technical details of the new *Hi-Lo* range of Antiference television aerials are given in our Radio Show review on page 527. A new principle is employed, namely, the electronic coupling of the Band I and Band III sections of a two-band aerial array by means of a critically spaced resonator element. This new system of coupling is claimed to provide additional gain on Band III, and enables the aerial to be designed and built as a robust and rigid structure.

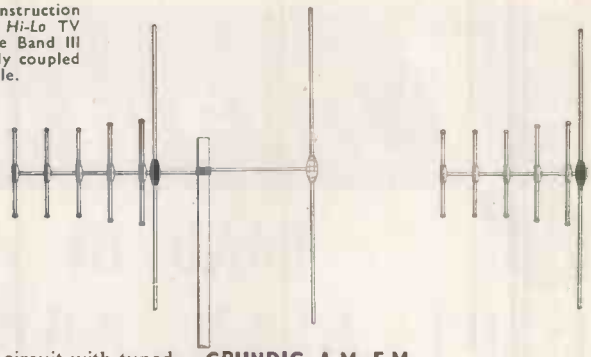
A pre-assembled construction is employed so that the various elements permanently attached to the boom can be simply swung into position and locked, thus saving assembly time and eliminating the possibility of error.

Five aerials are currently available in the range. Model HL60 is a Band I dipole plus 5-element Band III array with " U " bolt clamp assembly for fitting to existing masts up to 2in. diameter; list price £3 2s. 6d. Model HL61/3K is a Band I dipole plus 5-element Band III aerial with 5ft. stand-off mast and wall back-plate; list price £4 4s. Model HL61/5K is a Band I dipole plus 5-element Band III aerial with 5ft. stand-off mast and chimney lashing equipment; list price £4 12s. 6d.

The other two models incorporate a rotatable reflector enabling directivity to be varied independently on each band. Model HL70 is a Band I " H "-type aerial with rotatable reflector plus 5-element Band III aerial with double-" U " bolt clamp (head only); list price £4 7s. 6d. Model HL70/6G is a Band I " H " aerial with rotatable reflector plus 5-element Band III aerial with 10ft. mast and type 6 mounting; list price £8 2s. 6d.

Models are available for channels 1 and 9, 2 and 9, and 4 and 8.

Diagrams showing the construction of the new Antiference *Hi-Lo* TV aerial range in which the Band III elements are electronically coupled to the Band I dipole.



Another new Antiference item is a universal "Y" box for interconnecting Band I and Band III aerial feeder cables. It embodies a printed circuit with tuned filter circuits for use with balanced or unbalanced feeder cables of 75-80 ohms impedance. Type Y1, for external use, has a waterproof cover; type Y2 is identical in construction, but is supplied without waterproof cover for indoor mounting. Prices are: Y1—16s. 6d.; Y2—12s. 6d.

PORTOGRAM BABYGRAM

Portogram Radio Electrical Industries, Ltd., Priel Works, St. Rule Street, London, W.8. Telephone: MACaulay 2246/7.

THIS new Portogram record reproducer (illustrated) was introduced at the Radio Show. Known as the *Babygram*, it comprises a 3-speed record-playing unit with a 2-valve built-in amplifier having tone and volume/on-off controls. Output is via a 7in. × 4in. elliptical speaker.

The instrument is housed in a laminated wood cabinet covered in leather cloth of various designs and colour. The motor board and fitments are ivory-finished. For use on a.c. mains 200-250V. Price 11 gns. (tax paid). A 110V model is available at 10s. 6d. extra.

The new Portogram *Babygram* 3-speed record reproducer.

GRUNDIG A.M.-F.M. RADIOGRAMS

Grundig (Great Britain), Ltd., Kidbrooke Park Road, London, S.E.3. Tel.: LEE Green 8541-5.

TWO new Grundig products are announced, the *Arundel* and *Warwick* radiograms, both of which incorporate v.h.f. f.m. tuning. The

Thr Grundig *Arundel* a.m.-f.m. radiogram

Arundel (Type 8055/W3D) is a 6-valve 4-waveband superhet covering l.w., m.w., s.w., and v.h.f. An f.m. dipole and a ferrite rod aerial are built-in. Output is 6 watts via a comprehensive " 3-D " loudspeaker system comprising two bass units, two middle range units, and two electrostatic tweeters. Separate bass and treble controls are provided.

