PRACTICAL TELEVISION

AND TELEVISION TIMES

1/-

EDITOR F. J. CAMM

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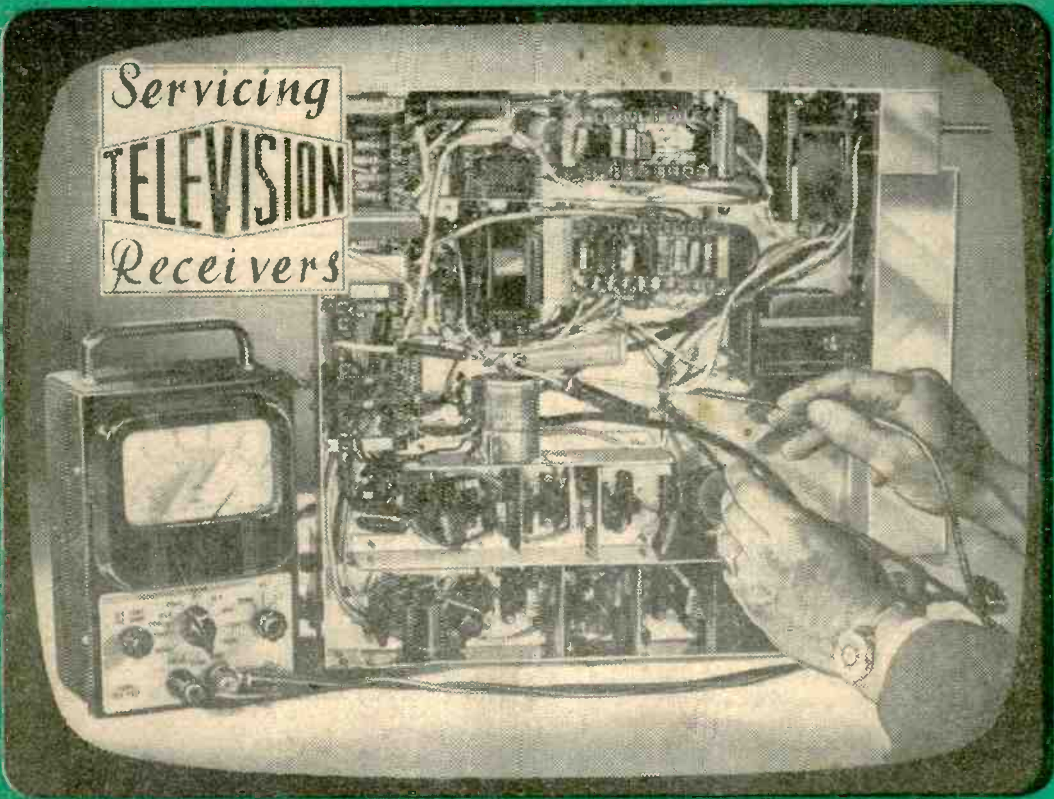

FEATURED IN THIS ISSUE

- Vision Receiver Faults
- Aerial Attenuators
- Picture Shapes
- A Television Receiver for £9
- Using the EF54
- From VCR97 to Magnetic

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Televiews

TELEVISION—WORLD SURVEY

ACCORDING to the United Nations Educational, Scientific and Cultural Organisation there are 182,000,000 radios and 15,000,000 television sets in the world. Great Britain has 1,000,000 television sets, the second largest number; the United States, 13,400,000; Russia, 50,000, and France, 30,000.

The United States has 53 per cent. and Europe 35 per cent. of the total number of radio sets existing in the world to-day.

FILM EXCERPTS ON TV

AN agreement between the BBC Television Service and the film industry, the first post-war agreement of its type, will enable the BBC to transmit a series of programmes entitled "Current Release," and these will consist of excerpts from films being distributed to the cinemas.

These trailers are to be broadcast on alternate evenings commencing with January 17th, and they will be repeated during the intervening weeks in the afternoons. It is proposed to have film actors and actresses associated with the films being broadcast in the studio to talk about the films.

TELEVISING WEDDINGS

AN English girl who recently married a member of the United States Air Force in New York became the first British bride to be married before American television cameras. This took place in the daily television show entitled "Bride and Groom," which is regularly followed by millions of women American viewers. A film was flown to London for possible showing by the BBC.

THE BBC CHARTER

THE Government has decided to extend the existing BBC Charter for a period of six months so that it can have time to consider the recommendations of the Beveridge Report. The Government has already decided, however, to adopt the suggestion of the previous Government and to extract for purposes of general revenue £2,000,000 from the BBC licence revenue.

Naturally, this will cause a restriction of policy and some retrenchment. It had been hoped that the new Government would have reversed the policy of the previous on this matter so that Great Britain could retain its lead over America in the television field. Naturally, the development of V.H.F. which the Beveridge Report stressed as an urgent necessity will have to be delayed.

This does not mean that the programme for the development of a nation-wide television coverage is to be shelved; it means that its progress will be less rapid.

The only other alternative seems to be to increase the licence fees, and that would be an unpopular move in these days of rise in prices when the Government is anxious to keep down the cost of living.

WANTED—AN ECONOMY SWITCH!

A CORRESPONDENT makes the interesting suggestion that a switch should be incorporated in all television receivers so that the cathode ray tube can be cut out of circuit when sound only is being transmitted. Tubes carry the full Purchase Tax of $66\frac{2}{3}$ per cent., and such a switch would effect an increase in the life of the tubes. It would not be a costly fitment and we think it should be done.

OUR FIRST BIRTHDAY

OUR thanks to those many readers who sent us greetings and messages of congratulation upon the attainment of our first birthday. It is with pleasure that we can record that the circulation and prestige of this journal, the only British technical television journal, has continued to expand as the number of listeners has increased. This expansion has been greatly augmented by the opening of the Holme Moss Station, to be followed a few months later by Kirk o'Shotts.—F. J. C.

Vision Receiver Faults

SERVICING WITHOUT EXPENSIVE INSTRUMENTS By "Erg"

OBTAINING the elusive video signal can be a very tricky job—especially for the fringe viewer—and not a few beginners give up at this point. It is much easier for those lucky people who possess a good signal generator, but without this most valuable tool one is at the mercy of the vagaries of the ionosphere, and the few brief hours of time which the BBC allots daily to viewers.

However, if the job is tackled systematically the trouble can be found without the aid of expensive gear. The main emphasis is on the word *systematically*; it is useless to potter around prodding this and that, and fervently hoping; that process is a mere waste of time: the circuit should be checked stage by stage from the input to the CRT to the aerial, and the following details show how to trace a fault with only a good voltmeter and a milliammeter.

First Stage

As this article is mainly concerned with the vision signal itself we will assume that the raster has been obtained and is functioning satisfactorily. The brilliance control should be turned down until the raster just disappears; the contrast control should be advanced, and the screen should then show one of three things:

(a) A jumble of black and white lines moving across the screen.

(b) A white raster which is completely devoid of picture content.

(c) Little specks of white which tend to merge into each other as the contrast control is advanced.

(d) A completely blank raster.

If (a) is received, all that remains to be done is to adjust the line hold control until the picture resolves itself, and then to adjust the frame hold to prevent the picture slipping up or down.

It may be found that it is not possible to obtain the picture by any adjustment of the line hold control; two pictures side by side may be resolved or possibly three or more at the same time (multiple pictures). If this is the case it indicates that the time base is not running at its correct speed and some experiments with the values of the components in the time base, will have to be undertaken. The actual components which may require different values will, of course, depend on the type of time base being used, and whether it is for an electrostatic or electromagnetic tube.

The same principles hold good for the frame time base where difficulty is experienced in locking the picture vertically, or in obtaining correct interlace. One point to bear in mind is that with some circuits line hold and width controls interact with one another and adjustment of the line hold control to its correct operating position may alter the width of the picture.

If (b) is received it generally indicates that one or more stages in the vision receiver is unstable—a valve is oscillating. To find the faulty valve check the anode currents of each valve in turn and note if there is a change when the grid is short-circuited to earth. If it does change then it is that valve which is causing the oscillation. Having found the valve then the stage should be checked carefully to ascertain the reason for the instability. Points to look for are stray anode-to-grid capacity and undecoupled dropping resistors.

The hash on the screen indicated in (c) is generally due to valve noise and indicates that the video receiver itself is functioning though no video signal is being received. Before doing anything desperate remember that the BBC occasionally have troubles of their own and it may be that the signal is temporarily off the air. However, if nothing happens within a reasonable time the trouble is either that the tuning circuits are tuned very far from the signal frequency, or that the trouble is in the aerial or associated circuits. The latter is more likely.

The result in (d) represents the biggest problem as it is the symptom of so many different faults. It is worth while trying a few short cuts before getting down to serious business.

With the contrast control fully extended (in a semi-darkened room) increase the brilliance control until the raster just appears. If the raster shows traces of moving black lines across it then the signal is there though very weak, and can be resolved by adjustment of line hold and frame hold controls in the manner indicated in earlier paragraphs. The picture can then be made stronger by adjustment of the tuning coils. If no result is obtained by using this method then the following points should be checked:

Is the connection between the video output valve and the tube O.K.?

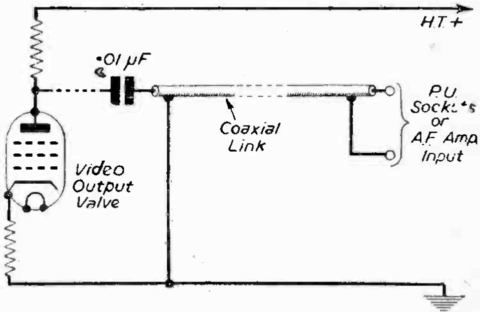


Fig. 1.—Using a radio receiver to check the video section.

Is the aerial connected to the video receiver? (Check this point carefully as it is possible for the aerial to be connected by one side only and still provide a good sound signal.) Examine the plugs with care, especially if a coaxial transmission line is used; it is so easy to get a short-circuit at this point.

Is the aerial connection to the transmission line O.K.? If a folded dipole is used it will present a short-circuit (so far as D.C. is concerned) at the receiver end of the cable, and thus forms a convenient method of checking to see if the transmission line is disconnected; the fold will, however, mask a short-circuit in the line.

Having run through these items a simple check can now be made. Turn up the brilliance control until the raster appears on the screen. Now tap an earthed wire on the aerial input socket. (By "earthed wire" is meant a wire which is connected to the common earth line of the receiver.) Tapping the wire on the non-earthy side of the aerial input socket should cause the raster to "jump" in sympathy.

Second Stage

We have now reached the stage where we have one of two conditions :—

A. The raster "jumps" when the earthed wire is tapped on to the aerial input socket.

B. The raster does not "jump" under the above conditions.

Now from this point pertinent sections will be individually numbered so that easy reference can be made to them.

1. If condition *A* results from the test then the fault will come under one or more of the following categories :

(i) The aerial is faulty.

(ii) In the case of a superhet the oscillator is not functioning correctly.

(iii) The tuning circuits are very badly out of alignment.

(iv) The vision receiver is not working at full capacity.

2. If condition *B* results from the tests then the fault will come under one or more of the following :

(v) Common H.T. or L.T. line in the video receiver is disconnected at some point.

(vi) There is a disconnection between the video valve and the CRT.

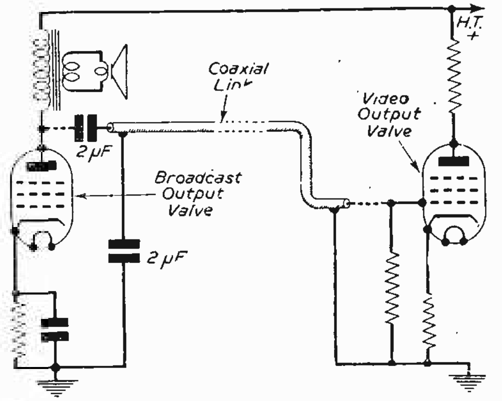


Fig. 2.—Testing the video and tube stages by coupling radio output into them.

(vii) One or more of the valve circuits is faulty.

(viii) In the case of a superhet the oscillator is not functioning at all.

3. With regard to the first fault (i) here are a few points to check : The transmission line to the aerial is either disconnected at some point or is short-circuited. If the aerial is a folded dipole a check can be made for disconnection in the line by the method indicated previously. A battery and voltmeter connected across the end of the line should give a reading. This reading will only indicate that the line is not disconnected ; it will not reveal that the line is short-circuited. The only sure method of checking the aerial is to take it down and inspect it. It is wise to open up the junction box and examine the connections carefully.

If the connections are in order, make certain that the aerial is pointing in the right direction. The shortest element in an H or a Yagi array should point in the direction of the transmitter.

This advice may seem superfluous but one enthusiast who called in the writer's aid had struggled for three months to pick up the TV signal without success. The reason was obvious : he was using a home-made wire contraption as an aerial and poking it out of the back bedroom window every night. The window faced south but the transmitter was 80 miles to the north of him !

In view of the foregoing ensure that there are no obstructions between you and the transmitter, and do use a proper aerial, not a couple of pieces of conduit separated by a marble. If you are at, or beyond, the fringe area have a good multi-element array (Yagi).

4. Fault (ii). If a superhet is used it is, in some respects, easier to trace a no-signal condition than with a straight receiver. The oscillator valve can be checked for oscillation by putting a milliammeter in its anode circuit and then short-circuiting the grid to earth. The anode current will fall if the valve is oscillating.

If a multi-grid valve is being used as combined mixer and oscillator then the appropriate grids corresponding to the above should be checked.

If a separate oscillator valve is used it should be checked to verify that the connections between it and the mixer valve are in order.

Should there be no change in anode current when the above test is made then it indicates that the valve is not oscillating, and the associated circuit should be checked.

5. Fault (iii). The tuning circuits in the video receiver cover a broad band of frequencies, but if the signal is very weak it is possible for them to be sufficiently off-tune to prevent the signal from operating the CRT.

The first thing to do is to check the coils to verify that the number of turns is correct ; if this is the case then the following procedure can be adopted.

Connect the output from the video valve to the input of an amplifier as shown in Fig. 1. The A.F. portion of the sound receiver can be used, or the pick-up terminals of a broadcast receiver. The leads must be screened and an odd piece of coaxial cable can be used for the job.

It may be possible that the video signal will be heard immediately though it may not be strong enough to operate the CRT. The signal sounds something like a mixture of 50 cycle hum and motor-boating. If the signal is heard, adjust the tuning coils, starting with the detector stage until as loud a signal as possible is obtained. Now change over to the CRT and the signal should be seen on the screen.

Quite a loud volume of signal is required to operate the tube. Having once obtained the picture the procedure outlined in sections 9 and 10 can be followed.

6. Fault (iv). This fault is one of the most difficult to trace and may need some patience. First check all the anode, screen and cathode voltages, and verify that each valve is receiving its full filament supply. Next verify that each valve is well home in its socket—some EF50 valveholders are notorious for poor contacts between valve pins and holders.

7. Having checked the points mentioned in the above paragraph, check the video valve circuit by connecting a source of A.F. to its input side. This can be done conveniently by using the output from a broadcast receiver tuned to any station which is radiating a programme. Fig. 2 shows the method. Keep the volume at a reasonable level to avoid overloading

the video valve. A varying pattern should appear on the screen of the CRT.

If this is not the case connect a pair of earphones between the anode of the video valve and its resistor. The sound should be heard. If this is the case then the fault lies from this point to the CRT grid or cathode according to the scheme used. If the sound is not heard, or is very weak, then the fault is in the video output valve or associated circuit.

8. If the above test is O.K. then the detector circuit must be checked. A rough test can be made by disconnecting the tuning coil, and injecting a source of modulated R.F. This can be done by using the broadcast receiver in a similar manner to section 7, but this time a tap is taken from the grid of the last I.F. valve (this point is chosen for simplicity), and inject it into the input of the detector valve. The connection between the two units should be made with coaxial cable. Fig. 3 shows the

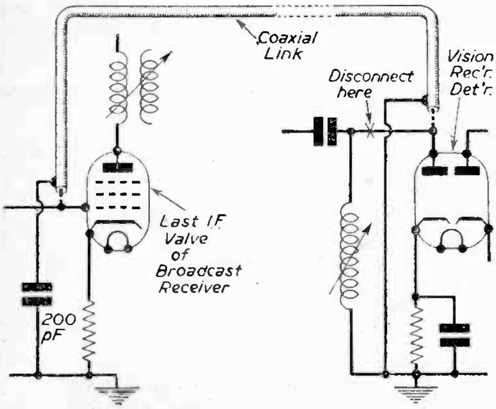


Fig. 3.—How to couple the I.F. stages of a video receiver to a radio set.

scheme. The sound of the station being received should be heard in the 'phones.

All the above tests being O.K. then the next step is decided by the type of receiver being used. If it is a superhet the following procedure can be adopted.

9. The whole of the I.F. stages can be checked by tapping a long length of wire on to the grid of the first I.F. valve. Morse and/or telephony stations will be heard in the 'phones if the I.F. stages are functioning. If nothing is heard, or if the signals are very weak, then, using the long wire trace the faulty stage by tapping the wire on the grid of each I.F. valve in turn, working from the last I.F. to the first. The signals should increase in volume progressively as more and more stages are included. A deviation from the step-by-step increase indicates a faulty stage.

Should the above tests be O.K. then the fault is confined to the mixer valve and/or R.F. stage.

10. Referring back to section 8, if the receiver is a straight receiver and all the tests up to this point are O.K. then the following procedure can be adopted. Starting from the last R.F. valve test each stage in turn by tapping the grid of each valve with a screwdriver. A distinct click should be heard in the 'phones becoming progressively louder as each extra stage is included. A deviation from this step-by-step increase indicates a faulty stage.

One point to bear in mind with straight receivers is that misadjustment of the rejector coils may cause severe attenuation of the video signal if they are tuned to the video frequency.

11. Condition *B* fault is when the raster does not jump when an earthed wire is tapped on to the live side of the aerial input socket. This may be due to :—

12. Fault (v). The method of checking this will be fairly obvious. Of course it is assumed that preliminary "short cut" tests have been made. Check the voltages right on the valve pins and also check the voltages across the cathode resistor to ensure that each valve is taking its correct current.

13. Fault (vi). This should have been checked in the preliminary stages. The type of fault will largely depend on the system of coupling to the CRT. For example if directly-coupled cathode modulation is used then a disconnection to the cathode from the anode circuit of the video valve will cause the screen to glow brilliantly white all over.

14. Fault (vii). The methods given in sections 7, 8, 9, and 10 should be used after the tests indicated in section 12 have been made.

15. Fault (viii). A method of checking the oscillator was given in section 4. Should the oscillator be found to be working satisfactorily then the fault obviously lies either in the mixer stage or the first R.F. To prove this tap an earthed wire on to the control grid of the mixer valve ; if the raster jumps then the fault is in the preceding stage. If the raster does not respond then the fault is in the mixer stage itself.

Employment of the foregoing procedures should enable a fault to be tracked to a particular stage. Owing to the multiplicity of circuit designs it is not possible to give a detailed analysis of all possible faults ; when the faulty stage has been located it is merely a matter of checking the wiring and components in that particular stage. Condensers are the trickiest, and the best method is to substitute them with others which are known to be in good order.

Time Bases

For satisfactory checking of the working of the time bases an oscilloscope is almost essential, and in next month's issue we will give a description of this type of instrument and its use in testing and servicing the time base section of a television receiver.

1951 Servicing Examination

OF the 53 candidates who sat the 1951 Television Servicing Certificate Examination of the Radio Trades Examination Board, 19 satisfied the examiners in all papers, 16 were referred in the practical examination, and six qualified for the certificate, having been referred in the 1950 practical examination.

Candidates living outside the range of a BBC television transmitter and who have completed an approved course of study were allowed to sit the written papers only.

Twenty-nine candidates sat the examination under these regulations, of which 21 were successful.

The closing dates for the entries for R.T.E.B. 1952 Servicing Examinations are as follows :

Radio Servicing Certificate Examination, February 1st, 1952.

Television Servicing Certificate Examination, January 15th, 1952.

Regulations and examination entry forms may be obtained on application to the Secretary, R.T.E.B., 9, Bedford Square, London, W.C.1.

PICTURE SHAPES

A BRIEF EXPLANATION OF THE VARIOUS SHAPES WHICH ARE POSSIBLE AND THEIR RESPECTIVE ADVANTAGES

By W. J. Delaney (G2FMY)

ONE of the main advantages possessed by the home constructor is that he can experiment, and where necessary depart from standard commercial practice. In the case of television equipment this is particularly applicable to the shape and dimensions of the picture which he chooses to produce on his C.R. tube, and as is already well known there are two distinct shapes now being employed in this country. For the benefit of newcomers it should be pointed out that there is a definite relationship between the width and height of the modern television picture. This relationship, or aspect ratio, as it is technically called, is 4 : 3 and if this is not adhered to the objects seen on the screen will be flattened out or tall and thin. When tuning in, therefore, the clock surround in the tuning signal should be made to conform to a perfect circle in shape by means of the height and width controls—used, of course, in conjunction with the linearity controls. When a perfect circle is obtained, the correct aspect ratio should be automatically received, but, in some cases, due to poor linearity, there may be some irregularity at the edges. For the correct balance of these Test Card C should be used, and in this all the squares should be equal in size with each of the four sides also equal.

