THE "SIMPLEX" MAGNETIC MODEL

PRACTICAL TELEVISION

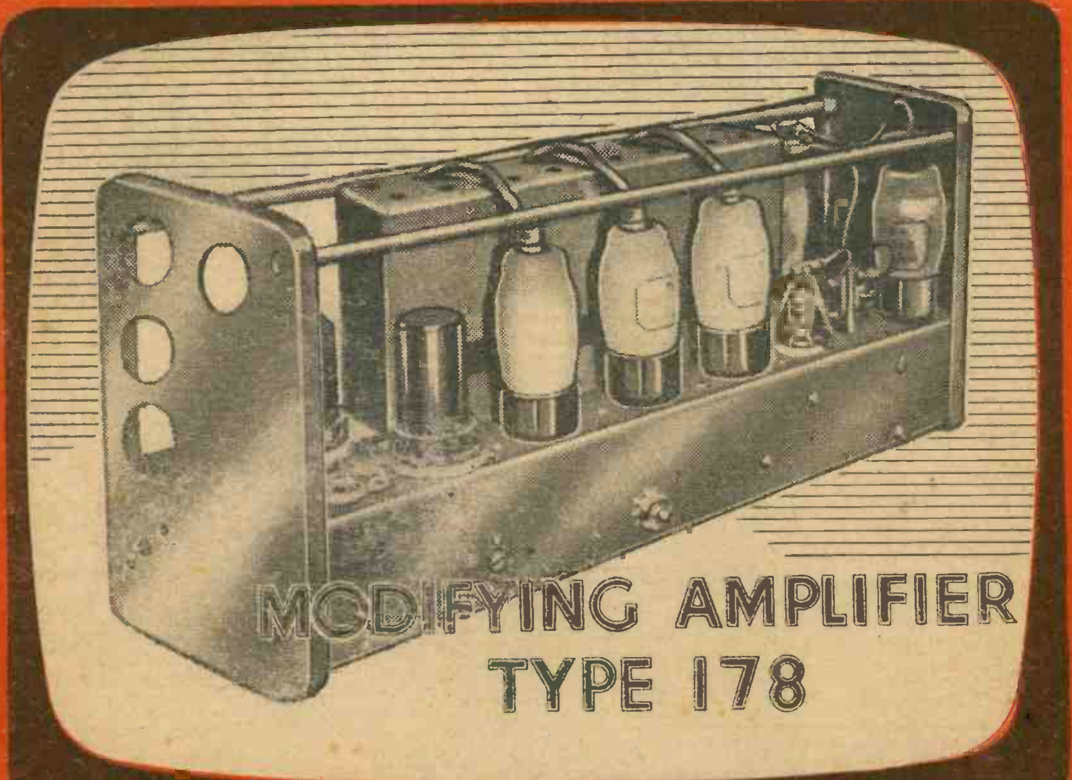
AND TELEVISION TIMES

1/-

EDITOR F. J. CAMM

A NEWNES PUBLICATION

Vol. 5 No. 56 JANUARY, 1955



FEATURED IN THIS ISSUE

- Changing to the New Stations
- Positive or Negative ?
- Using the Responser Unit
- Making TV Coils
- Fault Symptoms
- Interference on Band III
- Your Problems Solved

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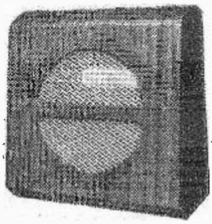

This attractive walnut finished cabinet is available for 6½in. or 8in. speaker units. Metal speaker fret, complete with back and rubber feet.
6½in. type :
Measures 8¼in. × 8¼in. × 4¼in. at base. Price 15/6 each.
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Measures 10½in. × 10½in. × 5in. at base. Price 19/6 each.

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12 v. ½ amp., 4/6 ea. ; 12 v. 1 amp. 4/6 ea. ; 2 v. 1 amp., 3/- ea. ; 250 v. 45 mA., 6/3 ea. ; 250 v. 75 mA., 7/6 ea. ; 300 v. 60 mA., 7/6 ea.

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PY80	11/-
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SP61	3/9
SP41	3/8
TP26	9/-
U10	9/-
U22	8/-
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U81	10/-
U281	10/6
U403	10/-
U801	14/6
UU6	10/-
UAF42	12/-
UB41	9/-
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UCH42	11/-
UF41	11/-
VC150/30	9/-
VP23	8/-
VR105/30	5/6
VR116	4/-
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VU120A	3/-
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1A7	11/6
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1LD5	6/9
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220VSG	6/9
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5Z4G	8/6
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6BE6	8/-
6BR7	9/6
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6C4	8/-
6C5GT	7/6
6C6	6/6
6C9	8/-
6D3	7/6

6D6	7/3
6F6G	7/6
6F6M	8/6
6F8G	7/-
6F13	12/6
6F14	12/6
6F15	11/6
6G6G	6/6
6H6	3/6
6J5G	5/-
6J5GT	5/6
6J5M	6/6
6J6	8/-
6J7G	6/6
6K6GT	6/6
6K7G	6/-
6K7GT	6/6
6K7M	6/9
6K8G	8/-
6K8GT	9/6
6L1	11/6
6L19	12/6
6L6G	9/-
6L7M	7/6
6L18	11/-
6N7	7/8
6Q7G	9/-
6Q7GT	9/-
6R7G	8/-
6SA7GT	8/-
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6V6G	7/6
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7C6	8/6
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9001	5/6
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12J5	6/-
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12SC7	7/6
12SH7	5/6
12SJ7	8/6
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12SR7	7/6
20D1	10/6
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20L1	10/-
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25Z6GT	8/6
30L1	10/6
35L6GT	8/9
35W4	10/-
35Z4GT	8/6
50L6GT	8/6

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Ten VR91 (EF50) Valves Ex. Brand new units, 6/- each, 45/- set.
6K8G, 6K7G, 6Q7G, 5Z4G, 6V6G, 37/6 set.
1R5, 1S5, 1T4, 1S4, or 3V4 or 3S4, 30/- set.
6K8G, 6K7G 6Q7G, 25A6G, 25Z4G, 37/6 set.
12K8G, 12K7G, 12Q7G, 35Z4GT, 35L6GT, or 50L6GT, 37/6 set.
Ten 6AM6 (EF91), 75/- set.
7S7, 7B7, 7C6, 7C5, 7Y4, 42/- per set.
ECH42, EF41, EBC41, EL41, EZ40, 50/- per set.
UCH42, UF41, UBC41, UL41, UY41, 50/- per set.

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Solon type 968 Fitted Pencil Bit ... ... 19/11 ea.
Both types are complete with approx. 6ft. of Henley 3-core cable and are suitable for 230/250 v.

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72 Ω Welwyn 2 section 40 Ω 32 Ω ... ... 1/9 ea.
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Dagole Mains Dropper .3A, cement coated with 2 sliders ... ... 3/9 ea.
.2 amp. as above 1,200 Ω ... 3/9 ea.
Green Vitreous Mains Dropper 1,328 Ω 2 taps ... 1/3 ea.
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Resistor and Condenser Panels, over 50 items guaranteed, including wire wound resistors ... 4/- ea.
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Tagboard, latest type vertical mounting, with resistors and condensers ... 1/- ea.
Tagboard, containing 2 watt Resistors, wire wound resistors and condensers... 2/- ea.

CONDENSERS MOULDED MICA

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.00027 .0005 .001 .002 .003
.005 .01 50 PF. 20 PF.
All 4½d. each.

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8 x 32 mfd. 475 v. 3/9
12 x 4 mfd. 450 v. 2/-
16 mfd. 450 v. 3/-
16 x 8 mfd. 350 v. 4/-
16 x 16 mfd. 350 v. 3/3
20 x 20 mfd. 500 v. 4/9
24 mfd. 450 v. 2/9
25 x 16 mfd. 350 v. 3/6
32 x 8 mfd. 350 v. 3/6
32 x 16 mfd. 350 v. 4/6
32 x 32 mfd. 450 v. 6/11
32 x 32 x 8 mA. 350 v. ... 5/6
32 x 32 mfd. 350 v. 25 mA. 25v. 5/9
64 mfd. 350 v. 2/-

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B.R.850 8 mfd. 500 v. ... 2/9 ea.
B.R.1650 16 mfd. 500 v. ... 3/3 ea.
B.R.2050 20 mfd. 500 v. ... 3/6 ea.
8 x 8 mfd. 500 v. ... ... 4/- ea.
B.R 501 50 mfd. 12 v. ... 1/9 ea.

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2 Tag Type and Earth ... 2½d. ea.
4 Tag Type and Earth ... 3½d. ea.
Tag Board No. 4 ... ... 1d. ea.
Group Tag Board 3½d. per inch, any length cut up to 1 yard.

GROUP TAG BOARD
9-way Open Type 4in. long with fixing feet ... ... 10d. ea.

MAINS TRANSFORMERS

3-WAY MOUNTING TYPE MT1
Primary : 200-220-240 v.
Secondaries : 250-0-250 v. 80 M/A 0-6.3 v. 4 amp. 0-5 v. 2 amp. Both tapped at 4 v ... ... 17/6 ea.
MT2
Primary : 200-220-240 v.
Secondaries : 350-0-350 v. 80 M/A 0-6.3 v. 4 amp. 0.5 v. 2 amp. Both tapped at 4 v. ... ... 17/6 ea.
MT3
Primary : 200-220-240 v
Secondary 30 v. 2 amps.
Taps at 3 v., 4 v., 5 v., 6 v., 8 v., 9 v., 10 v., 12 v., 15 v., 18 v., 20 v., 24 v. ... 17/6 ea.

EX GOVERNMENT AND SURPLUS CONTROLS

This popular range is suitable for all Television constructors, etc. Keep your costs down when Building the "Argus." or "Simplex" receivers. Available ... 500 Ω, 600 Ω, 1,500 Ω double type, 2K Ω, 5K Ω, 10K Ω, 20K Ω, 25K Ω, 50K Ω, 200K Ω, 100K Ω, ½ meg Ω, ¼ meg Ω, 1 meg Ω 2 meg Ω, 50K Ω double type.
All 1/2 each.

COLVERN PRE SET CONTROLS
Type CLR 1106/88 1.000 Ω 1/9 ea.
Type CLR 1126/78 250 Ω ... 1/9 ea.

PERSPEX IMPLOSION GUARDS BROWN ESCUTCHEON FILTER INCORPORATED. 12in. size, 11/6 ea. ; 16in. size, 14/6 ea.

RESPONSER UNITS, Less Valves. Type ZC8931, 15/- each, post 2/6.

TERMS: Cash with order or C.O.D. Postage to be added to orders as follows : 9d. up to 10/- ; 1/- up to 20/- ; 1/6 up to 40/- ; 2/- up to £5. MAIL ORDER ONLY : Send 6d. in stamps for illus. catalogue. When ordering please quote " Dept. P.T.V."

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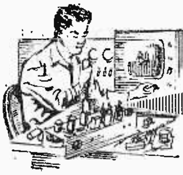
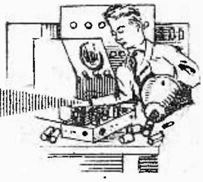


Practical Television



& TELEVISION TIMES

Editor : F. J. CAMM

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Televiews

TV RECEIVER INTERMEDIATE FREQUENCY

AS a result of investigations, made by B.R.E.M.A. in consultation with the G.P.O., an announcement of a recommended intermediate frequency for television receivers of 34.65 Mc/s with a high oscillator has been made. It is the subject of a report prepared for the industry by a B.R.E.M.A. panel formed specially for the purpose.

The TV industry in general have endorsed the recommendations which have received the approval of the G.P.O. It should, however, be made clear that the choice of an intermediate frequency must rest solely with the individual receiver manufacturer, who must have the same liberty in design as he has in the selection of a particular circuit. The designer naturally bases his circuitry in accord with a number of technical and economic factors, not the least of which is that it must satisfy public need.

Too much significance should not therefore be attached to the B.R.E.M.A. recommendations. Indeed, it would be misleading to do so. Members of the public may safely continue to choose their TV receivers without reference to the I.F. used. A great deal of confusion over this matter has been caused by a G.P.O. statement on the protection of amateur wavebands, and it has led some members of the public to believe that the incidence of interference from amateurs is high.

The truth is that hundreds of thousands of television receivers in use to-day have an I.F. in the vicinity of the amateur waveband and are operating quite satisfactorily without interference from that source. It is pointed out that provided the designer's receiver is satisfactory, and amateurs keep their harmonics within the prescribed limits, there is no reason to expect such interference.

The B.R.E.M.A. report therefore means that 34.65 Mc/s is a preferred frequency towards which designers should veer in future development. Some manufacturers are making receivers to this frequency, and no doubt in the course of a few years such an I.F. will become standard.

WEAK COMMERCIAL TV ?

COMMERCIAL TV is to make its debut next autumn, and it is thought in some circles that the signals will be so weak that only a small percentage of present televiewers will be able to receive the alternative programme. It is suggested that commercial TV will be restricted to an area of about 35 miles radius of the transmitter. When the Manchester station opens which will radiate programmes via the BBC Holme Moss transmitter, it is doubtful whether Blackpool, Southport or any other north-west coastal resort will be able to receive the programmes. Liverpool and Preston are in the fringe area, where reception cannot be guaranteed, and Chester will be out of range. On the other hand, most of the industrial areas of Lancashire will be able to watch I.T.V., but only half of Cheshire, a small part of Yorkshire and less than half of Derbyshire.

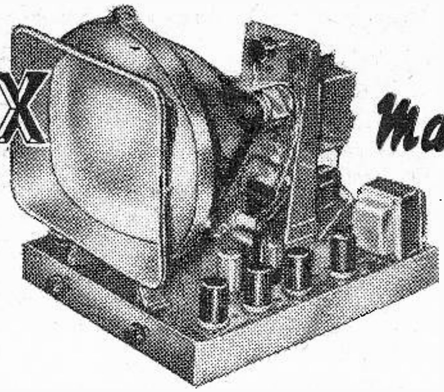
The suggested reason for the weakness of the signals as compared with those radiated by the BBC from the same mast is that the BBC works on Band 1, while I.T.V. has been relegated to the much less satisfactory Band 2. In its early days, at least, commercial television may not be able to employ the equivalent power of the latest BBC transmitters—100 kW.

When the three stations—Manchester, Birmingham and London—are operating at full strength, it is expected that I.T.V. programmes will reach an area of population of 30 millions, which is about 50 per cent. of the BBC's coverage.

In the meantime, political controversy still rages around this thorny subject in the House of Commons.

The Postmaster-General is satisfied about the power of I.T.A. But politics itself has extended its influence into radio, which we have always considered to be a retrograde step.—F. J. C.

The SIMPLEX Magnetic Model



DETAILS FOR CONVERTING THE SIMPLEX TO MAGNETIC TUBE

(*Continued from page 295 December issue*)

A FOUR-WAY tag strip is mounted on the tube holder for terminating the scanning coils and another one-way is used for mounting the width control.

On the other side of the holder a one-way tag strip is fitted to hold R43.

The periphery of the holes cut for the neck of the C.R.T. should be bound with plastic tubing slit down the centre. The outer covering of a piece of coaxial cable is very suitable for this purpose.

Under no circumstances should the edge of the bar metal come into direct contact with the glass of the tube.

MR6 and CM6 are mounted directly on the base of the transformer.

MR1 and MR2 are mounted at right angles to each other and soldered directly between the line transformer and CM8. If mounted in this manner they are well protected and accidental contact during the preliminary running-in period is thereby avoided.

Soldered connections in the E.H.T. stages should be made very carefully and the joints finished with well rounded blobs of solder. No sharp points should exist as these will set up corona discharges.

VRM1 with CM7 and the width control are mounted on the tube rear support.

The wiring can now be completed and then carefully checked before proceeding to Stage VI.

STAGE VI (M)

The final stage has now been attained and it is very short. The mains transformer and smoothing choke should be mounted in their positions and the rectifier holder wired in. R43 can be fitted in position (this belongs, of course, to the original power pack).

Separate tubular condensers have been used for smoothing so they can be conveniently mounted beneath the chassis.

The transformer input is connected in parallel with the vision mains transformer input and the mains supply taken via the filter to the switch.

After this work is completed the scanning coils can be wired in to the tag strip on the tube support using flexible leads.

The tube can be wired using a valveholder to suit type of tube.

C.R.T. Heater

C.R.T.s fall into three main classes so far as the heaters are concerned; they are 2 volt, 4 volt and 6.3 volt. Some tubes are designed to be used on A.C./D.C. receivers and have larger voltage ratings, but we are not concerned with them here.

If a 4-volt tube is used the supply can be obtained from the transformer T1 using the spare 4-volt winding. This winding can also supply the sound output stage where fitted. If the tube has a cathode-heater short a separate transformer is not required.

When a 6.3-volt tube is used then the heater supply can be taken from the normal 6.3-volt line of the time-base amplifier from T2 mains transformer. If the tube has a cathode-heater short then a separate transformer must be used and this can be a heater-to-heater type or a mains type.

A 2-volt tube requires a separate transformer either of the heater-to-heater (type 6.3 volt to 2 volt) or a direct mains type. It does not matter if a cathode-heater short exists in this case.

If a heater transformer is required it can be mounted on the rear support of the tube above the smoothing choke.

Note that V13 is wired in the heater chain from

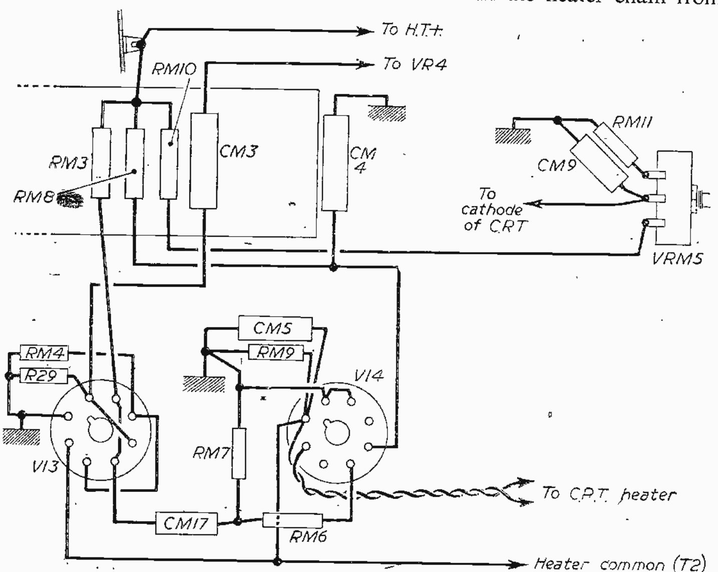


Fig. 12.—Under-chassis wiring of line amplifier and brilliance control.

transformer T2 and *not* in the original heater line feeding V11, etc.

After wiring check the circuit carefully and ensure that no contacts exist between H.T. lines and the heaters.

TESTING

And now comes the exciting point—we are ready to connect the power!

Do not connect the aerial at this point nor put in the C.R.T. Set the chassis on its side so that access can be obtained to components underneath.

Insert all the valves except V16.

Switch on the mains.

Observe the components while warming up takes place and if any overheating is evident switch off and investigate the cause.

Assuming that all is in order and the valve heaters light up, insert V16 and again watch for possible overheating.

Within a very short period the whistle from the line circuit should be heard and it should be possible

STAGE VI (M)

1 mains transformer 350-0-350 v. 150 mA 6.3 v. 3-4 A. 5 v. 3 A.
1 smoothing choke 3 Henry 150 mA.
1 earth terminal
1 twin suppressor choke. (Radiospares)
1 I.O. valveholder
1 5U4G valve
1 16 μF 450 v. wkg. tubular
1 8 μF 450 v. tubular
2 .01 μF 450 v. wkg.
1 heater transformer if required. (See text.)

to draw off a spark from the E.H.T. with the blade of a *well-insulated* screwdriver.

Note that the E.H.T. is of the "safe" type and while accidental contact may produce a nasty shock it is not in any way dangerous. When probing into E.H.T. circuit the wise engineer always keeps one hand in his pocket to ensure he does not get a shock across two hands, and thereby through his body.

After verifying that all is in order then switch off, mount the chassis the correct way and then insert the C.R.T. Make sure it is fixed firmly.

Take out V16. Set the brilliance control half-way. Switch on again, allow for warming up and then insert V16.

A blur should be received on the screen, but if it does not appear simply turn up the brilliance control.

The blur should be roughly oblong in shape.

Adjust the focusing magnet by means of the fixed screws for optimum focus and then adjust with the knurled screws for fine focusing. The lever for the final focusing can be set in mid-position and final adjustments done on this lever.

Rotate the scanning coils until the raster is square on the screen. Reduce the brilliance until the raster is faintly seen and then prepare for the vision signal.

Alignment of Vision

Connect the aerial and also connect a pair of 'phones or a loudspeaker between the grid of the C.R.T. and chassis. Listen for the vision signal which sounds like a rough mains hum and tune it in to its strongest position on the coils.

VOLTAGE READINGS

V13—anode 28 v., cathode 0.05 v.
V14—screen 42 v., cathode 7.2 v.
V15—anode 40 v., screen 55 v., cathode 7.5 v.

The contrast control should be set at first so that it has minimum resistance (maximum contrast) and then reduced as the strength of the signal increases.

Adjust the rejector coil so as to reduce the sound signal appearing on the vision as much as possible.

Disconnect the 'phones and turn up the contrast so that a pattern appears on the screen. Adjust the line hold control carefully to resolve the pattern into a picture and adjust the frame hold control to prevent the picture rolling.

Width height and linearity controls can then be set and, finally, all vision coils should be adjusted to give a picture of the maximum quality.

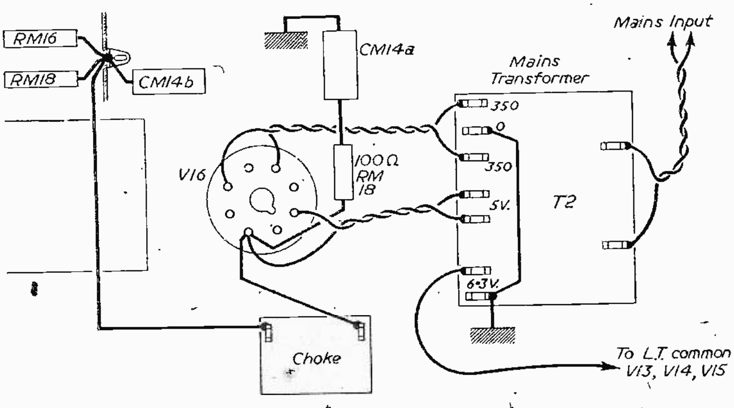
The larger tube will be capable of resolving greater detail than a small VCR97 and advantage should be taken of this to improve the quality by stagger tuning the vision stages.

If the signal strength is weaker than expected then fit the pre-amp stage so as to enable the coils to be staggered.