A 3-speed record changer is fitted, and provision is made for a Grundig tape recorder to be played back through the instrument. The cabinet is finished in highly polished figured walnut, and is gold embossed. An illuminated record storage compartment is provided. For a.c. mains only, 105-250V. Price 195 gns. (tax paid).

The *Warwick* (Type 7062/W3D) has a 6-valve 4-waveband chassis (including f.m.) and incorporates four loudspeakers including an electrostatic tweeter. The cabinet, of the console type with top lid, houses a 3-speed autochanger and record storage space, and is finished in

(*continued on page 571*)

BRAND NEW *Continued*

highly polished walnut. Facilities are available for tape-recorder playback. For operation on a.c. mains 105-250V. Price 102 gns. (tax paid).

EDISWAN RECTANGULAR 14in. C.R. TUBE

The Edison Swan Electric Co. Ltd., 155 Charing Cross Road, London, W.C.2. Telephone: GERrard 8660.

THE first 14in. rectangular cathode-ray tube to be introduced by Ediswan is now available. It is designated type CRM143, and is characteristically similar to the CRM142. Features include an ion-trap tetrode electrode gun and B12A base.

Specifications: heater 12.6V, 0.3A; final anode (max.) 14kV, (min.) 8kV; first anode (max.) 410V; screen colour —white fluorescence, grey glass face.

NEW FERGUSON MODELS

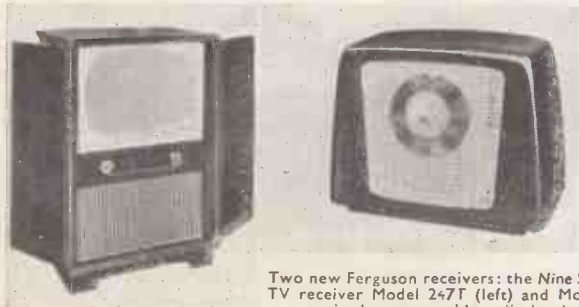
Thorn Electrical Industries, Ltd., 105-109 *Judd Street, London, W.C.1. Tel.: EUSton 4433.*

SEVERAL new additions to the Ferguson radio and television range were on view at the Radio Show. In addition to the *New Standard* series of 14in. and 17in. television receivers in table and console models was a new 21in. tube *Nine Star* television console with doors (illustrated). This model, in common with all Ferguson television sets, incorporates a 12-way turret tuner and a new type of vision a.g.c. circuit. Price 135 gns. (tax paid).

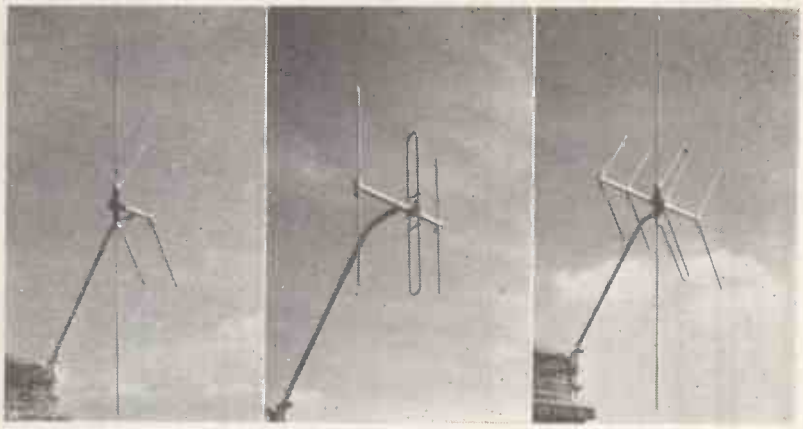
In radio Ferguson have a new mains-battery portable, Model 342BU, with a crystal plastic triple concentric control dial mounted centrally in the speaker grille. It embodies a 5-valve chassis covering medium and long wavebands, housed in a moulded plastic cabinet available in two colour schemes. Price 16 gns. (tax paid).

Model 352U, at the low price of 13 gns. (tax paid) is a new a.c.-d.c. mains transportable in a plastic cabinet covering medium and long waves. Output is via a 6in.×4in. elliptical speaker.

A new radiogram for a.m.-f:m. reception is Model 375RG, a 6-valve, 4-waveband bureaugram with 8in. speaker and built-in v.h.f. dipole aerial. The cabinet, finished in walnut veneer with handles of toning bronze, has record storage space. Price 69 gns. (tax paid).



Two new Ferguson receivers: the *Nine Star* 21in. console TV receiver Model 247T (left) and Model 352U, a low priced transportable radio in plastic cabinet.



