THE BEGINNER'S TIMEBASE

PRACTICAL TELEVISION

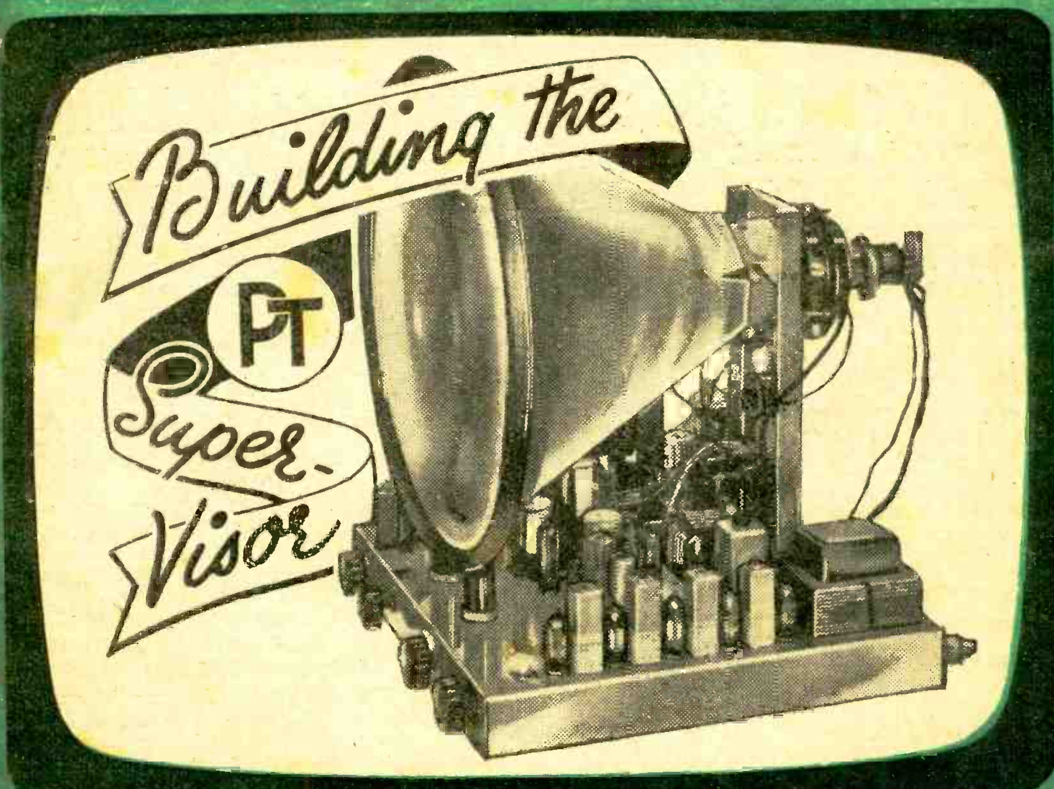
AND TELEVISION TIMES

1/-

EDITOR F. J. CAMM

A NEWNES PUBLICATION

Vol. 4 No. 40 SEPTEMBER, 1953



FEATURED IN THIS ISSUE

- Picture Tube Control
- Sound Rejection
- Video Stage and Bias
- Conversion to Magnetic CRT
- Fault Symptoms
- Obtaining More Sound

PRACTICAL TELEVISION

& "TELEVISION TIMES"

Editor : F. J. CAMM

Editorial and Advertisement Offices: "Practical Television," George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. 'Phone: Temple Bar 4363.
Telegrams: Newnes, Rand, London.
Registered at the G.P.O. for transmission by Canadian Magazine Post.

Vol. 4 No. 40 EVERY MONTH SEPTEMBER, 1953

TELEVIEWS

Television—Free or Fettered?

ALL aspects of sponsored television were considered by the Beveridge Committee which was appointed to examine the working of the BBC monopoly. It heard evidence from every interested party, including the Church and the newspapers. It sat for three years and issued two voluminous tomes extending *in toto* to nearly 1,000 pages. It reached the conclusion that the BBC monopoly should continue as far as broadcasting is concerned, but that with television the monopoly should end, and that licences should be granted to approved people or businesses for the radiation of sponsored programmes.

The Church did not like the conclusions reached, and it has without surcease endeavoured to get the matter re-opened through mouthpieces such as Ebor and Cantuar. Their campaign has been carried to the extent of speeches in the House of Lords. The newspapers too, whilst they are not, in principle, opposed to sponsored programmes, are opposed to the method of granting licences which, they say, would place a patronage in the hands of the Government which will virtually grant other monopolies and will be the antithesis of the principles of free enterprise, which the Beveridge Report envisaged. Obviously, all of those who would like to sponsor programmes cannot be accommodated on the frequency bands available.

The Government, since that report, has issued a White Paper explaining the general principles of sponsored programmes, the Government having tied itself to the provisions of the report. It has since announced, however, that the debate on this White Paper will not take place until the autumn and that it would like time to consider it—another way of saying that it is giving consideration to the opinions expressed by the opposition. We cannot, at this stage, say whether the Beveridge recommendations are to be set aside, but it would be a national scandal if they are. What is the purpose of appointing a committee to examine the problem if the recommendations, having been considered and adopted, are to be set aside? It would be a great waste of the time of the committee and of the country's money.

It is our view that the real opposition of the Church is concerned with the declining church-going population and not with ethics. Otherwise, it could have applied for a licence itself to run religious programmes on Sunday. The Church opposed radio in its early days, but is now glad to occupy programme time on Sunday for the radiation of Church services. Surely there can be no more certain way of reaching the widest possible public than through the ether. In this connection two organisations have been formed, one pledged to oppose and the other to support sponsored TV. The Popular Television Association is the latter and the president is Lord Derby.

It is felt that a fundamental principle is involved and that it is dangerous to leave the important influence of television in the hands of a monopoly.

Adequate provisions are made in the report to ensure that the highest standards of good taste in programmes are maintained.

The BBC answer is that they could themselves provide alternative programmes if they were allowed to retain all the licence fees and they have applied for use of all of the eight frequency bands set aside for sponsored TV. The Government should ignore Church opposition. It had its say before the Beveridge Committee, and if it wishes to re-open the matter everyone else who gave evidence should have the opportunity of doing the same. The Government should stand by the recommendations of its committee and not listen to the verbal coronachs of Church spokesmen, however highly placed.

"Practical Wireless" Comes of Age

THE October issue of our companion journal, *Practical Wireless*, celebrates its twenty-first year of continuous publication. It is a souvenir issue of 96 pages in a specially printed cover and contains a free-gift blueprint of the editor's latest receiver—the "Coronet AC4."

It is packed with special features and will be on sale on September 4th.—F. J. C.

THE BEGINNER'S TIMEBASE–1

DETAILS OF THE CONSTRUCTION OF AN INEXPENSIVE UNIT FOR ELECTROSTATIC TUBES

By B. L. Morley

THIS unit has been designed to accompany the beginner's TV superhet described in previous issues, though it can be used with any type of vision receiver. It is entirely self-contained on a single chassis complete with its own power pack, and comprises the timebase, CRT network and EHT supply.

The total cost should not exceed £8 and will probably be rather less than this where the constructor possesses a spares box. Those who have built the TV superhet described previously will find the cost well below the £8, as parts surplus to the R3170A unit can be used in this timebase.

Although the design has been simplified for the novice the circuits are very sound and can be used with confidence by even the advanced worker. The unit is especially useful for the experimenter as all components are easily accessible and it is a simple matter to change components for the purpose of experiment.

One important feature is that the construction can be carried out in easy stages and a test made at each stage. As an example, the first stage in construction enables the E.H.T. supply and tube network to be completed, and when this is done the circuit can be tested to ensure that everything is working as it should do, before proceeding further. This enables faults to be cured in the individual stages, so that if a fault does occur it is readily localised.

An additional benefit obtained from this method of construction is that a very clear idea of the function of the various parts of the timebase is automatically obtained in the building process.

General Description

The unit is based on a readily obtainable ex-Gov. unit the Type 6 indicator. There are various modifications which have been made to the original Type 6 indicator and they have been numbered differently. The one used in the prototype was a 6H and the data will refer to this particular unit. The 6H was used as it appears to be the one which is in the greatest supply, but there is no reason why another of the series (a 6D for example) should not be used. Basically the units are the same, the main difference being in the component values.

If a type other than the H is used then it will only be necessary to compare the resistors and condensers available in the unit with the actual list of components required and to obtain those which are in the list but are not in the unit.

It will be observed that the CRT projects beyond the end of the unit. This has been arranged first to allow room for the power pack, secondly to avoid the restricted view which results when the tube is completely enclosed in the unit, and thirdly so that the unit can be mounted in a cabinet and a correct mask used together with a magnifier if desired. If it is required to use the unit purely as an experimental model then the tube can remain in its original position but the power pack (H.T. and E.H.T.) will have to be constructed on a separate chassis.

E.H.T. is derived from the usual mains transformer which is fitted at the rear of the chassis. A valve rectifier is used as they are available from ex-Gov. stocks very cheaply; the prototype employed a VU134 which was surplus to the R3170A unit described in previous issues, but any similar type such as VU111, VU120A or 2X2 can be employed.

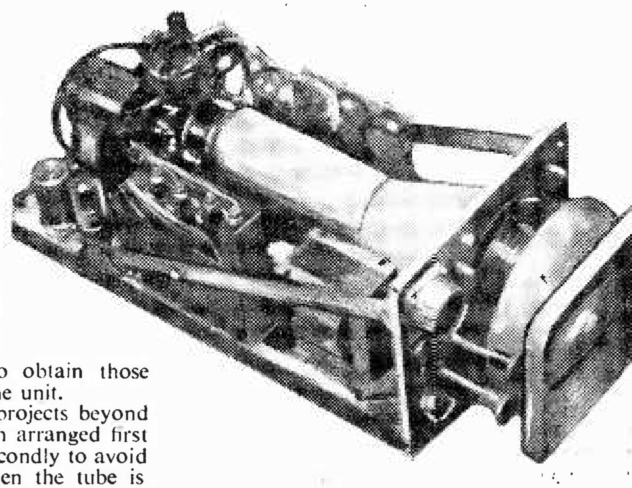
It is important to adhere to the specifications for the mains transformer and choke used in the power supply. Space is very restricted and these items have been chosen with considerable care so that they can be accommodated in the positions shown in the photographs. The dimensions of the transformer must not exceed 4in. x 3¼in. x 2¼in. overall and the smoothing choke must not be more than 2¼in. x 2in. x 2in. (these measurements need not include fixing lugs). A suitable mains transformer and smoothing choke are obtainable from Clydesdale Supply Coy.

Indicators type 6 contain a VCR97 tube fitted with a mu-metal screen. There should be no need to describe this tube which has been used with great success in thousands of receivers. The screen colour is light green and is 6 in. in diameter. It is important that a mu-metal screen is fitted to the tube; this type of screen is a normal fitting to the tubes used in this type of unit. Severe distortion of the raster is liable if the screen is removed.

The Circuit

The circuit is given in Fig. 1. It is quite straightforward and uses well-known and well-tried principles.

The input should be positive going on picture



A view of the beginner's timebase.

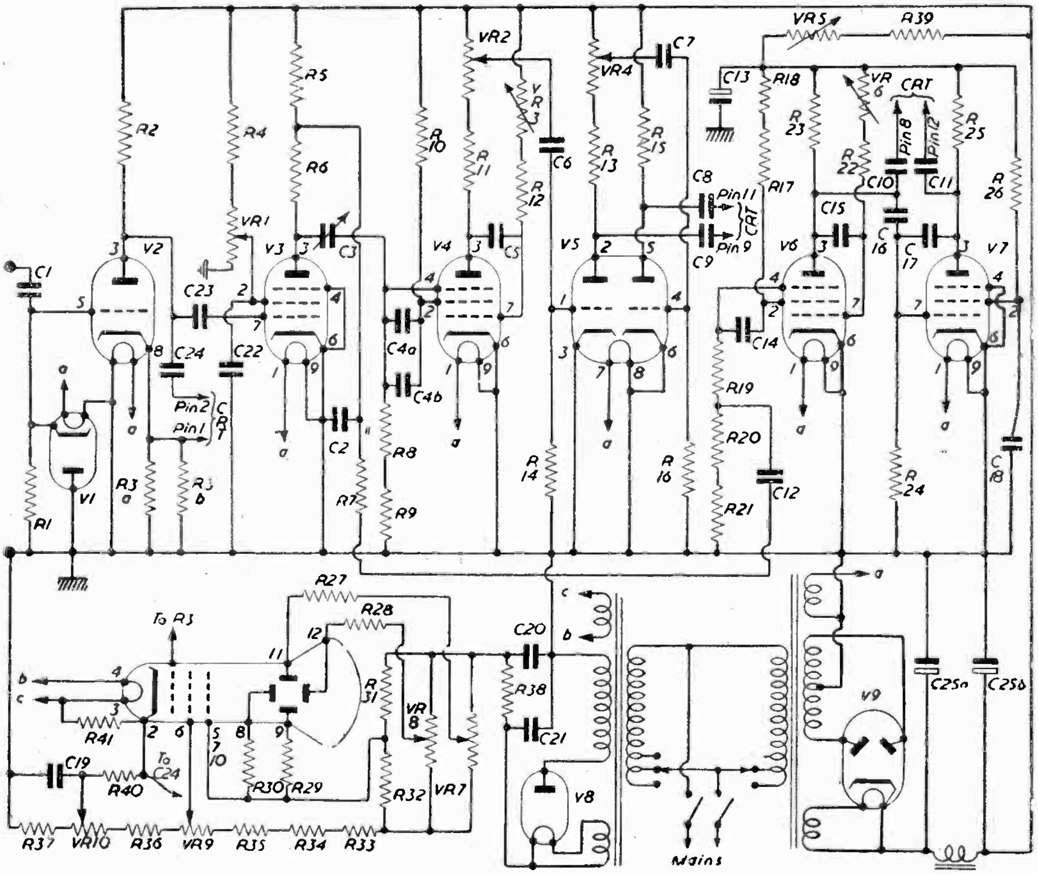


Fig. 1.—Theoretical circuit of the complete unit.

LIST OF PARTS FOR FIG. 1

R1 1 M Ω.
R2 10 K Ω 2 w
R3a 18 K Ω
R3b 22 K Ω
R4 100 K Ω
R5 47 K Ω 1 w
R6 6.8 K Ω 1 w
R7 33 K Ω
R8 27 K Ω
R9 27 K Ω
R10 47 K Ω
R11 27 K Ω 2 W
R12 470 K Ω
R13 100 K Ω 2 W
R14 1.2 M Ω
R15 100 K Ω 2 W
R16 1.8 M Ω
R17 22 K Ω
R18 33 K Ω
R19 38 K Ω
R20 22 K Ω
R21 10 K Ω
R22 5.6 M Ω
R23 100 K Ω 1 W
R24 2.2 M Ω
R25 100 KΩ 1W.
R26 68 K Ω ½ W. (2 W. can be used).
R27 2.2 M Ω
R28 2.2 M Ω
R29 2.2 M Ω
R30 2.2 M Ω
R31 220 K Ω
R32 220 K Ω
R33 1 M Ω 1 W.
R34 1 M Ω 1 W.
R35 1 M Ω 1 W.
R36 150 K Ω 1 W.
R37 27 K Ω 1 W.
R38 470 K Ω
R39 22 K Ω 2 W.
R40 1 M Ω
R41 470K Ω
All ¼ W. unless stated otherwise (see text).

VR1 20 K Ω w.w. Sync.
VR2 20 K Ω w. w. width.
VR3 2 M Ω carbon. Line hold.
VR4 20 K Ω w.w. Linearity.
VR5 20 K Ω 10 W. w.w. Height.

C6 0.1 μF
C7 0.1 μF
C8 0.1 μF 2.5 K v
C9 0.1 μF 2.5 K v
C10 0.1 μF 2.5 K v
C11 0.1 μF 2.5 K v
C12 0.01 μF
C13 8 μF 450 v. elec.
C14 0.005 μF
C15 0.005 μF
C16 0.001 μF
C17 0.001 μF
C18 0.1 μF
C19 0.05 μF
C20 0.1 μF 2.5 K v
C21 0.1 μF 2.5 K v
C22 0.1 μF
C23 0.1 μF
C24 0.1 μF
C25 {a, 8 μF; b, 16 μF}

All 450 v working unless stated otherwise. (See text).

VR6 2 M Ω carbon. Frame hold.
VR7 1 M Ω carbon. Horizontal shift.
VR8 1 MΩ carbon. Vertical shift.
VR9 500 K Ω carbon. Focus.
VR10 500 K Ω carbon. Brilliance.

V1 EA50
V2 6J5G
V3 EF50
V4 EF50
V5 6SN7
V6 EF50
V7 EF50
V8 VU134
V9 VU39A

C1 0.1 μF
C2 0.0025 μF
C3 0.30 pF
C4a 100 pF
C4b 300 pF
C5 100 pF

signal, i.e., the detector of the vision receiver should be so connected that the output of the video valve provides a picture which is positively phased. This is fairly standard practice with VCR97 circuits.

V1 is the D.C. restorer and provides a D.C. level for the signal input to V2; the coupling condenser C1 removes the D.C. component which was contained in the video signal at the anode of the video valve and in order to provide correct condifions for synchronisation and a black reference level for the picture tube the D.C. component must be restored.

It is possible to use one of the modern crystal diodes in this position, but it was found that the EA50 (service number VR92) provided a better signal for modulation of the tube.

The signal is fed directly to V2 which is the phase-splitter valve. A 6J5G was used for this valve in the prototype, but any 6v triode or pentode strapped as a triode can be used in this position.

The function of the valve is to supply a positively phased sync signal (picture content negative) for the sync separator V3, and at the same time supply a positive going picture signal for modulating the grid of the tube. The grid of the tube is fed from the cathode resistor R3aR3b, while the sync separator is fed from the anode via the coupling condenser C23.

A further connection is taken from the anode of this valve which feed the cathode of the tube via the coupling condenser C24. By this method double modulation of the tube is achieved; when the white parts of the picture come along they are positive on the cathode of V2 and negative on the anode. By applying the positive to the grid of the tube then the current through the tube increases and the screen becomes brighter; this represents the white part of the picture.

Another method of making the screen of the tube brighter is to make the cathode of the tube more negative; this in effect makes the grid more positive and so increased current will flow. If we now modulate the grid in one direction (positive) and the cathode in the reverse direction (negative) we have in effect a push-pull circuit. The practical result is a picture with a much brighter contrast range. By this method the picture can be viewed in full room lighting provided the light does not fall directly on the face of the tube.

One point which may cause comment is the use of two resistors in the cathode circuit. This is done simply to utilise to the full those components which were available in the unit. The approximate value is 10K Ω, and if the reader wishes to try the circuit other than by using an indicator type 6, then a value of 10K Ω ½ watt should be used in lieu of R3aR3b.

The value of 10 K Ω in the cathode circuit may appear a little high, but it is the best value for use with the 6J5. If a valve other than the 6J5 is used then the cathode resistor should be some value between 3.3 K Ω and 10 K Ω.

Use of double modulation of the tube means that the full picture signal is produced in the anode of V2. In order to retain the full quality of the signal it would have been better to have made R2 about 3.3 K Ω with an equivalent value for R3. However, as the VCR97 provides quite a good picture without making these changes, it was not thought worth while reducing the overall gain of V2 by this method as it would have involved further complications in the sync circuits.

The output of V2 is fed to the sync separator V3. In order that this valve can be adjusted to work on the optimum portion of its characteristic curve and thereby provide the best separating conditions, the screen voltage is made variable through the potentiometer marked VR1. This makes good use of a component surplus in the unit. The control is pre-set and is labelled "SYNC."

Line pulses are fed from the anode of V3 via the differentiating circuit, and the coupling component C3 is made variable so as to obtain the optimum amplitude of sync pulse. If it is found that the picture is inclined to appear with jagged outlines, Then C3 can be reduced from maximum capacity to a point where the best conditions are obtained.

SHOPPING LIST

Note that this list contains the components required in addition to the Indicator 6H unit. The constructor is advised to purchase his unit first, and then decide from consultation of the list given on page 149. The total number of additional items which will be required.

RESISTANCES
- One 1 Megohm ½ watt.
- Four 1 Megohm 1 watt.
- One 10 K Ω 1 watt.
- One 47 K Ω 1 watt.
- Two 27 K Ω 1 watt.
- One 47 K Ω ½ watt.
- One 27 K Ω 2 watt.
- Two 100 K Ω 2 watt.
- One 22 K Ω ½ watt.
- One 33 K Ω ½ watt.
- Three 2.2 MΩ ½ watt.
- One 150 K Ω 1 watt.
- One 470 K Ω ½ watt.

VARIABLE RESISTORS
- Two 2 MΩ carbon.
- Two 1 MΩ carbon.

CONDENSERS
- One 0-30 pF (postage stamp type).
- Six 0.1 μF 2.5 Kv. wkg.
- One 8 μF 500 v. (Dubilier Drilitic).
- One 0.005 μF 450 v. wkg.
- Two 0.001 μF mica.
- One 0.05 μF 450 v. wkg.
- Three 0.1 μF 450 v. wkg.
- One 8+16 μF 450 v. wkg.

SUNDRIES
- One mains transformer. 350-0-350 80 m/A. 6.3 v. 4-5 A 4-5 v. 2-3 A. Clydesdale Supply Co. (see text).
- One smoothing choke type W/B 104. Clydesdale Supply Co. (see text).
- One VU39A valve.
- One VU134 valve.
- One four-pin ceramic valveholder.
- One four-pin valveholder.
- One EA50 valve and holder.
- One VCR97 mask (optional).
- One EHT transformer for VCR97 (available various suppliers).
- One 6J5 valve (see text).

It is important to note that the mains transformer and smoothing choke should conform to the specification as regards overall dimensions and outputs. In order to assist constructors the name of a firm who are known to have supplies of the type needed to meet the specification is quoted above; the actual make of the transformer is immaterial provided it meets the specifications.

The working voltages of the condensers are the minimum; condensers of higher working value can be used.

V4 is the line oscillator working in a simple Miller transitron circuit, the frequency being controlled by VR3, the "LINE HOLD" control. Its output is taken from the slider of VR2 which forms the width control, and is fed to the 6SN7 amplifier, V5.

The input to the second portion of this valve is taken from the potentiometer VR4; this allows good control of each section of the valve and assists materially to linearise the line scan. It is labelled the "LINEARITY" control.

The outputs of the 6SN7 are fed to the X plates of the tube via the high-voltage condensers C8, C9.

From the junction of R5 and R6 is taken the frame sync. pulse; this is fed via the integrating circuit to the frame oscillator V6 which is another Miller transitron type. V7 is the paraphrase valve which amplifies the output of V6 in the reverse phase, the outputs of the two valves thus being in push-pull to modulate the Y plates of the tube.

The frequency of the oscillator is controlled by VR6, which is labelled "FRAME HOLD."

H.T. supply to the frame circuit is controlled by VR5; increasing the H.T. increases the amplitude of the output: this control is therefore labelled "HEIGHT."

The power supply is quite standard, but it should be noted that although the transformer output is specified as being 350 v., the actual voltage in the circuit will be in the region of 400 v. For this reason C25 should be 450 v. working.

The VU39A rectifier has a 4 v. heater and is indirectly heated. This avoids the high surge voltages which arise when a valve such as the 5U4G is used.

E.H.T. is obtained from a transformer, the rectifying valve V8 being so arranged that a positive output is obtained. C21 and C20 are used in conjunction with R38 for smoothing and the smoothed current is applied to the bleeder chain R31, 32, 33, 34, 35, VR9, R36, VR10, R 37. Bias for the deflector plates is taken from the fixed potentiometer R31, 32, while the two opposite plates have variable bias via VR7 and VR8; this is to allow the spot to be centralised on the screen. VR7 operates horizontally and is therefore labelled the "HORIZONTAL SHIFT," and VR8 operates vertically and is labelled "VERTICAL SHIFT." VR9 is the "FOCUS" control and VR10 is the "BRILLIANCE" control.

Note that a resistance R41 couples the cathode and heather of the C.R.T.; this resistance must not be omitted or trouble from hum will be experienced.

Having described the circuit we will now proceed to the building of the unit. The work is done in easy stages and tests are applied after each stage has been completed.

