THE AC/DC TELEVISION RECEIVER

PRACTICAL TELEVISION

AND TELEVISION TIMES

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EDITOR
F. J. CAMM

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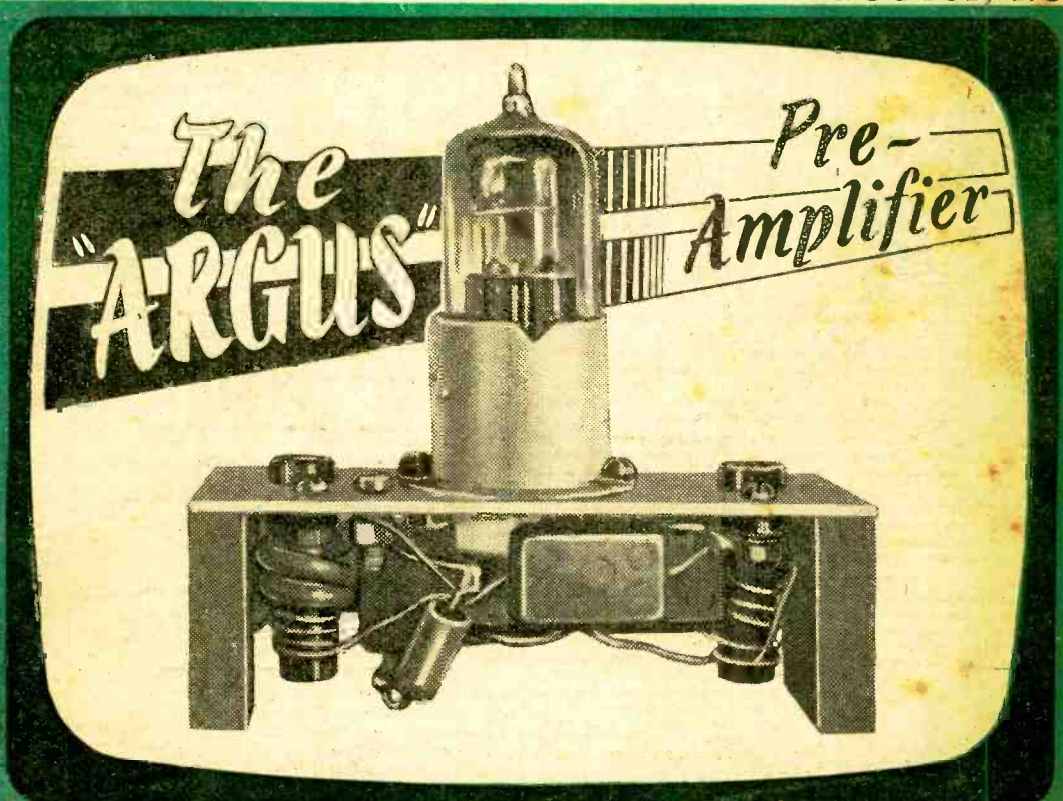

FEATURED IN THIS ISSUE

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Strays and Losses
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Televiews

Franco-British TV Link-up

IT will be remembered that on April 21st this year a successful demonstration of a Franco-British TV link-up indicated the possibilities of further development in this direction. Since April technical discussions have continued between the BBC and the French television authorities with a view to developing this two-country link-up. The original test showed that the system adopted was worthy of further experiment. Between July 8th and July 14th a number of programmes were televised from Paris, and were seen by viewers served by each of the British TV stations. Viewers were taken on a tele-tour of Paris, the tour including fashion parades, art galleries, churches, famous buildings, sports events, night clubs and ended with the famous "Storming of the Bastille" celebrations on July 14th.

British and French television engineers have worked in close co-operation for some months to bring this about and it is a tribute to a British engineer that British television camera and associated equipment was used for all the outside broadcasts. The British firm of Pye made the cameras. They used a complete mobile television set-up, as described elsewhere in this issue, which passed the television pictures simultaneously into the French and British television networks. The pictures seen by British viewers were passed to Paris to London through a series of special micro-wave links ; but before being transmitted across the Channel, the French 819 line signal was converted to the British 405 line signal.

A press reception was given by the BBC and the French television authorities at the Eiffel Tower on July 1st to a group of specially invited guests, including the P.T. special representative. His report will appear in our next issue.

This series of programmes marks a momentous step forward, and presages the time when British viewers will be able to look-in to countries more remote than France.