Three aerials from the new Wolsey range. From left to right—Type SDL+2 for combined Band I/Band III operation; Band III aerial Type Y3; combined Band I/Band III aerial type SDL+4.

NEW WOLSEY AERIAL RANGE

Wolsey Television, Ltd., 43-45 *Knight's Hill, West Norwood, London, S.E.27. Tel.: GIPsy Hill 2207.*

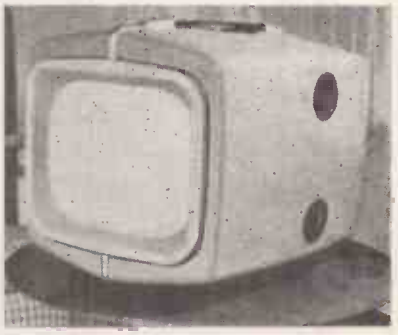
WOLSEY have introduced a range of new additions to their Band III and combined Band I and III aerials, which were shown for the first time at the Radio Show. The models include:—

Type HL+3—an "H" type (Band I) plus 3-in-line (Band III) complete with 4ft. cranked arm and chimney lashing (£5 12s. 6d.). Type HL+4—an "H" type (Band I) plus 4-in-line (Band III) complete with 4ft. 6in. cranked arm and chimney lashing (£6). Type SDL+2—a single dipole (Band I) plus 2-in-line (Band III) complete with chimney lashing (also available for wall mounting) (£3 7s. 6d.). Type SDL+3—a single dipole (Band I) plus 3-in-line (Band III) complete with chimney lashing also available for wall mounting) (£4 7s. 6d.) Type SDL+4—single dipole (Band I) plus 4 in-line (Band III) complete and with chimney lashing (also available for wall mounting) (£4 15s.). Type Y3—a 3-element Yagi array (Band III) incorporating purse-type junction box complete with chimney lashing (also available for wall mounting) (£2 5s.).

MURPHY V230 TRANSPORTABLE TV

Murphy Radio, Ltd., Welwyn Garden City, Herts. Telephone: Welwyn Garden 3434.

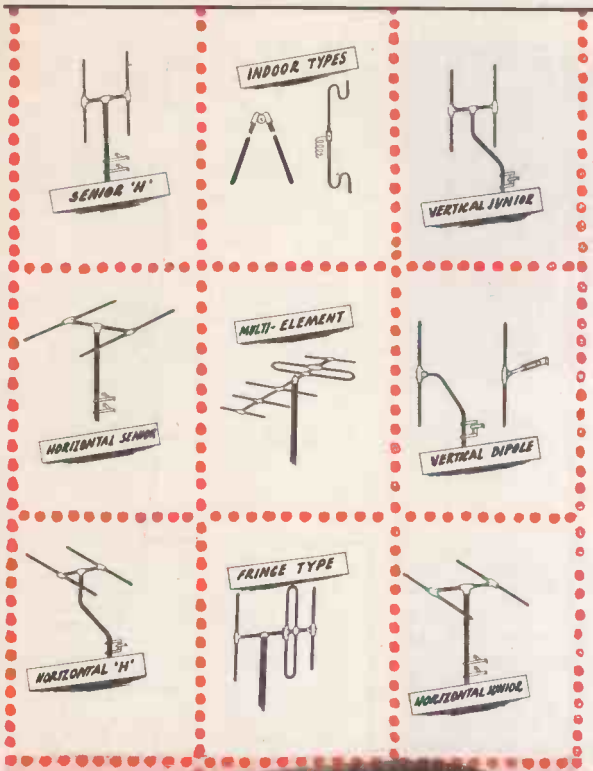
ONE of the most interesting TV sets at the Radio Show was the new Murphy a.c.-d.c. transportable receiver, Model V230 (illustrated). It is designed for easy carrying from room to room by means of a built-in carrying handle and can be used wherever mains and aerial facilities exist. The cabinet is of modern functional design.



Murphy V230 transportable TV receiver.

The set uses a 12in. aluminised tube, and incorporates a 4-position turret tuner. Sound output is via a 5in. speaker. Dimensions are: height 14½in. width 14in., depth 17½in. For operation on a.c.-d.c. mains 200-250V. Price £50.

