A HOME CONSTRUCTED TELEVISION RECEIVER

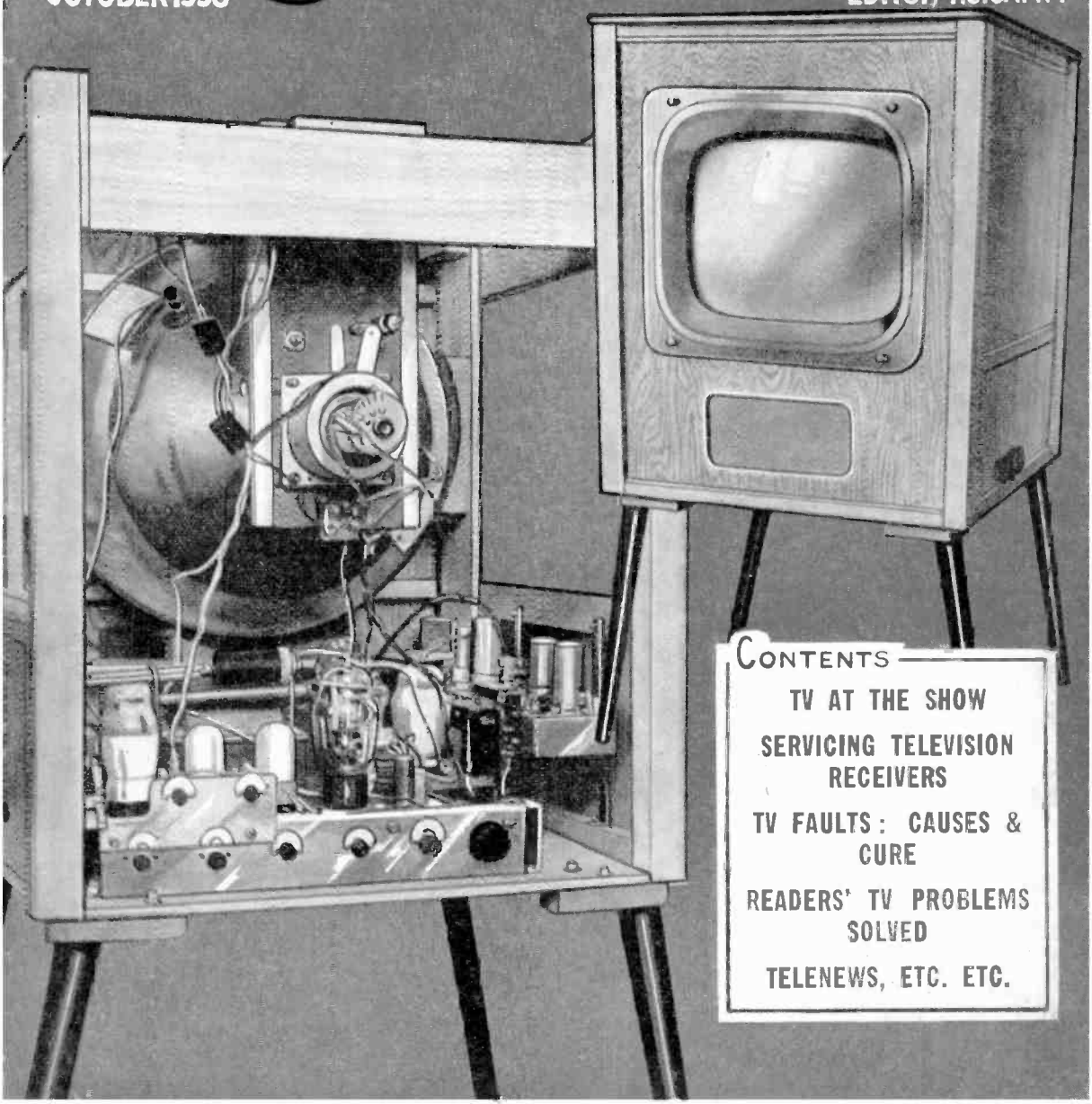
Practical Television

1/3

AND TELEVISION TIMES

OCTOBER 1958

EDITOR: F.J. CAMM

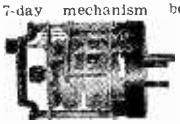


CONTENTS

Wireless Set 19—30/-

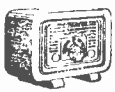
Transmitter receiver contains £20-£30 worth of spare parts. Complete and in good condition less valves and meter. Price **30**/- plus 5/-.

Small Clock Movement



7-day mechanism beautifully made and fully jewelled, few only sale price **12/6** plus 1/6 each.

Simplex Transistor Kit



Makes ideal bedroom radio, uses one transistor and one crystal diode. Complete less case **19/6**, case 5/- extra, post 1/6.

Mains Isolation Transformer

Makes servicing safe. Input tapped 200-250 v., output tapped 200-250 v. Rated at 500 watts, intermittent rating 2,000 watts. Screens for suppressing mains interference. Size 14in. x 6in. x 6in., weight 40lbs. Price **£5.12.6**. Carriage 7/6 (up to 250 miles).

Car Starter Charger Kit

All parts to build 6- and 12-volt charger which can be connected to a "flat" battery and will enable the car to be started instantly.

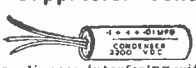
Mains transformer	22/6
5-amp. rectifier	17/6
Regulator Stud Switch ...	3/6
Resistance Wire	2/-
Resistance Former	2/6
Mains on/off Switch	2/6
0-5 amp. Moving Coil Meter ...	12/6
Construction Data	1/6
Or if bought all together price is	52/6

plus 3/6 post and packing.

Variable Rheostat

Heavy duty slider resistor rated at 25 amps. Basic resistance is .4 ohms. Can be rewired to suit individual requirements. Ideal for dimmer circuit, etc. Price **8/3**, post 2/6.

Suppressor Condenser



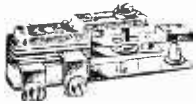
Stop your drill or other appliances interfering with your or your neighbours' radio or television. Simple instructions given **1/6** each, **12/-** dozen.

Latest AVO Testmeter

Can be yours for only 10/- deposit and 19 payments of 10/- weekly. Like all AVO meters it is a very fine instrument; it has a sensitivity of 10,000 ohms per volt and 19 most useful ranges as follows—D.C. volts 0-1,000 (seven ranges), A.C. volts 0-1,000 (five ranges), D.C. current 0-1 amp. (5 ranges), resistance 0-2 megs. (2 ranges) (complete with test leads). Immediate delivery. **Cash price £9.10.0.**

FREE GIFT.—All purchasers will receive Range Extender scale and data which add: capacity 0-1 mfd. in two ranges. Inductance 0-100 henrys, etc. etc.

THERMOSTATS



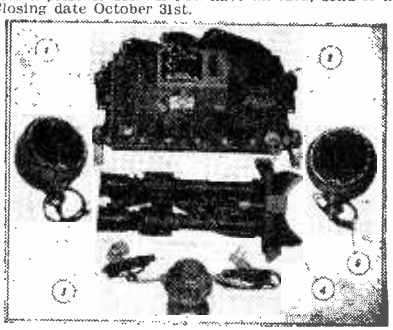
2¼in. x 1in. x 1¼in. high. Useful for the control of appliances such as convectors, gluepots, vulcanisers, hot plates, etc. Adjustable to operate over temperature range 50-550 deg. F., fitted with heavy silver contacts. **8/6**. Other types: 1½ amp., **3/6**; 5 amp., **8/6**; 2 amp. QMB, **5/6**; 15 amp. QMB, **15/-**; 15 amp, encased wall mounting type, **29/6**.

Introducing . . . THE INDUCTOR 80

80 w 5ft. fluorescent fitting with a 5 year guarantee—uses the latest type of impregnated induction (choke) control gear—absolutely quiet in operation—all steel batten type construction stove enamelled white—suitable for direct mounting or for suspending. Undoubtedly the most modern fitting available will last a lifetime and will save its cost in lamps and electricity in about 12 months. Two models available—Type A, fixed voltage suitable for 200-240 v. price **39/6**. Type B, Variable voltage suitable for 200-250 v., price **45/-**, carriage and insurance up to 150 miles 5/6; up to 250 miles 7/6. Tubes, latest type which give more light for same electricity, daylight or natural to your choice, **14/6** each—no extra carriage if ordered with fitting.

£10 FOR AN IDEA

With the equipment described below you can see but cannot be seen in the dark. It has many obvious uses, driving in the fog, bird and animal watching, rat catching, watching for intruders, etc., but we believe it has many novel uses and we invite readers suggestions, in fact for the best novel use suggested we will give a prize of £10. If you have an idea, send it in. Closing date October 31st.

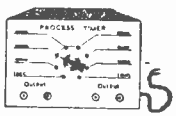


As fitted to Army vehicles for night driving, etc. Comprises: 2 Infra Red Radiators, adjustable binoculars, power pack for 6 or 12 volts, control units and inter-connection cables. Original cost probably around £100. Unused and in perfect order—**£10**, carriage and insurance 10/-, or **10/-** deposit and 21 weekly payments of **10/-**.

SUPER SENSITIVE (2,000 O.P.V.) MULTIMETER KIT

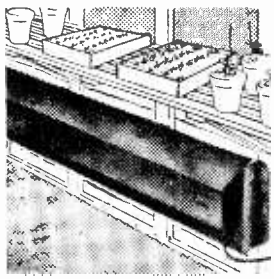
17 ranges including D.C. volts to 1,000 v, A.C. volts to 1,000 v., D.C. milliamps to 500, ohms to 2 meg., capacity and inductance. All the essential parts, including metal case, selected resistors, wire for shunts, selected switches, calibrated scale and instructions, **32/6**, plus 2/6 post and ins.

Process Timer for 15/-



Make a time delay switch to work off mains (A.C. or D.C.), all the parts (less case). Price **15/-**, post and ins. 2/6.

Instantus Heater



Convector heater Made from heavy gauge sheet steel (galvanised). For greenhouse, workshop, aviary, etc. 500 watt, **£1.12.6**; 1,000 watt, **£2.10.0**. 1,000 watt with wired but separate thermostat, **£3.17.6**. 2K watt free standing or wall mounting, **£3.19.6**; 2K watt with built-in thermostat, **£4.19.6**. Carriage and insurance 5/- per heater. ALL ARE GUARANTEED FOR 5 YEARS.

Making a Solder Gun

A 7-second solder gun of the type costing £3-£4 was described in "Practical Mechanics". Only two essential parts are required—(a) the transformer and (b) the push switch. These we can supply at **13/6**, plus 2/- post. The rest of the parts you will have in your own "junk" box. Copy of the article concerned given free with the kit.

STOP PRESS

Long, Medium and Short Wave Coil Pack

An exceptionally well made coil pack which covers the standard long, medium and short wave bands for 465 Kc. I.F. complete with diagram of connections, **14/6** plus 1/6 postage and insurance—limited quantity only.

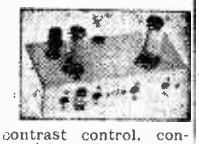
50 More T.V. Service Sheets.—Readers already possessing our service sheets numbers 1-100 will be glad to know that 101-150 are now ready, price **10/-** post free.

Install 2-way Switches. Our outfit comprises: 30 yds. multicore cable, two 2-way switches, two wood blocks. Full instructions. **9/6** each, post and insurance 2/6.

THE TRANSISTOR 8.

A superb little portable receiver which is also loud enough and sensitive enough to be a car radio. All parts, prepared chassis, 8 selected transistors, 7in. x 4in. elliptical speaker and handsome carrying case—supplied for **£11.10.0** or **10/-** deposit and 24 weekly payments of **10/-**

Band III Converter

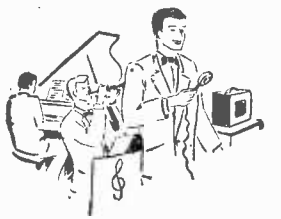


Suitable Wales. London. Midlands, North, Scotland, etc. All the parts including 2 EF80 valves, coils fine tuner, contrast control, condensers, and resistors. (Metal case available as an extra.) Price only 19/6, plus 2/6 post and insurance. Data free with parts or available separately, 1/6.

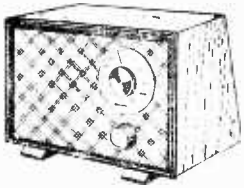
Please send two more kits, the one you sent last week is performing magnificently.

We receive this sort of letter every day of the week, so if you have hesitated because you thought our kits too cheap you need hesitate no longer.

All-Mains Amplifier



Powerful three-valve mains amplifier ideal for dances, parties, etc. Complete less chassis, cabinet and speaker (available if required)—data 1/6 (free with parts). Price 19/6, plus 2/6 post and insurance.



The Skysearcher

This is a 2-valve plus-metal receiver set useful as an educational set for beginners, also makes a fine second set for the bedroom, workshop, etc. All parts, less cabinet, chassis and speaker, 19/6. Post and ins., 2/6. Data free with parts or available separately, 1/6. **3-valve battery version also available at the same price.**

A.C./D.C. Multimeter Kit

Ranges: D.C. volts 0-5, 0-50, 0-100, 0-500, 0-1,000. A.C. volts 0-5, 0-50, 0-100, 0-500, 0-1,000. D.C. milliamps 0-5, 0-100, 0-500. Ohms 0-50,000 with internal batteries. 0-500,000 with external batteries. Measures A.C./D.C. volts, D.C. current and ohms. All the essential parts including metal case, 2in. moving coil meter, selected resistors, wire for shunts, range selector, switches, calibrated scale and full instructions, price 19/6, plus 2/6 post and insurance.

50 More T.V. Service Sheets

Readers already possessing our service sheets numbers 1-100 will be glad to know that 101-150 are now ready, price 10/-, post free.

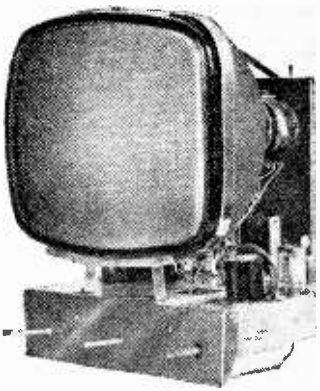
Build this 17in. T.V. in an evening

Undoubtedly the most up-to-date televisor for the home constructor. You can build it in an evening and the set when finished will be equal to a factory made equivalent.

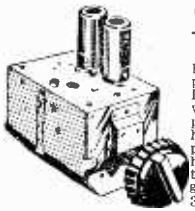
- All miniature valves, and metal rectifier.
- 12-channel turret tuner.
- Multivibrator time bases.
- Ferrox cube E.H.T. and scan coils.

The building cost (less tube) is only **£29.10.0.** plus 10/- carriage and insurance. Or £5 down and 28 weekly payments of £1. All parts guaranteed twelve months.

Full information and data free with parts or available separately, price 3/6.



Now 2 Models Turret Tuner



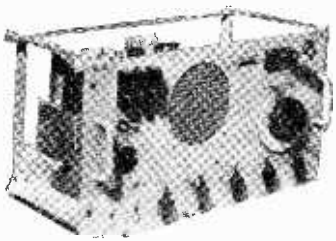
Brand new stock, not surplus, with coils for Band I and III complete with valves. Model I I.F. output 33/33 Mc/s. Series heaters Model 2 I.F. output 16/19 Mc/s. Parallel heaters. With instructions and circuit diagram. 79/6. With knobs 3/6 extra, post and insurance 2/6.

Medresco Hearing Aid

As supplied by National Health, completely overhauled and in good working order with six months' guarantee. Only £2.15.0 plus 2/6 post and ins. Complete with earphone and *new* ear plug but not batteries, these can be supplied as an extra for 5/- per set.

Instructions showing how to convert to pocket radio available free if requested.

Short Wave Communications Receiver R.208. Only £6.19.6. 10/- Deposit



This is a super short-wave receiver covering 5-30 metres (10-60 Mc/s). Uses 6 valves. Has R.F. stage, 2 I.F. stages, B.F.O., etc. Muirhead instrument drive, two internal power packs, mains and battery vibrator pack. Complete with own P.M. speaker. Provision for phones and speaker muting. Complete in metal transit case; size approx. 24 x 18 x 12in.; weight 70lb. Suitable A.C. mains 100-250 and 6 volt battery. In perfect condition, practically unused. Tested before despatch and guaranteed. Handbook free with each. Price **£6.19.6**, carriage and insurance 15/-. Or 10/- deposit plus 15/- carriage and ins., then 15 weekly payments of 10/- each.

This Month's Snip Somweave

This really lovely loudspeaker fabric we offer at half price, namely 7/6 per yd., 48" wide. This is also very suitable for covering plain wooden cases for portables.

Yaxley Switches

3-pole, 2-way	1/3
12-pole, 2-way	1/6
3-pole, 3-way	1/6
9-pole, 3-way	2/-
2-pole, 4-way	2/-
6-pole, 4-way	2/6
4-pole, 5-way	2/6
2-pole, 6-way	2/6
1-pole, 7-way	2/6
1-pole, 12-way	2/6
6-position shorting switch	2/-

Double-pole mains switch for attaching to Yaxley switches... 1/6
Discount of 10% allowed where a dozen of one type ordered. Special quotes 144 or over.

Ganged Pots for Stereo, etc.

Made by Morganite, these are a first class control, unfortunately only linear type, are available, in the following values: 5K +5K, 50K +50K, 100K +100K, ½ Meg. + ½ Meg., 2 Meg. + 2 Meg. All in original cartons price 3/- each, special quotes for quantities.

STOP PRESS!

8 Watt Stereo Amplifier.—Complete with valves, ready to work, £8 plus 7/6 carriage & insurance.

ELECTRONIC PRECISION EQUIPMENT, LTD

Post orders are dealt with from Eastbourne, so for prompt attention please post your orders to 66, Grove Road, Eastbourne, marked Department 5.

42-46, Windmill Hill, Ruislip, Middx.
Phone: RUISLIP 5780
Half day, Wednesday.

66, Grove Road, Eastbourne, Sussex.
Half day, Saturday.

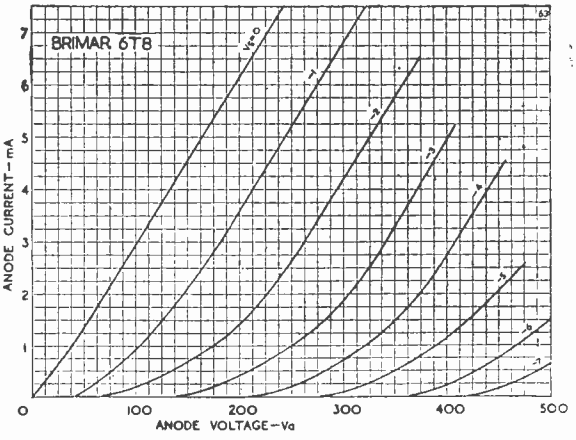
29, Stroud Green Rd., Finsbury Park, N.4.
Phone: ARChway 1049
Half day, Thursday.

266, London Road, Croydon.
Phone: CRO 6558
Half day, Wednesday.

BRIMAR 6T8

The Brimar 6T8 is a triple-diode triode in which one diode has a separate cathode. The triode section has a high amplification factor making the valve suitable for use in AM/FM receivers in the demodulation and first stage audio circuits. The diodes may be used in series shunt limiter circuits, for example, in the audio sections of television and communications receivers, followed again by the triode, section for A.F. amplification.

Near Equivalents
EABC80 DH719
6AK8



Typical Triode Operating Characteristics as an R.C. coupled amplifier.

Anode Supply Voltage	250	250 volts
Anode Load Resistor	0.25	0.25 megohm
Grid Resistor	1.0	10 megohms
Cathode Bias Resistor	3	0 kilohms
Peak Output Voltage	43	40 volts
Stage Gain (for 24 V peak to peak output ...	42	42
Distortion (for 24 V peak to peak output) ...	1	5%

Keep this for further reference or write to the Publicity Department for a data sheet.

Standard Telephones and Cables Limited **FOOTSCRAY SIDCUP KENT** **Footscray 3333**

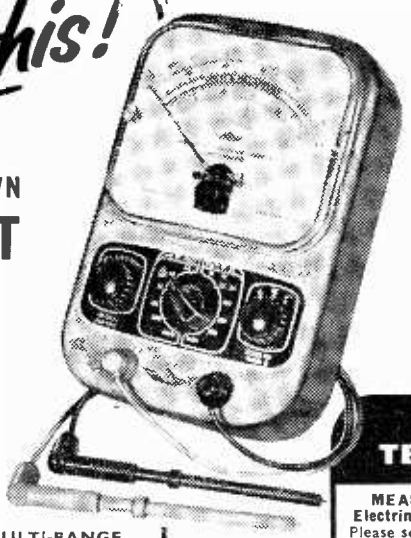
How's this!

YOUR VERY OWN

TEST SET

NOW

It's as simple as this. You just send 47 6 deposit to have one of the newly stylised M.I.P. Multi-Range Series 100 Test Sets posted to you almost by return of post. Balance is payable over 6 months at £1.16.0 per month. Cash price is £12.7.6. Post coupon now for full details.



There is also the **SERIES 90 MULTI-RANGE TEST SET**, *having 19 SELF-CONTAINED ranges a.c./d.c. volts up to 1,000 V., d.c. current up to 500 mA., a/c current up to 200μA., resistance 0-200,000 Ω.*

Deposit **35/-** *and six monthly payments of* **28/10.** *(Cash price* **£9.15.0.**)

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covering

10-1,000 d.c. volts
10-1,000 a.c. volts
100 Microamps to
500 Milliamps d.c.
100 Microamps a.c.
0 to 1 Megohm
0 to 10,000 ohms

MIP

MULTI-RANGE TEST SET-SERIES 100

MEASURING INSTRUMENTS (PULLIN) LTD.
Electrin Works, Winchester St., Acton, London, W.3.
Please send illustrated leaflet of the Series 100 Test Set with details of new easy payments scheme .....
Ditto Series 90 .....
**Please indicate instrument required.*

NAME .....

ADDRESS .....

.....

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GD.22

Practical Television

& TELEVISION TIMES

Editor : F. J. CAMM

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CONTENTS :

The Editor will be pleased to consider articles of a practical nature suitable for publication in "Practical Television." Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed to : The Editor, "Practical Television," George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

Owing to the rapid progress in the design of radio and television apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

TELEVIEWS

THE RADIO SHOW

As far as television is concerned, there were no surprises, and beyond minor improvements and reduction in size and prices, 1959 receivers are as they were. One firm showed a push-button receiver covering all 13 channels with instantaneous channel choice. On another receiver, the push button controls definition. The wide-angled tubes have enabled designers to make their receivers shallower, without the unsightly protrusion at the back of the set. Self-contained portables were also shown by two makers. Although 21in. and 24in. receivers were available, the 17in. tube models still remain the most popular. Most of the TV receivers made use of printed circuits in some part of the circuit and transistors, of course, were much in evidence. One manufacturer showed red and green lighting on the switch to distinguish between BBC and ITV. channels. There was also shown a unit-constructed TV.