A DEALER'S LIABILITY

JUDGE WALMSLEY discussed a dealer's liability at Salford County Court and his views are worth recording for the benefit of our readers. He awarded £15 damages and costs to a man whose television set had proved unsatisfactory after two months from the time of sale. The Judge pointed out that the set seemed to contain several faulty components. The plaintiff in evidence said he paid £60 for the receiver to the dealer and the set worked well for about two months, then the pictures deteriorated in quality. They became ragged and there was considerable fading. The receiver had been returned to the manufacturers no less than four times, but each time upon its return there was no improvement in its performance and the set had been out of action since March.

The judgment was that the dealer had not supplied an instrument reasonably fit for its purpose and the Judge held that a dealer's liability under the Resale of Goods Act which places the onus on him to ensure that the goods supplied are satisfactory, was unaffected by the twelve-month guarantee of the manufacturers of such goods.

This is a point which dealers and manufacturers have not fully understood, and now that a judgment has been given it is obvious that the guarantee cannot be used as a means of escape from liability either on the part of the dealer or the manufacturer. The decision places a dealer in an unfortunate position, because when a receiver turns out on rare occasions to be as unsatisfactory as the one which figured in this case he lays himself open to a fine if the trouble is not remedied.

SPONSORED TV

THE Government's White Paper on broadcasting, which contains a clause providing for the introduction of sponsored television, was approved by the House of Commons by a majority of 28. An opposition amendment regretting the intention to provide for commercial TV programmes was defeated. The Assistant Postmaster-General in the debate said that the proposal for sponsored TV was an attempt to compromise between two opposite points of view and behind it was the vital principle that the Government did not believe in monopoly. These programmes will, of course, be entirely independent of the BBC programmes and competition will be admitted in frequencies higher than those now in use but competitors will have to provide their own equipment. He added that he hoped the experiment would be tried soon.—F. J. C.

The A.C.-D.C. Television Receiver

CONSTRUCTIONAL DETAILS OF A NEW RECEIVER FOR A.C.-D.C. MAINS, 210 TO 250 VOLTS

By S. A. Knight

(*Continued from p. 75, July issue*)

THE tube specified is a 9in. tetrode type, and the first anode normally requires some 300 volts to ensure a good focus; this voltage is partly obtained from the main H.T. rail and partly from the E.H.T. supply. The bleeder chain consisting of R77 (seven of 20 MΩ resistances in series) and R78 is tapped at the latter, and the main H.T. supply is placed in series at this end; an average first anode voltage of about 300 volts is obtained in this way.

There are four controls on the front panel, these being Brightness and On-Off, Frame Hold, Contrast, and Volume. Frame Hold is included as it has an effect on interlace, and so may be carefully set at the beginning of each programme to provide the best possible raster formation. The on-off switch is included on the Brightness switch, thus ensuring that the tube is adequately blacked out before the receiver is switched off, and also, when switching on, if this control is not advanced for a few moments while the valves are warming up, the tube grid cannot become positive with respect to cathode.

The four pre-set controls are Frame and Line Linearity, and Line Hold and Height; two are mounted on the rear panel and two on the actual chassis body. The width control (a plunger) is mounted on the tube rear support.

The following details deal with the construction of the receiver and the winding of the coils for the various channels.

Construction

The receiver is built on two chassis, each measuring 16in. x 8in. x 2½in., these being bolted together along their 16in. sides to form a final unit 16in. square. The