Obviously, from the illustration of the official tuning signal which is reproduced on this page, the correct shape is a rectangle with 90 deg. corners, as it will be seen that the diced border runs right to the corners. Few, if any, commercial masks are provided in this shape and purely from an aesthetic point of view most screens have rounded corners as shown in the mask outline drawn in Fig. 1. It will be seen that this results in the actual corners of the picture being cut off, but the B.B.C. take care to arrange their cameras and settings to avoid any critical detail coming within these corners, and normally the viewer does not lose anything by having a round-corner mask.

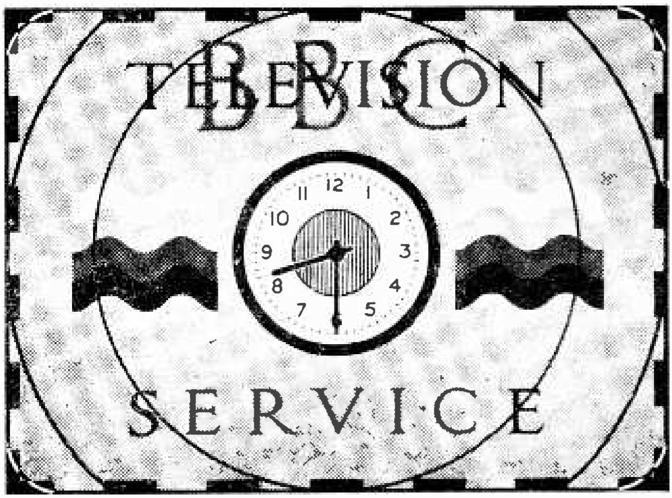


Fig. 1.—The tuning signal with three popular picture shapes superimposed.

Larger Area

There is, however, an alternative shape which may be used and which is almost universal in the U.S.A., and that is the "D"-ended arrangement which is also outlined for comparison in Fig. 1. There is a distinct advantage to be gained by adopting this shape as for a given size of tube it provides an increased area of picture, which means to say that the objects seen on the screen are slightly larger than with the straight-sided area. To enable this fact to be appreciated the diagram in Fig. 2 should be studied. The majority of tubes in use are round-ended and when the normal rectangle is superimposed on this round end it will be seen that a considerable area of tube is wasted or unused. This is not normally a disadvantage as many tubes have a very convex surface and if full use were made of the tube across its face, objects would tend to be distorted round the sides unless viewed from a position directly in front. Modern tubes are being produced with a flatter surface, however, and this does permit the picture width to be taken out farther towards the edge and if the "D" is drawn on a masking sheet and taken out towards the edge of the screen the increased width will necessitate an increase in height in order to keep the aspect ratio correct, and thus, as shown in Fig. 2, there is quite an appreciable gain in overall area. The claim has been made in more than one advertisement that the use of a mask of this shape provides the viewer with a 9in. tube with a picture comparable with that obtained with a straight-sided mask of a tube of the next size, but this is hardly correct unless a "flat-ended" tube is employed. In this case it is possible to run much nearer the edge of the tube without making it necessary to sit exactly in the front of the tube to avoid distortion, and a scale sketch on a piece of paper will soon show that the area gained is then, in fact, quite appreciable.

The amount of detail lost with this shape (at the corners) is insignificant except when the transmission carries a large amount of reading matter, such as an extract from a page of a magazine or paper, but this is usually then of such a depth that the picture has to be run upwards at the transmitter to bring in successive lines, and thus it is easily possible to follow the matter as it passes across the screen.

Circle

There is one further shape which may be preferred on some occasions and this has been dealt with earlier in these pages. This is the circle, also shown reproduced to correct scale on the tuning signal in Fig. 1. It will be seen from this that if the picture area is opened out by suitable adjustment of the line and frame amplifiers so that the top and bottom edges of the raster come just to the top and bottom of the circle, and if this is of the same size as the face of the tube (or just under) the image will be considerably greater than if the raster is closed to fit within the circle. Unfortunately, however, there is a considerable area outside the tube, and in a large percentage of the transmissions this would be lost, and would probably spoil the transmission from an entertainment point of view. There are, however, quite a number of occasions when the only point of

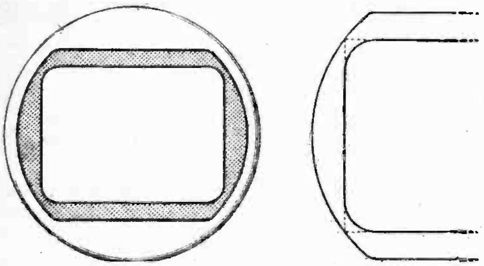


Fig. 2.—Proportions of the rectangular and the "D"-ended picture area.

interest is in the very centre of the picture—for instance, the opening announcements, talks, solo musical artistes, etc., and obviously if these are made to fill the circle they will be very much larger and to many viewers will be more enjoyable. As already mentioned, this enlargement can be obtained by increasing the output of the line and frame time-base amplifiers, but it is necessary to guard against exceeding the anode current drain of the particular valve in use, and in some cases it may be necessary to fit larger types of valve. If this is done, then the bias circuit may be made up of two components in series, with a switch to short-circuit one section and thereby increase the output. In some circuits, it may also be necessary to modify the oscillator stage to provide greater drive, and E.H.T. will have to be watched when it is obtained from the line output stage.

Masks may be cut out from thin sheet rubber or Perspex, and the most satisfactory idea for the home-constructor is to attach the mask to the protective glass front, and at the rear of the mask to cement (with Bostik or similar solution) four fairly thick pieces of sponge rubber. The tube may then be pushed up into position and the sponge rubber blocks will prevent the tube face from coming into contact with the protective glass. The main difficulty will be to try to form a seal all round the end of the tube to avoid the need for constant removal for cleaning. In the normal cabinet there is a fairly high temperature rise when the receiver is working and this causes convection currents, and dust therefore circulates fairly freely and, depending upon the surrounding temperature of the room, the back of the protective glass and the tube face become quickly "dirty." A commercial rubber mask which fits over the end of the tube and has a flat front face may be pushed firmly against the protective glass and will slow up the dirtying process and thus reduce the time between successive cleanings. No doubt the keen experimenter can construct a similar type of mask with the aid of rubber sheet and a good adhesive.

Coast-to-coast TV

TELEVISION facilities for coast-to-coast network service on a regular basis, were announced recently by the Long Lines Department of the American Telephone and Telegraph Company. The cross-country service, which is made possible by completion of the company's transcontinental radio-relay system, will provide, initially, one programme channel in each direction.

The new radio-relay system was first used for coast-to-coast TV on September 4th when facilities were provided temporarily at the request of the State Department to permit transcontinental telecasting of President Truman's opening address to the Japanese Peace Treaty Conference in San Francisco. These facilities will also be used to carry other highlights of the five-day conference after which they will be removed from service to complete construction on a permanent basis.

Speeding up the installation of facilities to televise the Japanese Peace Treaty Conference, made it possible to advance the start of regular coast-to-coast service in both directions sooner than had been previously contemplated.

The Bell System, in six years, has made available a network of more than 23,500 miles of inter-city television channels connecting cities in the East, South, Middle West and now the West Coast. Including the coast-to-coast link there are approximately 14,500 miles of radio-relay channels and 9,000 miles of coaxial cable channels serving the nation's television audience. Additional thousands of miles of channels are expected to be available in late 1952, which will permit adding Miami, New Orleans, Tulsa, Oklahoma City, Fort Worth, Dallas, San Antonio and Houston to the rapidly expanding nationwide network.

Trouble with VCR97

SEVERAL home constructors have, to my knowledge, discovered when using the VCR97 that an EHT voltage of about 1,800 volts in conjunction with a 350-0-350 volt H.T. transformer gives a satisfactory picture, with adequate width and height. But as time goes on the brilliance has to be turned up more and more until eventually a negative picture is obtained.

This fault is not peculiar to the VCR97. It shows up on commercial tubes operated at too low an EHT voltage, but is not quite so obvious. In the case of a VCR97 with an EHT less than 2,000 volts, for reasonable brilliance the grid is only slightly negative to the cathode, and, with a bright picture, may even be driven positive.

What is happening is that secondary emission is taking place from the grid, and this emission supplements the electron beam. To maintain this state over a period of time the grid voltage has to be increased. Eventually the grid voltage is such that instead of increasing the beam, grid current flows and reduces it and a negative picture appears.

The tube is not necessarily " dud " when this happens. I have found in most cases that by raising the EHT voltage the tube has come back into operation ; with the VCR97, 2,500 volts usually does the trick. 2,300 volts appears to be the lowest limit for operating these tubes. One way of getting the required voltage for the VCR97, is a multiplier circuit using four Government surplus high-voltage rectifiers and four .25 μF 600 volt condensers with a final smoothing condenser of .1 μF to .25 μF 3,000 volts.

Multiplying up from the 350-0-350 transformer the final voltage is about 3,000 volts ; this can be broken down by a series resistor.—R. PINKNEY (Fareham).

The Design of Video Frequency Output Stages—4

CONCLUSION OF A SHORT SERIES EXPLAINING THE PRINCIPLES OF MODERN CIRCUITS

By K. D. J. Grosvenor

(*Concluded from page 293 December issue*)

PREVIOUSLY in this series the requirement of a V.F. output stage and the circuitry used to achieve the desired performance have been considered in detail; now it only remains to apply this information to produce a practical circuit. The object of this final section is to show how the information given previously determines the design of a V.F.A. and to illustrate how one can design such an output stage.

Designing V.F. Output Stage to Feed VCR97 (Fig. 22)

Firstly, the required output voltage fully to modulate the C.R.T. and the desired top video-frequency response have to be decided on. The former presents no problem, as it is determined solely by the C.R.T. used, and in this case will have to be at least 25 volts, which means that the V.F. signal will need to be 35 volts (including the blacker than black sync pulses). To do full justice to the BBC transmission the V.F. response should go to at least 3 Mc/s. However, with a small C.R.T. operating at a low E.H.T. voltage, the spot size is relatively very large and consequently it is rarely possible to obtain a better resolution than that corresponding to a little over 2 Mc/s. Thus there is nothing to be gained by making the response of the V.F.A. considerably better than this; consequently, a value of 2.5 Mc/s has been chosen as the highest frequency of interest.

The advantage of choosing this value is that it will enable one to use a slightly larger anode load on the V.F.A. and consequently make it easier to obtain the necessary output voltage and, as a result, ensure an ample contrast for the picture.

If the VCR97 grid is directly connected to the V.F.A. anode, the total anode-to-earth capacity will be nearly 50 pF; this is excessively large (mainly due to the high input capacity of the VCR97 of 25 pF) and will make it practically impossible to achieve a good high V.F. response. Therefore, instead of direct coupling, the output is taken to the C.R.T. via a cathode follower. This reduces the total anode to earth capacitance on the V.F.A. to about 20 pF.

When a peaking choke is used the maximum value of video anode load will be 3.9 kΩ, and as an output of 35 volts (positive going) is required, the anode current at no signal must be at least 12 mA. Thus, the valve used for the V.F.A. must be capable of supplying this current without exceeding its maximum anode dissipation. The Z77 has a maximum anode dissipation of 2.5 watts and thus would be suitable as $0.012 \times 205 = 2.46$W (note that the anode voltage is in this case 45 volts less than the H.T. line due to the drop across the anode load resistor). For 12 mA anode current the bias will need to be 1.7 volts and the total anode and screen current will be about 14.8 mA; thus the cathode bias resistor should be about 115 ohms.

Finally, the value for the peaking choke must be calculated. This comes to 129 μH, and consequently the coil (when wound to dimensions of Fig. 14) will need 153 turns.

The values for the remaining components are more or less standard, the reasons for their actual values having been given in previous sections.

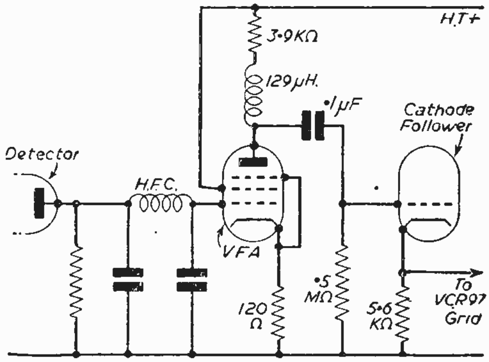


Fig. 22.—A complete video output stage.

Conclusion

Although there are a lot of factors to be considered, it is quite possible for an amateur to design his own V.F. amplifier, and there is no reason why it should not give excellent results.

However, the constructor should not forget that the strength of a chain is the strength of its weakest link, and it is quite useless to expect good definition, however perfect the video stage, if the rest of the set is below par. It is pointless to design a video stage with a wide response if the bandwidth of the RF sections in the video receiver is too narrow. It is also futile to expect to get a well-defined picture even when feeding a perfect video signal to the C.R.T. if the spot size is too large when focusing is correct (due to a poor C.R.T. or too low a value of E.H.T.).

A Television Receiver for £9

AN INEXPENSIVE UNIT FOR THE EXPERIMENTER

By B. L. Morley

(*Continued from page 315 December issue.*)

GREAT care should be taken not to get the leads mixed and each 6in. length should be suitably labelled.

Before remounting the strip, the valveholder for V12 (originally removed from underneath the chassis), should be remounted towards the back end of the chassis (underneath). The strip can now be replaced and the wiring up of the time base completed.

C54 and R44 are mounted on a small paxolin strip fitted underneath the E.H.T. transformer on the back end of the chassis. The strip should be fixed right at the bottom well clear of the E.H.T. leads.

The connection between C54 and "A", Fig. 4, should be made in coaxial cable, the outer sheath being earthed *at each end*.

The height of the picture is controlled by varying the H.T. applied to the anodes of the frame time base valves. VR4 forms the control and is one of the 25 KΩ potentiometers previously removed from the top panel. It is shunted by a 1 watt resistor, R83.

The connection to the deflector plates and to the grid of the CRT can be made by utilising existing wiring.

The Sound Receiver (Fig. 5)

Two R.F. stages using VR65s (V7 and V8) are transformer coupled. V9 is a VR54 and one-half forms the detector while the second half is used for noise limiting.

The output from V9 is fed into the first A.F. valve, a VR65 (V10), which is R.C. coupled to the 6V6 output valve, V11. VR2 is the volume control. Screened leads and valve caps can be used, though they should not be found necessary.

Trimmers T1, T2 and T3 should be firmly wired and fixed so that they are easily accessible from the side. The coils are mounted in a similar manner to those in the vision receiver. When mounting these coils it will be found that the best method is to wind on the secondary, bolt the former to the chassis, and then wind on the primary.

Connection between L11 and L3 (Fig. 2) is made in coaxial cable, the outer sheath being earthed at *both* ends.

If the anode circuit of V11 is disconnected while the valve is working, heavy current will flow via the screen and the valve may be severely damaged. It is, therefore, wise to permanently wire the loudspeaker transformer in the circuit, detaching it from the loudspeaker if necessary, and making connection between the transformer secondary and the speech coil via a plug and socket.

E.H.T. Supply (Fig. 6)

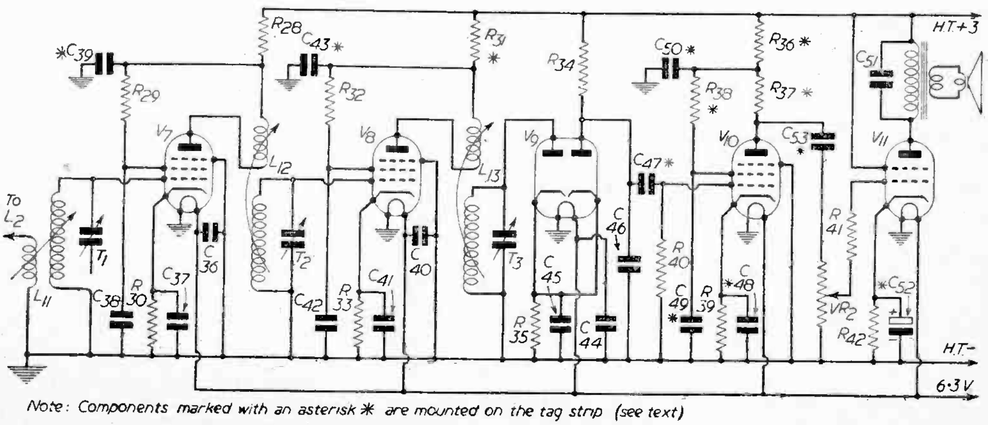
The E.H.T. transformer is mounted at the end of the deck containing the vision receiver (see Fig. 1). It will be noted that the positive E.H.T. is earthed. The reason for this is to keep the peak inverse voltage from the transformer windings. When the negative is earthed we have on the second half of the A.C. cycle (when V20 is not conducting) the potential across C78 (2.5 kV.) added to the inverse voltage (2.5 kV.) which appears across the windings of the transformer. This is the reason for many early breakdowns in E.H.T. transformers.

Another benefit derived from earthing the positive is that the working voltage of the coupling condensers to the deflecting plates of the CRT need only be that of the time base H.T. 450 v. working condensers provide a good safety margin.

One snag with this system is that the cathode and heater of the CRT are at E.H.T. potential and must be carefully insulated from the earth. This feature is catered for in the layout of the 62 unit, but it is important to bear the fact in mind when handling the televisor when it is working.

All E.H.T. wiring must be thoroughly insulated. In the prototype the wires were first covered in systoflex sleeving of sufficient diameter to contain the wire, and then covered again with another length of systoflex of larger diameter.

Soldered terminations must be made with care, no stray ends being left to set up brush discharges.



Note: Components marked with an asterisk ✳ are mounted on the tag strip (see text)

Fig. 5.—Circuit of the sound receiver section.

C78 is mounted in the position shown in Fig. 1 and R75 wired directly to the top terminal of the condenser, its remote end being supported by the insulated strip mounted on the supports of the potentiometer panel.

VR8 is already in situ and R75 is connected directly to it. R76, VR9, R77, R78, R79 will be found in situ and wired. R79 is earthed at one end and this connection is broken so that R80 can be inserted. C76 and R74 are wired across VR8, both components being supported by their own wiring. Care should be taken when fixing these two items so that they do not make contact with the chassis, or with the mu-metal screen of the CRT when it is in place.

The D.C. restorer V19 and associated resistor R73 are already in situ adjacent to the CRT base. The wiring can remain as it is except that the connections to the cathode and anode of the valve must be reversed, and any wiring between the cathode and heater must be removed.

CRT Network (Fig. 6)

Bias for the deflector plates is obtained from the time base H.T. supply. The coupling resistors R66, 67, 68 and 69 can be wired directly to the tube holder. R72 (2 watts) and R70 and 71 are mounted on the potentiometer panel. VR6 and VR7 form the shift controls for centralising the raster.

It should be possible to obtain even focusing over the whole of the raster, but if this should not be the case (some tubes are temperamental), the deflector plates 11 and 12 can be taken to separate shift controls. To do this disconnect R66 and 67 at their junction and from each other: connect two more 100 KΩ controls across the biasing network in a similar manner to VR6 and VR7. Connect the centre of one potentiometer to R66 and the centre of the other to R67. (This modification was made to the prototype as a refinement, though it was not really necessary.)

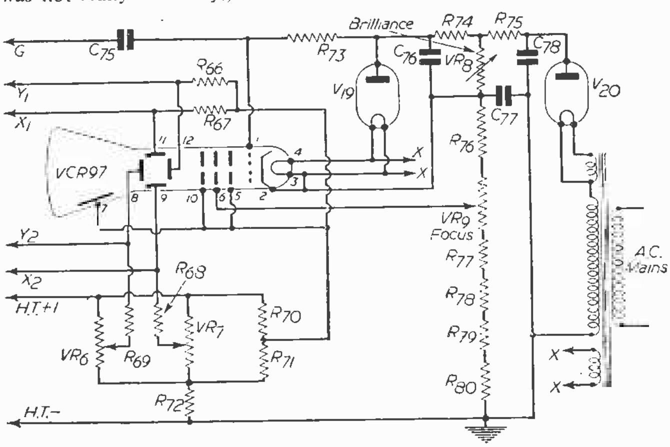
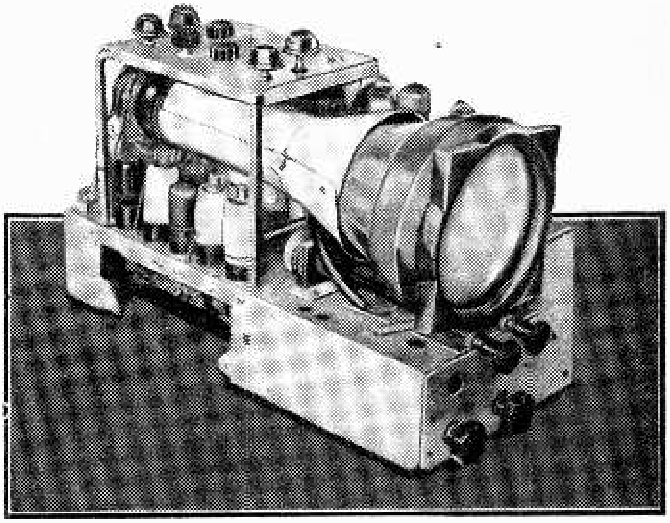


Fig. 6.—Circuit of the CRT network.