Stereophonic sound really stole the show and it is a marked improvement on the older system, a special Audio Hall being set aside for demonstration, particularly of stereophonic gramophone records. Of 160 exhibitors, at this 25th Silver Jubilee Exhibition only 36 manufacture radio and TV receivers. Many receivers were equipped for reception of V.H.F./F.M. sound broadcasting. Some receivers were fitted with the new electrostatic focus tube with a deflection angle of 110 deg., but most tubes had the 90 deg. deflection angle. Several manufacturers listed legs for fitting to table models as an optional extra. A number of exhibitors showed loft aerials of an improved form. They can easily be fixed and permit tilting, rolling, and turning for anti-ghosting. It was noteworthy that colour television demonstrations dropped out of the show.

"A BEGINNER'S GUIDE TO TELEVISION"

THERE has been a huge demand for "A Beginner's Guide to Television" (7s. 6d.) or 8s. 3d. by post, and as with the companion volume, "Beginner's Guide to Radio," the edition will soon be exhausted. It is necessary therefore to order now to secure a copy.

TV SPREADS OVER THE WORLD

THE annual production of television receivers in Australia at present is 310,000, and receivers go from the dealers into the home as fast as they are delivered. Retailers have negligible stock. Other countries not at present equipped with TV have laid plans to develop such a service and soon there will be world-wide coverage, and further possibilities for B.B.C. programmes are augmented by Continental TV linkages.—F. J. C.

Our next issue, dated November, will be published on October 22nd

Band III Double Array Aerial

THIS ARTICLE DESCRIBES A CONNECTOR BOX

By M. S. Ford

READERS who made up the Band III aerial described in PRACTICAL TELEVISION for June, 1957, may like to try out a double array, by making an exactly identical aerial and positioning it a short distance away. Although theoretically this arrangement should give twice the input it gives somewhat less. However, the improvement in reception is very marked and can climinate certain ghost images and other interference.

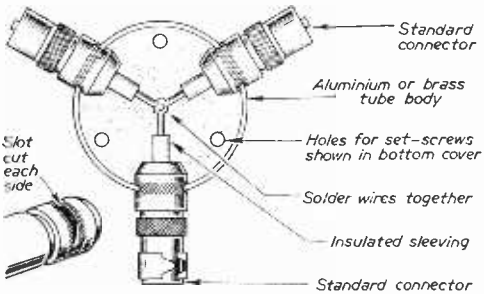


Fig. 1.—An open view of the connector.

General Description

This article describes the actual coupling made from standard connectors to couple two such aerials. In general, it is a three point coupling allowing a short lead from two aerials (Band III) to be joined to one down lead to the Band III socket of the set.

It takes the form of a cylindrical box, with two input and one output plugs or sockets, equally spaced around the perifery. The central contact wire from each is soldered together at the exact central position in the box, and are, of course, perfectly insulated from the metal. The metal of the connectors, is, of course, common to the connector box and forms the other lead via the metal braiding of the co-axial cable.

Fig. 1 shows an open view of the connector box. Figs. 2, 3, 4 and 5 show the separate parts, whilst Fig. 6 illustrates the exploded assembly, with one standard connector omitted to show the slot arrangement.

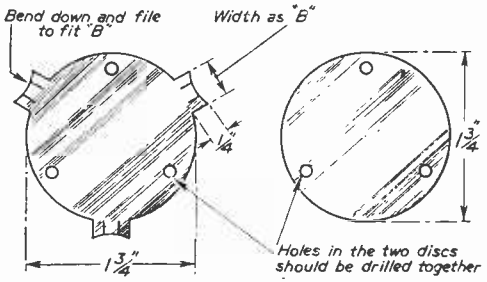
Materials

The writer used three metal type standard connectors and chose two plug types and one socket type. It is just a matter of personal choice, but whatever type is used they must have their appropriate plug and/or socket to agree.

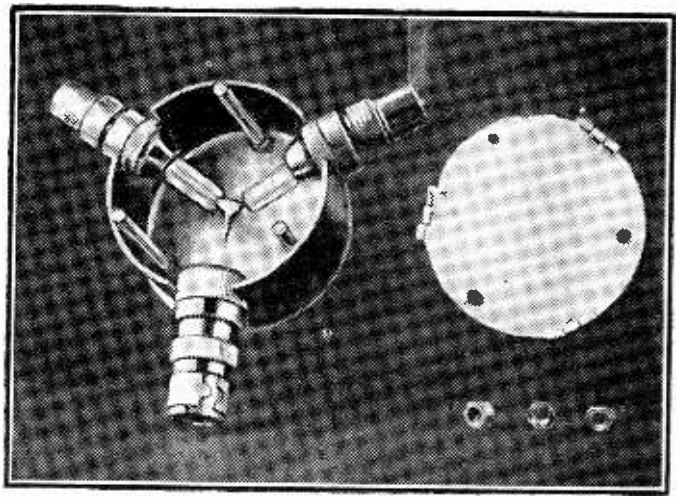
The cylindrical body was made from 1¾in. dia. brass tubing, but if obtainable aluminium tube might be used. Top and bottom covers were cut out of aluminium sheet. The set screws were of 4 B.A. brass screwed rod.

Construction

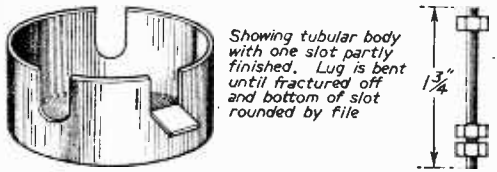
The simple method of fixing connectors snugly into the tubing is shown, slots being cut in the brass body at equal distances around the periphery 120° apart. The main sleeving of each connector is then cut at each side with a small junior hacksaw, and the connectors pushed into the slots. A certain amount of care should be exercised here, but it does not matter greatly if the saw cuts penetrate right through. Do not cut right round, of course, or you will have two rings. Just cut at each side. Assemble the three connectors to try out the arrangement and if correctly cut the connectors should point exactly toward the centre of the body. Remove the connectors and make a wire connection to each in



Figs. 2 and 3.—The top and bottom covers.



The completed unit and cover.



Figs. 4 and 5.—The tubular body and set screw.

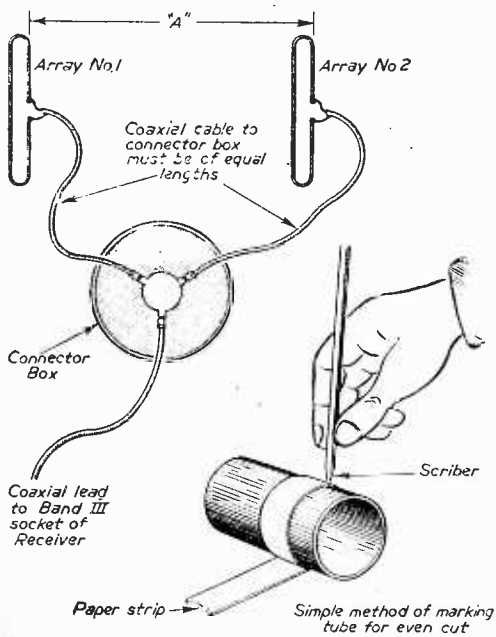
the usual way, each being soldered and protruding about ¼in. Push in each connector and slip on short lengths of plastic sleeving. Join the wires at the exact centre and solder together. Fit the top and bottom covers by the lengths of screwed rod. It will be noted that the top cover has lug pieces. These not only close the small gaps left, but also completely locks the three connectors and forms quite a rigid job. Although short, the wiring inside the box must be stranded, as contained in the Band III type co-axial cable and soldering is, of course, most important. The dimension "B" (width of slot) has been omitted as the standard connector varies just slightly in different makes. A pair of callipers would be useful to measure the sleeve diameters.

Method of Cutting Tube

Fig. 7 shows a simple method of cutting tubing to give an even cut right round. A line is scratched by a scriber against a paper strip of known machined edge.

Fig. 8 shows diagrammatically the arrangement in use. The short cable lengths from each array should be identical in length. Again the dimension marked "A" has been omitted, but one wavelength, i.e., 53½in. for channel 9, is suggested as quite convenient in most lofts. Experiment is quite possible, of course, indoors.

The short saw cuts seen in the lugs of the top cover were found to make bending down of these lugs easier, and retains as far as possible the circular form of the cover. It is a good plan to drill the holes in the top and bottom covers together, clamping the discs in a vice.



Figs. 7 and 8 —(Below) How to cut the tubing. (Above) Showing diagrammatically the arrangement in use.

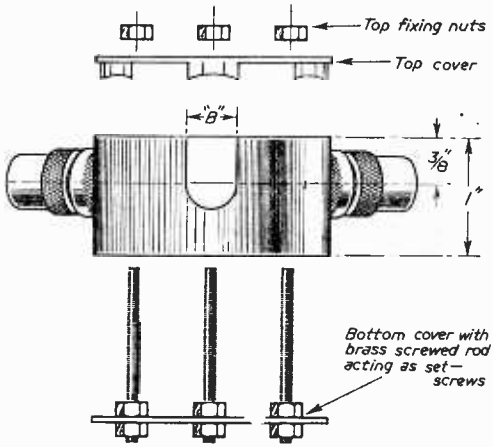


Fig. 6.—An exploded assembly, with one standard connector omitted to show the slot arrangement.

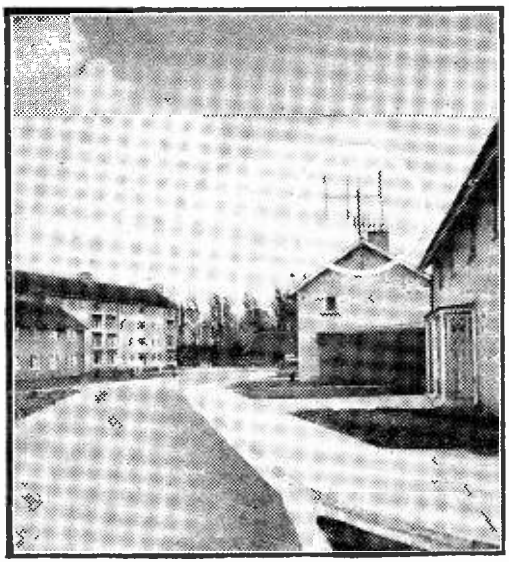
Aerials

Finally, a word about the two aerials. These should agree, of course, exactly, and should be mounted at same heights. A slight variation in alignment one from the other can be experimented with to give interference free reception as far as is practicable.

More About Shared Aerials

PROBLEMS WHICH ARISE WHEN SEVERAL RECEIVERS OPERATE FROM THE SAME AERIAL

by S. J. Jackson



This estate of 73 dwellings is supplied with BBC and ITV television signals from a common aerial system, seen ringed in the photograph.

THE value for the "star" network resistors must be chosen to suit the coaxial cable employed and the number of outlets required. Since the cable impedance is usually the same all the way round, the resistors should have like value, which can be discovered very quickly from the following expression: $R = Z (n - 1/n + 1)$, where Z is the characteristic impedance of the cable and n is the number of outlets. Thus, for a two-outlet network using standard 72 ohm feeder, the resistors must each be 24 ohms.

Unfortunately, however, there is a price to be paid for this maintenance of matching, and that is the input to each receiver is less than the aerial signal by 20 log n db. This means that with a two-outlet system the signal at each set is half that at the aerial, with a three-outlet system the signal at each set is a third of that at the aerial and so on as the number of outlets is increased.

All is well in an area of high signal strength, where it matters little if the signal is divided among the outlets in this fashion, but in fringe areas there is a call for amplifiers to make good the network losses. Then, of course, there is the loss in the cable itself to be considered.

Amplifiers Required

The diagram in Fig. 4 shows a simple set-up which may be employed to supply three receivers. If the aerial signal is 500μV. which is a desirable level to operate a receiver adequately, and it is required to have the same signal level at each outlet, then it is obvious that an amplifier will have to be used to make good the losses in the network and cables.

Losses and gains are usually expressed in decibels (db) instead of voltage ratios. If a signal is doubled then it is said to have increased by 6db; if it is halved then it is said to have decreased by 6db. Plus and minus signs are often used to indicate losses and gains in db. It is much easier to work in db than in voltage ratios direct, and the db equivalent of any voltage ratio can be found from db tables without trouble.

To get back to Fig. 4. Here the loss in the star network is 0.5db (corresponding to a three to one signal loss) and in the cable, from the star network to an outlet, 5db, thus, the total loss is 14.5db (db are simply added or subtracted). Clearly, then, in order to get 500μV from each outlet, the amplifier will need to have a gain of 14.5db.

In Fig. 5 the exercise has been complicated a little by the requirement for the system to

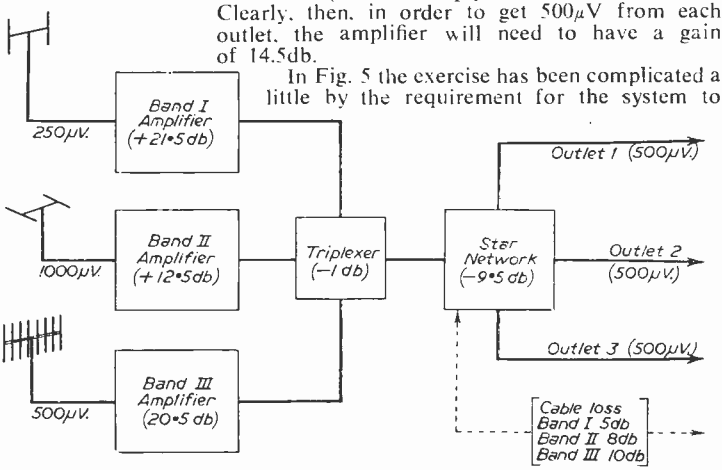


Fig. 5.—A more complex arrangement in which the signals of three bands are fed to three outlets at a level of 500 μV.

carry signals in Bands I, II and III. The aerial signals are also different, as would be expected, but in spite of this and the fact that the attenuation value of the cables differs over the three bands, it is a relatively simple matter to secure 500μV of signal on each band at the three outlets by adjusting the gain of the amplifiers accordingly.

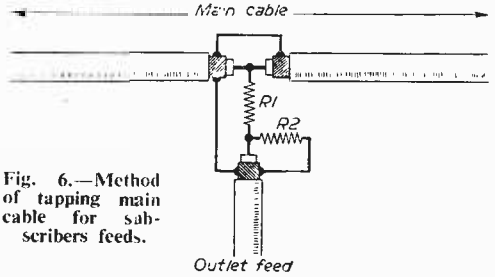


Fig. 6.—Method of tapping main cable for subscribers feeds.

In this system it will be seen that a triplexer is used to combine the outputs into a common feeder.

On Band I there is only 250μV of signal, which is 6db below the required 500μV to start with; there is 1db of loss in the triplexer and 5db in the cable at Band I frequencies. Plus the 9.5db loss presented by the star network, the amplifier is required to raise the signal by 21.5db (equal to the sum of all the losses).

On Band II the aerial signal is 6db up on 500 μV. Thus, the gain required for the Band II amplifier is found by subtracting 6db from the sum of the losses; it will be observed in this case that the cable losses are 8db, becoming greater as the frequency rises. On Band III the aerial signal is the same as required at the outlets, so it is a matter of adding up all the losses, including the 10db cable losses, and arranging the amplifier to have equivalent gain.

Amplifiers

There are on the market amplifiers which are highly suitable for this kind of work, which can, for example, be rigged up in the roof-space below the aerial system and energised continuously from the mains supply. The power requirements are quite modest, and, provided due consideration is given to the ventilation, there is little danger of overheating. Nevertheless, the amplifiers should be lightly fused and adequately earthed. The author has under his control aerial amplifiers which have been running continuously for three years without component failure of any kind! Indeed it would appear that the valves and components live

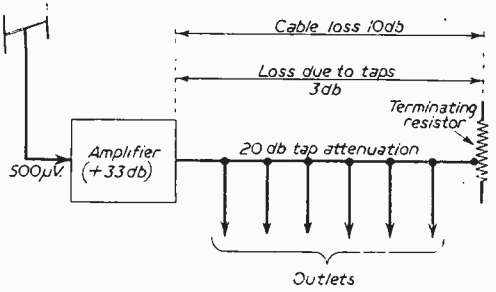


Fig. 7.—A simple signal distribution system.

longer when the equipment is permanently energised than when it is intermittently switched on and off.

Some amplifiers feature pre-set gain controls which can be adjusted to provide a balance of signal at the outlets, but in cases where such a facility is not available, fixed or variable attenuators can be introduced at the outlets of the amplifiers to serve the same purpose.

There is another method of tapping the required level of signal at various points along a main cable feed for subscribers' outlets, as shown in Fig. 6. Here the signal in the main cable is at fairly high level since it is obtained from the output of a distribution amplifier, and it is extracted by breaking into the cable as shown, but instead of the feed cable being connected directly into the main cable, it is isolated by means of resistor R1, while a second resistor R2 server to load the end of the outlet feed cable to avoid standing waves and stub effects.

In effect, the resistors form a potential divider across the main cable at the point of entry, and the signal level fed into the feed cable is dependent on the ratio of the resistors. The

(*Continued on page 122.*)

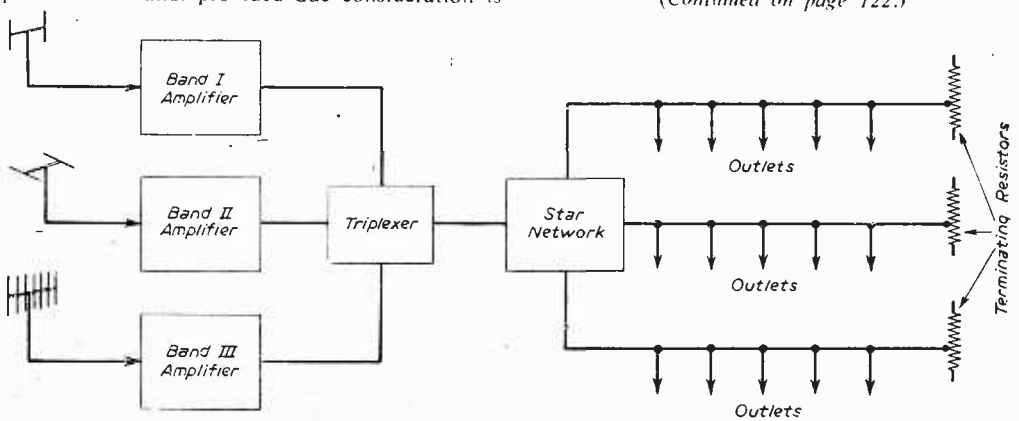


Fig. 8.—A more advanced three-band signal distribution system.

An Improved Video Amplifier

THIS ARTICLE DEALS WITH THE PRINCIPAL FACTORS INVOLVED

By S. D. R. Bowman

THE video frequency amplifier is without doubt the most critical circuit in a receiver from the design aspect, apart perhaps from the timebases. In this stage a great deal can be lost and, what is perhaps worse, much can actually be introduced to spoil a picture. Commercial design is fair, but a number of the cheaper receivers display faults which the home designer can, for a little trouble, avoid altogether.

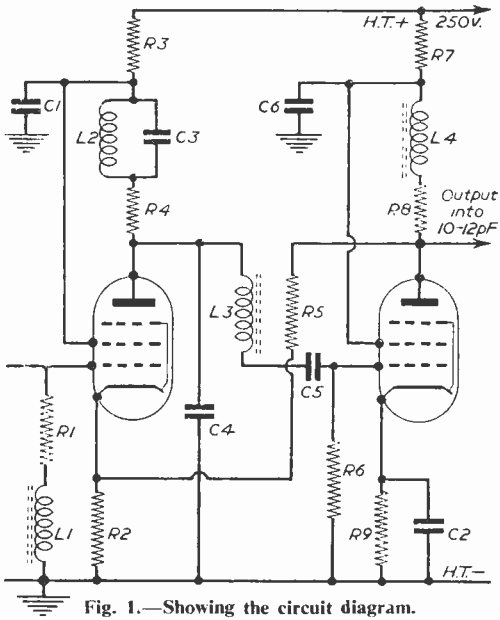


Fig. 1.—Showing the circuit diagram.

The characteristics of a perfect V.F. amplifier are, briefly, as follow:

(a) Linear amplification of frequencies from zero to 3 Mc/sec. (or whatever upper limit is nominally imposed on transmissions).

(b) Zero phase shift of all frequencies amplified.

(c) Zero rise time to an input voltage "step"—i.e., to a square wave, with zero "overshoot."

The amplifier here described represents an approximation to the ideal, and its gain is such that it may be found a better alternative, in fringe areas, to the use of an extra I.F. or R.F. stage.

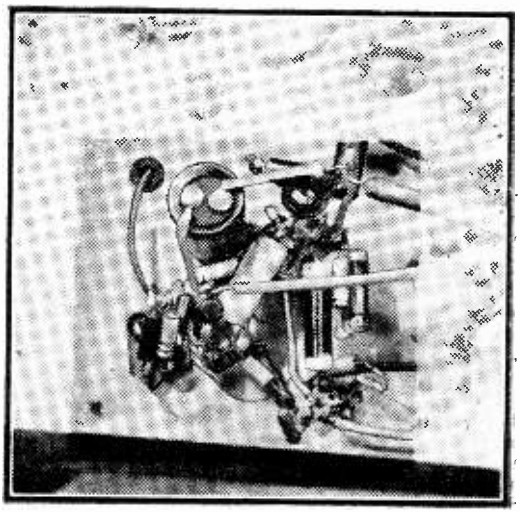
The Circuit Diagram

Fig. 1 shows the circuit diagram. It is a two-stage amplifier of fairly conventional design, with negative feedback. This may cause some eyebrows to be raised; as is well known, the larger the number of stages of video amplification the more the possible sources of loss in performance. However, the writer met this challenge with the idea that the larger the number of stages the more opportunity for correction.