Stage I—Preparing the Unit

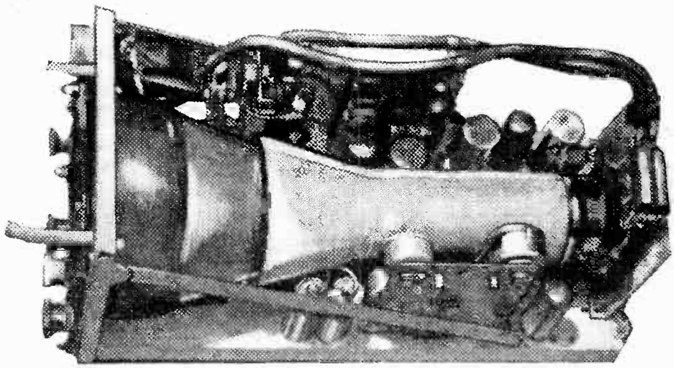
The first step is to remove the C.R.T. by unscrewing the mounting which holds the tube base: the screws are found underneath the chassis. When the base is removed the tube can be slid out of its mask and placed in a safe position.

Remove the C.R.T. holder and associated wires completely. The wires should be retained for use when rebuilding the unit as they are heavily insulated and are useful in wiring E.H.T. circuits.

The coaxial cables to the top of the tube-holder should be removed.

Remove the panel containing coils, etc., and strip the panel. Remove the small transformer adjacent to the front panel; remove the potentiometer panel and resistors; remove the mask but refix the bolts which held the mask to the chassis.

The whole unit should now be completely dismantled, unsoldering all condensers and resistances. The only items which should be left *in situ* are the focus and brilliance controls, the switch labelled "Marker Pips," the bottom one of the three Pye sockets, the various tag-panels and the valveholders.



Another view of the complete unit.

The blue wiring on the valveholders can be left *in situ* and the earths on the various pins can also be left.

This is the completion of Stage I and the chassis should now be entirely free of components and encumberances other than those mentioned.

Proceed to Stage II.

Stage II—Preliminary Reconstruction

The C.R.T. is mounted as shown in the photographs. The first step is to cover the tube orifice in the chassis with some cushioning material to prevent the fragile glass envelope of the tube bearing directly on the metal. This can most easily be done by cutting a length of the P.V.C. covering used on coaxial cable equal to the circumference of the hole; the P.V.C. is then slit throughout its length and inserted round the periphery of the hole like a tyre on a bicycle.

Now the tube can be pushed through the hole, and the tube base (still mounted on its metal holder) is placed in position; the tube is inserted in the hole as far as it will go, the tube-holder is pushed firmly home and then the position for drilling holes for the metal holder can be marked on the chassis. Fig. 2 shows the idea.

In Fig. 3 is shown the method of mounting the tube mask. It is advised that one of the inexpensive white rubber masks is fitted to the tube as it does much to enhance the appearance of the picture and takes away the "home-made" look of the screen.

(To be continued)

Standard Frequency Transmissions

DETAILS OF A NEW SCHEDULE OF N.P.L. BROADCASTS FROM RUGBY

STANDARDS of frequency and time differ from other standards of measurement in that they can be made available continuously over wide areas by means of radio transmissions. The frequencies of 2.5, 5, 10, 15, 20, 25 Mc/s have, by international agreement, been allocated to this purpose and a continuous service on all of these frequencies is in operation from station WWV of the National Bureau of Standards situated near Washington D.C.

Such transmissions enable the user to standardise his equipment without having to install and maintain costly and elaborate equipment, but to be fully effective they must be received in all parts of the world at all times. The WWV transmissions do not meet this requirement, and experiments on an international scale are, therefore, being conducted under the general direction of the International Radio Consultative Committee in order to discover the best means of securing world-wide coverage.

Transmissions from the United Kingdom

As the United Kingdom's contribution to this programme, transmissions, each of 31 minutes duration on 5 and 10 Mc/s have been made daily since February, 1950, from the Post Office station at Rugby, under the call sign MSF. Numerous reception reports have been received and have helped in the planning of the second stage of this experiment which was inaugurated on May 26th, 1953. The transmission period is now extended to 24 hours per day and the power reduced from 10 kW to 0.5 kW. The transmission is interrupted during the interval between 15 and 20 minutes past each hour to enable one station alone to be measured under those conditions in which two stations such as MSF and WWV are being received at nearly equal strengths. The break in transmission also permits radio noise measurements to be made if no other transmission is present.

Transmissions at present are made on 2.5, 5 and 10 Mc/s ; later, 15 and 20 Mc/s may be used but only three frequencies will be broadcast simultaneously. The carriers are modulated in accordance with the following 60 minute schedule :

Minute past each hour	Modulation
0 - 5 30 - 35 45 - 50	1000 c/s
5 - 10 20 - 25 35 - 40 50 - 55	1 c/s pulses, the 59th pulse in each minute being omitted
10 - 14 25 - 29 40 - 44 55 - 59	unmodulated
14 - 15 29 - 30 44 - 45 59 - 60	speech announcement

Accuracy of the Transmissions

The carrier and modulation frequencies are all derived from the same 100 kc/s standard and are maintained within ± two parts in 10^8 of their nominal values. The frequency of the received signal may vary throughout the day, however, if there are ionospheric reflections in the transmission path. This frequency error is due to the movement of the reflecting layers ; it seldom exceeds ± two parts in 10^7 and for a large part of the day is not more than a few parts in 10^8. The transmitted frequencies do not, in general, vary from day to day by more than ± two parts in 10^9.

Uniform Time—A New Time Scale

The frequencies and, therefore, the time intervals marked by the seconds pulses are measured on what may be called an estimated uniform time scale.

There is evidence that the length of the day varies by about one millisecond in a periodic manner in the course of the year, partly due to a variation in the position of the earth's poles and partly due to a variation in the rate of rotation of the earth on its axis. For precise physical measurements such as the checking of the long term stability of a quartz standard it is desirable to remove this fluctuation. The extent of the fluctuation is estimated at the Royal Greenwich Observatory and is applied as a correction in setting the frequency of the standard controlling the transmissions.

Special Experimental Transmission on 60 kc/s

The frequencies allocated to standard transmissions are not the most suitable for use within the United Kingdom. A lower frequency has some advantages because the ground wave is then received and errors due to the Doppler changes at the reflecting layers are avoided. A special transmission at a frequency of 60 kc/s and a power of 10 kW is, therefore, made for use in the United Kingdom. The transmitter used for this purpose is a standby transmitter for a communication channel and is not always available for standard frequency transmissions. Experience has shown that a reliable service can be maintained if the transmissions are restricted to one hour per day. This transmission period is 1429-1530 G.M.T. and the modulation programme will be the same as for the short waves.

Frequency and Time Adjustments

Some adjustments to the frequency of the standard are necessary in order to keep within the stated tolerance of ± two parts in 10^8. The standard, which is an Essenring oscillator made by the Radio Branch of the General Post Office, has increased in frequency fairly steadily at the rate of about two parts in 10^9 per month since its installation in February, 1950. It is therefore set to be 1×10^8 less than its nominal value and is reset when it has drifted to 1×10^8 above nominal. Nine adjustments were made in the period between February, 1950, and February, 1953.

The seconds pulses are derived from the standard by division and consist of five cycles of 1,000 c/s tone. The precision of the pulses is ± 1 μs and the time interval between two pulses is, therefore, accurate to ± two parts in 10^8 ± 2μs. For example, if the frequency is 1×10^{-8} high then the time interval between corresponding pulses on consecutive days is 1×10^8 (approximately one millisecond) less than one day. The time error is integrated and in general no attempt is made to alter the phase of the pulses so as to make them coincident with uniform time. If, however, they are in error by more than 50 milliseconds an adjustment of 50 or 100 milliseconds is made. Such adjustments are made on the first day of the month and the extent of the adjustment is announced.

Reception Reports

The MSF service of transmissions is still experimental and reports concerning reception will be welcomed.

They should be addressed to The Director, National Physical Laboratory, Teddington, Middlesex, England.

THE NATIONAL RADIO SHOW

EARLS COURT
Sept. 2-12

List of Exhibitors in Alphabetical Order, with Stand Numbers

Name	*Address*	*Stand No.*
Aerialite Ltd. ...	Castle Wks., Stalybridge, Cheshire	79
Allen Radio, Ltd., Richard	Caledonia Rd., Batley, Yorks	85
Ambassador Radio (R. N. Fritton, Ltd.)	Princess Wks., Brighouse, Yorks	5
Antiference, Ltd....	67, Bryanston St., Marble Arch, W.1	53
Argosy Radiovision, Ltd.	Argosy Wks., Hertford Rd., Barking, Essex	3
Association of Radio Battery Mnfrs.	41, Gordon Square, London, W.C.1	99
Automatic Coil Winder & Elec. Equip. Co., Ltd.	Winder House, Douglas St., S.W.1	15
Baird Television, Ltd.	Lancelot Rd., Wembley, Middx.	59
Balcombe, Ltd., A. J.	52, Tabernacle St., London, E.C.2	101
Belling & Lee, Ltd.	Cambridge Arterial Rd., Enfield, Middx.	102
Boosey & Hawkes, Ltd.	Electronics Division, Deansbrook Rd., Edgware, Middx.	209
Bowmaker, Ltd....	Bowmaker House, Lansdowne, Bournemouth	210
British Radio and Television	92, Fleet Street, E.C.4	25
Brown Bros., Ltd.	Browns Buildings, Gt. Eastern St., London, E.C.2	70
Bulgin & Co., Ltd., A. F.	Bye-Pass Rd., Barking, Essex	1
Bush Radio, Ltd.	Power Rd., Chiswick, W.4	74 & 97
Champion Elec. Corp.	Champion Wks., Newhaven, Sussex	71
Cole, Ltd., E. K.	Ekco Wks., Southend-on-Sea, Essex	100
Collaro, Ltd. ...	Ripple Wks., Bye-Pass Rd., Barking, Essex	35
Co-operative Wholesale Society, Ltd.	Publicity Dept., 99, Leman St., London, E.1	6
Cosmocord, Ltd.	700, Gt. Cambridge Rd., Enfield, Middx.	234
Cossor, Ltd., A. C.	Cossor House, Highbury Grove, N.5	90
Decca Record Co., Ltd.	1/3, Brixton Rd., London, S.W.9	48
Domain Products, Ltd.	Domain Wks., Barnaby St., N.W.1	13

Name	*Address*	*Stand No.*
Dubilier Condenser Co. (1925), Ltd.	Ducon Wks., Victoria Rd., North Acton, W.3	98
Dynatron Radio, Ltd.	Perfecta Wks., Ray Lea Rd., Maidenhead, Berks	112
Econasign Co., Ltd.	92, Victoria St., London, S.W.1	20
Edison Swan Elec. Co., Ltd.	155, Charing Cross Rd., W.C.2	51
Electronic Precision Equipment, Ltd.	Elpreq House, High St., Wealdstone, Middx.	222
E.M.I. Sales & Service, Ltd.	Head Office, Hayes, Middx.	93 & 104
English Elec. Co., Ltd.	Queens House, Kingsway, W.C.2	52
Ever Ready Co. (G.B.), Ltd.	Hercules Place, Holloway, N.7	30
Ferguson Radio Corp., Ltd.	105, Judd St., London, W.C.1	57
Ferranti, Ltd. ...	Hollinwood, Lancs	49
Garrard Eng. & Mfg. Co., Ltd.	Newcastle St., Swindon, Wilts.	103
General Elec. Co., Ltd.	Magnet House, Kingsway, W.C.2	89
Goodmans Industries, Ltd.	Axiom Wks., Wembley, Middx.	37
Gramophone Co., Ltd.	Head Office, Hayes, Middx.	92
Hunt (Capacitors), Ltd., A. H.	Bendon Valley, Garratt Lane, Wandsworth, S.W.18	88
Imhof, Ltd., Alfred	112/116, New Oxford St., W.C.1	211
Invicta Radio, Ltd.	Parkhurst Rd., Holloway, N.7	47
J. B. Mfg. Co. (Cabinets), Ltd.	86, Palmerston Rd., Walthamstow, E.17	27
Kolster - Brandes, Ltd.	Footscray, Sidcup, Kent	32
McMichael Radio, Ltd.	190, Strand, London, W.C.2	34
Marconiphone Co., Ltd.	Hayes, Middx.	58
Masteradio, Ltd.	10/20, Fitzroy Place, N.W.1	46
Mullard, Ltd. ...	Century Hse., Shaftesbury Ave., W.C.2	91
Multicore Solders, Ltd.	Maylands Ave., Hemel Hempstead, Herts	111
Murphy Radio, Ltd.	Welwyn Garden City, Herts	31

(Continued on page 154)

(*Continued from page 153*)

Name	Address	Stand No.
NEWNES, LTD., GEO.	**TOWER HOUSE, SOUTHAMPTON ST., W.C.2**	**87**
Pamphonic Sales, Ltd.	400, Holloway Rd., London, N.7	108
Peto Scott Electrical Instruments, Ltd.	Addlestone Rd., Weybridge, Surrey	77
Philco (Overseas), Ltd.	Romford Rd., Chigwell, Essex	50
Philips Electrical, Ltd.	Century Hse., Shaftesbury Ave., W.C.2	33
Pilot Radio, Ltd.	31/37, Park Royal Rd., N.W.10	56
Plessey Co., Ltd.	Vicarage Lane, Ilford, Essex	113
Portogram Radio Elec. Industries, Ltd.	Priel Wks., St. Rule St., S.W.8	36
"PRACTICAL WIRELESS" & "PRACTICAL TELEVISION"		**87**
Pye, Ltd.	Radio Wks., Cambridge	76
Radio Gramophone Dev. Co., Ltd.	Eastern Avenue West, Mawneys, Romford, Essex	94
Regentone Radio & Television, Ltd.	Eastern Avenue West, Mawneys, Romford, Essex	60
Reproducers (Electronic), Ltd.	82, Great Portland St., W.1	233
Roberts' Radio Co., Ltd.	Creek Rd., East Molesey, Surrey	11
Rola Celestion, Ltd.	Ferry Wks., Summer Rd., Thames Ditton	8
Rudman, Darlington (Electronics), Ltd.	Wednesfield, Staffs	208
Simon Sound Service, Ltd.	48, George St., Portman Square, W.1	95
Sobell Industries, Ltd.	Langley Park, Slough, Bucks	55
Standard Telephones & Cables, Ltd.	Connaught House, Aldwych, W.C.2	81
Standard Telephones & Cables, Ltd. (BRIMAR)	Footscray, Sidcup, Kent	9
Stella Radio & Television Co., Ltd.	Oxford House, 9/15, Oxford St., W.1	72
Taylor Electrical Instruments, Ltd.	419, Montrose Ave., Slough, Bucks	105
Telegraph Condenser Co., Ltd.	Wales Farm Rd., North Acton, W.3	107
Telequipment, Ltd.	1319A, High Rd., Whetstone, N.20	28
Telerection, Ltd....	Antenna Wks., St. Pauls, Cheltenham, Glos	7
Television Society	164, Shaftesbury Ave., W.C.2	220
Trix Electrical Co., Ltd.	1/5, Maple Place, Tottenham Ct. Rd., W.1	16
Truvox Ltd. ...	Exhibition Grounds, Wembley, Middx.	106
Ultra Electric, Ltd.	Western Ave., Acton, W.3	73
Valradio, Ltd. ...	New Chapel Rd., Feltham, Middx.	207
Vidor, Ltd. ...	West St., Erith, Kent	75
Waveforms, Ltd.,	Radar Wks., Truro Rd., N.22	26
Westinghouse Brake & Signal Co., Ltd.	82, York Way, King's Cross, N.1	54
Whiteley Electrical Radio Co., Ltd.	109, Kingsway, W.C.2	109
White Ibbotson	205, Station Rd., Harrow	4
Wolsey Television, Ltd.	75, Gresham Rd., Brixton, S.W.9	61
Wright & Weaire, Ltd.	138, Sloane St, London, S.W.1	110

BBC Special Scenic Effects

VIEWERS may be interested to know that new methods of producing special scenic effects have been used in some recent television programmes. These effects are achieved with new apparatus, installed in one of the studios at Lime Grove, which makes it possible to produce a composite picture from scenes viewed by two separate cameras. In one method, the apparatus removes a chosen area from the first picture, thus leaving a "hole" into which the second picture is inserted. For example, in front of one camera may be a photograph of a house and in front of another camera a window from which an artist is waving. By electronic means the pictures can be joined in such a way that the artist appears to be waving from a window in a real house. This effect is called "inlay."

Overlay

In another method, one camera views, for example, an artist moving in front of a white screen, while another camera or a film scanner provides the background scenery from a photograph or a film, the two pictures are combined electronically so that the artist appears to be moving about freely in front of the scenery. This is called "overlay." In this case the apparatus makes a "hole" in the background picture exactly to fit the outline of the artist appearing in the other picture. The two pictures are combined so that the image of the artist exactly fills the blank space in the background.

The equipment used for both inlay and overlay was developed and built by the BBC Engineering Designs Department.

Bias and the Video Stage

THE IMPORTANCE OF VIDEO STAGE CATHODE CIRCUITRY ON PICTURE QUALITY

By W. J. Delaney (G2FMY)

FOR maximum picture definition on the present system a straight line frequency response up to 2.75 Mc/s is required, and in most cases this cannot be obtained in the receiver proper. The reception of a single side-band station offers many problems, and the shunting effect of stray capacities as well as the effect of the H.T. supply all help to reduce the response at the upper end of the frequency spectrum. As a result it is customary in most receivers to add devices in the video stage to accentuate the higher frequencies and thus restore the response to a level throughout the desired frequency range. Usually these devices consist merely of small inductances in the grid and anode circuits of the video stage, the values being chosen so that they resonate round about 2.5 Mc/s. There is, however, a drawback to their use and, although a poor response can apparently be restored by the use of these devices, the result is not the same as that given by a receiver which is designed for correct response without them. One of the principal defects introduced by some of these peaking coils is that they ring at some particular frequency, and this can be avoided by damping them. Some types of coils are, in fact, wound on a resistor of high value, the ends of the coil being joined to the ends of the resistor. Although a peaking coil may be justified in the grid circuit of the video stage, it should not be necessary to have any in the anode circuit, and in the P.W. receiver, it will be remembered, a single 250 μH coil was employed in the grid lead and the response of this receiver was good enough to see the 3 Mc/s bars without any trace of ringing.

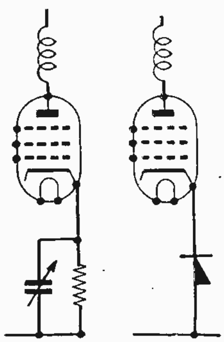


Fig. 1.—A variable bias condenser. Fig. 2. — A rectifier for biasing the video stage.

Bias

However, it is not proposed to enter into a discussion on the use or otherwise of these peaking chokes, but to deal with the question of biasing the video stage which, when the valve is operated in such a manner as to provide a signal for a cathode-modulated tube, can be quite a problem. An examination of various manufacturers' designs will show that there have been many attempts to overcome the defects of the biasing circuit, or to use cathode compensation for some defects in the earlier stages. A simple test may be applied to any home-made receiver and, in fact, to many commercial models. Usually, across the bias resistor in the cathode circuit of the video stage will be found a fixed condenser. This may have any value from 500 pF up to 2.200 pF—these being the usual limits. Solder a length of insulated wire to the cathode pin and bring this out so that the end may be contacted whilst the receiver is operating. Now between the chassis and this lead connect various small value fixed condensers. It will be noted that as the value of the condenser is increased, outlining of the picture will take place, at extreme values the edges of figures, etc., carrying quite thick white lines. It will also be noticed that all the whites in the picture will appear much brighter, even to the extent of defocusing in some receivers. The reason for this is that the impedance of the bias resistor varies with frequency, and if there is no condenser across it a form of negative feedback takes place. Now if a capacitor is connected across the resistor the N.F.B. factor is modified according to the capacity of the condenser, the value of the resistor and the frequency being handled. Unfortunately, it is difficult to arrive at a combination which will give all the desired attributes without any of the bad features, and theoretically it would be better to dispense with the automatic bias entirely, connect the cathode direct to chassis (H.T.—) and use a biasing battery to bring the grid to the desired working point. Again, this has certain drawbacks, but before going further, there are two simple arrangements which have been adopted by well-known commercial set makers. The first is shown in Fig. 1 in which it will be seen that a variable condenser (of low value, of course) is connected across the resistor, and this is made in the form of a pre-set control labelled "Picture quality." There is, of course, a very small fixed condenser in parallel to act as a minimum value. In Fig. 2 is the latest attempt at solving the problem where a special metal rectifier is employed and the impedance of this varies with frequency in such a manner that it provides the desired optimum value at approximately all frequencies. For the purpose of this article the question of phase is being ignored although it plays quite a large part in the video stage.

Auto Bias

Fig. 3 shows how a biasing battery would be

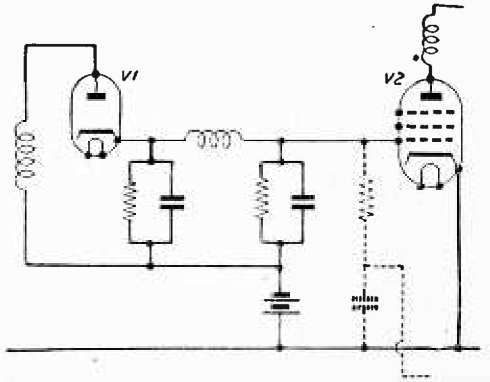


Fig. 3.—Using a battery for providing video stage bias.

arranged to bias the video stage (V2). Although the final tuning coil feeding V1 could be taken to the chassis line, there are difficulties in another respect, and furthermore, a large capacity across the battery does not help. The only point about the circuit is that it is possible to add a further resistor and condenser, as shown in the broken line, and to take out the sync pulse from this point, but the arrangement has not been found very successful. However, another designer has worked on the same arrangement and the result is shown in Fig. 4, which is taken from the Teleking circuit. It will be seen that in place of the battery the necessary voltage has been obtained by means of a diode connected to the 6.3 volt heater supply. This diode rectifies the 6.3 volt A.C. supply and applies it to the grid of the video stage, with suitable decoupling and smoothing components. The necessary cathode compensation is made in this circuit by using auto-bias sufficient to bring up the value to the desired level, a low value resistor being included in the cathode circuit with a very high cathode by-pass. For those who wish to experiment it would be instructive to short out or remove all peaking coils and to see the effect of retuning the R.F. stages (or I.F. in a superhet receiver). Further, the experiment may be tried, providing that the circuit lends itself to it, of reversing the polarity of the video detector and using the video stage with the minimum of protective bias and grid modulating the tube. Of course, these changes should only be made by those sufficiently experienced to be able to replace the circuit, etc., in their original positions. Although opinion appears to be equally divided as to the merits of cathode compensation, quite a few designers claim that a picture from a receiver devoid of all peaking chokes and other similar artificial aids is much softer and more detailed than other types.

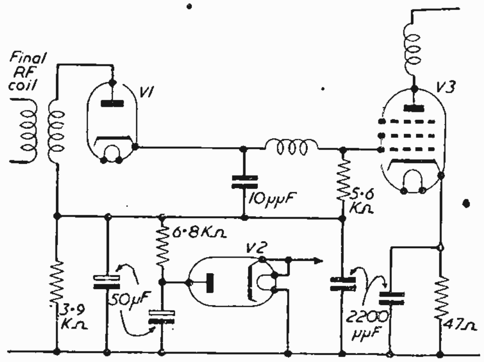


Fig. 4.—Bias obtained from the heater supply by means of a rectifier.

Marconi 80in. Lens

A NEW lens of 80in. focal length for television cameras is now on loan to the BBC by Marconi's Wireless Telegraph Co., Ltd., and was used at the televising of the Ascot meetings on the 18th and 19th June, 1953.

Its magnification is twice that of the recent 40in. lens, three of which the company supplied to the BBC earlier this year, and for which the claim was made that it could "spot a fly on the nose of a man half a mile away." During one test, the lattice work of an aerial mast three miles away was shown on the monitor screen in clear detail.