The completed receiver.

Power Pack (Fig. 7)

This is made on a separate chassis. It relieves the unit of a great deal of weight, though it is possible to fit it on the existing chassis, provided a transformer of suitable size can be obtained. If this is done it should be mounted underneath the chassis at the front end, below the bleeder network. Metal rectifiers will have to be used and the whole carefully screened from the rest of the equipment. A separate chassis is recommended for the reasons given.

Time base H.T. is derived directly from the smoothing choke, while the sound and vision receiver supplies are separated by the voltage dropping resistors R81 and R82. These resistors should be rated at 5 watts. It is wise to insert a fuse in the circuit as shown, because a complete breakdown of C79 would result in the loss of the 5U4G rectifier valve, V21.

The on/off switch can be incorporated with the volume control.

No details of chassis construction are given because any type which will accommodate the components will do.

Connection between the power pack and the unit is made by plug and socket.

Preliminary Adjustments

Before connecting the televisor to the mains, the wiring should be checked thoroughly. Make certain that no contacts exist between the H.T. line and filaments, or between H.T. line and earth.

Turn all controls to zero. Now switch on and wait for the unit to warm up. After about one minute advance the brilliance control until a pattern appears on the screen; now adjust the focus control until the lines forming the raster are finely focused; next centralise the raster by means of the shift controls.

Receiving Sound

Screw the iron cores until they are level with the tops of the formers. Advance the volume control to maximum position ; now adjust L1 and L2 cores until the sound is heard. Bring the sound up to its full volume by adjusting T1, T2 and T3 in that order, reducing the volume control as required.

Should it not be possible to get a peak due to the stray capacitances of the wiring, add half a turn of wire to the secondary of those coils which will not peak when the trimmer is set at maximum (i.e., when the lines on the fixed and moving parts of the trimmers are together). Unscrew the iron cores of those coils where the trimmers are at a minimum without peaking, until the peak point is found.

Receiving Vision

Insert a pair of headphones in the anode circuit of V7 between R24 and R23 and disconnect the lead to the CRT grid. Set all cores level with the tops of the formers ; now turn the contrast control to maximum

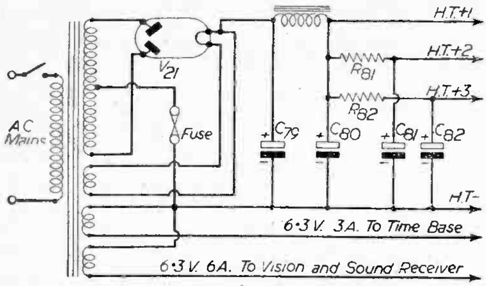


Fig. 7.—Circuit of the power pack.

and the vision signal should be heard. It sounds like a peculiar mixture of 50 cycle hum and motor-boating. L1, 2, 3, 4, 5, 6, 7, 8 and 9 are then adjusted for maximum signal, reducing the contrast control accordingly.

At the back of the vision signal will be heard the sound programme. Adjust L5 and L8 until the sound is no longer heard. Then readjust L4 and L7 for maximum vision signal.

It will be discovered that a peak value cannot be found on some of the coils ; this is arranged purposely so that adequate bandwidth can be received.

Now turn the contrast control to zero, restore the anode circuit of V7 and the lead to " A " ; reduce the brilliance control so that the raster just disappears ; now, by turning up the contrast control a pattern should appear on the screen. Turn the " line hold " control in either direction slowly and it will be found that a certain critical setting will resolve the pattern into a picture. Adjusting the " frame hold " control will lock the picture in a vertical direction.

If the picture is upside down reverse the connections to 12 and 8 on the CRT. If the picture is inside out reverse the connections on 9 and 11 on the CRT.

The quality of the picture will probably be very poor. L3, 4, 6, 7 and 9 should, therefore, be adjusted to give the best quality by screwing the cores in or out. Deal with each coil in turn, noting the effect on the quality. The contrast control will have to be advanced in step with this operation.

If at all possible, final adjustments should be made on test card " C " which is radiated from 10 a.m. to 11 a.m. on Saturday mornings, and at intervals between 10 a.m. and 12 noon on other weekdays.

Details of test card " C " were given in the June, 1951, issue of PRACTICAL TELEVISION.

When the televisor is finally set up, the coils L1 and L2 should be adjusted between the sound and vision signals. If you have plenty of signal strength in hand, the quality of the picture can be improved by adding damping to the coils. A 4.7 KΩ resistor can be connected across L1 and another across L2. 4.75 KΩ resistors can also be connected across the vision receiver coils but not across the rejector coils.

Television in Japan

PLANS have now been announced for the commencement of television transmissions in Japan early this year by two rival organisations.

The Japanese Broadcasting Corporation (the equivalent of our BBC) is to start broadcasts at the beginning of April from three transmitters, in Tokyo, Osaka and Nagoya, and these will operate for four or five hours each evening on a power of 10 kilowatts. There will be a monthly charge of 200 yen (about 4s.) for reception of these programmes, which will be mainly of a " cultural " nature.

This is but the first stage of the Corporation's ambitious five-year plan, which envisages about 30 relay stations throughout the country and it is estimated will cost at least 3,000 million yen (about £3,000,000).

The rival plans are those of the newly formed Japan Television Company, a £2,000,000 private organisation set up jointly by three leading Japanese newspapers in association with three Japanese film companies. This company plans to start transmissions very early in the New Year and it, too, has a five-year plan for 22 relay stations throughout Japan. JTC programmes will be commercials, somewhat on American lines, and there will be no charge for reception of these.

The first television sets with a 12in. screen will be marketed at about £150, but it is anticipated that mass production should before long bring this price down to £80. It is estimated that there will be a minimum of 300,000 homes in Japan equipped with television sets by the end of 1952.

There are two points of particular interest in these Japanese plans. In Britain and the U.S.A. the film industry views television as a dangerous rival that can do immense harm to the cinema and therefore any question of co-operation is very definitely out, whereas in Japan the leading film companies are taking an active part in planning and developing a nation-wide television service ! Secondly, although the Beveridge Committee in this country advised the continuance of the BBC monopoly and opposed suggestions for a sponsored television " second programme " in Britain, the Asiatic mind evidently realises the immense value of such a service in providing capital to speed up development of a comprehensive television service in Japan, and also in fostering competition to the great advantage of the viewer.

USING THE EF54

SOME FACTS ABOUT THIS USEFUL VALVE, INCLUDING A SUGGESTED DESIGN FOR A PRE-AMPLIFIER

By Gordon A. Symonds

As a voltage amplifier at television frequencies the EF54 (surplus equivalent VR136) is surpassed by very few valves, and doubtless many constructors have successfully incorporated these cheap and easily obtainable pentodes in pre-amplifiers and complete televisors of their own design. It is for the other section of enthusiasts, the not so successful, that this article is primarily intended.

Characteristics

First, its relevant characteristics as a voltage amplifier. These can be obtained from most valve data manuals, but are reproduced here for convenience at Table 1.

When used in a pre-amplifier, or first R.F. stage of a complete receiver, the important factors are low noise, low input and output capacitance, high slope and high input resistance. The input-tuned circuit is heavily damped by the aerial and feeder, thus, any extra damping imposed by the valve, whose input resistance is connected across this coil, results in the response curve being unnecessarily broad. To maintain a high input resistance, mainly attributable to cathode lead inductance, four cathode leads have been brought out, each to a separate pin, and to take advantage of this feature a de-coupling capacitor should be connected between each cathode pin and chassis. The circuit at Fig. 1 makes this point clear.

Incidentally, this circuit is that of the pre-amplifier to be described later.

Noise is largely a function of the ratio of anode to screen-grid current. In this valve this is kept high by careful alignment of the control and screen-grids, and the resulting value of equivalent noise resistance (Req), of 700Ω is better than even the more modern miniature pentodes.

Disadvantage

It was not until the author attempted to use the EF54 throughout in a video receiver that its great disadvantage was encountered.

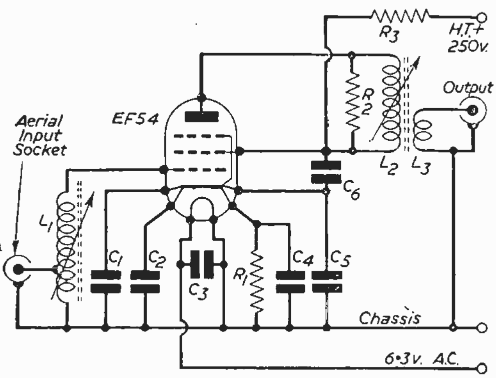


Fig. 1.—Circuit of the pre-amplifier.

The circuit was to consist of two stages of R.F. amplification, mixer and two I.F. stages before the detector. Band-pass coupling was used between each stage with the exception of the detector, as owing to the great distance of some 120 miles from Sutton Coldfield the maximum possible gain was essential. Also, this form of coupling enables a response curve closely approaching the ideal to be obtained.

Clearly, some form of gain control had to be fitted and the usual circuit (shown at Fig. 2) was tried. In the R.F. section it was found to be completely unworkable. Internal screening in the EF54 is connected to the cathode instead of being brought out to a pin, thus the 33Ω resistor in Fig. 2 prevents effective earthing of this screening and allows a small amount of capacitive coupling between input and output circuits. With the comparatively light damping of the tuning inductors, needed with band-pass tuning, stage gain is high, and with the control near maximum setting the coupling is sufficient to allow the valve to burst into continuous self-oscillation. Grid and anode stoppers were tried but with little effect.

TABLE 1
Characteristics of EF54.

Va—250
Vg2—250
Vg1—1.7
gm—7.7 mA/V.
Req—700 Ω.
Input resistance at 50 Mc/s—10,000 Ω.
Input capacitance—6.3 pF.
Output capacitance—4.9 pF.

When single stagger-tuned circuits are used and heavy damping thereby needed, stability can be achieved with this circuit, even without stopper resistors, but the presence of a tendency to regeneration has a detrimental effect on the noise factor, especially when it is allowed to occur in early R.F. stages.

Another possible form of contrast control circuit is shown in Fig. 3. Here the control grid bias is maintained constant at −1.7v. irrespective of anode or screen currents by using the volts dropped across a resistor in the H.T. negative line of the power supply. Control is then effected by varying the voltage on G2 by means of VR1.

At the I.F. used for the vision channel (10.5 to 13.5 Mc/s) the degree of capacitive coupling due to inefficient screening is correspondingly smaller, and here stopper resistors were found to be completely effective. Fig. 4 shows the circuit subsequently used for the first I.F. stage. At these frequencies it is unnecessary to provide a separate cathode capacitor for each pin. Since the input resistance of the valve is inversely proportional to the frequency squared—at 12.5 Mc/s it is some 250 KΩ—damping resistors must be provided to give a smooth overall response curve. The slight reduction of input resistance, resulting from connecting all cathode pins together and using only one decoupling capacitor, can thus be more than tolerated.

The circuit at Fig. 3 has not been adopted by the author as it is intended at an early date to add some form of automatic gain control, a function to which the circuit is not easily adapted.

Unlike the EF50, which has its suppressor grid brought out to a pin, the EF54 has this grid connected internally to cathode. This makes impracticable the circuit at Fig. 5, one commonly employed by constructors, which enables both the control and suppressor grids to be biased. In this circuit it will be seen that the internal screening is earthed to R.F. through the cathode de-coupling capacitor, thus reducing feed-back within the valve to a minimum.

Readers will be aware that these somewhat complex biasing arrangements are necessary in order that the input capacitance and resistance of the valve should not change as the contrast control is rotated throughout its range. The associated tuning coil relies on these valves to tune it to the correct operating frequency, thus any variation will lead to a distortion of the overall response curve with accompanying degrading of picture definition.

A Pre-amplifier

The construction of the pre-amplifier should be found to be quite straightforward, although a few points need particular attention if the maximum performance is to be obtained.

A chassis, bent from 22 S.W.G. aluminium, the dimensions of which are 3in. x 4in. x 1in. deep, will be found sufficiently large to accommodate all the components. A screen must be fitted across the valve-holder, in the position shown in Fig. 6, and bolted to the sides of the chassis. The length of all connections must be kept at a minimum, taking particular care with the grid and anode leads, and cathode by-pass capacitors. It is essential that the capacitors, C1 and C2, be earthed at the same point as L1, otherwise chassis currents will be set up with a risk of positive feed-back. The anode decoupling capacitor, C6, is connected to cathode instead of earthed to chassis in order to separate more effectively the grid and anode R.F. circuits. To reduce the possibility of aerial mis-match and loss of signal caused by the lead to the tapping on L1 forming a loop with the earthed lead, these should be run together through a short length of sleeving.

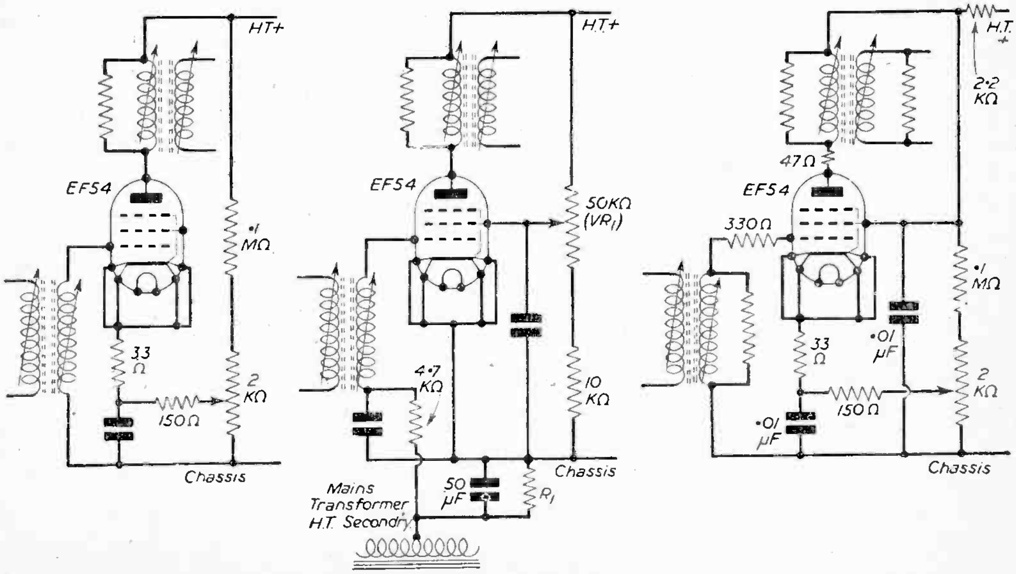
The coil-formers are the small Aladdin type, approximately ¼in. diameter, wound to the specifications found in Table 2, which gives the number of turns required for all five channels. A hard wax such as beeswax can be used to fix the wire in position after winding.

TABLE 2

Channel	Number of Turns			
	L1	Tapping	L2	L3
1	11	2	10	2
2	10	2	9½	2
3	9	2	9	2
4	8	1½	8	1½
5	7½	1½	7½	1½

L3 is interwound with earthy end of L2.
All windings of 32 S.W.G. S.S.E. wire.

The 4.7 KΩ resistor, connected across the anode coil, is needed to give the amplifier a sufficiently wide response curve. It will be appreciated by most readers that as the receiver with which the pre-amplifier is to be used, whether commercial or amateur built, will have a response curve of the desired form the response of the pre-amplifier should be flat over the 3.5 Mc/s needed for the



Figs. 2, 3 and 4.—Various gain controls as described by the author.

sound and vision channels. This cannot be obtained from two stagger-tuned circuits without embracing unwanted frequencies outside the required passband. The result is not as good as could be obtained from a receiver using similar valves and designed to have the sensitivity required with the minimum of amplification of unwanted side-bands. Nevertheless, in spite of the broad response curve the circuit at Fig. 1, when used in conjunction with many commercial receivers, those of pre-war manufacture in particular, will be found to improve the signal-to-noise ratio considerably.

It is hoped that constructors and experimenters who have encountered similar difficulties and have hitherto unwittingly condemned the valve will find this article helpful, and enable them to obtain the best results from this excellent pentode.

Points marked Ch. are connected to metal chassis

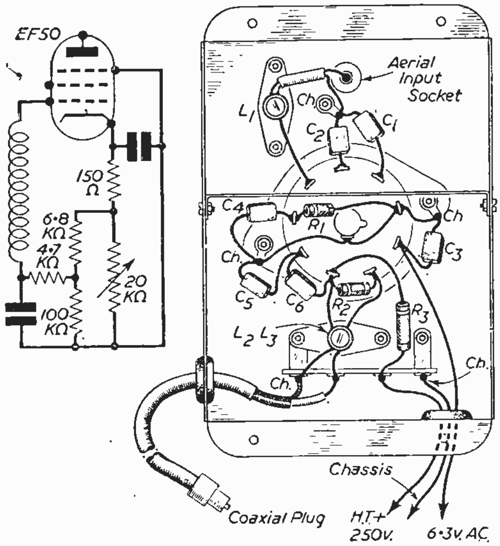


Fig. 5 (left). Contrast control circuit suitable for EF50, EF91, SP61. Fig. 6 (right). Underside of pre-amplifier.

LIST OF COMPONENTS FOR PRE-AMPLIFIER

C1, C2, C3, C4, C5, C6—500 pF.
R1—150 Ω (.25 watt).
R2—4.7 KΩ (.1 watt).
R3—2 KΩ (.25 watt).
Chassis—See text.
2 Aladdin coil formers ⅜in. diameter.
1 B9G ceramic valve-holder.
1 retaining clip.
2 rubber grommets.
Co-axial plug and socket.
Length of co-axial to requirements.
Nuts, bolts, wire, etc.
1 valve—EF54.

Big Screen Colour TV

COLOUR television pictures of theatre screen size were shown in New York recently by the Radio Corporation of America in tests that revealed further advances in the RCA compatible, all-electronic colour television system.

The colour show produced in the NBC Studios at Radio City was received at the Colonial Theatre, Broadway and 62nd Street, where representatives of the Press viewed the pictures in colour on a 9ft. by 12ft. screen.

The first programme was on the air at 10 a.m. It was not only seen on the theatre screen but was broadcast by the NBC's experimental transmitter on top of the Empire State Building, operating on Channel 4. This enabled owners of existing television sets throughout the Metropolitan area to view the programme in black and white. At the same time, the programme was sent to Washington, D.C., over radio relay and coaxial cable. In the capital, the programme also was broadcast on Channel 4, affording the public opportunity to view the show in black and white.

Tri-colour Receiver-projector

In addition, the public was invited to view the programme in the lounge of the Center Theatre in Radio City, where RCA colour television receivers have been set up to obtain public reaction to current field tests of colour television being conducted by RCA. Further tests were later transmitted over closed circuits directly from the NBC Studios in New York to the Colonial and Center Theatres, as well as by coaxial cable and radio relay to Washington for viewing on colour receivers in the NBC Studios in the Trans-Lux Building.

Apparatus shown at the Colonial Theatre consisted primarily of an RCA tri-colour receiver-projector, developed under the direction of Dr. David W. Epstein. He described the receiver-projector as "a painstakingly achieved refinement of one demonstrated by RCA in 1947 at The Franklin Institute in Philadelphia." Although the receiver-projector was mounted in the audience section of the Colonial Theatre for the current demonstrations, he said that subsequent models will be designed for a longer projection, permitting installation on theatre balconies. He further explained that there is no reason why the RCA receiver-projectors cannot be made to project pictures on full-size theatre screens up to 18ft. by 24ft.

"The improved receiver-projector employs three powerful 5in. projection kinescopes, or picture tubes, each coated with a phosphor which glows in one of three primary colours—red, green, and blue," continued Dr. Epstein. "Powerful and accurate projection lenses take the images from these three picture tubes, each much smaller than those used in present home television sets, and project these images for perfect registration to blend into a brilliant, full-colour picture on the big screen.