The sound section is simple to align as all that is necessary is to tune the coils for maximum volume. The output should be fed into a broadcast receiver as given in the data for the original model or a separate sound stage can be fitted.

In areas of weaker signal strength some constructors have had difficulty with the sound output stage. In order to increase its sensitivity the following modifications can be made:

Remove RS5 and place it in RS2 position. Transfer the volume control to RS5 position taking the slider to pin 5 of the pentode and the top end to the free end of RS3. The free end of C15 should be taken to pin 6 of the EBC33 and the free end of RS1 to chassis.



Note: RM18 (100Ω 1 w.) to be added to component list and stage 6M list

Fig. 13. Power supply wiring.

Positive or Negative?

THE ADVANTAGES OF BOTH FORMS OF E.H.T. SUPPLY

By S. A. Money

THE polarity of the E.H.T. supply must be decided upon before any piece of equipment using a cathode-ray tube is built. Why bother to use a negative supply at all? As a matter of fact it is possible to use positive E.H.T. almost every time, but in some cases it is much more convenient to use a negative supply. Consideration of the advantages and disadvantages of the two types of supply will make it easier to decide which polarity will be best for any particular circuit.

First, let us look at the negative supply. There are two points regarding negative supplies which might well be clarified. Some people may get the impression that because negative supplies are so called they are less dangerous than the positive variety. That is not true. A shock from a negative supply can be just as painful as one from a positive supply. It is the voltage that does the damage, and it makes no difference whether it is positive or negative with respect to earth.

Another point that some people cannot, at first, understand, is how a cathode-ray tube can work when its anode is earthed. The explanation is that the operating voltages on the tube are always referred to the cathode of the tube. If the anode voltage is stated as 2,000 volts then the anode must be made 2,000 volts positive to the cathode. If the anode is at earth then the cathode will have to be 2,000 volts negative to earth. Under those conditions the tube will work normally.

Negative

Negative E.H.T. is most useful in those circuits where signals are applied to the deflector plates of an electrostatic cathode-ray tube. These deflector plates are normally held at or near the anode voltage, which in this case is earth potential. The coupling condensers to the plates need only be of low working voltage. This point becomes increasingly important as the frequency of the signals is reduced and the value of the coupling capacity is increased. It is much easier to obtain a large capacity at low working volts than one which will withstand several thousand volts.

In some applications, such as low speed oscilloscopes where the sweep may last for several seconds, it is often necessary to use direct coupling to the plates. This only becomes practicable if the plates are at or near earth. Direct coupling is often used when measurements of voltage have to be made on circuits where a normal voltmeter would give false readings due to its shunting effect.

A Disadvantage

One disadvantage of using a negative supply is that it is necessary to use an isolated supply for the tube heater. The heater-to-cathode insulation is usually only rated at about 100 volts. Because of this one side of the heater is generally tied to the cathode through a high value resistor. The heater transformer supplying the tube must, therefore, be capable of withstanding the full value of the E.H.T. voltage. Such transformers tend to be large and expensive, their cost rising rapidly as the E.H.T. voltage is increased.

Since the tube grid is connected to the E.H.T. line at the negative end there is quite a high resistance between it and earth. This allows a certain amount of stray signal to be picked up on the grid. This stray signal shows up as variations in the brilliance of the trace. If another signal is being applied to the grid such pick-up can be very troublesome.

It should be remembered when designing the chassis that the focus and brilliance controls are at or near the E.H.T. potential. Therefore, it becomes necessary to mount them on insulated brackets and to insulate the control spindles from the earthed chassis.

When signals are applied to the tube grid it is sometimes necessary to make use of a D.C. restoring diode. If a valve is used its heater supply must be isolated from earth in the same way as the tube heater. In most cases it is possible to run the two heaters from the same winding by choosing a diode having the same heater voltage as the tube.

Positive

Positive E.H.T. is generally used in those circuits where it is an advantage or a necessity that the cathode of the tube should be at or near earth potential. This arrangement is invariably used with tubes of the magnetically deflected type such as those used in television receivers. These tubes have only two electrodes to which signals can be applied. These are the grid and cathode. It becomes much easier to apply the signals to these electrodes if they are near earth than if they are at some high voltage.

Another advantage of an earthy cathode is that the heater supply can also be earthed without fear of a breakdown between the heater and cathode. This removes the need for a special isolating transformer since the tube heater can be operated from the common heater line of the set.

In television work the video signals are often directly coupled from the anode of the video amplifier to the tube cathode. By doing this the D.C. component of the signal is retained and no D.C. restoration is necessary In order to do this the cathode must be made about the same voltage as the anode of the video valve This can only be done if the E.H.T. supply is made positive.

Summarising we see that positive E.H.T. is generally used for television receivers, especially those where a magnetic tube is used. Negative E.H.T. is generally used in oscilloscopes since it makes the coupling of signals to the deflector plates relatively easy. For television receivers using electrostatic tubes either polarity can be used, the choice depending on the components to hand or personal preference.

NEW SERIES

Servicing TELEVISION RECEIVERS

No. 5.—H.M.V. 1803-4, 1805-6, 2806, ETC.

By L. Lawry-Johns

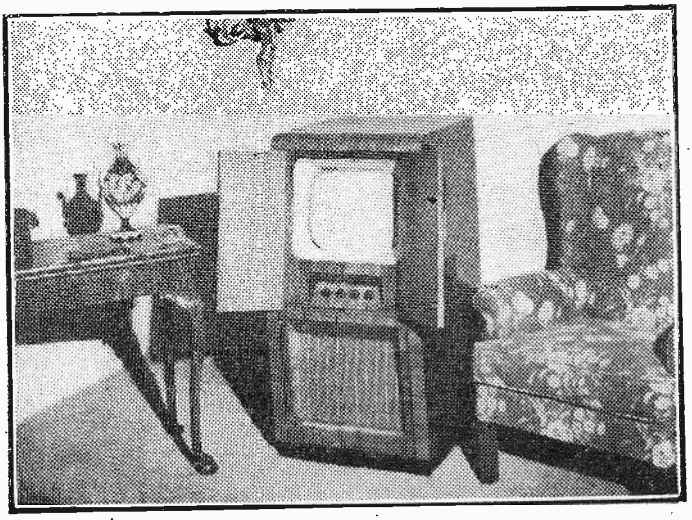
THE 1803 15in. console was built soon after the war and contained an essentially pre-war chassis with the addition of the Z66 and other valves. The chassis was also used in the 1804 table model with a 10in. tube and re-distributed controls. The main cause of trouble in these sets is undoubtedly the frequent failure of the Z66 valves, but once a good set has been installed, quite long periods of trouble-free operation can confidently be expected. These valve troubles are usually quite obvious and need not be considered further.

If the owner of one of these sets has not had a new tube since the original, a word about this could be of value, as the original type of tube is no longer supplied, and has not been for a considerable time. The replacement tube for the 1803 is a TA15J. Now the J is rather important as it concerns the shape of the bulb of the tube. In addition, a small modification is necessary, and the J type tube carton should contain the small kit of parts and instructions. These items are necessary owing to the altered position of the focus coil assembly, the tube base, springs, etc.

The 1804 replacement is the TA10 and the fact that both this and the TA15 are tetrode tubes must be remembered, and the extra supply taken from the focus coil tag to the first anode of the new tube base. It may be thought that the E.H.T. of the set which is under 4 kV. would not be sufficient for the proper working of aluminised replacement tubes which normally require 7 kV. However, the picture obtainable with this low voltage is as good as that with the original tube and unless extensive re-designing of the line timebase is carried out no attempt at boosting the E.H.T. should be made.

E.H.T. Smoothing

One fault that regularly occurs with these sets (and any others that employ transformer E.H.T. circuits) is the appearance of a band of bright illumination along the bottom of the raster. This may come and go at irregular intervals, or may appear and remain. This is due to the E.H.T. smoothing condensers becoming defective and the following suggestion should be considered before purchasing new ones. The condensers fitted are two .03μF 4 kV. mounted on the top of the chassis on the left side and are both fixed to a common plate. It is the writer's opinion that more reliable operation of this circuit is achieved by the use of a single .1 μF condenser of 5-7 kV. rating. This should be secured by a suitable clip in place of the unit, leaving a space for the E.H.T. cable to be passed through the chassis. This cable may be connected to the top of the E.H.T. bleeder resistor tube leaving the smoothing resistors in the circuit, and incidentally whilst this operation is being carried out the bleeder resistors should be tested to ensure that they are still fulfilling their purpose of discharging the condenser when the set is switched off. *Never* touch the E.H.T. components until this condenser(s) has been discharged to chassis with a screwdriver, the handle of which is well insulated. This is necessary as the bleeder network often goes OC leaving the condenser



An H.M.V. receiver, model 1806.

charged and *lethal*. Defective condensers in this position may also show themselves by "snowstorm" effects on the screen most often with a crackling on the sound.

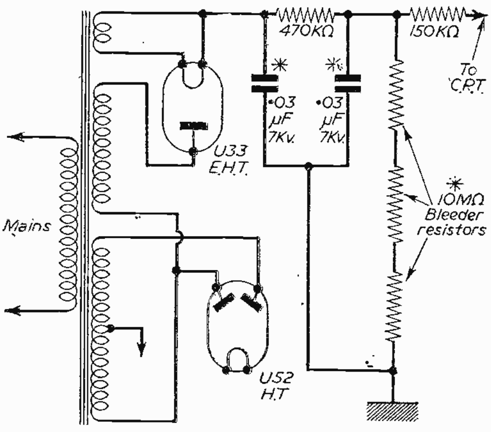
Other effects although less usual include that of the raster taking on a wedge-shaped appearance. This of course in more up-to-date sets is usually an indication of leaky scan coils. A "snowstorm" effect may also be caused by a resistor in the bleeder chain breaking down. All these effects of faulty E.H.T. components may in some circumstances be affected by the operation of the contrast and brightness controls.

1805, 2805, 1806, 2806, Etc.

These receivers employ a rather more up-to-date circuit using Z77 vision and sound amplifiers with the exception of the video which is a Z66 and the audio which has an L63 and KT61 sound output. The detectors and limiters are D77 double diodes and the sync. sep. line oscillator and frame oscillator employ Z66 valves which with the video amplifier make a total of four valves of this type used in this receiver.

The E.H.T. circuit is similar in design to the previous 1803 with the exception of the higher voltage, 7 kV. to supply the TA10 in the 1805 and TA15 in the 1806.

The same E.H.T. faults may be expected and the modification of fitting a single condenser in place of the two .03 μF can be adopted if trouble comes, remembering that the .1μF fitted must be rated at 7 kV. or over.



Components likely to be faulty are marked thus ✳

Fig. 1.—E.H.T. circuit of the 1805 model which may be used as a guide for the 1803.

The diagram of the circuit shows that one end of the E.H.T. winding is connected to the high side of one H.T. secondary winding on the mains transformer. This circuit may be used in following the design of the 1803 with the exception of the type of E.H.T. rectifier fitted and the voltage ratings of the condensers. Trouble with the line or frame timebases can nearly always be traced to a defective Z66 valve and sometimes a valve in this position can be changed for the central sync. separator as this is already operating under limited conditions and a slightly low oscillator valve may operate quite adequately as a sync. separator.

Dark hum bars across the raster may often be caused by a heater-to-cathode leak in the Z66 video amplifier. If this is the case it may be changed with one of the oscillators or the sync. sep. As these valves have their cathodes strapped to chassis a leak does not affect them. When replacing either of the Z66 oscillator valves it will be found that the new valve, if recently purchased, has a metal base. In the case of the frame oscillator, the valve base is mounted so

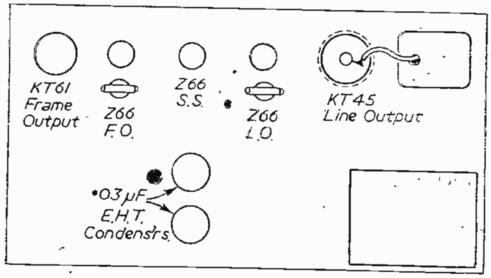


Fig. 2.—Plan view of lower chassis of the 1805 model, showing the position of components mentioned in the text.

close to the blocking oscillator transformer that one of the tags of this touches the base of the valve. As this is an H.T. tag, the reason for these words is obvious. Either the valve may be changed for the sync. sep. or the video amp., or the metal base must be covered with insulating tape. In the former case, it is assumed of course that the valves concerned do not have metal bases!

It is suggested that the tubes be rotated a little at, say, six monthly intervals to compensate for heater sag. This of course applies to most receivers and a useful length of life may be added to a tube by this means. The idea is that with a tube in a permanent position the wires that feed the heater do sag downwards after a lengthy period and many cause trouble, but by periodic rotation of the tube the risk is minimised. As the E.H.T. supply on these receivers is transformer supplied from the mains no variation of picture size or flaring should occur with varying brightness levels. If this does happen it points to a defective U33 E.H.T. rectifier, although flaring at high brightness level, or contrast, may indicate a failing tube.

As the latest Z66 valves have plastic bases the necessity of insulating the metal is obviated when replacing these valves in the timebase of the 1805-6.

Using the Responser Unit

HINTS ON ADAPTING A POPULAR EX-GOVERNMENT UNIT FOR BAND I AND BAND III RECEPTION

By R. E. Jones

(Continued from page 313, December issue)

If it is intended to build a separate timebase chassis, L5 and R59 can be fitted on the *outside* of the receiver chassis. R40, R58, C43, C63 were used in the author's case for a 12in. electro-magnetic tube. R58 and C63 feed the sync-separator and can therefore be on the timebase chassis. C43 and R40 were in the lead to the cathode of the C.R.T. and were fitted across the C.R.T. base.

Sound Rejectors

The rejection provided by the sound take-off coil proved sufficient, but if further rejection is found necessary the most suitable place to fit rejectors is in the cathode circuits of V5 and V6.

Contrast Control

It will be found that the cathode circuits of the I.F. valves have 100 ohm bias resistors across the valve bases. Those on the sound channel are already earthed. Those on the vision channel, however, are "commoned" and should at this stage be "floating," having been left so when the "gain" socket was removed. The "commoned" ends of these three bias resistors should be wired to the conventional type of contrast control. As this gives control of three stages, VR1 should be of low value (say 500 ohms). Alternatively, the first stage only can be controlled, the cathode resistors of the other two stages being earthed. In this case VR1 should be 2 k. It might be found that slight instability occurs at the maximum setting of the contrast control. This can be overcome by increasing slightly one of the fixed bias resistors.

The Sound Channel

A sound input coil has to be fitted. A small Haynes type coil can fits neatly in close proximity to V7. A hole should be drilled in the top of the can to allow exit for the wire to the top cap of V7. Details of the coil (L6) are given in the separate table. Tuning of L6 is by the iron-dust slug. In setting up the sound channel it may be necessary to make C48 variable. The frequency of the sound channel is to be approximately 10 Mc/s. In theory it is necessary to shunt the other two I.F. coils by extra capacitance in order to lower the frequency to $3\frac{1}{2}$ Mc/s less than the vision I.F. In practice, however, it was found that one coil could be adjusted on the iron core without the need for a capacitor. On the other coil a 20 pF capacitor was necessary. Sufficient gain was obtained by removing the tuned circuit damping resistors. Further gain can be obtained, if required, by removing one of the two 10 k load resistors in each can.

To utilise valves which were to hand, it was decided to use a DH63 and a 6V6 for the audio stages. This meant changing the valve bases of V10 and V11 from MO to IO type. The simplest procedure here is to recover all wiring and completely rewire. If economy is of importance, however, the existing valve bases can be left in place and the spare P61 and SP61 can be used in these stages.

Owing to the physical layout of the components it was found that the most suitable circuit for the audio and output stages was one similar to that used in the Lynx receiver. This allows the DH63 diode load and filter to be fitted inside the last I.F. can, and a short lead out of the top of this can connects to the top cap grid of the DH63. The existing EA50 was used as a noise limiter and its position in the circuit is following the DH63.

R.F. Unit for Band I

This was built up on a small aluminium sub-chassis, 3in. wide and equal in length to the depth

COIL WINDING DETAILS

L1.—$\frac{1}{4}$in. diam. Aladdin former. Winding length, $\frac{1}{4}$in. Wire gauge unimportant.

Channel	No. of turns	Tapped from earthy end
1	$8\frac{1}{2}$	$1\frac{1}{2}$
2	$7\frac{1}{2}$	$1\frac{1}{2}$
3	$6\frac{1}{2}$	$1\frac{1}{2}$
4	$5\frac{1}{2}$	1
5	5	1

L2.—$\frac{1}{4}$in. diam. Aladdin former. Winding length $\frac{1}{4}$in. Wire gauge unimportant.

Channel	No. of turns
1	9
2	8
3	7
4	6
5	5

L3.—$\frac{3}{8}$in. diam. Polythene o. Paxolin. 20 s.w.g. enam. close wound.

Channel	No. of turns	Oscillator frequency
1	15	32
2	10	38.75
3	9	43.75
4	8	48.75
5	6	53.75

L4.—$\frac{1}{2}$in. diam. Paxolin tube, 200 turns, 40 s.w.g. enam. winding length, $1\frac{1}{3}$in.

L5.—$\frac{1}{2}$in. diam. Paxolin tube, 180 turns. 40 s.w.g. enam. Winding length, $1\frac{1}{8}$in.

L6.—Haynes type former (with can). Approx. diam. 0.3in., 25 turns, 32 s.w.g. enam. Winding length, $\frac{3}{8}$in.

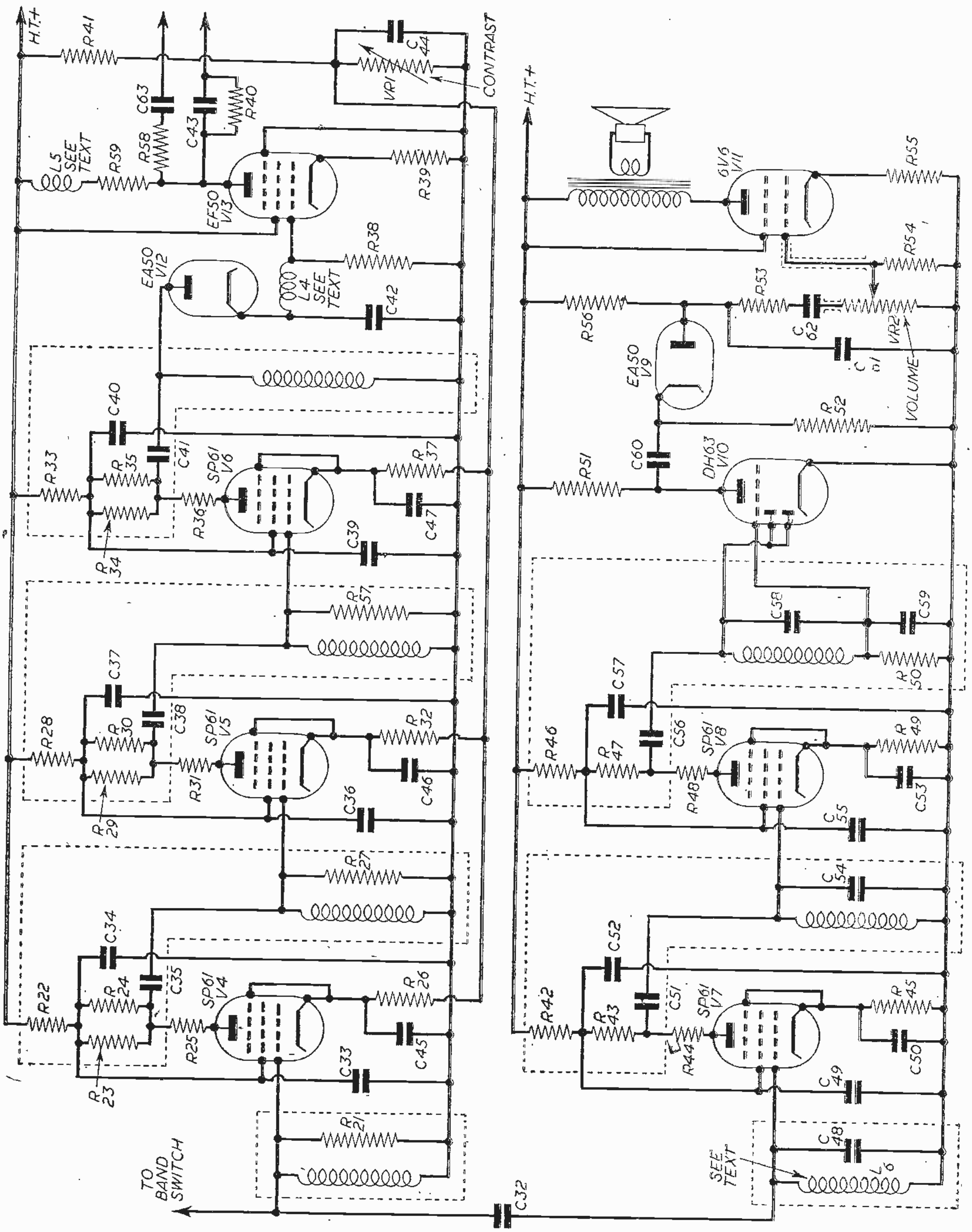


Fig. 6 — The completed, modified, video and sound receivers. The input marked "To Band Switch" is connected to the switch through condenser C63. A complete list of values was given in last month's issue.

of the unit. It consists of an R.F. amplifier (EF54), mixer (EF54) and oscillator (EC52) in line along the chassis. The oscillator valve is arranged to be at the front of the chassis and the R.F. amplifier at the rear. This allows the oscillator tuning control to appear at the front of the receiver similar to the three Band III tuning controls. The idea is, eventually, to have a flap in the front of the cabinet so that these controls are easily accessible. The circuit is shown in Fig. 5. The coils L1 and L2 are wound on ¼in. diam. Aladdin formers in small aluminium cans. Owing to the screening of the cans, no further screening was found necessary. The connection between the oscillator grid and the mixer grid (via C19) was taken in a few inches of coaxial cable, C19 being fitted at the V15 end of the cable.

An alternative to building the R.F. unit would be to use one of the surplus "Cyldon" 5-channel tuners now advertised. This has not been tried by the writer, but no difficulties are foreseen in its use.

The Rowridge Transmitting Station

THE new Rowridge transmitting station operates on Channel 3 (Vision 56.75 Mc/s, Sound 53.25 Mc/s).

Built on a 26-acre site 470 ft. above sea level and 3½ miles west-south-west of Newport near the Calbourne road, Rowridge, is the first of the five medium-power stations to be equipped with permanent transmitters. It is part of the BBC's 18-station plan to provide a television service for 97 per cent. of the population of the United Kingdom. Initially, Rowridge uses a temporary mast and aerial, and its service area will be somewhat less than that expected when the permanent mast and aerial system are brought into use next autumn. Nevertheless, it is expected to provide a reliable service to approximately two million people.