Theoretical Details

It is not proposed to go into the theoretical details of the design, but the reader may care to be reminded of the principal factors involved. In the first place, all amplifying devices possess self-capacitance, partly in the valves themselves and partly in the circuit. While at low frequencies this is insignificant, at high frequencies this capacitance causes two adverse effects—loss of amplification due to the familiar "by-passing" effect, and change of phase. In audio-frequency amplifiers the latter is of minor significance, but in video amplifiers it becomes a great nuisance. For these reasons it is essential for the circuits to possess intrisically low impedance, and this limits severely the load resistance which can be employed; this in turn reduces stage gain.

By putting inductance in the circuit, the capacitance can be "tuned out," thus enabling the load resistance to be increased, giving higher gain—and, incidentally, much improving the amplification characteristics at high frequencies. The size of the inductances used has to be calculated with care, otherwise more harm than good can result. Overshoot can occur quite readily. By this is meant that if a square wave is applied to the input, the output voltage shows a momentary jump above its final value. This will cause a light band on the left-hand side of a white object on the cathode-ray tube screen. "Undershoot" can similarly occur, resulting in a darker edge to a dark object. While this is sometimes done deliberately to improve the



The Video amplifier.

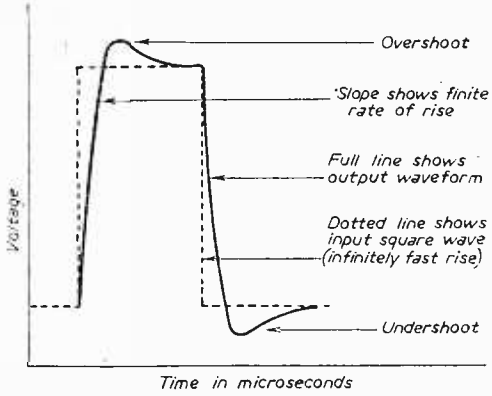


Fig. 2.—The "overshoot" and "undershoot."

apparent "resolution" of a picture it is actually a source of degradation of detail, and it should be minimised. Fig. 2 shows overshoot and undershoot.

Both shunt and series inductances are used in the present circuit, and their proportions are such that overshoot has been made negligible (a little under 2 per cent.).

The chief requirement is, however, a very fast rise of output voltage when a square-wave input occurs. This also affects the calculation of the compensating inductances, and when compromising between linear amplification up to high frequencies and fast rise it is better to let the linearity take second place. For British transmissions a maximum rise time (from 10 per cent. to 90 per cent. of final output voltage) of 0.1 microseconds or a little more is essential if all fine detail is to be displayed on the tube face. In this circuit the rise time is 0.038 microseconds—well under the maximum allowable.

LIST OF COMPONENTS

R1—3.8 K.	C3—See text.
R2—100 Ω.	C4—See text.
R3—2.2 K.	C5—1 mfd. (physically small).
R4—3.3 K., ½ watt.	C6—16 mfd. elec.
R5—5.6 K., 1 watt.	L1—65 μH.
R6—1 M.	L2—37 μH.
R7—1.2 K., 3 watt.	L3—130 μH.
R8—1.5 K., 3 watt.	L4—56 μH.
R9—100 Ω.	V1—6AM6.
C1—16 mfd. elec.	V2—6CH6.
C2—220 pF.	

Low-frequency Response

Low-frequency response is also important, and in this connection the chief difficulty is the avoidance of "sag" when a low-frequency pulse is applied to the input. Fig. 3 shows the effect. This is due to couplings having too low a time-constant (t = C.R.) so allowing "leakage" during the pulse. Grid couplings, cathode screen and anode decouplings, can all give rise to this undesired effect. In the amplifier just described, grid coupling has a time-constant of 1 second which enables a complete frame scan to be achieved without noticeable sag. In anode and screen circuits, it is impracticable to achieve a time-constant as long as this. With resistors of low enough value to give high enough screen and anode voltages, decoupling capacitors would have to be impossibly large. Compensation by R3, C1 and R7, C6 has, therefore, been introduced and it is important that the circuit values given are adhered to quite closely. With this arrangement, the sag is reduced to negligible proportions and in fact amounts to only 1.7 per cent. The difficulty about sag due to the cathode bias resistor-condenser combination is avoided by omitting the bias condenser altogether. (The 220 pf condenser across V1 cathode resistor is for frequency compensation purposes only, and does not count in low-frequency considerations.) The negative feedback so resulting is actually beneficial rather than otherwise, although, of course, gain is considerably reduced.

LIST FOR COIL CONSTRUCTION

L1—140 turns No. 40 gauge wire enam., on former 0.3 in. dia. V.H.F. (purple coded) dust core fully inserted.

L2—Same as above without dust core.

L3—Wearite M.W. oscillator coil (P.O.2), with small winding removed completely and ¼ the turns taken off the other.

L4—80 turns No. 36 gauge enam. wire—Aladdin former .4 in. dia. with iron dust core.

In order to reduce phase change still further and to level out the frequency response over a wide spectrum, a little negative feedback is added from the output anode to input grid—note, of course, that the cathode bias resistor of V1 is part of the V1 grid circuit. This feedback is D.C. coupled—a real necessity here—and the amount possible is limited by the inherent characteristics of V1. The network R5, R2 would have to be changed if any valve but one having the D.C. cathode current of a 6AM6 were used. The resulting gain of the whole amplifier is thus about 100—six to ten times that usually obtained in a single-stage amplifier—and therefore needs less than a volt input to modulate a C.R.T. fully.

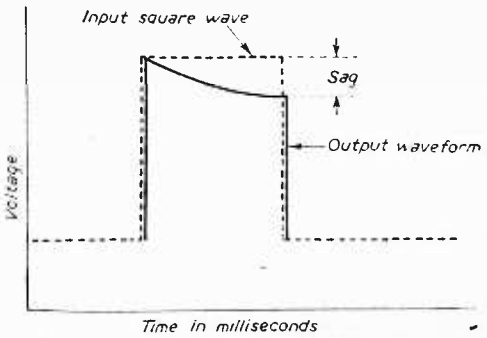


Fig. 3.—"Sag" at L.F.

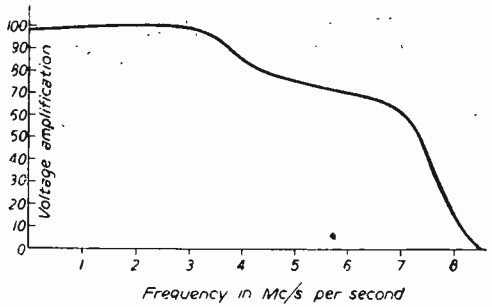


Fig. 4.—The frequency response curve.

Frequency Response

Fig. 4 gives the frequency response curve, and it will be seen that the whole range of British TV frequencies can be dealt with easily. Fig. 5 is a curve which shows the rise time actually achieved with this amplifier. Again, overshoot is very small and the rise time well within what is allowable.

Construction

The construction and layout presents no special difficulties, except the avoidance of stray capacitance. It should be remembered that unwanted feedback can occur, and screening of each stage is indicated.

C3 should be a total of 3 pf including "strays." If L2 is wound according to the table its self capacitance will be 1.2 pf. and the rest can be made up by normal circuit capacitance. It is, therefore, not a physical component. C4 is a trimmer; for the valves specified it is 4.7 pf, but if others are used it may well be advisable to make it 0-10 pf variable and to adjust it for minimum overshoot with a test-card on the screen of the C.R.T.

The circuit is intended to work into about 10 pf. This represents a reasonble value for an average cathode-ray tube, but best results are had by setting up the circuit, with tube in position, as follows:

Alignment

With signal generator set to 4.6 Mc/sec., apply about .3 volts to V1 grid. Temporarily short-circuit R8 and, with a valve-voltmeter connected to V2 anode through a 2 pf condenser, adjust the core of L4 for maximum response. If a maximum cannot be found screw the core right home: the circuit is evidently of lower capacitance than designed for, and no ill results will occur if then used as it stands. Remove the short-circuit on R8 and the amplifier is ready for use.

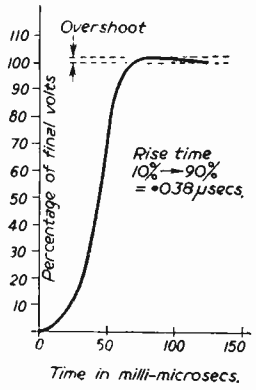


Fig. 5.—Amplifier rise time.

SHARED AERIALS

(*Continued from page 119*).

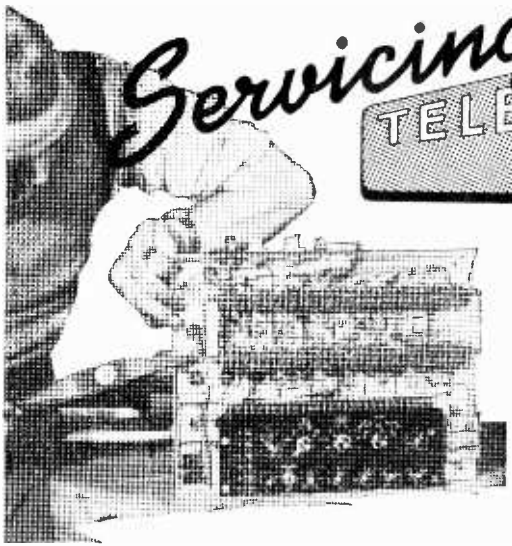
approximate degree of attenuation in db given by the network can be expressed as 20 log (2R1/R2).

The diagram in Fig. 7. shows a main cable on which six taps are made along its length and which is loaded at the far end by a resistor equal to the cable's characteristic impedance. In order to secure a good figure of isolation between outlet feeds and the main line, and to avoid interaction between outlets, the attenuation given by the tapping network at the far end of the main line should not be less than about 15db. Each tapping network has a slight loading effect on the main line, and thus tends to increase the line attenuation, but this is usually little more than about 0.5db per tap. With six taps, therefore, the 3db loss should be added to the 10db cable loss and the 20db attenuation of the end tapping network, giving a total loss of 33db, which has to be made up by the amplifier if a signal of equal level to that at the aerial is to be obtained at the far outlet. If required, the attenuation of the other taps can be arranged to increase progressively towards the amplifier to obtain a constant 500μV signal at each outlet.

The diagram in Fig. 8 shows this kind of distribution network can be extended to cater for all channels and a greater number of outlets. Additional amplifiers can be introduced to extend the coverage with little difficulty.

The photograph shows an estate of some 73 dwellings which is supplied with both BBC and ITV television signals from the common aerial system seen mounted on the wall of one of the houses. This system, which is in a fringe area and uses Spencer West distribution amplifiers, has now been in operation for nearly three years with excellent results.

In conclusion, it should be made clear that a Post Office Relay Licence is usually required to operate a large shared aerial system of this nature, but this may not be necessary if just a few neighbours get together to share a common aerial as a means of reducing expense and preserving the amenities.



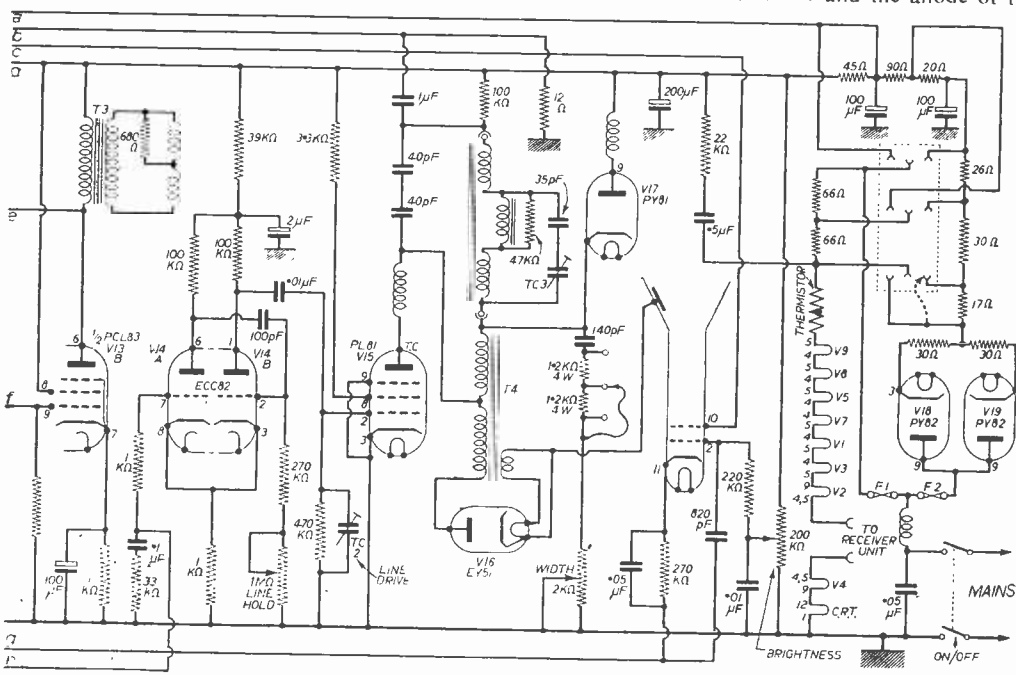
Servicing TELEVISION RECEIVERS

No. 41.—THE BUSH TV53 SERIES

By L. Lawry-Johns

THIS range of receivers includes the following models. TV53 and TV56 are table models with 14in. and 17in. tubes respectively, the T57 and TUG58 are 17in. consoles and the TUG 59 and T59 are 21in. consoles. A further model, the TV62, is similar but features a 14in. electrostatic tube and thus the setting-up procedure is somewhat different. The TV53 uses an MW36-24 tube, the TV 56, T57 and TUG58 use an MW43-64 (later models MW43-69), the T59 and TUG69 MW53-20. The TV62 has an AW36-21. The following range of receivers were also on similar lines with detail differences and these were the TV63, TV66 and TUG68. Therefore these notes may be used in conjunction with quite a comprehensive range of receivers with the reservation that the TV53 is the main subject. From a study of readers' letters received, it would appear that the pre-set controls present some difficulty as the purpose of these is not fully understood. We do not refer to the controls located under the front flap as these are clearly labelled. The pre-set capacitor TC2 is the line drive which should not require adjustment and this really applies to all the controls located at the rear end on the chassis.

However, for those not in possession of a service sheet the following, extracted from the setting-up procedure as recommended by Bush, will be of assistance. Set all controls for a normal picture, using a standard test pattern, and connect an AVO model 7, range 100mA., D.C., between the H.T. line and the anode of the



Circuit of the Power Pack

efficiency diode V17, PY81. Adjust the drive trimmer TC2, located in underside of main deck, for a deflection of 60mA., D.C.; this will correspond to a current of approximately 95mA., D.C., in the cathode of V15, PL81 line amplifier. Re-adjust focus lever if necessary. Adjust anti-ring trimmer TC3 (located on deflector coil assembly) for minimum waviness on line scan, left-hand edge of raster. Adjust line linearity coil L5 (located on deflector coil assembly) by sliding magnet in clip until a position is found at which optimum line linearity is achieved.

The focus unit uses two coaxially mounted Magnadur ring magnets, arranged with their magnetic fields in opposition; control of the focus is obtained by varying the distance between the magnets. Adjustment is by means of a lever on the left of the focus housing.

Centring of the Picture

Set the width and height controls so that the raster edges are within the mask. Adjustment of the lever at rear of the focus unit and projecting to the left achieves a vertical shift (if the lever is moved in a horizontal direction) or a horizontal shift (if moved in a vertical direction). This means that the whole raster is moved either sideways or up and down to present the picture centrally on the screen.

To square the picture in the mask (if the picture it tilted) adjust the scan coils by rotation on the tube neck, until the edes of the raster are parallel to the sides of the mask. The adjustment is made by releasing the knurled screw, located on the underside of the scan coil assembly (deflection coils), and rotating the complete assembly until the raster is square in the mask. Re-tighten the knurled clamping screw.

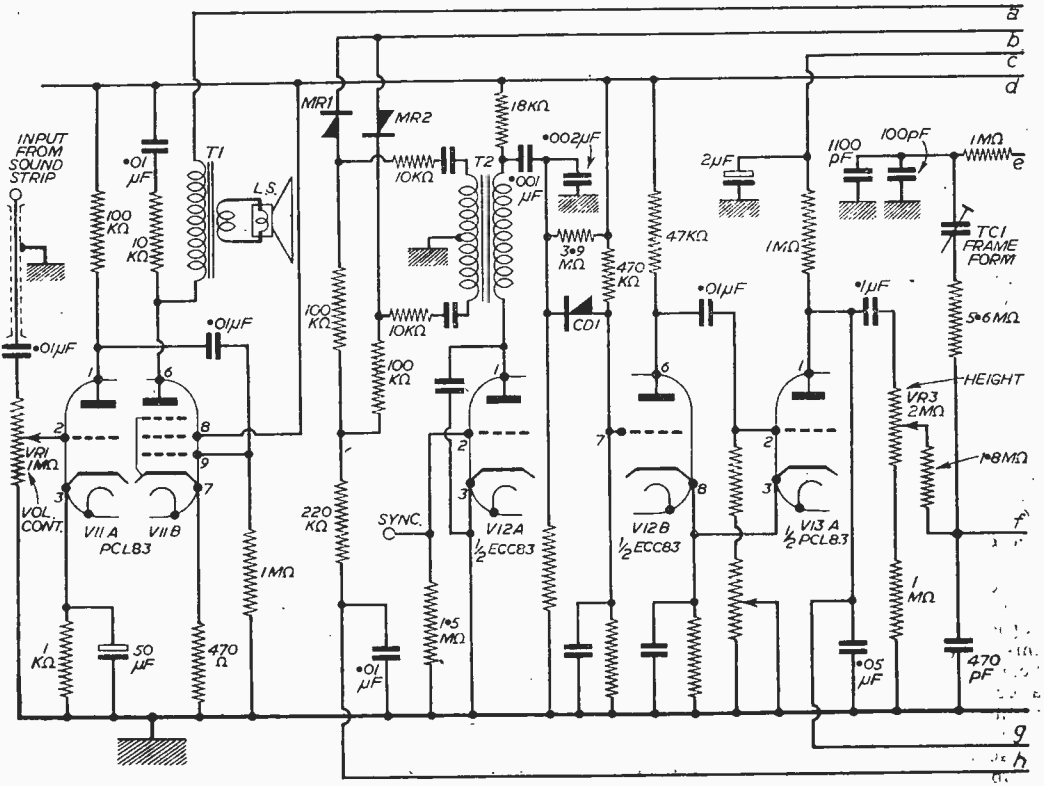
The frame form control TC1 must be adjusted for the best overall linearity. This means that the scanning lines should be as evenly spaced as possible at the top, centre and bottom of the raster.

Two picture width adjustments are provided. A variable resistor VR5 is located under the flap and a "stepped adjustment" is located on the rear of the line output transformer T4. To adjust for correct width, set the variable control VR5 for a picture which just extends beyond the edges of the mask. If VR5 does not provide sufficient adjustment, alter position of the plug on the "stepped adjustment" and reset VR5.

The Tuner Unit

These receivers do not employ a turret tuner of the conventional type. The channel selector and tuning control consists of a click-stop mechanism and cam which adjusts the separately ganged core assemblies to the channel required. The fine tuning control moves the entire channel selector assembly.

(To be continued)



Sync and frame amplitude circuit.

TELEVISION TROUBLES

Their Symptoms and How They May be Cured—3

By G. J. King

THIS month we turn our attention to the popular range of Bush receivers and deal with the many symptoms which result from faults in the timebase and synchronisation circuits. It is intended to pursue the general pattern of presentation as was described in the first and second articles of this series.

TV22 and TUG24 (Early Versions)

Irregular Pairing and Trembling of the Scanning Lines.—This symptom is very disturbing and due to its rather intermittent nature often proves somewhat of a problem to locate and cure. The frame timebase circuit employs an ECL80 valve, which is situated on the main chassis directly behind the mains dropper resistor in the near left-hand corner when viewing from the rear of the cabinet. The complete circuit, including the frame sync filter section, is given in Fig. 1.

It often happens that when this symptom occurs the ECL80 valve itself is suspected of being "noisy" and, indeed, when it is tapped with the handle of a screwdriver the symptom is invariably created. This, of course, leads to the replacement of the valve, which may appear to have cured the trouble. However, after a short while the symptom may reappear, and still can be promoted by tapping the replacement valve. In a lot of cases the real trouble is caused by an intermittent fault developing in the 250 pF capacitor connected between the slider of the frame linearity control and chassis—marked C1 in Fig.1.

It is worth noting that new and good condition ECL80 valves in this section of the circuit, seem to exhibit the symptom of loose electrodes when subjected to considerable vibration, though there are times when the valve itself is, in fact, responsible.

Impaired Frame Hold

A similar symptom is caused by intermittent operation of the frame coupling capacitor (C2 in Fig. 1). In this case, however, the height of the picture is affected slightly in a random manner. Applying pressure with a finger to the subject capacitor often proves this trouble conclusively.

In most cases this symptom is caused by trouble in a component associated with the frame sync feed and pulse shaping circuits. If the frame tends to lock lightly within the range of the hold control, the type W6 rectifier should immediately be suspected. If a replacement is not at hand for a substitution test, an idea of whether or not the trouble is in this component can be gleaned by placing a short-circuit across it. This should be done purely as a test and not as a permanent feature, for although a strong lock will be secured by this action in the event of the rectifier being defective, the excellent interlace performance of this model will be destroyed.

A critical frame hold symptom sometimes occurs as the result of open-circuit of the frame hold control itself. When this fault exists the control appears to suffer from hand-capacity effects, and the speed of the generator can be altered by bringing the hand in contact with the control panel.

Other causes of the symptom are: (a) open-circuit frame sync coupling capacitor (C3 in Fig. 1); (b) open-circuit or alteration in value of the components associated with the pulse shaping diode (W6) and (c) shorting turns or high resis-

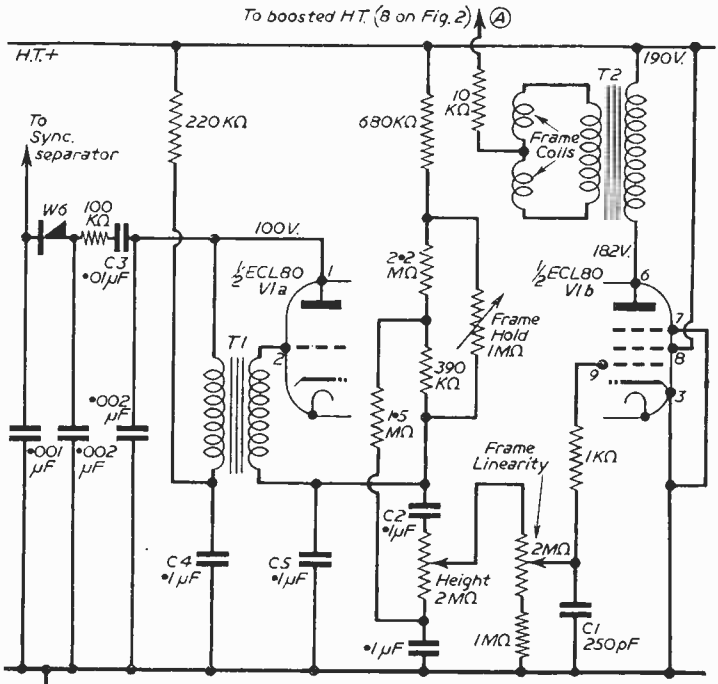


Fig. 1.—The Bush TV22 series frame time base circuit.

tance windings of the frame blocking oscillator transformer (T1).