The idea of producing an even larger lens originated when a BBC official returned from the United States after having seen a 60in. lens in use on a television camera. Marconis were asked to assist and, in co-operation with the optical firm of Cox, Hargreaves and Thomson, devised it.

The designers decided to adopt the Cassegrain reflecting system—which is only suitable for focal lengths exceeding 60in. A reflecting system is more practical than a refracting one because of better weight distribution and also there is no danger of chromatic aberration.

The new 80in. lens consists, very briefly, of two reflecting surfaces, the main mirror concave and the secondary convex. By suitable proportioning of the curvature of the convex mirror a "telephoto" effect is achieved, and because of the arrangement of the mirrors in this case the overall length of the entire piece of equipment is only 20in. Again because of the arrangement of the mirrors, the main body acts as a protective hood. The total weight is about 20 lb.

There is mechanical control of the aperture through which light passes from the lens into the camera.

Big Screen at the Show

A CINEMA-SIZE television screen will be used for the first time in the Radio Show, Earls Court, from September 2nd to 12th. Measuring 21ft. by 16ft., it will be mounted over the proscenium of the BBC television studio so that the audience of nearly 1,000 may see not only all that happens on the studio floor, but also the picture chosen for transmission over the air or round the closed circuit within the exhibition.

For the benefit of front-row occupants, the picture will also be seen on two screens measuring 4ft. by 3ft.

The big-screen projector will be in the auditorium, and control equipment will be in the public entrance to the studio behind glass walls so that visitors may see it.

"Great Britain has led the world in large-screen television," an exhibition official said, "and the firm which has pioneered it is responsible for the demonstration which will be given at Earls Court. The large screen greatly adds to the value of the studio and the exhibition as a whole as a demonstration of what can be done by British television engineers using British equipment."

Modern large-screen television was first seen by the public in the Telekinema at the South Bank Exhibition, and nine British sets were working on Coronation Day in this country and one on the Continent.

Pages from a TELEVISION ENGINEERS Notebook

8.—R.F. E.H.T. SUPPLIES

ALTHOUGH the tube E.H.T. supply is now generally derived from the line fly-back, the use of R.F. oscillators is still fairly common in some large screen receivers and projection models. In the latter type of receiver, tube high-tensions of some 20 to 25 kV. are required, and the use of a tripler-rectifier circuit fed from an R.F. oscillator is a very convenient form of supply.

The basic circuit of this form is shown in Fig. 1, and is a conventional tuned-anode feedback oscillator producing an R.F. voltage across the inductance L_c, which is rectified by V_2 and filtered by C_2R_2 to provide the output D.C. potential. The frequency of operation of such oscillators is usually restricted to the range of 30 to 200 kc/s, the lower frequencies being employed when greater voltage outputs are required. For single stage rectifier circuits of the type being described, outputs of some 5 to 10 kV. at current drains of up to 1 mA. are readily obtained.

Operation

Referring to the figure, the anode circuit of the oscillator is tuned by capacitor C to the desired frequency, this being finally determined by inductance L_c, which is tuned by strays C_s. Energy is fed back from L_a to the grid coil L_g in proper phase to sustain the oscillations, and the system is self-oscillating, bias being derived across R_1.

When oscillations commence after switching on there is no bias on R_1, but the positive half-cycles of oscillatory voltage cause grid current to flow, and this sets up a charge on C_1, the plates nearer the grid running negative. Thus the grid is negative with respect to the cathode. During negative half-cycles, the condenser discharges through resistance R_1, but if the time-constant of this combination is large compared with the time for one complete cycle, the discharge will be only partial. The grid current which flows on subsequent positive half-cycles, therefore, diminishes rapidly until a condition of equilibrium is reached where the tips of the positive half-cycles just cause sufficient grid current to flow to balance the discharge of C_1 during the remainder of the cycle. Fig. 2 shows the condition on the I_a/V_g characteristic of the valve. By a correct choice of C_1 and R_1, the bias developed can be adjusted to any desired value.

The circuit is self-regulating, for any tendency for a decrease in the amplitude of oscillations will be offset by a reduction in the bias so that the positive peaks of the grid volts remain constant and the angle of flow increases slightly. This results in increased amplification and restores the amplitude to its former value.

In design, C_1 must be large compared with the input capacity of the valve or else a large part of the R.F. cycle will be lost across C_1; at the same time, C_1 must not be too large or the oscillations will take an appreciable time to regulate themselves. R_1 must not be so large that blocking or squegging occurs.

The circuit, of course, is operating in Class C, the angle of flow being less than 180 deg. When the bias is large, anode current only flows when the anode voltage is in the region of its minimum value, and so the power dissipated at the anode can be made a very small fraction of the power supplied from the H.T. source. The efficiency of the system is thus quite high, and a figure of 70 per cent. is not unusual.

Points of Design

In actual design there are several points to be covered if successful operation is to be assured. Although the main frequency of operation may be fixed in the range mentioned earlier, it is not uncommon for parasitic oscillations of a very high frequency (several megacycles) to be simultaneously generated. When this happens, there is a loss of efficiency and the valve may overheat. The trouble is not always easy to detect, but it is usual to include

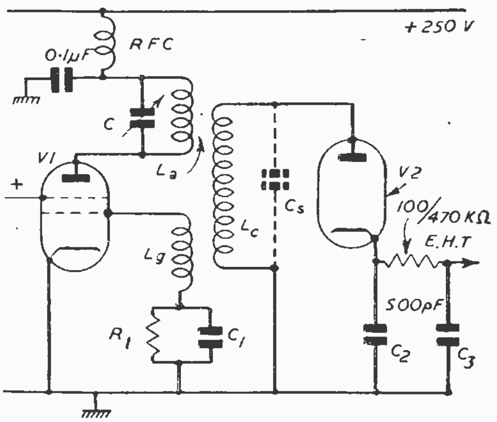


Fig. 1.—R.F., E.H.T. unit—basic circuit.

small resistive stoppers in both anode and grid circuits to prevent the effect. Fifty to 100 ohms is usual for the anode, 100 to 1,000 ohms for the grid, the components being wired as close to the valve pins as possible.

To prevent radiation from the oscillator (which is, of course, effectively a transmitter) the unit should be screened, and all outgoing leads should be filtered, preferably with feed-through or mica-disc capacitors.

The coil L_c is the E.H.T. secondary winding and so has many turns in order to secure the required step-up from L_a. For high voltage, the L/C ratio of this secondary must be as high as possible, and hence the necessity of tuning by the stray capacities only, which themselves must be kept at a minimum value. For a coil of many turns the self-capacity will tend to be large, and to minimise this the winding must be sectionalised and wavewound. Insulation is difficult for the home constructor, and is a source of many breakdowns. The whole coil must be thoroughly waxed, and there should be no sharp edges, bends or corners in the wiring, or sharp points of solder at the terminals or tags. A point ionizes the air and causes corona discharges, with the consequent noise, flashes and dots on the screen, smells, and eventual breakdown.

The rectifier filament is above earth by the value of the E.H.T. and must be suitably insulated. It is usual to light this filament from a coil wound with a few turns of well-insulated wire (the inner polythene conductor of coaxial cable is excellent), coupled to the main winding L_a. A small former carrying this coil may be inserted inside the main coil former, the position being adjusted until the valve is properly glowing. Alternatively, the filament coil may be fixed and a small series resistance used to regulate the supply.

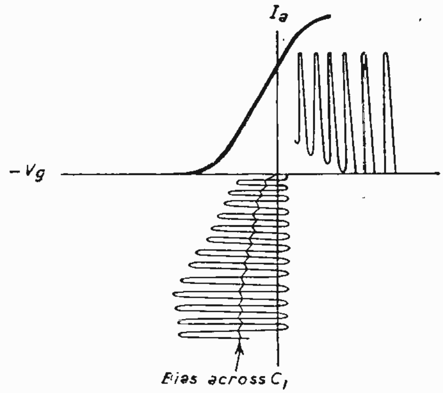


Fig. 2.—I_a/V_g characteristic of V1 in Fig. 1.

The final output across C_3 may, of course, be doubled or trebled in the usual way.

Capacitor Checking

Details of a Simple Method of Testing Paper, Ceramic and Mica Capacitors for the Usual Faults

By C. H. Banthorpe

WHEN a capacitor becomes faulty it will be either short-circuited, leaky, open-circuited, or its capacity has changed. These faults may be intermittent.

The writer has found that when testing a radio or television receiver it is easy to check for the first three of these faults using only a voltmeter and the receiver itself. To check for a short-circuit the capacitor should be connected in series with the voltmeter between H.T. + and H.T. – (Fig. 1). If there is any deflection on the meter after the initial surge the capacitor is short-circuited or very leaky. Really small leaks may be detected by connecting the voltmeter to the cathode of the D.D.T. or output valve of the sound receiver and joining the capacitor between grid and H.T. + (Fig. 2). If the meter reading is higher while the capacitor is connected, then the capacitor is leaky. Leaks of 1,000 MΩ are quite clearly indicated by this means. Very small leaks between windings of transformers, squegging, intervalve, etc., and between tags on tag strips can be detected in the same way. The method has the added advantage that leaks are detected under H.T. conditions, which is not so if a usual bridge is used for the purpose. To check for an open circuit the suspected capacitor should be connected across a circuit where, if normal, it will have a marked effect, such as between grid, or anode, and earth of the sound output valve, when the top frequencies will be reduced quite noticeably (Fig. 3). The effect is still more apparent between grid or anode and earth of a video stage of a television receiver, the picture becoming very smeared, or unrecognisable. R.F. or I.F. circuits may also be used for the purpose when checking capacitors of up to 50 pF. With a little practice it is possible to check a suspected capacitor very quickly and, in particular, the test for very high-resistance leaks has been found very useful in field and bench testing.

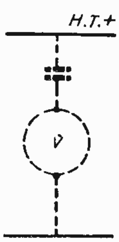
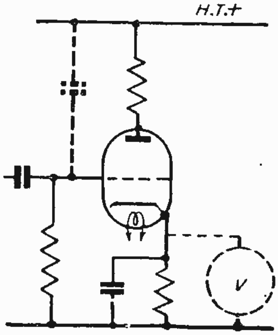


Fig. 1.—Checking for short-circuit.



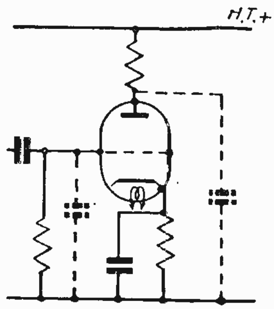


Fig. 2 (left).—Another way of checking a condenser. Fig. 3 (right).—Alterative positions at which condensers may be checked.

OUR 12in. RECEIVER

The LYNX

(Concluded from page 102 August issue.)

ALTHOUGH last month's issue contained alignment and fault-tracing data, it would appear that unfortunately certain information had not been given to enable readers to complete the construction. We must apologise for this oversight, for which we must blame disorganisation caused by the holiday period. However, below is given the necessary data of the power section showing the layout of the essential parts and wiring. This section is, of course, the lower rear part of the bottom of the main assembly, and the necessary details for the construction of the chassis were given on page 26 of the June issue. The positions of the important holes and items—i.e., mains transformer, V18 and electrolytic condensers are indicated, and these are important on account of the clearances which are necessary. The other items are flatter and may be positioned approximately from the illustration below.

" Pre-set " Controls

Also shown in the June issue was the cutting and drilling data for the rear small panel which carries the pre-set type of controls—namely, Line Hold, Frame Hold and Height. These are termed pre-set

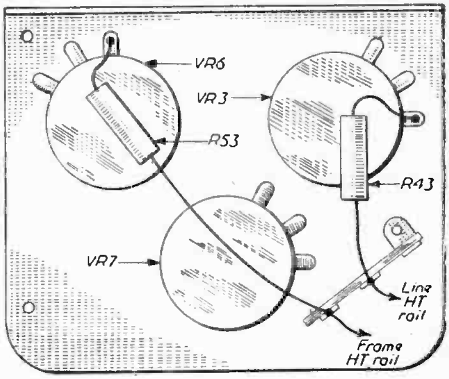


Fig. 10.—Details of the rear control layout.

as in practice they are not normally touched. Once set up they should hold until a valve ages and needs replacing, or some fault develops. The three controls are mounted on this small panel and wired, together with fixed resistors R43 and R53, as shown in Fig. 10. It will be noted that a small tag board is also mounted on this panel to assist in making the junction between the components and H.T. rails.

Focus Mount

Finally, there is the mounting strip for the focus unit and the clamp for retaining in position the mask and tube. For the specified Elac magnet the details

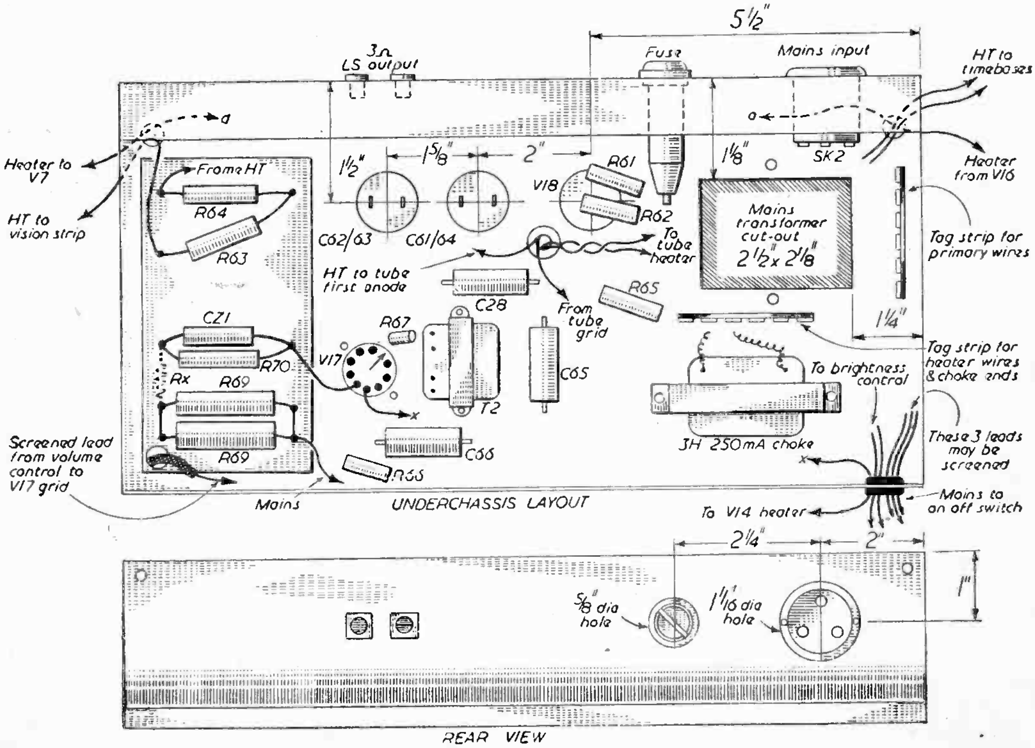
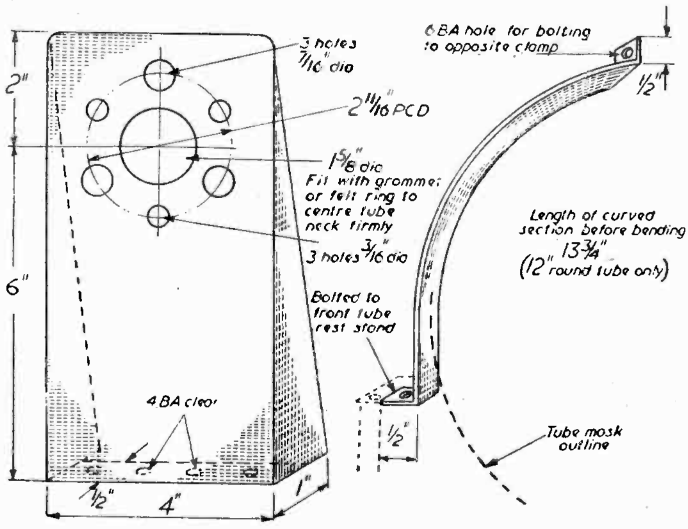


Fig. 7.—Details of the Power Unit, layout and wiring.

shown in Fig. 8(a) should be followed. If desired, however, the latest Elac product—the "Duomag" Focaliser unit—may be used, in which case the clearance holes will be different. The makers supply a template with the unit and this should be used to mark off the mounting holes, of which only four are needed. This new unit enables the picture to be accurately centred and focused without the need for loosening locknuts, etc., and avoids loss of quality due to the production of an oval spot caused by undue tilting of the magnet.

Front Tube Support

The tube clamp is in two parts, as shown in Fig. 9(a), and this is placed over the mask, as may be clearly seen in the illustrations which have accompanied this series of articles. Undue pressure must not be exerted on the tube by tightening the clamping nuts too hard.



Figs. 8(a) and 9(a).—Details of the focus unit mount and tube clamping ring.

New BBC Stations and Frequencies

THE Postmaster General on July 2nd mentioned seven new television stations. Five of these are the medium-power stations that were deferred by the Government in March, 1951; details of these are as follows:

	Channel No.	*Carrier Vision*	*Frequencies Sound*	*Transmitter Vision*	*Power Sound*	*Polarisation*
N. Ireland (Divis)	1	45 Mc/s	41.5 Mc/s	5 kW	2 kW	Horizontal
Plymouth area	2	51.75 Mc/s	48.25 Mc/s	5 kW	2 kW	Vertical
Rowridge (I. of W.)	3	56.75 Mc/s	53.25 Mc/s	5 kW	2 kW	Vertical
Aberdeen area	4	61.75 Mc/s	58.25 Mc/s	5 kW	2 kW	Horizontal
Pontop Pike (Newcastle)	5	66.75 Mc/s	63.25 Mc/s	5 kW	2 kW	Horizontal

These five stations will share channels with the five existing high-power stations as follows:

Channel 1—Alexandra Palace.
Channel 2—Holme Moss.
Channel 3—Kirk o' Shotts.
Channel 4—Sutton Coldfield.
Channel 5—Wenvoe.

Sites at Pontop Pike, Divis and Rowridge have already been acquired and negotiations are in progress for sites in the Aberdeen and Plymouth areas. Construction of all five stations will start at the earliest possible moment and the manufacture of equipment for all of them is already in hand. Temporary stations are already in service at Pontop Pike and Belfast, and similar arrangements will be made to provide a service in the Aberdeen, Plymouth and Isle of Wight areas as quickly as possible. It is expected that these temporary arrangements will be completed within eighteen months. The five temporary stations will be withdrawn when the permanent stations are completed; the Truleigh Hill Station, near Brighton, will be closed down when the temporary Rowridge station is brought into service. It is estimated that when the five stations are in service the coverage will be increased to at least 90 per cent. of the population of the United Kingdom.

In addition, the Postmaster General referred to television stations in the Channel Islands and the Isle of Man. These will share channels with two of the existing high-power stations, and work on them will start as soon as possible.

The new London television station at the Crystal Palace will use the same channel as the existing station at Alexandra Palace, which it will replace.

The first report of the Television Advisory Committee issued on July 7th draws attention to the fact that only two of the eight channels in Band III (the higher frequency band between 174 and 216 Mc/s) are at present available for television broadcasting. The report states that the complete clearance of this band for television broadcasting "can be regarded only as a future possibility." The BBC has, however, applied for the use of all the eight channels in this band, two for completing the coverage of its first television programme and six for establishing a second programme.

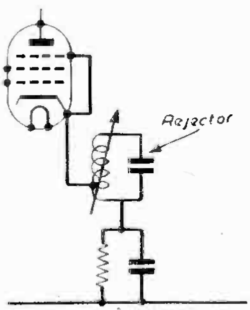
The BBC is not yet able to make a start with the proposed V.H.F. stations for sound broadcasting to reinforce the existing medium-wave services.

SOUND REJECTION

DETAILS OF A CIRCUIT FOR T.R.F. RECEIVERS

By J. S. Hopwood

UPON extending television coverage for Britain beyond that area served by the double-side-band London transmitter, the BBC decided to use single-side-band transmission, partly in order to keep the total frequency band required within the internationally agreed limits of 41-68 megacycles per second. The upper side-band is partially suppressed at the transmitter and complete vision intelligence is therefore only contained in the lower side-band. The sound carrier frequency is just below vision lower side-band for all transmitters, so that, if desired, sound and vision can be received on a single aerial and dealt with together in the earlier stages of the receiver.



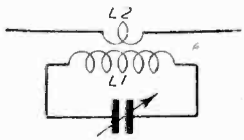


Fig. 1.—(Left) A Cathode Rejector. Fig. 2.—(Above) A rejector circuit as discussed in this article.

In actual fact 3.5 Mc/s separates sound carrier from vision carrier, and when the full vision side-band is taken into account only 1 Mc/s at most separates sound from the higher vision frequencies which are those that contain the finest detail. Owing to this proximity, sound interferes with vision in a receiver adjusted for full bandwidth unless precautions are taken to stop it. Generally, it is necessary to fit sound rejectors in the vision receiver, and it is most important that the rejectors do not affect any frequencies beyond the 1 Mc/s mentioned above, otherwise they will be rejecting part of the vision channel. The rejectors must therefore peak sharply enough at sound frequency to achieve this object, the sharpness required depending upon the type of receiver in use.

For constructors in the London area this problem is easily dealt with, for they can design their receivers for upper side-band reception. Most commercial receivers are lower side-band only in order to make them readily adjustable for all channels.

Superhets

In superhet receivers the lower the I.F. the easier it is to comply with the above condition ; in fact, in the well-known R 1355 receiver with an I.F. of 7.5 Mc/s there is no need for sound rejection at all. No data is therefore given in this article for superhet receivers, the highly critical problem of sound rejection in lower side-band T.R.F. receivers being dealt with solely. It will be an easy matter, however, for any constructor to apply the principle of the type of rejector mentioned to any superhet circuit.

It is readily ascertained if a system of sound rejection is satisfactory by observing the effect on the 2 and 2.5 Mc/s bars on test card "C" of tuning each rejector in turn away from vision. If at any point an increase in definition (sound breakthrough being ignored) is noticed, then the sound rejectors used are not satisfactory.

Difficulty may be experienced in applying the above test if cathode rejector circuits are in use (Fig. 1), as there is a strong tendency to instability when these rejectors are tuned far away from sound frequency.

One Circuit

A type of rejector which peaks very sharply is shown in Fig. 2. The variable condenser tunes the inductance L1 to peak at sound frequency. The circuit then offers maximum impedance to that frequency, and this impedance is coupled to the receiver circuit through L2. Provided the amount of coupling is small the rejector will not affect the vision frequencies, but at the same time the amount of rejection will not necessarily be sufficient. Two rejectors of this type is the very minimum in a vision receiver which has no additional rejection provided, such as, for example, via sound take-off at the first R.F. stage. This latter procedure, incidentally, is not favoured by the author, who prefers to keep matters as uncomplicated as possible by having sound and vision receivers completely separate, even to separate aerials.

Practical Considerations

The rejectors may be introduced into the receiver at various points, as shown in Figs. 3, 4 and 5. If sound and vision have a common R.F. stage, then of course the position shown in Fig. 3 cannot be used. In receivers of this type it is best to disconnect

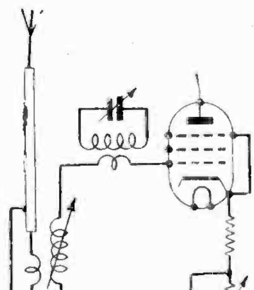


Fig. 3.—One example of a rejector circuit.

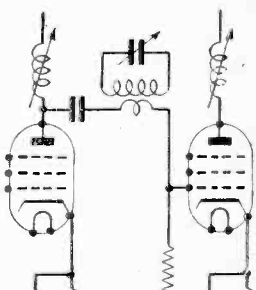


Fig. 4.—In this rejector arrangement the circuit is included between two stages.

temporarily the sound take-off circuit, fit and adjust the sound rejectors in the manner described below, rewire the sound circuit, and see what effect this has upon the 2.5 Mc/s. band, not forgetting to tune sound take-off circuit for minimum effect on vision, and not for maximum sound output. Depending upon the type of sound take-off circuit, it may be possible to dispense with one rejector. It may also be discovered, if the above procedure is followed,

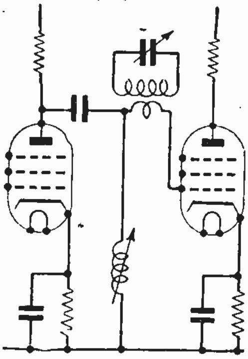


Fig. 5.—Another circuit arrangement for the rejector. Compare this with Figs. 3 and 4.

that the present sound take-off circuit is in fact affecting the vision frequencies.