Vision Transmitter

The main vision transmitter, manufactured by Marconi's Wireless Telegraph Co. Ltd., is of the low-level modulated type with a peak white output of 5 kW. Modulation is carried out at the 500 watt level and the signals are then amplified by two class "B" wide-band linear R.F. amplifiers each using a pair of forced-air-cooled triodes, type BR191, made by the English Electric Company. The appropriate shaping of the vestigial side-band signals radiated by the vision transmitter is carried out entirely by its own tuned circuits, and not by a separate vestigial side-band filter. The valve filaments are A.C. heated, with the exception of those in the modulated amplifier and the linear amplifiers. which derive their supply from metal rectifiers. The transmitter H.T. supplies are obtained from hot-cathode mercury-vapour rectifiers, which provide a maximum of 3,000 volts for the anodes of the linear class "B" amplifier stages.

Sound Transmitter

The sound transmitter, also manufactured by Marconi's Wireless Telegraph Co. Ltd., is of the conventional class "B" modulated type and is rated at 2 kW output. The output power will be adjusted to 1.25 kW to maintain the standard ratio of 4 : 1 in terms of vision to sound power. All valve filaments are A.C. heated. As in the case of the vision transmitter, the crystal-controlled drive and the power-conversion equipment are built as an integral part of the transmitter.

Both transmitters are contained in similar sheet steel cubicles mounted side by side, and so present a single continuous front in the transmitter hall.

The air blast cooling equipment and combining filter are mounted behind the transmitter cubicles which are built into a sound-proof partition wall so as to isolate the noise of the air blowers from the control desk situated in front of the transmitters.

Controls

The two transmitters are controlled and monitored from this desk, which incorporates a built-in waveform monitor and two picture monitors in addition to the conventional controls and meters. The provision of the two picture monitors enables the incoming signals to be compared with those radiated. Programme switching for both sound and vision circuits is accomplished at this desk. The controls of each transmitter are sequence interlocked to ensure that the various supplies are applied in the correct order and, where necessary, with the appropriate time interval between each. Adjacent to the control desk are the vision and sound programme input equipment bays, and the test waveform generating equipment which provides a variety of signals for testing, lining up and maintaining the characteristics and performance of the vision transmitter.

The low-power standby transmitters operate on the same frequencies as the main transmitter and have a rated power output of 500 watts vision and 125 watts sound. These are manufactured by Standard Telephones and Cables Ltd.

Links

The vision programme reaches Rowridge from London via a Post Office repeater station at Alton in Hampshire. Here, special receivers intercept the vision signal radiated from Alexandra Palace. The signal is then re-radiated by a microwave link transmitter and is received by Post Office equipment installed at Rowridge. From this the video signal is passed to the BBC vision input equipment.

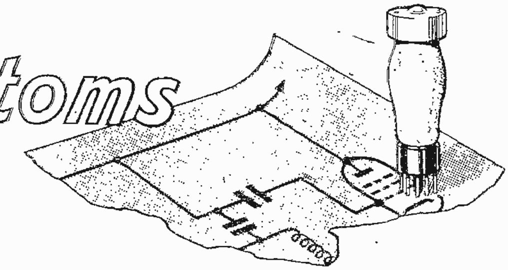
Ultimately two microwave links will be available, one normally acting as spare to the other, and they will be reversible so that outside broadcasts from the Isle of Wight may be relayed to the mainland for connection to the main television distribution network.

The sound programme travels to Rowridge over special G.P.O. telephone circuits including a submarine cable between Southampton and the island.

Aerial

The receiving aerial and reflector for the Alton-Rowridge microwave vision link are located at the 60ft. level on the temporary 200ft. self-supporting tower. This tower also carries the two dipoles forming a simple two-stack array which serves as the temporary vision and sound transmitting aerial for Rowridge pending completion of the permanent mast and aerial system. These are mounted at the 175ft. level, whilst at the very top are located aerials for receiving the television programmes from the high-power transmitter at Wenvoe should the normal programme route fail.

Fault Symptoms



THE CAUSES OF COMMON FAULTS, AND METHODS OF CORRECTION

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

(*Continued from page 320, December issue.*)

Instability

TO revert back to the rectified oscillation potential across the detector load resistor; this potential is, of course, directly coupled to the control grid of the video amplifier valve, which is thus driven heavily positive. As a result a large anode current flows in the valve and associated video amplifier load resistor, causing the video amplifier anode potential to fall considerably. This reduction in potential is reflected directly to the cathode of the picture-tube (assuming cathode modulation) and looks to the tube very much like a peak-white picture signal.

As a consequence the tube lights up very brightly as the potential at its grid is probably slightly more positive than the potential at its cathode, meaning that, in certain cases, screen illumination may be in evidence even at minimum setting on the brightness control.

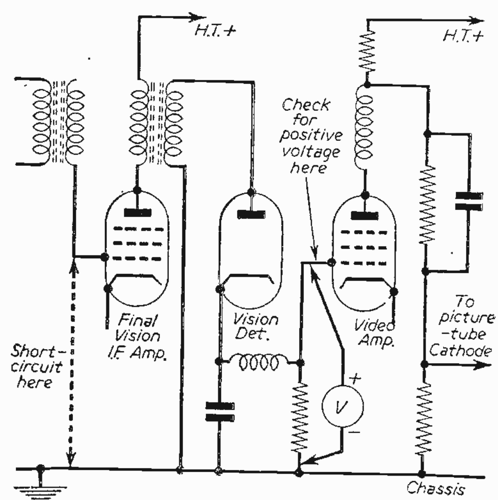
Apart from the more obvious symptom of excessive tube brightness and lack of picture, internal examination will often reveal the video amplifier valve anode load resistor to be operating very hot; this, of course, is due to the large anode current.

One stage oscillating only slightly—in the vision channel, for instance—may not wipe the picture out completely, but frequently causes the display of pattern interference that cannot be attributed to any external source, and that can be made to alter in form by adjusting the contrast control. Nevertheless, even slight instability will register at the vision detector to give rise to a mean D.C. potential due to the oscillation, and this, as we have already seen, arrives at the control grid of the video amplifier valve as a positive potential. Although of insufficient magnitude to over-drive the picture-tube, this oscillation potential is almost bound to outbalance the grid bias on the video amplifier valve with a consequent loss in picture contrast ratio.

Sometimes slight oscillation occurs in the vision channel at a frequency removed from the vision carrier frequency or sound I.F. so that heterodyne patterns, normally associated with slight instability, are not displayed.

In a case like this what generally happens is that the operating point of the video amplifier valve is shifted slightly—due to the bias neutralising effect of the oscillation potential—and the picture tends to resolve somewhat "flat"—as though the vision noise limiter is adjusted to "clip" on peak-whites.

We would point out that this symptom can readily deceive unless one happens to be well versed in the characteristics of the receiver concerned, for it might well be thought that the effect could be caused by more or less anything *but* instability!



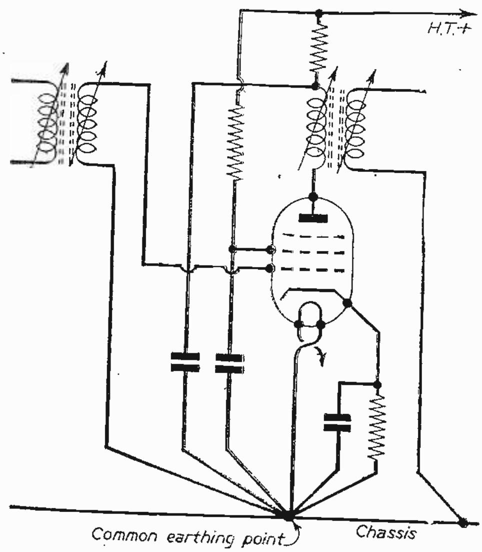


Fig. 79 (left).—A test for instability. Fig. 80 (right).—When replacing decoupling capacitors, ensure that they are returned to the common earthing point.

A Test

A quick test to prove whether the vision R.F./I.F. channel is oscillating is by measuring the potential across the vision detector load resistor, or at the control grid of the video amplifier valve—relative to chassis—with a high resistance voltmeter. If there is any tendency for the meter needle to swing in a positive direction, the control grid of the final vision I.F. amplifier valve should be short-circuited to

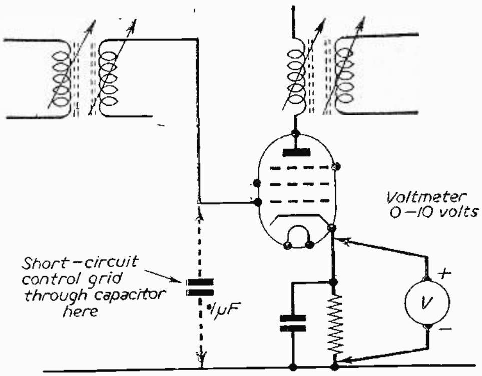


Fig. 81.—A method to prove which stage is oscillating.

chassis whilst observing the voltmeter reading (see Fig. 80). If, by suppressing oscillation by this means, this results in the needle swinging back to zero, then, almost certainly instability is occurring in the vision channel.

To prevent any spurious needle deflection due to picture signal, and to avoid any alteration in receiver characteristics that may occur by removing the aerial, it is often desirable to perform this test when the BBC is off the air.

The Ferguson 991T receivers would appear prone to this trouble, and in a large number of cases it is due to a defective EF80 valve operating in the vision I.F. channel. On several occasions, however, a similar symptom has been caused by deterioriation in a decoupling capacitor associated with the vision I.F. channel. Also, in this particular receiver, the crystal diode employed as vision detector (located within the final I.F. can) sometimes develops a fault that is conducive to the symptom of a "flat" picture without severely detracting from the overall definition —which means, therefore, that extra special care may be demanded in establishing the actual cause, since the two symptoms are more or less of the same character.

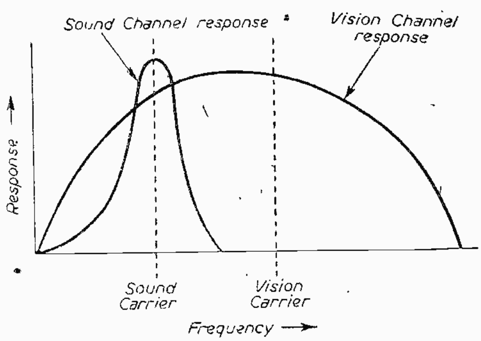
Some receivers are much more prone to instability than others. The old Invicta T101 series, for instance, often exhibit the effect when the contrast control is advanced beyond a certain critical point. To main-ain good stability on this receiver it is essential to ensure that the general alignment is kept up to standard, and this applies particularly as the R.F. valves age, and after valve replacement.

It is also most important to make certain that the copper screens underneath the chassis are making good electrical contact to the chassis, and that *all* the screws are used to secure the screens in position—an elusive bout of instability on one of these receivers was eventually traced to one loose screen securing screw!

There are times when both the sound and vision channels go unstable. This generally occurs when the stages common to both services turn into an oscillator. In such cases the set might well remain perfectly stable at a low contrast control setting, or if the sensitivity control is somewhat retarded. This fault would appear to be more in evidence in areas of low signal strength where a high or maximum contrast/sensitivity setting is demanded. Apart from the instability effect on a picture, as the gain of the set is advanced a "plop" is heard from the loud-speaker and the sound signal disappears completely. Under these conditions the contrast and/or sensitivity control performs a function analagous to the old-time reaction control; indeed, the same effect results in both cases.

Receivers which have a tendency to go unstable easily usually demand that the aerial feeder and aerial system possesses an excellent impedance match to the aerial terminals, particularly where high gain working is necessary. In fringe areas, where a receiver might be working "flat-out," a gradual tendency towards instability is sometimes provoked by deterioriation in the aerial and feeder systems. A fault of this nature is immediately revealed when the set stability holds on a different aerial system.

As previously intimated, an alteration in the characteristics of a valve—or valves—can often be



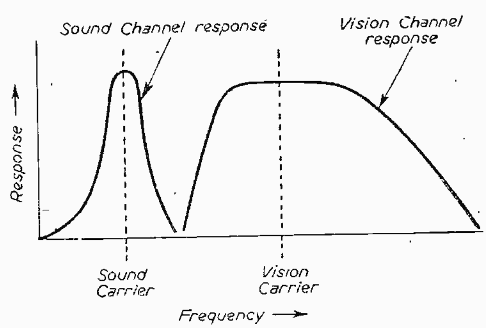


Fig. 82 (left). —Diagram showing how the vision channel response is liable to embrace the sound frequency and cause sound interference on vision. Fig. 83 (right). —The employment of a sound rejector provides a sharp cut-off at the low-frequency side of the vision channel response.

proved responsible for unstable operation. Sometimes an actual defect occurs in a valve to incite conditions for instability, whereas, in other cases, it is the alteration in valve characteristics which tends to modify the frequency of an associated tuned circuit, and thus disturb the overall alignment.

Special care must be taken to avoid misplacing circuit wiring and components appertaining to the R.F./I.F. stages during the process of repairs and general adjustments. Such inadvertent circuit disturbances might well be sufficient to induce positive feed-back in the high frequency section of a receiver that tends to be critical from the stability aspect.

Often an experimenter clears a certain fault in a television receiver, only to find on test that another fault has somehow or other been introduced unwittingly. After consulting our "Query Service" in despair, the experimenter eventually establishes that the second fault—which is often instability or low sensitivity—was instigated during the course of the original repair, when, for instance, it was necessary to disturb the R.F./I.F. wiring to permit easy replacement of a defective part—all would have been well if the experimenter had made a special point of rearranging the wiring.

Check Dubious Connections

After a receiver has been operating for several years without attention the symptom of intermittent instability may develop. This can often be stopped and started by gently tapping the cabinet. Removing the back of the cabinet and wriggling each valve in turn in its holder will nearly always prove the trouble caused by poor connections between the valve pins and the valve holder sockets and, in some cases, aggravated also by poorly fitting valve screening cans.

(To be continued.)

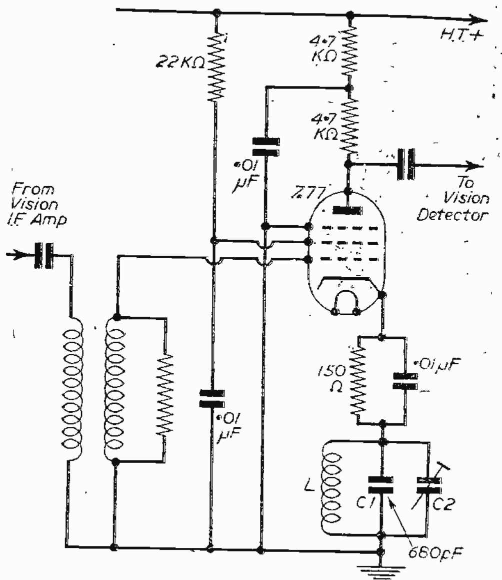
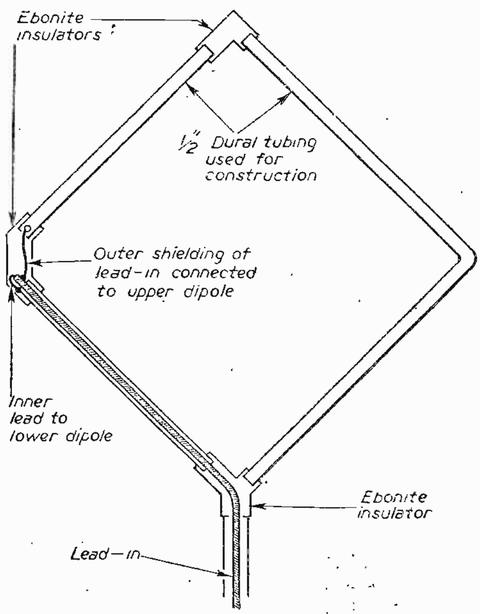


Fig. 84.—A cathode sound rejector circuit as used in G.E.C. BT1091 series receivers.

Further Notes on the Diamond Aerial

THE "Diamond Television Aerial" in November's issue of PRACTICAL TELEVISION, has drawn a deal of correspondence. One of the most common queries was the correct length to make the dipole and reflector.



The self-supporting "Diamond" aerial.

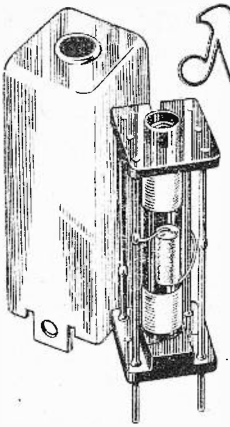
The lengths and angles were worked out to give, as near as possible, an impedance of 70 ohms at a frequency between vision and sound, so that the standard coaxial feeder can be connected straight to the aerial. If the lengths are kept the same and the angle reduced from 45 degrees to 40 degrees, to the vertical, the aerial impedance is also reduced to about 60 ohms. If the angle is further reduced to 35 degrees, the impedance goes down to between 40 and 50 ohms. The length of the spreader being reduced accordingly, of course. This is as far as the angle can be altered without reducing the efficiency of the aerial considerably.

The average "H" aerial has an impedance of about 50 ohms and the 70-ohm feeder is normally connected directly to the aerial; so the non-technical reader will see some mismatch is acceptable.

The correct lengths to cut the "diamond" for different channels are as follows:

	Each Half of Dipole	Reflector
Channel 1 (London) ...	5ft. 5in. ...	...11ft. 10in
Channel 2 (Holme Moss)	4ft. 6in. ...	...9ft. 6in.
Channel 3 (Kirk o' Shotts)	4ft. 2in. ...	...8ft. 10in.
Channel 4 (Sutton Coldfield)	3ft. 9in. ...	...8ft.
Channel 5 (Wenvoe) ...	3ft. 6in. ...	...7ft. 5in.

A Spalding reader who has made this self-supporting "Diamond" aerial, claims very satisfactory results from it.—R. PINKNEY (Fareham).



Making TV Coils

HINTS ON PRACTICAL METHODS OF WINDING COILS FOR ALL TYPES OF TV RECEIVERS

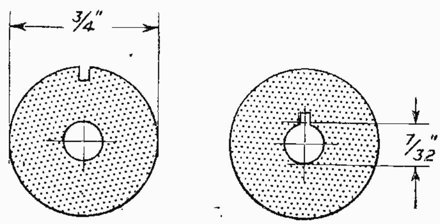
By W. J. Delaney

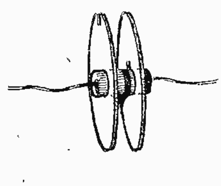
MOST home-made receivers call for the construction of the necessary coils, and constructors appear to find difficulty in either interpreting the instructions or in actually carrying out the constructional work. Many experimenters, too, fail to make full use of the equipment which they have available owing to the difficulty of obtaining suitable coils. A number of samples of coils and home-made receivers which we have seen have given poor results, simply because the coils have been badly made. There is nothing really difficult in making these components, and, in fact, they can be made by the beginner to be every bit as efficient as those which are produced by commercial firms, provided certain details are borne in mind.

Firstly, let us consider the materials which may be used. Popular with the cheaper and simpler types of receiver are the Aladdin small formers shown in the group on page 352. These merely need two fixing screws and a clearance hole for the core. They will, however, only accommodate a single core and therefore the range of coils and control is restricted. Ex-government coil formers of the clear polystyrene type, with a single core attached to an adjusting screw may also be used, but suffer from the single core restriction. Undoubtedly the most satisfactory type of former is the large component seen in the group, which is available with screening can. This type of coil is available in two lengths, but it is a fairly simple matter to cut down the long former if desired—although even if a single short coil is wound, there is no need to reduce the size of the former. The screening can is provided with two lugs, which, if bent inwards, enable the can to be attached to the chassis by the same screws which hold the coil former in position. The drawback to this is that if the can is to be removed in order to make some change in the contents, the entire coil will be loosened. The lugs may therefore be bent outwards and then the former may be left rigidly held whilst changes are made in the windings or other parts. A further, and most important advantage of these coil formers, is that the windings may be rigidly and simply attached by means of the side wires, and coupling condensers, parallel resistors, etc., may be placed inside the can, enabling a much more stable receiver to be constructed. A typical coil of this type is seen in the illustration. Modern receiver designs often call for coupled coils giving a type of band-pass characteristic with sharply peaked resonance points, but covering a fairly wide frequency band—say a full 3 Mc/s. This often means that there must be a primary and a secondary, one or both of which must be shunted by a resistor to obtain the necessary flattening of the response, plus a coupling coil. Constant coupling may be required, irrespective of the tuning of the two coils, and with the type of long former mentioned, the primary and secondary may be wound at the extreme ends, separate cores used for peaking, and the coupling winding placed at some point between them where the core will not provide any additional modification to the coupling. The resistors are mounted on the side wires, together with a coupling condenser, if needed, and the whole totally screened.

Windings

So far as the actual windings are concerned, the term "spaced" windings appears to offer some difficulties, especially to the newcomer. As a general rule it means that the turns of wire are spaced from each other by a space equivalent to the thickness of the actual wire used for the coil. The simplest way of obtaining the desired effect is to take a former of the required size and very roughly wind round the number of turns called for, hold the end of the wire and then let it slip off. In this way you will have a rough idea of the length of wire which will be needed. Cut *two* such lengths. Lay these side by side and wind both on together, attaching the ends as required —either with wax, cement or by soldering to the side wires. At the end, or when the cement is dry, remove one of these windings, and this will leave a neatly spaced coil as called for. As an alternative, the large formers shown are provided with an internal thread for the cores which is exactly OBA. If, therefore, a length of OBA rod is mounted on a support and one of these coil formers is threaded on to the rod, a length of wire may be anchored into position, and by holding this with one hand in a fixed position, and rotating the coil former with the other, the wire will be laid on with a spacing equivalent to the thread





Details of Construction of Video Peaking Chokes. The cheeks are made from card or paxolin, and mounted on a resistor.

of the OBA rod. Provided the wire is fine, this will be quite satisfactory, but obviously the thicker the wire the smaller the spacing between adjacent turns.