If the hold control appears to be right out of balance, and the picture seems as though it would lock if the control could be rotated past its stop, attention should be given to the resistors associated with the control circuit. These are of fairly high value and have a tendency to rise in value above tolerance and cause the trouble. Capacitors C4 and C5 should also be checked for value in persistent cases of the symptom. There is also the possibility of a drift in characteristics of the ECL80 valve, but a substitution test quickly proves this possibility.

Frame Non-linearity

Cramping at the bottom of the picture is a fair indication that the ECL80 is in need of replacement. The 1 megohm resistor in series with the frame linearity control may rise in value and put the point of optimum linearity outside the range of the linearity control. A leak in the coupling capacitor C2 also plays havoc with the linearity.

Another cause of poor linearity, which is rarely ever considered, is leakage between the contacts on tag strips and valve holders. During the course of investigating a very bad frame linearity fault on a TV22, it was noticed that some of the electrolyte had leaked from the 60+250 mF electrolytic smoothing capacitor which is mounted above the frame output transformer and had fallen between adjacent contacts on the tag strip which is mounted on the transformer. As this strip carries various resistors associated with the frame timebase, the insulation between the circuits was destroyed, as was also their balance. The tag strip was replaced along with the capacitor and the fault was completely remedied.

Frame on Sound

While this symptom, which takes the form of a rough buzzing on the sound channel, the pitch of which alters as the frame hold control is rotated, has no direct association as a frame fault symptom, it is included because it is caused by a frame timebase fault.

It occurred on a Model TV24, which uses a common panel for the frame hold and volume controls. It was eventually found that there existed an unusual form of coupling between the two controls, and this was promoted by the hold control being open-circuit at one end of its track. The curious thing about this was that the frame hold control operated pretty well normally, as did the volume control. However, replacing the control cured the unwanted coupling without any trouble.

It is worth mentioning that a symptom of this nature is invariably caused by a defective decoupling component either in the frame timebase or sound A.F. stages.

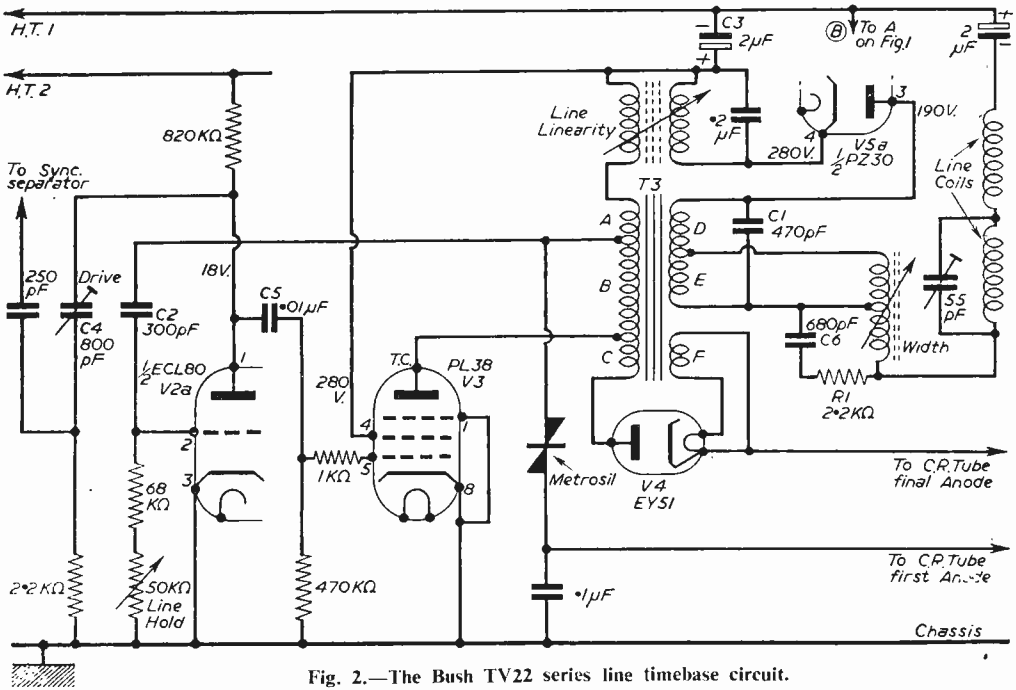


Fig. 2.—The Bush TV22 series line timebase circuit.

It is worth mentioning that a symptom of this nature is invariably caused by a defective decoupling component either in the frame timebase or sound A.F. stages.

EHT Failure

This, of course, results in a blank screen, though the sound is normal. The presence of EHT can be established by using a screwdriver with an adequately insulated handle and holding the blade close to the EHT connector on the tube. EHT is revealed by a series of thin sparks jumping between the two points: a more vigorous discharge can be evoked by holding

the blade in contact with the metal tube support. If EHT is lacking at this point, a test of a similar kind can be made at the anode of the EY5 EHT rectifier, but this time a connection should not be made between the screwdriver blade and chassis. If only a minute spark can be drawn from this point, or if it is totally dead, the trouble lies in the line timebase circuit, which are given in Fig. 2. If a healthy spark can be drawn from the anode, but not at the heater or EHT connector, then the EY51 should be replaced.

A frequent cause of line timebase failure is shorting turns in the line output transformer (T3), but before contemplating its replacement a series of tests should be made in the associated circuits. On a number of occasions the 470 pF waveform correction capacitor (C1 in Fig. 2) has been known to develop a slight leak and load the circuit so much that it fails to produce EHT. When this fault occurs there is no glow from the heater of the EY51 valve, though a faint 10 kc/s whistle, which alters slightly in pitch as the line hold control is rotated, can usually be heard from the line output transformer.

As will be seen from Fig. 2, the line timebase uses two valves, which are coupled and caused to oscillate by way of the output transformer and the 300 pF capacitor C2. Thus, failure of C2 represents another possible cause of the symptom. In this case, however, the stages will be completely dead from the point of view of oscillation; there will be no line whistle and the PL38 valve will rise to a high temperature owing to lack of bias, which is normally produced by the drive signal.

A short-circuit in the 2 mF electrolytic capacitor (C3) connected in the cathode circuit of V5a (efficiency diode) also destroys the EHT by promoting failure of the timebase. A clue in this connection is given by measuring the voltage either at the cathode of V5a or the screen of the line amplifier V3 when, instead of its normal 280 volts, it will be in the region of 180 volts.

Other causes of the symptom are: (a) poor insulation of the "drive" compression trimmer (C4); (b) poor insulation of C2 resulting in the grid of V2a going positive; (c) low emission of V2a or V3; (d) failure of V5a; (e) open-circuit or short-circuit of the coupling capacitor C5 and (f) shorting turns in the line output transformer.

In the case of a suspect line output transformer, a substitution check is the most conclusive and satisfying, but in the event of a replacement transformer not being available tests of winding continuity and resistance sometimes assist in establishing a definite fault, but it should be remembered that a short between adjacent turns will prevent operation of the circuit though will not show up in terms of a resistance test. However, as a guide to readers the approximate resistance values to be expected across the various windings on the transformer are given below: section A, 7.5 ohms; section B, 30 ohms; section C, 800 ohms; section D, 14.2 ohms; section E, 1.3 ohms; section F, 1.5 ohms.

Poor Line Linearity

This symptom is not very common on the model under discussion, but if it does occur and the line timebase valves are in good order, attention should be directed to the series-connected resistor capacitor across a section of the width coil (C6 and R1 in Fig. 2). Low H.T. voltage also causes the trouble, since then a too far advanced setting on the width control is demanded in order to secure adequate line amplitude—check the PZ30 valve.

Failing Line Scan

This often happens, and while the picture may appear perfectly normal at first, as the set warms up the picture will suddenly fade out, starting with a collapse of width and fading eventually to a dim pillar of light before disappearing completely. The trouble is caused by a fracture in the cathode circuit in the PZ30 valve (section V5a). There is continuity when the valve is cool, but as it warms up and the electrodes expand a break occurs in the circuit.

(To be continued)

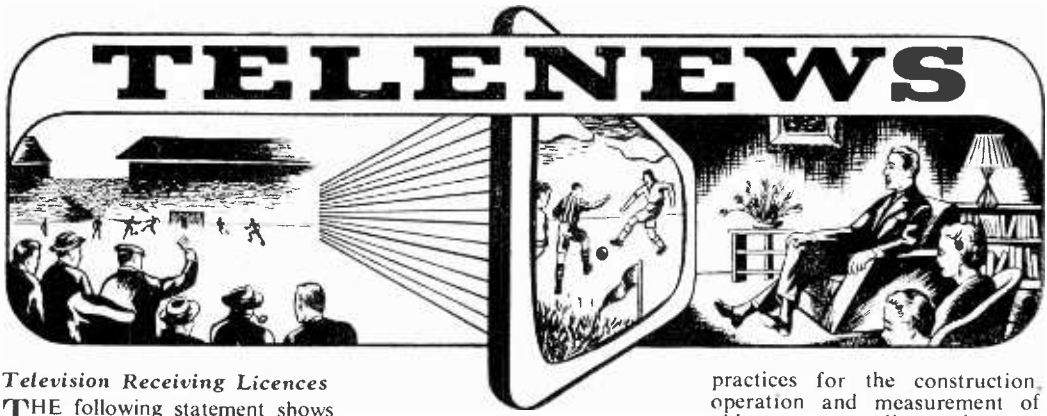
More Vidicons in Use

THE conversion of variations in light over a picture area into equivalent proportions of electrical signal information—an essential process in any television service—is carried out by two principal methods, photoemissivity and photoconductivity. An example of the former is, of course, the Iconoscope or one of its variations while in the latter class we have the Vidicon. Generally speaking the first named device, in which a concentrated beam of electrons striking a photoemissive surface brings about a release of free electrons from it, is much more sensitive, but of late, particularly in America, more television stations have been using Vidicon equipment.

Glass Face at End of Tube

At the end of the Vidicon tube is a glass face backed by a transparent conductive coating which is again backed by a photoconductive target. It has the advantage of signal storage in addition to being cheaper than its photoemissive counterpart. It has a very good signal to noise ratio, but at low levels of light intensity a Vidicon has been rather insensitive.

The new tubes, which are now available, show a considerable improvement in this connection, with the result that even for live television broadcasts Vidicon camera chains are now being employed. This is quite apart from its use in telecine equipment and industrial camera devices.



Television Receiving Licences

THE following statement shows the approximate number of Television Receiving Licences in force at the end of July, 1958, in respect of receiving stations situated within the various Postal Regions of England, Wales, Scotland and Northern Ireland.

Region	*Total*
London Postal	1,597,023
Home Counties	1,026,530
Midland	1,328,431
North Eastern	1,337,250
North Western	1,160,704
South Western	648,431
Wales and Border Counties ...	479,675
Total England and Wales ...	7,578,044
Scotland	627,454
Northern Ireland	89,411
Grand Total	8,294,909

Increase in Power at Blaen-plwyf TV Station

ON August 8th the power of the BBC television station at Blaen-plwyf, near Aberystwyth, was doubled; the station was opened in April 1957 with an effective radiated power of 1 kilowatt and this will now be increased to 2 kilowatts. This increase in power should improve reception, particularly in the fringe areas. It will not, however, materially increase the area served by the station, which extends around Cardigan Bay from Pwllheli in the north to Aberporth in the south.

ITV for the South

TOP ITV programmes are now being transmitted to southern England to a population of approximately 2¾ million. These are the shows with the highest viewing ratings, produced, filmed or bought from abroad by the four major TV contractors. They are beamed by the new independent TV station, Southern Television, over 3,500 square miles in a rough D-shape from Weymouth to Brighton and northwards to Newbury.

Television for Miners

MINERS in the Norgrad coalfield, in Hungary, have decided to build a television booster station at Salgotarjan. The TV mast will be sited on top of a 492ft. hill, and will enable viewers to watch programmes within 12½ miles radius.

100,000 Saw Southern TV Exhibitions

WELL over 100,000 people have been introduced to independent television and Southern Television through a series of exhibitions arranged by Southern TV.

Centrepiece of the exhibitions was the new station's outside broadcasting unit transmitting on a closed circuit to TV sets on the stands of retailers taking part.

Standardising Video Tape Practice

IN answer to the rising need for standardisation of video tape recording practices in the television industries, Mr. Axel G Jensen, Bell Telephone Labs, engineering vice-president of the Society of Motion Picture and Television Engineers, has announced the formation of a Video Tape Recording Engineering Committee, by the society.

The official scope of the committee, which will be chaired by Mr. Howard A. Chinn, CBS Television, will be "to propose standards and good engineering practices for the construction, operation and measurement of video tape recording and reproducing equipment and for those video tape or other characteristics which affect performance and interchangeability."

Items to be Standardised

Initially, the committee plans to consider standardisation of the following: tape (dimensions and identification), tape reels (hub and flange), tape tracks (locations, video-, audio-, control-, and cue-tracks), recorded signal electrical characteristics (video, audio, control and cue), tape leaders, methods of measurement, terminology and tape splicing.

New Features

New features include an image orbiting device which is designed to prevent "sticking" on static pictures (thereby prolonging the useful life of the pick-up tube) and a new picture and waveform monitor with 14in. picture and 5in. waveform tubes. The camera control and power supply are arranged for rack or mobile mounting, and the control panel contains no valves whatsoever.

Temporary Stations in Orkney and Caithness

THE BBC is building a combined television and V.H.F. sound broadcasting station in Orkney, and another near Wick; the latter is to fulfil the dual purpose of relaying the signals to the Orkney station and providing a service for listeners and viewers in Caithness. When they are in their final form these stations will carry the BBC television service and the three

sound programmes to almost the whole of the Orkney Islands and Caithness, with a total population coverage of some 43,000. In order to provide a television service before the constructional work on the permanent stations can be completed, it has been decided to provide temporary installations both in Orkney and at Wick, which it is hoped to complete early in the new year. Since the temporary aerials at these stations will be lower and less effective than the permanent aerials, the coverage in the temporary condition will be restricted to the immediate neighbourhood of Kirkwall and Wick respectively.

Skeleton Slot Aerial

OPTICESSORY PRODUCTS, Treharris, Glam, state that they can supply a Skeleton Slot Aerial, similar to that described in the May issue, at 28s., carr. free.

It is supplied folded flat, though completely assembled, the user having only to swivel the arm at 90 deg. to frame and tighten two screws. Both ends of the arm are shaped to suit the frame, thus giving a deadlock location.

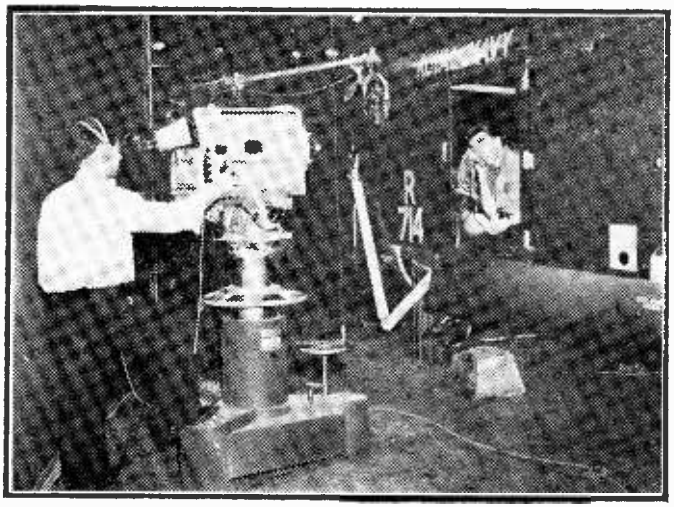
Tested against a normal five element the S.S. had a slightly higher gain with good bandwidth and better Band I rejection.

Light and robust, it is ideal for use outdoors, being easily fixed to any wall or chimney, quickly and permanently, or with the universal clamp, to any 1in. to 2in. diameter mast.

Due to its size it can be used anywhere indoors, even "hidden" under the TV table, or in a cupboard.

New TV Camera

MARCONI'S latest design of television camera channel is currently undergoing operational trials with the British Broadcasting Corporation at their Riverside Studios. Fifteen of these camera channels were recently ordered by the BBC for their new White City Television Centre, and the Australian Broadcasting Commission have also ordered eight for their new television studios at Brisbane and Hobart. This new image orthicon camera channel, known as the Mark IV, is equally suitable for outside broadcast and studio work. This design has been derived from the highly successful Mark III channel which pioneered the use of the 4½in. image orthicon pick-up tube and which has been adopted by the BBC, the I.T.A. programme contractors and television authorities throughout the world. The Mark IV camera, which weighs less than 100lb., allows full advantage to be taken of the technical superiority of the 4½in. tube, at a weight comparing favourably with cameras designed specifically to take only the 3in. tube. It can, of course, be easily adapted for use with the smaller tube.



Showing the Mark IV in use on "The Skylarks" set at the BBC's Riverside Studios.

New TV Link for Orkneys

THE BBC has recently placed a contract with E.M.I. Electronics Ltd., for a temporary microwave radio link to serve the new transmitting station in the Orkneys so as to bring television to people living in the Kirkwall area nearly a year sooner than would otherwise have been possible. The link will relay the BBC's programmes from a site near Wick to the new broadcasting station at Nether Button in the Orkneys. This station is due to be brought into service in a temporary condition early in 1959 and will eventually carry a full V.H.F. sound and television service.

The television link will operate in the 7,000 Mc/s band. It is designed for unattended operation and will comprise duplicate channels working into common aerial systems. A passive reflector system will be used at the receiving end of the link at Nether Button. Provision will be made for remote control over a separate radio link for changeover from one channel to the other.

E.M.I. Awarded Contract for Temporary Link

EARLIER this year E.M.I. was awarded a contract for a similar temporary link installation as mentioned above to relay television programmes to the BBC's new transmitting station at Peterborough. This station is due to be completed early in 1959.

A "Special Form" Tube

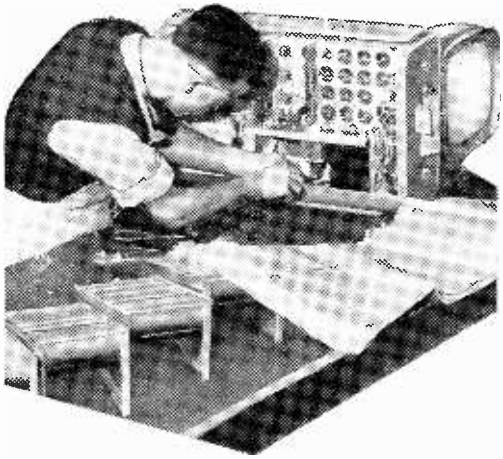
IT is amazing to see the strides which have been made to reduce the length of cathode-ray tubes used in television receivers. It was not long ago that boxed-in projections at the back of the cabinet to protect the cathode end of the tube were more the rule than the exception. Developments in wide angle deflection have been rapid, however, and the latest has been made manifest in a briefcase portable television set which makes use of a 17in. diameter tube made by Philco. This is called a "Special Form" and is just over 10½in. long!

A NEW SERIES

Analysing and Servicing TV Receivers

No. 2.—The Mixer Oscillator Stage

By "Diadem"



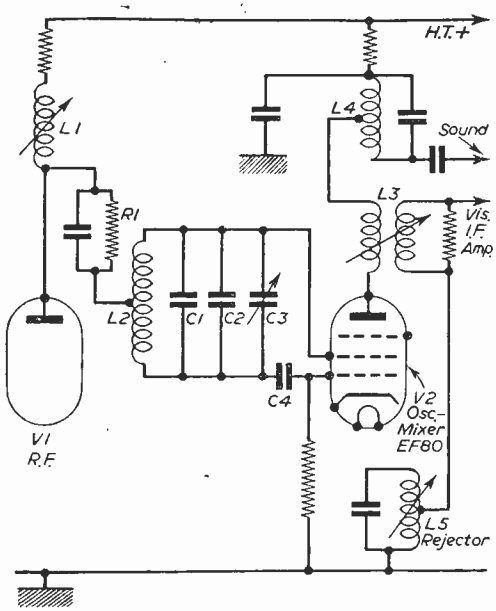
THE amplified R.F. signal appearing across the tuned anode coil is capacitively coupled to the oscillator coil L2 (Fig. 6). The signal is then fed to the control grid of V2 through the coupling capacitor, C4. V2 is a self oscillating frequency changer employing the usual Colpitts oscillator. C3 is the oscillator trimmer while C1 is a mica capacitor, C2 is a ceramic with a negative temperature coefficient. Temperature within the cabinet and of surrounding components may affect the oscillator frequency causing drift. Capacitors are particularly affected by heat changes. Heat will increase the value of C1 while it will decrease C2 by a similar amount, this helps to cancel out any overall change in capacity in the oscillator circuit due to heat, as any drifting will be very noticeable in the sound channel.

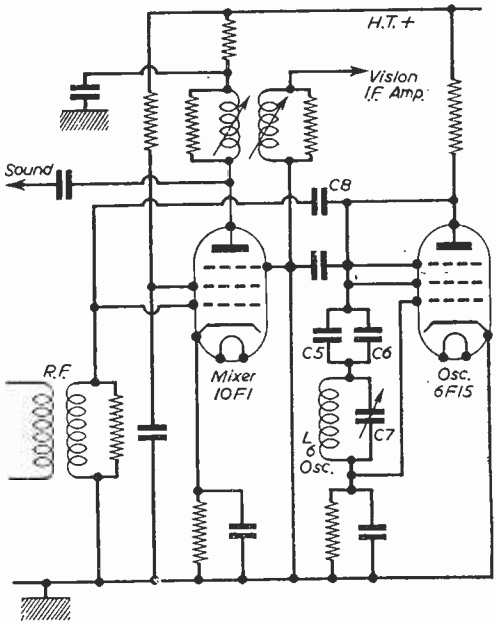
C1 and C2 have other uses besides frequency stabilising, by altering their value various frequencies can be covered which would otherwise be outside the range of the oscillator, and they also help to make the adjustment of the oscillator trimmer less critical.