A suggested construction and fitting of the rejectors is shown in Figs. 6 and 7. The rejectors are wound on ¼in. diameter ebonite rod (or similar material). Eight to 12 turns of 22 to 26 s.w.g. enamelled copper wire spaced by its own diameter will cover all channels —12 for Holme Moss, eight for Wenvoe. The ends of the wire are secured by adhesive tape. The overwound turn is spaced about 1/16in. away from the main winding, and its ends also secured by a piece of adhesive tape (if 3/16in. rubber tubing is available, ¼in. slices of this instead of adhesive tape make a very satisfactory job). This part of the rejector is then mounted across a 30 pF airspaced concentric condenser (such as is found in RF25 units and other surplus apparatus) by means of the ends of the larger winding, and the complete rejector can then be mounted on a piece of paxolin to insulate it from the chassis, as shown in Fig. 6. A hole is cut in the other side of the chassis, through which the rejector is adjusted.

If the usual EF50 layout is in use, the screens already in existence will screen the rejectors from each other. If no sub-chassis screening is fitted and interaction occurs, a screen must be mounted between the rejectors. Each rejector must not be individually screened by a can, for a loss in efficiency will occur owing to reduction of the "Q" of the rejector.

Adjustment

The rejectors are adjusted using test card "C," an ebonite trimmer of the type found in the R1355

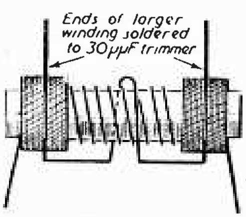


Fig. 7.—Practical details of the coil which is used.

receiver being used. Dealing with one at a time, and with the condenser at minimum capacity, the top is screwed in very slowly past the point at which there is a reduction in the vision signal until maximum rejection of sound is obtained. As the sound carrier is approached there is an increase in brightness, and then a decrease, and then an increase again which is not particularly easy to see, and which is the correct setting of the sound rejector.

It is convenient, after setting the first rejector, deliberately to tune the receiver towards sound, so as to get a good degree of breakthrough and render the adjustment of subsequent rejectors easier. The vision coils are, of course, re-aligned again afterwards, and in this connection it must be noted that the vision coils associated with the rejectors may need a fraction of a turn to be removed in order to bring them back to original tuning range.

If not enough rejection is provided, the overwound turn can be brought closer to the main winding, or a further rejector fitted if this adjustment either inter-

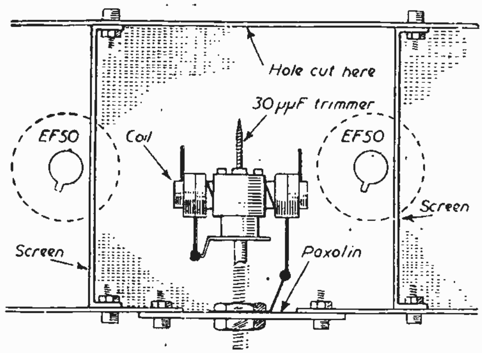


Fig. 6.—Pictorial arrangement of the rejector showing the mounting.

feres with vision frequencies as shown by the test already mentioned, or still does not provide sufficient rejection.

As a final check, the test mentioned earlier is carried out, and if the 2.5 Mc/s bars are affected (the 2 Mc/s bars will not be, unless the rejectors are not tuned correctly), the overwound turn L2 is spaced farther away from the tuned winding until the bars are just not affected.

Care must be taken in sets that have been tuned on test card "C" that the set has not been tuned too near sound frequency in endeavouring to get the 2.5 Mc/s bars clearly defined. Unless the video stage, etc., is perfect, this frequency will be attenuated, and if an unconscious attempt is made to correct this at the R.F. stages by tuning further away from vision carrier, apart from getting a flat picture, a false impression of the amount of sound rejection required is obtained. The more one tunes away from vision carrier, the more sound breakthrough occurs, and the more sound rejection is thought to be required.

The single overwound turn must not be exceeded, and never more than three rejectors need be fitted.

NEW! RADIO, TELEVISION AND ELECTRONICS

LEARN THE PRACTICAL WAY
Instruction *and* Equipment

Here at last is the only *real* way of making home study successful. Actual equipment is supplied, thus combining theory and practice in the correct educational sequence. Whether your need be for career, hobby or general interest, here is the ideal method for acquiring the knowledge in the most efficient way possible.

QUICKER — BETTER — MORE INTERESTING

With these components you can carry out practical experiments in your own home thus gaining knowledge far more rapidly. This equipment, specially prepared and designed, remains your property, and it provides thoroughly sound basic sets which can easily be expanded to meet your growing knowledge.

Over 150 courses of Home Study covering every aspect of Industry and Commerce, etc.

Practical courses in many other subjects including:

Draughtsmanship. Carpentry. Chemistry. Photography. Commercial Art. Amateur S.W. Radio. Electricity. Languages. Mechanics.

POST THIS COUPON TODAY

Please send me your FREE book on *Practical* Courses.

To: E.M.I. INSTITUTES, Dept. 138X, 43 Grove Park Road, Chiswick, W.4.

NAME ....

ADDRESS ....

....

....

EMI INSTITUTES

The only Postal College which is part of a world-wide Industrial Organisation

IC20

Picture Tube Control

BRIGHTNESS CONTROLS AND MODULATION ARRANGEMENTS

By "Engineer"

(Concluded from page 110, August issue)

SOMETIMES the tube heater of a cathode modulated system is isolated from earth by means of a transformer winding—many commercial receivers use this arrangement—even so, heater-to-cathode shorts still develop, and, although they do not give rise to the manifestations of uncontrollable brilliance, a marked reduction in picture definition results. This is because the loss inductance and capacitive effects of the transformer shunt the picture signal, and tend to by-pass its higher frequency components.

A slight leak sometimes develops between the grid and first anode of a tetrode tube, and, in a circuit such as Fig. 3 (reproduced below), this causes a loss of brightness control, for it will be noticed that even at the minimum setting of the brightness control a 1 megohm resistor is still in series with the grid; thus, the grid is held slightly positive due to the leakage, which makes it impossible to reduce screen illumination to zero. One way of giving the tube a further lease of life, provided the inter-electrode leak is only slight, is by connecting the grid direct to the slider of the brightness control—this has been practised by the writer on various occasions without any ill effects.

Grid-to-cathode shorts are extremely rare, but if they do occur the effect is very similar to a cathode-to-heater short, although the picture modulation in these cases is shorted out. Open circuit electrodes occasionally result within the tube (or base); the grid causing a loss of brightness control, and the cathode a blank screen.

Intermittent short circuits can present more of a problem to the experimenter, and are, in certain cases, troublesome to localise. These faults may show themselves during the initial minute or two after switching on the receiver, and tantalise the experimenter by disappearing for the remainder of the programme. The usual effect is that the picture without warning dissolves into a diffused patch of light that kills all traces of modulation, and then suddenly returns to normal. Often a gentle tap on the tube neck will disunite the short—unfortunately not for any length of time, but, at least, the cause is established.

Defective Emission

Failing emission is usually fairly easy to diagnose, the first indication is, of course, a reduction in picture brightness, and in the later stages this is followed by the effect of the picture turning negative when the brightness control is advanced, sometimes coupled with a loss of sharp focus.

Although it is not generally known, the above conditions are aggravated, in a large number of cases, by the picture interference diode which often shunts the video output valve. The circuit of Fig. 4 shows the vision interference suppression network as employed in certain G.E.C. receivers. Here the diode V2 is held non-conductive during normal picture signals by virtue of the potential-divider R1, R2, connected to the H.T. line. When the peak white signal level is exceeded, however, due to an interference pulse, for instance, the diode cathode swings less positive than the anode, and the offending pulse is effectively by-passed through C1 due to the conduction of the diode. R2 is often made variable in a circuit of this nature, thereby enabling the conductive level of the diode to be controlled at will.

Now when, due to a low emission picture-tube, a heavy signal is applied to the cathode in an endeavour to obtain a brighter picture, the diode is prompted to conduct during a peak white signal level, irrespective of interference control setting. Also, since the resistor R2 is returned to the slider of the brightness control, a more advanced brightness control setting will result in the diode anode going even more positive than the cathode, and thus assisting further diode conduction during a signal level representing peak white or less.

As the reduction in emission of a picture-tube is a very gradual process, we unwittingly tend to counteract the fall off in picture brightness by advancing the brightness control, and then the contrast control in order to maintain a correct contrast ratio. We can see, therefore, that not only does the picture-tube tend to be overloaded as it ages, but that the interference diode suffers from the same cause, and since both factors are of a synonymous nature the overall effect is unduly stimulated.

In many cases this state of affairs can be alleviated, and a better picture is often obtained by disconnecting the interference diode in a receiver manifesting the symptoms of an ageing picture-tube. In a case such as this an interference diode is unnecessary anyway, for the picture-tube itself satisfactorily performs the function of limiting without the aid of a diode.

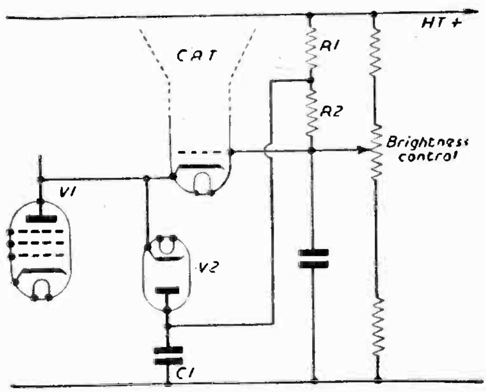


Fig. 4—Illustrating the vision interference limiter circuit as used in certain G.E.C. receivers.

Conversion To Magnetic C.R.T.

DETAILS OF TWO EASILY BUILT UNITS BASED ON ELECTROSTATIC TIMEBASES

(*Concluded from page* 107, *August issue*)

ALL the relevant conversion data has now been given, but no values were stated in the separate articles, as in many cases the appropriate data would be obvious when the modification was made. However, we give below the complete list of all the various items in separate sections to facilitate the conversion. A word of warning might again be given here concerning the use of fixed condensers of the paper type recovered from ex-government equipment. Many of these will be leaky after standing for such a long period under unknown conditions, and in sections such as the timebases a leaky condenser may give rise to all kinds of troubles which will be difficult to trace without a suitable condenser test meter or a long process of elimination.

COMPLETE LIST OF COMPONENTS

For modifying existing timebase :—

VRL—100 K Ω potentiometer } Also see text
VRF—100 K Ω potentiometer }
CL1—0.001 μF 450 v. working.
CL2—0.01 μF 450 v. working.
RL1—2.2 M Ω ½ w.
RL2—100 K Ω 1 w.
RL3—1 K Ω ½ w.

New Timebase
Line Circuit :—
R1—470 K Ω
R2—2.2 K Ω
R3—2.2 K Ω
R4—470 Ω 1 w.
R5—470 Ω 1 w.
R6—1 K Ω 10 w.
R7—33 Ω
R8—33 Ω
VR1—2 K Ω 4 w.
C1—0.1 μF 350 v.
C2—0.02 μF 250 v.
C3—15 pF mica.
1 valve—EL38.
1 valveholder International Octal.
1 Line O/P transformer Haynes type TW5/109.
1 anode connector.

E.H.T. and C.R.T. network.
R9—1 M Ω 1 w.
R10—470 K Ω 1 w.
R11—47 K Ω 1 w.
R12—22 K Ω 1 w.
R13—4.7 K Ω 1 w.
VR4—25 K Ω wire-wound.
C4—0.01 μF 2.5 Kv. working.
C5—0.01 μF 2.5 Kv. working.
C6—0.01 μF 2.5 Kv. working.
C11—0.01 μF 250 v. working.
1 C.R.T. anode connector
1 v/holder to suit tube
1 Elac. focus magnet to suit tube.

2 valveholders 4-pin Ceramic.
2 valves—VU120(A) (see text).
1—heater transformer T3 } (see text).
1—heater transformer T2 }
1—Scanning coil Haynes S112.
3—Pye plugs and sockets.
3—Lengths 80 Ω coaxial.
1—Chassis, 22/23 S.W.G. wire, sleeving nuts and bolts, wire for T3 and T2, see text.

Frame Circuit
R14—1 M
R15—22 K Ω.
R16—47 K Ω.
R17—1 M Ω.
R18—1 M Ω.
R19—4 K Ω 10 w.
R20—220 Ω 1 w.
R21—220 Ω 1 w.
R22—3.3 K Ω.
C7—0.1 μF 450 v. working.
C8—0.005 μF 450 v. working.
C9—32 μF. 350 v. working } Hunts capacitor type K4A
C10—32 μF 350 v. working }
VR3—2 M Ω carbon.

Power Pack
R24—250 Ω 10 w.
C12,13—16+16 μF 450 v. working.
1 valve—5U4G.
1 valveholder—I. Octal.
1 smoothing choke—150 mA.
1 mains transformer—350-0-350 150 mA. 5 v. 3 A. 6.3 v. 5 A. (Elston type MT/A150).

Version B.
Components for existing timebase; for the C.R.T. and for the power pack will be as for the above lists. New components in place of the remainder are :—

Line circuit plus E.H.T. and C.R.T. network :
RB1—390 K Ω.
RB2—220 Ω.
RB3—3.3 K Ω 1w.
RB4—68 ohms 1 w.
RB5—3.9 K Ω 1 w.
RB6—1 K Ω 1 w.
RB7—47 K Ω 1 w.
RB8—22 K Ω 1 w.
RB9—4.7 K Ω 1 w.
VRB1—25 K Ω wirewound.
CB1—0.01 μF.
CB2—25 μF 50 v. working.
CB3—0.1 μF 350 v. working.
CB4—0.1 μF 350 v. working.
CB5—0.1 μF 250 v. working.
CB6—0.1 μF 250 v. working.
CB10—0.001 μF 7 Kv. working.
1 valve—EL38.
1 valveholder—I. Octal.
1 anode connector.
1 valve—EY51.

1 Line O/P transformer Ediswan Type 72000 } Same as View Master
1 width control Ediswan type 72002 }

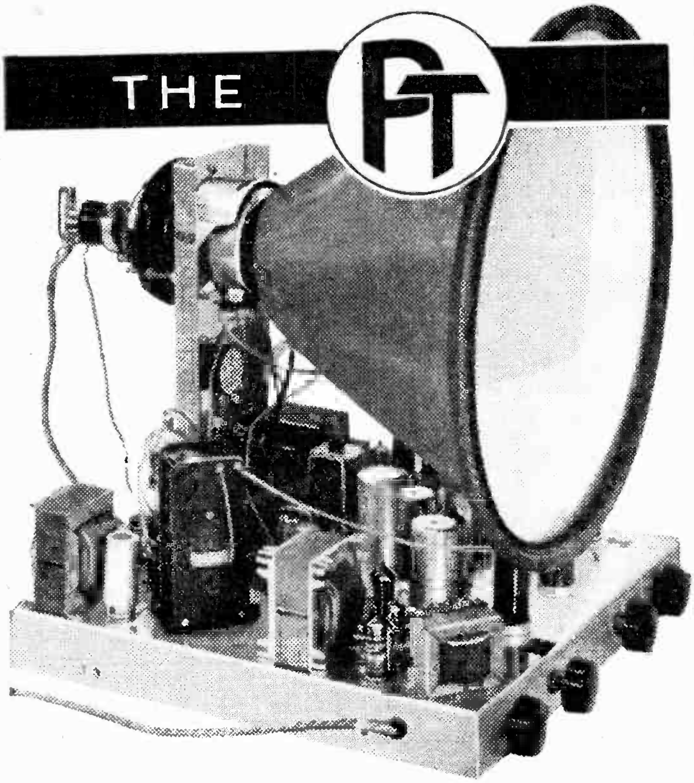
C.R.T. Network
1 heater transformer (see text).
1 anode connector for C.R.T.
1 valveholder to suit tube.
1 Elac. focus magnet to suit tube.
1 Scanning coil type Ediswan 72003 (same as View Master).
2 lengths coaxial cable.
2 Pye plugs and sockets.
1 chassis, 22/23 S.W.G. wire (see text), sleeving nuts and bolts.

Frame circuit
RB10—470 K Ω.
RB11—4.7 K Ω 1w.
RB12—560 Ω 1 w.
RB13—560 Ω 1 w.
RB14—470 Ω.
VRB2—1 M Ω carbon.
VRB3—2 M Ω carbon.
CB7—0.25 μF 450 v. working.
CB8—0.1 μF 350 v. working.
CB9—0.0005 μF 350 v. working.
1 valve—6V6.
1 valveholder—I. Octal.

1 frame output transformer :—Ediswan or Whitely as for View Master.

Note :—All resistors are ½ watt unless otherwise stated. All variable resistors can be pre-set.

THE PT SUPER-VISOR



FURTHER CHASSIS CONSTRUCTION DATA

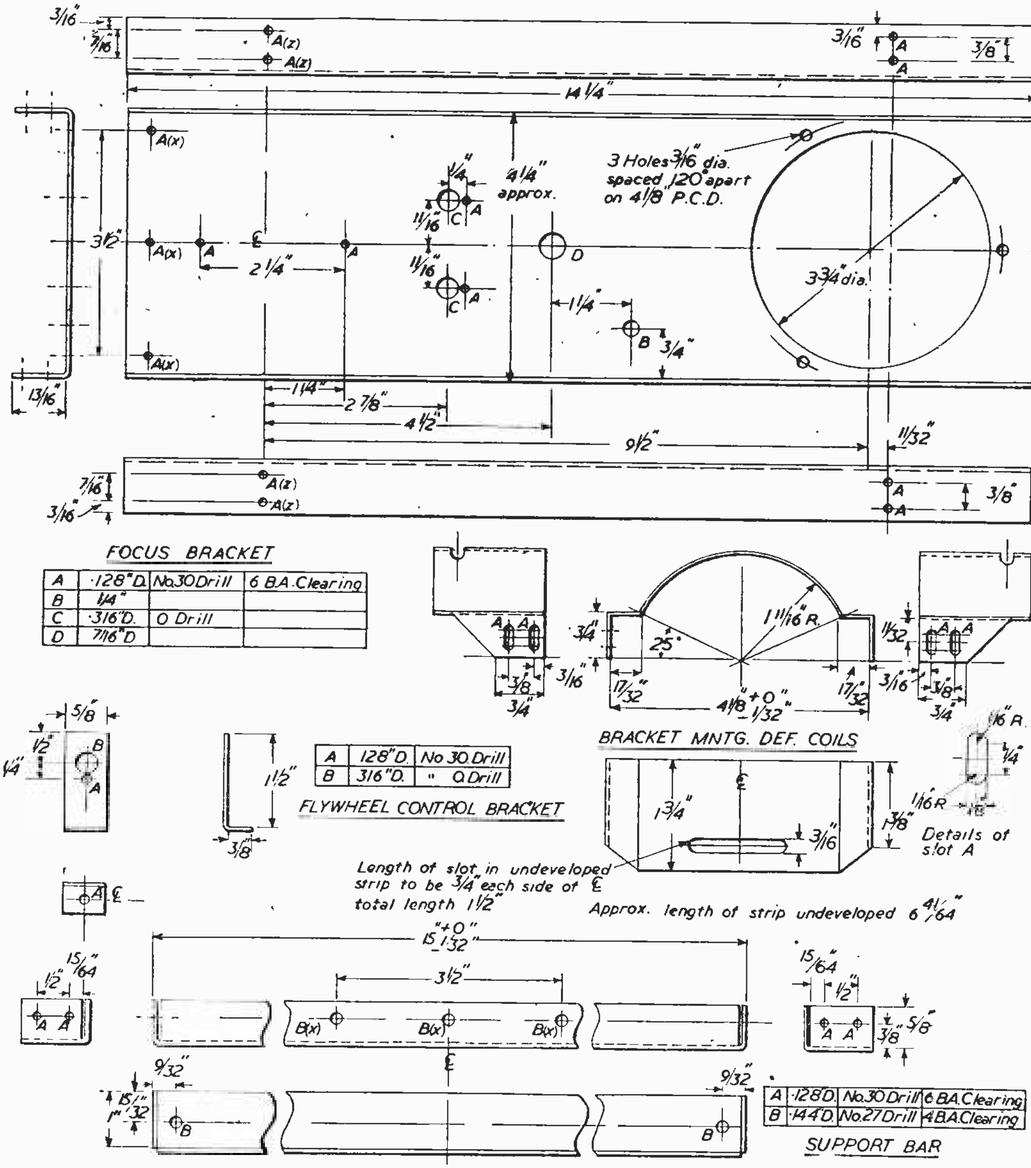
(*Continued from page* 121 *of August issue.*)

THERE are a few more pieces of metal to cut before the receiver can be assembled and certain of these must be drilled in conjunction with each other. It will be seen from the details of the main chassis given last week that a rectangle is cut from the rear centre of chassis and that the edges of this are upturned. The overall height of these upturned edges should be not less than ¾in., and the two holes marked " C " in last month's issue are to accommodate the metal rectifier. The other two holes marked " B " are used for the bolts which lock the sides of the focus and deflector coil mount. This is cut as shown in the upper part of the illustration on the next page and the sides are turned for at least 13/16ths of an inch. A further strip should now be cut and bent as shown at the foot of page 168 (marked Support Bar). In the short ends of this bar two holes should be drilled to clear a 6 B.A. bolt, and the exact positions of these holes should be taken off from the two holes marked B on the chassis sides. Bolt this support bar temporarily in position, and then drop the focus mount through the opening in the chassis with the turned sides towards the front. It should rest on the support bar at the bottom, which should be placed with the vertical portion towards the rear. Now mark the three holes marked " B(x) " on the support bar and " A(x) " on the focus mount. These two sets of three holes must register, and the two holes in the sides of the upturned edges of the rectangular cut-out in the chassis top should register with the two holes marked " A(z) " on the sides of the focus mount. It will be seen then that when these are bolted together the focus mount will be rigidly held in a vertical position and there will be no possibility of twist or play which would otherwise make it difficult to focus accurately. When these sets of holes have been accurately located the focus mount may be removed so that the remainder of the work may be carried out.

Before concluding these notes on the chassis constructional work a word of warning should be given concerning the chassis itself, an illustration of which was given on page 120 of last month's issue. One or two readers appear to have overlooked the relative positions of the side runners of the chassis. The illustration is given in the American projection system of engineering drawing, whereby the sides are illustrated as they would appear on turning the main body on its axis. The strip at the foot of the drawing is, therefore, actually the runner which is behind the rectangular cut-out for the rectifier and focus-mount. No difficulty should normally be experienced in this, however, as the photographic illustrations which have been given will indicate the positions of the various holes on the various sides, whilst the drawing of the chassis itself indicates on the plan view of the runners the actual holes and their centres.