The Wire

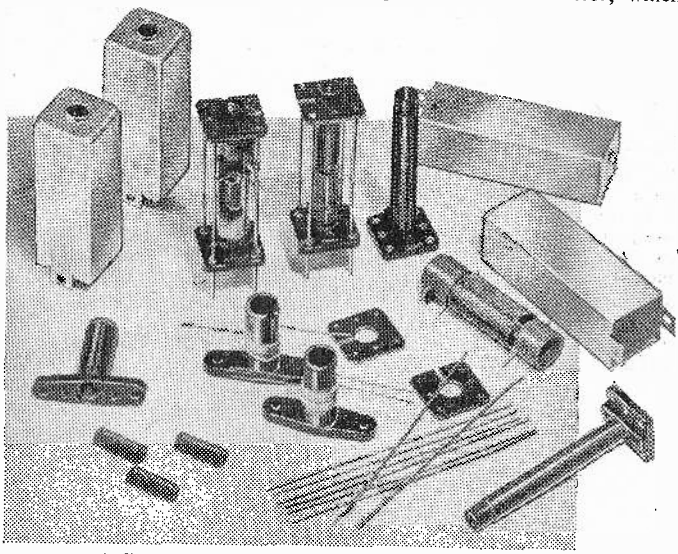
So far as concerns the actual wire to use, in spite of the fact that the television transmissions are on the very high frequencies, it is not necessary to use heavy gauge wire. At signal frequencies it will be found that with the number of turns which are required there will be little measurable difference between 18 s.w.g. and 30. An aerial coupling winding, for instance, may be made of wire as heavy as the internal lead of the coaxial feeder or the twin feeder, there being no object in making it thicker. All other windings may be carried out in about 30 or 32 s.w.g. The covering should be single or double-silk (the latter preferably as there will be less risk of shorted turns in a close-wound component), and this will be found to take the necessary fixing dope most readily. This should be polystyrene cement which is readily available under various proprietary names. Do not use cellulose paint except, perhaps, for a temporary type of coil. Cellulose, too, should not be used for locking the cores, as it will probably cause the core to disintegrate, or lock it so securely that it cannot be removed. The characteristics of the sound-trap coil may enable a thick tinned bare copper wire to be employed, but this depends upon the design.

The direction in which the windings are laid on (clockwise or anti-clockwise) is quite immaterial, provided that where two coils are used on a single former, they are both wound in the same direction—unless the designer has stated that they are to be in opposition. The question of whether or not the winding should be space-wound, may be settled if a particular design is being followed. The core proceeds into the coil as it is turned, its rate of forward movement being dependent upon the thread which is provided inside the coil former. If the coil is close wound, one turn of the core will result in the core moving through three or four turns of the coil, and consequently this will have a much greater effect than in a space-wound coil, where the same movement of the core will only result in the core moving through a single turn. The final tuning point with both types of coil will be more or less identical (depending upon the place in the circuit and the associated stray capacities, etc.).

An iron core gives a similar effect to that of adding turns to the coil (increasing the inductance), whilst a core of brass acts in the same manner as reducing the number of turns. If, therefore, it is found that a given coil does not peak when an iron core is fully withdrawn, it indicates that there are too many turns on the coil, and instead of removing one or two, a brass core may be inserted.

Video Chokes

Special chokes for peaking in the video stage, may be made in either of two ways. Small lengths of ½in. paxolin or similar formers may be employed, with the coils wound in the same manner as standard tuning coils, or they may be pile-wound on a small former which may conveniently be a ¼ watt Erie ceramic type resistor. In each case about 200 turns will be required, and 40 s.w.g. wire may be used here. Two discs or thick card as shown on page 351 may be cut and slipped on to the resistor, which should have a value of 1 MΩ, and the 200 turns wound haphazardly inside the cheeks. This will give a result somewhat similar to a wave-wound commercial coil, and the ends of the coil are soldered to the two end wires of the resistor, which will provide the necessary flattening effect and prevent sharp peaking which may lead to oscillation. As an alternative, such a coil, especially where used between the video detector and the video amplifier stage, may conveniently be wound on one of the formers already described and the entire unit, consisting of coil, detector load resistor and filter condensers, etc., totally screened.



A Group of Coil Components and some finished Coils.

Polytechnic Courses for Senior Engineers

IN September the Northern Polytechnic started some special classes dealing with Band III television and F.M. broadcasting for the benefit of service engineers.

Two groups of classes started: (a) one full day per week and (b) evening classes. The one day per week group finished their course at Christmas, whereas the evening class will terminate at the Easter recess.

In view of the interest in these classes it has been decided to commence a second one day per week course as from the 10th January next. The class will take place each Monday from 9.30 a.m. to 4.30 p.m. and prospective students can obtain full details of the course on application to the secretary of the department, Holloway, London, N.7.

CHANGING TO THE NEW STATIONS

SOME DETAILS FOR MODIFYING RECEIVERS AND AERIALS FOR THE NEW TV STATIONS

By "Erg"

PART I
THE ISLE OF WIGHT

TWO new transmitters are opening in the southern half of England, and should provide good service to many new viewers. The Southern Counties have a new transmitter situated on the Isle of Wight while viewers in the south-west have a new transmitter at Hessary Tor.

In the service area of the Hessary Tor transmitter most existing televisors are tuned to Channel 5 for the Wenvoe transmitter ; in the area served by the Isle of Wight, however, some viewers are tuned to London while others are tuned to Wenvoe. The I.O.W. transmitter itself is operating on the Kirk o' Shotts frequency in Channel 3.

There will be many people who come within the service area with existing receivers and aerials designed for other frequencies than those of the local channel, and it is in order to assist them in changing over to the new station with the least expense, that this article is written.

Most modern televisors are equipped for five-channel operation, and it is only necessary to alter the trimming or switching, as detailed in the instructions accompanying the televisor, to receive the new station. The aerial is not quite so simple to deal with and we shall discuss that problem later.

Converting the Superhet

Where five-channel switching is not incorporated within the televisor it will be necessary to modify the coils. It is only necessary to modify the first stages ; the I.F. stages work at a fixed frequency and can remain so. In fact, it is rather important that they are not tampered with, as once alignment of I.F. stages is lost, it is extremely difficult to re-align without the aid of specialised instruments, not normally possessed by the amateur.

The normal arrangement of the tuning stages of a superhet are shown in the block diagram in Fig. 1. The aerial is fed into the first amplifying stage which amplifies at signal frequency ; from this point the signal is fed into the mixer stage, which also has an input from the local oscillator stage. In the mixer the signal frequency is changed to another frequency which is the value of the sound I.F. and the vision I.F. No modifications are necessary beyond this point.

Fig. 2 shows the general coil arrangement. The dipole feeds into the R.F. stage via a coil L1, the dipole actually being coupled to the coil by a smaller primary coil. This coil must be modified.

From the R.F. stage the signal passes through another coil L2, which sometimes has two windings, as shown in the figure, and other times has a single winding. This coil must be modified.

The mixer stage also takes the output from the oscillator coil L3, and this, too, must be modified. The oscillator coil can usually be easily distinguished by the fact that it generally has no coil former, and is made of rather stout wire, self-supporting.

It is not possible to give exact data for every type of receiver, but we can provide some general information to furnish a guide. The coils will require extra turns when changing from Wenvoe to Kirk o' Shotts, and will require some turns taken off when changing from London to Kirk o' Shotts. (The Kirk o' Shotts channel is, of course, the new channel used by the I.O.W. transmitter.)

Channel 5 to Channel 3

In the case of L1 (p) one turn should be added. Wire of the same type already on the coil form should be used. The larger winding on the coil L1 (s) should have two extra turns added.

If L2 is a single wound coil then two turns should be added, but if it is double wound (i.e., it actually consists of two coils), then two turns should be added to each coil.

L3 need not have any turns added. It may be possible to find a position with the core where the I.O.W. transmitter can be received, but if this is not the case then a 25 pF condenser can be added across it.

Channel 1 to Channel 3

The conversion here follows exactly the same lines as the foregoing excepting the fact that two turns must be *taken away* from the existing coils, and if it is found that the oscillator will not trim to the channel then one turn can be taken from it. Otherwise, the procedure given above should be followed and alignment made as given below.

Alignment

Set the cores level with the tops of the formers and connect the aerial (modified). Now turn the oscillator until a signal is received on the sound and vision, but if the normal trimmer will not bring in the signal try varying the value of the added condenser. Repeated operations will bring in the signal, and L1 and L2 can be adjusted for maximum signal.

Adjust all coils so that the vision is at its maximum and then adjust the oscillator so that sound is at maximum ; the effect on the screen should be ignored while this is being done.

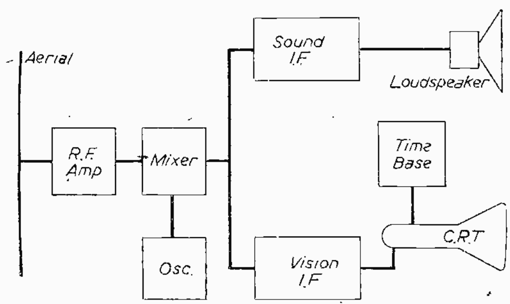


Fig. 1—Block diagram of a TV superhet.

Finally adjust L1 and L2 to give the best quality picture combined with adequate sound.

Straight Receivers

Most amateur-constructed televisors are of the straight type, and the modifications while being quite simple are a little more laborious.

Each R.F. coil should have two turns added to the grid coils, and to the sound rejector coils as well. London receivers should have two turns taken off and sound rejectors fitted; these should duplicate existing sound coils. If trimmers are not fitted all ready, then they can be fitted now instead of altering the windings. Trimmers of 0-30 pF can be used.

Note that this applies only to the sound section and not to the vision receiver.

Alignment

The alignment procedure given in the original data should be followed but if it is found that a particular coil does not peak then a turn can be added or subtracted as given in the section dealing with the superhet, provided that that coil was operated in peak position previously.

In some televisors it is not intended that each coil should peak, so that stagger tuning can be applied to increase the quality of the picture.

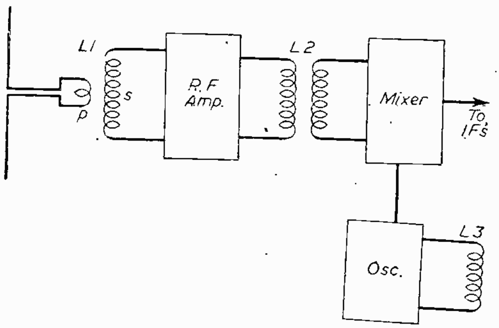


Fig. 2—Details of coil arrangements.

As a general guide the aim should be to get the core into approximately the same position it occupied previously.

The Aerial

The aerial which was used previously can be employed again if it is suitably modified.

Where an aerial for the London transmitter was employed then it will be necessary to shorten the rods. Dipoles should be shortened by cutting 1ft. 2in. from each end. The open ends of the tubing should be resealed by inserting of wooden plugs.

Many commercial aerials use rods filled with some substance (such as finely ground cork granules) in order to damp down vibration and, therefore, care should be exercised when cutting to avoid loss of this substance.

The reflector should be shortened by 1ft. 1½in. at each end, taking the same precautions as explained for the dipole.

Directors should be shortened by 1ft. 1in. for the first director and 1ft. 0½in. for the second director (if fitted). Note that this amount must be cut from each end of the rods.

It is not normally practicable to alter the spacing between the elements, and experience has shown that it is not really necessary unless one is at the fringe; in that case it is hardly worth while to change from one fringe to another.

There will be many cases where a much simpler aerial system can be used. In localities close to the new transmitter it will be possible to convert from a high-gain array to a simple dipole, or even an "H" type of aerial.

Converting Wenvoe Aerials

Those who are at the moment using Wenvoe aerials can alter them for the new station by adding sections on to the end.

Dipoles should have an additional 14in., i.e., 7in. should be added to each end of the dipole as shown in Fig. 3 (a). The added section is shown as "A." A length of duralumin tubing of the same diameter as the existing dipole rod should be cut 10in. long, and then a slit 3in. long should be made with the blade of a hacksaw, at one end. This portion fits over the end of the dipole rod. Rivets can be applied to keep the extensions in position.

A reflector should have similar extensions but they should be 8½in. long.

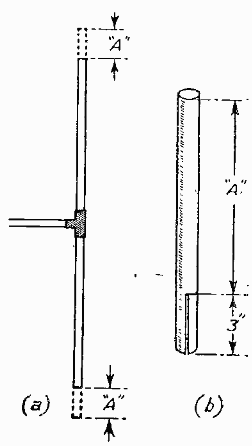
Directors should be dealt with similarly but the length of the extensions should be 6in. for the director nearest to the dipole and 5½in. for the second director.

Note that it may not be necessary to alter the aerial in any way other than re-orienting it towards the new transmitter. It is advised that the aerial be tried out first using Test Card "C" as a guide and if the full bandwidth is displayed then there is no need to make alterations. It may be that if this plan is adopted the signal will be too strong and in that case a simple attenuator can be fitted. A "T" type of attenuator giving about 20 db. attenuation is shown in Fig. 4 and this is suitable for coaxial cable. A "Pi" type of attenuator giving about 10 db. attenuation suitable for balanced twin cables is also given.

Types of Aerial

It is not possible to specify what type of aerial should be used in which locality. As a general guide when the station is on full power a normal dipole should be sufficient up to a radius of about 25 miles under average conditions. Up to 50 miles an "H" or "X" aerial must be used, and beyond this a Yagi array will be necessary.

Fig. 3— Details of a standard dipole, and method of increasing its overall length by adding a further length of tubing.



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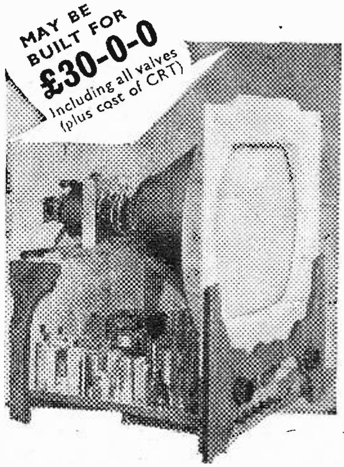

The NEW PREMIER TELEVISOR

USING THE ENGLISH ELECTRIC CATHODE RAY TUBE T901

Brief Technical Details are as follows :

20 valves (plus tube) Superhet Receiver, tunable from 40-68 Mc/s without coil or core changing. Wide angle scanning Flyback EHT giving 14 kV, Duomag Focaliser, permanent magnet focussing with simple picture centring adjustments, suitable for any wide angle Tube, may also be used with a 12 in. Tube with very minor modifications.

VISION CIRCUIT. Common RF Amplifier, single valve frequency changer, two IF stages, Video Detector and Noise Limiter followed by special type of Video Output Valve. ALL COILS PRE-TUNED ASSURING ACCURATE ALIGNMENT AND EXCELLENT BANDWIDTH.

SOUND CIRCUIT. Coupling from anode of frequency changer, two IF stages, Double Diode Triode detector and first LF Amplifier. Diode Noise Limiter and Beam type Output Valve, feeding a 10in. Speaker. ALL COILS PRE-TUNED.

TIME BASES. 2 valve sync. Separator, giving very firm lock and excellent interlace.

LINE TIME BASE. Blocking Oscillator using a pentode driving a high efficiency output stage comprising Ferroxcube Cored Output Transformer with Booster Diode.

FRAME TIME BASE. Blocking Oscillator driving a Beam Output Valve coupled through a Transformer to the high efficiency FERROXCUBE Cored Scanning Coils.

POWER PACK. Double wound Mains Transformer supplying all L.T. and H.T. using two full-wave Rectifiers.

The Televisor may be constructed in 5 easy stages : **(1) Vision, (2) Time Base, (3) Sound, (4) Power Pack, (5) Final Assembly.** Each stage is fully covered in the Instruction Book, which includes layout, circuit diagrams and **point-to-point** wiring instructions. The Instruction Book also includes full details for converting existing Premier Magnetic Televisors for use with modern wide angle tubes. All components are individually priced.

Instruction book 3/6, Post Free.

THE COMPLETE TELEVISOR IS SAFE TO HANDLE, BEING COMPLETELY ISOLATED FROM THE MAINS BY A DOUBLE WOUND MAINS TRANSFORMER. ALL PRESET CONTROLS CAN BE ADJUSTED FROM THE FRONT, MAKING SETTING UP VERY SIMPLE.

Console Cabinets in figured walnut can be supplied for the above receiver at a cost of £13/10/-, plus 21/- pkg. & Carr. H.P. Terms for cabinet on request.

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No Sw.	S.P.Sw.	D.P.Sw.
3/-	4/-	4/9

COAX PLUGS ... 1/2
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OUTLET BOXES ... 4/6

80 ohm CABLE COAX

STANDARD ¼in. diam. Polythene insulated. GRADE "A" ONLY

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SPECIAL.—Semi-air spaced polythene, 80 ohm **Coax** ¼in. diam. Stranded core. Losses cut 50% (just released), 9d. yd.

BALANCED TWIN FEEDER per yd. 6d. } 80
TWIN SCREENED COAX FEEDER per yd. 1/- } ohms
50 OHM COAX CABLE, 8d. per yd.
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WIRE-WOUND POTS. 3 WATT. FAMOUS MAKES
Pre-Set Min. TV. Type. Knurled Slotted Knob. All values 25 ohms to 30 K., **3/-** ea. 50 K., **4/-.** Ditto Carbon Track 50 K. to 2 Meg., **3/-.**
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O/P TRANSFORMERS.—Heavy duty 70 ma., **4/6.** Ditto, tapped primary, **4/9.** Tapped small pentode, **3/9.**
L.F. CHOKES 10 h. 65 ma., **5/-.** 20 h., 150 ma., **12/6,** 15 h. 100 ma., **10/6.** **SIMPLEX** 10 h 150 ma., **10/6.**
MAINS TRANS.—Made in our own workshops to high grade specification. Fully inter-leaved and impregnated. Heater Trans., tapped prim., 0-200 v./250 v. 6.3 v. 1½ amp., **7/6.** 12 v. .75 amp., **7/6.** 6.3 v 3 a., **10/6.** 350-0-350, 80 ma., 6.3 v. 4 a., 5 v. 2 a., ditto 300-0-300 ditto 250-0-250, **21/-.** Viewmaster, auto type, **35/-.** Teleking, **30/-.** Lynx, **30/-.** Coronet, **30/-.** Simplex (modified with 4 v. tap), **35/-.**
TV. AERIALS. Aerialite etc. full range all channels in stock. Indoor loft type Inv. T., **13/6** etc. etc.
TYANA.—Midget Soldering Iron. 200/220 v. or 230/250 v., **14/11.** Triple Three mod. with detachable bench stand, **19/6.** Solon Midget Iron, **19/6.**
TAG STRIPS.—2- or 3-way, **2d.**; 4- or 5-way, **3d.**; 6-way, **4d.**; 9- or 10-way, **6d.**; 28-way, **1/3.**
ENAMEL OR T.C. WIRE.—½ lb. 14 to 20 s.w.g. **2/-**; 22 to 28 s.w.g., **2/6**; 30 to 40 s.w.g., **3/9**
XTAL DIODE.—Sensitive G.E.C. type, **3/6.** H.R. Phones (S. G. Brown) or Hi-grade Amer., **15/6** pair.

SIMPLEX TELEVISION

Detailed price list available.

STAGE 1. VISION AND SOUND.

7 Valves	30/-
12 Resistors ...	3/-
16 Condensers ...	9/-
2 Potentiometers	6/-
7 Coil formers with cores	4/6
7 Valveholders ...	3/6
Sundries (with undrilled chassis) ...	22/6

STAGE 2.—TIME BASE.

6 Valves	29/-
20 Resistors ...	8/6
15 Condensers ...	15/6
5 Potentiometers	12/6
6 Valveholders ...	2/6
Sundries	1/6

STAGE 3.—POWER SUPPLY

2 Resistors ...	2/-
5 S.T.C. Rectifiers	27/6
5 Condensers ...	23/6
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1 Mains Trans. Tapped 4 v. and 5 v. ...	35/-

STAGE 4.—C.R.T. NETWORK

9 Resistors ...	4/-
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COMPLETE SIMPLEX KIT (less tube) 12 gns. **Drilled Chassis, Screens** etc., 17/6, or 10/- extra with **KIT** or **Sundries** (Stage 1).
VCR97 TUBE TESTED & GUAR., £2 (P. & p., 2/-).

NEW BOXED VALVES ALL GUARANTEED

1R5	8/-	6K8	9/-	6AC7	8/6	EF91	9/-
1S5	8/-	6BG6	12/6	6C9	12/6	EY51	12/6
1T4	8/-	6P25	15/-	35L6	10/6	PL81	13/6
1S4	8/-	6Q7	9/6	80	9/-	PY80	11/6
3S4	9/-	6SL7	9/-	EA50	2/-	PY82	10/6
3V4	8/-	6SN7	11/-	EB91	7/6	SP61	8/6
2X2	5/6	6U5(Y63)	8/-	EBC33	9/6	U22	9/6
5U4	10/6	6V6	8/-	EF39	9/-	ECL80	12/6
5Z4	9/-	6X5	9/-	EF50		EF80	10/6
6AM6	9/-	VT127 (Pen		Equip	5/6	12AX7	10/6
6AT6	10/6	46)	9/-	British	7/6	ECH42	12/6
6H6M	3/6	12AT7	10/6	Syl. Red	10/6	MU14	9/6
6J5	7/6	U25	12/6			EF55	12/6

Huge Stock B.V.A. Valves at 1951 low tax prices.

TV. PRE-AMP.—Channel 1, easily modified to other channels or converter use. Midget chassis 6in. x 3in. x 1½in. Complete with coax. lead, plug and EF42 valve. Brand new (boxed). Listed £3/15/-. Special clearance, **27/6,** p/p. 1/6.