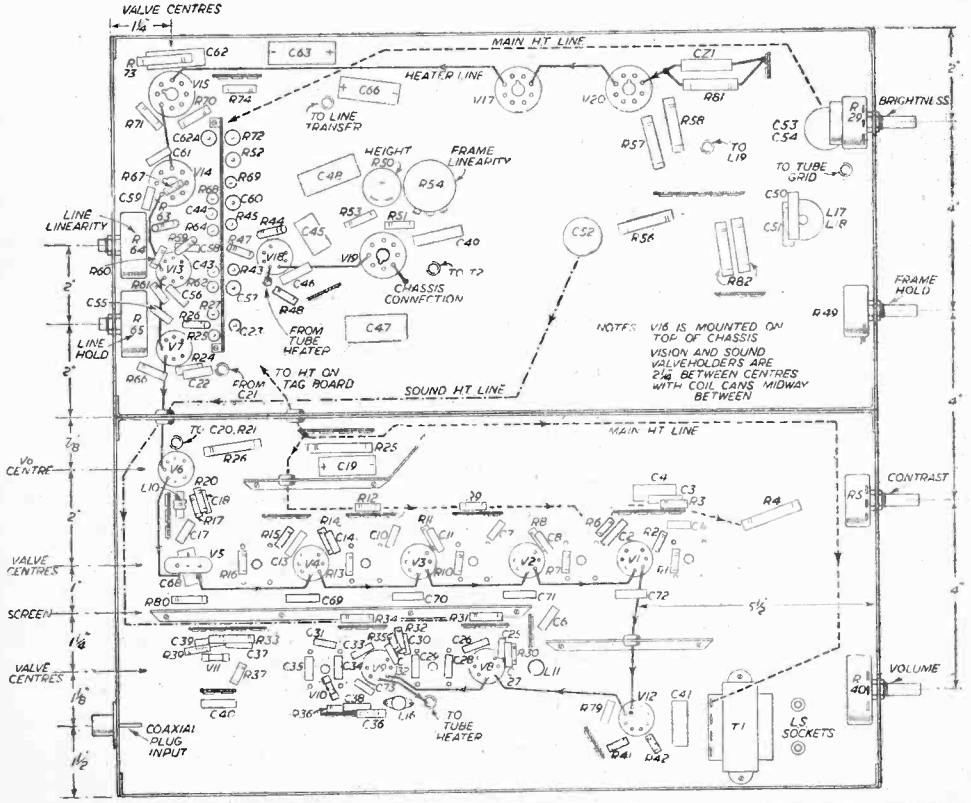


Fig. 6.—Underchassis layout of valves and components, showing run of heaters and H.T. lines. This layout applies to the transitron frame oscillator. The principal measurements are given, but small changes are permissible to suit alternative components, etc.

vision and sound receiver is built on one of these chassis, and the timebases and power unit on the other, and in construction each part can be built separately, the bolting together of the units taking place after most of the wiring is completed.

The chassis are of the open-ended types and the front and rear ends of each are completed by the fixing of

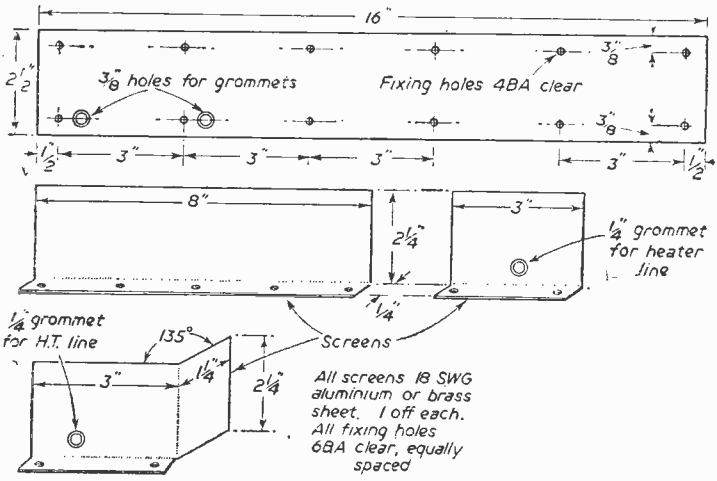


Fig .5.—Common chassis side drilling, and details of underchassis screens.

paxolin strips measuring 8in. x 2½in. to the chassis flanges already bent down. This paxolin sheet should be at least 1/16in. in thickness in order to avoid flexibility when the controls are mounted on it. It is bolted to the flanges by 6 B.A. bolts spaced evenly 2in. apart; the photographs of Figs. 2 and 3 show the fixing plainly. It is advisable to get these strips fitted, and also get the chassis common sides drilled in accordance with the measurements of Fig. 5, before any other work is undertaken. One chassis side should be drilled, and the other then marked through from this, so that the two units are properly "matched" side-by-side when finally bolted together.

The form of construction and the order of wiring is not very critical in this receiver, and either half may be completed first. The layout of the vision and sound receiver is very important, but the timebase unit is in no way critical and, provided the general layout of this is followed, no difficulty will be experienced. Fig. 6 shows the underchassis layout of the components in the model using the Transitron frame timebase-oscillator circuit; the equivalent photograph of Fig. 7 shows the frame timebase using a blocking transformer, and a few minor changes in other wiring details, but these are of no importance and the layout of Fig. 6 applies to the final design as shown previously in Fig. 1.

Wiring Details

The coils should be wound to the instruction given in Fig. 8 and Table I, particular note being taken of the fact that the sound input coil L11 is wound on a polystyrene former, and that for all models except London, two more of these are required (untapped) for sound rejectors. Details of winding and assembling the Haynes type screened coils have been given in previous issues (Oct., 1951), but for those constructors who do not want the trouble of winding their own, the complete set of coils can be obtained ready wound from Bel Sound Products. The 100 pF. coupling condensers (C5, C9, C12 and C16) are included in the cans and are wired between pins 1 and 4. Great care must be taken in assembly and soldering to ensure that when the screening can is fitted, the side wires do not short across to it. One iron core is required for each vision coil, two for each sound transformer, and these cores should be well smeared with Plasticine before insertion to stiffen them in the former threads and so make tuning quite smooth.