Deflector Coil Mount

It is important that the deflector coils be mounted in such a manner that they may be adjusted for accurately squaring up the picture, and too often it is found that they need rotating slightly away from the vertical. Vibration, too, can result in slight movement, and some form of rigid mount which will at the same time permit of the necessary rotation is desirable. The amount of movement normally required is not very great and the Allen coils are fortunately supplied with a projecting bolt which comes uppermost in use and therefore a slotted bracket can obviously be employed. This is cut as shown in the illustration on this page, and it will be seen that it is bent to conform to the outer radius of the coils and to have angular portions at the side for rigidity. Again, accurate registration between the slotted holes in the sides of the bracket and the two holes marked A shown on the right of the focus support at the top of the illustration referred to, should be ensured. The slots are to permit of slight adjustment in a vertical direction so that after the tube is mounted the coils may be made truly concentric with the neck of the tube, and then the coils are in effect suspended from the mounting bolt in the slot. It will be obvious that the coils may thus be rotated a few degrees each side of the vertical, and when the most satisfactory position is found the nut may be finger-tightened. The use of shake-proof or spring washers under this nut and the two side nuts is desirable at the point, as the assembly may then be accurately positioned before



FOCUS BRACKET

A	·128" D.	No. 30 Drill	6 B.A. Clearing
B	1/4"		
C	·3/16" D.	O Drill	
D	7/16" D		

FLYWHEEL CONTROL BRACKET

A	·128" D.	No. 30 Drill
B	3/16" D.	" Q Drill

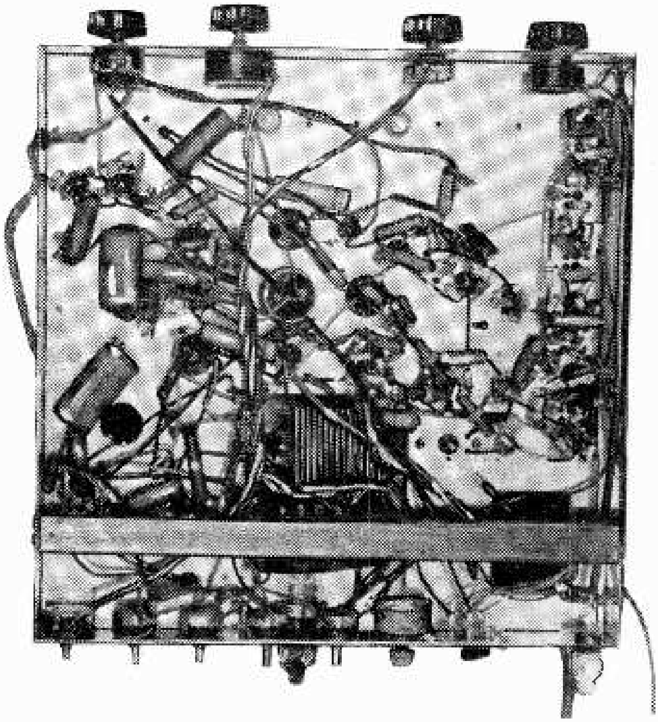
SUPPORT BAR

A	·128 D.	No. 30 Drill	6 B.A. Clearing
B	·144 D.	No. 27 Drill	4 B.A. Clearing

Fig. 4.—Remaining metal work for the "Super-Visor."

finally locking up the nuts.

One more small metal item is required and this is the small bracket upon which is mounted the flywheel control. This is mounted on the rear of the chassis immediately at the side of the rectangular cut-out, and the two holes which are drilled in this and two pairs on the focus mount marked C and A must be carefully drilled, using the actual controls as a guide, as the small hole is a locating device and prevents the special nut from rotating when the component is locked in position.



Underside of chassis showing cross-bar which supports the focus coil mount.

Mounting the Components

A television receiver is a bulky piece of apparatus and there should be a systematic approach to the mounting of the parts before wiring is commenced. Probably the best plan with this particular design is to mount the smaller items first, leaving the focus mount until last. The weighty mains transformer could also be left until the end. The tube itself is retained in position by means of short metal supports attached to the two special condensers mounted on the front of the chassis. If desired, the two condensers may be linked by a single piece of metal across the top, or two separate small supports may be used. The edges should be turned upwards so that the tube edge will be firmly held, and these pieces of metal should be strong enough to prevent the tube from sliding forwards. To one of these a lead is subsequently soldered from the line transformer and forms the E.H.T. connection to the metal cone, which it must be borne in mind is the anode of the tube.

It should be noted that in the theoretical diagram given on page 122 of last month's issue these two condensers (shown immediately above V19) were given the references C72 and C71. For C72, however, read C70 in this position. C72, which is a .005 pF 500 v.w. condenser may be seen below V19.

(To be continued)

COMPLETE CONDENSER AND RESISTOR SHOPPING LIST.

All 20% unless otherwise stated.
8.2pF ± 5%, Silver Mica, 1
10 pF Silver Mica, 1
22 pF Silver Mica, 1
47 pF ± 10% Silver Mica, 1
47 pF Ceramic, 4
100 pF Silver Mica, 1
220 pF Silver Mica or Ceramic, 3
390 pF Silver Mica, 1
470 pF Ceramic or Mica, 1

689 pF Silver Mica, 1
1,000 pF Ceramic, 17
.001 μF Paper 500 v.w., 2
.001 μF Visconol 15 K v.w., 2
3,000 to 4,000 pF, 1
.005 μF paper, 1
10,000 pF Ceramic, 7
.01 μF Paper, 500V., 9
.02 μF ,, 500V., 4

.05 μF. Paper 350V., 5
.05 μF. ,, 500V., 1
.1 μF ,, 350V., 5
.1 μF ,, 500V., 2
.1 μF ,, 750V., 1
.5 μF ,, 500V., 2
32-32 μF Electrolytic 350V., 2
50 μF Electrolytic 12V., 2
60-100 μF Electrolytic 350V., 1

All ¼ W or 20% unless otherwise stated.
33 ohms, 2
47 ohms, 1
100 ohms, 2
150 ohms, 3
220 ohms ± 5%, 1
270 ohms, 1
330 ohms, 1
500 ohms, 4 watt wire wound, 1

1K Ω, 1
1K Ω, 6 watt wire wound, 1
1.5K Ω ± 10%, 3
1.5K Ω 1 watt, 1
3.3K Ω, 2
4.7K Ω, 1
4.7K Ω ½ watt Erie type 8, 5
5.1K Ω, 5

6.8K Ω ± 5%, 1
10K Ω ½ watt Erie type 8, 3
10K Ω, 8
10K Ω 2 watt, 1
22K Ω, 6
33K Ω 5
47K Ω, 4
68K Ω 2 watt, 1
100K Ω, 5

150K Ω, 1
220K Ω, 6
390K Ω, 1
470K Ω, 5
680K Ω, 2
1M Ω, 4
2.2M Ω, 2
3.3M Ω, 1
4.7M Ω, 2
10M Ω, 2

FAULT SYMPTOMS

THE CAUSES OF COMMON FAULTS, AND METHODS OF CORRECTION

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

(*Continued from page* 114 *August issue*

THE left-hand side of the screen is that section of horizontal scan contributed from the reclaim energy (section (c), (d), Fig. 6 (B)). Now, as we have already seen, this energy possesses a component at the resonant frequency of the line output stage inductive and capacitive elements, and it is this particular frequency—or a harmonic of it—which heterodynes any spurious signal (such as local oscillator radiation) in the R.F./I.F. section of the receiver itself, and the resulting frequency is accepted by the first circuits, and is thus conveyed back through the receiver via the normal channels, to form the pattern during the reclaim period of scan only.

Unfortunately, little can be done to the receiver to prevent the effect completely, but usually it is not of sufficient magnitude to distract one's attention whilst viewing, for it is mainly in prominence during the transmission of a synchronised unmodulated transmission, provided, of course, the brightness control is suitably advanced. If the effect is noted in excess, however, a degree of alleviation is often yielded by decoupling the anode of the line output valve to chassis, vià a 20 to 50 pF 5,000 volt working capacitor. It should be remembered, also, that the sudden occurrence of the symptom may be due to a failing reclaim diode or charging capacitance.

The tell-tale symptom of a defective line output transformer is an interesting symptom to bear in mind, for it is often manifested on the picture-tube in the form of a vertical series of short (not clearly defined) white horizontal lines occupying a section of the raster (or picture), usually towards the left-hand side of the screen, and by reducing the contrast or sensitivity setting on the receiver the effect is also reduced. The cause is corona or breakdown within the line transformer during the line flyback period ; this gives rise to a form of synchronised radiation, which is accepted by the input circuits of the receiver and is displayed on the screen so that the interference lines—or horizontal dashes as they sometimes appear—are fairly evenly placed in the vertical plane. A reduction in the sensitivity of the receiver will, of course, reduce the effect (together with the picture), since, after leaving the line output transformer, the radiated pulses are propagated and superimposed on the vision and sound signal the same as normal impulsive interference, to make itself shown in the way described on vision, and on sound in the form of a gentle hiss. The only way a defect of this type can be remedied is by line output transformer replacement.

A reduced line scan, sometimes accompanied with picture cramping towards the *right-hand* side of the screen, is another fault that frequently occurs to bewilder the experimenter. A few minutes occupied in a thinking session is often well spent when endeavouring to locate any television fault, and in the case cited we realise that at the *right* of the picture the line output valve is working at its peak (delivering maximum scan current). We can, therefore, appreciate why the valve itself is frequently an offender in this respect ; and in the writer's experience the line output valve is the first of the timebase valves to show wear, doubtless because this valve has to supply considerably more power than any of the others associated with scanning.

A low H.T. line voltage also reduces the power-delivering capabilities of the line output stage, and owing to the same reasons it is always the picture width which suffers first. It sometimes happens that the fall-off in line voltage is so gradual that the diminutive reduction in picture width is counteracted over a period of time by width control adjustment. A position is eventually reached, however, when the width adjustment is either at its maximum setting or that a further increase, instead of providing a larger amplitude of line scan, tends to result in severe horizontal scan distortion due to the valve being over-driven.

The main cause of a low H.T. is usually a low emissive rectifier valve, or, apparently more frequently, a reduction in the rectification efficiency of the metal variety mains rectifier. It often saves considerable time if a receiver embodying the metal style rectifier, and exhibiting the symptom of insufficient picture width, is immediately suspected for a defective rectifier !

Insufficient Picture Width

There are, of course, other defects which occur in the line time-base to produce a reduction in line scan, a very common one being an increase in the value of the resistor employed as load to the generator valve. To illustrate this point Fig. 7 depicts the line generator section of the Murphy V114 and R1, the 100 KΩ resistor in the anode circuit, is the component referred to. This resistor has been known by the writer to increase in value to ½ megohm with a consequent reduction in picture width. The capacitor

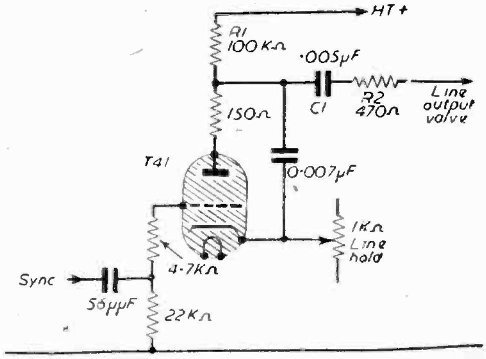


Fig. 7.—Line generator stage as used in Murphy Model V114.

C1 going low, or R2 going high in value will give rise to a similar effect.

The potentials existing on the electrodes of the line output valve itself should also receive due attention. The screen resistor going high in value, for instance, is bound to cause a reduced line scan, and in this respect the 5.6 KΩ wire-wound 8 watt component in the Ferranti T1205 series should be suspected when a reduced line scan is experienced on this receiver. Certain receivers employ a high value electrolytic capacitor in the cathode circuit of the line output valve; this often reduces in value or gradually deteriorates to upset the circuit function in this way.

If the voltage readings appear to be more or less

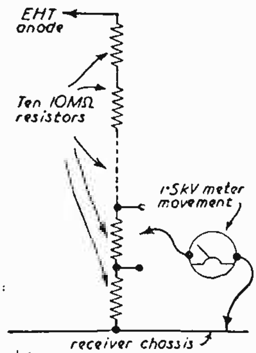


Fig. 8.—Circuit of an improvised voltage tester for an E.H.T. supply.

normal, and the associated valves and smaller components check O.K., and yet the picture is still of insufficient width, the cause is most likely due to a defective line output transformer or scanning coils. The usual trouble in such a case being short circuit turns or inter-winding leakages. These defects will cause serious losses, just as they do in radio receiver transformers, for quite apart from the resulting turns ratio variation (in the case of a transformer), the inductive element of the defective component will also be severely modified.

Apart from trying a replacement component when a fault of this nature appears to exist, precise diagnosis is extremely difficult. Even if the experimenter is in possession of the manufacturer's coil resistance data the problem is far from solved, for the figures quoted are only average values, which frequently vary as much as 10 ohms in every 100. And when it is realised that a short-circuit turn may alter the overall resistance value of the winding by only one ohm or so we can well imagine the resulting difficulty in definitely pin-pointing the suspected component. This was well illustrated to the writer a short while ago when a receiver was being investigated for insufficient width. All voltages, valves, and smaller components checked normal: the D.C. resistance of the line output transformer and scanning coils were well within the manufacturer's tolerance, and yet on replacing the scanning coils the fault was completely cured. Later, comparing the resistance value of the defective coils against the replacement revealed a deviation in resistance of 0.5 ohm!

E.H.T. Circuits (Measurement)

Closely associated with the line timebase, and dependent upon its working, is the flyback E.H.T. circuit. In the case of a blank screen on a receiver using this system, therefore, the E.H.T. voltage should first be measured, and if low or absent a means must be devised to determine whether the line output stage is working properly.

The actual measurement of E.H.T. often presents much of a problem to the experimenter, for only the more fortunate ones of us possess an electro-static voltmeter, or similar high impedance instrument suitable for this purpose. Before proceeding we must remember that an ordinary multi-testmeter cannot be used for E.H.T. testing; not so much because probably its maximum range is limited to the region of, say, 1,000 volts—we can overcome this easily enough by the use of external series resistors, the main reason being, of course, that the power needed to deflect the meter movement is far in excess of the power capabilities of the E.H.T. section.

How absurd it would be, for instance, to endeavour to turn a 2 horse-power 230 volt D.C. electric motor by the power capabilities of two 120 volt standard H.T. batteries connected in series. The same reasoning applies when a 100 ohm-per-volt meter is connected to a flyback E.H.T. circuit. A current of 10 mA is needed to actuate the meter for full-scale deflection, and when it is realised that the E.H.T. generator can only provide 0.2 mA (200 microamps)—most miniature E.H.T. rectifier valves operated with pulse input can provide an output little in excess of 0.5 mA anyway—it is easy to comprehend the effect a low resistance meter will have on the E.H.T. voltage.

Probably the resulting load across the line output transformer would prevent the production of E.H.T. by severely damping the flyback action. We can see, therefore, that it is essential to ensure that the meter movement consumes little more power than the picture-tube when working at full brilliance (peak white). A 20,000 ohms-per-volt instrument with suitable series resistors has been successfully employed by the writer for E.H.T. measurements, but even so, the drain on the E.H.T. supply is rather heavy

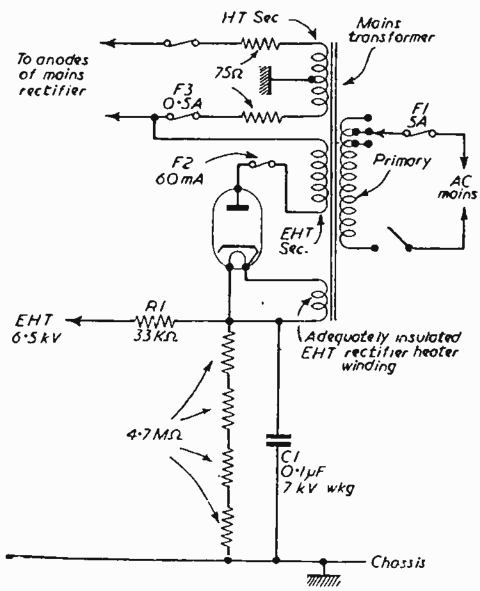


Fig. 9.—A typical mains-derived E.H.T. circuit.

and a high impedance valve-voltmeter, or an infinite impedance electrostatic voltmeter, is to be recommended for accurate measurement.

A method whereby an indication of E.H.T. potential can be gleaned, comprises the employment of a potential divider network comprising 10×10 megohm 1 watt resistors wired in series and terminated across the E.H.T. supply, as shown in Fig. 8. An ex-Government 0 to 1.5 kV meter movement is then inserted between the receiver chassis and a tapping on the resistor chain to provide a convenient reading on the meter. This arrangement provides a high input impedance and a fair indication of E.H.T. potential for low cost.

Whilst on the subject of E.H.T. it is as well to mention—once again—that it can be dangerous, in fact, lethal if applied under good electrical conditions across the body. Use suitably insulated connecting leads when making any E.H.T. tests; make the connections before applying power to the receiver, and always keep one hand in the trouser pocket. Never use a test prod. The writer did once, and held the prod on the E.H.T. anode whilst adjusting the brightness control; the insulation on the prod collapsed, and a flashover occurred between this point and the hand—the other hand was unfortunately making good contact with the brightness control grub screw! The receiver in question was an old style employing a mains-derived E.H.T. system; luckily the writer's heart must have been in good condition then; now, of course, he does not check it in this way!

Owing to the high E.H.T. potential at the anode of the picture-tube a spark can be made to jump between this point and the blade of an insulated screwdriver, and the length of the spark corresponds to the magnitude of E.H.T. This is a quick method of determining whether or not E.H.T. is actually present on the picture-tube, and after a little experience in checking in this way one gets to know the approximate voltage present on the tube anode. In fact, one instrument manufacturer has devised an E.H.T. tester embodying this principle. it is known as the "Kilovolter" (Waveforms, Ltd.), and consists essentially of an adjustable spark gap with a calibrated scale showing the voltage at which the insulation breaks down between two spheres as they approach each other. A reduction drive moves one of the spheres towards the other, and at the point where the spark occurs the drive control knob is unscrewed half a turn, and the voltage is read off on the scale. It can be seen, therefore, that the instrument presents no load to the E.H.T. circuit when the gap setting is correctly adjusted.

Mains-derived E.H.T.

For the sake of completeness we will consider also the now commercially obsolete style of E.H.T. production—the 50 c.p.s. mains-derived system. Fig. 9 is a typical example of this mode, and corresponds to the circuit employed by Murphy Radio in their V114 series receivers. There is nothing at all complicated about mains-derived E.H.T. circuits, and they probably represent the simplest feature of the whole television receiver network. Half-wave rectification is employed, a special high-voltage rectifier valve, capable of withstanding the high inverse voltage, is used for this purpose. E.H.T. smoothing and filtering is achieved by means of C1 and R1; C1 possessing a relatively high value compared with the capacitor employed in flyback systems. This is, of course, because the voltage across C1 will fall in giving up some of its charge to the tube, but it is being replenished 10,000 times a second with flyback systems, and only 50 times a second with mains-powered systems.

Furthermore, the peak inverse voltage appearing across the high voltage rectifier in any circuit employing the line flyback E.H.T. is less than with the 50

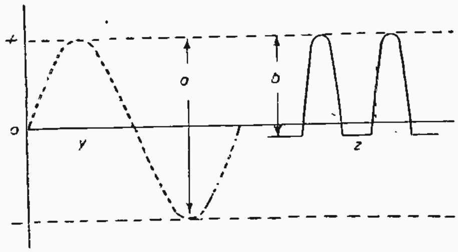


Fig. 10.—Magnitude of inverse voltages across rectifier valve.

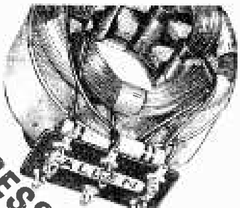
c.p.s. system, this being due to the induced positive peaks which are applied to the anode of the rectifier. The (full line) waveform of Fig. 10 depicts the shape of such a pulse, and it can be clearly seen that there is a great reduction in their amplitude in the negative direction as compared with the sine waveform (broken line) of 50 c.p.s. mains. The magnitude of the inverse voltage across the rectifier employed in a 50 c.p.s. circuit may, therefore, be represented by the line (a), while line (b) represents that due to a flyback pulse, and for this reason a smaller rectifier may be used in conjunction with equipment obtaining E.H.T. from the flyback than its 50 c.p.s. counterpart, for a given output voltage.

Owing to the heavy charge remaining on C1 after switching the receiver off, a bleeder chain comprising 4×4.7 megohm 1 watt resistors connected across the E.H.T. circuit serve the purpose of discharging the capacitor. Incidentally, it has been known for E.H.T. bleeder resistors to become open circuit, so do not assume that when the set has been switched off, the charge will have leaked away. Make sure. Momentarily short-circuiting the capacitor after the application of E.H.T. may not mean that the capacitor has been wholly discharged, for it may build up a considerable voltage again within a minute or so, due to a phenomenon known as dielectric absorption.

A Blank Screen (No E.H.T.)

Having established that E.H.T. is lacking on the final anode of the picture-tube it is probably best to ensure that it lives in A.C. form on the anode of the E.H.T. rectifier. If an A.C. voltmeter is not available for this purpose we can again use the dodge of drawing a spark from the blade of an adequately-insulated screwdriver—this is a very convenient and rapid test. No high voltage A.C. at this point should lead us to suspect an open circuit high voltage secondary winding on the mains transformer, or a blown fuse, such as F2 in the circuit of Fig. 9. The primary fuse, F1, will, of course, be intact, since we should have already observed that the valve heaters, or the rest of the receiver is functioning normally.

(To be continued)



For SUCCESSFUL wide angle scanning

ALLEN DEFLECTOR COILS

70 deg. Scan with minimum deflection defocusing high-efficiency castellated " FERROXCUBE " core. Suits any wide angle C.R.T. up to 27 in. double (d) Scan.

LARGE SCREEN TELEVISION

Only achieved with high efficiency components throughout. ALLEN can supply complete range.

Send 9d. and S.A.E. for circuit diagram of line and Time Base. Write for price list and details of full range of ALLEN components to

ALLEN
COMPONENTS LIMITED
Crown Works, 197 Lower Richmond Road, Richmond, Surrey. Tel.: Prospect 9013

HANNEY of BATH offers:

STANDARD VIEWMASTER. Constructor's Envelope, 7/6; complete kit with wire, sleeving, nuts and bolts, less valves, tube and cabinet. **GENUINE** parts only. £31. **OR** in 7 easy stages: 1, 62/3; 2, 42/9; (Wenvoe, 39/-); 3, £5/1/8; 4, 9/10; 5, £10/4/-; 6, £7/5/9; 7, 67/8; Individual Parts (any item separately), WB100 (sound and vision chassis), 18/6; WB101, 6/-; WB102, 18/6; WB103, 42/-; WB103A, 52/6; WB104, 15/6; WB105, 43/6; WB106, 25/6; WB107, 32/6; WB108, 33/3; WB109/1, 2 or 3 (state tube type), 22/6; WB110, 10/-; WB112, 21/6; WB Console conversion kit, 35/-; WB300 pre-amp chassis, 17/6; Westinghouse Rectifiers, 14A86, 20/4; 14D36, 11/7; WX3 and WX6, 3/9 each; 36EHT100, 29/5; 36EHT50, 26/1; 36EHT45, 23/8; K3/100, 14/8; K3/50, 8/9; K3/45, 8/2. T.C.C. Condensers, £7/10/- (any condenser supplied separately). Morganite pots, 5/- each; Morganite resistors, 35/3. Colvern pots, 22/6; or CLR901, 3/3 each and CLR4089 22, 6/4. Belling Lee L707, 8/9. Fuses, 6d. each. Wearite Coilsets (with L9), L'don, 22/-; Wenvoe, 28/-; B'ham., H'Moss and K.-O.-S., 30/-. Pre-amp coils, 4/- pair, any channel. Special condensers are also available for the WIDE ANGLE Viewmaster.

TELEKING. Constructor's Envelope, 6/-. Coilsets, 54/3; Chassis Kits, 70/-; T.C.C. Kit, £7/4/3; R.M. 4 rectifier, 21/-; Allen Wide Angle Components, LO.308, 50/-; FO.305, 21/-; DC.300, 42/-; FC.302, 35/-; GL.16 and GL.18, 10/- each; BT.314, 15/-; SC.312, 22/6; AT.310, 30/-; OP.117, 9/-. Dubilier Resistor Pot. Kit, 81/6.

MAGNAVIEW. Constructor's Book from BRIMAR Valves. Denco coilsets, 41/2; Chassis kit, 37/6; Erie resistor kit, 39/2; DENCO Wide Angle Components (also suitable for TK), WA DCA1, 43/-; WA/FCA1, 31/-; WA/LC1 and WA/WC1, 7/6 each; WA FBT1, 16/-; Condensers and pots as per our Magnaview Supplement. ELAC Mark 2 PM Focus Rings (with Vernier Control), R.17, 28/6; R.20, 30/-; R.25, 32/6; W.22, 52/6; W.25, 57/6. Ion Traps, IT4, IT6, IT8 and IT9, 5/- each.

STOP PRESS . . . . P.T. 'LYNX' and SUPER VISOR. All Components in stock. Please send for a priced Parts List.

Send 6d. in stamps for our **NEW LIST**, which contains details of all worthwhile designs.