C.R.T. HEATER ISOLATION TRANS. Ratio 1 : 1.25 Low leakage winding with 25% sec. boost, 2 v. **10/6**; 4 v., **10/6**; 6.3 v., **10/6**; 12 v., **10/6.**
BRIMISTORS.—CZ1 .3 a., **3/6.** CZ2 .15 a., **2/6.**
CONDENSERS.—New stock. .001 mfd. 6 kV. T.C.C., **5/6.** Ditto, 12.5 kV., **9/6**; 2 pf. to 500 pf. Micas, **6d.**; .001 Mica or Tub. T.C.C. 500 v., .01. Sprague 500 v., .02 N.S.F. 500 v. .1 mfd. 350 v. Micamould Tub. **9d.**; Hunts Moldseal 500 v. .005, .01, **9d.**; .05 mfd. and .1 mfd., **1/-**; .25 mfd., **1/6.** .5 mfd., 350 v., **1/9**; .1 mfd., 1,500 v. T.C.C., **3/6.**
SILVER MICA CONDENSERS.—10%, 5 pf. to 500 pf., **1/-**; 600 pf. to 3,000 pf., **1/3.** **DITTO** 1% ex Stock 1.5 pf. to 500 pf., **1/9**; 515 pf. to 1,000 pf., **2/-.**

ELECTROLYTICS ALL TYPES NEW STOCK

Tubular Wire Ends		Can Type, Clips, 3d. ea.	
2/450 v. B.E.C.	2/3	8+8/500 v. T.C.C.	4/6
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8/450 v. T.C.C.	2/9	250/350 v. B.E.C.	8/6
8/500 v. Dubilier	2/9	8+16/450 v. B.E.C.	5/-
16/500 v. Dubilier	4/-	8+16/500 v. Dubilier	5/6
8+8/500 v. Dubilier	4/6	16+16/450 v. B.E.C.	5/6
16+16/500 v. Dub.	6/-	16+16/500 v. T.C.C.	6/-
32/500 v. Dubilier	5/-	32+32/275 v. B.E.C.	4/6
32+32/350 v. Dub.	5/6	32+32/450 v. B.E.C.	6/6
25/25 v. Hunts.	1/9	32/350 v. Dubilier	4/-
50/12 v. B.E.C.	1/9	60+100/350 v.	11/6
50/50 v. Plessey	2/-	100+200/275 v.	12/6

SPECIALS—500 mfd. 12 v., **3/-,** 1500 mfd. 6 v., **4/6,** 6000 mfd 6 v., **5/6,** 1000+1000 mfd. 6 v., **6/6.**
SENTERCEL RECTIFIERS.—EHT Type. Flyback Voltage.—K3/25 2 kV., **4/3**; K3/40 3.2 kV. **6/-**; K3/45, 3.6 kV., **6/6**; K3/50 4 kV., **7/3**; K3/100 8 kV., **12/6**; K3/160 14 kV., **18/-.** **MAINS TYPE.**—RM1, 125 v., 60 ma., **4/-**; RM2, 100 ma., **4/9**; RM3, 120 ma., **5/9**; RM4, 250 v., 275 ma., **16/-.**
KNOBS, GOLD ENGRAVED.—Walnut or Ivory. 1⅛in. diam., **1/6** each. Not engraved, **1/-** each.
LOUDSPEAKERS P.M., 3 OHM.—3in. Plessey, **12/6**; Goodmans, 4in. square, **15/6**; 5in., **14/6**; 6½in. **16/-**; 8in. R. & A., **17/6**; 7in. Eliptical, **18/6**; 10in. R. & A., **25/-**; 6½in. with transf., **19/6.**
SLEEVING—Various colours, 1. 2 mm., **2d.**; 3, 4 mm., **3d.** yd.; 6 mm., **5d.** yd. **TOGGLE SWITCHES EX-GOVT.** "On-Off," **9d.** Ersin M'core solder, 60/40, 16 g. or 18 g., **4d.** yd., **5/6** ½ lb.; PVC Connecting wire, 10 colours. Single or Stranded **2d.** yd.
V'HOLDERS.—**Pax**: IO, **4d.**; EF50, EA50, **6d.**; B12A CRT, **1/3.** **Moulded**: IO, **6d.**; B7G, **9d.**; with screening can, **1/6**; B8A, B8G, B9A. **1/-**; **Ceramic**: EF50, B7G, **1/-.** **All English,** 5, 7, 9 pin and U.S.A. UX types, **1/-.** VCR97 moulded holders, **2/6.**
ALADDIN FORMERS and core, ¼in., **8d.**; ⅜in. **10d.**
INT. OCTAL CABLE PLUG (8-pin), with cover, **1/3.**

P. and P., 6d. £1 orders post free. Lists 3d.

RADIO COMPONENT SPECIALISTS

307, Whitehorse Road, West Croydon.
THO 1665

Orientation

In many cases, by reason of the improved signal it will not be necessary to align the aerial directly on the transmitter. As a general rule, where signal strength is adequate the aerial should be arranged so that local interference is least. As an example, if the transmitter is almost in line with the main road fronting the house it is often beneficial to arrange an "H" or "X" aerial at right angles so that the rear points towards the road.

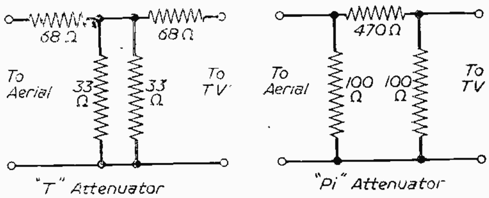


Fig. 4—Two simple types of signal attenuator.

PART II
HESSARY TOR

The opening of the new transmitter at Hessary Tor, in Devonshire, extends the service area of the BBC Television to an area which is notoriously ill-served even by the normal broadcast service.

Although it is not possible to forecast the actual results likely to be obtained it is thought that in the extreme south-west high-gain Yagi aerials will have to be fitted—a rather difficult operation in some areas swept by the winter gales!

In the districts around Plymouth some stalwarts have been using television receivers aligned on Wenvoe and a surprisingly large number of high-gain aerials are visible in the remote areas almost as far as Land's End. It is hoped that this section will enable them to convert to the new transmitter at the least expense.

The Hessary Tor transmitter will provide vertically polarised signal using Channel 2, which is the channel used by the high-powered station at Holme Moss. Wenvoe which has been serving the area up to the present time operates on Channel 5 and it is regrettably much easier to convert from a lower channel to a higher one than *vice versa*.

Those who possess a modern television receiver equipped for five-channel operation can convert their sets quite easily by simply following the instructions accompanying the televisor. The aerial can be modified in the manner given in the case of the I.O.W. transmitter and details will be given later in the article.

Converting the Superhet

Most commercial televisors are of the superhet type and it will be necessary to alter the windings on the R.F. and mixer coils, and to vary the frequency of the oscillator by adding a variable condenser across the coil.

The method given in the previous section dealing with conversion from Wenvoe to Channel 3 should be employed the only difference being that three turns should be added to the R.F. coil and three turns to the mixer coil. The data given in the previous section should be studied in relation to Figs. 1 and 2 and there should be no difficulty in arranging the alteration.

It is important to follow the alignment procedure so that maximum quality of picture is obtained and under no circumstances must the I.F. stages of the vision or sound I.F. stages be disturbed as it is rather difficult to re-align these stages accurately.

Should it be found impossible to obtain a peak on the respective coils then a turn can be added or subtracted to enable a peak to be found.

Straight Receivers

In this case the previous section relating to conversion from Wenvoe to Channel 3 should be followed except that the number of added turns should be three per grid coil. For the sound section 0-30 pF trimmers can be added where trimmers are not fitted at present, and it will not then be necessary to alter the sound coils.

Do not omit to adjust the sound rejectors.

Aerials

The existing aerials in this area are tuned to Wenvoe and it will be necessary to alter the tuning to Channel 2 by adding sections to the dipole as given in Fig. 3.

The dipole should have an additional 13in. added at each end using a short length of duralumin tubing of the same diameter as the existing dipole rod.

A reflector should have similar extensions added but in this case the extra length required will be 13½in.

Directors should be dealt with in a similar manner. The first director will require an extension of 12in. and the second an extension of 11½in. Note the previous remarks concerning riveting of the extension pieces.

Orientation

The remarks concerning orientation given in the preceding section should be studied as it is often beneficial to arrange the aerial to pick up the minimum interference rather than the largest signal.

Ghosts

Due to the rather rugged nature of the Devon and Cornwall countryside it may be possible that ghost reception will be troublesome. A ghost is a second or even third image on the screen slightly displaced to the right of the main image. It is caused by reflections from hillsides, etc.

In these cases a directional aerial should be employed and it would be wise to study the article on this subject given in the November issue of PRACTICAL TELEVISION.

It should be noted that sometimes it is possible to get a better signal from the reflection itself than from the main source of signal, and pointing the aerial towards the source of the ghost may provide a worthwhile picture.

1954 Now and Then 1936

By "Omega"

OUR CRITIC REVIEWS STUDIO METHODS AND CONDITIONS OVER THE PAST 18 YEARS

WHEN the first television programmes in the world began at Alexandra Palace in 1936 the producers of those days were not fettered by any conventions. There were no precedents to follow. The producers came from the theatre, films and radio and all soon agreed that nothing they had done before would, by itself, be sufficient for this new electronic baby which they hoped to rear to manhood.

In those early months two types of equipment were used. One the E.M.I., which is still giving faithful service in certain programmes, and the other Baird, which recorded on film that was developed and transmitted less than a minute later.

Two Systems

The Baird system, which, incidentally, called for the most fiendish make-up ever devised, was discarded after a time, but how enjoyable it would be if some of the films made by it were available and suitable for showing to-day. Would some of those early programmes still appear as wonderful as we then thought them to be, or would they seem to us as comic as those early silent films we are treated to from time to time?

The equipment in the pre-war days suffered from several handicaps which have now largely been removed. The cameras had one lens only, so that for any close-ups the mountain of the camera had to track forward to the Mohammed of the artiste. Having got there, the depth of focus was only a few inches, so that if any close-ups involved two artistes, inevitably one was in sharp focus and the other seen through a gentle mist. It was the rule always to focus on the nearer object and the cameraman saw his picture upside down in his viewfinder.

At the present time only O.B. cameras are fitted with "zoom" lenses. Possibly in time to come studio cameras will be fitted with them too. Another pre-war handicap removed after the resumption of television was the inability to "cut" from one picture to another. A "mix" took several seconds and rendered impossible any snappy camera work.

Television is a medium demanding and receiving full co-operation between the technical and programme sides. Although few, if any, producers could trace an electric circuit, all of them, by the nature of their work, have to learn and respect the capabilities of the equipment they use. The old-timers learnt by trial and error in a period of intense enthusiasm and co-operation amongst themselves. Their mistakes did not matter so very much in the beginning because, after all, there were only some 7,000 viewers to be considered and the novelty of getting a picture on their screens lasted a long time. But any mistakes by the designers of the first equipment would have mattered very much indeed. They, too, had no precedents to guide them and it is, to say the least, remarkable that their equipment has stood the test of time so well. A suggestion has been made that when the new studios at the White City are built a place of honour should be kept for one of the first E.M.I. cameras, to remind future generations of the great pioneering work it typifies.

Lighting Engineers

A class of engineers whose work is largely taken for granted is the lighting engineers. Light in great quantities had to be used at Alexandra Palace, much to the dismay of some artistes and all cooks, who found their ingredients behaving as if in a tropical country. Less light is needed in the Lime Grove Studios owing to the greater sensitivity of present-day cameras. Apart from quantities of light there is great skill in lighting a television production, which is generally appreciated most by visiting lighting cameramen from film studios. The film men achieve a quality of lighting which is seldom approached in television, but, as they themselves point out, they can concentrate on a comparatively small area for a shot which may last a few seconds only. The television lighting engineer has so to light a set that continuous well-illuminated action is possible in any part of it. The resulting pictures are not as consistently good as those seen in films, but fortunately they do not have to be, as the demands of the small television screen are less exacting than the large screen in the cinema. As time passes the engineers place more equipment at the disposal of the producers. There is now "inlay" and "overlay," permitting a shot of a princess in the studio to appear in the top window of a castle 100ft. high. Back projection gives wings to studio actions in photographed pictures of the authentic places where the action is set.

More and more refinements will doubtless continue to come. What of the producers in the midst of all these aids to their craft? The majority to-day have passed the time of what is sometimes called "new boys'" disease. This can be described as an irresistible impulse to use all the gadgets available to him. When a singer is performing happily to one camera, he suddenly cuts to another and so causes her to sing to someone else on her left or right; or to use superimpositions without proper cause. The whole tendency amongst experienced producers is towards greater simplicity and the avoiding of stunts unless strictly necessary.

Looking Back in 1973

How interesting it would be if producers and engineers could see their efforts of years ago. Perfection has not been reached and never will be reached. The passing years will see continuing experiments in all directions in search of the unattainable and in this way television will remain vital, although few viewers may be able to point the reasons accurately. But it is a safe prophecy that just as we would be amused or possibly shocked could we see again those programmes of 18 years ago, so in another 18 years' time the viewers then, probably taking for granted their coloured stereoscopic pictures, will see the tele-recordings of to-day and be amused, and possibly shocked.

only, leaving the other ends free. Fit the screens either by nuts and bolts or, if tin plate is used, by sweating to the chassis which is also tin plate Fit tags 1, 2 and 3 and brackets for coil LG. Fit and wire coil LG. Connect one end of R104 to tag 2 and the other end to the junction of R103, R105 and C102. Secure earthy ends of C102, C101 and C108. Fit coil LO and connect between pin six on V1 and tag three (see Fig. 6), fit C107, C105, R106 and connect tag two to H.T. rail. The modification is now complete and the receiver can be lined up.

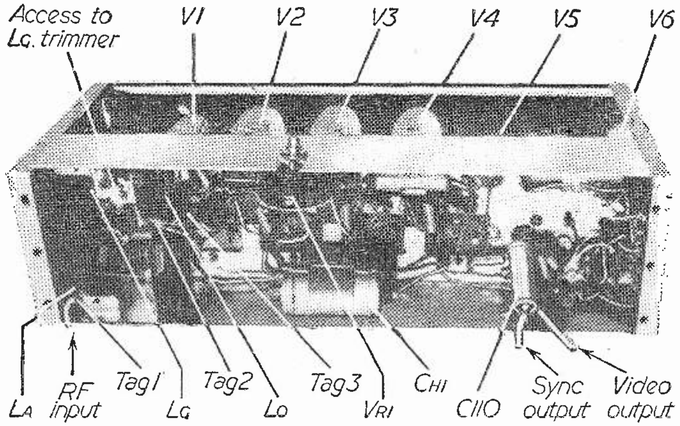


Fig. 5 (a)—View of the unit with various parts identified, after modification.

Setting Up

With a signal generator, valve-voltmeter and oscilloscope the setting-up procedure is straightforward; however, it is possible to obtain satisfactory results with a test oscillator and an A.C. voltmeter.

With the A.C. voltmeter set on the 100 v. range, connect across V8 cathode. Inject a modulated signal of 12 Mc/s into V1 grid with LO short-circuited. The I.F. coils will not require much tuning. Swing test oscillator output between 10 and 14 Mc/s. Note the two frequencies that give an output of 70 per cent. of maximum, if the difference is not 3 Mc/s adjust the tuning slugs of L2 to L5 until this is so. If the television receiver is to use a 6in. C.R.T. 3 Mc/s is more than adequate and greater sensitivity without appreciable loss of definition will be achieved if the I.F. coils are peaked until the bandwidth is reduced to 2.5 or even 2 Mc/s.

Transfer the test oscillator to the aerial input, inject an R.F. of suitable frequency, remove short circuit from LO and tune oscillator for maximum output as indicated by the voltmeter. Tune LA and LG then

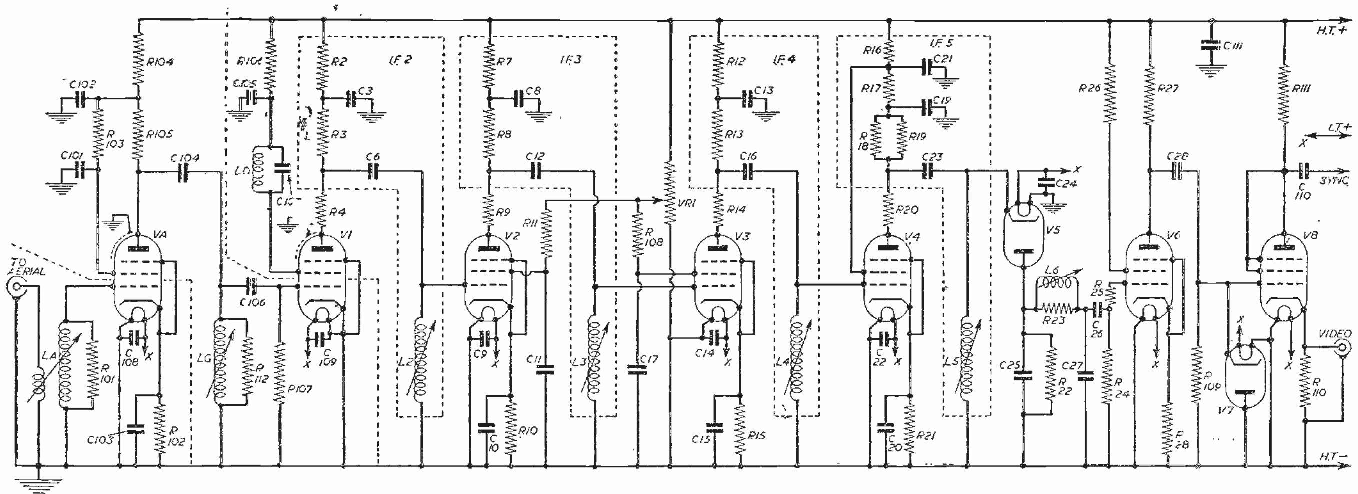


Fig. 3.—Complete circuit of the modified unit.

COMPONENT LIST

RESISTORS :

- 27 Ω $\frac{1}{2}$ w. R4, 9, 14 and 20
- 100 Ω $\frac{1}{2}$ w. R10, 15 and 21
- 220 Ω $\frac{3}{4}$ w. R28
- 1 K $\frac{1}{2}$ w. R102, 103, 104, 108, 2, 7, 11, 12, 16, 17 and 26
- 3.3 K $\frac{3}{4}$ w. R3
- 3.9 K $\frac{1}{2}$ w. R22
- 4.7 K $\frac{3}{4}$ w. R8, and 13
- 4.7 K $\frac{1}{2}$ w. R112
- 5.6 K. $\frac{1}{4}$ w. R101
- 5.6 K $\frac{3}{4}$ w. R105
- 10 K $\frac{1}{2}$ w. R23 and 25
- *10 K $\frac{3}{4}$ w. R110 and R111
- 12 K 2 w. R27
- 15 K $\frac{3}{4}$ w. R18 and 19
- 20 K $\frac{1}{2}$ w. R106
- 22 K $\frac{1}{4}$ w. R107
- 1 m $\frac{1}{2}$ w. R109 and 24
- 100 K wirewound potentiometer VR1.

* See Text. Resistors R2 to R28 and condensers C3 to C28 are already in position in original amplifier.

CONDENSERS :

- 10 pF Ceramic C107
- 20 pF Ceramic C106
- 25 pF C26
- 40 pF C25
- 50 pF C108, 109, 9, 14 and 22
- 100 pF Ceramic C104
- 200 pF C6, 12, 16 and 23
- 500 pF C101 and 102
- 0.001 μF C103 and C105
- 0.01 μF C3, 8, 10, 11, 13, 15 17, 19, 20, 21 and 24
- 0.1 μF C110, 27 and 28
- 16 μF C111.

VALVES :

- 6AC7, VA and V1
- EA50 V5 and V7
- VR65 V2, 3, 4, 6 and 8
- 2 Ceramic I.O. valve holders
- 1 B3G valveholder
- 3 $\frac{1}{4}$in. Aladdin formers
- 3 insulated soldering tags.

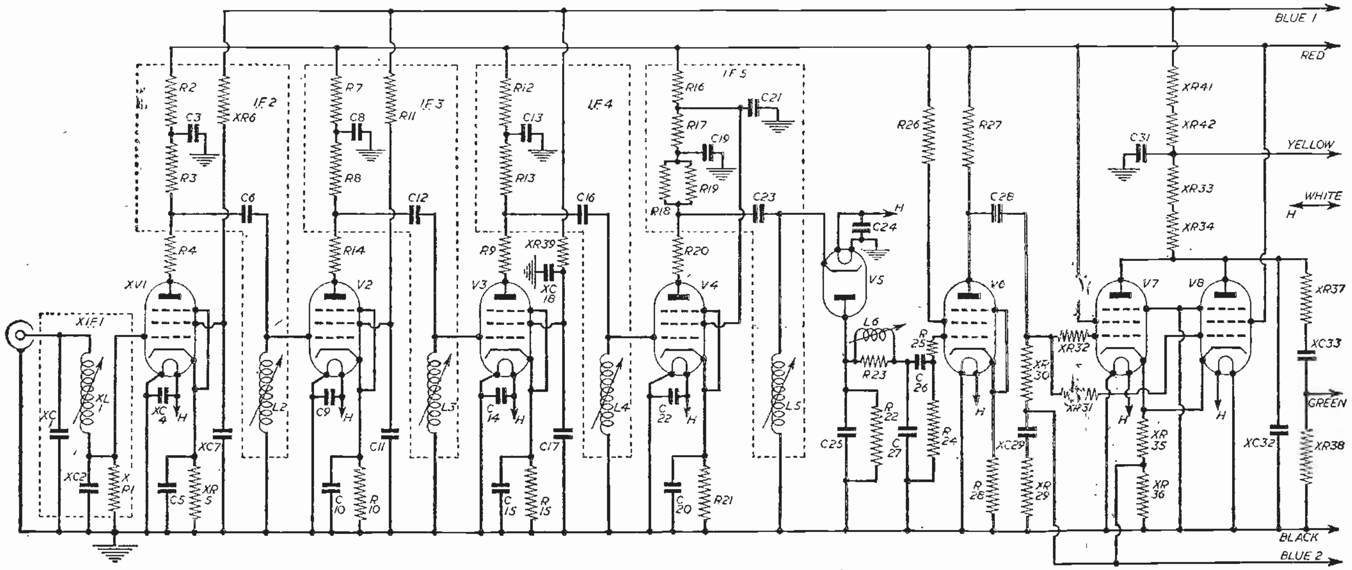


Fig. 2.—Complete circuit showing components, prefixed by "X," which have to be removed.

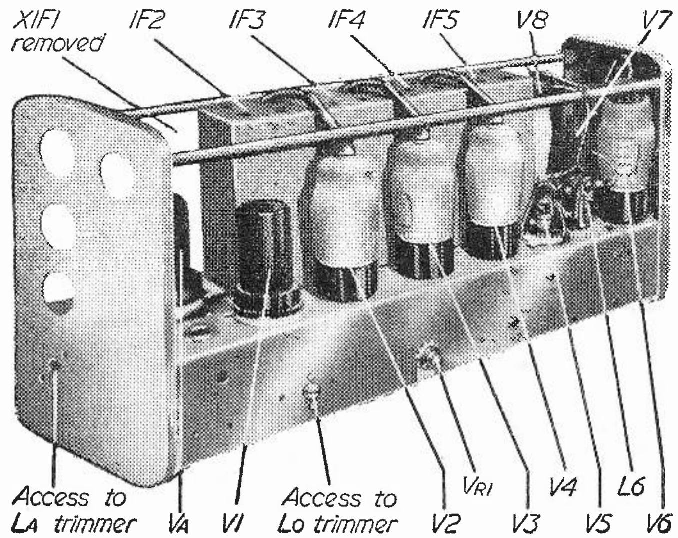


Fig. 5 (b)—Another view of the modified unit with further identifications.

readjust LO. The tuning of LA and LG is fairly flat but LO is sharp enough to give complete separation between sound and vision.