"Special projection kinescopes achieve their brightness and effectiveness, in large part, through advances made by RCA since development of the original kinescope by Dr. V. K. Zworykin, Vice-President and Technical Consultant of the RCA Laboratories Division. Some of these advances, such as the design of electron guns to operate at higher voltages, and the development of efficient phosphors with a wider range of colour, have been under continuous research for many years."

From VCR97 to Magnetic—1

CONVERTING A RECEIVER FOR STANDARD TUBES

By R. Shatwell

MOST users of VCR97 sets eventually change over to the magnetic tube, and the aim of this article is to enumerate the changes necessary and the alternatives available, both for this change and the addition of radio and gram. Whilst the problems are not great, it is advisable to try to foresee pitfalls and thereby avoid much trouble and expense.

The VCR97 set described in the March, 1951, issue of PRACTICAL TELEVISION is used as the basis of the conversion, but the principles apply to any conversion. The changes can be summarised as follows :

(1) Receiver section : minor changes only.
(2) E.H.T. : increased voltage according to tube used.
(3) Time-bases : replaced.
(4) Sync circuits : cathode follower and D.C. restorer no longer necessary ; possible changes to output circuits.
(5) Tube circuit : replaced by simpler circuit.

The conversion will be dealt with in this order and will ignore the radio addition in the first instance, since this involves no major change in principle, layout or wiring, as will be seen later.

Receiver Section

Grid feed of the signal to the tube is usual in VCR97 sets, whilst magnetic tubes usually operate with a cathode feed. Signal polarity must therefore be changed by reversing the connections to the detector diode. Any noise-limiter used must also be adapted to operate on a signal of reversed polarity. The video valve bias must be increased to deal with the reversed input. Fig. 1 shows the changes necessary to the circuit of March, 1951, incorporating these reversals and a modified video output circuit and bias resistor. The component numbers are as in the diagram of March, 1951 (Fig. 6, page 458), but new items have identification letters. The stages prior to the detector can be of any conventional type.

E.H.T.

Again summarising, several courses are open in this field as follows :

(1) Doubling or trebling VCR97 E.H.T. (50 c/s.)
(2) New mains E.H.T. unit : transformer, rectifier and smoothing.
(3) R.F. E.H.T.
(4) Flyback E.H.T. : by line-transformer overwind, doubling or trebling.

The first (doubling) is convenient, using metal "pencil" rectifiers, and sufficient for a 9in. tube ; regulation is good. Trebling, necessary for a 12in. tube, is bulky and the cost approaches that of a new mains E.H.T. section.

A completely new mains E.H.T. section has no disadvantages in performance, but is costly, lethal, and not easily adjustable. Precautions against tube burn when switching off are also necessary.

R.F. E.H.T. has many advantages, being adjustable up to about 8,000 volts for the normal unit, non-lethal and compact. It is, however, costly and places a further demand on the H.T. supply, not always permissible, particularly in a long-range receiver.

There can be little doubt that the most popular, convenient and economical source of E.H.T. is the high-peak pulse at the line output valve anode during flyback. It can be doubled or trebled without appreciable loss of regulation, or the line transformer can itself step-up the voltage to a sufficiently high figure.

Its disadvantages are its close integration with picture

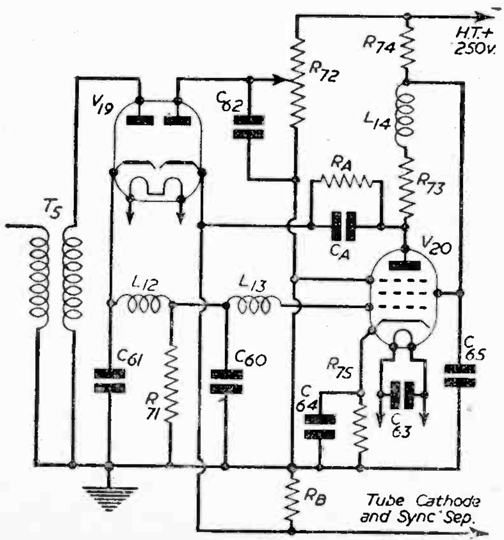


Fig. 1.—Video and noise suppressor stage.

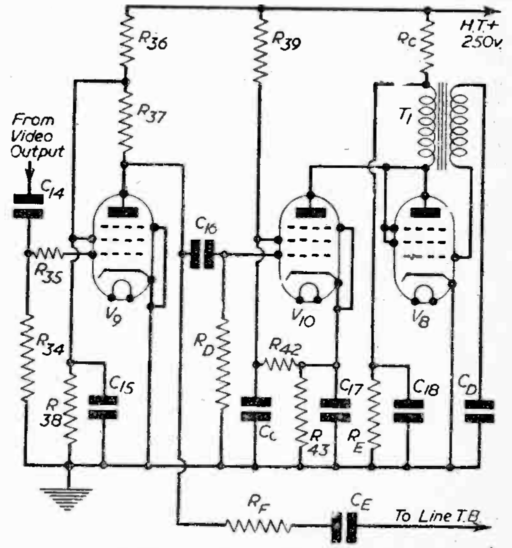


Fig. 2.—Frame time-base.

width and linearity, and regulation problems. Approximately 10 per cent. variation in E.H.T. between near-white and near-black is the worst regulation tolerable in practice, the ill-effects showing as a change in picture size and focus. With a good system 5 per cent. is possible and is beyond reproach. As the E.H.T. is raised so does the regulation *apparently* improve, as the focus is far sharper with the higher E.H.T. It is thus advisable to operate on the normal E.H T. for the tube rather than a lower potential.

The relationship between picture width, linearity and E.H.T. in flyback systems makes it essential to use matched deflector coils and line transformer. and if used in the circuit specified by the makers, no great trouble should arise in obtaining satisfactory results at moderate cost.

Choice of Tube

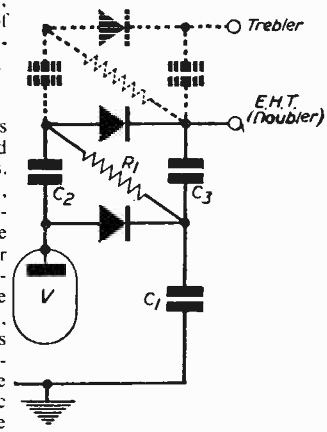
A point often overlooked in choosing deflector coils and tube is that these must also match. If a flat-faced tube is used with coils designed for a curved-faced tube, the picture will be drawn up and out at the corners (" pincushion " distortion). If the opposite is done the picture will be drawn into " barrel " distortion. The only cure is a mechanical one—the varying of the spacing between the coils, and this is rarely possible. The author prefers a flat-faced tube and is using a Ferranti T12/44. Deflector coils and line transformer are home-constructed to match each other and the tube. but the work entailed is tedious and beyond the resources available to the average constructor.

Time-bases

These generally take three possible forms, thyratron or soft valve time-bases. blocking oscillator, and Miller Integrator, both the latter being hard valve time-bases. Most VCR97 sets use a hard valve time-base and the sync circuits are, therefore, to suit these and need little alterations if hard valve circuits are again used. If Miller oscillators are used the anode pulse is negative-going and since it is difficult to secure an adequate cathode output, an additional valve, reversing the phase of the anode pulse, is necessary between the oscillator and output valve. Its use is avoided if blocking oscillators are used.

In the set previously described (originally in P.T., June, 1950), a spare valve-hole was punched in the sync separator strip. This will now take the frame output valve, and the blocking oscillator will take the place of the cathode follower. now superfluous. The oscillator anode is fed via the blocking oscillator transformer and is strapped to V10 anode as in Fig. 2. which shows the sync circuits associated with a suitable frame time-base oscillator.

It is not intended to specify particular components or circuits for the time-bases, as sufficient have been published recently. Mr. Morley's (P.125, August issue of P.T.) are very similar to the author's and provide flyback E.H.T. For use in other circuits. Fig. 3 gives details of the doubler circuit used by the author, with the addition necessary for trebling. " Surplus " 5,000 v. mica condensers are ideal for these circuits and make a cheap, compact unit, with no danger of overload or breakdown of condensers.



V – Line Output Valve
C_1 C_2 C_3 – ·001μF 5000 v. mica
R_1 – 1MΩ

Fig. 3.—E.H.T. circuit.

Sync Separator

Signal polarity is now correct for feed to the sync circuits. V7 and V8 (March, 1951), the D.C. restorer and cathode follower. and their associated components, can be removed up to C14, which then becomes the coupling condenser from the receiver. The sync circuits are suitable for hard valve time-bases, but extensive re-design would be necessary for thyatrons. Fig. 2, shows the completed change associated with a blocking oscillator frame time-base. For use with a blocking oscillator line time-base, changes to the line output circuit are shown to suit Mr. Morley's time-base, previously mentioned. Condenser C14, although included in the circuit of the sync separator, is best included in the video stage.

Tube Circuit

This can be entirely dismantled. with its shifts. focus. and brilliance controls. The separate heater winding for the tube is a distinct advantage, reducing danger of heater/cathode insulation breakdown. Focus can be by focus coil or permanent magnet, but again both economy and simplicity can be met without loss of efficiency and a permanent magnet is advised. The only advantage of the focus coil is its ease of adjustment. and this is slight if one of the geared magnets is used. In any case, the permanent magnet has no " drift " on

COMPONENTS FOR FIG. 1

EXISTING COMPONENTS

- C60, 61—10 pF.
- C62, 63—.01 to .1 μF.
- C64 — Reduced to .001 μF.
- C65—8 μF.
- R71—3.3 KΩ.
- R72—200 KΩ.
- R73, 74—4.7 KΩ 2 watts.
- R75 — Increased to 220 Ω.
- T5—Video Coupling Transformer.
- L12, 13, 14—Filter and Corrector Chokes.
- V19—EB34.
- V20—EF50.

NEW COMPONENTS

- CA—8 μF.
- RA, RB—100 KΩ.

COMPONENTS FOR FIG. 2

EXISTING COMPONENTS

- R34—5 MΩ.
- R35, 39, 42—47 KΩ.
- R36—30 KΩ 1 watt.
- R37—25 KΩ.
- R38, 43—22 KΩ.
- C14, 17.—.1 μF.
- C15, 18—2-8 μF.
- C16—230 pF.
- V9, 10—SP61.
- V8—SP61 (previously Cathode Follower).

NEW COMPONENTS

- RC—47 KΩ.
- RD—2.5 MΩ.
- RE—33 KΩ
- RF—100 KΩ.
- CC—.1 μF.
- CD—.05 μF.
- CE—100 pF.
- T1—Blocking Oscillator Transformer.

warming up and rarely needs adjustment. Again tube and magnet must be matched, the triode tube needing a stronger focusing field than the tetrode. The tube circuit then consists of E.H.T. anode connection, grid connection to brilliance control, cathode connection to video feed, and heater circuit. In the case of a tetrode the screen will need an H.T. connection as specified by the makers. With H.F. E.H.T. (flyback or R.F. unit), the brilliance control consists of a potentiometer in series with a resistance across the 250 v. H.T. supply. The ratio of potentiometer to fixed resistor should be such that the tube grid never becomes positive to cathode, which is, of course, at the same potential as the video valve anode. 100 kΩ is a good average value for each, the fixed resistor being changed until the correct proportion is obtained. With this circuit it is not essential to combine the on-off switch with the brilliance control.

If mains E.H.T., either by doubling of the VCR97 supply, or new transformer, is used, there is a considerable delay after switch-off before the higher capacity condensers in the E.H.T. circuit have discharged. During this time E.H.T. is applied to the tube without a bias voltage. Severe burning of the tube would result. In these cases, therefore, the brilliance control must be inserted at the earthy end of a 10 megohm chain of resistors across the E.H.T. supply (Fig. 4). RB, which completes the cathode circuit to earth, ensures that a bias exists, via tube current. A defocused low intensity spot exists for a second or two but this is harmless.

Power Supplies

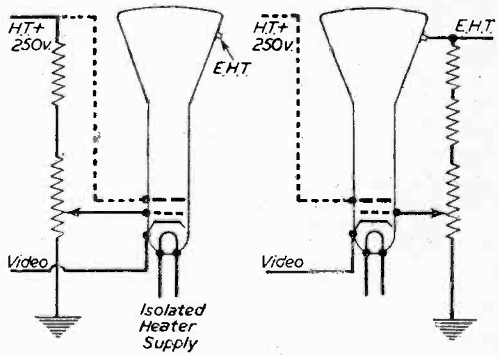
The supply used for the VCR97 circuit of March, 1951, (500 v. at 250 mA), will still be sufficient in most cases, but whether it would be sufficient if an R.F. E.H.T. unit is used depends upon the time-base consumption. In cases where a transformer of lower output rating has been used, there are advantages to using an additional small power unit for the line time-base, which normally has the heaviest consumption of any of the sections. A further suggestion is included in the radio conversion details.

General

A few notes on correct setting up of the sync circuits will not be amiss, as the quality of the picture can be greatly improved by correct interlace. First replace R38 by a 50 kΩ variable, and with Test Card "C" on the screen adjust so that no "pulling on whites," best visible as steps in the pulse bars opposite the white edges of the band, exists. Set fairly close to optimum and replace by a fixed resistor of the correct value. Secondly, replace R43 by the 50 kΩ variable and repeat for correct interlace. If too low in value line pulses will trigger the frame time-base; if too high the frame pulse will be too weak for good interlace. Again replace by fixed resistor. These adjustments should be carried out on a picture correctly adjusted for contrast and brilliance.

Layout of the time-bases should be such that there is no interaction between them, and a screen between them below chassis is advisable. Frame output load resistors and line output transformers, both of which run quite warm, should be above chassis. Care with E.H.T. circuits is essential, as particularly in pulse circuits an occasional arc over a ¼in. gap can, without any actual harm, cause puzzling effects on the screen, particularly if it is inside a "canned" transformer. If a rubber mask is used, bond the tube by a strip of copper gauze passing between mask and tube and the supporting clamp. This will save many unpleasant shocks from residual charges, often hours after switching off.

At extreme range it is often better to sacrifice the 3 Mc/s bars, and even the 2.5 Mc/s if necessary to secure a picture free from noise, visible as "graininess" of the raster, and jagged outlines of verticals. In this connection, if a 25 kΩ variable is inserted in the feed to C14 and adjusted so that "pulling on whites" is just avoided the picture will be cleaned up considerably. No long leads are permissible here. The addition of radio and gram will be described next, but a satisfactory picture should be obtained before progressing to this stage.



Note: Dotted connections necessary for tetrode tubes only

Fig. 4.—Tube connections.

Adding Radio and Gram

The addition of radio and gram to the set can be made a very elaborate and complicated process, but can be simplified considerably if the dual use of components is not carried too far. The aim should be economy of operation with the use of common circuits where technically practical, but it is, in the opinion of the author, necessary to weigh the saving effected by complicated circuitry against the simplicity made possible by the use of separate circuits in some instances.

Firstly, if we use common R.F. and I.F. circuits, the saving is one of the valve costs, with the associated cathode and screen components. Additional tuning coils, I.F. transformers, etc., will be necessary in any case. The essentials of a good radio tuner unit for normal programme listening can be incorporated in a two-valve superhet circuit, consisting of a frequency-changer and a double-diode high-frequency pentode. The cost of this is not likely to exceed 30s., and in most instances can be made up from the spares box.

From the detector output there are no difficulties in using common audio stages for TV, radio and gram, and access to these is without complications.

The power unit of the TV set *can* be used for radio also, but its high output becomes a liability rather than an asset. The H.T. consumption on radio is likely to be between 25 per cent. and 33 per cent. of that on TV, and unless the power unit is stabilised, the increased voltage will often exceed the ratings of the condensers normally fitted.

(To be continued.)

SERVICING TELEVISION RECEIVERS—NEW SERIES

3.—Cossor

MODELS 900, 900A, 901, 902, 912/14 916/17, 923, 918/19/20

By H. E. Jeffrey (A. C. Cossor, Ltd.)

LACK of knowledge as to the correct adjustment of manual and preset controls and the misalignment of some internal components often mars the performance of a television receiver. The following information has, therefore, been compiled in the hope that by its practical application post-war Cossor television receivers may be operated so as to give of their best. It is recommended that all settings be made either on the BBC Test Card "C" or the tuning signal.

Adjustment of Controls

BRIGHTNESS.—Adjustment of picture brilliance is made by turning the control clockwise until the flyback lines are just visible ; at which point the setting should be decreased until they disappear. The optimum setting is dependent on the adjustment of the contrast control.

If the contrast level is altered, the brightness setting must always be readjusted. It is important that the white level be set so that enough contrast is maintained in the lighter parts of the picture.

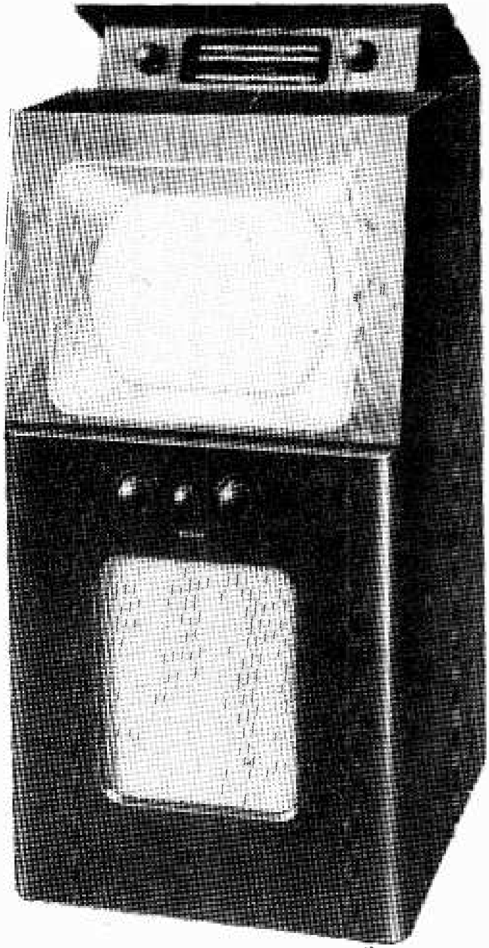
CONTRAST.—This varies the gain of the picture amplifier and the setting is, therefore, dependent on the strength of the signal being received. After each adjustment of the control the brightness setting will have to be corrected. Only by alternate adjustment of the two controls is it possible to obtain a satisfactory picture. When the white portions of the image have been correctly adjusted, and it is found that all detail has been lost in the darker portions, excessive contrast is being applied. The control should then be rotated slowly in an anti-clockwise direction to reduce the black level.

FOCUS.—Adjust only to compensate for changes due to variations in mains supply voltage. The setting should be made before the final adjustment to Contrast and Brightness controls. A slight trimming of focus may be necessary after this has been done.

VERTICAL HOLD.—This controls the grid time-constant of the frame blocking oscillator. The adjustment should be made by bracketing to ensure that the vertical time base does not go out of synchronism with variations in mains voltage and temperature. The final setting of the control will be midway between the two positions where synchronism ceases. The control is then said to be bracketed.

HORIZONTAL HOLD.—The blocking time-constant in the grid of the horizontal driver valve is varied by means of this control. It should be adjusted by bracketing. As the control is bracketed the picture will move bodily on a horizontal plane ; but it should not be centralised until the final setting of the control has been made.

PICTURE HEIGHT.—To *increase* the height of the picture turn clockwise ; to *reduce* the height turn anti-clockwise. The height should be reduced when centring the picture, and then increased until approximately ⅛in. of the top and bottom of the image is covered by the mask.



Cossor Model 920.—A 12in. and radio model.

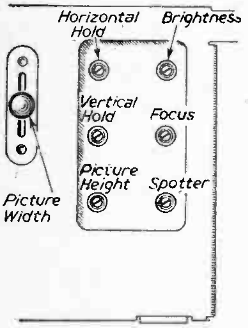
PICTURE WIDTH.—This controls the amplitude of the sawtooth voltage applied to the horizontal deflector coils. Picture width should be reduced when centring the picture, after which it should be increased until ⅛in. of the image is hidden by the mask. On Models 916-920 the picture width is increased by moving the control downwards.

FRAME LINEARITY.—This expands and contracts the top and bottom of the picture relative to the centre. Once set it should need no further adjustment.

LINE LINEARITY.—The velocity of scan over the left-hand half of the picture is controlled by this preset. Misadjustment either stretches or cramps the left-hand side of the image.

SPOTTER (Picture Interference Limiter).—The bias on the spotter diode is governed by this control, which should be set so that the diode chops all signals stronger than peak white. Beyond this point the further control is advanced clockwise the lower will be the level at which the diode chops. Adjustment can only be satisfactorily made when interference is superimposed on the picture. The control should then be advanced clockwise until the interference is reduced to fine white lines. But the setting should not affect the white parts of the picture.

SOUND NOISE LIMITER.—This should be adjusted under normal working conditions while interference is being received by rotating the control in a clockwise direction until the disturbance is reduced without distorting the reproduction. The setting is critical.