The circuit shown in Fig. 7 works in a similar manner to Fig. 6 except a separate oscillator is used giving greater gain in the mixer stage, the gain from a single valve frequency changer being practically nil. The pentode is strapped as a triode. The total capacity of the oscillator coupling condenser is split into two halves, C5 and C6. C5 is mica, C6 is ceramic. These two capacitors have a similar stabilising influence to C1 and C2 in Fig. 6, but they don't have the same function of course. C5 and C6 can be likened to C4 in Fig. 6. The output from the oscillator is taken through C8 and fed into the mixer grid.

Fig. 8 is another type of frequency changer using a single valve. This is not the self oscillating type as in Fig. 6. The oscillator being formed by the control and screen grids and the reaction

(*Continued on page* 133)





Figs. 6 and 7.—(Left) A self-oscillating frequency changer. (Right) This circuit works in a similar manner as Fig. 6, except that a separate oscillator is used.

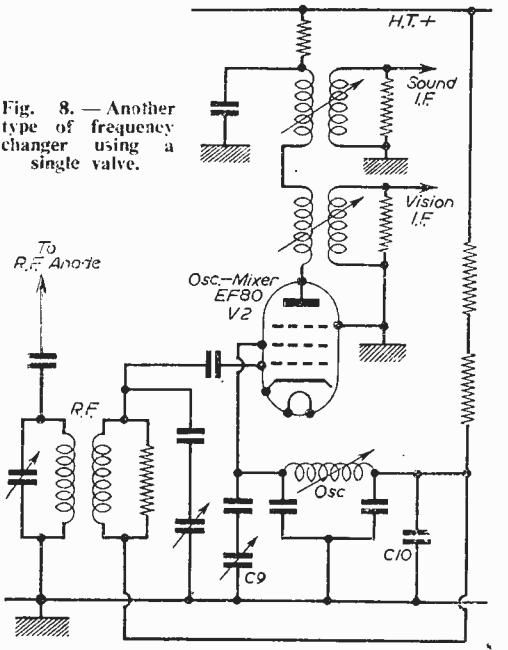


Fig. 8. — Another type of frequency changer using a single valve.

coupling between them being across the common impedance C10. The oscillator trimmer is C9. The amplified output from the R.F. stage is combined with the oscillator voltage in V2 which produces the separate sound and vision intermediate frequencies at the anode of V2.

Fig. 9 is a modern version of Fig. 7, the pentode section being the mixer and the triode section the oscillator. Automatic mixing of oscillator and signal frequencies does not take place in this valve as it does with the triode hexode where an internal connection is extended from the oscillator grid into the mixer section. The triode pentode is two separate valves in one envelope and therefore either an inductive or capacitive coupling is necessary between the two sections. The capacitor coupling seems the most popular and this is carried out by a very small value, usually about 2 P.F. by C11. The oscillator trimmer being C12.

The I.F. Amplifier

The R.F. and I.F. circuits must be designed to give a substantially flat response of 3.5 Mc/s where only the lower sideband is used. The I.F. usually chosen lies between 10 Mc/s and 38 Mc/s.

The vision signal appearing across the I.F. bandpass transformer L1/2 is fed to the I.F. amplifier V2 control grid, the amplified signal appears across L4/5 and is then passed to the diode detector. R1 and R2 in Fig. 10 are damping resistors shunted across the primary and secondary I.F. coils to maintain the required bandwidth necessary for good picture definition. The contrast control R3 operates the same as the gain control in the R.F. stages which has already been explained. Breakthrough of sound on vision is prevented by the sound I.F. rejector coil L3. This rejector is only one of many types that can be used. The cathode circuit rejector mentioned in the forthcoming faults section as upsetting the stability of the stage if incorrectly adjusted is shown in Fig. 12.

The I.F. amplifier shown in Fig. 11 works in a similar manner to Fig. 10 except the I.F. coils L6 and L7 are of the single wound stagger tuned type which are much simpler for the amateur to design and align. But simplicity always has its snags. In this case it is the time constant developed by C1 and R4. In resistance capacity coupled circuits such as this a heavy burst of interference will charge C1 and cause grid blocking until the extra bias has leaked away, thus cutting down the stage gain to a low level. In bad cases the picture may be blacked out altogether for a few seconds. A stagger tuned circuit of this type does not normally require damping resistors across the coils and the value of the anode resistor in the previous stage can be slightly increased, which also reduces the damping effect giving higher gain to the stage.

The bandwidth is preserved by tuning two of the I.F. coils slightly to either side of the correct frequency and the third coil tuned to the frequency. This gives an overall pass-band of the required width. It should be remembered that too much staggering will reduce the overall gain. In fringe areas the coils can be peaked up a little to give a restricted bandwidth of 2 Mc/s, this will give greater gain per stage. But even greater gain can be obtained from a correctly designed and aligned I.F. transformer.

The Detector-video Amplifier and Noise Limiter Stages

Fig. 13.—The vision signal from the final I.F. stage L1 is passed to the detector anode V1A. The positive going video signal developed across R1 is fed to the grid of the video amplifier V2. The output from the amplifier is negative going on signal and is therefore suitable for feeding direct to the tube cathode. The sync pulse is always the reverse of the vision signal and is therefore positive going.

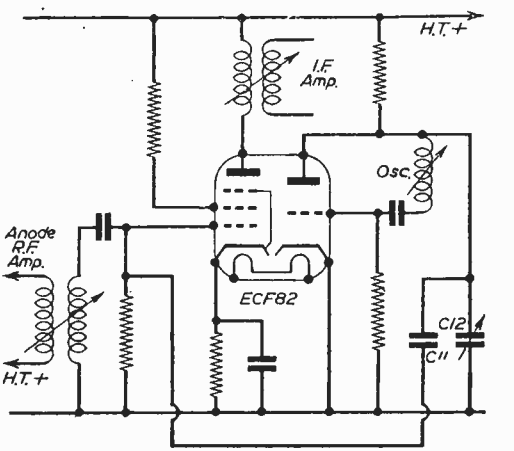


Fig. 9.—This is a modern version of Fig. 7.

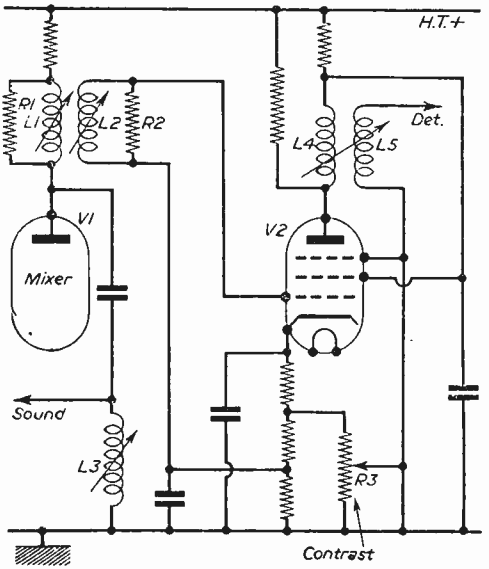


Fig. 10.—I.F. amplifier circuit.

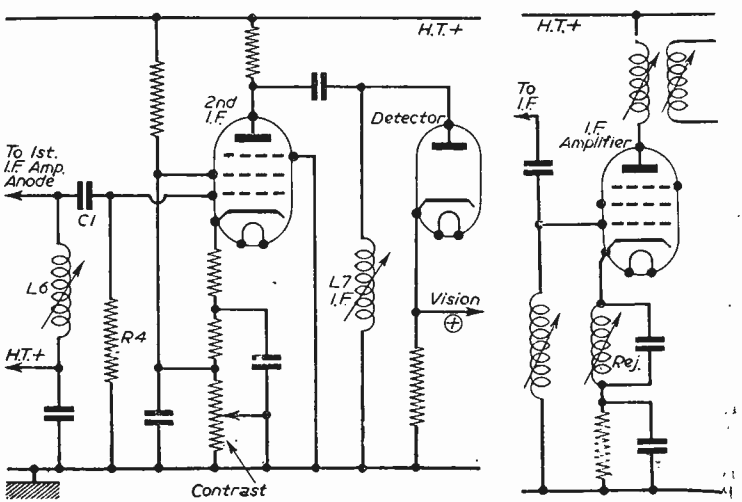
The video frequency correcting circuit comprises of R2 and the choke L2, L3, and the damping resistor R3 prevents L3 from ringing at certain frequencies.

V1B is the interference limiter, bursts of interference send the cathode negative causing the valve to conduct, and this shorts out the video output momentarily through C1 to chassis, the voltage on the anode of V1B is varied by the limiter control R4 and the setting of this adjusts the level at which the valve conducts. The brilliance control network is also part of the potential divider feeding V1B, variation of the brilliance control will also affect the voltage on the limiter anode. V1B must be a low impedance type of valve otherwise it will not form an effective shunt during conduction.

Fig. 14.—As it will be immediately noticed that the two diodes and the input and output phase symbols to V4 are in reverse to those in Fig. 13, the cathode bias resistor is considerably lower in value. All this is necessary when the vision signal is fed to the tube grid. The output of V4 must be positive going on signal and the sync pulse is therefore negative going. The coil L4 is a filter coil to prevent voltages at intermediate frequencies from being fed into the video amplifier from the detector stage, the coil also provides a measure of compensation at the higher end of the video frequency band. The coil with the input capacitance of V4 resonates at about 4 Mc/s. R5 is a damping resistor to prevent ringing. R6 is the diode load, its value is lower than the resistor in a similar position in the sound detector circuit. A low value of about 5K is necessary when the valve has to deal with frequencies of several megacycles per second in order to maintain the required frequency response. Now we have arrived at the detector a word or two about phasing may be helpful to the reader.

Phasing commences at the vision rectifier V3A. Notice should be taken of this valve to see which way round it is connected. If, for instance, this detector was reversed and the output from V4 was taken to the tube grid as shown, the vision signal would have the wrong polarity, and the picture would be the same as viewing a photographic negative. The sync pulses feeding the line and frame generators would also receive synchronising pulses of incorrect polarity and difficulty may be experienced in holding the picture steady. Further diagrams of correct phasing will be seen in the tube and time-base sections. This is one reason why it is not wise for the newcomer to TV to mix circuits, but to stick to a published design unless they have sufficient knowledge to take the polarity problems into consideration. Other examples which may confuse beginners are that in some receivers two video amplifying stages may be used, this means the polarity will again be reversed, the above remark does not apply to two video output valves in parallel. The same phase reversal takes place when a sync separator is followed by a sync amplifier or triode line and frame clippers are used prior to the generators, also when a phase splitter or cathode follower is used to feed the picture signal to the tube, at its anode will appear sync pulses of reversed polarity to those at its grid.

In Fig. 14 a positive going sync pulse could be taken from the cathode of V4 if required, or a negative going pulse from V2 cathode in Fig. 13, these connections will depend on the type of timebase in use.



Figs. 11 and 12.—(Left) Another I.F. amplifier. (Right) The cathode circuit rejector

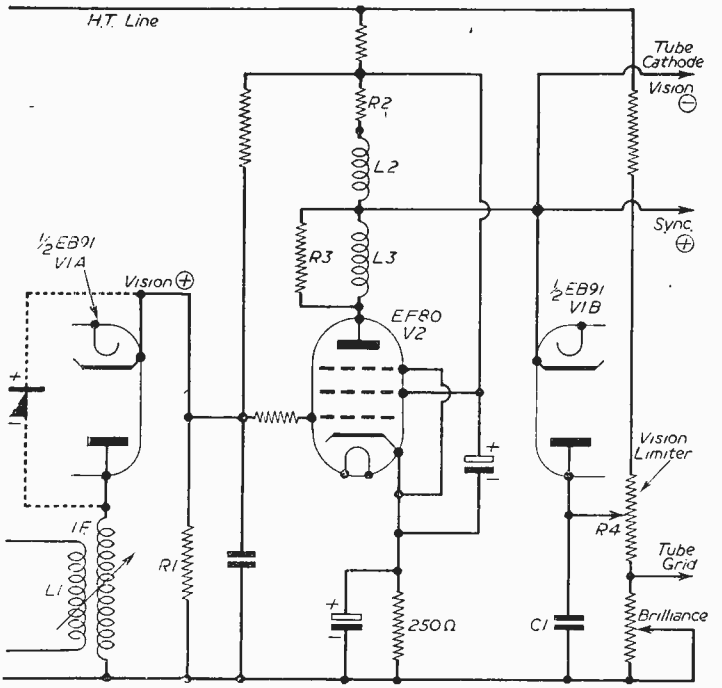


Fig. 13.—Germanium crystals can be used in place of the diodes.

In place of the diodes in Figs. 13 and 14 some designers prefer to use germanium crystals, but the ultimate results are the same. These are shown by the dotted lines.

Faults Affecting the Vision Strip

Sound on Vision.—Bars on picture, with trembling picture varying with sound intensity. A strong signal can cause overloading, attenuate the signal at the aerial or reduce contrast or gain control. tune oscillator to max. sound; also check for incorrect setting of the sound rejectors and for microphonic valve.

Ragged Verticals does not always originate in the sync stage, but may be weak signal in vision strip if accompanied by snow (grain specks on picture); also check aerial.

Loss of Highlights (Whites).—Check interference limiter for faulty components and tube for low emission. if the whites are clipped as though the vision interference limiter is at max., the fault may only be instability; check the decoupling condensers in the strip or if excessive contrast Check Det., Video Amp., and EHT.

Smearing. Flaring or Right-handed Overshoot. —Can be due to L.F. phase distortion; check the I.F. alignment and the crystal detector; check the black and white rectangle on top of the test card. Bad low frequency response can also be caused by faulty decoupling condensers especially the ones in the video amplifier, and check the voltage in this stage.

Pulling on Whites or Stepped Verticals.—Check the H.F. response. The fault is usually caused by misalignment of one or more coils in the vision strip, this causes the sync pulse to fire the line oscillator out of step. Try staggering the tuning; check the video output valve and its components. If the fault still persists and picture definition is good, check the input condenser to the sync control grid and all the sync components (see sync faults).

Black after White or Reverse.—Misalignment fault again. Poor H.F. response. Check the damping resistors across the coils for high resistance or open circuit. examine the video amplifier and its components.

Plastic Effect.—Caused by poor L.F. response; align the tuned circuits; check the decoupling capacitors, the coil damping resistors and video correction chokes.

Smearing.—The faults on smearing given in an earlier paragraph should not be confused with smearing due to leakages across electrodes in the C.R.T.; check also the damping resistors across the tuned circuits for O/C or high resistance.

Uncontrollable Brilliance.—This can be caused through other than tube defects or brilliance network faults. Check the video output stage components and valve and also the vision noise limiter.

(To be continued)

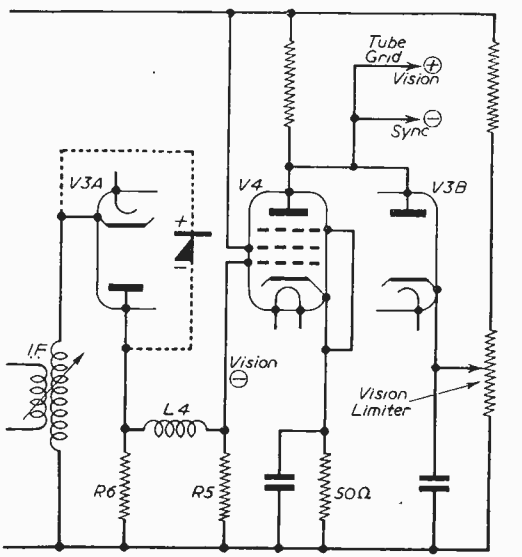
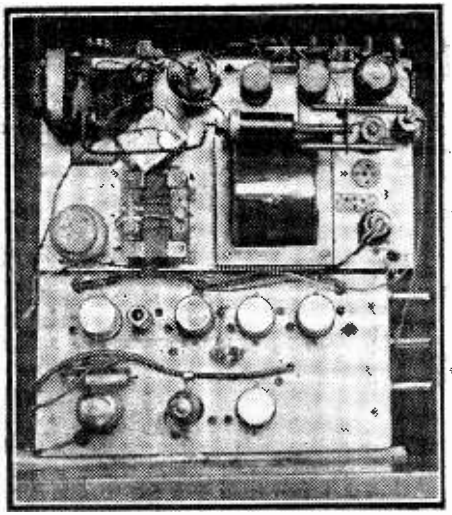


Fig. 14.—If required the positive going sync pulse can be taken from the cathode of B4.

A Home Constru

A MODIFIED VERSION OF THE "VIEW MAS
BBC CONVERTERS



Top view of the chassis.

AS there has been a large number of requests from readers for constructional details of television receivers, the author decided to pick the best parts from past designs in this magazine and to bring them up to date.

"View Master" Circuits

It was intended to follow the "View Master" circuits, with all the modifications that have

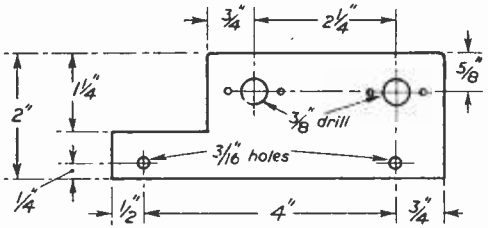
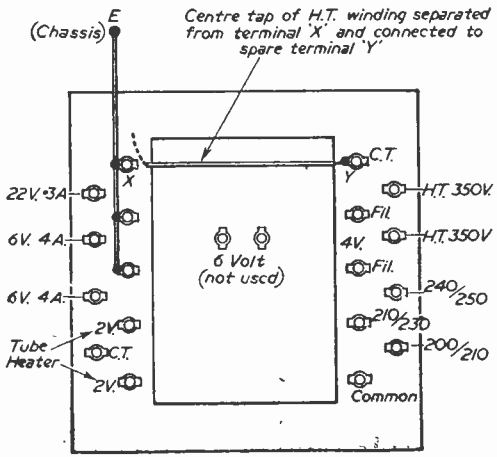


Fig. 4.—Extension piece for 2 controls.



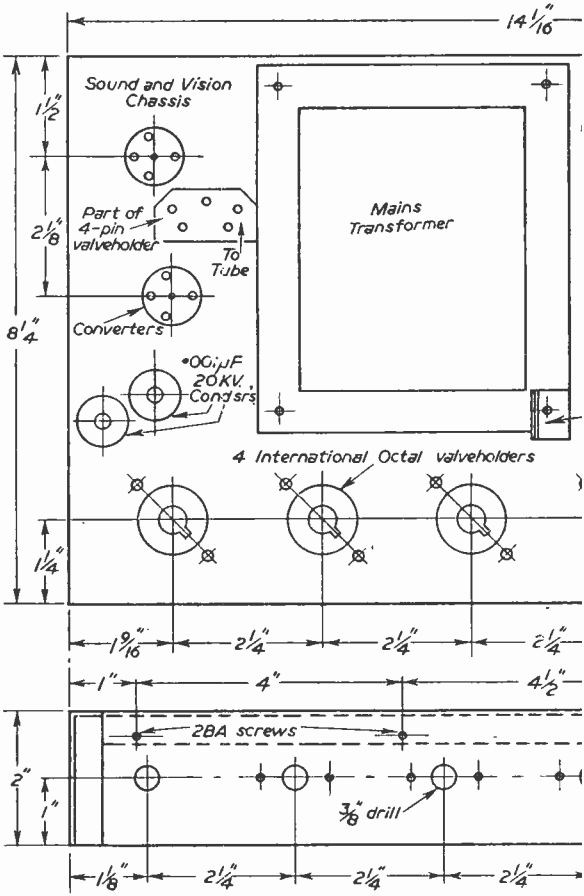
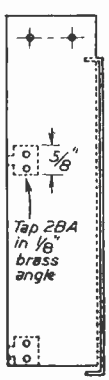


Fig. 2.—(Above) Modifications to chassis for power pack and time base (old Ultra power chassis).

Fig. 3.—(Left) Mains transformer showing modifications for centre tap.



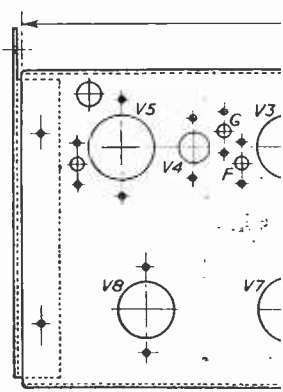
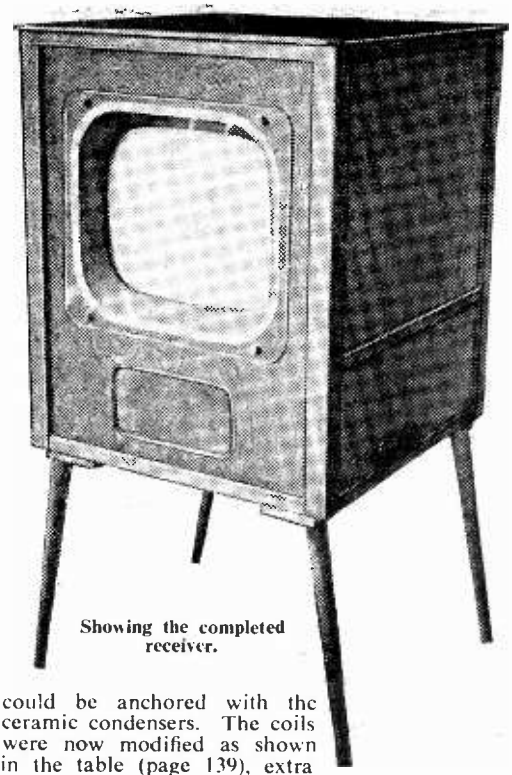


Fig. 1.—(Right) Showing modifications to "View Master" chassis.