On the vision-sound unit, all EF91 valveholder holes are ⅝in. diameter, the output EL42 (V12) being ¾in. diameter. Mount the holders in accordance with Fig. 6 so that the pins are correctly orientated, and mount the assembled coils between the holders so that the pin numbering corresponds to that shown in Fig. 9. The wiring can then follow the typical system shown in this figure; 22 S.W.G. copper wire with 1 mm. sleeving is used for all wiring, but in general no sleeving need be used on those component wires which connect directly across from holder to tag strip. The dividing screens need not be fitted in place until the wiring is completed, but the holes for these should be previously drilled, of course. The lead from the coaxial input

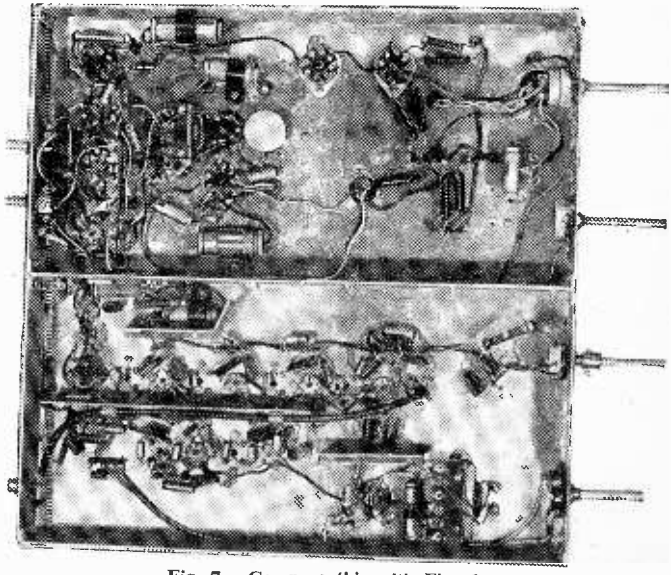


Fig. 7.—Compare this with Fig. 6.

socket to the coupling coil (pins 1 and 3) of L1 is a length of 70 ohm coaxial cable, and is clipped to the upper edge of the long central dividing screen. The outer braiding of this cable is joined to the body of the input socket by a tag under one of the fixing bolts.

Other points of particular importance are as follows: the lead from C40 to the volume control R40 and the return to R41 are screened; common earthing points for each stage must be used as shown in Fig. 1 and detailed in Fig. 9; the coil end projecting wires should not exceed some $\frac{3}{8}$in. in length below chassis; and do not wire the damping resistances or other components across the coil pins so that the trimming hole at the base of each coil is obstructed.

Turning now to the timebase and power unit, here

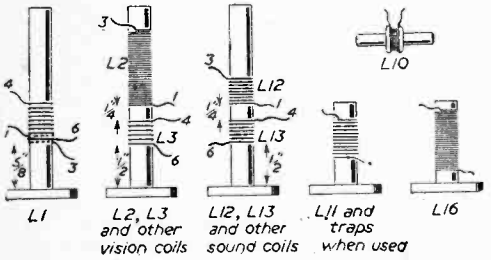


Fig. 8.—Coil winding details.

he wiring is not so critical, and no particular location for the leads and components is necessary. The valve positions are shown in Fig. 6, and the photographs of Figs. 2 and 3 give the positions of the upper-chassis components. The preset controls R50 and R54 have screwdriver slots made in their spindles and they are tunable from above the chassis. The other preset controls are R64 and R65 and these are mounted on the rear paxolin strip. Valveholder holes for the valves apart from the three EF91 stages are $1\frac{1}{8}$in. diameter standard Octal. The holders should be mounted so that the pin orientation corresponds with that given in Fig. 6, where the direction of the keyways are shown. Points of importance are: C63 and C66 have their positive holes earthy, and they should be mounted in insulating clips so that the metal cases are isolated from chassis. This is particularly important for C66 where the case is not isolated from the negative terminal. All high wattage resistances should be suspended well above the chassis, and the Thermistor CZ1 should be well clear of the shunting R81 and the chassis, as this component gets very hot in operation. The lead from the brightness control slider to the tube grid is screened and is run above chassis to the tube base.