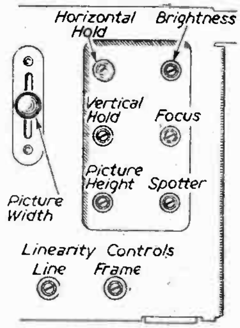


Fig. 1 (left).—Preset controls on back of models 916/917 and 923 (some models may also have the two linearity controls shown below on Models 918, 919, 920). Fig. 2 (right). Preset controls on back of Models 918, 919, 920.

Position of Controls

The readings are from left to right on all receivers, except for the preset controls on Models 916, 917, 918, 919, 920 and 923.

Models 900/900A.—Manual controls on front of cabinet : Brightness and On/Off, Focus, Contrast.
Presets on back of Vision chassis : Spotter, Line Amplitude, Frame Amplitude, Frame Sync., Line Linearity, Line Sync.

Model 901.—Manual controls on front of cabinet : Brightness and Picture On/Off, Tele-Sound Tuning, Focus.
Presets on front of cabinet above manual controls : Vertical Hold, Picture Height, Spotter, Contrast, Picture Width, Horizontal Hold.
On the back of the Vision chassis : Sound Noise Limiter.

Model 902.—Manual controls on front of cabinet : Brightness and Picture On/Off, Focus, Sound Tuning, Volume and Master On/Off.
Presets on front of cabinet above manual controls : Vertical Hold, Picture Height, Spotter, Contrast, Picture Width, Horizontal Hold.
On the back of receiver chassis : Sound Noise Limiter.

Models 912/914.—Manual controls on the front of the cabinet (Television only as regards Model 914) : Brightness, Focus, Sound Tuning, Volume and On/Off.
Presets between manual controls on the front of cabinet : Vertical Hold, Picture Height, Spotter, Contrast, Picture Width, Horizontal Hold.
On the back of Vision chassis : Sound Noise Limiter.

Models 916/917 and 923.—Manual controls on front of cabinet : Volume and On/Off, Contrast.
Presets on panel at right back of chassis : Left-hand column : Horizontal Hold, Vertical Hold, Picture Height. Right-hand column : Brightness, Focus, Spotter.
On the left of this panel : Picture Width.
Below the Width Control : Line and Frame Linearity controls (not on all models).

Models 918/919/920.—Manual controls on front of cabinet : Volume and On/Off. Tone. Contrast.
Presets the same as for Models 916/917.

Internal Adjustments

When carrying out internal adjustments on any television receiver, the utmost care must be exercised, and, because danger exists in the very high voltages at which the receivers operate, such adjustments should only be made under the supervision of a fully qualified television engineer.

NEGATIVE ION TRAP.—This device is located on the neck of the C.R. tube. Its function is to produce a transverse magnetic field exactly counteracting an electrostatic field within the tube. The combination of the two fields permits the passage of electrons, but effectively suppresses the heavy particles known as negative ions from reaching the screen.

There are alignment markings on both the tube neck and the ion trap assembly. The assembly should be moved slowly fore and aft along the neck of the tube (reducing the Brightness control setting to prevent over-brightness) until the focused raster is at its brightest. The ion trap should then be rotated a few degrees around the neck in order to obtain the position of maximum brightness. If shadows appear at the picture corners it will mean that the ion trap has been incorrectly set.

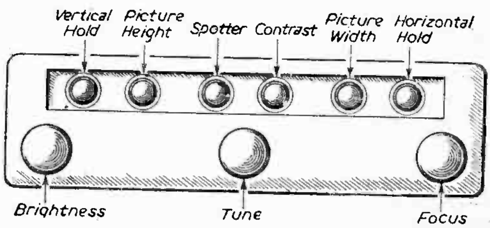


Fig. 3.—Controls on front of Model 901.

But the deflector coil assembly will also produce this fault if it is not in the maximum forward position.

Improved sharpness can often be obtained by moving the ion trap slightly backwards (without rotating) from the position of maximum brightness ; the consequent loss in picture brilliance can be compensated for by advancing the Brightness control setting.

After adjustment to the ion trap it may be necessary to readjust the focusing magnet and centralise the picture.

FOCUS MAGNET.—This adjustment may become necessary after the ion trap has been repositioned, or

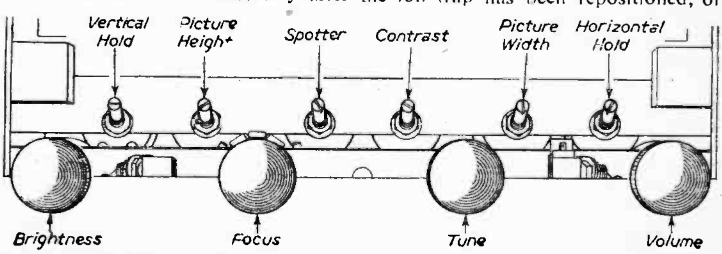


Fig. 4.—Controls on front of Model 902.

when the optimum point of focus is outside the range of the Focus control.

The longitudinal position of the focus magnet controls the focusing action. Adjust so as to produce optimum focus with the focus control set at the mid-position.

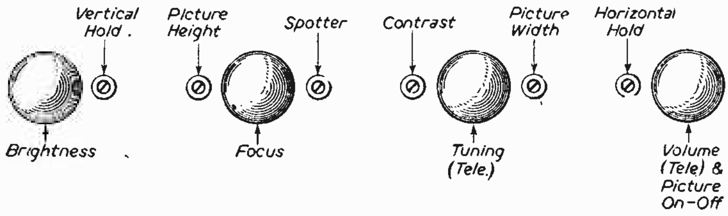


Fig. 5.—Controls on front of Models 912, 914.

It is more important to bring the vertical lines of a transmitted picture into focus than the horizontal ones.

DEFLECTOR COIL ASSEMBLY.—This unit is mounted on the neck of the tube. The radial position of the assembly orientates the picture within the mask perimeter. If corner shadows are present on the picture, the unit must be checked to ensure that the assembly is in the fully forward position.

CENTRALISING THE PICTURE.—If the picture is not central within the screen mask, it may be aligned by adjusting the plate forming the rear face of the focus magnet.

The picture will move at right angles to the movement of the plate. Thus, if the plate be shifted in an upward direction the picture will travel towards the left (viewed from the front of the screen), any downward movement will shift it to the right. Should it be necessary to lift the picture vertically, the plate must be moved to the left, and where downward movement is required, to the right.

On Models 900, 900A and 902 it will be necessary to slacken the three screws which clamp the magnet assembly together before the plate can be adjusted; but on all other models knurled nuts are provided for the purpose.

Centralising will be easier on a picture reduced in size by about half an inch on all sides within the mask perimeter.

Dutch Amateur's Effort

AS an answer to the very interesting article in a recent issue of PRACTICAL TELEVISION on the miniature television receiver built by a young amateur, I would like to tell you something about my version of the same object, which I called the Minivisor, a similar affair, somewhat smaller, somewhat less sensitive, but—I believe—somewhat better looking (viewing, too, because of the bigger picture screen), and, anyway, quite appealing, too.

I'm also an amateur, and rather young, too—23.

This receiver, using a 2½ in. screen (Philips C.R.T. DG 7-3), measures about 4in. x 4½in. (high) x 7½in. (deep), including cabinet and knobs. Two colours are used for the cabinet—red and creamy white; construction is of plywood and aluminium.

Circuit

The receiver itself consists of a video section, using 2 R.F. and 1 video valve only (this is possible because the bandwidth, necessary for such a small image, doesn't need to be very high, and, besides, this set is not intended to be a DX receiver), a sound section with one limiter stage, an FM discriminator (this is necessary in Holland because the European standard of 625 lines and FM sound is used here) and normal audio amplifier, driving a 3in. PM speaker, mounted above the cathode-ray tube. A mumetal screen around the tubular part of the tube proved necessary as a guard against the magnetic field. A transitron sync separator drives a multi-vibrator type line time-base, followed by a triode phase inverter to obtain a balanced sawtooth voltage. For the frame T.B. a blocking oscillator was chosen because of its greater stability and simplicity. It turned out to be possible to get enough scanning voltage by using the 1,000 volt H.T. for this valve. So far, this has not done it any harm.

Components

Normal American IRC resistors (half watt unless otherwise noted) were used throughout, and tubular condensers of the hearing-aid type (carefully selected, because leakage current turned out to be quite high with many units). Several parts of British origin were used in the construction. The transformers are home-made, the smallest one being the blocking oscillator. Controls include focus, contrast and volume—no brilliance control is provided—there was no room for it! Between the first and second R.F. valve the 6X4 rectifier is placed as a screen, the anodes being earthed for R.F. Single rectification was used, because the transformer could be made easier, and because 50 c/s hum is less troublesome and annoying than 100 c/s hum. In the cathode lead of the second R.F. stage an L.C. circuit, tuned to the centre of the sound frequency, is included, filtering the sound signals out of the video part by negative feedback.

The results are very satisfactory, compared to a bigger set. First try-outs were made in the vicinity of Eindhoven, the experimental Philips transmitter, but now here in Delft reception is possible of the first test runs of the new Lopik transmitter (a distance of 25 miles).—H. V. (Delft, Holland).

These People Provide yo


ur Programmes
MOCK
4. DEREK BURRELL-DAVIS
5. RONNIE WALDMAN
8. MARTIN PULLING
9. PHILIP DORTE
ARY AMS
13. MICHAEL BARRY
14. MISS FREDA LINGSTROM

These People Provide Your Programmes

SOME BRIEF AUTOBIOGRAPHIES COMPILED BY E. C. THOMSON

ON the two previous pages will be found portraits of some of those people at the BBC who are responsible for the television programmes. To enable you to become better acquainted with them the following particulars are given, in the same order as they appear in the portrait layout.

1. **GEORGE BARNES**, as Director of Television, is "the man in charge." With a seat on the BBC's Board of Management, he is immediately responsible to the Director-General, Sir William Haley, who appointed him to the television post in October, 1950. Now 47, he began his career as a schoolmaster at Dartmouth, finished up in sound broadcasting as Director of the Spoken Word. A philosopher and man of vision.

2. **CECIL McGIVERN** (43), Controller of Television Programmes, is a Newcastle man and was also a schoolmaster before joining the BBC in 1934. Becoming famous as wartime writer-producer of broadcasts like "Battle of Britain" and "The Harbour Called Mulberry," he took over TV programmes in 1947 after two years of film script writing. His responsibilities, once described by him as "the biggest headache in the field of entertainment," cover TV programmes from A to Z.

3. **PETER DIMMOCK** (31), de Lotbiniere's lieutenant on the TV side, is also a first-rate sports commentator, specialising in horse-racing. A flying-instructor during the war, he resumed civilian life in Fleet Street, but soon transferred to TV. He has done much to persuade sports promoters that television is no enemy but a friend.

4. **DEREK BURRELL-DAVIS** (33), a relative newcomer to the BBC, is a Yorkshireman with the appropriate job of producing TV outside broadcasts in the Holme Moss area. Before joining TV last December as studio manager, he was in films as location director and specialised in the independent frame system of film production.

5. **RONNIE WALDMAN**, Head of TV Light Entertainment, is now 37 and has made "show business" his life ever since taking an Oxford M.A. degree in 1935. Before joining BBC Variety in 1938, he produced, managed and acted in every kind of play from English and American farce to Shaw and Shakespeare. As principal performer in "Puzzle Corner," he is one of the few BBC Chiefs to make personal appearances.

6. **JOLY DE LOTBINIERE** (46), Head of Outside Broadcasts for both sound and vision, brings the legal mind of a barrister to the job of managing the two mediums. He is a diplomat, too, and to his tact and suavity viewers owe many television events which their promoters threatened to ban.

7. **DOUGLAS BIRKINSHAW**, Superintendent Engineer, is 45 and comes from Sheffield. He is one of TV's real pioneers, having taken technical charge of the BBC's experiments with the 30-line Baird system from 1932 onwards. In 1936 he became Engineer-in-Charge at Alexandra Palace when the world's first high-definition service was opened. For many years an amateur radio experimenter, he is also a talented amateur musician and campanologist.

8. **MARTIN PULLING** (45), TV's Senior Superintendent Engineer, began as a Cambridge radio research specialist, then entered commercial radio, switched to the BBC's engineering information branch in 1934 and was head of the recording department from 1941 until his TV appointment in 1949. He has overall technical charge of all television activities from Alexandra Palace to Kirk-o'-Shotts.

9. **PHILIP DORTE** (47), Head of Television Films, was a radio engineer and then film sound expert before joining TV in 1937. He began on outside broadcasts but switched to films in time to inaugurate the now famous Television Newsreel. Every foot of televised film, from drama "inserts" to documentary sequences, from interlude pictures to newsflashes, comes under his supervision.

10. **BARRIE EDGAR** (32), among the most popular TV commentators on the children's programmes, is also an experienced "O.B." man, both at the control panels and in front of the cameras. A Birmingham man, the son of former BBC Midland Region Director, Percy Edgar, he has been chosen as television outside broadcasts producer for the Midlands, which share a micro-wave mobile unit with the north.

11. **JACK KNOTT** is TV's "business manager" or, in BBC terms, Head of Television Administration. A 37-year-old Birmingham man, he started as radio engineer, was a TV cameraman at Alexandra Palace before the war, and rose in the Army to full Colonel. On returning to television, he forsook the studios for the managerial desk.

12. **MRS. MARY ADAMS**, as Head of TV Talks and Features, has the challenging task of presenting the spoken word in terms of vision. New inventions, art, cookery, women's fashions, politics and personalities—all these and many more are fair game for her team of producers. Mrs. Adams is a Master of Science, Cambridge ; joined TV in 1937.

13. **MICHAEL BARRY** (41) succeeded Val Gielgud in 1951 as Head of Television Drama. A brilliant producer, he is also a television playwright of distinction, learning his art first in the theatre as stage director and actor, then at the TV studio control panels. His television experience dates back to 1938.

14. **MISS FREDA LINGSTROM**, appointed Head of TV Children's Programmes in April, 1951, is a mural artist, novelist and authority on schools broadcasting. She created the television puppet "Andy Pandy," and since joining TV, has originated several new features, including "Festival Frisk." She is the only TV Chief required to provide an hour's programme every day of the week.

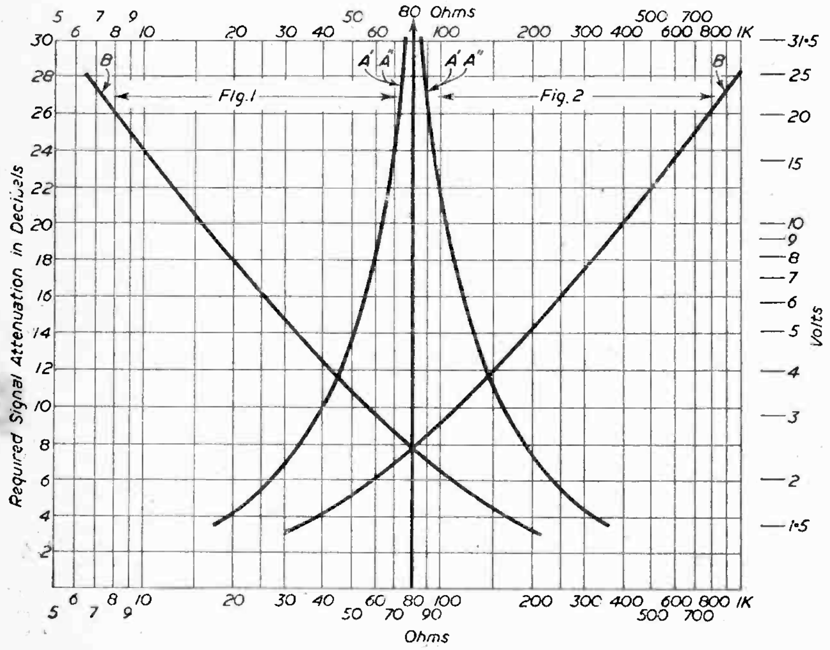
AERIAL ATTENUATORS

THEORETICAL AND PRACTICAL CONSIDERATIONS OF SIGNAL STRENGTH CONTROLS

By C. T. Clack

WITHIN a radius of two miles, or thereabouts, around a television transmitter, an aerial may pick up enough signal voltage to overload the receiver, and consequently there arises the need for some means of reducing the signal input to avoid distortion. This distortion is easily recognised by an over-white picture lacking in high-light detail, which is obtained with the contrast control turned to minimum; if the brilliance is reduced, a "soot and whitewash" effect is observed, i.e., a picture in which there is an absence of all the intermediate tones between black and white.

An indoor or other low-efficiency form of aerial may provide a satisfactory solution to the problem in the majority of cases, provided that the level of mains-borne and other forms of interference is negligible. In some instances, however, where the indoor aerial happens to be situated in a closely built-up area, despite a high-field strength, there is a possibility that local industrial and domestic equipment will produce an appreciable background of interference and, furthermore, if the installation is situated alongside a main thoroughfare, the ignition radiation from traffic may also mar reception. In such cases a great improvement is effected by erecting an outside aerial, such as a single dipole or "H" type on the roof of the dwelling, but then the chances are that the signal input to the receiver is much too great.



"T" and "π" networks for unbalanced coaxial lines.

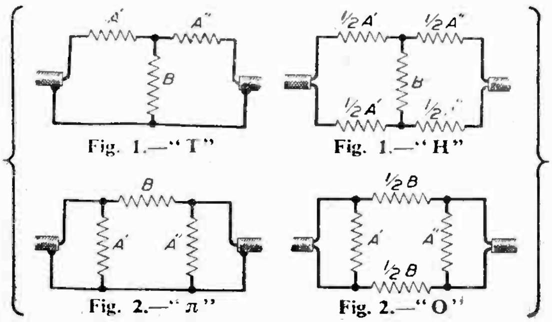


Fig. 1.—"T" Fig. 1.—"H" Fig. 2.—"π" Fig. 2.—"O"

"H" and "O" networks for balanced pair.

Figs. 1 & 2.—Nomograph for the design of "T," "π," "H" and "O" attenuators with input and output impedance of 80Ω for use with television aerials.

Having secured an improved signal-to-noise ratio, it then becomes necessary to reduce the amount of signal reaching the receiver and for this purpose a simple resistive network can be inserted between the aerial feeder and the receiver input socket. The description "simple resistive network" is real in practice, but examination of the curves shown in Figs. 1 and 2 reveals that the combination of resistance values for different levels of attenuation is certainly not so simple as one might expect. The reason for this is that not only does a required attenuation call for a definite proportioning of the elements A′, A″ and B, but that the input and output resistance of the attenuator must always be constant, i.e., in this instance 80 ohms. If an attenuator has an input and output resistance other than 80 ohms, it may introduce reflections back along the aerial feeder. The fact that it also delivers more or less attenuation than originally intended is of little importance, but as mismatching can, under some conditions, introduce undesirable responses on the picture, all that need be stressed here is that in a correctly terminated aerial circuit distortion of this nature is absent.

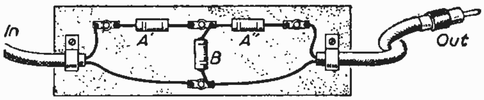


Fig. 3.—Practical layout of an attenuator.

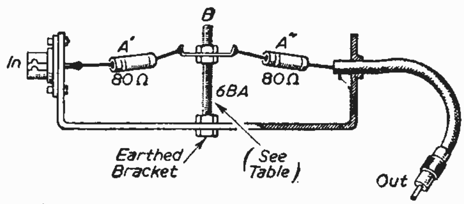


Fig. 5.—A length of screwed rod forms the B resistance in this arrangement. Note that the output lead screening is earthed.

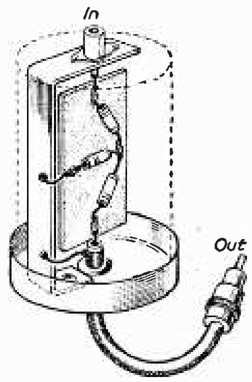


Fig. 4.—A practical interpretation of an attenuator of the type shown in Fig. 3—showing a suitable screening can.

Type of Attenuator

An attenuator used for the purpose described here is a resistive network designed to introduce a specified power loss when inserted between two circuits of known impedance. The term impedance must be mentioned here because the practical circuits with which we are concerned, i.e., the aerial and input coil of the receiver, contain inductive and capacitive reactance as well as resistance, and it is not usual for such circuits to maintain an entirely resistive condition over the band of frequencies needed for television reception. However, the sum total of resistance and reactance can still be visualised as " so many ohms " and for our convenience the generalised use of the term " resistance " will, where necessary, imply a combination of both components.

Figs. 1 and 2 illustrate two types, and from their configuration the names " T " and " π " are easily recognised. Neither has any functional advantage over the other, but for attenuations greater than 30 dbs the B resistance in the " T " type can be replaced by a short length of screwed 6BA rod or thick wire as described later.