L. F. HANNEY
77, LOWER BRISTOL ROAD, BATH. Tel. 3811

Five Tips FOR FASTER SOLDERING

TRIGGER-FEED SOLDERGUN

The Wolf Type 51 with its trigger-feed action is indispensable to all modern assembly

GENERAL INDUSTRIAL PURPOSES

Type 21—complete with chisel bit and perfectly balanced easy-grip handle. Heavy Chrome finish. Net weight 7½ oz.

FINE INSTRUMENT WORK

Type 31—complete with two bits, one straight and one angular—easily interchangeable. Net weight 8 oz.

FINE TO MEDIUM WORK

Type 41—complete with easily adjustable diagonal bit—the temperature can be controlled by extending or shortening the bit. Net weight 8 oz.

MEDIUM TO HEAVY WORK

Type 71—complete with square section bit, heavy chrome finish, plastic easy-grip handle. Net weight 9½ oz.

EXTRA HEAVY WORK

Type 81—complete with 16 oz. bit and easy-grip plastic handle heavy chrome finish. Net weight 2 lb.

SOLDERING IRONS

Models 21 and 31 also available with straight handles and heat deflecting skirt. Ask for models 22 and 32

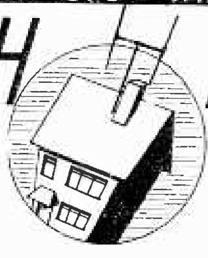
WOLF Electric SOLDERGUNS
AND SOLDERING IRONS

★ *Obtainable from all leading tool merchants and factors.*

WOLF ELECTRIC TOOLS LTD
PIONEER WORKS · HANGER LANE · LONDON · W.5
Branches: Birmingham Manchester Leeds Bristol Glasgow Tel. Perivale 5631-4

TELEVISION PICK-UPS AND REFLECTIONS

UNDERNEATH THE DIPOLE



By Iconos

COMPARISONS are said to be odious, but they are none the less interesting when they refer to television and are made by visitors recently returned from the United States. "British television is *so* peaceful," said one returned traveller to me. "'There is such intense competition between the stations over there, that the stations don't seem to let up for a second, for fear of losing the attention of viewers," he added.

With 11 different programmes simultaneously available in the New York City area at the same time, the prime object of each station is to retain the interest of the maximum viewing audiences. It is realised that any gap or pause in the proceedings encourages viewers to reach for the tuning knob and turn over to another station. For them, there are no prolonged interlude pictures of peaceful river scenes or goldfish in bowls; and the exhibition of the sign "Interval" for 10 minutes during the course of a programme would provoke derision.

TRAGEDY IN A TV KITCHEN

MY informant commented upon the large percentage of filmed programmes, particularly the staged subjects of dramatic content and their associated "commercials." Live television is particularly disliked for any advertising announcements, for which every second's screen time is planned. The death knell of the live commercial was rung when an attractive girl demonstrated a new streamlined refrigerator in a model labour-saving kitchen. Concluding her persuasive chat on kitchen gadgets, she turned to the gleaming white cabinet, centre-piece of a housewife's dream kitchen. "Light as a feather to open," she purred, touching the chromium door handle of the refrigerator. Alas! It didn't budge. Grasping it firmly and at the same time endeavouring to conceal her action by turning her back to the camera, she heaved at that refrigerator door. The entire set of gadgets began to shake, and still the door failed to open. The remainder of the scene was mercifully faded out—but the damage was done, so far as the sponsors were concerned. The new model refrigerator, delivered to the TV studio at the last moment before the transmission, had developed a sudden and most unusual fault in its quick-release lock—which the viewers will never forget. Sponsors are no longer willing to take any chance on what is likely to happen to their demonstrations on live TV. The scene is now carefully and safely filmed and edited. The character: "television refrigerator demonstrator" has become a stock American joke, like the kipper or the pier at Wigan over here.

A BRITISH COMPROMISE?

NEVERTHELESS, though the differences between American and British television were great, my friend from America expressed no particular preference for either style of programme—both, in his opinion, having their good points. "I have the feeling that the type of sponsored TV which may eventually become established in Britain will develop a special style of its own, tempering the vigorous, brassy approach of the typical U.S.A. sponsor with the good taste and restraint to which the British viewers have already become accustomed. "The competition over there is intense," he concluded, "but that doesn't do any harm." This seems to support my remarks last month about the probable effect of competition upon the BBC TV service.

PARLOUR GAMES

NEVER has there been such a concerted Press attack upon a special type of programme as there has been upon the TV parlour game. For a long time, some of the peak viewing times have been allocated to this type of feature, which achieved great popularity with "In the News," "What's My Line" and "The Game." In due course, we shall be treated to spelling bees, kiss-in-the-ring and happy families, I expect, but in the meantime, "Why" got the "bird" in no uncertain manner. Parlour games have served their purpose in introducing a number of striking personalities to the TV screen, including the fabulous and inimitable Gilbert Harding, and are quite a valuable part of the programme. But, like Sherlock Holmes and Billy Bunter, they should be rested for periods from time to time.

UPSIDE-DOWN!

TELEVISION in England made its first really big impression on the public when the Coronation Procession of 1937 was televised from the Apsley Gate. There were not very many television sets in action then but there must have been a relatively large viewing audience. Ever since, the actuality transmissions of national and sporting events have maintained their position as the most important features of British television. In this field, the BBC certainly leads the world. Unfortunately, the most important events seem to take place in the afternoon. The telefilm has been much improved and, with the BBC newsreel, can reproduce the events in the evening peak viewing hours; but without the impact of audience participation, characteristic of the direct transmission. The horse shows are a "cert" for actuality features, and the recent White City transmission was grand entertainment, very well handled technically. This type of transmission calls for expert handling of the cameras, with smooth panoramic movements and well-timed cuts from set-up to set-up. It is strange that many of the television camera operators, having got thoroughly used to looking at viewfinders which show the picture upside-down and in reverse, are loath to change over to the improved types of viewfinder which shows the scene the right way up. Probably these TV camera operators feel that the grand old horse, Foxhunter, is far more at home when he is upside-down and Col. Llewellyn is standing on his head!

Obtaining Increased Sound Output

METHODS OF IMPROVING SOUND WITHOUT EMPLOYING A PRE-AMPLIFIER

By P. Dodson

SOME receivers, while giving an excellent picture, tend to be rather weak on sound. This failing is by no means confined to home-constructed sets. The author has come across cases where a commercial receiver, especially in fringe areas, needed just a little more volume on sound to get the full enjoyment from the programme. It is always desirable to have a little volume in reserve. There are occasions when more gain is called for, such as when the transmitter has to go on reduced power.

Assuming the sound receiver coil cores and/or trimmers are correctly adjusted for maximum sound output, an improvement can sometimes be effected by slightly retuning towards the sound channel the coil cores in the vision section which are common to both vision and sound. In the case of the super-heterodyne, the oscillator should be tuned for maximum sound output. This setting will automatically give best vision results. If the desired improvement cannot be obtained by retuning then the balance of vision-sound is not correctly established.

A pre-amplifier could be used, but this would boost both the vision and the sound. If the vision signal is satisfactory there is no point in introducing more noise (snow) into the picture simply to gain more sound volume.

There are several ways of increasing the sound without appreciably affecting the vision, depending on the type of receiver.

T.R.F. Circuit

All the suggested modifications refer, of course, to receivers where one or more valves in the vision portion are common to both sound and vision. This applies to both straight and super-heterodyne types. Dealing with the straight T.R.F. first. Three R.F. stages on sound are usually considered sufficient up to the fringe areas. A popular arrangement is to have the first R.F. stage in the vision receiver broadly tuned to accept all sidebands of both vision and sound signals, the output from this stage being fed to the sound receiver, which usually consists of two R.F. stages, detector-noise limiter, A.F. stage and pentode output. More sound can easily be obtained without fitting an additional valve by taking the sound from the output of the second R.F. stage in the vision section, as shown in Fig. 1.

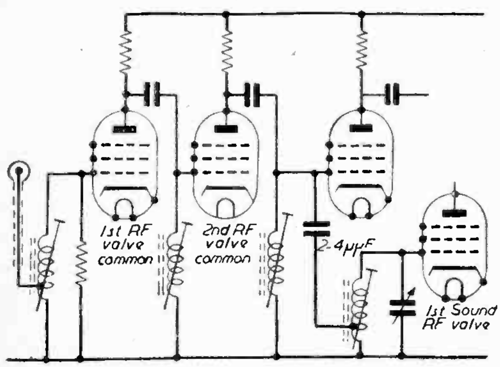


Fig. 1.—Where two R.F. stages are employed, sound may be taken after the second stage to give increased gain.

With a receiver such as the "View Master" having one common R.F. stage and only one valve actually tuned to the sound frequency, this arrangement is particularly applicable and will result in much improved sound volume. The vision signal should not be impaired if care is taken in lining up the R.F. stages. On the provincial stations using the asymmetric system of transmission, the video stages will be tuned to the sideband approaching the sound channel. No trouble should be experienced from vision break through by this modification. Should the vision signal be audible, tapping the sound input coil towards earth end, as shown in the diagram, should remove all traces of the interfering signal.

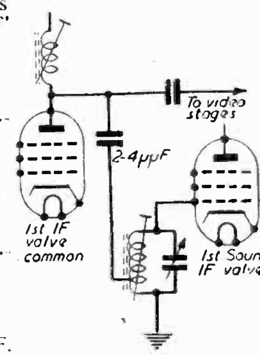


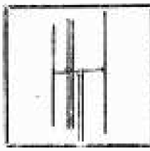
Fig. 2—The sound tapping is usually taken after a single common R.F. stage as shown here.

Extra Audio Stage

If space permits on the sound chassis an extra audio stage could be fitted where only one is used at present. This will give much greater sound output without having the slightest effect on the picture.

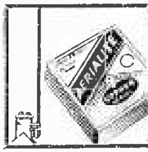
Super-heterodyne receivers usually employ a broadly tuned R.F. stage, followed by the frequency-changer, the A.F. signal being obtained from the output of the mixer valve with two I.F. stages tuned to the sound frequency. Several combinations are possible. For instance, a receiver having only one I.F. sound stage could have either one or two I.F. stages common to both sound and vision. Usually, sufficient sound volume is available, even in fringe areas, with sound taken from the anode circuit of the first I.F. valve, as shown in Fig. 2, with only one I.F. valve tuned to the sound channel. A little experimenting will soon decide which combination gives the best results in a particular locality.

BETTER RECEPTION with Aerialite AERIALS



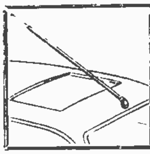
TELEVISION AERIALS.—The Aerialite range covers all types from the "AER-FRINGE" 3-element folded dipole aerials (illustrated) to the "AERADOOR" room or receiver mounting single dipoles. Designed to give maximum electrical performance and robust mechanical construction. Prices from 13/6. Also the Dublex (as supplied to the B.B.C.) is competitively priced at £4/8/6.

DO NOT



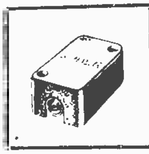
RADIO AERIALS.—The signal pick-up qualities of Aerialite radio aerials are well known. The "Mastatic" and "Anti-static" ensure interference-free reception on all wavebands. The "Trapeze" and "Anomast" aerials are inexpensive and very effective. Aerialite all-copper "Aerial Wire" is still supreme. Prices: 50ft., 4-; 75ft., 6-; 100ft., 7/6.

FAIL TO SEE



CAR AERIALS.—Whatever the make of car, there is a suitable Aerialite car aerial made to provide high gain trouble-free radio reception. Types available for header, scuttle, wing or under-the-car mounting. All fully weatherproofed. Model 17 (illustrated) for header-mounting, with telescopic aerial tubes fully chromed and waterproofed. Price 32/6.

THE AERIALS ON



ACCESSORIES.—Aerialite manufacture all accessories for use with aerial equipment. Including Mains Suppressors, H.F. Coaxial and Balanced Twin Feeder Cables, Coaxial Plugs and Sockets, Connector Boxes, Gutter Brackets, Line Connectors, Earth Rods, etc.

STAND 79

WE SHALL BE AT THE **RADIO SHOW**
EARLS COURT — SEPT. 2–12

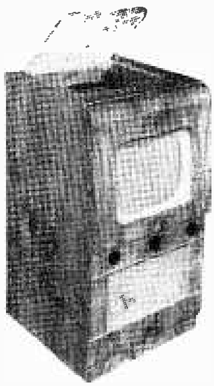
★ *The safeguard for all receivers.*

The New AERIALITE Neon LIGHTNING ARRESTOR, 8/6

Aerialite AERIALS

AERIALITE LTD.
CASTLE WORKS · STALYBRIDGE · CHES

Armstrong



3 NEW TELEVISION RECEIVERS OF EXTREMELY ECONOMICAL PRICE

TELE-GRAM

A 14in. flat-faced rectangular Television receiver combined with the very latest three-speed record player, housed within a handsome veneered walnut cabinet 35in. high, 20in. wide, 20in. deep. 19 valves. Aluminised tube with tinted filter, pin point focusing coupled with full bandwidth and accurate interlacing ENSURES BRILLIANT DAYLIGHT VIEWING. 5 channels—selected instantaneously. 10in. loudspeaker for magnificent reproduction. A.C. mains 200/250 volts.

Price: **78 guineas** (inc. P.T.).

TV 5. 14in. CONSOLE

The 14in. Console model is exactly similar in all respects to the Tele-gram, with the exception of the record player, as described above. Price: **69 guineas** (inc. P. Tax)

TV 5. 17in. CONSOLE

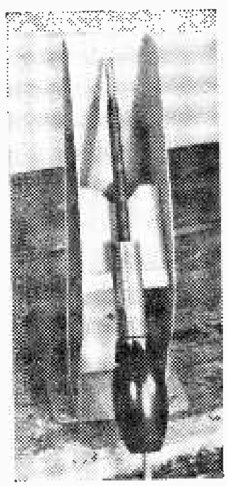
Similarly this 17in. model which gives a superb large picture has the same specification as the 14in. models.

Price: **79 guineas** (inc. P. Tax)

ARMSTRONG WIRELESS & TELEVISION CO. LTD.,
WARLTERS ROAD, HOLLOWAY, LONDON, N.7
Telephone: NORth 3213/4

ADCOLA

(Regd. Trade Mark)



Shields as illustrated 10/6 extra.

SOLDERING INSTRUMENTS

FOR

SUCCESSFUL HOME CONSTRUCTION AND ALL SOUND EQUIPMENT SOLDER JOINTING

"STANDARD MODEL," as ILLUSTRATED, **25/6**

Any volt range supplied. 6/7 to 230/250.

3/16" dia. bit Standard Model

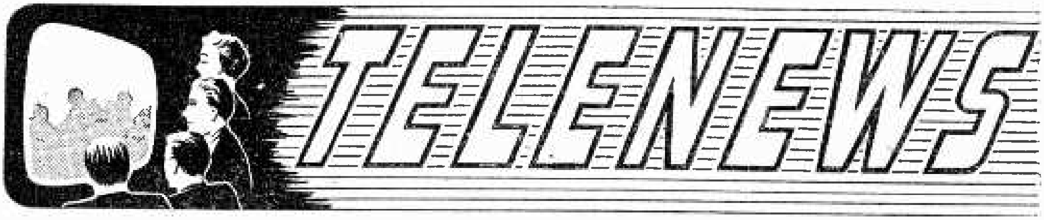
Equally suited to daily or intermittent use

Made in England
Registered Design
(British, U.S.A., Foreign Patents)
Export Enquiries Invited

WRITE DIRECT TO

ADCOLA PRODUCTS LTD.

Sales, Offices & Works: CRANMER COURT, CLAPHAM HIGH ST., LONDON, S.W.4. *MACaulay 4272*



Experiment Continues

WITH the approval of the Dutch Government, experimental television broadcasts in Holland are to continue after October 1. At present the number of broadcast hours a week is three, two evenings of one and a half hours' viewing, but this will be increased to one and a half hours seven times a week.

Tests in Moscow

A DISPATCH received in London states that the Russians are experimenting with large-screen colour television in Moscow.

Cinemas Pay TV Fees

SO successful have cinema screenings been of television transmissions, including the Coronation, the Royal Tournament, Trooping the Colour and the Spithead Review, that special fees are being prepared by the G.P.O. for cinemas wishing to show more TV programmes.

Some cinema executives believe that other relays might be well received, such as " Down You Go " and fashion shows and would like to introduce them into their normal film shows. Cinemas that took advantage of the transmissions of the Royal occasions had a special dispensation.

Television Licences

THE following statement shows the approximate number of television licences issued during the year ended June, 1953. The grand total of sound and television licences was 12,964,065.

Region	Number
London Postal ...	771,291
Home Counties ...	273,351
Midland	503,599
North Eastern ...	282,489
North Western ...	316,495
South Western ...	84,375
Wales and Border ...	95,863
Total England & Wales	2,327,463
Scotland	84,077
Northern Ireland ...	3,765
Grand Total	2,415,305

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

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

Mr. Norman Collins

MR. NORMAN COLLINS, head of High Definition Films, Ltd., and the Associated Broadcasting Development Company, wishes to take a 21-year lease of the two large main halls at Alexandra Palace, the building in which he was Television Controller until three years ago.

Mr. Collins has offered over £19,000 for the lease when the BBC moves out in 1956. The studio space provided by the large halls would prove useful to his firm which has interests in sponsored television.

Washed Out Viewers

A MEMBER of the London County Council Education Committee has said that the headmistress of a mixed children's school complained that she could always tell which pupils had spent the previous evening viewing television—they look tired, bleary-eyed and washed out.

Another member of the committee claimed that television catered for people with little education and no intelligence. " I

TV cameras and equipment were installed in the South-west London home of Mr. Peter Smithers, Tory M.P. for Winchester, for the recent discussion programme " Private Opinion." Mr. Smithers and his wife are seen inspecting one of the cameras.

think it is bad for children," she said, " bad for them to be cramped over a television set when they should be in the open air."

Possible Newsreel Reduction

BBC discussions are taking place with a view to altering the form of news presentation on television.

The present newsreel, TV's most consistently popular feature, may be replaced by an announcer reading news bulletins with photographs and maps as illustrations. This could be followed by a film of topical events more in the line of a magazine than a newsreel.

German Summer Games

OF the 1,800,000 people in East Berlin, one ninth possess television receivers. This summer they have seen the second event in the East German Republic to be televised—the East German summer sports festival.

Paged in Silence

IT is possible that the use of page boys for calling hotel visitors will be replaced eventually by television.

A small camera could be focused on a list of the names of people wanted on the telephone, etc. Monitor screens in other parts of the hotel would keep everyone in touch with the list. The only slight drawback with this scheme is that one can avoid looking at a screen in a corner of the room but can hardly help hearing one's name when called loudly.

Vancouver Station

THE Canadian Broadcasting Corporation has selected Vancouver on the West Coast as the site for its fourth television station, and has ordered complete transmitter, studio and mobile broadcasting equipment from Marconi's Wireless Telegraph Co., Ltd. Vancouver is to have a 5-kilowatt vision transmitter, a 3-kilowatt sound transmitter, with combining unit and ancillary equipment. These were shipped to Canada in August, and the station will be ready to go on the air by the end of 1953.

The mobile outside broadcasting unit is due for delivery towards the end of the year, but work on the studios will not begin until a later date, probably early in the new year. The outside broadcasting unit consists of a van fitted with two camera channels, monitoring and production gear, and a microwave link for sending the signals back to the station.

Slot Machine Pictures

THE Zenith Radio Corporation in America believes that " phonevision," if introduced, could replace a sponsored television service.

Instead of relying on advertisement revenue, stations could transmit a " scrambled " picture that would be received only on receivers fitted with an " unscrambling " attachment. A form of cash till would be installed with this attachment so that viewers pay for the programmes they wish to see with money which is duly collected by the television companies.

Across the Atlantic

THE United States Senate Foreign Relations Committee has shown approval of the proposal to study the possibility of television across the Atlantic Ocean.

Under this Bill the enquiry committee are granted £89,280, a progress report to be submitted by the end of December next year. Among the theories investigated would be the idea of a microwave relay chain to carry television as well as other telecommunications.

Link-up in Europe

DISCUSSIONS were held in London recently by engineers on permanent TV links between Belgium, Holland, France, Western Germany and Britain.

London Relay Service

AT a fee of between £30 and £40 a year, a " piped " television service is being introduced in London during the autumn.

Simplified receivers will be installed with 14in. or 17in. screens. In addition to the BBC TV service, the sets are wired to provide four radio programmes.

New Pontop Pike Mast

WHEN the temporary Pontop Pike mast is replaced by a permanent one it will be 570ft. tall, twice the height of the existing mast, it is learned.

A BBC official has stated: " Plans have been prepared to build the new unit as close as possible to the present site without causing any interference or obstruction to the temporary buildings and unit."

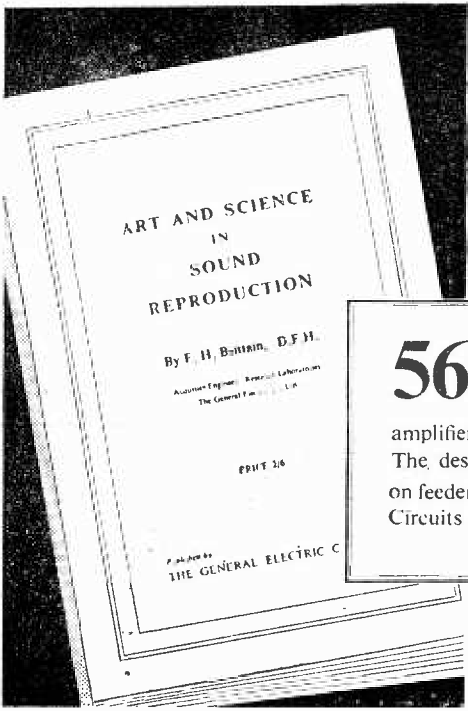
Richard Hearne, television's own Mr. Pastry, exhibits some of the giant-size rhubarb which he has grown on his Sevenoaks farm in Kent.

It is not expected, however, that the transmitters will be ready for 18 months.

Always Be a Cinema

SPEAKING at Liverpool recently, Dr. Roger Manvell, director of the British Film Academy, predicted that within five years nearly all the large cinemas in this country would be equipped to show either three-dimensional or panoramic films in addition to the normal flat pictures.

" As soon as television is commonplace," he said, " it will not detract from the cinema nearly as much as it is doing now. There will always be a cinema-going public, provided films are good enough."



A new essential publication for your technical library!

Published by The General Electric Co. Ltd.

56 PAGES Reverberation and echo · The loudspeaker · Amplifiers for the high quality reproduction of sound · Design factors in high fidelity amplifiers · Notes on 6, 12, 14, 20 and 30 watt amplifiers · The design of the pre-amplifier and tone control · Notes on feeder units · Using the G.E.C. Metal Cone Loudspeaker · Circuits and full constructional details.

2/6 *from the G.E.C.* **DEMONSTRATION ROOM D9** *at the National Radio and Television Exhibition*

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

THE TELE KING. Large screen television for home construction. Superhet. 5 channel. 32-page booklet and full-size wiring diagrams.
PRICE 6/- POST FREE.

9in. TABLE TV CABINETS. Medium shade mahogany finish. Complete with back, safety glass, speaker-fret. Internal dimensions : 19½in. high, 16in. wide, 14in. deep.
LASKY'S PRICE 39/6 Carriage 7/6 extra.
Adaptor frame available for 6in. C.R. tubes. The aperture can easily be enlarged to take 12in. or 14in. tubes.

VCR97 C.R. TUBES, new unused, 35/-. Carriage 5/-.

EHT. Transformer for VCR97, 45/-.

Screen Enlarger for VCR97, Filter type. 17/6. Postage 2/6.

E.H.T. Condensers .1mfd. 3kV. 3/6. .1mfd. 2.5kV. 2/6.

THE MAGNAVIEW. 6d. POST FREE.

THE VIEWMASTER. Television for the home constructor at its finest. 32-page booklet and 8 full-size wiring diagrams. PRICE 7/6. Post Free. State station required.