The tagboard containing the seven 20-megohm resistances making up R77 is mounted above the chassis on the line of centres of the two chassis. The resistances are zig-zagged on the board as shown in Fig. 10, and, when mounted, the tags should be well clear of the chassis, especially at the positive E.H.T. end of the chain. R78 and C67 are also mounted on this strip. If desired, this strip may be mounted vertically between the frame transformer and V17, C67 being at the bottom end.

The connections to the line output transformer are shown in Fig. 11. The EY51 rectifier is wired directly across the upper tags, and the lead from its cathode to C65 is looped well clear of surrounding components. The inner polythene-covered lead of a piece of coaxial cable makes a suitable E.H.T. lead for this purpose. The connections to the line coils must be as shown, otherwise a narrow raster will be obtained. If the picture when first received is back to front, the connections to the line coils must be reversed, *not* the transformer connections.

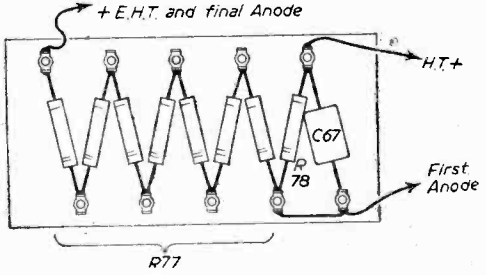


Fig. 10.—Bleeder and first anode boost resistance panel details.

When the wiring of each chassis is completed, the units may be bolted together, and the H.T. and heater wiring run through the appropriate grommets in the common wall. The video output is taken through a grommet to the tagboard mounted on the tube rear support (see Fig. 2 and Fig. 12), and the input to the sync separator is similarly fed through to the grid of V7.

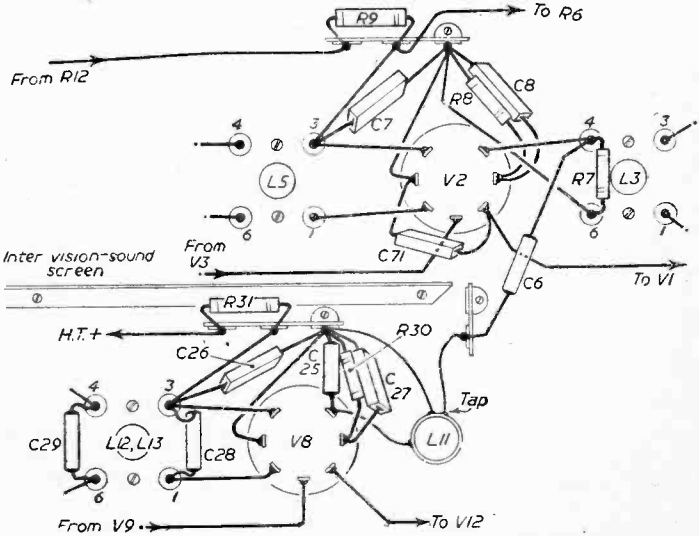


Fig. 9.—Layout of V2 and V8 stages. This gives the general layout of all vision stages.

The Tube Mounting

The tube is simply mounted, being supported at the rear by the aluminium bracket shown in Fig. 13, and at the front, resting on two wooden supports, details of which will be given next month, and clamped around the mask by brass grips. The rear support is mounted centrally across the two chassis, and is placed so that it lies about 2½in. from the rear chassis edge. In addition to carrying the tagboard of Fig. 11, the focus magnet is mounted on this stand, as is also the width choke and condenser C64 with R75. The width coil locates in the ¼in. hole on the right of the support, and the shunting C64-R75 are mounted on a small tagboard behind and under the focus magnet. The width plunger control is therefore accessible from the rear of the chassis.

At the front, the wood blocks are screwed from below the chassis by wood screws in the position shown in Fig. 3, the distance from the chassis front edge being about 1½in. An ordinary rubber mask is fitted to the tube, and the brass clamps are screwed to the ends of the wood supports and grip the mask firmly around its circumference, a 6 B.A. bolt and nut being used to fix the clamps together at the top. The hole in the rear support should be packed out with a strip of felt to hold the tube neck central. When mounted, the tube should be quite firmly held, and the mask front should overhang the chassis front by about ⅛in. A mask of the type which has a safety glass already fitted to it is best for this receiver but it is not essential.

(To be continued.)

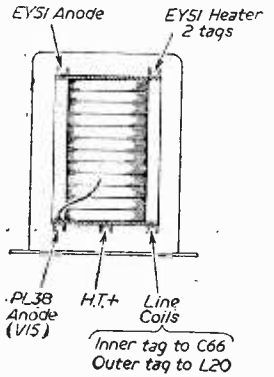


Fig. 11.—Line output transformer wiring.