Use of Graphs

The calculations necessary to determine the values of the resistances for any desired level of attenuation are

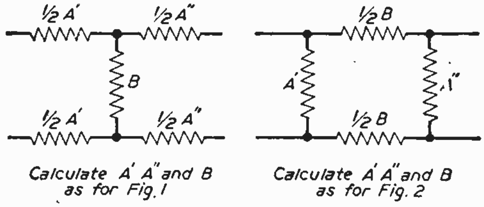


Fig. 6.—Networks for a balanced line.

relatively straightforward, and a number of examples for both " T " and " π " types have been worked out and presented in the form of an easy-to-work graph for quick reference. An illustration of the use of the graphs can be given by assuming that the input voltage to a receiver is to be reduced by 10 times (or 20 dbs in power, whichever terminology is preferred), and then reading the values of resistance in ohms at the points where the 10 times (20 dbs) line intersects the A', A'' and B curves. From the graphs, a " T " attenuator requires A' A'' resistances of 65 ohms, and a B resistance of 16 ohms ; likewise, for the " π " attenuator, the A' A'' resistors must be 100 ohms and the B resistor 400 ohms. In any example taken from these graphs the attenuation factor, input and output resistances will be accurate to about 5 per cent., and the use of 5 per cent. resistors will keep mismatch and attenuation factors within acceptable limits.

Construction

The layout should be symmetrical, as shown in Fig. 3, with the internal connections kept as short as possible by using small carbon composition resistors to assist this requirement. It is best enclosed within a small screening can as suggested in Fig. 4, which is the most convenient form for immediate use.

At 28 dbs attenuation, the B resistance in the " T " type has a value of 6.5 ohms, and at 45 Mc/s a 1in. length of 6BA rod has a reactance of approximately 4 ohms. If the A' A'' resistances are made 80 ohms and a 1in. length of 6BA rod is used as the B resistance (Fig. 5), an attenuation of 32 dbs is obtained. For other lengths of rod the following table will serve as an approximate guide :

B Length	London 45 Mc/s.		Northern 51·75 Mc/s.		Midland 61·75 Mc/s.		A' A'' = 80 Ohms for all values of B shown in table
	approx. XL	approx. dbs	approx. XL	approx. dbs	approx. XL	approx. dbs	
1"	4 Ohms	32	4·6 Ohms	31	5·25 Ohms	30	80 Ω — 80 Ω
¾"	2·5 "	35	2·9 "	34	3·5 "	33	B Length
½"	1·5 "	40	1·75 "	39	2·0 "	38	
¼"	0·82"	46	0·95 "	45	1·1 "	43	

The attenuators described are for use with an unbalanced (co-axial) feeder, and where an attenuator is required for a balanced line the A' A'' or B resistors are reduced in value by one-half and inserted in both sides as the configuration shows in Fig. 6. Constructional details are as previously described.

SYNC SEPARATOR

A THREE-STAGE DOUBLE-LIMITER AND "CLIPPER"

ONE of the most interesting and important parts of the modern television receiver is the sync separator and many different circuits have been recommended. Where the thyratron is favoured the circuit shown in Fig. 1 has been reported on as giving very good results on weak signals, although as with the majority of sync arrangements if the signal level falls too low it will be found difficult to hold sync constant in the presence of interference. As will be seen from Fig. 1, the circuit employs a diode separator followed by a valve amplifier with low voltage on anode and screen. The result of this arrangement is that double limiting is achieved, and all sync pulses are brought to the same level.

Separator

The action of the separator is as follows. Positive-going video signals are fed to the diode anode from R2

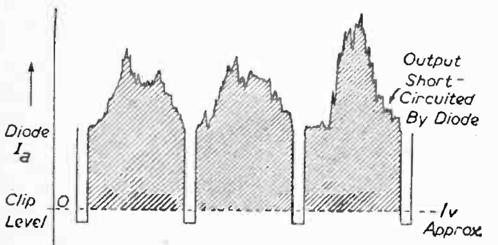


Fig. 2.—How the picture impulses are shorted and the negative pulses obtained.

which prevents short-circuit of the tube input, the cathode being biased to +1 volt above the "no signal" level by R4, R5, and decoupled by C1. When the input rises above this level the diode conducts, short-circuiting the output, thus producing negative-going sync pulses of 1 volt at its anode. These are then fed via C2, R7 to the grid of the amplifier, R7 being inserted to limit the effects of noise on the tips of the sync pulses.

The anode and screen of the valve have only a low value of H.T., which causes the valve to cut off when the input exceeds approximately .75 volts, the amplified pulses appearing at the anode and screen, from where they are fed to the time-bases through suitable filter circuits.

Details of the original circuits used are included in the diagram, but any type of normal filter circuit can be used without upsetting the working of the separator.

If pulses of opposite polarity are required for other types of time-bases, readers will no doubt be able to

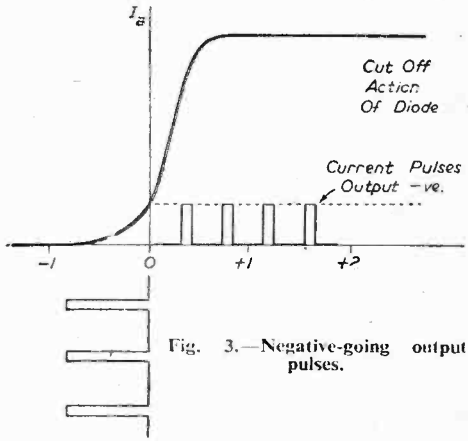


Fig. 3.—Negative-going output pulses.

modify the circuit so as to work the amplifier on the upper bend of its curve instead of the lower bend, thus producing negative pulses at the anode of the amplifier.

Big Tubes

It is important to remember that when using tubes of the larger size the interlace becomes very critical and a multi-stage type of separator is very desirable. It is worth while experimenting with the various circuits which are available to find that which gives the maximum performance with the particular vision receiver which is used, as it should be remembered that the strength of the sync pulse is controlled in the vision circuits and instability or poor bandwidth can result in a weak or distorted pulse which cannot be straightened out in the sync separator stages.

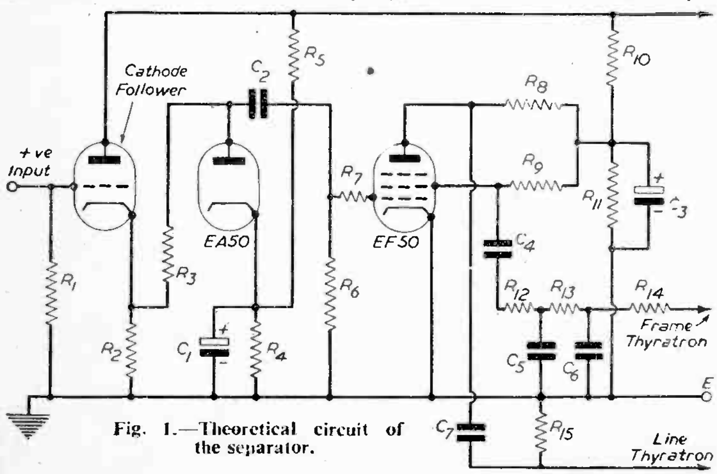


Fig. 1.—Theoretical circuit of the separator.

LIST OF PARTS

C_1—25μF 25v.	R_5—150k Ω
C_2—.1μF	R_6—1M Ω
C_3—25μF 25v	R_7—10k Ω
C_4—.05μF	R_8—20k Ω
C_5—.001μF	R_9—30k Ω
C_6—.001μF	R_{10}—100k Ω
C_7—2pF	R_{11}—4.7k Ω
R_1—1M Ω	R_{12}—100k Ω
R_2—5k Ω	R_{13}—100k Ω
R_3—56k Ω	R_{14}—100 Ω
R_4—4.7k Ω	R_{15}—47k Ω

Look Out, Mrs. Moss!

AN OPEN LETTER ON THE DANGERS OF TV IN THE HOLME

DEAR Mrs. Moss,—Now that a BBC television transmitter is operating within earshot—or shall I say eyeshot—of your home, it is as though you and the family had gone to a new country. However settled your habits, unassailable your marriage, however biddable and promising your children—all are suddenly beset by new problems. If you found yourself on a Swiss Family Island it could be no more dangerous. Your husband has become a pioneer and you and the kids must rough it with him. The focal point of his interest is no longer *you*—Mr. Moss, most faithful of spouses, is straying. You must beware!

And it doesn't matter whether Mr. Moss has yet bought or constructed a television set himself or not! Indeed, you will find that having a set is a lesser evil than being in an area where you *could* have one, and not getting the darn thing. Moss will just fret . . . and the little Mosses, who fret for anything they haven't anyway, will positively nag about this. So you might as well encourage the purchase—or clear the kitchen table so that the old man can make one. Hereafter your difficulties will be less because they are more tangible.

Trouble number one will arise about where to put the thing. Mr. Moss will decide on purely technical grounds! He will tell you that the down lead should be as short as possible. This may mean putting the set in the upstairs lav. . . . but don't argue. Let him pioneer—that's your duty. He may be less sternly technical and make a social concession by putting the set in the dining-room where the fire is lit only on Sunday. This will mean lighting another fire. For goodness' sake do it and don't break up the home just for a few lumps of precious coal!

By the way, he will discuss with you whether it should be a table or a console model—this roughly involves whether you should move the aspidistra or the piano. Try not to think about it . . . because he'll move more than that before he's finished.

When the set is installed, my dear Mrs. Moss, you will pass through two stages of anxiety—the first domestic, the second communal. If Moss works locally he will suddenly take to popping home for a few moments in the forenoon—just to see the test film. He will catch you, so to speak, in your dust cap and apron, and while for years he has seen you untidy at breakfast, it will now strike him forcibly that he's married to a drab. This will be emphasised by his new girl friend, a Miss Sylvia Peters who, if she ever wears a dust cap, never gets caught in one before the cameras.

You will see more of Moss in the evenings—but he won't see you. He may even, for a time, forget to take the dog for a walk until it's so late that he can only take the dog for a walk. Without his habitual pint you may find him less philosophical about life in general and you in particular.

At this stage he will warn you and the children on no account to touch the set. In a month or so if you ask him to "please put on the television" . . . he will probably say, "you really are helpless, can't you switch on yourself, I'm busy!" But not at first. It's trying, isn't it?

Practical Hint.—Whatever you do, Mrs. Moss, never detach the television plug from the wall point—for example, to connect the vacuum cleaner—without putting it back. You've no idea what wrath this can bring.

On Saturday afternoon it is advisable to spread newspaper over the carpets. You will find that Moss, who is gardening with very little horticultural enthusiasm, will walk straight in as soon as TV starts—muddy boots and all. But it's not so bad if you know what to expect. (Incidentally, very little gardening will be done during the first TV season, so you are advised to open an account with a good greengrocer.)

Now to the social problem! Moss will develop in the early days the outlook of a hermit . . . and a bitter hermit at that, with a hatred of his fellow man. If anyone calls he will blast the moment the door bell rings, and should the visitor arrive by motor car, your husband, normally a pleasant host, will start to utter abuse before the guest has pulled up at the gate. (This is technically known as interference, though it has not been finally agreed who is interfering with whom.)

The odd thing is that when you've got used to this desire to be left alone, Moss will decide to keep open house. All and sundry will be asked in on all occasions to see the television. They will involve you in making a cup of tea for them at the least and cutting sandwiches at the most. People you scarcely nod to in the street will be sitting in friendly intimacy all over your floor.

By this point you may seriously think of divorcing the man, Mrs. Moss—citing the BBC. Take my advice and put up with it a little longer. Mrs. Wood Green got over it in London—so did Mrs. Sutton in Birmingham and I have no doubt so will Mrs. Shotts in Scotland.

You can always slip away by yourself and listen to the radio!

Your affectionate

AUNT JANE.

Here and There

Colour Tests in This Country Soon

IT is understood that when Mr. Spyros P. Skouras, president of Twentieth Century Fox pictures, visited London recently on his way to New York from Zurich, he aroused Mr. J. Arthur Rank's interest in the Swiss colour system which his company hopes to instal in 2,000 of its cinemas in the United States.

Mr. Skouras had just attended satisfactory tests in Zurich and intends to return to this country at the beginning of next year to arrange tests in London.

Police Calls Received

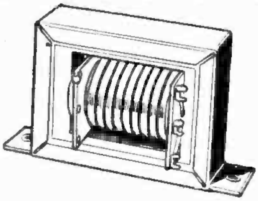
VIEWERS in the Headingley district of Leeds, one of the highest neighbourhoods in the area, have lately been receiving police messages on their television sets.

This is due, so says an engineer, to the use of large aerials on high ground in Headingley, originally installed for the Sutton Coldfield transmitter before the opening of Holme Moss.

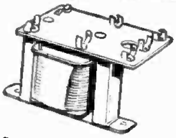
A recent crime case was so interesting that a viewer, who had followed the story while watching "Picture Page," stopped a police car to inquire about the result.

D. COHEN

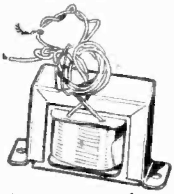
Radio and Television Components



Line and E.H.T. Transformer 5-7kV., removed from chassis, guaranteed, **12/6**

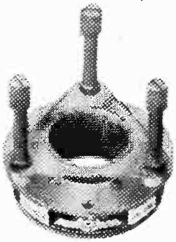


Smoothing choke 150 mA 2 Henry **3/6**



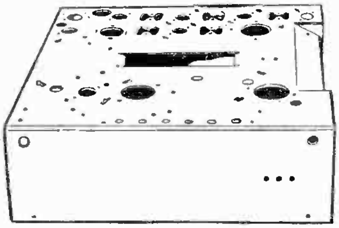
Heater transformer Pri. 230-250 volt, Sec. 2 volt 2½ amp. **5/-**

Frame oscillator blocking transformer **4/6**



PM Focus Unit. Any 9in. or 12in. tube, except Mazda 12, state tube. **12/6**

P.M. Focus Unit for 12in. Mazda **15/-**



T.V. Chassis, could be adapted for use with the above components. Size 9¾ x 9¼ x 3½ **3/-**

The above components are a very famous T.V. manufacturer's surplus.

MAINS TRANSFORMERS

These transformers are all famous radio manufacturers' surplus and are fully inter-leaved, impregnated and guaranteed.

Primary 200-250 v. P. & P. on each 1/6 extra.
300-0-300, 100 mA, 6 volt 3 amp., 5 volt 2 amp., 17/6.
320-0-320, 100 mA, 6 volt 3 amp., 5 volt 2 amp., 17/6.
320-0-320, 120 mA, 6 volt 4 amp., 5 volt 2 amp., 25/-.
280-0-280 v, 120 mA, 6 v. 6 amp., 5 v. 2 amp. Less fixing clamps, 18/6.
250-0-250, 100 mA, 6 v. 3 amp., 4 v. 3 amp., 4 v. 3 amp., 17/6.
250-0-250, 60 mA, 6 v. 4 amp. (to be used on common heater. chain with 6 x 5 rectifier), 13/6.
280-0-280, 80 mA, 6 v. 3 amp., 4 v. 2 amp., drop-through, 14/-.
Drop thro', 350-0-350 v. 70 mA, 6 v. 2.5 amp., 5 v. 2 amp., 14/6.
Semi-shrouded, drop-thro', 280-0-280 80 mA, 4 v. 6 amp., 4 v. 2 amp., 12/6.
350-0-350 v, 120 mA, 4 v. 6 amp., 4 v. 3 amp. drop-through, 21/-.
350-0-350 100 mA. 4 v. 2 amp., 4 v. 4 amp. Upright or drop-through mounting, 16/-.
Auto-wound, could be used in the Viewmaster. H.T. 280 volt, 360 mA, 4 volt 3 amp., 4 volt 3 amp., 2 volt 3 amp., 2 volt, 3 amp., **10/-** plus 1/6 post and packing.

9in. White rubber mask with armour-plate glass	10/-
12in. Rubber mask with armour-plate glass	15/-
15in. Rubber mask	15/-
12in. Armour-plate glass	4/-
9in. Armour-plate glass	3/-

Heater Transformer Pri. 200-250 v., 6 v. 1½ amp., 6/- ; 13 v. 1½ amp., 6/- ; P. & P. each 9d.
R.A. 6½" closed field P.M. 12/6. Width coil 2/- post paid.

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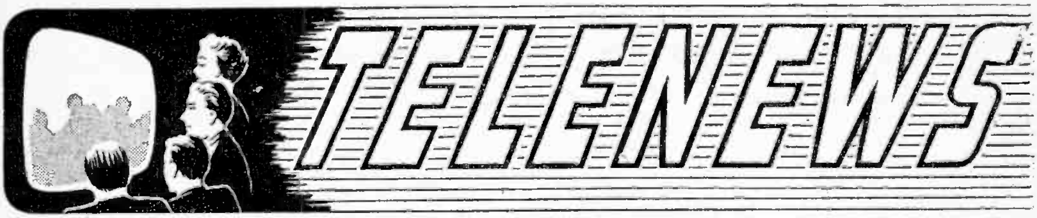


Mobile Television Stations

PART of the large contract to provide a complete television system for Canada (won by Marconi's Wireless Telegraph Co. Ltd. some months ago) was for two special vehicles which are now ready for delivery.

The design and manufacture of these "television stations on wheels" constitutes a great advance in television outside broadcasting technique, for each is a self-contained three-camera station, with its own production and transmission equipment.

It will be possible to drive one to any place within micro-wave range of the main station (or farther if using intermediate re-transmission points) and go into action with on-the-spot programmes in a very short time. A trained crew could be "on-the-air" within 45 minutes.

Underground Cables

WHEN the BBC mobile outside broadcasting unit visited the Manchester racecourse last month, camera cables were buried so that horses could be televised parading round the paddock prior to the running of each race.

New Medium in Education?

A RECENT report from the National Association of Head Teachers says that before the medium of television can be adopted in this country for education in schools, the Association intends to discuss and investigate the idea thoroughly.

"Live" West End Shows

IT is understood that proposals have been made to the BBC by the Theatres' National Committee which may result in the ending of the ban on the televising of West End shows, plays, etc.

The proposals and suggestions cannot yet be disclosed as they are still being considered by the BBC.

Scottish Campaign

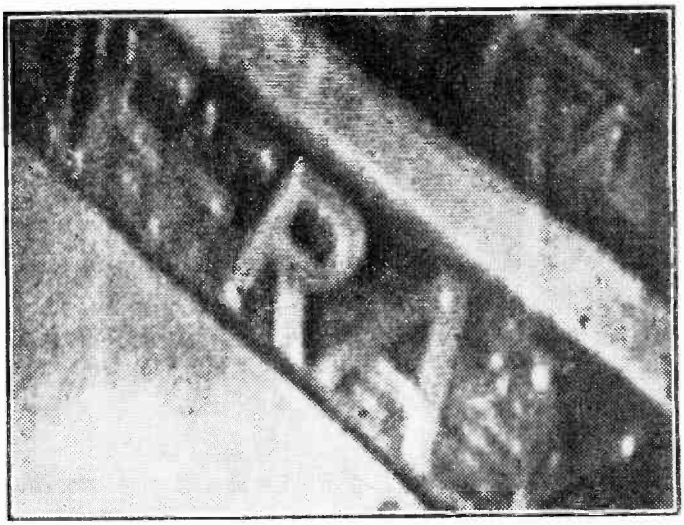
THE big drive against television interference continues.

As the opening day of the Scottish transmitter at Kirk o'Shotts approaches, the Scottish Radio Retailers' Association is doubling its efforts to reduce possible television interference by telling motorists of the small cost of fitting a suppressor and reminding the housewife that no matter how harmless her vacuum cleaner may appear to her, it can cause annoyance to viewers when used during transmission hours.

Paris-London Transmission

MR. CECIL McGIVERN, Controller of Television Programmes, and Mr. Imlay Watts have been in Paris to study with the French television service the possibility of television relays between Paris and London.

As a result of this discussion the possibility of such relays is appreciably nearer. It would be a joint operation and can probably be achieved by using the Paris-Lille radio link which has just been established by Radiodiffusion et Television Française and on which regular services will begin very shortly. From Lille to Calais and from Calais to London micro-wave gear will be used and at some point on this part of the route a converter will have to be employed to convert the French 819 line system to the BBC 405 line system.



A photograph taken from the screen of the Marconi monitor on board H.M.S. Reclaim, showing the name AFFRAY coming into view over 260 feet below the sea.

Appointment of Engineer-in-charge, Kirk o'Shotts

MR. JAMES CLELAND has been appointed Engineer-in-charge of the television transmitting station which is now being built at Kirk o'Shotts, between Glasgow and Edinburgh.