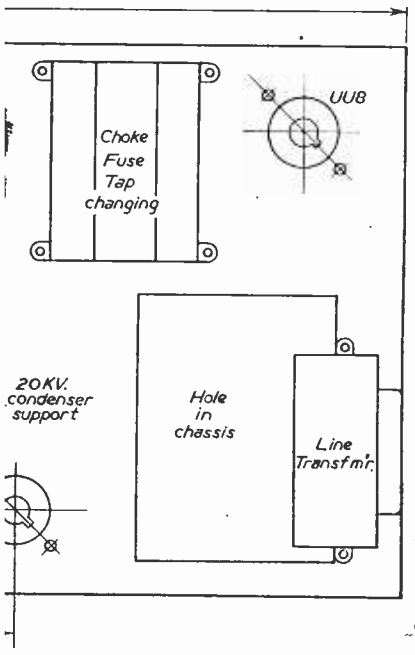
;ted TV Receiver

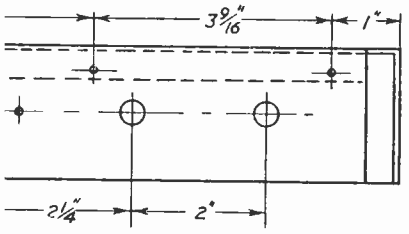
ER" WITH DETAILS FOR MAKING ITV AND

By P. Green



Showing the completed receiver.





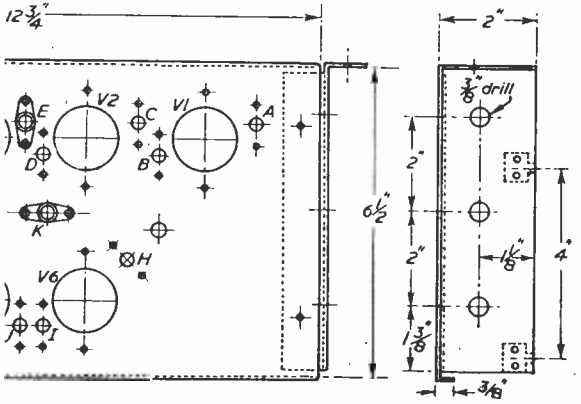
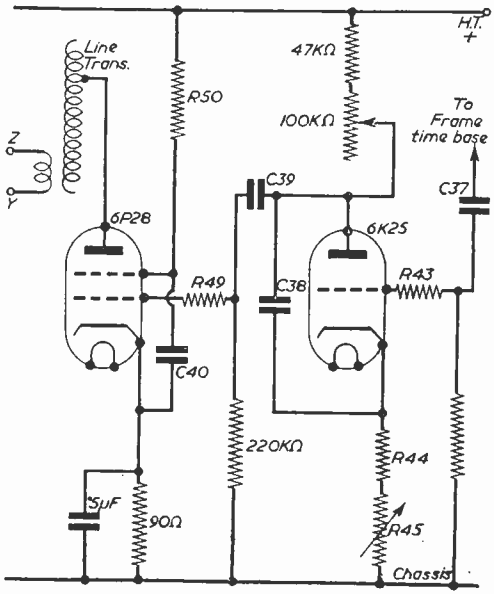


Fig. 5.—(Right) Modifications to line time base. Values given for components changed.

appeared in PRACTICAL TELEVISION from time to time. Wishing to obtain both BBC and ITV, a suitable sound and vision chassis was made. as shown in Fig. 1. The .0005 micadiscs were omitted and .001 ceramics used instead for fear of instability in the receiver due to insufficient decoupling when operating at lower frequencies. and a small terminal post was fitted at each micadisc position, so that the leads could be anchored with the ceramic condensers. The coils were now modified as shown in the table (page 139), extra turns being added as given for the conversion to 33-38 Mc/s in PRACTICAL TELEVISION dated December, 1955. The sound rejector coil was also wound on one of the spare formers. In wiring, the "View Master" diagrams were followed with



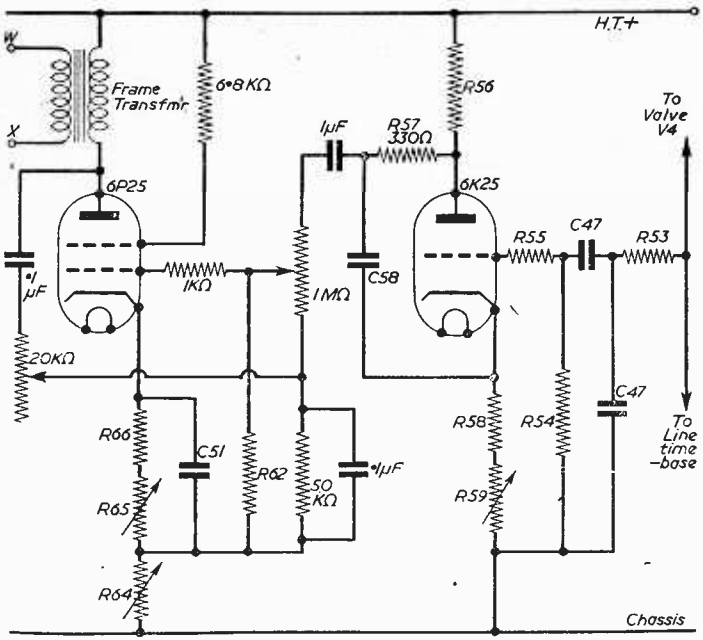


Fig. 6.—Modifications to frame time base. Values given for components changed.

the exception of the above modifications. The 2½ volt negative bias to valve 6D2 is carried via the 5-pin plug. The lead to the time bases from this valve is a separate wire through a single point plug. This is near the valve and allows the chassis to be separated.

Power Pack and Time Bases

For the power pack and time bases an old Ultra chassis was now modified as shown in Fig. 2. As there is no centre tap available from the H.T. windings of the mains transformer. this wire had to be separated from the thick bus wire connected to the chassis. It was taken to a spare terminal on the side panel as shown in Fig. 3 and diagrams of connections in Fig. 8. The cathode heater short transformer can be seen in the photograph of the chassis. mounted near the on/off switch. Three sockets were now fitted. each one to supply a different point, viz., sound and vision chassis, converters, and the tube. A control panel was made and fitted to the rear of the chassis; it contained six controls and an on/off switch (Figs. 4 and 7).

ITV Converter

Diagrams are shown in Figs. 5 and 6 which differ

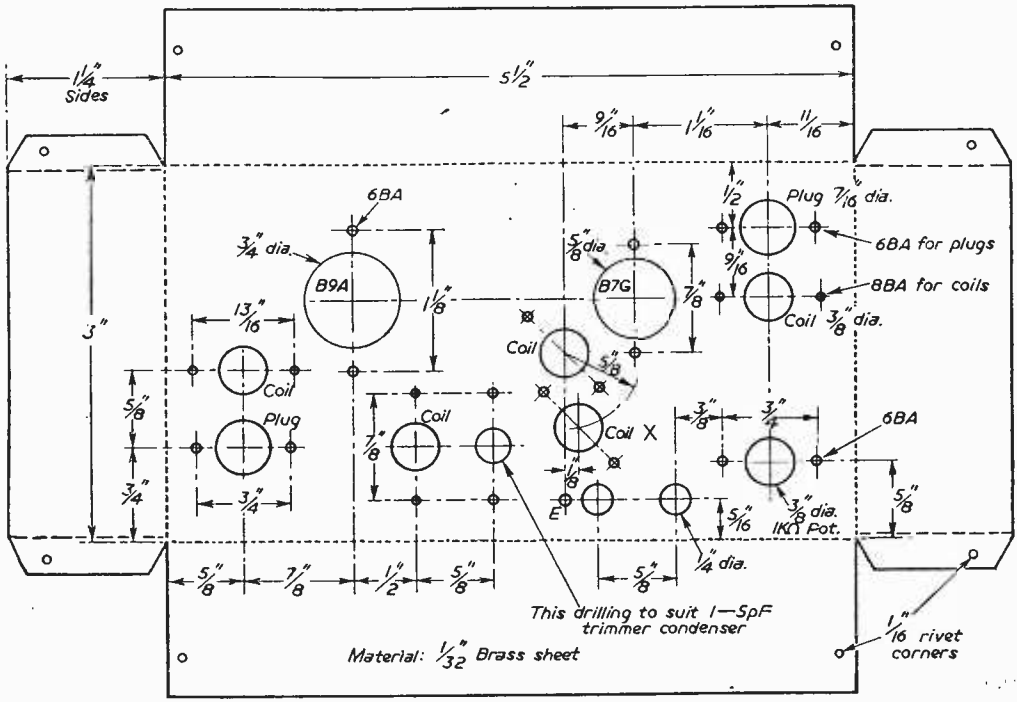


Fig. 9.—BBC converter drilling as viewed from top. ITV converter drilling, but 2-B9A valves. Omit coil drilling X unless extra gain is required (see P.T. June, 1956).

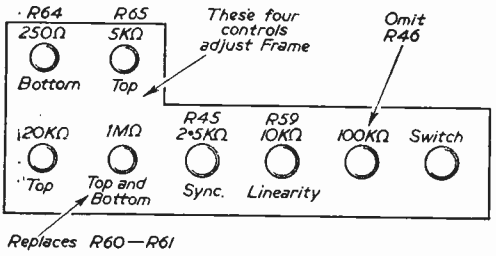


Fig. 7.—The control panel.

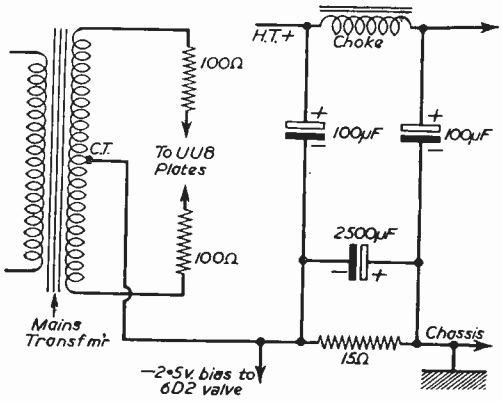


Fig. 8.—(Above) Modifications for 2.5 v. bias to 6D2 valve. Fig. 10.—(Right) Diagram of ITV converter. All .001 condensers ceramic.

from the "View Master," as they include modifications that have appeared in PRACTICAL TELEVISION at various times. On page 136 is shown the top view of the chassis. Unfortunately, at this period much time was wasted on tuners and certain published diagrams of converters which proved unsatisfactory. It was, therefore, decided to make an ITV converter as near as possible to the one published in the October, 1955, issue. It was an outstanding success. Fig. 9 shows the chassis and Fig. 10 the circuit of the ITV converter. Two identical chassis were made and the coils wound on standard 5/16in. formers with O.B.A. slugs. The number of turns for the coils is shown in the tables.

BBC Converter

The BBC converter will be shown next month. It will be noted that in this converter a 6F12 valve was

COIL WINDING DATA

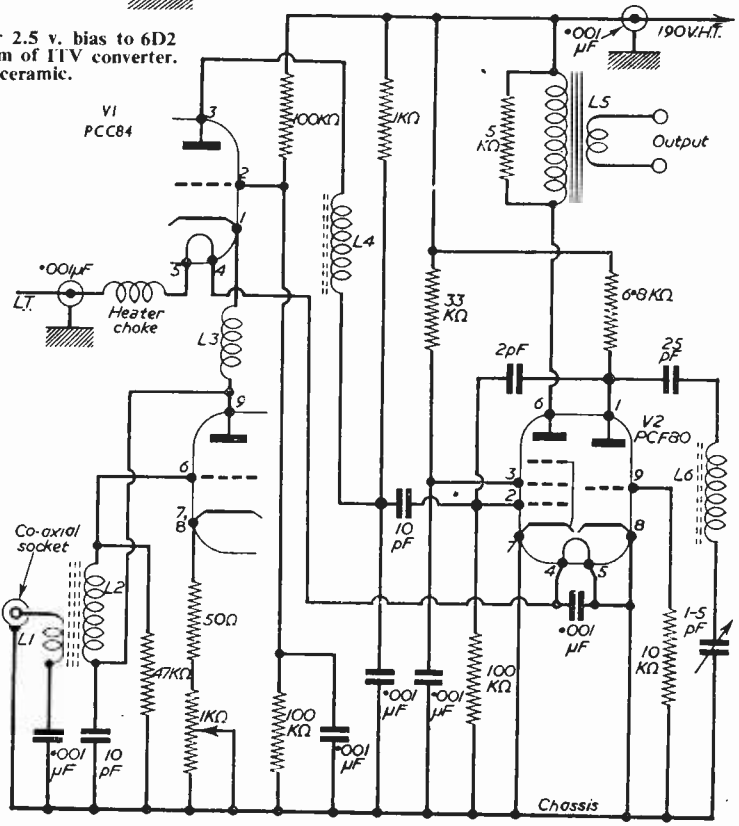
Coil	ITV Converter
L1, L2	2T. 26 s.w.g. S.C. cop. wire. 4T. 22 bare cop. wire.
L3	4T. 18 s.w.g. en. cop. wire.
L4	2T. 18 s.w.g. en. cop. wire.
L5	12T & 2T. 28 s.w.g. S.C. cop. wire.
L6	4½T. 22 s.w.g. bare tin cop. wire.
Heater choke	12T. On ⅛in. former. 22 en. cop. wire.

Coil	BBC Converter
L1, L2	2T & 13T. 28 s.w.g. S.C. cop. wire.
L3A	10T. 28 s.w.g. S.C. cop. wire.
L3B	12T. 28 s.w.g. S.C. cop. wire.
L4	14 & 2T. 28 s.w.g. S.C. cop. wire.
L5	6T. 22 s.w.g. bare tin cop. wire.
Heater choke	12T. on ⅛in. former. 22 en. cop. wire.

Note.—All coils on std. 5/16in. dia. 0 B.A. slug formers except coil L3 and choke.

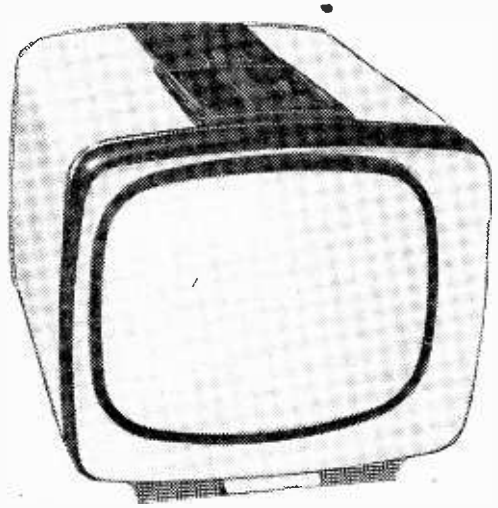
used in the first stage, but it was found there was not enough gain and a further coil had to be added, similar to the description given in the June, 1956, issue. It would appear that both converters should be constructed on the same lines, both using the PCF80 and PCC84 valves.

(To be continued)



T/V AT THE NATIONAL RADIO SHOW

The Trend in Design at This Year's Exhibition



The Bush 14in. push-button transportable model.

LAST year portability was the main feature in television design and although a number of portable receivers were again in evidence at the show, this year the emphasis was on television receivers equipped with V.H.F./F.M. radio, and the use of printed circuits.

Purely as a novelty was a 29 transistor portable television receiver with an 8½in. tube which operated from an 18 volt battery. It was shown working on the Vidor stand but is not available to the public as it was an experimental model Vidor have been working on for the past 18 months.

The Ferguson "400" series television receivers incorporated many new technical features, among them "Sequential Auto-Gain," which enables the best possible signal-to-noise ratio to be achieved combined with very good cross modulation characteristics. Another exclusive feature is a "Resonant Spot Limiter" which results in interference pulses (e.g., car ignition) appearing only as a grey dull spot instead of a bright white spot. Other technical features are "Stabilised EHT," "Frame Flyback Suppression," "Optimised D.C. Components," "Anti-drift Line Synchronisation" and "Positive Interlaced Circuit."

Large Picture Area

Ferguson showed a number of table models with either 17in. or 21in. electrostatically focused aluminised 90 deg. deflection angle tubes, and "push through" presentation affords the largest possible picture area. Two models were equipped with V.H.F./F.M. radio. The V.H.F. radio unit is entirely separate from the television circuit. Two other models had a sync-cancelled A.G.C. system with gated amplifier which gives a true black-level control over a wide range of signals and minimises re-adjustment when switching from one channel to another. A pre-set "local/distant" control enables the receiver to be adjusted upon installation for the best possible signal-to-noise ratio. The flywheel line synchronisation uses a sinusoidal oscillator—an exclusive feature of Ferguson receivers.

All the models are convertible, matching legs being available for the 17in. models as an optional extra at two guineas and matching stands for the 21in. models at three guineas.

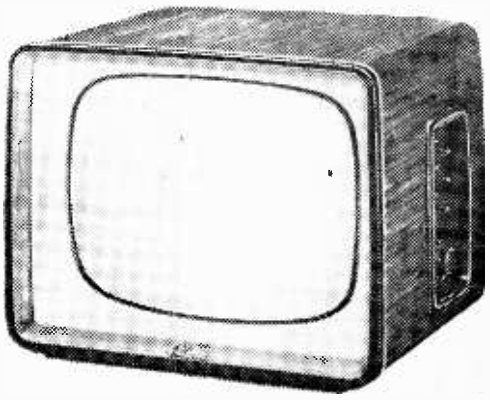
Printed Circuits

H.M.V. "New Highlight" receivers featured an electrostatically-focused 90 deg. deflection tube and a new type of tuner. Coils for all 13 channels are incorporated and a "slot" front facing speaker is fitted. Printed wiring is used for the sound and vision I.F. amplifiers and for the line output stages. An important feature in these new television models is the speaker, which occupies a relatively small space. The new-type multi-coil radial turret tuner has an exclusive colour-coded illuminator, showing green for BBC and red for ITV.

New is the resonant spot limiter for neutralising interference and automatic sensitivity compensation for best possible signal-to-noise ratio.

The above firm also showed a 17in. table model which included a self-contained radio unit to receive V.H.F. sound programmes. The fringe area models incorporated keyed automatic gain control to minimise output variation over a wide range of signal input, thus reducing the effect of fading due to weather and other conditions.

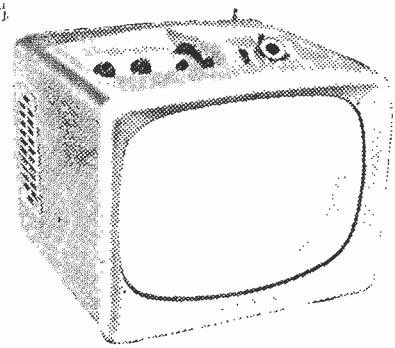
Dynatron offered many outstanding features in

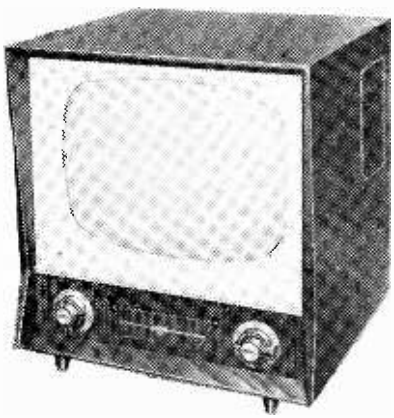


Marconiphone Model VT157, which is a 17in. A.C./D.C. table receiver for normal reception areas.

their receivers. They included aluminised tubes, automatic control of picture and sound and a highly efficient turret tuner. A wide choice of cabinet styles, for both console and table models, are available to suit varying tastes in furnishings.

A highlight of the Cossor exhibit was a new printed circuit television receiver of "unit construction" design. The receiver is composed of separate printed circuit boards which simplify servicing to a considerable degree. The 17in. 90 deg. aluminised tube is push through mounted



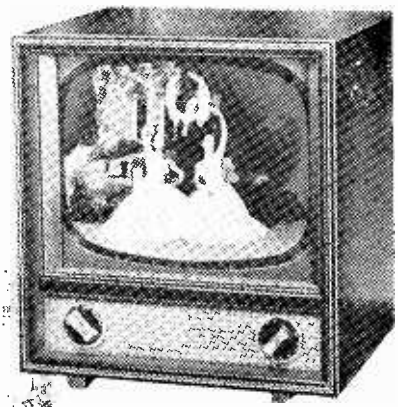


(Left) Another attractive transportable is the Ekco 14in. receiver incorporating VHF radio (Right) The Argosy Model 17 F41 for fringe reception.

which means that maximum picture area is obtained as no part of the screen is masked.

A 21in. table model incorporated automatic picture control and syncrolock self-centering flywheel synchronisation to ensure a rock-steady picture. Also with a 21in. tube was a receiver specially designed for operation in Band I or Band III fringe areas. Universal models were also seen.

Another fringe area model with a 17in. aluminised electrostatic tube with direct synchronisation, automatic picture control, frame flyback



Two other attractive receivers are (Left) the Pye SP17 and (Right) the Invicta Model F.237.

suppression and automatic sound noise limiter was shown by Argosy.

Push-button Model

A push-button, high definition 17in. table model was shown by Pye, which, by pushing a button the highest possible definition picture automatically appears. The set is available in standard or fringe form. A standard model is also available incorporating V.H.F. radio.

Another push-button model was exhibited by Bush and is dealt with later.

Murphy Range

Murphy showed a universal television receiver incorporating V.H.F./F.M. radio which is identical externally with the now familiar V310 and retains all the features of that receiver. The exclusive Murphy feature of easy operation on television with no fine tuner has been maintained, the special tuner provided serving for the selection of V.H.F. programmes only. The vision side of this receiver is also identical with the V310 but the sound channel has an innovation in that a double superheterodyne circuit is used. By permitting a low final I.F. this results in selectivity on V.H.F. reception similar to that of a normal radio set.

The turret is provided with a special pair of coil biscuits to cover all BBC stations in the F.M. band. When these are brought into position a cam, fitted to the turret control shaft, operates the multi-pole changeover switch. Thus in changing over to V.H.F. the timebase valve heaters are switched off, as also are the tube heaters. In order to keep the heater current constant, an extra resistor is switched into circuit.

This resistor is located adjacent to the other heater droppers.

A Varite thermistor is provided within the switched heater chain to prevent current surges from damaging valves or tube. The H.T. connections to the timebase circuits are also broken and a ballast resistor is substituted to prevent the H.T. line from rising and causing valves and components to over-run. The vision I.F. amplifier is also muted to protect the video stage and tube. As the cascode and common I.F. valves are used both on television and F.M., they are switched to maximum gain for F.M. reception.

Ekco had three new 17in. receivers incorporating a channel selector on which the BBC and ITV stations are side by side. One of these models was suitable for the fringe area.

Unique Test Method

In the R.G.D. television range pride of place was occupied by the Deep Seventeen. A unique feature of this set is the fact that it begins its working life, fully operational, while still travelling along the factory conveyor line. Taking current from a live rail, it is subjected to a series of transmission tests, the results of which are computed electronically. R.G.D. engineers claim that their test methods, even at peak production, give a quality graph which is constant to within 3 per cent.