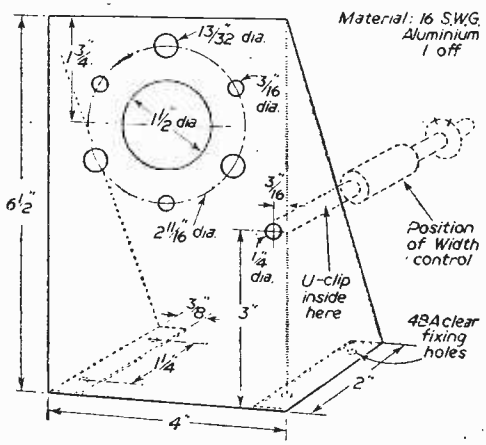


Fig. 13.—Tube and focusing magnet support.

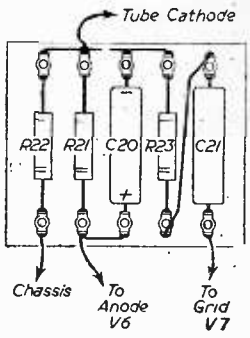


Fig. 12.—Tagboard fitted to tube rear support, showing component wiring.

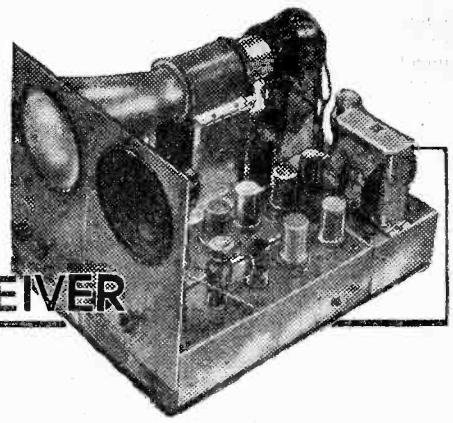
TABLE I.—COIL WINDING DATA

Coil	Wire	Turns			Remarks
		London	B'ham	Holme M.	
L1	38 D.S.C. 30 D.S.C.	1¾ 9	1½ 7	1½ 7½	The aerial coupling winding is interwound at the earthy end of the main winding.
L2 L3	38 enam. 30 D.S.C.	90 7	90 5	90 6	L2 is close wound ; L3 spaced out by one diameter of wire. All other vision coils are identical.
L12 L13	30 D.S.C.	7 6	6 5	6½ 5½	Coil windings spaced out one diameter of wire. The other sound coil is similar. Two tuning slugs are required.
L10	38 enam.	50	50	50	This coil is wound on a grommet slipped on a ½-watt resistance, value ¼ to 1 MΩ. The ends are connected to the resistance leads.
L11	22 tinned copper	8	6	7	For L11 the winding is centre-tapped. For sound-trap use, no tap is required. The former is polystyrene with iron slug tuning.
L16	38 enam.	—	—	—	Close wound to fill former to within ⅛in. from each end, approx. length ½in. Not critical. No core is used here.

N.B.—Kirk o' Shotts constructors use windings as for Birmingham. Wenvoe constructors use Birmingham windings less ½-turn.

Some Queries Answered, relating to—

THE "ARGUS" TELEVISION RECEIVER



SOME READERS' DIFFICULTIES OVERCOME

THE Argus was designed with two main objects in view: they were to produce a complete, yet inexpensive, televisor and to give plans so that construction could be undertaken by the novice. Our correspondence has shown that both objectives have been reached, and the series of articles has brought television to many who could not afford a commercial televisor, and yet who did not have the technical knowledge which would enable them to build directly from theoretical circuits.

Now it has been said that it is very easy to wire up a circuit from a blue-print, but the difficulties arise when the power is switched on, and snags begin to crop up. It is at this point where past experience comes to the aid of the more advanced worker, but the constructor who is building a televisor for the first time is quite often puzzled by queer "faults" which are actually part and parcel of television phenomena.

We have found that queries on the Argus have fallen into three main categories: the first is in regard to the phenomena mentioned above, the second is about the liberties which can be taken with published designs, so that components which are on hand can be utilised, and the third group is timebase troubles.

The Raster

Dealing with the first group, one of the most frequent queries is with regard to the appearance of the raster. If no signal is being injected into the tube circuit (i.e., with the Contrast control at zero or with V13 removed) then the normal appearance of the raster is as shown in Fig. 1. The line oscillator V15 and its associated amplifier valve V16 produce a line across the tube face; the backward stroke of the beam, or "flyback" to give it its correct term, moves so rapidly that it is scarcely visible. The frame flyback is, however, clearly visible, but it does not travel in a straight line from the bottom to the top of the raster but zig-zags across the tube.