(*Continued on page 574*)



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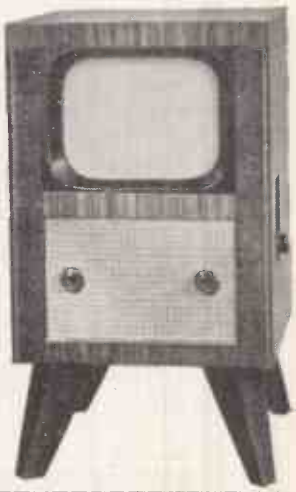
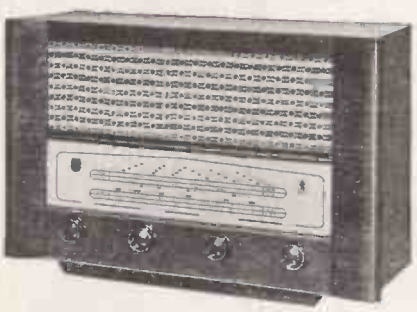


THE "ELSTREE" RECEIVER



Model D 157

Modern walnut veneered cabinet. 7-valve FM/AM AC for use on 200/250 mains, with Tuning indicator, provision for pick-up and extension speaker sockets.

34 gns.

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BRAND NEW *Continued*

NEW TELERECTION TV AERIALS

Telerection, Ltd., Antenna Works, St. Pauls, Cheltenham. Cheltenham 55960.

NEW types of Band III indoor aerials are being developed by Telerection and will soon be available. In addition the company are to market a 4-channel converter accommodating one B.B.C. Band I channel, one B.B.C. Band III channel, and two I.T.A. Band III channels. Another new composite aerial, comprising a single dipole for Band I combined with a high-gain Band III array, selling complete with chimney lashing at around £4 10s. will be available this month.

Telerection in the design of their aerials make a feature of low acceptance angle for maximum directivity combined with adequate bandwidth and high front-to-back ratio.

Prices range from £1 12s. 6d. for a Band III array with universal joint for loft-mounting to £12 10s. for a double 6-element stacked array complete with mast and lashings. Band III conversion kits are available at 7s. 6d. and 15s.

The Webcor *Lark* lightweight portable record reproducer.

WEBCOR RECORD REPRODUCERS

Webcor (Great Britain) Ltd.,
36 *Grosvenor Street, London, W.*1.
Tel.: MAYfair 6051.

WEBCOR, a subsidiary of the Webster-Chicago Corporation of Chicago, U.S.A., have announced their first three models. These record reproducers are built in this country to the specifications of the American counterparts. The styling of all three fonografs (which is the spelling adopted by Webcor) is contemporary.

The *Lark* is a small lightweight portable of non-automatic type, in grey-green or grey-rust, measuring 14in. × 13in. × 8in. It embodies a 3-valve amplifier and 5in. speaker. Price 18 gns.

The *Holiday* is a larger version with 3-speed autochanger, a 3-valve amplifier and twin 5in. speakers. Styling and colour choice is similar to the *Lark*. It measures 17in. × 19¾in. × 9¼in. Price 30 gns.

The third model is the *Musicale*, housed in a walnut-veneered cabinet, and is for the more discriminating record enthusiast. Features include a 5-valve, 5-watt amplifier, with push-pull output and negative feedback, a three speaker system using two elliptical units 6in. × 4in. and one 5in. round unit, and independant bass and treble controls. It measures 19¾in. × 15¼in. × 12in. Price 45 gns.

Eventually Webcor will widen their range of products, British made from American designs, including radio receivers and tape recorders.

CORRECTIONS

WE have been advised of the following price revisions details of which were received after the advertisements referred to in the September issue had gone to press.

CHAMPION Model 841 (*Sonata*) is now 29½ gns. (£23 9s. list plus £7 10s. tax), not 30 gns. as advertised on page 396 of the September issue.

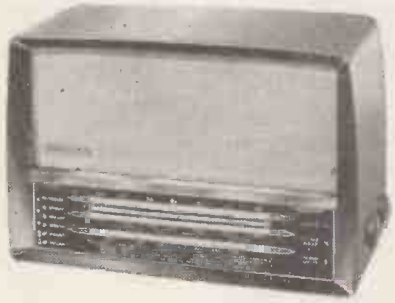
REGENTONE HG4F record player is 11½ gns. (£9 2s. 10d. list plus £2 18s. 8d. tax), not 11 gns. as advertised on page 367 of the September issue.