Note that the value o. R111 and of R110 is critical and that the optimum value is affected by load conditions. It is advisable to fit a 10 K variable resistance in the place of R110 and a 15 K variable resistance in the place of R111. Various combinations

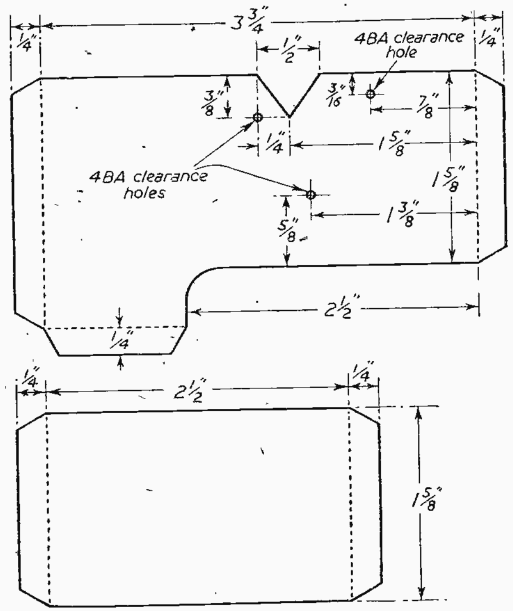


Fig. 4.—Details of the screen.

of these two components can be tried until the most suitable positions are found under load conditions. Fixed resistances can then be fitted of values equal to the measured values of the variable resistances.

It should be pointed out that, as with all ex-service equipment, individual samples of apparatus may differ, due to their having been modified or put to some special use whilst in the Services, and therefore correspondence cannot be entered into with regard to individual departures from standard.

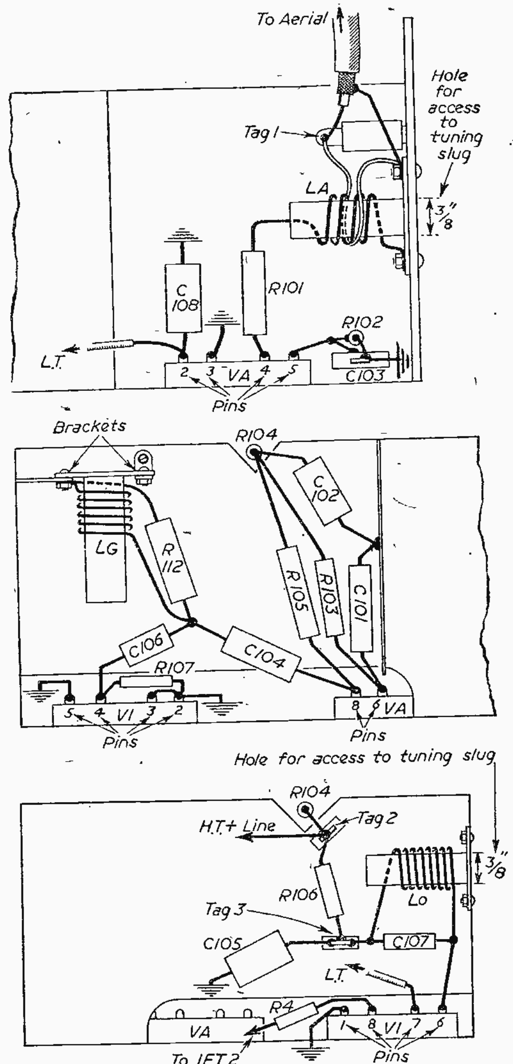


Fig. 6.—Component Layout.

HERE AND THERE

Aberdeen Exhibition Planned

PLANS are in hand for a radio and television exhibition to be run by the north-east branch of the Scottish Radio Retailers' Association next October.

It is hoped that this exhibition will coincide with the opening of the permanent TV transmitter at Corehill, Oldmeldrum.

No Rent, No Viewing

THE rural council of Wainford, Suffolk, intends to refuse permission for the erection of a TV aerial to all council tenants who do not pay their rent.

500 Prosecuted

THE G.P.O. visit to Leicester recently with detector vans resulted in prosecutions for 500 TV "pirates."

"What's My Line?"

"WHAT'S My Line?" is to continue through the first quarter of this year with the same team and chairman. The producer of the show will be Leslie Jackson who was responsible for the production of some earlier editions in this series.

Some Advertising

THE Belgian Government is expected to charge a licence fee soon to its viewers who have so far been enjoying a free service. Some programmes may be allowed containing a little advertising.

Park Committee's Refusal

MANY angry protests were registered recently by North Pembrokeshire residents when the national Park Committee decided to deter permission for the erection of a television relay station at Foel Eryr in the Prescelly mountains.

Modifying the Amplifier Type 178

DETAILS OF CONVERSION OF ANOTHER POPULAR EX-SERVICE RADIO UNIT

By F. J. Shipgood, A.M.I.P.R.E.

FROM time to time there appears on the market various Government surplus I.F. and R.F. amplifiers. Their attractiveness lies in the saving in expense and in the ease of modification. From these two viewpoints alone the amplifier makes a "good buy." In addition, the completed amplifier compares favourably with its commercial counterpart.

It is possible to convert the amplifier into a TV receiver, giving both sound and vision outputs, but it was decided to concentrate on the vision side alone. The following specification shows this to have been worthwhile. An input of 35 μV at 65 Mc/s modulated 30 per cent. by 1,000 c/s gave an undistorted output of 50 v. A.C. (measured peak-to-peak) at the phase-splitter cathode and 35 v. at the anode. To obtain the same output with 70 per cent. modulation only 17 μV input is required. The bandwidth is 3 Mc/s, this being more than ample for receivers employing average diameter picture tubes.

Fig. 1 shows a block diagram of the amplifier (a) before and (b) after modification.

With reference to Fig. 1 (b) and Fig. 3, the circuit of the complete receiver is described as follows. The received signal is applied from the aerial to an R.F. amplifier (VA) via the R.F. transformer LA. This valve is resistance-capacity coupled to V1, a tuned-grid, tuned-screen frequency changer. The next three stages, V2, V3 and V4, are I.F. amplifiers with grid coils slug-tuned to or near 12 Mc/s. The H.T. supply to V2 and V3 screens may be varied in order to control the gain. The I.F. voltage developed across L5 is rectified by the diode V5, filtered by L6 and C27 and the resulting video applied to V6, a video amplifier. This valve has its cathode resistor unbypassed to provide negative feedback. V8 is a phase-splitter with a D.C. restoring diode V7 in its grid circuit. The picture content is available at the cathode of V8 and synchronising pulses at the anode.

TABLE 1—COIL DATA

Channel	Coil LA Primary	Coil LA Secondary	Coil LG	Coil LO
1	1	8	8	10
2	1	7	7	9
3	1	6¼	6¼	8
4	1	5½	5½	7¼
5	1	5	5	6½

Figures indicate number of turns of 26 s.w.g. enamelled copper wire required for each channel. LA primary is covered in 1 mm. diameter PVC sleeving. All formers are ¼in. Aladdin type.

Modification Procedure

The modification procedure is as follows: Referring to Fig. 2, remove all components preceded by an X. Start by removing X1FI, the first I.F. can which contains XC1, XC2, XR1 and XL1. Next remove XR6 which is in I.F. can, number two, then XR5, XC4, XC7, XC18, XC29 to XC33 and XR29 to XR42. Remove the coaxial input socket and its bracket.

At this stage it is advisable to check and replace where necessary all paper type condensers. Some of these will be found in the I.F. cans.

Now the new circuit as shown in Fig. 3 may be built up. In order to retain the old valve numbers as indicated on the chassis the first valve is numbered VA. This valve is fitted in the space previously occupied by the first I.F. can. The holder of the old V7 may be removed or left in to serve as a convenient anchoring point for L.T. and H.T. supplies. Above this holder and fitted to the side of the chassis is the B3G holder for the D.C. restoring diode, the new V7. Other valve holders to be fitted are, as previously mentioned, VA which is a ceramic International Octal, and V1—here the British Octal holder is removed and another International Octal fitted. Wire up all these holders for L.T. and earth all pins where indicated in the circuit. Fit the wire-wound potentiometer, VR1, to the chassis and complete the wiring to the screens of V2 and V3. The circuit of V4, V5 and V6 requires no modification and part of the wiring of the old valves V7 and V8 can be utilised when wiring up the D.C. restorer and the phase-splitter.

There now remains the R.F. amplifier and frequency changer circuit. Table 1 gives the coil data, Fig. 4 details of screens, and Figs. 5 and 6 component layout. First check that heater and earth wiring is complete then wire in VA cathode components. Fit coil LA and complete VA grid circuit, as in Fig. 6 (a). Wire in C104, C106, R107 and R112. Connect C101, R103 and R105, at the valve pin side

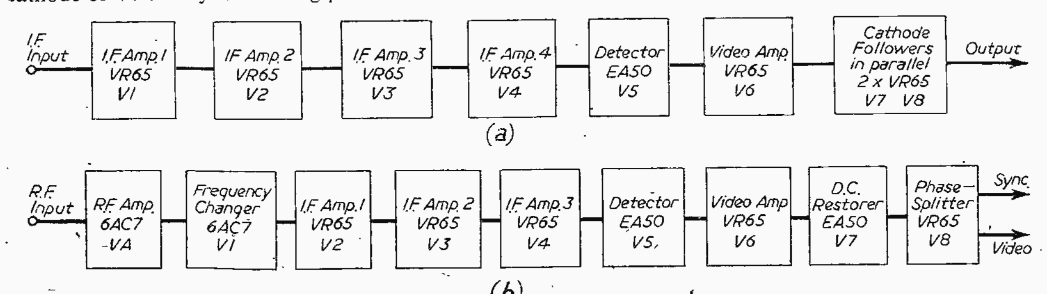


Fig. 1.—Block Diagram (a) before modification and (b) after modification.

INTERFERENCE ON BAND III

By A. E. LOFTING

NOW that Band III is well on the way, it is as well to consider what interference is to be expected, and what measures will be necessary to reduce it. The much higher frequencies of Band III require special treatment. The higher the frequency the more difficult is its suppression. This is because of the greater ease with which high frequencies leave conductors. Thus a length of wire having negligible radiation at 45 Mc/s will radiate like a charm at 200 Mc/s. With this in mind one can realise the extra difficulties involved, and the uselessness of present suppressors at these frequencies. Much work will have to be done to eliminate as far as possible the radiation of Band III frequencies, and the first "interfering agent" to be investigated will doubtless be the fractional horse power motor. First let us consider the few points on which we, the home constructor, have some control. These are: the careful choice of motor, and correct brush adjustment.

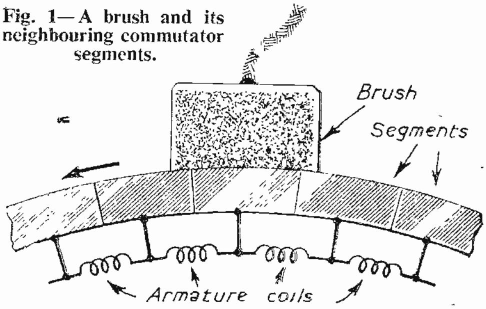
Brushes of commutator machines are the source from which our trouble flows. Each tiny spark produced, as the copper segment of the armature moves away from the brush, being responsible for a wide range of frequencies. Fig. 1 shows a diagrammatic representation of a brush and its neighbouring commutator segments. It will be seen that as the armature rotates there will be one or two coils short circuited beneath the brush, the number depending on the width of the brush. As these coils have an induced voltage within them, a current will flow. When the segment moves past the brush the circuit is interrupted, then a spark is formed. The intensity of this spark, and consequently the R.F. energy radiated, will depend mainly on the initial current flowing and coil inductance. The initial short-circuit current is proportional to circuit resistance and coil voltage. To reduce this current we must either increase the closed circuit resistance and/or reduce the coil voltage. Coils necessarily have a low resistance, only a fraction of an ohm; therefore, in practice the brushes are designed to have a high resistance. To reduce the coil voltage the number of turns for each coil must be reduced. But at the same revolutions per minute this will result in lower available torque, unless more coils are used. From this it follows that for a motor of a given size, the one having more coils and therefore more commutator segments will produce less interference. More coils for a given output also has the desirable effect of reducing coil inductance.

Bedding-in Brushes

Intermittent contact between brush and commutator can cause serious interference. This occurs if the brush is not "bedded in," or shaped to fit the commutator, and if the copper segments are rough and burned. To bed-in a new set of brushes is an easy matter, and can produce worthwhile results. First remove the brushes and place a narrow strip of the finest emery paper around the commutator, rough side outwards. Replace one brush to touch the paper and rock the armature to and fro until, on removing the brush, it has assumed the correct shape. Note carefully the positioning of the brush in its holder, so that it may be replaced the same way. After grinding both brushes it is as well to remove dirt and dust from the segments. A glass hairbrush is the best tool, it does not scratch the soft copper. For bad marks use carbon-tetrachloride on a rag.

In addition to these points there are the basic precautions necessary for all interference suppression. The most important of these being effective screening and earthing. Screening of a small motor is best achieved by using its own metal frame, this frame extending well over the ends of the motor and brushes. Good bonding between the three (usually)

Fig. 1—A brush and its neighbouring commutator segments.



pieces forming the frame and case is essential. Unfortunately not all small motors have a metallic frame, and it is sometimes inconvenient and cumbersome to place a frame around the motor. In this respect the manufacturers must provide some answer. One remedy applicable with a bakelite casing is to coat the inside of the case with a conducting film, a relatively simple matter for the manufacturer. Now a metallic screen is provided to be the point at which electrostatic lines of force (interference lines) terminate. For this the screen must be well bonded to earth. The interfering lines finishing at the screen then do no further harm. However, we still have two leads supplying power to the motor, and these can, and do, lead away interference currents to be radiated from the cable. As mentioned earlier only a small length of conductor is sufficient to radiate considerable interference. At 200 Mc/s 1 or 2in. is a lot! Therefore any suppressor we may design must be connected closer than 1in. to the screen to be effective. The best mounting for such a suppressor is through the screen.

Conventional suppressors having lumped capacitance and inductance will not be suitable. A suppressor quite satisfactory at broadcast, medium wave bands is shown in Fig. 2, though at 200 Mc/s it would be of little use. This is mainly because the interfering currents flowing along the input to the inductance and capacitance will radiate in so doing. For this reason it is expected that tuned suppressors will be of great importance.

Practical Data

I mentioned these briefly in the May P.T. for use on present TV frequencies. However, the higher frequency of Band III permits the use of another arrangement to provide a resonant rejector circuit.

Inductors can be wound to specified dimensions to have a predetermined value of self-capacitance, this self-capacitance, together with the coil inductance, forming the tuned circuit, Fig. 3. If this circuit be arranged to resonate at the TV channel frequency, it will form an effective barrier to this frequency. This insertion loss will be very high, depending on the circuit Q. Self-capacitance of inductors can be calculated from a variety of formulae, as can the inductance. These formulae are obtainable for many types of coil windings in good radio reference books, giving accuracy to practically any degree. But for general work the following formulae will be useful for single layer coils :

$C_0 = Hd$ pF. Where d = diameter in cms.
H = constant depending on ratio l/d, where l is the coil length. Given in Table I.

$$L = \frac{d^2 n^2}{18d + 40 \times l}$$

d = diameter, inches.
n = number of turns.
l = coil length, inches.

Armed with these formulae the enthusiast will have useful weapons to weald against interference.

Among the rarer cases of interference are the oscillations of old carbon filament lamps. Though the lamp has only one apparent electrode it can, and does, emit amplitude- and frequency-modulated V.H.F., due to an interesting effect investigated by Barkhausen and Kurz, after whom the oscillation has been named. More modern lamps sometimes give rise to interference, caused by arcing across tiny fissures in the filament, usually when nearing failure. A simple remedy in either case is to renew the lamp.

Unfortunately the majority of us suffer from interference of someone else's manufacture. Interference over which we have very little control. Eventually all appliances sold will be suppressed for Band III, but that still leaves a lot of apparatus working today which will create plenty of 200 Mc/s interference. Also manufacturers have yet to develop effective and cheap suppressors for their products, or provide other means of preventing interference, i.e., prevention rather than cure. One interesting possibility is the design of motors having balanced to earth layout. We all know the effect of twisting valve heater wires, and of keeping them of approximately the same length. This basically is the idea with motors, to produce "balanced" interference whose net result is zero.

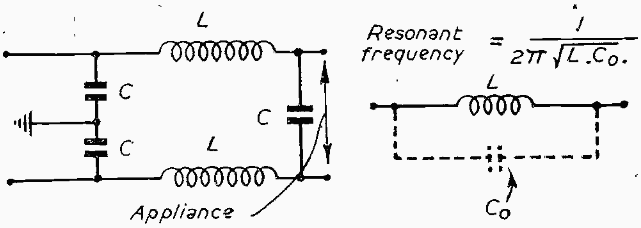


Fig. 2 (left)—A simple suppressor circuit. Fig. 3 (right)—The essential components of a suppressor.

TABLE I

l/d	H	l/d	H
10	1.32	1.5	0.47
9	1.22	1.0	0.46
8	1.12	0.9	0.46
7	1.01	0.8	0.46
6	0.92	0.7	0.47
5	0.81	0.6	0.48
4	0.72	0.5	0.50
3	0.61	—	—
2.5	0.56	—	—
2.0	0.50	—	—

New Mullard Voltage Stabilisers

ALMOST every piece of industrial, military, and commercial electronic equipment incorporates a source of stable voltage. Mullard gas-filled stabilisers and voltage reference tubes such as the 90C1 and 85A2 are widely used in such equipments because of their extremely long life, freedom from voltage "jumps," and close tolerance burning voltages. Samples of Special Quality versions of these tubes are now being made available by the Communications and Industrial Valve Department of Mullard, Ltd. These combine the good qualities of normal types with the ability to operate satisfactorily under severe conditions of shock and vibration such as are encountered in aircraft, ships, vehicles, and in industry. They are tested to withstand impacts of 500g. and vibrations of 6g. at 175 cycles per second.

The new tubes are electrically equivalent to the 85A2, the 90C1, and the 150B2. They are available in two forms, one with pins and one with flying leads. Flying leads are desirable because, since they can be soldered firmly in place, variations in contact resistance such as are encountered when plug-in types are subjected to vibration are eliminated. Such variations give rise to noise and minute voltage fluctuations which degrade the high performance of a voltage reference tube. The fact that replacement is more difficult mechanically than with plug-in types is of little importance in view of the long life of these tubes.

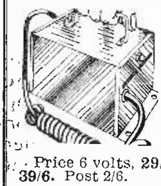
Extending Mast Vehicle

THE BBC recently introduced a new prototype extending mast vehicle. This vehicle, which has been produced for use with television outside broadcasts, is unique in performance and provides means whereby the radio link transmitting or receiving aerials, and associated electronic equipment, can be elevated to a height of just over 60ft., in order to clear obstructions that might otherwise impede the transmission or reception of signals. The aerial, consisting of a 4ft. diameter paraboloid which is mounted on top of this mast, has to be accurately set to within approximately ± one deg., and a system of remote control has been devised whereby this can be readily achieved. The aerial can be rotated continuously through 360 deg. in the horizontal plane.

The mast is erected from the horizontal position on the vehicle to the vertical position on the ground by a system of hydraulic rams. A similar system is then used to extend it to its full height of approximately 60ft. In this position the mast is self-supporting, but provision has been made for stay wires to be fitted should it be necessary for the mast to be left erected in strong winds.

The remote control system employed enables a pre-set bearing to be determined and set up to within ± half deg. On bringing the remote control into operation the paraboloids will adjust themselves to the position indicated.

CLEVELAND CAR BATTERY CHARGER



gives 1½ amps. charge — uses everlasting metal rectifier and robust double-wound mains transformer — in metal carrying case with leads and croc. clips. Price 6 volts, 29/6 ; 6 to 12 volts, 39/6. Post 2/6.

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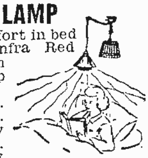

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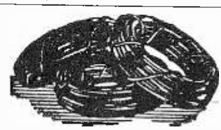

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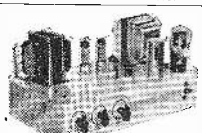

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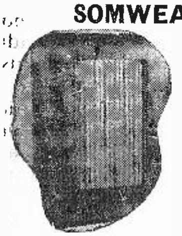
SOMWEAVE



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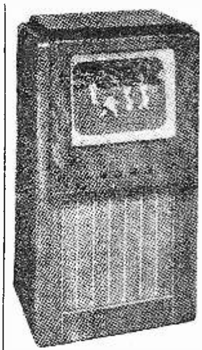

A FEW REMAIN

This cabinet is offered below cost. It is suitable for a televisor using tube sizes varying from 12in. to 17in., its overall dimensions being 3ft. 5in. high, 1ft. 4in. deep, 1ft. 10in. wide. It is complete with plywood back and "Bowler Hat." Originally made for a very expensive televisor and really good quality. Unrepeatable. Offered at £6.19.6 carriage, packing, etc., 12/6. Note : These are cut for 12in. tubes, but the holes for the controls are not drilled.

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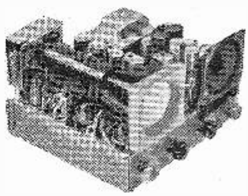
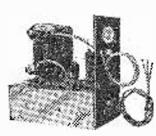


The Elpreq Miniature Televisor uses standard conventional circuitry, employing a total of 13 valves and 2 crystal diodes. The cathode-ray tube used is a 2½in. Service type VCR139A, which has a standard equivalent and will therefore always be obtainable. The layout is extremely clean, straight-forward and professional. The wiring, whilst naturally being a little more intricate due to miniaturisation, is nevertheless completely accessible. The total cost comes to £16-£17. Its size will be approximately 9½in. x 8in. x 6in. Full construction data, layouts, diagrams, templates, etc., running into some 50 sheets is available, price 5/-, post free.

THE ELPREQ E.H.T. GENERATOR



This is a made up unit working on the blocking oscillator/overwound amplifying stage principle. It is of moderate power consumption (6.3 volt .8 amp. filament and approx. 59 mA. H.T.) and contains three BVA valves. Output obtainable ranges from 6kV to 9kV with normal H.T. rail input but somewhat higher outputs can be obtained with higher H.T. supply. Valve rectification is employed in the output stage. The dimensions are 6¼ x 4¼ x 7in Price 69/6, post, packing, etc., 5/-.

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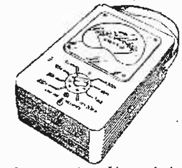

The Multi-meter illustrated measures D.C. volts, D.C m/amps and ohms. It has a sensitivity of 200 ohms per volt and is equally suitable for the keen experimenter, service engineer or student. All the essential parts, including 2in. moving coil meter, selected resistors, wire for shunts, 8-point range selector, calibrated scale, stick-on range indicator and full instructions for making are available as a kit, price 15/-, plus 9d. post and packing.

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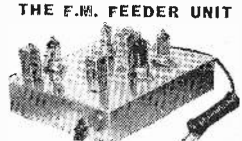
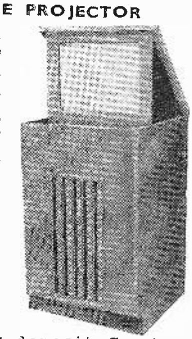


All the parts necessary to make the Denco F.M. Unit are now available. The unit gives an A.F. output suitable for feeding in at the pickup sockets of any standard broadcasting receiver and superior results can be expected. The full constructional details as prepared by the Denco technicians are available—price 1/6, post free. Alternatively, they will be given free to those ordering all the parts which come to £6.7.6. plus 2/6 post and packing. Note : four valves and everything including a prepared metal chassis is supplied. Approximate chassis measurements are 6 x 6 x 1½.