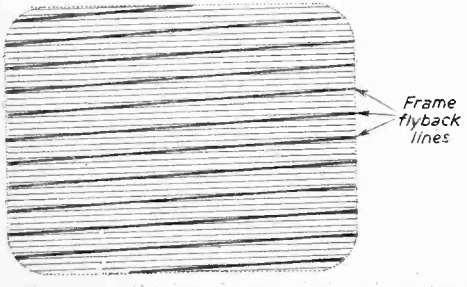


Fig. 1.—Normal appearance of a raster without picture detail.

It will be found that with electrostatic tubes such as the VCR97 the flyback lines are about $\frac{1}{8}$-$\frac{1}{4}$in. apart.

When the televisor is first switched on, the raster will probably be found to consist of a fuzzy oblong shape. Operation of the Focus control will enable the lines to be clearly discerned but the actual size of the raster will be reduced. It must be remembered, therefore, that the operation of the Focus control will affect the overall dimensions of the raster.

It is quite probable that the frame flyback lines move up and down, the speed being varied by operation of the Frame Hold control. Sometimes, if the frame frequency is very low, the whole raster will jump up and down.

The Frame Hold control actually controls the frequency of the oscillations of the frame oscillator. In practice it is used so as to bring the natural frequency of the frame timebase close to that of the transmitted signal, until the synchronising pulse from the signal takes over, and controls the actual period of each frame stroke.

If the frame frequency is very low the lines of the raster will be spaced very wide apart.

Another phenomenon is a high-pitched whistle which emanates from the timebase, and which can be varied in pitch by the operation of the Line Hold control. It will be found that this whistle can come from the line oscillator valve itself; some valves are more prone to it than others. As the Line Hold control is varied it will be found that the whistle disappears: this is because it has reached a pitch which is beyond the range of the human ear to resolve.

Tubes

VCR97's have been made by different manufacturers and vary a little in their characteristics. Table I gives the details of two types of VCR97. The constructor should take care to purchase a tube which is guaranteed to give full picture size; some tubes have deflecting plates so positioned that cut-off occurs and neither full width nor full height can be obtained.

Without any signal being injected into the tube, it should be possible to black-out the raster completely by reducing the Brilliance control. Further details on this

point will be given later in the article. It is important to remember that the raster and the picture are, to all intents and purposes, separate items. The picture is *not* produced by modulating the raster with the picture signal. When receiving the picture the Brilliance control should be reduced until the raster completely disappears from the tube; the tube face should be blank, when the Contrast control is at zero. It should only just be blank, as this is the most sensitive position.

When the Contrast control is advanced the picture signal should produce its own "raster." When the picture has been correctly locked by the Line and Frame Hold controls, then the flyback lines from the frame circuit will not be visible; the picture itself blacks out the flyback. During the frame flyback the synchronising pulse applies a heavy negative potential to the grid of the CRT so that the cathode-ray beam is prevented from reaching the screen.

Adjusting the Controls

The correct operating conditions to receive the picture are as follows:

The Line and Frame Hold controls should be turned in any direction until they reach the limit of their travel. With the raster just blacked out, the Contrast control should be advanced until a pattern appears on the screen, the average brilliance of which is more or less equal to the previous brilliance of the raster. The pattern may be fairly steady or it may be moving—it doesn't matter which condition obtains.

The Line Hold control should now be turned slowly until the pattern changes into a number of broad horizontal lines which may be moving up and/or down, then as the control is further advanced the lines will commence to move at an angle until they become almost upright, and at this point the picture will be found to be resolving. The control is then adjusted steadily until the picture is completely resolved. The actual point of complete resolution is rather critical.

If the control is turned beyond this point the picture will collapse into lines again.

Should you find that, as you commence to turn the Line Hold control, multiple pictures appear it simply means that the frequency of the line oscillator is a multiple of the line frequency, and you should continue turning the control until the correct single picture is resolved. As a matter of interest you will quite often find that in travelling from one limit of the control to the other, double, treble and quadruple pictures can be received.

If the picture tends to slip upwards then it can be locked by operation of the Frame Hold control. If the Frame Hold control is at a point very far removed from the frame frequency, the unresolved pattern will flicker rapidly in a vertical direction. If you find that this is the case when you first turn up the Contrast control, then you will not be able to resolve the picture with the Line Hold control. The correct thing to do is to adjust the Frame Hold control first, until the pattern is fairly steady.

If you have two or more complete pictures one above the other, or if the picture has incorrectly locked so that the top half appears at the bottom and vice versa, then the Frame Hold control must be further adjusted, until a single complete picture is obtained.