Mr. Cleland joined the staff of the Glasgow station of the BBC in 1931, transferring to the Scottish Regional station at Westerglen in the following year. In 1936 Mr. Cleland was transferred to the London Television station at Alexandra Palace where he remained until 1938 when he returned to Westerglen.

In 1950 he became Assistant Engineer-in-charge Westerglen and for the last few months he has been Acting Engineer-in-charge.

Mr. Cleland's assistant at Kirk o'Shotts will be Mr. W. L. Nicoll, who is at present one of the senior engineers at the Skelton short-wave transmitting station.

Broadcast Receiving Licences

STATEMENT showing the approximate numbers issued during the year ended October 31st, 1951.

Region	*Number*
London Postal ..	2,346,000
Home Counties ..	1,653,000
Midland	1,748,000
North Eastern ..	1,938,000
North Western ..	1,634,000
South Western ..	1,073,000
Welsh and Border Counties	733,000
Total England and Wales	11,125,000
Scotland	1,113,000
Northern Ireland ..	211,000
Grand Total ..	12,449,000

The above total includes 1,031,950 television licences, which is an increase of 73,450 during the month—the largest monthly increase so far recorded.

Telefilming of United Nations

AT the sixth session of the United Nations Organisation, which opened in Paris last month, an important application of kinescope recording was achieved by technicians of Marconi's Wireless Telegraph Co., Ltd., and Paramount Pictures Inc.

By televising the meetings of the United Nations Organisation with three Marconi Image Orthicon cameras, and by filming directly off the face of a cathode-ray tube, it is now possible to present complete edited telefilms of the proceedings on American television networks the following morning.

Only 40 seconds elapse from the exposure of a frame, through processing and drying, to its winding on the finished film reel. The time usually taken up by manual editing is completely eliminated.

This compact control room contains all the equipment necessary to put a small Ultra High Frequency community television station on the air. It's located in RCA's experimental UHF television station at Bridgeport, as described above.

Plans Delayed Down Under

AUSTRALIA, due to defence requirements, has been forced to delay its plans for the development of television.

Music While You Adjust

AN experiment is being made by the BBC in giving excerpts from the morning edition of "Music While You Work" while the test card is being shown for the benefit of technicians and engineers wishing to demonstrate or adjust receivers.

U.H.F. Television

A PIONEERING television station in suburban Bridgeport, Conn., points the way for some 2,500 new television stations across U.S.A. It is the first ultra high frequency television station in that country to operate on a regular daily basis. The station is operated by the Radio Corporation of America and the N.B.C., to explore the practicality of higher frequencies for television broadcasting.

Charges Illegal

A RECENT proposal to aid the finances of the Town Council of Hawick has met with a legal problem.

The idea, suggested by Coun. Andrew Pennycook, was to install big-screen television in the Town Hall and charge the public for admission.

The big snag arose, however, when the Town Clerk pointed out that any person or persons charging an admission fee for viewing television would be likely to become involved in legal action !

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EA50	3/6	3S4	10/6	76	6/-
EBC33 Gov.	8/6	5Z3	10/6	77	7/6
EB41	8/6	5Z4 metal	10/6	80	10/-
EB91	7/6	6AG5	9/6	954	5/-
EF39	10/6	6AK6	8/6	955	5/-
EF39 Gov.	7/6	6B8	8/-	9003	5/-
EF50	7/6	6C4	7/6	VU111	7/6
EF54	7/6	6C5m	7/6	35Z5	12/6
EF91	10/6	6C5gt	7/-	35Z4gt	12/6
EL32	8/-	6H6m	4/6	25Z5	12/6
EL35	10/6	6J5gt	6/6	6BE6	12/6
KTW61	8/6	6J7G	8/-	6BW6	15/-
KT33C	16/-	6K6	8/6	6AT6	10/6
MS/Pen	7/6	6K7 metal	8/-	50C5	13/6
N37	10/6	6K7G	8/-	S130	7/6
Pen46	8/-	6L7 metal	8/6	12K8	12/6
PT25H	5/-	6SA7gt	8/-	7C5	8/6
U78	10/-	6SH7 metal	7/6	UB41	8/6
VU120A	4/6	12SF7	7/6	VR116	3/6
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SELENIUM RECTIFIERS.—24v. 1¼a., 7/6. 350v. max. 75 m/a., 7/6. Type 14D36, 10/6. Type 14A86, 18/6. Type 36EHT100, 27/10. WX3, 3/5. WX6, 3/5. Meter rectifiers, midget, 5 m/a., 1/-.

EASYBUILT CHASSIS.—Two chassis for the Easybuilt Televisor, heavy gauge tinplate soldered four sides, 8/6 each. EF50 3in. x 3in. screens, 6d. Ask for complete list of parts.

SPEAKERS.—2½in. WB, 17/3. 6in. Elac, 15/-. 3½in. Elac, 14/3. 5in. Plessey, 14/9.

HAYNES COMPONENTS.—Scanning Coil Units. Type S914, S914H, S112, each, 42/-. Transformer TQ135, 17/6. Choke Type LUS8F, 22/-. LUS6L, 16/6. TQ132, 12/-.

SPANNERS.—4 B.A., 6d. Five for 2/-. Box type, set of three Flat Type, 2 B.A., 4 B.A., 6 B.A., 1/-.

FILAMENT TRANSFORMERS.—Midget dimensions, finished in green crackle. Primary 210/240v. to 6.3 v. 1.5 a., 8/6 ; to 6.3 v. 3a., 12/6 ; to 4 v. 3 a., 12/6. Multi purpose type for instruments, models, etc., tappings 3 v. to 30 v. at 2 amp., 21/-.

SPEAKER TRANSFORMERS.—Super Midget for personals, DL92, 3S4, 1S4, 5/- ; Standard Pentode, 4/6 ; 60 and 30 : 1, 4/6 ; 30 : 1, 4/-. Mains Pentode Midget, 4/-.

COILS.—Wearite "P" Coils, 3/-. Wearite Viewmaster coils, per set, London, 20/- ; Midland, 28/- ; Holme Moss, 30/- ; MW/LW TRF Matched pair with circuit, 7/6. Weymouth CT3W3, 9/6 pair. CS2W2, 11/6 pair. K.O. Coils, 4/9. "H" Coils, 3/3.

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BOOKS.—Viewmaster Book and Circuits, 5/-. London or Midland Easybuilt Televisor, 2/6 ; Portable Televisor, 3/- ; Personal Portables, 2/6.

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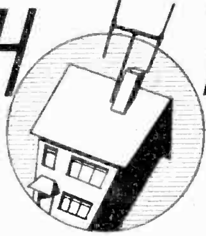


By Iconos

SHERLOCK HOLMES

SINCE I have been writing this column, several things I have suggested for television have, somehow or other, found their way into the programmes. This may have been a coincidence, of course, but at least one complaint I made seemed to produce a very rapid remedy. That was the fact that the National Anthem was played at the end of the sound radio programmes, but not at the end of television. Several engineering suggestions were considered and a few adopted, which, I admit, might have been coincidences. But I wrote at some length of the television suitability of "Sherlock Holmes" as a series, and that seems to be one of the few suggestions I have made for the production side which has, also by coincidence, perhaps, reached your television screens. It is early yet to express an opinion, especially as I was prevented from seeing the early episodes—but experience in America indicates that if a dramatic series is well cast, with actors experienced in the medium, there is a gradual rise in public goodwill which, later on in the series, offsets any shortcomings of story or presentation which might occur. The best example of steadily built-up goodwill I can think of is the comedy duo Laurel and Hardy, whose early film comedies are occasionally seen on television. When my family sit around and a Laurel and Hardy title comes on, they start chuckling even before those crazy comedians appear. The preposterous signature tune and the sense of hilarious anticipation are quite sufficient. I, for one, can stand for a lot of repeats of the comedies of Laurel and Hardy, Chaplin, Buster Keaton and Harold Lloyd. I wouldn't mind seeing some of the very old comedies I laughed at as a small boy, with John Bunny and Flora Finch, Max Linder, Mr. and Mrs. Sydney Drew, "Pimple," the Tilly Tomboys and the Brunel Burlesques. Each of these might be highly amusing if televised seriously. And by "seriously" I mean with a modern synchronised musical accompaniment by an orchestra—not with a "period" tinkle on an out-of-tune piano. Also, the films should be projected at the speed which was standard in the silent days—16 pictures a second, compared with the modern 25 pictures per second of TV. Did you ever see Buster Keaton's *The General* or Pimple's burlesque of an epic film made in about 1915, *The Battle of Waterloo*? Or Sydney Drew and John Bunny in *A Regiment of Two*? At the time these were known as "rib ticklers" or "belly laughs." But if the BBC adopts this idea, I beg them to present them in the best possible technical manner, with new, clean prints, at the right speed and with a modern musical score. Period-type presentation, with a "Hearts and Flowers" accompaniment on the piano and an announcer in a high stiff collar, with waxed moustache and seedy-looking dinner-jacket, just wouldn't do. As Bud Flanagan once told me, "You can't burlesque burlesque."

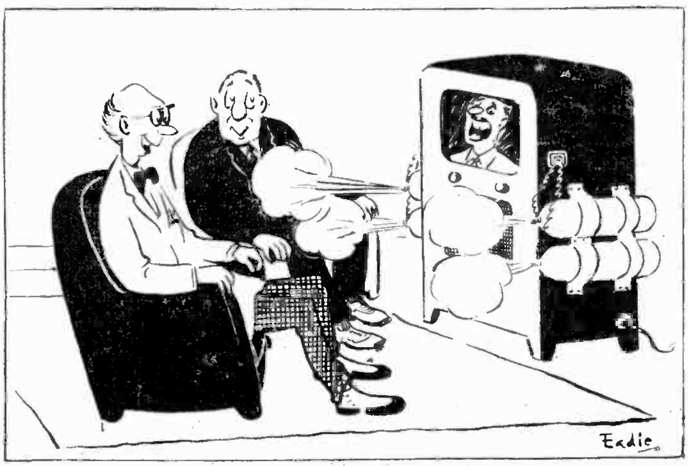
FASHIONS

FASHIONS in entertainment are almost as changeable as styles in women's clothes. Success of a strong psychological drama on stage, screen or in a book frequently produces a crop of similar stories. Do you remember the rush of psychiatric dramas which followed the phenomenal success of *The Seventh Veil*? In the U.S.A. the success of a particular type of TV or radio feature on one hook-up persuades the sponsors of rival programmes to send out a cycle of variations on the same theme on the opposition networks. The best-seller novel is still the principal source of the stories, and the harvest of royalties reaped by a successful novelist includes valuable returns from radio, TV, film and stage rights. Novels and short stories with crisp and witty dialogue score every time, which accounts for the popularity of the works of W. Somerset Maugham on both American and British television.

STARRING THE ENEMY

ROMMEL—Desert Fox was a best-seller book and a best-seller film which, in due course, became a radio play broadcast by the BBC, though not yet televised here. This has, of course, started a fashion of stories concerning enemy war personalities which will reach us on one medium or the other. Books of a documentary type do not always make good television or screen material, however, for the obvious reason that commercial

PROFESSOR BOFFIN



"Every time he cracks a joke the laughing gas helps the gag along."

entertainment values require a certain amount of glamour and a part which is a good " vehicle " for a star actor. The next one to come down the line will probably concern one of the most sinister of our late enemies, Vidkun Quisling. Here is a ready-made theatrical character, if ever there was one, whose underground activities formed the nerve centre of the Nazi Fifth Column in Norway. The climax of Quisling's infamous career was the twenty-four dreadful hours in which his well-organised plan of sabotage and treachery prepared the way for the invading hordes. There is no generally recognised biography of Quisling, as in the case of Rommel, but many scenario writers are feverishly carrying out research for facts—to which, no doubt, will be added a little fiction and glamour. There should be no difficulty about this, for Quisling is reputed to have retained a battalion of beautiful and seductive Mata Haris ! The BBC television boys have done fine work in historical documentary plays. Here is an opportunity for them to get in first, with no copyright fees to pay to novelists.

BLASÉ VIEWERS

I SEEM to have heard a record number of complaints about the quality of the BBC television programmes during the last week or so. On the other hand, the few persons I contacted who had only recently acquired sets seemed to be quite satisfied. The fact of the matter is that television's impact is far greater than sound radio, and the eye takes in so much so quickly that the viewer quickly becomes super-critical. This effect has been noted in America, where the entertainment periodical *Variety* reports—" In a relatively short period TV has started to pall. Video fans air the same gripes about the mediocre programmes after two years as they did about pictures after over a quarter of a century. Viewers have become contemptuous through familiarity with the programme content unreeled week after week. TV is a combination of the aural and the visual and both faculties reject after a short spell what they first eagerly accepted." The blasé reactions of British viewers are similar, in spite of the fact that the general level of programme material is on a somewhat higher level than the average American network. Here, we are occasionally regaled with " high-brow " stuff which would not be tolerated on American TV. Sometimes it makes a success but invariably the " long hair " content results in overlength in dramatic material, repetition and boredom. *A Tomb With a View*, Lance Sieveking's play, came in this category. Lance Sieveking was a pioneer in the use of advanced technique in sound radio plays, being one of the first producers to use the Dramatic Control Panel at the BBC's Savoy Hill studio, many years ago. His *Squirrel Cage* was one of the first sound radio plays to make full use of dissolves, technical tricks as a means of putting over flash-backs and Greek choruses. But this technique is now dated, slowing the tempo and obtruding the mechanics of production on the unfolding of a story. Good slick dialogue is the demand of to-day—and no arty crafty nonsense ! Still, we'll look forward to another experiment from Lance Sieveking—he is certainly a man of ideas.

AN AERIAL ACT OF PARLIAMENT

I AM now situated about 40 miles away from the Alexandra Palace, but being high up on a 400ft. hill and with little or no local interference (touch wood !) receive a much stronger signal (and stronger wind !) than when I lived a mere 15 miles away, in a screened locality. Then, living in a block of flats at Richmond, I had almost to promote an Act of Parliament before I could obtain permission to erect a TV aerial. When it was finally erected it had to be on a high pole behind some trees in the garden, with the lead-in wire connected to a telephone type of insulator on the building as a disguise ! In 1937 television was regarded by that flat-owning company as being slightly *infra dig.*, but a telephone cable and insulator were accepted without question. Nevertheless, I had to indemnify the flat-owning company against any damage to persons or property caused by the said aerial and/or pole and/or lead-in wire, as the lawyers neatly put it, in an addendum " to be attached to the lease." I did not take out an insurance, as the installation was very securely put up—and it gave me good pictures until TV closed down at the beginning of the war. Shortly afterwards I removed, but occasionally I passed the flats and observed the pole and its aerial high up in the breeze. After the war I called at the flats to try to recover the perfectly good H-type dipole I had left behind. The porter told me that on one dark and stormy night pole, aerial and lead-in had all come down, but fortunately without damage to persons or property. All I was able to salvage was one copper tube, and the pole had been cut up for firewood.

GALES AND THE AERIALS

I HAVE heard a lot from time to time about insurance policies covering the possible damage that might be caused by a TV aerial falling—but haven't taken a great deal of interest in the matter. However, the terrific force of the gales in November has made me realise that aerials *do* fall down. I had been looking forward to that Saturday night programme which contained a Sherlock Holmes episode (" The Red Headed League "), Jewell and Warriss in " Turn it Up ! " and an ice-hockey match. However, when I switched on—there was no picture and greatly diminished sound. The gusty winds and heavy rain made me suspect that all was not well with my aerial and I stumbled out in the rain to investigate. I found the pole had blown down and that one of the pick-up dipole rods had been broken off at its insulator. So I had to be content to listen to Jewell and Warriss and try and imagine the visual side. I thoroughly enjoyed these two slap-stick comedians (who, by the way, have made a TV success in U.S.A.), and afterwards telephoned a friend to find out how the visual side of the programme worked out. " Not too good," he reported. " It was funny on TV, but probably funnier still without the visual." This rather discouraging criticism puzzled me, because I have often seen Jewell and Warriss on the music-halls and have always thoroughly enjoyed their turn. I hope it will not be long before they are on TV again so that I can check this particular point.

PROVINCIAL RELAYS

THE fine quality of the relay of amateur boxing, Belfast v. Manchester, from the T.A. Centre, Great Clowes Street, Salford, whets the appetite for more provincial relays. Manchester is not so very far from Blackpool, with its 520ft. imitation of the Eiffel Tower which would make an ideal site for a relay transmitter. And what a wealth of entertainment material there is to be tapped in that great Lancashire seaside resort ! I have a shrewd idea that its go-ahead Borough Council and energetic public relations officer would seize upon the opportunity of obtaining terrific publicity. No other seaside resort has such a natural site for a TV transmitter as Blackpool Tower.

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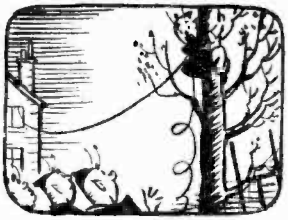

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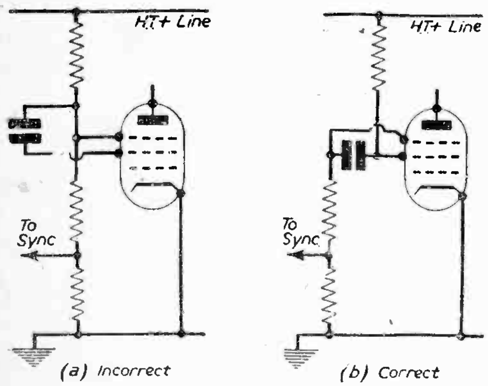
CORRESPONDENCE

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).

CONVERTING THE RDF1

SIR,—I notice that an error has crept in during the printing of Fig. 6 of my article "Converting the RDF1." The fault is in the flyback circuits of both the frame and line oscillators (V17 and V15). The condenser is shown connected as in (a) below. It should be connected as shown in (b) with the H.T. being supplied



Circuit modification suggested by Mr. Morley.

through a resistance (R42 for Line and R49 for Frame) to the screening grid, the sync pulse being applied to the suppressor grid.—B. L. MORLEY (Bristol).

INTERFERENCE SUPPRESSION

SIR,—Owing to a large number of requests for the value of components employed in the selected interference suppression circuits described under the above heading in the November issue, I suggest the following values which are applicable to all components merely indicated by a reference letter.

The Circuit of Fig. 2

R1—100 KΩ.
R2—10 MΩ.
R3—1 MΩ.
R4—1 KΩ (rather dependent on the type of valve employed for V1).
R5—500 Ω (rather dependent on the type of valve employed for V1).
R6—250 KΩ.
R7—100 KΩ.
C1—0.02 μF.
C2—0.05 μF.
C3—0.01 μF.
C4—100 pF.
C5—500 pF.

The Circuit of Fig. 3

R1—4.7 MΩ.
C1—10 pF. approx. In practice this capacitance is usually formed by the capacitance of the diode and associated wiring.

The Circuit of Fig. 5

C1—0.1 μF.
R1—50 KΩ. The values of the other two resistors in either leg of R1 should be arranged to enable the potentiometer to be adjusted so that the potential of its slider relative to earth is the same as that of the tube cathode on peak white signal.

The Circuit of Fig. 6

C1—0.1 μF.
R1—10 MΩ. This value may be built up by external fixed resistors.—GORDON J. KING (Oxford).

SPONSORED TELEVISION

SIR,—I quite agree with your remarks in the November issue regarding advertising on TV, but think that you fail to make what is undoubtedly the strongest point in favour of it.

Providing it is an *alternative* programme, how can anyone honestly object to it? They are not obliged to look at it, and if they still have the existing BBC programme—how can they be any worse off? I, personally, do not like the BBC Third Programme, and never listen to it, but I do not object to it except on the grounds of its cost being unproportionate to the size of its audience. This would not apply to advertising, since it would pay and pay well.

Another point. If the BBC do not wish to advertise, why are they not more consistent about it.

Artistes are often asked "In what show are you appearing next, and when and where, etc.?" Surely this is advertising?

And on TV in Woman's Hour, books and other articles are held up and recommended for purchase. I myself went to buy a book on Cold Cookery that was advertised in this way, and found they had sold out as a result of the pull of the TV advertisement. Few of us, I think, would wish a state of affairs such as exists in America, where all or most of the programmes are sponsored, but a sponsored alternative programme running side by side with the BBC and paying the BBC for the use of the "air" would surely offend no one and would probably benefit even those who chose never to look, since the revenue might well be used to improve BBC programmes and development.—R. WATERFIELD (Birmingham).

SOME EXPERIENCES AND A HINT

SIR,—In the November issue, "Problems Solved" section, a reply to a query *re* ion burn appears to be a little inaccurate.

Surely it is the heavy ions, and not the relatively weightless electrons, which cause the disintegration of the screen phosphor.

I agree, however, that most of the damage is done on switching off, when the rapidly-falling E.H.T. fails to repel the positive ions still travelling from the cathode.