THE PROJECTOR



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Primaries 230/250 v 50 c/s 4 v 2.5 a, **4/9**; 4 v 6 a (High Ins.), **7/9**; 48 v 1 a, **9/9**; 400 v. C.T. 150 ma 4 v 6 a, 6.3 v 6 a 6.3 v 0.6 a, 4 v 6 a, 4 v 3 a, 5 v 3 a, 4 v 3 a, 5 v 2 a, **22/9**; 300-0-300 v 120 ma 4 v 1 a, **17/6**; 865-775-690-0-690-775-865 v 500 ma, **29/6**; 610-0-610 v 150 ma, 300-0-300 v 150 ma, 1220 v 350 ma, **29/6**; 460 v 200 ma, 6.3 v 5 a, **29/6**; 460 v 200 ma, 6.3 v 5 a, **29/6**.

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.02 mfd 8,000 v, **1/11**; .25 mfd 4,000 v (Block), **4/9**; .5 mfd 3,500 v, **3/3**.

R.F. UNITS TYPE 26.—Brand new. Cartoned, **39/6**, plus carr., 2/6.

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1LN5	8/-	7W7	8/6	6K7GT	5/6
1L4	7/6	12H6	8/6	807	7/6
2B7	8/6	12J5	6/-	ECH35	12/6
3A4	9/-	12AH7	12/6	EA50	3/6
3B7	8/6	12SG7	7/6	EBC33	8/6
6AG5	7/6	12SK7	8/6	EB34	3/6
6AK7	9/6	12SR7	7/6	EF36	6/6
6B4	7/6	28D7	7/6	EF39	6/6
6B8	7/6	32	7/6	EF50	6/6
6C8	8/-	36	7/6	,, Red	
6G6	6/6	50Y6	8/6	Sylvania	8/6
6H6	5/-	58	8/6	EF91	12/6
6K6	9/-	1622	11/-	EY51	15/-
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6N7	7/6	1299A	7/6	EL32	7/6
6R6	8/6	VR150/30	8/6	SP61	4/-
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6V6GT	7/6	KT2	5/-	VS70	7/6
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E.H.T. TRANSFORMER FOR VCR97 TUBE.—2,500 v. 5 ma., 2-0-2 v. 1.1 a. 2-0-2 v. 2 a. **37/6** (postage 2/-).

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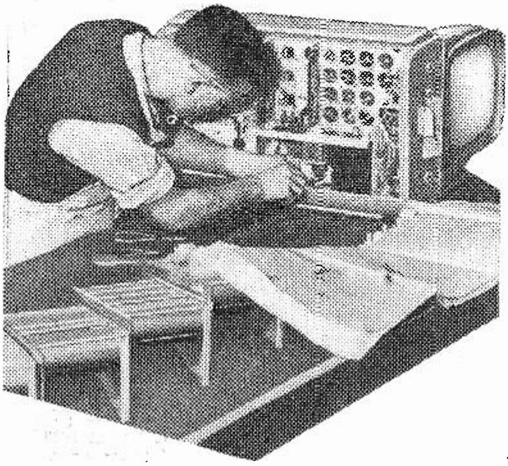
PAGES FROM A TELEVISION ENGINEER'S NOTEBOOK



24.—OSCILLOSCOPES

The Time Base

THE choice of a time base for an oscilloscope often presents several difficulties. There is the necessity of keeping the number of valves at a minimum, especially when a compact, portable design is the aim, and this restriction usually leads to a comparatively narrow range of sweep frequencies. A thyratron time base can be made up using a single valve but the frequency is then restricted to a maximum of some 20 to 30 Kc/s at the high-frequency end and it is not always simple to get good linearity below some 20 cycles at the low-frequency end.

Thyratrons are made to have good high-frequency performances, but in the present design these were dropped in favour of a conventional hard-valve type of generator used in conjunction with one other valve (omitting a clipper diode) to give push-pull deflection. A frequency range of some 5 cycles to 50 Kc/s with good linearity is easily obtained in five switched and overlapping steps, and flyback suppression and the introduction of external synchronising is readily achieved.

The circuit is shown in Fig. 1 and the valves used are type Z77, or equivalents, and an EA50 diode.

Readers will see at once that the circuit is a Miller transitron with switched condenser feedback between anode and control grid. Coupling is also provided through C16 from screen to suppressor, the valve then providing its own triggering and so becoming a free-running generator. The square wave at the screen is clipped by the diode at a level determined by the voltage across R25.

One output is taken to X1 plate from the anode of the transitron, while another is fed via VR6 to the grid of the paraphase amplifier V3. There is

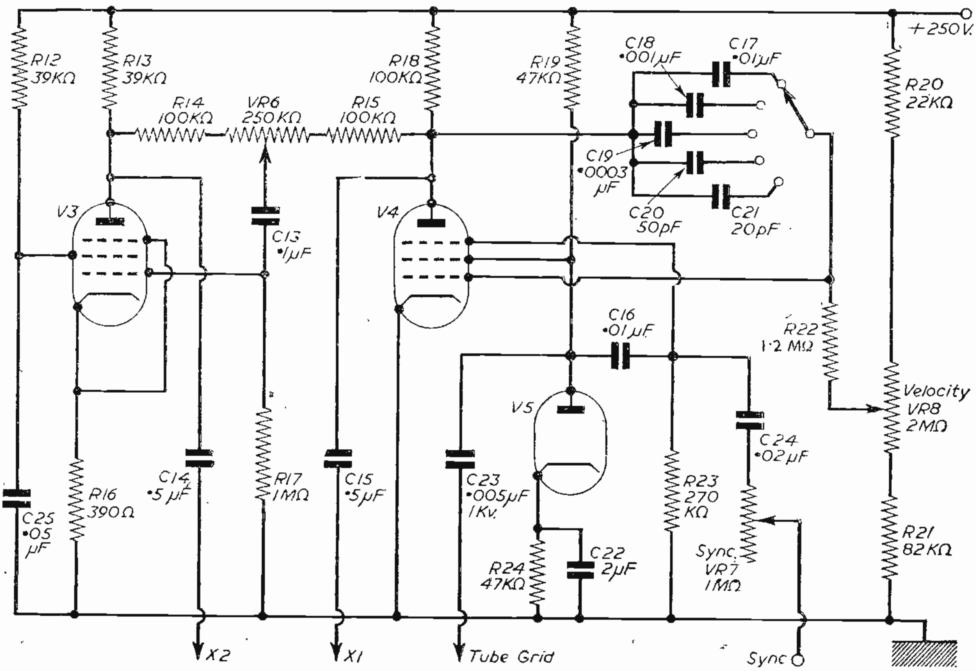


Fig. 1.—Time base circuit. All resistors are ½ watt and condensers paper, 350v. working, except C23.

negative feedback between the anodes of the two valves and the gain of V3 is unity, the output at the anode being an inverted but equal version of that at the anode of V4. This is fed via C14 to the other X plate of the C.R.T. and push-pull deflection is obtained. This prevents defocusing at the extremities of the trace and results in a sharply defined image.

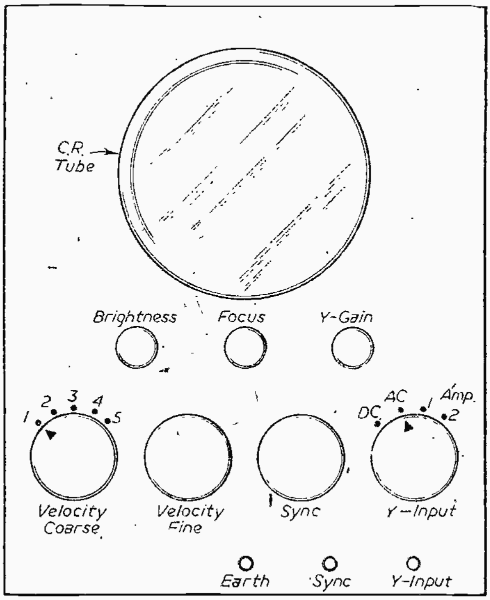


Fig. 2.—A suggested panel layout of knobs and input terminals.

External synchronising is applied through VR7, the sync control, and C24 to the suppressor of the transitron, and so lock the trace to the work signal. A voltage of 15 is necessary for stable lock under normal conditions.

Constructional Notes

A rough layout of the chassis was indicated in last month's article, and this should be followed in main outlines. The total chassis length need not exceed that of the tube and mains transformer combined and, with a width of some 6in., the other valves can be easily mounted along the side of the tube. There are no special precautions necessary, apart from that of mounting the Y-amplifier close to the panel input socket and switch. A suitable control layout is shown in Fig. 2.

A small screen may be well fitted around the Y-amplifier section and the leads to the Y-plates should be kept short and well clear of other leads, especially those carrying A.C. Screening will tend to reduce the bandwidth (on the wide range) of the amplifier, but up to a foot of low-capacity screening may normally be used for the Y1 input without serious effect. The correction choke of 125 μH is wound on a ½in. paxolin former from 36 s.w.g. enamelled wire, 95 turns close wound being required.

Use of the Instrument

Normally, the first check on the design is to ensure that the timebase is functioning on all switch positions and that proper brightness and focus control is obtained. The setting of VR6 is not very critical and it will normally be about two-thirds turned towards the anode of V4. An improper setting will show itself up as a thickening and slight kinking of the trace at one end or other of the scan. This control is, of course, a pre-set and is not mounted on the panel. The H.T. rail voltage should be 250 volts, and R1 may be adjusted if necessary to bring it roughly to this figure should any large change be noticed, provided this is not due to a fault.

Work signal inputs are applied to the input terminal and the amplifier switch is set according to whether an amplified or straight input to the Y-plate is required. Normally, the A.C. position will be used for unamplified conditions of input, particularly on signals where a D.C. component is present, as when investigating ripple on H.T. points of a receiver. With amplified conditions, the narrow band position is most generally useful as a large gain is possible without overloading; a trace amplitude on the screen of roughly 2in. can be obtained without distortion in this position. For video work and other high-frequency set-ups, however, wide-band working will be necessary and here a reduced gain must be tolerated. A maximum undistorted trace amplitude of about ½in. is obtainable in this switch position. Both the above conditions are with the gain control at maximum setting; there will be some restriction of the high-frequency response, on wide-band working, when the control is used at very low settings and it is always advisable to work it as far advanced as possible. The sync control is normally set fully anti-clockwise (resistance fully in circuit), and only advanced far enough to ensure locking when a sync signal is applied, otherwise distortion will occur.

The base connections of the two tubes mentioned in the previous article are given below.

ECR30

Pin	1	2	3	4	5	6	7	8	9	10	11	12
	K	G	H	H	A2	—	Y2	X2	A3	X1	Y1	—

(A2 is focus anode, A3 final anode, internally joined to A1).

DG7-5

Pin	1	2	3	4	5	6	7	8	9
	H-K	Y1	Y2	A2	X2	X1	A1	G	H

(A1 is focus anode, A2 final anode and coating).

It should be noted that the ECR30 has a 4 volt 1 amp. heater whilst the DG7-5 has a 6.3 volt 0.3 amp. heater. The recommended transformer is wound for either type of heater.

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WIDE ANGLE 38 mm.

Line E.H.T. trans., ferroxcube core. 9-16 kV. ...	25/-
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Frame Output Transformer	10/6
Scanning Coils low imp. line and frame	17/6
Frame blocking osc. transformer	4/6
Line Blocking osc. transformer, caslam cored ...	4/6
Focus Magnets Ferroxdure	25/-

STANDARD 35 mm.

Line Output Transformers No. E.H.T.	12/6
Line Output Transformers 6-9 kV. E.H.T. and 6.3 v. winding. Ferroxcube ...	19/6
Scanning Coils. Low imp. line and frame	12/6
Scanning Coils. Low imp. line and frame, by Igranic	14/6
Line blocking oscillator transformer	4/6
Frame blocking oscillator transformer	4/6

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1 Focus magnet. W/B 118.
1 Ion trap (Optional).
1 B.12.A Base.
1 K3/100 rectifier.
1 K3/40 rectifier.
1 6CD6 Valve.
1 6U4 Valve.,
3 Sundry resistances.
9 Sundry condensers.

THE COMPLETE PARCEL Including VALVES £9 . 3 . 8d. Carriage 3/6d. extra.

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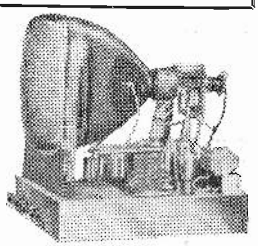

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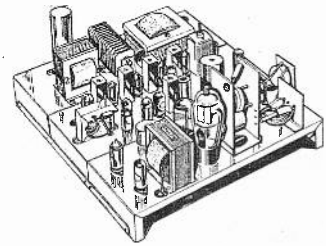

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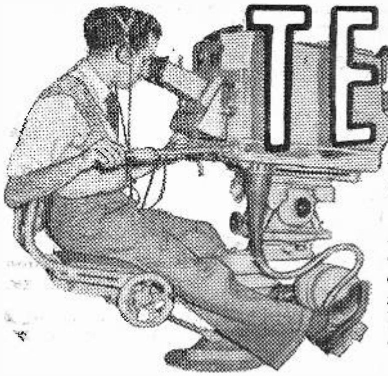
For Use with The Tele King and the Viewmaster

14 Inch. Mullard. MW36-24. £19 9s. 3d.
Brimar. C14FM. £20 10s. 1d.
16 Inch. English Electric. T.901 £22 4s. 10d.
17 Inch. Mullard. MW43-64. £23 12s. 8d.
Brimar. C17FM. £24 13s. 6d.

Carriage and insurance 15/- per tube extra.

TELENEWS



Nera Ceiling Projectors

FOUR Nera Ceiling Projectors have been permanently installed by the BBC in the Television Theatre at Shepherd's Bush.

These large-screen projection receivers, which were first used by the BBC at the 1952 National Radio Show, provide an audience with "double vision," enabling them to see both the action on the studio floor and the transmitted picture on the receiver screen.

Programme Check Before Cuts

IN future, the North-Eastern Electricity Board intends to refer to the BBC before making power cuts so that the "blacking out" of programmes of national importance can be avoided.

Heated Protest

MR. T. LEONARD, a cafe proprietor, was so disgusted with the standard of BBC programmes that he threw both his radio and television receivers on to a public bonfire in Shepperton on Guy Fawkes night.

Boom in Germany

THE Eurovision link-up between West European countries has caused sales of television sets in Germany to double. The average number sold each month before July, 1954, was 3,000. Now, with more and more programmes being shared internationally, the average is 6,000.

Not Completely Abandoned

"COIN-IN-THE-SLOT" TV, where the viewer inserts money into his set and selects a film he wishes to see, has been dropped in Palm Springs, California, where the system was in its experimental stage. Its backers insist, however, that the scheme has not been completely abandoned.

Soccer in the Cinema

WHEN England played Germany at Wembley on December 1st, TV transmissions of the match were shown on cinema screens in eight cities and towns including London, Doncaster, Leeds and Manchester.

Members of the public were charged for admission.

By February

MR. L. D. GAMMANS, Assistant Postmaster-General, announced in the House of Commons recently that the new television transmitter at Talcolneston would be ready to serve central Norfolk by February.

Tower Inquiry

AN inquiry has been made, it is learned, into the possibility of using Blackpool Tower as a relay station for commercial TV.

Car Ignition Tester

TECALEMIT, LTD., are to market a car ignition tester designed by the English Electric Company, following an agreement recently concluded between the companies.

The tester is comprised of a small cathode ray tube which gives the car owner a complete picture of his ignition system, enabling him to detect and rectify faults with ease.

State TV Service in Sweden

A TELEVISION committee has recommended the Swedish Government not to introduce a commercial television service but to keep it under the auspices of the National Broadcasting Corporation. The committee calls for television transmissions to begin from July, 1956, to serve the interests of "culture, national education, the community and the home."

Ghosts from the School ?

RESIDENTS in the Eltham district of south-east London complain of "ghost" television reception which, it is claimed, is caused by steel girders in the new giant Kings Park Comprehensive School built by the L.C.C. Some viewers in the area report that a mixture of BBC and French programmes is sometimes received while others are bothered by background voices in French or German.

Television Licences

THE following statement shows the approximate number of television licences issued during the year ended October, 1954.

The Pye television studio at Baghdad Fair, showing the 408 aerial which transmitted pictures to sets installed in different parts of Baghdad, including the King's Palace.

Bob Hope, Moira Lister and Maurice Chevalier rehearsing a scene for the film made recently at the TV theatre, Shepherd's Bush, for screening on American television.

The grand total of sound and television licences was 13,701,205.

Region	Number
London Postal ...	1,026,658
Home Counties ...	407,577
Midland	731,950
North Eastern... ...	538,612
North Western ...	551,220
South Western ...	176,616
Wales and Border Counties	201,152
Total England and Wales	3,633,785
Scotland	190,838
Northern Ireland ...	17,045
Grand total	3,841,668

Bob Hope TV Shows

WHEN he visited this country in November, American comedian Bob Hope had to film his weekly TV programme which is received in about 50,000,000 homes in the U.S.A. The film was made here to keep up the continuity of the series and may be shown later in this country.

This Year's Show

THE Radio Industry Council has announced that the next National Radio Show will be held at Earls Court, London, from August 24th to September 3rd, 1955, with a preview for overseas and other special visitors on August 23rd.

This period is approximately the same as in 1954.

Mr. Peter Dimmock

MR. PETER DIMMOCK, Assistant Head of the Outside Broadcasts Department of the BBC Television Service, and recently Acting Head, has been appointed Head of the department.

Commercial "Plugs"

IT is reported that commercial television in this country will attract an audience of 10,000,000 each evening, and that all the advertising spots will be on film so that planners will be able to time programmes to the split-second.

Newsreel Application

MR. JACK DAVIS, managing-director of the Monseigneur News Theatres and of British Newsreels has applied to the I.T.A. for a contract to supply the newsreel for the national network.

"Keeping Up with the Schmidts"

POST OFFICE officials checking on television licences in a small West German town found that 170 residents, although having an "H" aerial on top of the roof, really had no set at all but just wanted to impress neighbours.

No Swiss TV Yet

THERE is still no regular television service in Switzerland, although test programmes are transmitted on six evenings each week from Geneva and Zurich. These test transmissions are composed entirely of films, however, as Switzerland does not yet possess any TV cameras.

When a television service is eventually inaugurated, it will be run by the State without advertising.

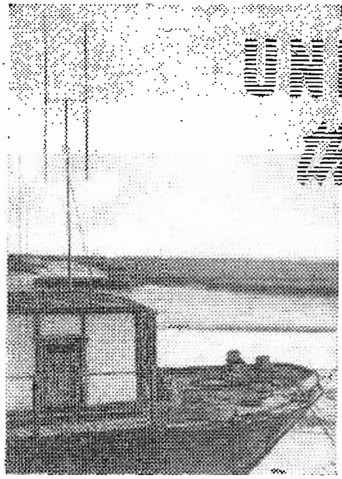
Simplicity the Keynote

SPEAKING to members of the Publicity Club of the Cotswolds in Gloucester recently, Mr. Neal Arden said that when commercial television begins in this country, the keynote of most programmes will be simplicity.

He described how he had helped in the making of a half-hour film which had been shown to the Independent Television Authority as an example of the way commercial shows would be presented.

Sewing Machines Come First

IT is learned from Italy that television receivers cost so much in comparison with wages that the average Italian finds TV beyond his means. "The average household," a report states, "as soon as it has a little money set aside, first buys a sewing machine and then a midget motor-cycle. A long way after comes a TV set."



UNDERNEATH the DIPOLE

TELEVISION PICK-UPS AND REFLECTIONS

By Iconos

BACK PROJECTION

THE use of back projection in BBC studios varies a great deal in the quality of the results. The equipment for film or still photograph slides has reached a high standard of performance. The uneven results we see, I am told, are largely due to over-confidence on the part of the BBC producers. A film cameraman or a still photographer is despatched to obtain specified background scenes at the docks or an airport—and the weather is bad. Nevertheless, the backgrounds are wanted against time and the producer has perforce to accept photographic backgrounds obtained from flat and dull negatives. The technicians cannot be blamed for this. A first requirement of this particular process, and of the "inlay" and "overlay" matte process is an absolutely first-class photographic negative for the proposed trick background. In America, the use of studio back projection has reached a new peak with the N.B.C. production of *Richard II*, when a screen 15ft. high and 60ft. long was used. This was illuminated by two 90 amp. arc slide projectors using 4in. by 5in. slides made on heat-resisting glass. A new type of screen made of a blue latex rubber has been found to give a better diffusing quality than previous types of screen. It is stated that the picture can be viewed at an angle of 45 deg. to this screen with no noticeable difference in illumination from that observed at the perpendicular. This means that there is less "hot spot" effect in the centre of the screen, a common fault, and a greater flexibility for the television camera in the use of angle shots from widely spaced camera positions. Incidentally, there were no less than 250 additional television stations brought into operation in the U.S.A. during the 12 months to June, 1954, many of them with 25 kW. and 50 kW. transmitters. It is this intense progress which has forced the American motion picture industry to develop CinemaScope and other wide screen techniques for colour pictures with an aspect of 2.5:1, otherwise the cash customers at the cinemas are inclined to say "We could have seen that on our TV sets."

STORY TELLING

THE art of story telling on TV is not an easy one. The late Algernon Blackwood could hold one's attention by means of this highly stylised technique. No special props or assistants were necessary; he just sat back in an armchair and talked quietly to the television camera. His marvellous sense of timing and his expressive vocal delivery made every point on sound radio. The addition of picture broadened his technique by enabling us to watch the many slight changes of expression on his face and above all to come under the spell of his almost hypnotic eyes. No one has yet replaced him. Joseph Tomelty made a fine attempt when relating Guy de Maupassant's short story, "The Necklace." The Producer, Tony Richardson, presented him in character of a jeweller in a shop setting with a customer at the other side of the counter. This automatically made the viewer a third party, listening to a story told by the jeweller to his customer. In this way, the personal contact with the viewer was not so close as the simpler and more direct story telling of Blackwood. However, it was a most enjoyable little feature and I look forward to hearing more stories from Joseph Tomelty.