Bush exhibited a large number of receivers, the highlight of which was the Twin Set, which has a separate V.H.F. circuit and is for fringe area reception.

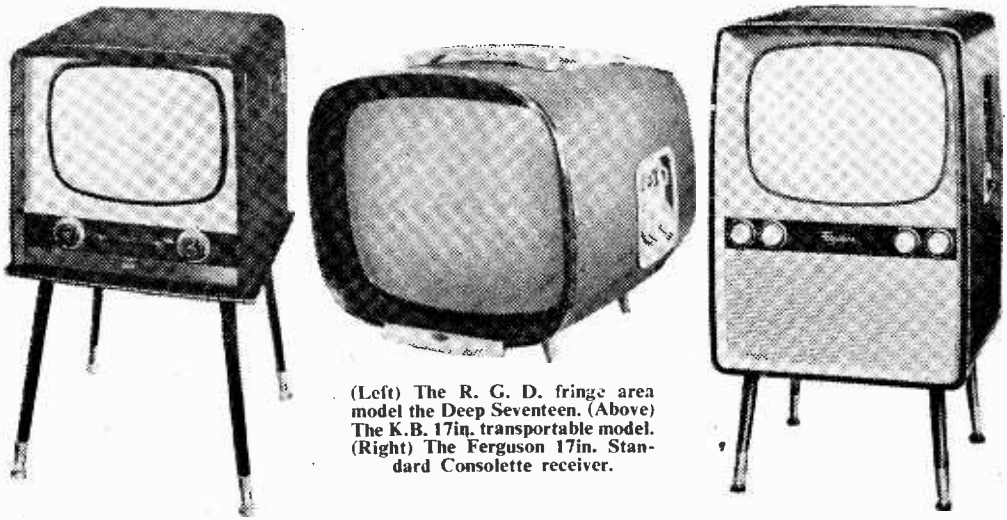
The first television receiver with push-button instantaneous switching from BBC to ITV and vice versa without further adjustment was the Bush 14in. transportable model. It covers all thirteen channels, but only four buttons are fitted, two for adjusting to any two channels on the BBC band (Band I—channels 1 to 5) and the other two channels on the ITV band (Band III —channels 6 to 13).

Kolster-Brandes featured a 17in. lightweight portable TV, the Royal Star. It weighs only 38lb. and is available with a telescopic aerial, which is not required in all areas, and is therefore optional. The specification includes 14 valves, 3 germanium diodes, 90 deg. self-focus tube, miniature 13 channel tuner, printed circuits and wide range A.G.C. circuits. It measures 16in. × 16in. × 16¾in.

24in. Model

Large size pictures are provided by a 21in. Console and a Consolette. Both of these models are available with V.H.F./F.M. if desired. The range of receivers has also been increased with a 17in. fringe model. The 24in. Regina Consolette provides one of the largest direct viewing pictures in Great Britain.

A 17in. screen receiver incorporating printed circuit design was shown by Spencer-West as standard and fringe models. Another receiver incorporated a vertically-mounted chassis with printed circuit, hinged for complete accessibility for servicing, at the same time leaving all hand controls in the mounted position for operation enabling testing to be carried out under ideal conditions.



(Left) The R. G. D. fringe area model the Deep Seventeen. (Above) The K.B. 17in. transportable model. (Right) The Ferguson 17in. Standard Consolette receiver.

Television Cameras

A novelty on the Peto Scott stand was a studio and an industrial television camera shown in conjunction with their 14in. and two 17in. television receivers, the latter having automatic self-locking synchronisation circuits to prevent line tearing, frame flyback suppression and regulated EHT. The studio camera was British built and the industrial camera is suitable for 405 and 625 line transmission.

Masteradio showed receivers with 17in., 21in. and 24in. tubes. Features of the sets was a new type of elliptical speaker facing front, improved automatic picture control, a new automatic focusing system giving freedom from focus and ion

trap adjustments and electrostatic focusing cathode ray tubes.

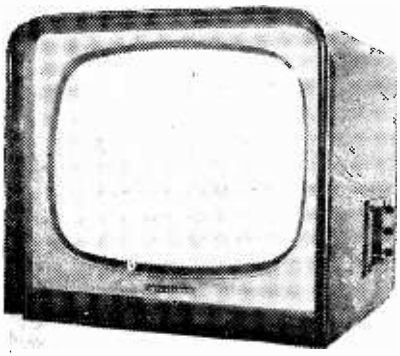
A number of sets from 14in. to 21in., including fringe models, were shown by Invicta Radio.

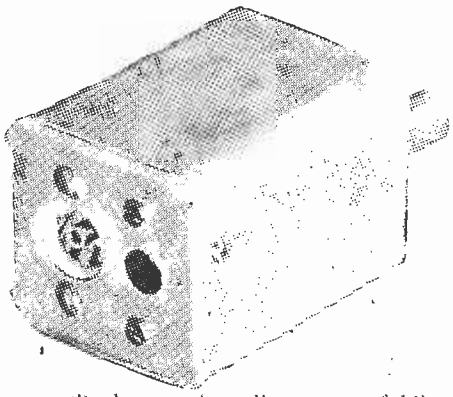
TV/Radiogram

Where living room space is a problem, this was overcome by Ferranti who introduced a TV/radiogram. Combined in this receiver were a 17in. television set, V.H.F./F.M. radio and a record player.

A new 21in. receiver introduced by G.E.C. incorporated V.H.F./F.M. radio and twin loudspeakers. Printed circuit technique was used in some of their designs.

Each of the new range of television receivers by McMichael used printed circuits and had V.H.F./F.M. radio. Two of their sets had multiple-speaker systems.





(Left) The Spencer-West Model 174. (Right) The Lahgear picture equaliser.

On the Pam stand was a transportable 17in. receiver capable of receiving V.H.F./F.M. broadcasts.

Features of the Philco range was 17in. receivers with variable interference suppressors and V.H.F./F.M.

The advantages of indirect viewing shown by the Valradio 48in. large screen projection receiver is the absolute absence of flicker and the photographic quality of the life-size 48in. picture.

Cathode Ray Tubes

One of the interesting features of the Siemens Edison Swan stand was the presentation of new developments in tube design.

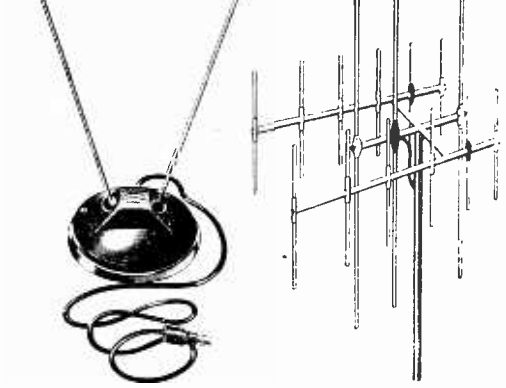
Examples included the new 21in. electrostatic focus tube with a deflection angle of 110 deg. Another 21in. tube was the C.R.M. 212 90 deg. magnetic focus. The 17in. range was represented by two new electrostatic focus tubes: the first again had a deflection angle of 110 deg., and with it was the new C.M.E. 1702—a 90 deg. deflection tube with a maximum overall length of 15in. In addition, two new 14in. electrostatic focus tubes were seen: the C.M.E. 1402, which has a 90 deg. angle of deflection, and another tube which has appeared recently, the C.M.E. 141, with a 70 deg. deflection angle.

For the television receiver, a complete first preference range of 0.3 amp. heater current type valves was being displayed, providing an up-to-date type for every purpose. Three of these valves, the 6/30L2, the 30FL1, and the 30PL1 possess identical characteristics in the triode sections, allowing an unusual flexibility in constructional layout.

The Mullard stand also showed new developments in cathode ray tubes and valves. A giant wire model of a valve was seen, the main features of which were highlighted and emphasised by explanatory captions.

Aerials and Components

Combined arrays for covering BBC and ITV reception were to be seen on J-Beam Aerials stand. To these can be added attachments for V.H.F. radio if required. Prominent among these were the long and medium range folding double beam arrays being basically a two element Band I with a double four slot beam Band III for medium range, and a three element Band I with a double four slot beam Band III for long range. The skeleton slot principle is not only used to give optimum gain and bandwidth on Band III, but the matching properties on the skeleton slot are utilised to enhance the Band I

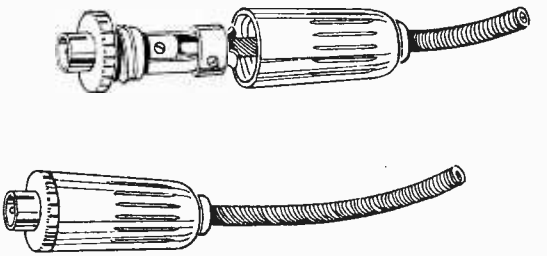


(Left) The Antiference, Ltd., Vantenna all-band room aerial. (Right) The Aerialite Aermatch 3 twin-band model 840/T.

performance. Complete isolation of each band is ensured by the use of co-axial isolating sections which even allow Band II elements to be added with no effect whatsoever on the television bands. For stronger signal areas there was the Unibeam and Twinbeam.

Burwell products showed the View Well range of Band III and combined aerials, Band I and II aerials, dipoles, loft aerials, conversion kits for stacked arrays and chimney lashing kits.

On the Belling Lee stand was a comprehensive display of aerials and accessories. Of interest was the Golden V television aerial attractively styled in black, with gold plated telescopic elements. It may be placed anywhere in the room —on top of the set or hung on wall or picture



The Wolsey all-polythene construction solderless co-axial plug and socket.

rail. It is simply plugged into the set and the length and position of the elements adjusted to obtain the best results. A range of collapsible Band III attic aerials made from flat aluminium strip were shown, as also were a new range of combined BBC/ITV attic aerials for use in primary service areas. Among the accessories were diplexer and triplexer coupling units including waterproof versions, co-axial plugs and sockets and attenuators.

Room Aerial

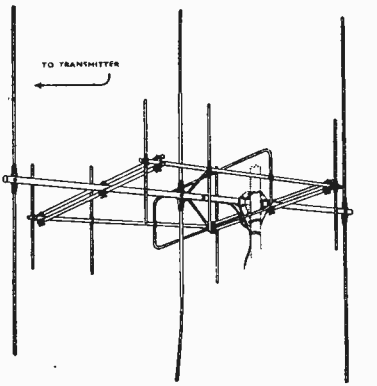
Several important additions to the Antiference range included the Vantenna which is a new all-band room aerial and a range of loft aerials for Bands I, II and III. The latter are of complete new design. The mast/boom clamp, angled arm and bracket provide a versatility which, overcomes all loft mounting difficulties as well as permitting vertical or horizontal mounting plus tilting, rolling and turning for anti-ghosting.

Completing the display were a wide selection of diplexers, triplexers, outlet boxes, co-axial plugs and sockets, etc.

On the Aerialite stand the emphasis was on the range of twin band aerials with the exclusive Crosslink connection. Within this range is a special array for every locality. Aerialite twin bands are not only supplied for varying distances from the transmitter but are also available in all channel combinations for loft, wall and chimney mounting.

Labgear showed their space match range for Bands I, II and III. This represented a departure from conventional design in as much as it uses space impedance termination to secure a uni-directional polar diagram from a V beam configuration.

The normal high gain associated with this type of array is thereby still further enhanced by an extra 3dB yielding an overall performance equivalent to an eight or nine element Yagi. In order to match the characteristic impedance of free space a skeleton conical arrangement is employed which greatly extends the band width enabling all existing channels on Band III to be covered. The aerial operates as a broad band half wave dipole on all channels in Band I and as a full wave broad band dipole on Band II and in this latter instance has mixed polarisation. It is, therefore, suitable for V.H.F./F.M. reception whether used in a Band I/III area of vertical or horizontal polarisation.



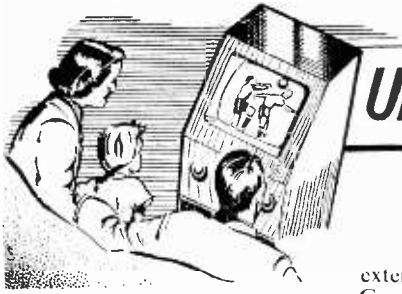
Folding double beam aerial shown by J-Beam Aerials, Ltd.

In addition there is a super model which incorporates a channelised Band I reflector for areas of poor Band I reception. This is an add-on unit enabling independent orientation on Band I and III.

Amplifier System

Wolsey Electronics have produced a completely new and flexible amplifier system. They can supply single amplifiers of large, medium and small gain for Bands I/III. The system provides a wide variety of amplifier units in many combinations for distribution purposes. For example, a unit is now available providing 12 outlets each having a Band I/III signal with a variable gain control on each input channel. Another example is a single outlet amplifier with a gain in the order of 50dB on Band III. This is also available for Bands I and II. The whole range has been designed to provide extremely high signal/noise ratio.

A solderless safety co-axial plug was also introduced by the above firm. Being entirely constructed from polythene no metal parts can be touched by hand when the plug is inserted in the socket. Further models will be dealt with next month.



UNDERNEATH THE DIPOLE

A MONTHLY COMMENTARY

By Iconos

Manchester Progress

BOTH Granada and ABC-TV are spending a lot of money on improvements at their Manchester Studios. Having got their new large and well-fitted stage into operation, Granada have now branched out into extensions of ancillary premises and plant. There will be a special sound effects studio for all types of programmes, music and tape recording libraries, an Ampex recording department for magnetic recording of pictures, together with new wardrobe, make-up and dressing-room facilities. This is a practical indication of the success of commercial television in the Northern area, excerpts only of which are seen in the South from time to time. A small point which puzzles some of my friends in Lancashire is the Granada Network's habit of omitting the National Anthem at the end of the programmes. I feel this must be an oversight, as occurred at the start of BBC television after the war. I admit that I may not always look and listen to the National Anthem at the end of television on BBC or I.T.A., but I would feel very offended if it wasn't there. As far as I know, all other television organisations in this country always end their programmes with the National Anthem.

I.T.A. Extensions

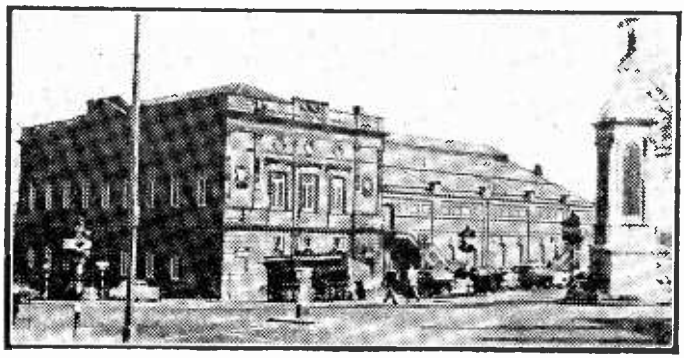
I.T.A. programme companies are now making a reasonable profit, commensurate with their early losses, as one executive put it. And as those initial losses went into millions, the returns must now be highly satisfactory, to say the least. At any rate, nearly all the area stations are expanding rapidly and now spending quite a lot of money on new equipment and facilities. Apart from the extensions already mentioned at Granada's Manchester Television Centre, their London Chelsea television theatre is being refitted with new permanent control rooms, additional lighting by Mole-Richardson, improved lighting control equipment by Strand Electric and new 4½in. Image Orthicon cameras by Marconi. Associated Rediffusion are planning large studio extensions at Wembley, including a huge studio stage, which will probably be the largest television stage in Europe. Scottish Television are also spending a lot of money on new lighting equipment and expanding their facilities. Southern Television, having converted the Plaza Cinema, Southampton, into a compact yet very complete television centre, are arranging for Post Office lines to London for reverse network operation. This will not come into operation immediately, and the opening all-star programme, together with a weekly mystery serial will be sent to London via a number of temporary microwave link "hops." When I called at the studio recently, some of this equipment, supplied by E.M.I. was just arriving. Most of the television equipment at Southampton will be provided by E.M.I., though a flying-spot telecine apparatus will be supplied by Cintel.

East Anglia

THE changed financial climate of independent television operation has also put a different aspect on the planning of future studios in the smaller areas yet unoccupied. East Anglia, for instance, with an I.T.A. transmitter at Mendlesham, Suffolk, will be served by the Anglia studios, Norwich. This will be quite an elaborate set-up in the large Agricultural Hall building in the centre of that city, formerly used for circuses, exhibitions and agricultural shows. This is an 80-year-old building, slightly reminiscent of a small Alexandra Palace, which is ideally suited for conversion into two quite large television stages, with plenty of space for ancillary offices, dressing-rooms and workshops. I understand that the Mendlesham aerial will be highly directional, radiating most of its power in a north-westerly direction, and will be mounted on one of the highest television masts in Europe—1,000ft. high.

Regional Tastes

BOTH BBC and I.T.A. cater to some extent for local



Showing the imposing building of the Agricultural Hall at Norwich.

tastes. I.T.A. companies take the majority of the programmes from the I.T.A. Network, but these are varied with a few local programmes, together with films specially obtained and run on the local telecine equipment. Local programmes are especially popular in Scotland and Wales, some of them obtaining quite high ratings from the public opinion polls—T.A.M. and Nielsen. I would expect that a strong regional flavour will also be appreciated when the South Western area I.T.A. transmitters start operating for Devon and Cornwall. Cornish viewers in particular appreciate a local flavour to their entertainment. BBC regional studios in Manchester, Birmingham, Glasgow and Cardiff make frequent contributions to the BBC programmes, and to these will shortly be added a studio at Southampton.

Automation

THE keynote of most of the new equipment coming along for television studios is automation—or, at least, semi-automation. When the BBC reopened the Riverside Studios, Hammersmith, a year or so ago, with two large stages and a very elaborate lighting equipment, it was considered to be the most up-to-date television studio in the world. It still is one of the best from the facilities point of view, but several further developments in lighting and lighting control have been made as a result of experiences there. Both Mole-Richardson and G.E.C. have produced new types of lightweight spotlights, the focus and other adjustments on which can be made with "lamplighter" poles, manipulated by an electrician on the studio floor. This avoids lowering the lamp for adjustment or the use of ladders or steps to reach the lamp. Telescopic and lazytongs types of lamp support are now in general use, various types of runners are installed for moving lamps from one part of the stage to another in the shortest possible time and with the minimum of labour. Strand Electric have also improved their elaborate organ console remote lighting control, and various new types of memory devices have been devised for "punching up" lighting arrangements for different stage settings in advance, with their dimmers pre-set to give the best results as determined at rehearsals. Mole-Richardson have also produced a new lightweight general purpose lamp, which can be readily converted from a flood to a spotlight. Many of these devices are in the course of being installed at BBC and I.T.A. studios and will improve the general quality of the picture. Operation of the lighting is then in the hands of one man, who should be well versed in the art of portrait photography.

A High Density

IN the United States, an investigation carried out by an advertising research body, has brought to light the amazing fact that 84 per cent. of the homes in that country have television installed. The actual figures are 50,540,000 homes and 42,400,00 with TV. This represents a substantial increase over the survey carried out two years ago, when the respective figures were 48,800,000 homes and 35,500,000 with television, a percentage of 72.8.

Colour TV Demonstrated in Poland

DURING the course of the recent Polish International Trade Fair in Posnan, colour television was demonstrated by the Radio Corporation of America. This is said to be the first time such a show has been organised behind the Iron Curtain. All the programmes were originated in a specially erected studio inside the American Pavilion and were watched by visitors on a number of R.C.A. colour TV receivers.

Television in China

USING a 625 line standard, the first television station in China has been opened in Peiping. During the course of the next year a second station is to be established in Canton.

Hong Kong Vision Service

IN May 1957, the first public television service to be operated in any British Colony was opened by the Governor on behalf of Rediffusion. This was an additional service to the relaying of sound programmes in the three main Chinese dialects which had been functioning for some years. The rapid growth of this combined service has necessitated the provision of plans for a new nine storey building and it is anticipated that this will be ready for occupation next year.

Creating a TV Commercial

A DETAILED presentation showing the creation of a TV commercial was the theme of the display by the five agencies of The Advertising Service Guild at the first European Television Exhibition at Park Lane House, London, W.1, from May 19th to 24th.

A huge wall display, 27ft. × 9ft. in the form of a progress chart, simplified by colour and illustrated by photographs, traced the creation of a TV commercial from the first contact with the client and product research to the final transmission —and subsequent audience inquiry. Separate panels also illustrate the work in television of each agency.

CORRESPONDENCE

The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

ENGLISH ELECTRIC TV DEFECT

SIR,—I wish to thank you and express my appreciation for your reply to my query regarding a fault in an English Electric TV set, and also to let you know that your diagnosis was correct.

One of the .001 mfd high voltage capacitors was leaking, and after this was replaced the set is once again working satisfactorily.

It may interest you to know that the leaking capacitor was detected with the aid of a 250 volt D.C. supply, taken from the A.C. mains via a metal rectifier, and a neon-lamp rigged up on the lines of the Condenser Condition Tester described in the February, 1958, issue of *Practial Wireless*. This has proved to me the value of this instrument, and I shall certainly be making this up in the near future.

Many thanks for two very valuable journals—PRACTICAL TELEVISION and *Practical Wireless*.—W. A. THOMAS (Enfield).

SPECIAL NOTE

Will readers please note that we are unable to supply Service Sheets or Circuits of ex-government apparatus, or of proprietary makes of commercial receivers. We regret that we are also unable to publish letters from readers seeking a source of supply of such apparatus.

TROUBLE WITH PROJECTION RECEIVER

SIR,—With regard to "D.F." in the August issue of PRACTICAL TELEVISION. The trouble indicated with the Philips 1400A is clearly indicative of the C.R.T. grid being driven too far positive. It is common practice with projection receivers to connect the negative end of the brilliance control network to a negative supply; the tube is, therefore, biased beyond cut-off at all settings of the control. The tube is brought within its grid base by a positive potential derived, via the protection circuits, from the timebase output stages. Failure of either scan, therefore, blacks out the tube.

I suggest that "D.F.'s" negative supply has failed and so the tube grid is driven positive. Connection of resistance, small compared with the brilliance control network (usually a few megohms), between grid and earth will reduce this positive voltage but is extremely unwise as the benefits of the protection circuits are lost. Anyone who has seen a projection tube on which a scan has failed and the protection circuits not operated will appreciate the folly of this. The correct course is to restore the negative supply to the brilliance control.—J. C. NELSON (Leeds, 16).