DE LUXE TELEVISION CABINETS. Our new 1954 Mark II Model. For 12in. C.R. tubes. Finished in beautiful figured walnut, light, dark or medium finish, with high polish. Supplied complete with mask, glass, castors, back, speaker-fret, speaker baffle, and C.R.T. neck protector. Suitable for most home construction TV receivers. Inside dimensions : 16⅝in. deep, 17⅞in. wide, 28in. high. Overall height, 32in. and width 18½in. Rondated front.
LASKY'S PRICE, £8.10.0. Carriage 12/6 extra.
Adaptor frames for 9in. and 10in. C.R. tubes can be supplied.

SPECIAL CATHODE RAY TUBE OFFER

Brand new and unused, 12in. ion trap type cathode ray tubes. 6.3 Volt heater, 7-9 kV. E.H.T. 35mm. neck. Black and white picture. Famous British Manufacturer.
£12.19.6d. PERFECT
Carriage and insurance 15/- per tube extra.

CATHODE RAY TUBE MASKS
New Aspect Ratio
9in., 7/-.
10in. Double D, 7/6.
12in. Cream, 15/-.
12in. Flat Face, 15/-.
12in. Old ratio, 9/6.
15in. Do. Do., 21/-.
12in. With dark screen filter and escutcheon, 17/6
14in. Rectangular, 21/-.
15in. Cream, 17/6.
16in. Double D, 31/6.
17in. Rectangular, 25/-.
12in. Soiled with fitted safety glass, Cream, 11/6.
12in. Do. Do., Black, 8/6.

LASKY'S RADIO,

LASKY'S (HARROW ROAD), LTD., 370, HARROW ROAD, PADDINGTON, LONDON, W.9.

Telephones : CUNningham 1979-7214. ALL DEPTS.
MAIL ORDER AND DESPATCH DEPARTMENTS : 485-487, HARROW ROAD, PADDINGTON, LONDON, W.10.
Hours : Mon. to Sat. 9.30 a.m. to 6 p.m. ; Thurs., half day, 1 p.m.
Postage and packing charges (unless otherwise stated) : on order value £1—1s. 0d. extra ; £5—2s. 0d. extra ; £10—3s. 6d. extra; over £10 carriage free. All goods fully insured in transit.

ARMOUR PLATE GLASS.
15in. Actual size.
18⅛in. x 19¼in. x ⅜in., 7/11
12in. Actual size.
13in. x 10½in. x ¼in., 4/-.
9in. Actual size.
9in. x 8in. x ¼in., 3/-.

Plessey Width Controls, 6/6.
C.R.T. Rear Neck Protectors, 2/6.

Scanning coils. Low impedance frame, low line. With aluminium shroud, **12/6.**
Wide angle scanning coils. Low impd. line and frame, **12/6.**
Scanning Coils. Low impedance line and frame, **7/6.**
Frame blocking oscillator transformer. Plessey, **10/6.**
Multi ratio frame output transformer, **10/6.**

TELEVISION SELENIUM RECTIFIERS
The very latest S.T.C. "Sentercell" and Westinghouse ranges.

K3/40, 3.2 kV	7/6
K3/45, 3.6 kV	8/2
K3/50, 4.0 kV	8/8
K3/100, 8.0 kV	14/8
K3/160, 12.8kV	21/6
14A86	20/4
14A100	21/6
RM4	18/-

SPECIAL. BRAND NEW T.C.C. TV CONDENSERS.
32+100mfd, 450v.w. Type CE15PE. Price 7/6.
.04mfd, 12.5 kV. Type CP59VO. Price 7/6.

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).

"THE MIRACLE"

SIR,—The letter signed by C. A. Burton (Churt) invites comment; he certainly seems to have had a raw deal in his experience with his dealer. However, newcomers to TV must not be disheartened by his experiences. Here is mine.

January 11th, 1950—purchased a console 9in. tube; reception from Sutton Coldfield; aerial home-made; reception fair, especially after the makers provided a set of "fringe" coils, which the dealer fitted free of charge; hours of use approximately 3,500; replacements—two rectifiers (PZ30), two E.F.50's (replaced by Red Sylvanias at 8s. 6d. each), and one voltage divider resistor (the first PZ30 saw it "off").

The picture is still excellent—sharp and a really good black and white; ion burn is very little and can only be seen without a picture; the circuit is a T.R.F., and I have had a very fair deal with the retailer (incidentally, this was his first TV sale), he has been most helpful.

Mention of "tampering" with the receiver recalls a period of interference, i.e. intermittent white dots in lines across the screen and "frying" in the speaker; six weeks of intensive search revealed loose leads in an alarm clock upstairs, every small vibration causing minute sparking in the brass sockets, hence the "interference." I even replaced every electrolytic condenser myself, believing it was an internal breakdown in one of them (Fred Barrell, W. Harrow, July, 1953, please note).

Judging by comments and experiences of my friends, the inexperienced retailer is one of the causes of bad feeling. I met one who had no idea what "standing waves" were; others are using poor equipment, but don't blame them all—there are some good ones, too! When you find one, make a friend of him: he will be only too glad to help.—ARTHUR ASHCROFT (Ormskirk).

CHEAPER VALVES?

SIR,—It seems to me the keen growth of the amateur to the interests of television is in danger of apathy owing to the continued high price of the radio valve. One would not quibble so much at the price asked for the modern valve if an expectancy of life similar to its pre-war counterpart could be anticipated.

I had occasion recently to purchase an output tetrode. This valve cost 22s. 6d., plus 7s. 6d. purchase tax. It was installed reasonably close to a dropping resistor in a popular set. After three weeks the anode cap became loose and the glass envelope was also loose. I referred the matter to my dealer who, quite complacently informed me: "The caps frequently come adrift, but we codge 'em up with a bit of Seccotine." This may be all very well with a shilling article, but with a 30s. television valve bearing an honourable in the industry it is just not good enough.

The B7G valves are completely without guides to assist in replacing in the valveholder, and where is the fan who has not at some time or other buckled the curious wire pins protruding? All these valves are usually well over the 20s. mark, but the quality of their finish leaves much to be desired. These valves are sealed off at the top, and there are many instances where the spring loaded securing "can" has removed the roughly finished glass pip, thus ruining the valve.

Considering the price of the average commercial television set, the 16in. and 17in. C.R.T. will cost upon replacement around about £30 with purchase tax. Its healthy life begins to wilt after 18 months, over two years it just is not entertainment, and I am of opinion that it is quite time both user and experimenter alike can expect a better and cheaper "bottle."—E. R. PALMER (Handsworth).

TUBE REACTIVATING

SIR,—With reference to the recent article on C.R. tube reactivation I give below the results as obtained by myself and would welcome your comments.

The circuit used was as published, using metal rectifier and mA meter with tapped heater transformer.

Tube No. 1 was a VCR517 which had lost emission through applying H.T. to the grid, tube having only had a few hours' use before a condenser broke down and ruined the emission. Picture was present, but very dim.

Test No. 1: with only 4 volts on heater, no current showing on mA meter.

Test No. 2: heater current raised to 5 volts; slight rise on meter to 2 mA after 30 minutes' run.

Tested on picture—no improvement.

Test No. 3: heater current raised to 5½ volts, steady rise on meter, until after 20 minutes—approximately 20 mA showed on meter.

Tube "aged" on normal 4-volt current for six hours. Picture tested—no improvement.

Test No. 4: a further run with heater at 5½ volts, meter showed 35 mA after a further 30 minutes and was still rising when switched off.

Tube "aged" again for eight hours at normal heater current; picture tested—no improvement. (I can always use this tube as a rectifier!)

Test No. 5: Normal VCR97 a good tube; tested to find out emission; showed 10 mA at normal heater current; this emission showed signs of dropping as test exceeded two minutes' run, so hurriedly switched off! Picture tested—as good as ever.

Test No. 6: a VCR97 had much use, picture dim, screen quite good, no burns. No current at normal 4 volts. Heater raised to 5½ volts, rose fairly steadily for one-and-a-half hours to 10 mA, remained steady for 10 minutes. Tube "aged" for four hours, then picture tested—no improvement. Focus appeared good, which is usually impaired if gas is present.

Test No. 7: CRM121. Picture dim, tested at normal heater current (2 volts), no emission. Heater raised to 2½ volts, run for one hour; slight rise on meter to 2 mA. Picture tested—no improvement.

Test resumed, heater current raised to 3 volts; after 20 minutes' run mA had risen to 8 and remained steady for a further 10 minutes. Tube "aged" for four hours at normal voltage on heater; picture tested—no improvement.

Test No. 8: VCR517 as tested in Test No. 1; run with picture with 5½ volts on heater—good picture!

Test No. 9: VCR97 from Test No. 6; heater on 5½ volts run with picture—fair, about 75 per cent.

Test No. 10: CRM121 heater at 3 volts; picture tested—fairly good, about 60 per cent.

Test No. 11 : VCR517 from Test Nos. 1 and 8 run again with 5½ volts heater current for a further 50 minutes, when emission had reached 50 mA, which is maximum of meter—and of rectifier—tube "aged" for two hours at normal heater current ; tested again for emission at normal heater current, showed 10 mA ; picture tested—slight improvement on first test.

"Aged" again for a further two hours : "improvement" noticed in last test had disappeared.

Reactivated at 5½ volts for 20 minutes ; emission rising, at 35 mA placed into set with normal voltages present ; brilliance control nearly off and left for six hours ; brilliance turned up—tube was about 75 per cent. as good as new ! has been run for some 50 hours since and appears to be improving !

CRM121 reactivated at 3 volts for period of 20 minutes ; emission steady at 8 mA put into set and run with raster, and E.H.T. with brilliance turned down for about four hours, when brilliance was turned up ; a good picture at approximately 80 per cent. as good as normal tube was obtained ; tubes are all grid-modulated.

The conclusions I have come to appear to be that it seems to harm the tube in some way in running the heater without voltage being applied to the other electrodes. That it would appear that "ageing" should be carried out with these voltages applied. —R. L. KING (Carshalton).

[*Can any other readers supply practical experience of this nature so that an analysis may be made of the effects of the process?*—ED.]

AERIAL RESULTS

SIR,—I notice some of your readers doubt if elaborate aerial arrays are any more efficient than a simple "H," or just provide extra perches for birds, as one reader put it. In this area, at any rate, I have found the elaborate arrays to be definitely superior.

Since the opening of Holme Moss I have used a multi-rod aerial positioned about 40ft. high, and although we are about 70 to 80 miles from Holme Moss, except for a few odd occasions I have received a good and quite often excellent picture. A neighbour who has an "H" aerial at a similar height with a similar, though not the same, make of set receives normally a good picture, but finds it necessary to work at almost full contrast, while my set works at somewhat reduced contrast.

Some weeks ago interference patterns from a foreign station caused trouble in this district. While my picture remained steady, my neighbour's picture broke up. Presumably, his signal was too weak to overcome the interference.

Recently we tried the effect of erecting temporarily a second-hand folded dipole multi-array only about 20ft. high for my neighbour's set. As compared with the "H" this gave much better results even at half the height, in fact it was necessary to reduce contrast for the folded dipole to a point where, on plugging in the "H," no picture was visible.

Of course, in good signal-strength areas it must be difficult to appreciate the superiority of the multi-array. Thus it is not until Holme Moss has an "off-night" that an appreciable difference is detected, even at this distance from the transmitter—G. HUTTON (Redcar).

POINTS OF VIEW

SIR,—I was very interested indeed to see your new design for the P.T. Super-Visor which has been designed as a de luxe receiver incorporating many of the refinements suggested by the correspondents to your journal, including the writer.

First of all I should like to congratulate you on a first-class design, but would like to say that I am disappointed on one or two respects.

But, I am disappointed to see that a black level clamp is not included as I consider this to be desirable even in adequate signal areas to cope with camera variations at the BBC. I would also suggest the provision of optional spot wobble.

Furthermore, I am disappointed to see that you have used flyback E.H.T. instead of R.F. E.H.T. The objection to flyback E.H.T. is, of course, that width, linearity and brightness are interlocked too much and no matter how good the output transformer is, picture size still varies with brilliance.

Lastly, I am disappointed from a practical point of view to see that you have used one chassis for the unit. From experience I find it much better to divide any television receiver into four or five chassis which can be simply disconnected by plug arrangements and individually checked. by the designer, giving an indication of how to pre-test each of these chassis by use of simple instruments prior to overall assembly.

I personally propose to build this receiver with the modifications and refinements which I have mentioned and I think that this should get as near practical perfection as can be expected.—G. T. LAYTON (Urmston).

[*A satisfactory clamp has not yet been found which could be easily incorporated, and be used fly back E.H.T. on the grounds of cheapness. The drawbacks are not, in our opinion, serious*—ED.]

SIR,—I have read the details of your latest receiver and am glad that you have adopted the ordinary type of construction again. Apart from the circuit, I think the arrangement you used in the Lynx was very awkward. If you want to service anywhere you cannot get to all parts very easily, whereas in the one chassis idea, as in the new model, the receiver can obviously be turned on its side and everything is get-at-able. The circuit appears to offer everything that the modern viewer who is also a "fan" can wish for, and it should prove ideal in almost any part of the country. I have started on construction and only wish all the details could be given at once as I am dying to get it completed, but must curb my patience for at least three weeks out of every month.—J. HUDSON (N.W.9).

TEST CARD C

SIR,—I remember some time ago you appealed to the BBC to put on Test Card C for the benefit of experimenters, etc., and it appears that you have been successful. I find this card now comes up most evenings before the programme commences, and have found it of great value. I had no idea how bad my set was—and I thought I was getting a good picture. I turned up your back number describing the features of this and spent odd moments making use of the diagram with great improvement in details and also in brightness, due to a weak peak white resulting from badly out-of-tune circuits. I do not think many people realise how bad their pictures really are, and I have found several non-technical friends who do not, incidentally, take any radio papers, and who have seen the card but do not know what it is for.—R. E. MCDOUGAL (Manchester).

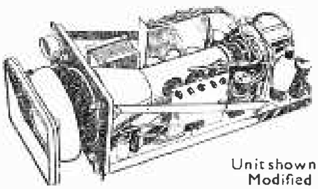
CLYDESDALE

Bargains in Ex-Services Radio and Electronic Equipment

THE "PRACTICAL TELEVISION" BEGINNER'S RECEIVER

by B. L. MORLEY

VISUAL SECTION



Unit shown Modified

INDICATOR UNIT TYPE 6H
in Maker's Original Case

Containing a VCR97 Cathode-ray Tube, with mu-metal screen, 4/VR91s (EF50), 3/VR54s (EB34), various w.w. pots, switches, H.V. Conds., Resistors, etc., built in metal chassis to fit into metal box 8 x 8½ x 7½in.

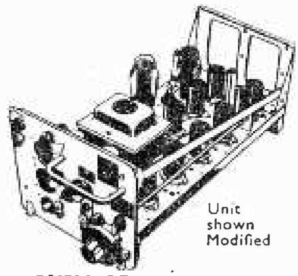
ASK FOR No. D/E777 **£4.9.6** CARRIAGE PAID

MAINS TRANSFORMER ... 27/6
SMOOTHING CHOKE 15/6
E.H.T. TRANSFORMER, H832... 45/–
or H835... 50/–

COMPONENTS PRICE LIST FOR BOTH SECTIONS ON REQUEST

REPRINT OF P.T. BEGINNERS' RECEIVER ARTICLES APRIL/JULY NOW AVAILABLE, 1/6.

RECEIVER SECTION



Unit shown Modified

R3170A RECEIVER UNIT

A 16-valve Radar Chassis with 30 Mc/s I.F. Strip, etc., original range about 200 Mc/s. In metal case, 18 x 9 x 8in.

ASK FOR No. D/H492 **£4.12.6** CARRIAGE PAID

MAINS TRANSFORMER ... 35/–
SMOOTHING CHOKE... ... 15/6
OUTPUT TRANSFORMER ... 9/9
CRYSTAL DIODES 5/3

"ECONOMY TELEVISION" RECEIVER

Reprint of the article by B. L. Morley 1/6. Components Price List Free on Request.

INDICATOR TYPE 62

In original wood case ASK FOR No. D/H526 **£5.9.6**

In used condition ASK FOR No. D/H774 **£2.9.6**

Both carriage paid

E.H.T. TRANSFORMERS 37/6 and 49/6
MAINS TRANSFORMERS £2/15/0 and £3/0/0
SMOOTHING CHOKE... ... 7/6

"ARGUS" TELEVISION RECEIVER

A reprint of the blueprint and data, 2/6. Components Price List Free on Request.

INDICATOR TYPE 6 in original wood case (H524), containing: The VCR97 Tube, 4/VR91 (EF50), VR54 (EB34), 3/VR92 (EA50) valves, plus condensers and resistors.

ASK FOR No. D/H524 ... ... **£4.9.6**

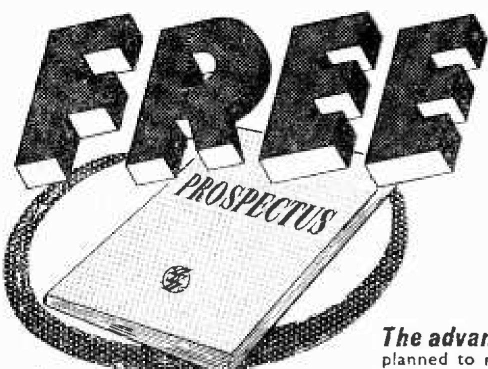
E.H.T. TRANSFORMERS 45/- and 50/-
MAINS TRANSFORMERS £3/7/6 and £3/6/0
SMOOTHING CHOKE... ... 15/6

Order direct from :

CLYDESDALE SUPPLY CO. LTD.

2 Bridge Street, Glasgow, C.5. 'Phone : SOUTH 2706/9

Visit our Branches in Scotland, England and N. Ireland.



POST THE COUPON TODAY FOR OUR BROCHURE ON THE LATEST METHODS OF HOME TRAINING FOR OVER 150 CAREERS & HOBBIES

PRIVATE AND INDIVIDUAL TUITION IN YOUR OWN HOME

City and Guilds Grouped Certificates in Telecommunications: A.M. Brit. I.R.E Examination, Radio Amateur's Licence, Radio and Television Servicing Certificates, General Radio and Television Courses, Radar, Sound Recording, etc. Also Courses in all other branches of Engineering and Commerce.

The advantages of E.M.I. training. ★The teaching methods are planned to meet modern industrial requirements. ★We offer training in all subjects which provide lucrative jobs or interesting hobbies. ★A tutor is personally allotted by name to ensure private and individual tuition. ★Free advice covering all aspects of training is given to students before and after enrolling with us.

NEW LEARN THE PRACTICAL WAY. With many of our courses we supply actual equipment thus combining theory and practice in the correct educational sequence. Courses include: Radio, Television, Electronics, Draughtsmanship, Carpentry, Photography, and Commercial Art, etc.

Courses from £1 per month

POST THIS COUPON TODAY

Send without obligation your FREE book.
E.M.I. INSTITUTES, Dept. 138K
43 Grove Park Road, London, W.4.
Phone: Chiswick 4417/8.

NAME ....

ADDRESS ....

....

SUBJECT(S) OF INTEREST ....

EMI INSTITUTES

The only Postal College which is part of a world-wide Industrial Organisation.

IC18

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

" LIVE " TUBE FACE

I have built the " View Master " and have two faults which I cannot put right. Can you help me, please ?

(1) I have increased E.H.T. to 9 Kv. and am using a Mazda CRM123 C.R.T. After the set has been working for about 10 minutes a static discharge seems to leak away around the front support bracket and no amount of insulation seems to make any difference. If, however, a finger is placed on either of the two bracket fixing screws the discharge ceases. This is a most annoying fault, as it affects both sound and vision.

(2) I have cramping at the top of the picture. I have tried increasing the capacity of C49, but this has no effect.—E. L. Ottley (Crowthorne).

We are most surprised at the peculiar effect which you mention and which is apparently due to a static discharge from the front of your C.R.T. We have not previously heard of this trouble and as it is just possible that the glass used in your particular tube is more conductive than normal, you could take this matter up with the manufacturers, who should be able to advise you.

Cramping at the top of the picture is most unusual and may indicate a wrong value resistor in the cathode of V12. We suggest checking R66 and if necessary reducing in value.

INCREASED E.H.T.

Last February I completed a " View Master " and have very good results which I still enjoy. The 2.5 Mc/s lines on test card " C " are clearly visible on a MW31-16 12in. tube.

It is built of the correct components and of the recommended makes in console form with the modifications given on page 60 of PRACTICAL TELEVISION, Vol. 1, No. 2.

I am using a WB.103A mains transformer that is the auto transformer, in order to ensure correct voltages. On the 230 v. tapping I got very near the voltages given in the V. M. booklet—nearer than the 10 per cent. allowed.

But over the four months the set has been working without any trouble, I have made certain observations and it is these queries I should like answered.

1. I have not increased the E.H.T. and feel it is not desirable by results. Is this detrimental to the tube ?

2. On switching on the set the tube heater lights up a little brighter for a second or so and then dies back to its normal colour as do dial lights in A.C./D.C. radio receivers. Is this normal ?

3. I read in various articles in P.T. that a receiver should produce a raster when the aerial is disconnected or during periods of non-transmission. My set will only produce a raster when the BBC transmits such a pattern with flyback lines continuous at the top and in part at the bottom. When transmissions cease the screen becomes dark in appearance with occasional white flashes of interference. Although I am getting pictures up to commercial standard, ought I to be able to get a set produced raster.—F. H. Nelmes (Swansea).

1. Increased EHT will normally give a brighter picture with better definition. 2. It is quite normal for the C.R.T. heaters to light up brightly when first switching on. The manufacturers state that no harm is caused by this. 3. If you are unable to obtain a raster when there is no transmission it may indicate that the value of R68 is a little too high and should be reduced.

BEGINNER'S RECEIVER

I am at present building the Beginner's Television Receiver and I accidentally took off L15 and removed the turns. Would it be possible to tell me the winding instructions for this coil ?

Also, it is intended to build the " Argus " timebases and C.R.T. network. Is it necessary to have a 425-425 transformer as specified in the data ; if not, would you tell me the gear needed for this.—M. T. Milligan (Glasgow).

L/5 requires approximately 15 turns 30 s.w.g. wire. A transformer supplying 350-0-350 volts at 80 mA. can be used for the timebase. We are commencing constructional details of a timebase for this receiver in this issue, in which you may be interested.

FAULTY LINE OUTPUT TRANSFORMER

Having used a Bush TV24 for the past eight months with excellent results I am now finding that the picture is momentarily contracting from either edge towards the centre of the tube. This lasts only long enough for it to be perceptible, but may be repeated several times after which the set will settle down before it is again repeated. Adjustment of the line hold does not affect a cure.

The set is used on 240v. A.C. mains to which supply it is adjusted, and as this set is well away from any likely heavy industrial loading I can see no reason for rapid changes in supply voltage. The aerial used is an indoor one and has given excellent results since the installation of the set.

In all other senses the picture and sound are all one could desire, but this " flicking " is marring the pleasure we get from viewing. If you could suggest any simple cure I might undertake I should be grateful to you.—G. Shaw (Sheffield).

The defect you mention is very often provoked by an intermittent fault in the line output transformer or scanning coils, and, apart from relacing the faulty component, little can be done by way of a small adjustment to alleviate the intermittent contracting effect. It sometimes happens, however, that the line output valve itself is diagnosed to be the cause, and before you attempt extensive replacements it may be advisable to have this valve checked—a substitution check is the most desirable with a fault of this nature. Carefully examine the circuitry associated with the line output stage in general, for an intermittent capacitor or resistor can, in certain cases, give rise to a similar effect.

REALIGNMENT NECESSARY

I have had a Cossor No. 916 television set for about 3½ years. During the last few months the picture has lost definition and some brilliance, the only clue I have got is on test card "C," which shows black after white, in some cases two white lines, especially noted after black oblong at top of card.

Resistances have been tested, E.H.T. rectifier renewed and valves changed where possible with no effect. Could this be due to too much contrast in an ageing tube, as same has several tiny black spots on screen ?

I should be glad of any advice you could give me and also whether I could use a larger tube with this set.—W. H. Harvey (Greenford).

It is possible, of course, that after 3½ years the picture-tube in your receiver is losing emission and thereby contributing to an overall reduction in picture definition. Replacing your tube will obviously enhance the quality of the picture, and it is possible to replace the 108K tube in the receiver with the Cossor 15in. 85K, provided, of course, that it is possible to cater for the larger tube from the mechanical aspect.