"WAR IN THE AIR"

IN setting out to tell in a TV film the story of air power and its impact on the world during the past 20 years, the BBC set itself a pretty stiff task. "Victory at Sea," the American documentary TV film, produced by Henry Salomon, reached an extremely high standard in the expert handling of film material from many sources and is still well remembered by viewers. Here was a most professional job of film editing, with a wide variety of material skilfully knitted together with commentary, music and sound effects. Could the BBC match it with their documentary, "War In The Air"? Having seen several episodes, I would say that the BBC has achieved its task most triumphantly. Philip Dorté, who launched and directed the project, assembled a fine team of producers, editors and technicians to tackle the job and the result has been a series of documentaries which have set a new standard. Each episode had its basic background story line, each its build-up of historic sequences smoothly linked with music and commentary, Churchill's war speeches and a cautious use of diagrams. Few viewers could have failed to have been moved by this re-creation of the atmosphere of the terrible days of the Battle of Britain or the stupendous efforts to get the convoys through.

GREAT TEAMWORK

A SPECIAL word of praise must be given to John Elliot, the producer, for his brilliant script and also to John Byers for his excellent sound recording. Philip Dorté, the director of the series, is to be congratulated on what must be his last major undertaking before leaving the BBC for sponsored TV. His next opus will probably appear in due course under the flag of his old chief, Norman Collins, radiated from I.T.A. aerials.

NEWS AND NEWSREEL

THE departure of Philip Dorté from the BBC indirectly focuses attention on the TV News and Newsreel, for it was Dorté who organised the original BBC Television Newsreel and ran it until about a year ago. Since that time, the influence of the sound news side of the BBC has turned it from being a smooth, slick and entertaining feature into a shapeless, halting mixture of lantern slides, diagrams, and announcements eked out with a few flashes of the old newsreel style. News and Newsreel in its present form is a most unsatisfactory mixture of styles of presentation and its conception is one of the few mistakes of Sir George Barnes. He would be well advised to abandon the "hotch-potch" and adopt once more the conventional cinema newsreel style or the somewhat slower tempo of the original TV newsreel.

"WAITING FOR GILLIAN"

NIGEL BALCHIN'S novel, "A Way Through The Wood," has been read by many thousands who were interested to see just how a TV play could be adapted from it. However, Ronald Miller is a playwright and film scenario writer of high reputation and we were entitled to expect a skilled transfer of the somewhat rambling though absorbing story into the newer medium. Mr. Miller did not disappoint us. He divided the plot into several separate sequences, in the manner of the theatre, interpolated with exterior film sequences and montages worthy of his best film scripts, and an ending in the traditional cinema style. Having said this, it will be appreciated that the ending of the TV play is completely different from the book! However, under the skilled direction of Alvin Rakoff and with a distinguished cast, including Anne Crawford, Patrick Barr and Michael Denison, the play held one's interest for the full ninety minutes of its playing time. The most memorable performance, I thought, was the polished acting of Michael Denison as the Hon. William Bule, in which character he had the advantage of the brittle dialogue traditionally spoken by the theatrical cad.

"THE FAST BUCK"

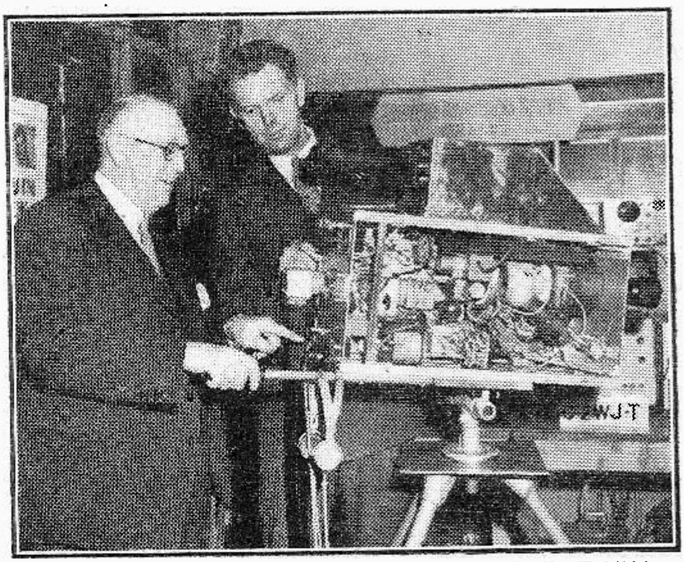
HALF-HOUR features are the main-stay of American TV. There is a lot to be said for limiting TV plays to this playing time, though such an assertion must not be read as a reflection on the merits of "Waiting For Gillian." Not many TV plays have the weight of story or characterisation to sustain ninety minutes, and "The Fast Buck," a short story in one scene, fitted its twenty-eight minutes, plus titles, to the last second. Here was an amusing little sketch of a couple of confidence tricksters outwitting a master confidence trickster. A twist ending, in the manner of Maugham, was to be expected and duly turned up. This play was well cast, but the major part of the interest was centred on the interplay between a couple of picturesque crooks, played by John McCallum and Alexander Gauge. Both of these artists once more demonstrated their mastery of television acting technique, under the experienced and smooth direction of Dennis Vance. Praise must also be given to the technicians for first class photographic and sound presentation.

MAGNETIC RECORDING

IN America, magnetic recording for TV and in the film studios is carried out on a multitude of different widths of film and tape, at various speeds. Recordings are made on 35 mm., 17.5 mm. and 16 mm. perforated magnetic film running at 90 to 45 feet per minute, and also on tape running at 7½ and 15 in. per second. Sound chiefs of British film studios, sitting on a technical committee of the British Film Producers Association, have got together to avoid a repetition of this multitude of standards and have decided to standardise on 35 mm. magnetic film running at 90 feet per minute and tape at 15 in. per second. Manufacturers of sound equipment and engineer representatives of the BBC were invited to attend the deliberations of this Sound Committee, an act of co-operation suggested in this column some months ago. These decisions are well-timed, for photographic recording is on the way out and magnetic is "in."

ARSENIC AND OLD LACE

"THE Projection of Britain," a series of three episodes purporting to describe the growth and influence of the British documentary film carried with it a curious atmosphere of arsenic and old lace. The first instalment perpetuated the myth that "Drifters," an interesting film of the herring fisheries of Scotland, launched the documentary film upon an eager public and initiated a new field of information and instruction. Mention of such monumental documentary films as Ponting's "With Captain Scott in the Antarctic" and "With Cobham to the Cape," or other films which preceded "Drifters" was conspicuous by its absence, though excerpts of these films were shown on TV some time ago. Proceeding with excerpts from various odd films from the Empire Marketing Board, the Post Office Film Unit and the C.O.I., most of the films seemed to strike the same note, with the exception of a very fine sequence from Harry Watt's "North Sea," which had the story and tension demanded by audiences.



One of the exhibits at the Eighth Annual Amateur Radio Exhibition, organised by the R.S.G.B., was the first British regularly-operated amateur TV station which was built two years ago by Mr. Ralph Royle and his son Jeremy, age 21. Mr. Royle is seen showing the camera he and his son use to Mr. H. Faulkner, C.M.G., B.Sc.

Your problems solved

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. 383 must be attached to all Queries, and if a postal reply is required a stamped and addressed envelope must be enclosed.

ADJACENT CHANNEL INTERFERENCE

I have a Pye V.4 in conjunction with a J-beam aerial (four element) and have changed over from Holme Moss to the Isle of Man. I get a much better, far more reliable picture but with the following defect.

The picture is crossed by horizontal lines, sometimes about ¼in. apart and sometimes perhaps 1in. and these are sometimes hardly noticeable and at others are most distracting. They are continually on the move and change from going up to going down most erratically. I rather suspect that the set is not at fault as others get the same result, but is there anything that I can do to counteract it ? None of the ordinary controls has any effect. I might say that in the intervals when there are no such lines the raster looks rather like fine linen with vertical, somewhat irregular lines running vertically. But still, Isle of Man is the best we can get on this Cumberland coast !—W. A. Henderson (Whitehaven).

The picture disturbance described is almost certainly the result of external spurious signals adjacent to the vision frequency of the Isle of Man transmitter. They are most likely originating from the local oscillator of neighbouring receivers tuned to a different channel. Unfortunately, there is little that can be done at the affected receiver to alleviate the effect. It is generally a matter of completely screening the offending set, or installing wave-traps in the associated aerial system. The G.P.O. interference investigation department should be able to give you assistance in this connection.

SOUND ON VISION

I have an Ultra television model V8ULF with J-type aerial and could you please help me with the following ? I have a hum all the time but more pronounced during transmissions from the studio, namely, announcements, weather and also during the showing of test card "C." This hum can be cured by the following :

(a) Tuning selectivity back in an anti-clockwise direction.

(b) Reducing contrast with selectivity adjustment.

By doing either of these till hum disappears I get in return a very poor picture, "white-washy" and blurred. I have had the set 18 months and this hum has gradually crept in during the last three months. The set is tuned to Brighton, about 40 miles distant.—C. J. Petter (Chichester).

This effect is known as vision interference on sound and it is, in fact, caused by the vision signal gaining admittance to the sound section. Since you mention that the disturbance has appeared gradually during the last three months, we feel that it is the result of a drift in the alignment of the tuned circuits. If you cannot cut it out entirely by adjusting the local oscillator trimmer for maximum sound, consistent with minimum *sound interference on vision*, your set may have to go to your Ultra dealer for complete realignment.

H.T. RECTIFIER FAILING

I am having trouble with my G.E.C. TV, model BT4544, which is 12 months old and has had three KT36 and one Z77 valves.

For some time now the width has been closing in towards the centre of the screen. My width control fails to operate on the outward, or the width, to give me a full picture or mask and leaves the black line ⅜in. to ½in. each side. My horizontal form is all right. But the width will take the picture in, but not out. It is not possible to get test card C at width by well over ½in. each side.

My picture fades out and the only thing which will bring the picture back is to ease back the brightness control to focus again.

This does not happen on every picture.—J. S. Whitehead (Stoke-on-Trent).

The lack of full picture width on your set is almost certainly caused by wear in the metal H.T. rectifier. We would advise, therefore, that you have this part checked for efficiency and replace it if necessary.

A certain degree of defocusing is normal on your set when the overall brightness of a picture suddenly increases—such as during a newsreel programme. We would mention, however, that the effect is aggravated somewhat by a low emission E.H.T. rectifier valve.

A slightly misplaced aerial would have no bearing at all on the above defects.

LOW E.H.T.

I am still having some trouble with my Simplex. The cause of it all is the E.H.T. which is very low—700 volt. But if I disconnect VR9 from the circuit I can get 1,000 volt reading on my electrostatic meter. I have replaced VR9 and also re-checked my circuit, but it is still the same.—R. Avery (Coventry).

Lack of E.H.T. may be due to faulty rectifiers, faulty smoothing condensers (they should be tested at full working voltage), faulty E.H.T. network due to leakage direct to chassis by corona discharge, and finally by too low a value for C34.

These points should be checked.

VIEWMASTER FRAME AMPLITUDE

I have recently converted my Viewmaster to take the Cossor 15in. tube. In doing this I have increased the E.H.T. and scanning amplitude of both line and frame line bases.

Before fitting the line and frame moderator I found the picture width was ½in. short on the right-hand side, and the height and depth suffered the same.

The frame moderator gave me more height but caused a foldover at the bottom and cramping at the top. I have altered C49 to 0.025 μF; this has nearly corrected the foldover but has slightly affected the height. I have tried decreasing R56 to 220 k. but without effect.

The line moderator, even with the 1 MΩ resistor in parallel with R46 removed, still gives me a bright line on the right of the picture.—D. Brooks (Princes Risborough).

To increase frame amplitude even further we suggest the following modification.

Connect a 1 μF condenser between the top of R60 and the junction of R57 and C48, reduce the value of R66 to 220Ω, connect a 1,000Ω resistor in parallel with R65, delete R67, then adjust R64 and R65.

To remove the bright line on the left of the picture it should only be necessary slightly to increase the value of R46, the best way being to connect a variable resistor in series with it; at the same time connect a 500pF condenser across the line scanning coils tags L1, L2.

INCREASING E.H.T.

I have an Ekco TS46 which has recently been thoroughly overhauled by a qualified dealer.

Although the picture is good as far as brilliance and contrast are concerned, the general focus is not all that it should be. When the centre is in focus the corners are slightly out, and about 1in. of the right-hand edge is quite appreciably out of focus.

I have heard that by increasing the E.H.T. to the maximum allowed by the makers (in this case 6,000 volts) it is possible to overcome this fault. Can you tell me how this is achieved ?

There is another fault and that is that when the set is first switched on the picture is broken up linearly, but as the set warms up this slowly corrects itself from the bottom upwards until the picture is fully held. This takes about 10 minutes. If the line hold is adjusted when the set is switched on the picture breaks up after about 10 minutes.—K. A. Noll (London).

The E.H.T. potential in your receiver is 6,000 volts, and it is not readily possible to increase it above this value. Uneven focus generally indicates that the focus unit has been shifted relative to the neck of the tube. You should try the effect of adjusting this in your case. The line hold defect is almost certainly caused by a worn line oscillator valve.

USING THREE-CHANNEL TUNER

I wish to replace the front end of my Magnaview receiver with a commercial three-channel tuner, being particularly interested in the "Pilot" as it has means of a slight oscillator adjustment by means of a ring round the selector knob. Could you tell me if this unit would be suitable, or if not could you suggest any other make that would do? The vision I.F. in the Magnaview is 19.75 Mc/s, and sound 23.25 Mc/s, as you probably know. I have plenty of heater and H.T. current to spare.—J. Williams (Manchester).

As a potential aid to minimise possible interference in Band III due to local oscillator radiation, Band 1-3 (13 channel) front-end adaptors are designed to have an I.F. output in the region of 35 Mc/s. For this reason, therefore, they would not be suitable for use with your receiver in its present form.

LINE FOLDOVER

I would be very grateful if you could give me any advice with my problem of "foldover." The set is a Marconi VT73DA, and the foldover is on left, accompanied by a bright band about 1½in. from left-hand edge of mask.

I have tried to cure by replacing main rectifier and also cathode bias resistor of line output value KT36, but without success.

At its most the foldover is about ½in., although this varies at different times.—H. Morris (West Bromwich).

Make sure that the U31 efficiency diode and the associated 2 μF electrolytic capacitor are well up to standard. Check the 0.01 μF capacitor coupling the line generator to the KT36 for insulation—if a *slight* leak is evidenced the capacitor should be replaced. Suspect the line output transformer and/or line scan coils for short-circuited turns.

INCREASING E.H.T. VOLTAGE

In my Masteradio Model T412 I have altered the tube to a C12B with P.M. focusing. The E.H.T. is insufficient to give me a good picture and I would like to add a 5 Kv R.F. unit in series, to make 10 Kv. Can this be done ? I can add an efficiency diode for the consequent non-linearity which will result, or decrease the E.H.T. on the R.F. unit.—P. C. Whittingham (St. Albans).

We do not advocate the modification you suggest. It is, of course, feasible to raise the E.H.T. potential by means of an R.F. E.H.T. generator, though extreme care would have to be taken to achieve correct potential distribution throughout the series network. Another method is by rectifying the pulse potential existing at the anode of the line output valve during the line flyback, and adding the so-derived D.C. in series with the existing E.H.T. supply. The main trouble that will almost certainly arise in both of these cases is the unavailability of sufficient scanning power.

H.T. RECTIFIER FAULTY

I have an Invicta T105 about which I would be most grateful for advice.

With the line amplitude plunger at maximum, on first switching on, the line timebase fails to reach the mask both left-hand and right-hand sides of the screen by ¼in. to ½in., but after the set has been running about 30 minutes the amplitude creeps until mask is just filled.

I have renewed line generator EF50 and amplifier PL38M with no effect or fault at all. Frame timebase has no fault.—R. Wellis (Alton).

Yours may be due to H.T. rectifier trouble. Two metal rectifiers are used in your set for this purpose, and they often reduce in efficiency to provoke the symptom described. You should check the H.T. line voltage over the period of time it takes for the effect to correct itself; if the voltage rises gradually you should have the rectifiers tested for efficiency. The normal H.T. line potential in your set is 245 volts, and the total H.T. current ranges between 220 to 240 mA.

NEW BOOKS for the constructor. "Unit Constructed TV Receivers," by Bradley, everything from 3in. ex-Gov. tubes to 15in. magnetic, **6/-** each; "TV Circuit Refinements," by Banthorpe, telling you how to improve your set, **5/-**; "TV Faults," by Stevens giving actual circuits of six leading manfr., **5/-**; "TV Fault Finding," the ideal book for the beginner, **5/-**; "TV Picture Faults," **3/6** each; "TV Test Equipment," by Bradley, describing the construction of all the instruments you need, **5/-**; "The Oscilloscope Book," by Bradley, **5/-**; "Transistors and Crystal Diodes," by Bettridge, what they are and how to use them, **5/-**. Send stamp for free list if you are not already on our mailing list. SERVIO RADIO, 156-8, Merton Rd., Wimbledon, S.W.19. (LIBerty 6525.)

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RATES: 4/- per line or part thereof, average five words to line, minimum 2 lines. Box No. 1/- extra. Advertisements must be prepaid and addressed to Advertisement Manager, "Practical Television," Tower House, Southampton St., Strand, London, W.C.2.

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VALVES WANTED. EB91, EF80, ECL80, PL81, EY51 and all TV. types, 5Z4G, 6Q7, etc., etc., Brand new only, prompt cash. Send us your offers. RADIO HAM SHACK LTD., 155, Swan Arcade, Bradford, 1.

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).

R1355 AND R.F. UNIT FOR BAND III

SIR,—With Commercial Television always coming nearer, many of us who are using R1355 and the associated R.F. units for our respective Band I transmitters, would like to be given a circuit for conversion of an R.F. unit to Band III, using the present I.F.s of the R1355. It would mean completely breaking down an R.F. unit and rebuilding it for Band III, but it wouldn't require more than a few seconds to change a Band I R.F. unit for a Band III unit when one desired to switch over to another programme.—J. RODGER (Reverend) (Oldmeldrum).

BAND I CONVERTER RESULTS

SIR,—While at Robin Hood's Bay, which is on the north-east coast of Yorkshire, last week, I built the Band I Converter Unit as in the October issue of PRACTICAL TELEVISION.

I found that by using Aladdin ⅜in. coil formers with dust cores for the two oscillator coils, I was able to receive very good vision and sound from Holme Moss on a H.M.V. 1807 London fixed tuned receiver, using a cross type aerial (forward gain 6dB).

I should point out that Robin Hood's Bay is 85 miles from Holme Moss. Also, if trouble is found in getting the two 18pF condensers, 20 pF will work just as well.

I hope you will publish the above, as I am sure there are many who have a London fixed tuned receiver wishing to use them in the coverage of Holme Moss transmitter.—GORDON R. BUSSEY (A.M.I.E.T.) (Coulsdon).

TUBE DATA—ACR10 AND VCR139A

SIR,—It appears that for some time the cathode-ray tube ACR10 has been sold by many firms as a VCR139A.

According to my reference books these tubes are far from direct equivalents, the only similarity being the base connections, and I am sure that this has misled many experimenters.

The following are the figures quoted in one of my reference manuals:

ACR10

Diam. 2.5in.	Ih	Vh	Va_1	Va_2	— Vg_1	Sensitivity
	1.1	4	800	120	12	.217 mm/v (Both axes)

Va_3 800

VCR139A

Diam. 2.75in.	Ih	Vh	Va_2	Va_3	— Vg_1	Sensitivity
	1.1	4	100	450	10	.11 mm/v (Both axes)

Bases:	1	2	3	4	5	6	7	8	9	10	11	12
	k	g	h	h	a^2	—	y″	x″	$a^{1\times3}$	x′	y′	—

—H. D. FORD (Fleet).

SERVICING ARTICLES

SIR,—I read Mr. Waldron's letter in the November issue with great interest. It is a good idea to gather information from many quarters to form the basis of an article on servicing.

The sliders on the 1807 chassis are troublesome, but as the defect, or rather the source of it, is nearly always evident (I said nearly) upon operating these controls I did not deem it necessary to include this fault in the article; however, for readers' information they are 25K sliders made by either Colvern or E.M.I., the two makes being of different size. Take a sample when buying! The fact that the valve noise limiter is often replaced by a metal rectifier was mentioned in the caption beneath the diagram on this subject. It is rare that an EA50 is fitted and the metal type will nearly always be encountered.

I expected plenty of comment in the correspondence column regarding why this fault or that was not included, but the original aim was to help readers to service their own sets; and whether all available information is included or not, the fact is that the ball has been set rolling, and I know that the great interest of readers on this subject will ensure that the maximum information will be forthcoming whether from my pen or not. Mr. Editor, I have a feeling that the subject will not end here.—L. LAWRY-JOHNS (Gravesend).

TUNABLE TV

SIR,—Re your articles on a communication receiver, Ediswan have just introduced a 12-band turret tuner for TV, with replaceable coil units.

Why not a similar job for 12-band radio, —2RF+FC? Surely this would be the "dream come true" for amateurs!

Suggestion (1) Cathode sensitivity control (manual); (2) screen A.G.C.; (3) variable selectivity; (4) B.F.D.; (5) initial valves of latest type for U.S.W.

What do other readers think?—E. T. BATEMAN (Southampton).

"CANNED SOUND"

SIR,—It is with great misgiving that I learned recently that many commercial programmes will be on film. "Canned vision" means "canned sound" and one has only to see and hear the "Amos 'n Andy" editions to realise how badly recorded sound tracks come over to the viewer. Only "live" sound can be easily received on the ear, and the sponsors will find this a sore point when they are trying to give the public the best in entertainment in order to sell their goods. Film sound tracks can only be amplified over a cinema sound system if good reproduction is desired.—B. COOK (Charlton).

QUERIES COUPON

This coupon is available until Jan. 21st, 1955, and must accompany all Queries.

PRACTICAL TELEVISION, JAN., 1955.

Published on the 22nd of each month by GEORGE NEWNES, LIMITED, Tower House, Southampton Street, Strand, London, W.C.2, and printed in England by W. SPEAIGHT & SONS, Exmoor Street, London, W.10. Sole Agents for Australia and New Zealand: GORDON & GOTCH (A/sia), LTD. South Africa: CENTRAL NEWS AGENCY, LTD. Subscription rate including postage, for one year: Inland and Abroad 13s. 6d. (Canada 13s.) Registered at the General Post Office for the Canadian Magazine Post.

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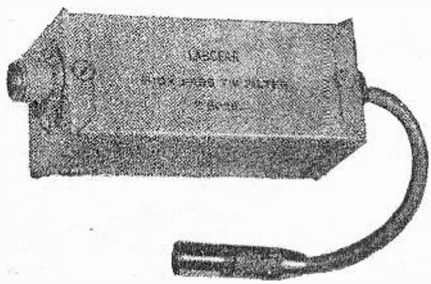

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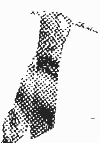

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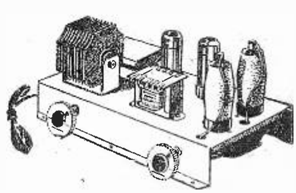

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