For good looks

Philco 'deep picture' TV on 17" aluminised rectangular tube with tinted screen. 15 valves plus germanium crystal and metal rectifier, 13 channel programme selector, automatic gain control, vision, noise, and fly back suppression, preset variable picture quality control. Housed in beautiful walnut veneered cabinet. **A.1810** 200-250 volts AC/DC. Price: 103 gns. including p. tax.

'Deep Picture' TV from this compact table model with 13 channel programme selector, 15 valves plus germanium crystal and metal rectifier. Vision and noise suppression, automatic gain control vision and sound. Walnut veneered cabinet, 200-250 v. AC/DC. **A.1800** 17" screen. Price: 78 gns. including p. tax. **A.1497** 14" screen. Price: 67 gns. including p. tax.

...and good listening



High quality, low cost AM/FM receiver, 6 valves; long, medium and FM bands, highly sensitive circuit giving powerful reception from its special in-built aerial system. Quality P.M. speaker for good reproduction and handsome plastic cabinet.
A.3610 200-250 volts AC. Price: 27 gns. including p. tax.
A.3610U AC/DC version. Price: 27 gns. including p. tax.

AM/FM 6 valve including magic eye tuning + metal rectifier. 4 Waveband receiver of outstanding quality. Highly sensitive circuit permits use on special in-built aerials on all wavebands. High fidelity speaker, attractive specially treated plastic cabinet, 200-250 v. AC. 50-60 c.p.s. **A.3658**. Price: 32 gns. including p. tax.

PHILCO *takes the laurels*

All Philco sets for Britain are made in Philco's own factory at Chigwell, Essex.

Have you got your copy of E.S.D?—if not turn to page 584

CLASSIFIED ADVERTISEMENTS

Rates: 4d. per word (Minimum 18 words) per insertion. Box Numbers 6d. extra. Series rate on application. Copy and remittance should be sent to the Classified Advertisement Manager, British Radio and Television, 46 Chancery Lane, W.C.2, before the 10th of each month preceding publication. Classified advertisements must be prepaid.

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Engagement of persons answering these advertisements must be made through the local office of the Ministry of Labour or Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless otherwise excepted from the provisions of the Notification of Vacancies Order 1952.

DUE to continuous expansion, DERWENT TELEVISION have a number of vacancies for experienced Television Engineers and Testers, particularly those interested in Band III. The positions are interesting, progressive, well paid and permanent. Apply: Wadsworth Road, Perivale, Greenford. Tel.: PERivale 6488.

FIRST-CLASS field engineers, fully experienced on all the popular current models, required in the following areas: Berkshire, Buckinghamshire, Coventry, Shrewsbury, Stoke-on-Trent, Surrey, West London. Attractive salary and congenial working conditions are offered to top-grade men. Apply to Personnel Manager, Belcher (Radio Services), Ltd., 59 Windsor Road, Slough, Bucks.

FIRST Class Television Engineer required. Good working conditions and top pay for the right man, also... **RADIO Telecommunication Engineer required,** driving ability desirable. This job entails the maintenance and repair of Radio Telephone installations fitted to mobile vehicles such as ambulances, taxis, etc. Wages according to qualifications. Vallances, 2 Wharf Street Leeds, 2.

MANUFACTURER'S agent required for London and the Home Counties, by established Company marketing Record Cabinets, TV Tables, etc. Existing accounts handed over. Apply in writing to Record Housing, Brook Road, London, N.22.

RADIO/TELEVISION engineers required, £12 per week or according to experience. Modern well equipped Service department handling all leading makes. Telephone: Speedwell 9811 for interview at Northern Lights, Limited.

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TELEVISIONS, radios, washing-machines, fridges, heaters, etc. We can clear your surplus quickly and obtain the highest price for you. Eastern Auction Mart, Whitehorse Lane, Mile End Road. Opposite Stepney Green Station. STE 3993/3296.

FOR SALE

TV TUBES, cheap, guaranteed, reconditioned and surplus; from £3. Also cheap valves, speakers and components used and new at "silly" clearance prices, send for our bargain list now! Video Electronics, 16/22 Bacon Street, London, E.1.

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A REWIND service for the discriminating dealer; good finish and fine workmanship; M.T.s, including E.H.T.s, L/S cones, fields and O.P.T.s, etc.—Raidel Services, 49 Lower Addiscombe Road, Croydon. Cro. 6537.

A SECOND - TO - NONE rewind service—neat, clean, reliable. New Transformers, standard or to specification. Tube Heater low-loss Isolation Transformers. Radio & Electric Facilities, 137a Ashton Road, Oldham, MAIn 4141.

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