An excessive contrast setting may aggravate the effect of black after white, but it is more likely that, owing to ageing components and valves, your receiver could do with a general realignment.

"VIEW MASTER" CRAMPING

I have recently completed a "View Master" receiver using a 12in. tube, and I find that the picture is cramped to the right of the screen. I have not made the circuit alteration for increased E.H.T., etc., as given in the 6th edition of the construction manual. Could you please advise me on how to correct this fault? Also, I am using an indoor aerial which is close to the receiver and if any person approaches it the picture tends to slip at the top. Is this to be expected with the aerial arrangement that I have ?—T. E. Young (Stratford, E.15).

The cramping which you experience at the right side of the picture may be due to the D.C. supply in the V10 stage being too low ; we suggest this be measured and if necessary increased by fitting an auto transformer if your A.C. mains volts are low. You could also reduce the value of R46 ; this should have the effect of opening out the right side, and by pushing the iron dust core farther into L14 it would close up the left side ; also try reducing the value of R50 slightly.

Regarding the effect you experience with your indoor aerial, very obviously this is due to reflections and can only be overcome by putting the aerial farther away so that people moving around the room do not affect it.

R.F. STAGES DEFECTIVE

I have a Vidor 12in. set tuned to the Wenvoe station, and my problem is that the vision and sound faded out together one evening. By turning up the contrast control the raster reappears on the tube and that is all, although traffic passing the house is heard faintly and small dots appear across the tube as though the signal is very weak.—E. J. Smith (Wareham).

Your trouble lies somewhere within the first three stages—R.F. amplifier, mixer/oscillator, and first vision I.F. amplifier. EF80 valves are employed in each case, and are in line with the aerial socket on the right-hand side of the R.F./I.F. chassis—the R.F. amplifier being the valve adjacent to the aerial socket—and the other stages follow on. You should first of all have the associated valves checked for emission, and also ensure that the valves are receiving anode and screen volts. Probably the fault is in the local oscillator section (the second valve in the line) : it is possible that by interchanging the first and second valves in the line the fault will be remedied —you should try this, for it often happens that certain EF80 valves cease oscillating and yet work perfectly satisfactorily as an amplifier.

HEATER-CATHODE CIRCUIT

I have a fault just developed in my "View Master" which I believe to be a heater-cathode short in the tube (Type CRM121, Mazda). After 20 minutes or so black bars flashing across the tube face, also defocusing for 5 to 10 seconds. The fault disappears altogether for some time, only to reappear. Could you please inform me if my deductions are correct and, if so, please supply me with details of how to grid modulate the tube? I have just been reading in your issue of July, 1952, page 66, Mr. P. Dodson ("Using Faulty Tubes") and feel this circuit will suffice.

I have two valves in stock, namely 6H6DD or VR92 for D.C. restorer, and 6F13 phase splitter. Is it possible to use these and could you supply a circuit ?—A. V. Butcher (Edenbridge).

You are perfectly correct in assuming that your tube has developed an intermittent heater/cathode short. We cannot add any further information to the July, 1952, article on grid modulation but would suggest that in preference to modifying the circuitry you fit one of the special heater transformers now being sold for this purpose.

LINE OUTPUT STAGE FAULT

I have a Kolster-Brandes HV.40 receiver, and I recently fitted a two-valve pre-amp. to improve the gain. The result was a very much better picture and also sound, but an intermittent fault has now developed in the receiver.

After the set has been on for a time the picture suddenly gets narrower and stretched in a vertical direction. It quickly loses width and finally vanishes altogether. When this happens the raster also vanishes, and no amount of manipulation of contrast or brilliance controls has any effect, the screen remains blank. When I switch off, the usual spot does not appear on the tube. The sound is not in any way affected during this time.

The pre-amp. which I have screwed to the TV table has a separate mains lead, but no mains on/off switch, so that I have to use the power point switch. I have noticed that even with the mains switch in the off position, but with the receiver switch on, the metal casing of the pre-amp. seems slightly "live." Is this in order ?—G. Thomas (Carmarthen).

The symptom you describe is the result of a sudden failure of the line output stage, and is probably due to a valve defect. One of three valves could possibly be responsible—the horizontal generator (12AU7), the horizontal output (6CD6G) ; and the reclaim rectifier (6U4GT). You should have these valves time tested for emission, or preferably check each stage in turn by valve substitution.

HOLME MOSS Fringe Aerial for sale, was £18 new, will take £8 or nearest. MUSGRAVE, 575, Durham Road, Low Fell, Gateshead, 9.

LATEST Type 10 Home-Lab. Sig. Generator, £5. 78, Bryant Road, Strood, Kent.

OUTSTANDING OFFER of the year: save ££'s and build Universal Meter from our professionally designed kit. Complete, with all components, instructions, blueprints: price £4/19/-; c.o.d. or c.w.o.: money refunded if not satisfied guarantee. GERRY, 22, Birkbeck Road, Sidcup, Kent.

CANNED ⅜in. sq. TV Cored Coil-formers, 2/3 ea.; TV Coil Sets, UHF FM Receivers for Wrotham HI-FI Station, £11/17/6; ALO Kits. BEL, Marlborough Yard, Archway, N.19. (ARC. 5078.)

TV WITHOUT MAINS. Absolutely first-class picture plus DC circuit for lighting; as supplied to the B.B.C. Special AC/DC "Chorehorse" Generators, self-starting, compact, and complete AC 220/250 volts, 50/60 cycles, 250 350 watts AVC. Will run radios, vacuum cleaners, small tools, etc.; £47/10/-, plus 10/- delivery.—Below.

STORAGE BATTERIES, 12v. 75 AH heavy duty, 19 plates; separate cells in hardwood cases; finest possible specification, approximately ¼ present list; £7/17/6, plus 9/6 delivery.—Below.

6v. 90 AH, 15 plates, hard rubber cells; also suitable for cars, tractors, lorries; £3/7/6, plus 7/6 delivery. TEDDINGTON ENGINEERING CO. LTD., Dept "C," High St., Teddington, Middlesex.

"DIRECT T/V REPLACEMENTS" enables you to purchase all your components, valves and T/V books from one supplier. Largest stock of manufacturers' and home constructors' components. Spares Manual and Supplement, 9d. 134-136, Lewisham Way, New Cross, S.E.14. (TIDeway 2330 and 3696.)

50 SECONDHAND Televisions always for sale; famous makes. TOMLINS, 127, Brockley Rise, Forest Hill, S.E.23. (FOR. 5497.)

BOOKLETS: "How to use ex-Gov. Lenses and Prisms." Nos. 1 and 2, price 2/6. Ex-Gov. Optical lists free for s.a.e. H. ENGLISH, Rayleigh Road, Hutton, Brentwood, Essex.

500 NEW BOXED Receivers, type 1124, complete, 6 valves, 25/- ea. AMATEURS PARADISE, 155, Humberstone Road, Leicester.

"RADIO UNLIMITED" offer Viewmaster Valves, as specified, complete set of 12, £6/2/6; EF91, 6AM6, 8D3, 12AT7, 1T4, 1S5, 1R5, 1C5, 7/9 each; 6V6, 6F6, 6K6, 5Z4, 5U4, 6J6, 6BW6, EBC33, 8/3 each; EF39, EF50, EF36, 7S7, 7B7, 7/6; PZ30, 15/-; EC91, 6/6; 6AL5, 6/-. Full list available. Viewmaster Coils, complete set of Coils and Choke, 17/6. Full range Transformers and Chokes for Viewmaster, list available. Non-mag., 6in. Speakers, 11/6, 8in. 12/6, 10in. 17/-. W.W. Pots, 4 watt, 500 ohm, 750 ohm, 5,000 ohm, 3/9 each; 50 ohm, 1 watt, long spindle, 3/- each. Dubilier BR series card/tub. Condensers, 500vw, 8 mfd, 2/6, 16 mfd 3/-, 8 x 8 3/9, 16 x 16 4/6, 32 mfd, 4/6, 32 x 32 5/6. Return of post service. RADIO UNLIMITED, Elm Road, London, E.17. (Telephone: KEY. 4813.)

ACKNOWLEDGED to have the finest selection of Radio and Television Valves and Components at the lowest prices in all London. Full list available, stamp please. WINWOOD RADIO, 12, Carnarvon Road, Leyton, E.10. (Mail only.)

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.

CAR RADIOS, £10. GERRY, 22 Birkbeck Road, Sidcup, Kent.

VIEWMASTER KITS, complete with genuine brand new, specified parts, less speaker. £25/10/-; superior 15in. Kits, with all valves, etc., only tube required, £23/10/-, or assembled, £27; Viewmaster sound/vision Chassis, assembled with specified parts, £7/3/6; with alternatives, £5/13/6. S.A.E. details. BETTS, 53, Mirfield Grove, Hull.

NEW BOOKS for the constructor.—"Television Faults," giving actual circuits of 6 leading TV manufacturers with quick reference fault guide, 5/-; "The Oscilloscope Book," giving details of constructing and using oscilloscopes, 5/-. If you are not already on our mailing list, write to-day for our new list. SERVIO RADIO, 156/8, Merton Rd., Wimbledon, S.W.19. (LIBerty 6525.)

MAINS TRANSFORMERS

We have a reputation for quality transformers. All our windings are varnish impregnated and baked, and we have types for every purpose. If you want the best buy "Howorth" Transformers. There is no alternative. Our rewind dept. gives the same high standard of workmanship

Remember the name.

HOWORTH

51, Pollard Lane, Bradford, Yorks.

Tel: 37030

S.A.E. with enquiries, please.

THE TELEVISION COMPONENT SERVICE

FOR CONSTRUCTORS

All parts available for these well proved favourites.

The VIEWMASTER Instruction book ... ... 7/6d.

PRACTICAL TELEVISION RECEIVER Instruction book 3/6d.

ELECTRONIC ENGINEERING TELEVISOR Instruction book ... ... 5/6d.

And now the new 1953 designs.

PT LYNX see current "Practical Television."

THE 16in. TELEKING Instruction book ... ... 6/0d.

E.E. wide angle modifications Instruction book ... ... 1/2d.

HAYNES TP38 5th ed. wide angle **VIEWMASTER,** and **PT Super-Visor** ready autumn.

Separate price lists available on request.

PROMPT POSTAL SERVICE

J. T. FILMER,

MAYPOLE ESTATE BEXLEY, KENT.

Tel.: Bexleyheath 7267

RECEIVERS: Type 25, with 6 valves, 2/465 kcs., IFTs, 28/-; R1132, in transit case, 50/- (carr. 10/-); Coilformers, ⅜in., Aladdin, cored, 9d.; 7 mcs IF traps, 9d.; IFTs, 10/13 mcs, canned, new 1/6; 7 mcs (R1355) diode box, 1/6; Formers, 2in. x ⅜in., pax, cored, 4 for 1/3; R1355, good cond., 35/-, new 45/- (carr. 6/-); RF Units, type 24 21/-, 25 25/-, 27 42/6. Receivers, 300/800 mcs, with 10 valves, 60/- (carr. 10/-); Test Sets, with 230v AC input power pack and 7 valves, 500Ωa meter, 60/- (carr. 10/-). Terms: c.w.o.; immediate delivery; postage extra; s.a.e. for lists and enquiries. W. A. BENSON, 308, Rathbone Rd., Liverpool, 13.

"VIEWMASTER" VALVES, exact to specification, guaranteed new and boxed, comprising 5 EF50, 1 6P25, 1 KT61, 1 EBC33, 1 EB91, 2 6K25, 1 6P28, set of 12 £6/2/6; with EF91 7/- extra. (Post and insurance 2/-.) "Tele-King" 16in. Receiver, complete set of 17 valves exact to specification, £9/9/-; "Lynx," specified set of 17 valves, £8/7/6; Crystal 2/6 extra. 6AM6, EF91, 6F12, Z77, 8D3, 6C4, L77, W77, EF92, 6AM5, EL91, 12AX7, 7/9; any 8 for 56/-; FB91, 6AL5, HVR2A, 6/9; 1.4v Miniatures, 1S5, 1R5, 1T4, 3S4, 3V4, 1S4, 1L4, 3Q4, 3A4, 7/6; set of any 4 27/6; 6V6G, 6F6G, KT63, Y63, EF39, EBC33, EF50, 20D1, 7B7, 7C5, 7C6, 7H7, 7S7, 7Y4, 7/6; 5Z4G, 5U4G, MU14, U22, U78, DH77, 6AT6, 12AT7, ECC81, 6X4, 6BA6, 6BE6, 6BW6, 6J6, EC91, Pen46, 6V6GT, PY82, 6F15, 6LD20, 6X5GT, 8/6; PZ30, GZ32, 6U4GT, 17/6; N78, ECH35, CCH 35, 15/-; 6P25, CL33, U25, 13/6; 6K25, UU8, U16, 12/6; EAC91, ECC91, 6A7, UBF80, 6F1, DF33, 1N5GT, 12/-; PL81, PL82, PY81, X65, 10F9, 10LD11, 10C1, 10C2, 11/-; ECL80, EF80, EY51, PY80, 43, AZ31, CY31, 6K8GT, 12K8GT, EAF42, KT33C, 6C9, 10F1, 10P13, R10, 10/6; 25Z5, 25Z6GT, EBC41, UBC41, DL35, 1C5G, DAC32, 1H5G, DL33, 3Q5G, 10/-; 6SN7GT, 6Q7GT, 12K7GT, 12Q7GT, 25Z4G, 25A6G, EF41, 9/6; U50, 5Y3GT, 25L6GT, 35L6GT, 50L6GT, 35Z4GT, 80, UU9, U404, UY41, UF41, EZ40, 9/-; 6K7G, 6K7GT, 6/-. All new and boxed. Postage 4d. per valve extra. READERS RADIO, 24, Colberg Place, Stamford Hill, London, N.16. (STA. 4587.)

AERIALS, 3-element folded dipole of al. alloy, basically to design by Mr. Gordon A. Symonds in June issue; complete aerial with mounting bracket for 1½in.-2in. pole and 75ft. co-axial cable (75-80 ohm), all channels, £3/17/6; Chimney Lashings, complete, single bracket, double support, £1/5/-; 2 brackets, £1/10/- (state length stranded wire); I.F. Assembly by famous manufacturer: 3 I.F. transformers, 3 coils on polystyrene formers, 15 resistors, over 20 condensers, 4 ceramic valve-holders (6CB6); useful for components; 50 only, with circuit diagram and list of components, 7/6; Teleking, 5-channel superhet, constructor's envelope, 6/-; all components supplied, separately or sets; write for price list; Resistors, ¼w, 3½d. each; Darkscreen for 12in. tube, 7/6; P.T. "Super-visor," components supplied; prices on application. REBUS ELECTRIC LTD., Gladstone Place, Newton Abbot, Devon.

WANTED

WANTED, P.T., vols 1 to 3. YATES, Linwood Lodge, Knowle, Birmingham.

NEW VALVES WANTED, small or large quantities, 3Q4, 6V6, 5Z4, ECL80, EF80, KT66, KT61, 6L6N, VR150/30, 5R4, 80, etc., etc. Prompt cash. WM. CARVIS, 103, North Street, Leeds, 7.

News from the Trade

Plessey Components

THE Plessey Co., Ltd., announce that arrangements have now been completed whereby Messrs. Amplion (1932), Ltd., are appointed distributors to the wholesale and retail trade for the sale of the comprehensive range of Plessey radio and television components.—Amplion (1932), Ltd., 230, Tottenham Court Road, W.1.

Console Television Cabinet Half-door Model

MESSRS. LEWIS have designed a unique television cabinet primarily with the home constructor in view, the object being to provide a handsome cabinet ready in every detail for chassis, tube and speaker to be installed. The tube opening panel is hinged at the top allowing the tube face and plate glass to be cleaned, and also adjustments of the set to be carried out.

This cabinet can be french polished to a light, medium or dark shade, and is generally available from stock in walnut, but oak, mahogany or other veneers are available to order.

An internal shelf is provided as well as a baffle board and well-ventilated back board—castors are fitted.

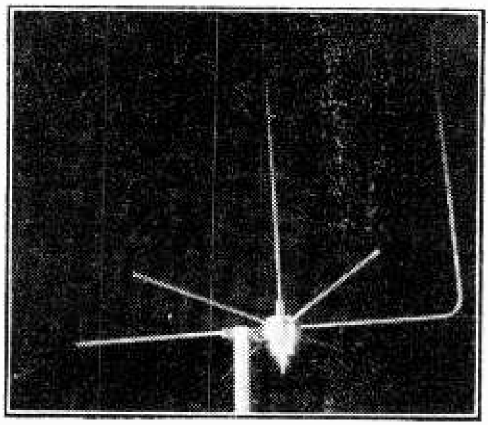
It is necessary to supply the type and size of loudspeaker; size of tube opening required, and the distance between the internal shelf and the bottom of the tube opening. The internal measurements are: 18¾in. wide x 35in. high x 19¾in. deep. The overall height including castors is 40in. Price, £15 10s.—Lewis Radio Co., 120, Green Lanes, N.13.

Radio Servicing Co.

WELL known for a long time in the industry, the Radio Servicing Co. have now produced a 68-page booklet for the use of the constructor. Profusely illustrated this is a catalogue of all the well-known constructor items from such firms as Haynes, Clix, Allen, T.C.C., Elac, Ellison, etc., etc. There are also four pages devoted to valves. Well produced on art paper, and measuring 9½in. x 7½in., the catalogue costs 1s.—Radio Servicing Co., 82, South Ealing Road, W.5.

Spencer-West Aerial

THE accompanying illustration shows the new Spencer-West aerial (briefly mentioned last month) designed to secure improved reception under adverse interference and weak signal conditions. It incorporates a two-stage amplifier with neutralised triode first stage and cathode follower output built into the light alloy housing seen in the centre. A separate power supply unit is provided for mounting near the receiver. The aerial element is a quarter wave, and six quarter wave counterpoise elements are mounted radially round the amplifier housing in such a manner that each pair are a correct half-wave in length thus providing a good interference shield. The supporting bracket is intended for attachment to a standard 2in. mast. The price of the equipment with valves, 65ft. of Telcon K18SM cable and power supply unit is £33 15s.—Spencer-West, Quay Works, Gt. Yarmouth.



The new Spencer-West aerial.

Teletron Coils

MESSRS. TELETRON can supply a pair of coils (L14 and L15), as specified for the Lynx receiver, at 6s. the pair. These coils are wave-wound to the inductance specified for the receiver, and we have tested a pair and found them perfectly satisfactory.—The Teletron Co., 266, Nightingale Road, N.9.

G.E.C. Model BT.5147

THE outstanding receiver in the television programme of the General Electric Co. Ltd. for the coming season will be the BT. 5147, a new table television receiver, equipped with a 14in. rectangular tube. The list price of the receiver will be only 60 guineas (tax paid), and ample stocks will be available to meet a mass demand.

A major part of G.E.C. production, research and development effort has been concentrated on this model, which incorporates extra protective circuits to maintain the correct heater chain current. A thermistor prevents the initial switching current surge, and a barretter with a high positive temperature coefficient thereafter maintains regulation of the heater current over a wide range of input voltage. Another valuable innovation is the incorporation of a neutral density filter in the face of the tube itself to improve contrast in high ambient light and to prevent halation.—General Electric Co. Ltd., Magnet House, Kingsway, W.C.2.

QUERIES COUPON

This Coupon is available until September 21st, 1953, and must accompany all Queries.

FRACTICAL TELEVISION, September, 1953.

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.

CITY OF COVENTRY EDUCATION COMMITTEE

COVENTRY TECHNICAL COLLEGE

Session, 1953-54

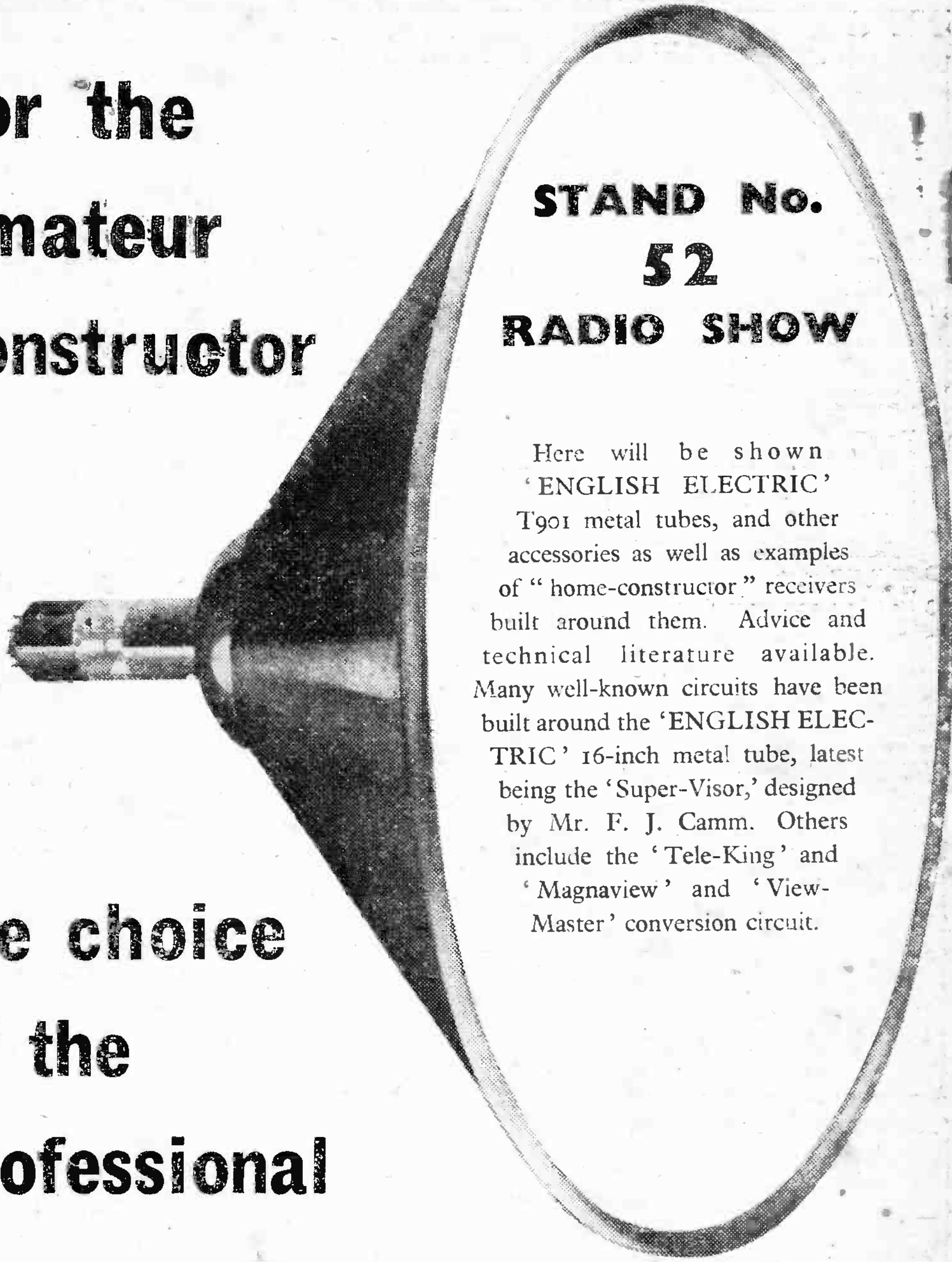
ELECTRONIC ENGINEERING

Applications are invited for entry to the next 3-year full-time course commencing in September, 1953, from those requiring a comprehensive training to an advanced level in ELECTRONIC ENGINEERING, to qualify them for technical posts in radio, telecommunications, television and industrial electronics. The syllabus will cover the requirements of C. & G., Brit.I.R.E., and I.E.E. examinations. Entry age 16 years or over. Application forms and further information available from the Principal, Coventry Technical, College.

W. L. CHINN, M.A.,
Director of Education.

Council House, Coventry

For the amateur constructor



the choice of the professional

'ENGLISH ELECTRIC'

BRITISH MADE LONG LIFE 16″ T901 METAL C.R. TUBE

THE ENGLISH ELECTRIC COMPANY, LTD., TELEVISION DEPARTMENT, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2