In the bent gun assembly, I believe the magnet is just strong enough to pull the electron beam control without exerting any appreciable directional alteration of the ions which, following the angle of the bend in the gun continue to strike the C.R.T. walls, well clear of the fluorescent screen.

Incidentally, some of the snags I encountered when constructing a receiver about two years ago might be of interest: first, the 9in. C.R.T. went "gassy" after ten minutes' use, and gave the most spectacular display of corona discharge I have ever witnessed. On changing the C.R.T. the E.H.T. rectifier (a U22) developed a dead short on its heater.

Next a 30-30 μF. electrolytic blew up like a bomb and stripped the cathode of the main rectifier (a UU8). The moral I learned here was never adjust the audio without the time base, tube assembly and video amplifier in circuit—the peak surge was probably in excess of 500 volts.

On replacing these components the speaker transformer promptly burnt out, and I subsequently spent many hours trying to cure a top and bottom overlap of the frame, but this, for some unknown reason, rectified itself.

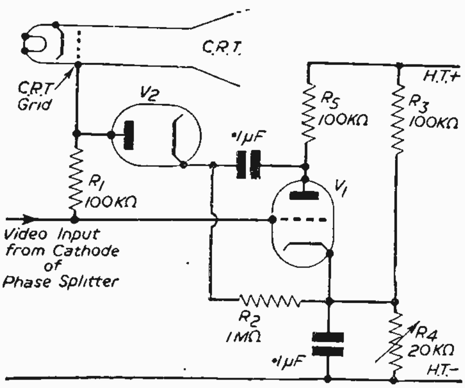
In the meantime I built up a "surplus" TV using the popular VCR91, and once again trouble appeared; the E.H.T. transformer broke down, ruining the rectifier valve, and next two VR91's went faulty, and I have still to get this second set working satisfactorily.

I should like at this point to suggest a tip. My tube has developed a slight ion burn, after about eighteen months of working very well, and I have found that the destruction of the screen can be slowed up by refocusing, i.e., from time to time slightly shifting the focus coil to left or right, up or down, balancing the picture again with the amplitude controls, so that the focal point on the screen is not long in the same place; this slight distortion is not apparent, even on the test card.

In conclusion, I should like to say that I find PRACTICAL TELEVISION a very great help with TV problems, and, as its title suggests, packed with practical articles, fulfilling a long-felt want.—A. C. DEVERELL (Rickmansworth).

BLACK SPOTTER

SIR,—Having been intrigued by Mr. Cross's "black spotter" in the September issue, and noting that it was suitable only for cathode modulation, I did a bit of doodling with the idea of modifying this for use with grid modulation (to suit VCR97 users). The following circuit is the result.



A black spotter circuit by Mr. Wylie.

The resistor R4 is set so that V1 is biased beyond cut-off during the whole of picture modulation, but passes current on interference peaks. V2 is biased from the same point so that it has no shunting effect on the CRT grid up to peak white. On a positive pulse exceeding peak white V1 conducts, and a large negative pulse is produced in the anode circuit. This is applied through V2 to the CRT grid, blacking out the tube while the pulse lasts.

R1 serves to keep this pulse from the grid of V1, which would, of course, give 100 per cent. negative feedback. Similarly R2 keeps the anode pulse from being shunted to cathode of V1.

There may be a slight loss of video voltage through R1, but this should be negligible.

I have not had time to try this circuit out, and will not be able to do so for some time, so if any reader decides to have a go with it, will he please let us hear of the results. Some experiment may be necessary with the resistor valves.—J. WYLIE (Cardiff).

WEATHER EFFECTS

SIR,—I note with interest the article on "weather effects," and television reception, in the October issue.

I live about 50 miles from Alexandra Palace, and am considered on the fringe. Although mostly I receive a very good picture on my commercial receiver, I do experience a great deal of fading, losing vision altogether for a minute or so at times; this happens for three or four nights during the full moon period. Other viewers living near to me have similar experience.—G. A. CROWHURST (Nr. Uckfield).

TECHNICAL ARTICLES

SIR,—I feel I must write to express my appreciation of the article, "More About the C.R. Tube," by Gordon J. King. It is very pleasant to read something which is written assuming that its readers have some knowledge of elementary mathematics and mechanics. Far too many people nowadays try to please everyone by catering for the people who know nothing of these subjects. The result is that the majority of so-called "technical" articles are "much of a muchness," dealing in a loose sort of way with the workings of some piece of apparatus or of some new circuit. There should, of course, still be articles designed for the person who has not a wide knowledge of mathematics; but I personally would be very pleased to see a great increase in those which deal quantitively with their subject. The choice of subjects is very large. After all radio is an extremely quantitative branch of science.—C. J. AELKINS (S.W.16).

"COMPACT TELEVISOR"

SIR,—As it is possible that other readers may have encountered the same difficulty in E. N. Bradley's "Compact Televisor" described recently, may I be permitted to pass on the following hint.

When I originally tested my VCR97 in the circuit it was impossible to obtain a spot of any description on the screen. Another tube was bought but with the same result. Arranging the tube as is usually done in an oscilloscope, i.e., taking the cathode to the top of the brilliance control, various blobs and smudges were produced. With a little juggling I managed to get the required spot.

The remedy now appears so obvious that I wonder if it is worth passing on. The brilliance control in the original design is 0.5 megohm and this does not put the grid sufficiently positive to allow the tube to pass current, in other words, the beam is permanently cut off. Insertion of a 0.22 megohm resistor at the bottom end of the brilliance control solves the problem and a spot is produced when the control is approaching maximum.

I do not wish to suggest that Mr Bradley is wrong, only that in my case the stated value of the brilliance control with my particular tube was too low.—P. LUMB (Knaresboro').

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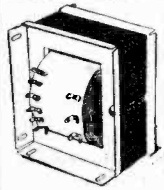

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EDUCATIONAL

TELEVISION.—The Gothic Television School, devoted exclusively to training in Television, prepares students to Brit. I.R.E. and R.T.E.B. examination standards. Correspondence course prospectus from the Secretary, GOTHIC TELEVISION SCHOOL, 13, North Avenue, London, W.13.

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TRADE TOPICS

Television Turning Table

WE have not yet reached the point where, as in the United States, new houses are designed around the television screen. But with the number of licensed viewers topping the million mark, it is obvious that, in this country, too, the TV set is increasingly competing with the fireside as the centre of attraction in the home.

Many of the sets sold in Britain require a table or pedestal to be viewed comfortably, and this little household problem has now been elegantly solved by the new Joel television table with revolving top. This top, rotating on a simple pivot, turns the set in whichever direction is required for the comfort of the audience or to adjust controls at the back. Handsomely designed, the table fits all interiors and is large and strong enough to carry all known models with ease. When not used for television, it makes a useful occasional table, and when necessary, it can be folded and carried handily. It is priced at four guineas, tax free.—**David Joel, Ltd., Oakcroft Road, Tolworth, Surrey.**

New 17in. Low-focus-voltage Metal Tube

THE 17TP4 is a 17in. metal-shell picture tube utilising low-voltage electrostatic focus—an achievement in picture-tube design which, in addition to eliminating the need for a focusing coil or magnet, makes it possible to obtain the focusing-electrode voltage from the low-voltage D.C. supply of the receiver.

The focusing electrode in the 17TP4 has its own base-pin terminal to permit choice of focusing voltage for best results. The focusing-voltage range within which a cathode-ray tube gives optimum focus will change with different combinations of A1 and A2 voltages.

Because the focusing electrode operates at low voltage, the focusing voltage can conveniently be obtained from a fixed or adjustable tap on the low-voltage D.C. supply of the receiver. With either method focus is maintained automatically with variation in line voltage and with adjustment of picture brightness.

When fixed focus is used, the designer can set the focusing voltage at a value which will give good results for his particular operating voltages. If somewhat better performance is desired, he can provide for adjustment of the focusing voltage.

Using a design in which the cathode is not connected to any other electrode, the 17TP4 retains the advantage of low input capacitance when employed in a cathode-drive circuit. Also, since the focusing electrode is not connected internally to grid No. 2, the 17TP4 has the advantage of permitting reduction in focusing voltage as grid No. 2 voltage is raised—a necessary relationship for optimum focus.—**RCA Photophone, Ltd., 36, Woodstock Grove, London, W.12.**

21in. Tube Direct Vision Receiver

HIGHLIGHT of the 1951 Radio Show, having the largest direct screen picture, was the H.M.V. Model 1820.

Special techniques have enabled a metal 21in. Emiscope tube to be developed for use in this model. This tube has an exceptionally wide neck angle which means that a much bigger diameter screen can be obtained without an excessive tube length. It has the special aluminised screen pioneered by E.M.I. in this country and provides pictures suitable for daylight viewing.

All the resulting advantages of direct viewing, including greater clarity, crispness of focus and wide viewing angle, which are unattainable by other methods, are given by this receiver. The pictures are remarkably life-like, due to the excellent contrast in light and shade that is obtained. The picture area is over 240 square inches.

A special circuit innovation enables the picture quality to be maintained even under fringe area conditions.

Besides being available as a separate item a unique 10 waveband radio console and high fidelity record playing unit are available in separate matching console cabinets to form a three piece assembly (Model 1903).

Model 1820.—Price 275 guineas (tax paid).

Model 1903.—Provisional price 540 guineas (tax paid).
—**Gramophone Co., Ltd., Hayes, Middlesex.**

New Aerialite Aerial

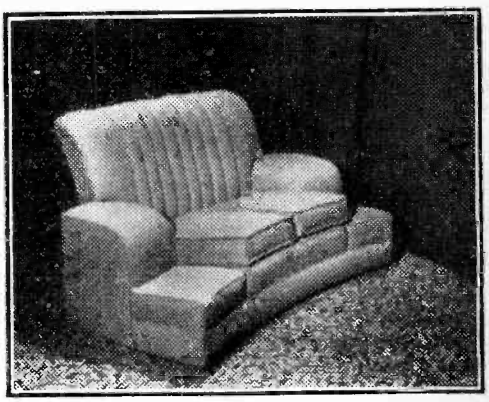
MESSRS. AERIALITE LTD. announce a new, Model 71, indoor-type television aerial suitable for loft, attic or room mounting. Unlike other indoor television aerials it has very valuable direction characteristics which can be used for the elimination and reduction of "ghosts" and interference. The construction is such that the aerial is fully flexible, and spring tensioning devices enable the aerial to be installed so that the elements are held firmly in a vertical position.

The 71 consists of two folded dipoles connected in anti-phase and the resulting performance equals the standard outdoor "H" by giving a high forward gain of 3.75 db., high front/back ratio of up to 40 db., and a small acceptance angle of 170 deg. It is designed to match a 70/80 ohm co-axial feeder. It is very easy to install and, since its performance equals some outdoor types, has the advantage of being inconspicuous.

The aerial is ideal for housing estates where regulations prohibit the use of outdoor aerials. The aerial is priced at 25s. retail.—**Aerialite, Ltd., Castle Works, Stalybridge, Cheshire.**

Television Upholstery

ILLUSTRATED below is the "Kindred" viewing settee, specially designed by Goodwood for family use. As may be seen, it provides for two adults and two children. It is also available as a three-seater settee accommodating five persons or as an easy chair with seats for three. Other products of this firm consist of "Tele-circle" unit upholstery, which may be distributed round the house when not in use, or packed side-by-side to form a multi-seat settee for viewing.—**Goodwood Upholstery & Furniture, 24, Ronald Street, Radford, Nottingham.**



The "Kindred" four-seater settee.

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. If a postal reply is required a stamped and addressed envelope must be enclosed.

AERIAL MATCHING

"I recently sold my Pye receiver and purchased a new model of another make. At the same time, to obtain better signal strength, I bought a new aerial, but am finding that although the new receiver has two additional stages signals are weaker, and I have been told that this is because the aerial does not match. Is this possible? If so, can I do anything about it?"—J. R. T. (Farnborough).

We presume that your informant was familiar with the arrangements used in the aerial and on this account we imagine that your previous aerial was fitted with a coaxial aerial and your new aerial has a twin feeder; or, alternatively, that your new aerial has coaxial and the new receiver is designed for twin feeder. It is essential that the two should match and in general the use of the wrong type of feeder will result in reduced sensitivity and bandwidth. If this is the case, and you do not wish to change the feeder, you will have to include a special transformer between the feeder and the input to the receiver and this must be of the "balance to unbalance" type. It should be connected the right way round so that the aerial is matched to the receiver. You can make the transformer by winding a normal coil, tapped 1 turn up from one end, and a short distance from the other end of the coil wind on 1 or 2 turns.

FLY-BACK OSCILLATION

"On my home-made set a fault has arisen which I am not certain how to tackle. The picture is still good but on the left, about half an inch in from the edge, there is a bright white line. At the same time there is a form of distortion round this line causing the image to be what I might describe as 'wavy.' When I adjust the line linearity control the effect is to move the line along vertically but there is no effect on the distortion in the picture. Is it possible to state the cause of this?"—G. R. E. (Surbiton).

There can be two or three faults which give rise to this effect but the most common is oscillation. In most line output circuits it will be found that there is a condenser and resistor in series across the line coils or the line output circuit. The purpose of these is to damp oscillation at certain frequencies, but in the event of unsuitable values arising as a result of a change in value of either condenser or resistance, or due to wrong values having been chosen, oscillation will occur and give rise to the bright line. A good plan is to use a very high-voltage type condenser in series with a low-value resistor and in series with these to include a good wire-wound resistor. This may then be adjusted to give the desired characteristic for the coils and circuit in use. It must be remembered that in view of the very high fly-back voltages present in this part of the circuit the condenser should be rated for at least 2,000 volts working.

REJECTOR ACTION

"I recently tried to improve my receiver (which had had sound breakthrough on vision) by fitting a rejector in the cathode circuit of the last I.F. stage. I find, however, that this makes the raster almost clear white all over, but as soon as I short-circuit the rejector the picture comes back clear. All the coils in the set are on top of the chassis and screened and the rejector has been fitted under the chassis but is not screened. Can it couple with wiring, or what is causing the white screen?"—B. A. (Wolverhampton).

A rejector in a cathode lead may easily cause oscillation until it is adjusted to the correct frequency. You do not state whether you have adjusted it or whether you found the flare on switching on and did not go any further. You should therefore try adjusting the circuit. (We presume you have a core to the coil for this purpose). When adjusted correctly to sound it should make no difference to the vision and the set should not be unstable. If, however, you find that the constants of your receiver are such that it will not operate without oscillation, and you do not wish to alter any of the vision coils, try connecting the rejector between the anode of the stage and earth, with a 2 or 3 pF. condenser in series. This arrangement is generally more stable but not so effective in removing the sound. It may prove good enough in your case.

LOSS OF LINE SYNC

"While we were looking last night the picture suddenly broke up and I would say that the images remained in their same positions but were all in separate pieces. You could see the table, for instance, but it was repeated many times and all the things on it were doubled up side by side right along the screen. I tried the knobs on the back but cannot put it right. Do you think it ought to go back to the shop or can I do anything?"—M. E. D. (Sheffield).

From your description we think that the trouble is loss of line sync only. The complete loss of sync pulses would break up the entire picture and you would be unable to recognise any objects, but as you can apparently recognise them it would appear that frame sync is holding but that merely the line time-base is running free. This would point to the failure of the coupling between the sync separator and the line time-base and most probably is the result of an open-circuited coupling condenser. In the absence of suitable test equipment it would be desirable to have the circuit tested by a dealer and it should not be a difficult job to find the faulty item.

TESTING WITHOUT INSTRUMENTS

"I gained a great deal of experience in making my own receiver and have cured many of the smaller faults which developed when building and first putting into commission. I think, however, that there is a field for details on how to use normal methods of testing to find the sources of a fault in a receiver—not necessarily the way to test a component. Can you give any clues to methods which the ordinary viewer might adopt in the cases where no test equipment (other than the standard volt- and ohm-meter) is available?"—L. B. I. (Harringay).

It is possible to adopt ordinary testing or checking methods to some parts of a television receiver and an article on this subject will be found on page 340 of this issue. The time-bases are, however, not so easily checked, although if one can be certain that the vision receiver is functioning satisfactorily it should not be difficult to isolate a defective circuit in the time-bases. Unfortunately, although it may be a simple matter in some cases to ascertain, for instance, that the line oscillator is not functioning, the actual reason for this may not be easily found without at least a current- and an ohm-meter.

FAULTY BIAS CIRCUIT

" I should like you to try to tell me the cause of a fault in my receiver. Just lately it has developed a trouble which takes the form of the picture suddenly closing down so that it is about half an inch wide. It goes down quite quickly, stays closed for a few seconds and then slowly opens up to normal again. It may remain normal for the rest of the evening or go on closing and opening at irregular intervals for a period or the whole evening. It does not do it every night and the time intervals vary every night. Have you any ideas on the subject ? "—L. D. E. (Kingston).

We have no circuit of this receiver but as it has persisted and has not formed a complete breakdown it is obviously some form of intermittent interruption in the frame time-base amplifier. It might be in the oscillator stage but we would expect this to result in a complete cessation of oscillation after two or three repetitions, whereas in the amplifier stage there are two or three points where the valve can be made to have a varying anode current. If the grid circuit, for instance, has a leaky coupling condenser whereby the grid of the amplifier can be made positive the anode current would vary ; whilst in the bias circuit a defective bias resistor or condenser could also give varying anode current. We are sure that if you include a current-meter in the anode circuit you will find that the anode current falls and rises with the picture variation, and we suggest that to start with you replace the grid coupling condenser and leak (if any) and also the bias components.

SWITCHING OFF

" I have just finished making a receiver and am now in a bit of a quandary regarding the fitting of an on/off switch. On looking at a number of commercial receivers I find that some fit the switch to the brilliance control and some to the volume control, and I wonder if there is any rule which can be adopted according to the circuit which is in use. My main interest is, of course, in preserving the tube and getting the maximum life from it."—R. E. K. (Loughborough).

There is considerable controversy as to which is better, and to some extent it is bound up with the internal circuit arrangements of a receiver. It is, in most cases, preferable to black out the raster before switching off and this means that the on/off switch should be on the brilliance control. However, it is possible to make arrangements such as the fitting of a special bleeder resistor, so that when the raster is left on and the set switched off, the bleeder will rapidly take off the E.H.T. and this will discharge the condensers as well as prevent a residual spot being left on the screen.

BLOCKING OSCILLATOR TRANSFORMER

" I am making a televisor and want to make as many parts as possible—not to save money but for the interest of the hobby. Can you give me any details of the oscillator and line output transformer so that I could wind these myself. I wish to use line-flyback E.H.T. at about 10 kV with an EL38. Any details would be appreciated, especially as to the precautions to take from a safety running point of view."—R. B. (Kingston).

We receive many letters in a similar vein but again must point out that it is not possible to give such information in the form of a letter. At least a thousand words are required to cover the construction of a line output transformer designed to provide E.H.T., and there are various factors which have to be taken into account which are not given in your letter. It is not a simple matter to make this type of component and in the winding special precautions have to be taken to prevent end turns from falling down to lower layers when winding. A blocking oscillator transformer is, however, a very simple component to make and an old speaker output transformer or one of the ex-Service transformers may be used with a one-to-one winding. Usually there are no special characteristics required and if any damping is subsequently needed it may easily be added in the form of a resistor across the winding.

PROTECTIVE COVER

" I wish to install my home-made receiver in a home-made cabinet which I have nearly finished. There is one point about which I should like advice and that is concerning the glass in front of the tube. Do you advise plate-glass or will ordinary Perspex do? Are there any points about this part of the receiver which I should be aware of ? "—R. M. (Herne Bay).

Plate glass is not essential but in the larger sizes of screen it is naturally stronger than plastic. Furthermore, plastic will scratch if any grit happens to be on it when it is wiped. Against this may be set the fact that it is cheaper, is not difficult to re-polish and is much lighter. It should be at least ¼in. thick to offer adequate protection against implosion. So far as concerns other details we recommend that you obtain a tube-type mask (that is one which is designed to be mounted on the tube end), and that you mount your protective screen in a small, thin frame, hinged in some way to the *front* of the cabinet. In this way you can open it to clean it easily.

E.H.T. RECTIFIER

" I have just purchased a line output component in which is incorporated one of the small midget E.H.T. rectifiers. I am rather troubled by the fact that there is no access to this and am wondering what happens when it goes. Can you tell me, therefore, what sort of life I can expect from this? "—W. E. S. (Birmingham).

If the component is in a metal box it is probable that the makers have made arrangements for a portion of this to be easily removed when required. The type of valve has a very long life but it is not possible to say just how long it will last under normal operating conditions. They stand a lot of abuse and overloading and, as you will no doubt have noticed, they are not provided with a base but the leading-out wires are soldered direct into the circuit so that they become more or less a fixture.

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