EXPERIENCES WITH MURPHY V310

SIR,—I note the letter in August issue, from G. W. Warner (Morecambe) regarding Murphy V310. I have the same model, new last October, the picture on both stations is very good, but the test cards are the same as described by your correspondent. More information could be given by the makers on how to tune up from zero; the dealers do not run after you every five minutes as the makers seem to think.—E. RAKEHURST (Hendon, N.W.4).

PAM 13 CHANNEL TV ADAPTOR

SIR,—Reading G. Parkinson's query regarding the Pam 13 Channel TV adaptor, and your reply (August issue), has prompted me to write this letter. I purchased one of these adaptors to convert my receiver, a Cossor 12in. table model No. 932.

The way in which I have achieved this conversion despite the difference in frequencies, will, I hope, be of interest to your readers, some of whom have, no doubt, purchased this adaptor.

By the simple expedient of connecting a 10 pF mica condenser across the aerial, R.F. and oscillator coils I have brought the tunable frequency of the input stages within the band of adaptor output frequency.

The success of this method makes me think that other receivers could be likewise modified.

Naturally, for different sets different values of condenser will be needed but the values quoted were sufficient for my purposes.

The results obtained are good as the extra noise that is present is far offset by the increase of signal.

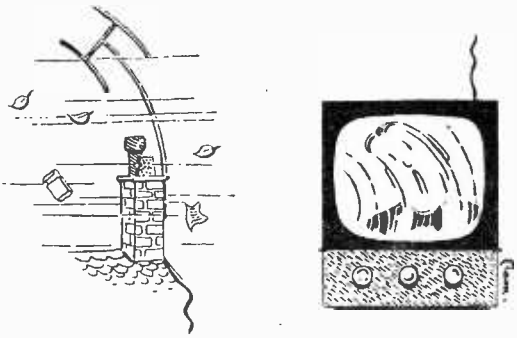
I might add that this locality is known as a black spot for TV reception but my results are obtained with a simple H mounted below roof height.—E. M. STONER (Bath).

THE QUAD AERIAL

SIR,—I should like to report on the Quad aerial described in your June issue. I have tried this out in the Furness peninsular, in a location which is average for the district and the results are nothing short of amazing. I supported the aerial, in the loft, by laths nailed to rafters and floor joists, with cross-laths lashed to them. A good signal was obtained using the aerial element only, but was improved by addition of the reflector. But the interesting point is that the same aerial suits ITV perfectly also, stations are, Holme Moss and Bolton—Channels 2 and 9, but I also received sound on Channels 5 and 8. The aerial has 5ft. sides and the reflector, 2ft. behind, has 5ft. 3in. sides. I intend trying the effect of a director of 4ft. 9in. sides, 2ft. in front of the aerial. This is not required here, but should prove interesting.—F. GATES (Ulverston).

SERVICE DATA

SIR,—I also support the suggestion that space should be devoted to requests for service data. Manufacturers should really not presume that all their customers are nitwits and unable to service receivers themselves. Some of us know



"Here is a gale warning."

a great deal more about it than agents into whose hands they try to force us. Some branded receivers are precisely the same as others, the only difference being the brand name. One factory makes for several firms.

Readers should bear in mind when purchasing a TV receiver that it is important to ascertain whether circuit diagrams and service data are available, and they should only support those manufacturers who give such information. Only in this way will manufacturers be forced to change their "dealer only" policy, and the public be protected from the exploiting dealer who charges you for new parts when such are not necessary.—A. H. K. (Sevenoaks).

"YOUR PROBLEMS SOLVED"

SIR,—In my opinion the most valuable part of your journal is the feature entitled "Your Problems Solved." I am a service engineer and there are lots of practical hints in those replies which are outside the ordinary service drill. I have found them most valuable. I always cut them out and paste them in a book classifying them under the various makes. In my opinion also these should be republished annually in book-form.— S. T. (Ipswich).

HOME BUILT SETS

SIR.—I support the views of A. P. (Kenton) for readers to submit details of receivers they have made or modified. This would be particularly useful especially if such are designed around ex-Government apparatus, service data for which is hard to come by. I suggest that readers send you such service data for which they have no further use so that you can lend it out to readers.—E. N. G. (Walthamstow).

[*We shall be delighted to inaugurate a loan service such as is suggested here. The difficulty is, however, in getting readers to return service sheets. Often several letters are necessary before they are forthcoming, and this makes unnecessary work. Some readers retain the sheets and ignore correspondence. If a sufficient number of service sheets are sent in we will consider a scheme for loaning them out against a deposit of 10s., as with our companion journal the "Practical Motorist and Motorcyclist."*—ED.]

"HORIZONTAL AERIALS"

SIR,—Replying to the criticism of your correspondent "Senior Research Engineer" regarding the "incorrect" theory of my "Horizontal Aerials" article, I would point out that I have been incorrectly quoted twice. I did not say that "the acceptance angle is wider than when mounted in the horizontal plane," and my remarks regarding the impracticability of combined aerials were solely confined to Channel II for the benefit of the long suffering viewers in East Anglia.

Their two stations will be about 25 miles apart, each with directional aerials, the I.T.A. radiating between 200 KW and 20 KW E.R.P. and the BBC between 10 KW and 1 KW E.R.P., so every village on the map will present its own problems to the local man, who in many cases is still erecting three-element yagis to receive good BBC.

The diagrams and data of the article were the result of practical experiments carried out without too much regard to prevailing theory. Two factors brought this about. One was that before a start was made many previous articles on aerials were read and the dimensions given were carefully tabulated. No two were alike. The other was the deep seated mistrust of aerial manufacturers data brought about by cold hours of disillusionment up among the chimney pots.—"SERVICEMAN" (Thetford).

SERVICE DATA

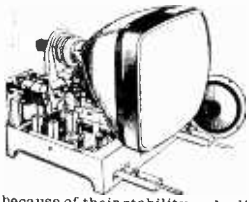
SIR,—I am in full agreement with P.B. (Cheltenham) that space should be provided for circuit requests. The good service provided by Messrs. Marconi, could apply to H.M.V. as some chassis are interchangable between the two makes. I have just received a most insulting letter from a service department refusing data. It went on to question the technical qualifications of the applicant. In some strange way they seem to assume the receiver still belongs to them, and no one else must touch it but their agents.

In contrast the service given by Messrs. Cossor and Messrs. Pye is very good indeed.—A. M. (I.O.W.).

R.A.F. Pilot to dealer aligning TV receiver: "Left . . . Right . . . Climb . . . Target in sight . . . Steady . . . Steady . . ."

Everything for the T.V. & Radio Enthusiast

17in. T.V. CHASSIS, TUBE & SPEAKER, £19.19.6.



17in. Rectangular Tube on modified chassis. Supplied as single-channel chassis covering B.B.C. channels 1-5 or incorporating Turret Tuner which can be added as an extra, at our special price to chassis purchasers. 50/-, giving choice of any 2 channels (B.B.C. and I.T.A.). Extra channels can be supplied at 7/6 each. Chassis size : 12in. x 14½in. x 11in. Less valves. Similar chassis were used by well-known companies because of their stability and reliability. With Tube and Speaker £19.19.6. With all valves. £25.19.6. Complete and working Turret Tuner. £28.9.6. 12 months' guarantee on the tube, 3 months' guarantee on the valves and chassis. Ins. Carr. (incl. tube) 25/-. Complete and working Turret Tuner. £28.9.6. 12 months' guarantee on the tube, 3 months' guarantee on the valves and chassis. Ins. Carr. (incl. tube) 25/-.

PLESSEY SOUND & VISION STRIP, 25/6.

Superhet. Tested. I.F.'s 10.5 Mc/s sound. 15 Mc/s vision. 6 valve basis (6-6F1's and 2-6D2's not included). Size 8½in. x 5in. x 4½in. high. Post and packing 2/6. The Turret Tuner plugs directly into this chassis.

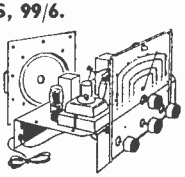
SOUND & VISION STRIP. 10/6. Superhet. Complete vision strip. Less valves. Not tested. Drawings free. Postage 2 6.

POWER PACK & AMPLIFIER, 19/6. Output stage 6V6 with O.P. trans. Smoothed H.T. 350 v. 250 mA.. 6.3 v. at 5 A. 22 v. at .3 A 6.3 v. at 4 A centre tapped. Less valves. Free drawings. Ins. carr. 5/6.

POWER PACK & AMPLIFIER. 19 8. Output stage PEN 45, O.P. trans. choke. Smoothed H.T. 325 v. at 250 mA.. 4 v. at 5 A, 6.3 v. at 5 A, 4 v. at 5 A centre tapped. Less valves. Carr. 5 6.

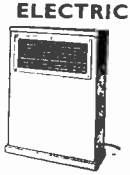
CHASSIS, 1/- each. 6 or 8 valve. Latest type midget valve design for A.M. or F.M. Brand new cadmium plated. Size 12½in. x 7½in. x 2½in. Post 1/9. 4 for 4 -. post 3 -. 12 for 10/-, carr. 5/-.

SUPER CHASSIS, 99/6.



5 valve superhet chassis including 8in. P.M. speaker and valves. Four control knobs (tone, volume, tuning, w change switch). Four w bands with position for gram. P.U. and extension speaker, A.C. Ins. carr., 5/6.

ELECTRIC CONVECTOR HEATER, 99/6.

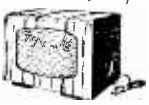


A.C. D.C. Switched for 1 or 2 kW. Illuminated grille. size 26in. x 18in. x 7½in. deep. Ins. carr. 10/6.

INSULATING TAPE, 1/6. Finest quality. 75in. x ½in. wide. Post 9d.

GANG CONDENSERS, 1/9. 2 and 3 gang .0005 pF. Standard. Salvaged. Tested. P. & P. 1/3.

BEAUTIFUL EXTENSION SPEAKERS, 29/9.



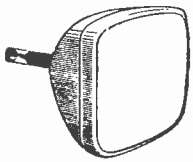
Fitted with 8in. P.M. speaker W.B. or Goodmans of the highest quality. Standard matching to any receiver. (2-5 ohms.) Switch and flex included. Unrepeatable at this price. Money back if not completely satisfied. Ins. carr. 3.6.

STEREOPHONIC SOUND !

These extra speakers will now be required.

8in. P.M. SPEAKERS, 9.9. With O.P. transformer fitted. 10/-. Postage 2.9.

8in. P.M. SPEAKER. 12 6. Postage 2.9.



REGETTERED IMPROVED VACUUM T.V. TUBES.

17in. £7.10.0.

14in. £5.10.0.

12 MONTHS' GUARANTEE.

6 months' full replacement, 6 months' progressive. Made possible by the high quality of our tubes. Ins. Carr. 15/6. 9in., 10in., 14in., 15in. and 16in. round tubes. Our special offer of these sizes. £5. 12in. T.V. TUBES, £6. Three months' guarantee on round tubes. Ins. Carr. 15/6.

14in. RECTANGULAR T.V. TUBES with burns, 30/-. Ideal as a standby or testing. Carriage 10/-.

EXPRESS DESPATCH SERVICE

Phone to confirm tube in stock. Send Telegraph Money Order. On receipt of same, tube despatched Passenger Train same day.

TRANSFORMERS

MAINS TRANSFORMERS, 15/9. 350-0-350 v. 250 mA.. 6 v. at 5 amp.. 4 v. at 4 amp., 22 v. at 6 amp.. extra winding for 2 v. or 4 v. tubes. Primary 200-250 v., 50 cycles. Post and Packing 3 9.

MAINS POWER TRANS. 350-0-350 v..12/9. 250 mA. 6 v. heater at 5 amp., 4 v. at 5 amp., 4 v. centre tapped. Dropthrough type. Prim. 200-250 v. (4½in. x 5in. x 5in.). Post 3/9.

MAINS TRANS., 3/9. 350-0-350 v. 80 mA., 4 v., 4 v. heaters. 250-250 v. prim. Post 2/3.

MAINS TRANS., 5/9. 280-0-280 v. 90 mA., 6 v. 4 v. heaters. 200-250 v. prim. Post 2/3.

O.P. TRANS., 1/3. Standard size, 2-5 ohms. Post 1/-. 20 for £1. Post 5/6.

MAINS TRANSFORMERS, 12.9. 425 v. 300 mA. Single secondary 6.3 v. at 12 amp., 6.3 v. at 0.6 amp., 200-250 v. screened primary. Post and Packing 3/6.

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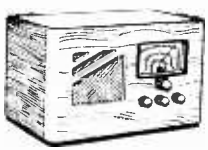

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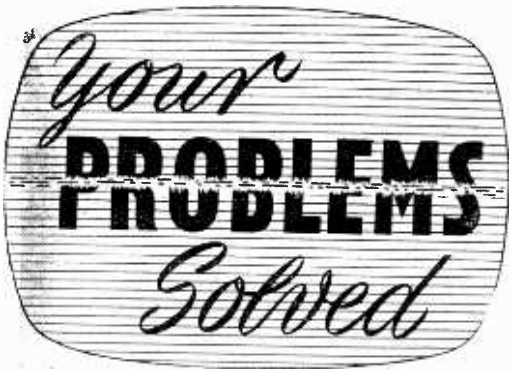

Whilst we are always pleased to assist readers with their technical difficulties, we regret that we are unable to supply diagrams or provide instructions for modifying surplus equipment. We cannot supply alternative details for constructional articles which appear in these pages. WE CANNOT UNDERTAKE TO ANSWER QUERIES OVER THE TELEPHONE. The coupon from p. 156 must be attached to all Queries, and if a postal reply is required a stamped and addressed envelope must be enclosed.

PYE V4

My set is fitted with the makers' tuner unit. Once the set has warmed up the picture takes a saw-tooth effect which appears to ripple from the bottom upwards.—R. Carslaw (Glasgow).

We suggest you check the ECL80 line oscillator which is in front of the "black box." Another possible cause is a faulty EY51 inside the "black box," and if this is the case reducing the brightness will reduce the amount of "saw-toothing."

ALBA 17in. T304, T494

I converted the set with one of the two models of turret tuner as advertised in "Practical Television." It worked well until recently, when I found out that the sound on ITV had fallen off considerably. Previous to this the sound or volume was equal to the BBC. I still have good sound from the BBC, but not quite so good on ITV (Wenvoe). If I retard the contrast control sound diminishes even more.

The set has recently been serviced with a L/O transformer and two new rectifier valves (PY82). Could you give me any advice as to where the trouble is likely to be?—B. Green (Llanelly).

From the description given it is difficult for us to say whether the drop in ITV volume is due to deterioration in the receiver sound valve stages or whether it is due to tuning drift in the tuner unit. If the latter provides maximum sound with the fine tuner midway, it may be assumed that it is the receiver which is at fault and the V9-V10 (EF80), V11 (EB91) and V12 (PL82) sound valves should be tested. If these are in order, check the core trimming of the sound I.F. coils and the 25 mfd. capacitor associated with the PL82 cathode circuit.

BUSH TV63

The receiver is a Bush TV63, tuned to Sutton Coldfield (no I.T.A. aerial although 12 channel tuner in set). Trouble is uneven illumination of picture; sometimes top and bottom lighter than middle, other times middle of picture lighter than top and bottom. The picture also is too contrasting but when contrast is turned down the picture breaks up eventually after the verticals have become wavy. When brilliance is turned down the parts of picture which are dark go black and only the lighter part of the picture is left. The fine tuning control is very sensitive; any slight movement and the picture breaks up.

I am fairly sure it is not the tube because when the aerial is disconnected or when the channel selector on tuner is turned to a not used position the screen is illuminated uniformly and brilliance control reduces illumination. Sound is all right, but a very slight hum is heard which changes very slightly when vertical hold is revolved through its entire travel. When width control was operated to reduce width of picture the left-hand side of front of picture was an uneven edge. —C. Nutall (Mon.).

The symptoms indicate a defective PCF80 video amplifier-cathode follower. If replacement of this valve does not cure all the fault symptoms, we would suggest you replace also the line oscillator ECC82.

INVICTA 126

After my Invicta 126 has been on some time the picture breaks up and the only way to get it back is by letting it cool off. The line oscillator PCF80 has already been changed six times. After this it will be all right for a week. There is a pre-set condenser with a fixed one across it, but all adjustment has gone. I have tried new ones, but only get multiple pictures and shortened scan. The value of the two condensers pre-set is 250 pF and fixed 910 pF. Changing these and keeping them away from heat makes no difference.—W. Kinghorn (Peterborough).

The symptoms described may be due to a defective PL81, the screen dropping resistor of this valve, a defective metrosil associated with the cathode circuit of the PCF80 or a defective 25 mfd. capacitor (there are two), again associated with the cathode circuit.

PHILIPS 1800A

The grid of test card "C" is received on above set with the left-hand side much smaller than the right. Two squares normal to 1½ small, horizontally. This is not noticeable on the other programme. Lately a black border on the left side has cut short the picture. I have been able to keep a full size picture by adjustment to tube magnet and variable controls at set face. I appear to be at the end of this latter adjustment horizontally though picture is fairly good and steady. Apart from valves could you advise which condenser/resistor or both to test? I have not been able to secure a circuit or data sheet.—T. W. Carr (Hull).

We would advise you to have the inner of the two PZ30 valves tested. This, if failing, would account for the poor width on the left-hand side. Also have the UL44 line output valve tested and check the resistors and capacitors associated with this and the UY41.

We have dealt with the 1800A receiver in a past issue of PRACTICAL TELEVISION, namely the September, 1955, issue.

PHILIPS 1446U

I have a Philips 1446U set which at present has no coils in the tuner for Channel 11. If I fit these coils is there any other adjustment necessary to the set?—L. Coombs (Andover).

If a correct pair of Channel 11 coil biscuits is obtained and fitted, there may not be any need to carry out any further adjustments. However, you may find it necessary to remove the small stop screw (which prevents the turret from rotating fully) from the rear of the tuner unit if this has not already been done, and it may be necessary to insert an insulated trimming tool into the hole in the front of the tuner unit to adjust the core of the new oscillator coil if the fine tuner does not produce maximum sound at, or about, its mid-position.

The sensitivity control should, of course, be well advanced.

K.-B. KF60

I noticed my EHT rectifier was running low on emission so I replaced it. On completion of doing the necessary soldering I switched on and found it wouldn't light. I have checked the line output transformer and find I get a spark from the anode connection of R12. I get a slight spark from the H.H.K. of same, does this suggest the L.O.T. is gone, or is there a condenser causing the trouble?—J. O'Donnell (Glasgow).

You should check the setting of the horizontal linearity control. Then have the 8D3, 6CD6G, and 6U4GT valves tested.

If in order, check the 16 mfd. wired from pin 3 of the 6CD6G to chassis. Then ensure that the resistor wired between the O.T. windings (on the transformer) is 15 kilohm. Check .1 mfd. capacitors associated with the 6U4GT.

FERRANTI 17T3

My trouble is fuses blowing. First time H.T. fuse 1 amp. went I hadn't a 1 amp., so used 1.5 amp. When I switched on again mains fuse 2 amp. went.

I have tested (with Avo 7) all condensers, etc., and have had rectifier valve tested, but cannot find anything wrong.

One peculiarity of set has been that on switching off a small bright spot remains on centre of tube. This can be removed only by turning down brightness control.

I should be much obliged if you would suggest the way to find cause of blown fuses.—C. W. Richards (Madeley).

You should first replace the PZ30 valve. This may have been tested, but it still remains by far the most likely suspect.

If the fuses still continue to blow, however, we will assist you further if you will let us know the period of time which elapses between switching on the set and the fuses blowing and any other signs you may have observed as they blow. The residual spot which remains when the receiver is turned off is quite normal.

K.-B. "QUEEN" HV40

The picture is brilliant and clear, but highlights in it are accompanied by horizontal shadows both sides of the highlights.

The fault appears at its simplest and most obvious forms in captions. Thus a caption consisting of three lines of simple lettering, white on black, will appear as though the lettering is set on bands darker than the normal background.

The effect is also to be seen in, say, a close-up of a man with white hair. From the top of the picture to a horizontal line touching the top of the head the black level is lighter than below that horizontal line.

In intervals between "shots" short lines are evident thus:

They are evenly spaced.

There are reserves of contrast and brightness and definition is good.—A. S. Maultby (Ilford).

We would advise you to check the resistors associated with the 6AL5 detector and the 6AM6 video amplifier. The 6.8 kilohm anode load of the video amplifier is likely to have changed value, the 15 kilohm resistor (across the video grid coil) may be open circuit or the video amplifier cathode (pin 2) components may be at fault.

DEFIANT 14in.

I live in a black spot and do not get a good picture on I.T.A. Would a booster on I.T.A. improve my picture?—I. Jones (Holyhead).

We would say that in a situation like yours the use of a Band III preamplifier would be definitely advantageous. It would "load up" the A.G.C. circuit and enable a picture to be held under varying conditions even if an amount of "snow" is the price of such amplification. In all cases, however, every effort should be made to secure better reception by means of a highly efficient aerial rather than a preamplifier. As intimated above, the latter does tend to introduce valve noise which appears as background "snow" or mush on the picture.

BUSH TV24

Lour blurping noises on sound occur; these are intermittent and sometimes cut the speech out.—J. Houlihan (Norwich).

The noises referred to are often due to a defective PL33 sound output valve. If this is not responsible, check the volume control wiring for poor connections.

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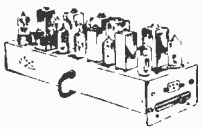

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6V6M	8/9	DK96	8 9		10 9	TT11	6 9
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6SA7M	3 9	EA50	1 9	KTW63	8 9	W81	3 9
6SG7	3 9	EABC80	9 6	L410	1 9	Z77	7 9
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8D2	3 8	EB34	1 9	PEN45	6 9	UX TYPES	
8G8	7 9	EF36	5 9	PEN46	6 9	18	3 9
9D2	6 9	EBC33	6 9	PEN220A		42	3 9
11E3	5 9	ECC81	8 9		3 9	75	3 9
12A6	8 9	ECH42	8 9	PL82	8 9	78	3 9
12AT7	8 9			PM202	1 9	1D6	3 9
12BE6	6 9	EF37	4 9	PP225	3 9	25RE	3 9
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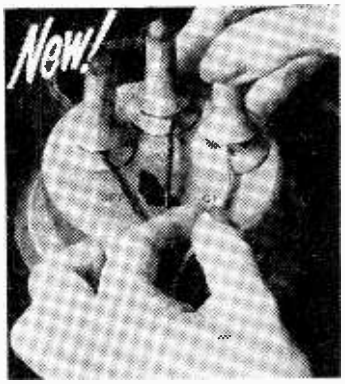

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