Interlacing

In most cases interlacing can be checked by advancing the Brilliance control while the picture is on, until the flyback lines appear. (By "interlacing" is meant the alternate scanning of odd numbered and even numbered lines, which is done at the transmitter.) The lines will not be complete across the whole of the tube, those at the bottom appearing in part. Under correct interlace conditions the lines should be evenly spaced, and not "paired." Adjustment of the Frame Hold control will ensure correct interlace, and it will be found that the correct position is a little critical. In the Argus, in spite of the simple circuits employed, it will be found that the interlacing is quite good, and a steady picture results. Fig. 2(a) shows lines "pairing."

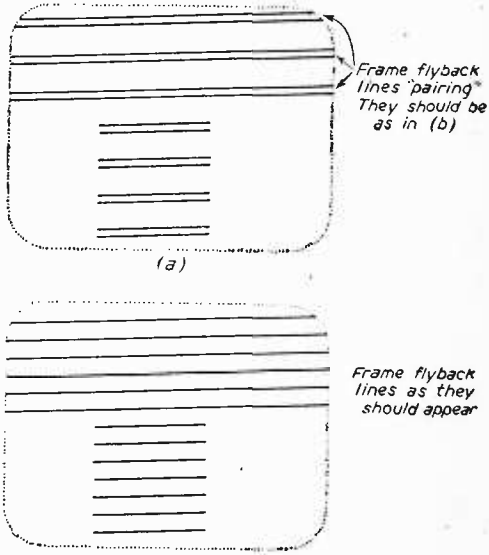
To obtain the best relation in tonal values of the picture, the Contrast control and Brilliance control should be adjusted together so that the correct tones of white, neutral, grey and black appear on the tuning-in signal. The best method is to reduce the Brilliance control for the blacks, and to advance the Contrast control for the overall brightness of the picture. Fig. 3 shows the tuning-in signal.

Where the signal is weak, or where difficulty is being experienced in getting the vision signal, it is possible to advance the Brilliance control a little so that the raster appears very faint on the screen. The picture will then appear superimposed on the raster.

Table 1

G.E.C. (VCR 97)		
Heater V	=	4V.
Heater I	=	1·1A.
Va 1	=	2500 max.
Va 2	=	Va3 x 0·475 mean
Va 3	=	5000 max. 1000 min.
Vg	=	−(Va 1 x 0·04) max.
Mullard (VCR 97)		
Heater V	=	4V.
Heater I	=	1·0 A.
Va 1 − Va 3	=	2500 V.
Va2	=	260 to 450V.
Vg	=	−1 to −100V.

Fig. 2 (right).—Appearance of the flyback lines with correct and one form of incorrect interlacing. On the left is a table of VCR97 characteristics.



Note: (a) and (b) are the conditions obtained when the brilliance control is advanced while receiving a picture

The Sound Receiver

There should not be much difficulty with the sound receiver, the only points to bear in mind here are that the trimmers T1, 2 and 3 (0-30 pF) should be used for the tuning, the iron cores of the coils being used as verniers for fine tuning.

It should be noted when taking voltage checks that there will be very little voltage on the second anode of V9 due to the high resistance of R23.

L2 is rather critical where the signal is on the weak side; it can be made less critical by connecting a 4.7kΩ resistor across it. Remember that the tuning of this coil and of L1 affects both sound and vision.

Vision Receiver

The blueprint shows no rejector coils for Alexandra Palace. These are not required and can be omitted together with their associated condensers C9, 10, 17, 18.

If, when listening for the vision signal, it is found that the Contrast control goes "plop" at a certain adjustment, it means that the vision receiver is breaking into oscillation at this point. It can be cured by correctly tuning the coils, and checking the decoupling circuits.

The best method of aligning the receiver is by use of Test Card "C," which is radiated every morning of the week except Sunday. Full details of the Test Card were given in the June, 1951, issue of P.T.

It will be found that the quality of the picture signal can be affected by the sync. pulse. If too high a line sync. pulse is injected into the line oscillator then the edges of the picture will become very ragged, and/or the picture will appear very smeary and watery. The correct amplitude of sync. pulse is obtained by adjusting C48.

When a pre-amplifier is used and the contrast is at maximum then the background of the picture becomes affected, and it appears as though the scene is being televised in a snowstorm. This "snow" is the visual representation of valve hiss. The only method of overcoming it is to improve the aerial system.

Where a good signal is received, over-advancement of the Contrast control will produce a negative picture with the whites black and the blacks white—as in a photographic negative.

Tracing Troubles

Firstly, let us get a clear idea of what can be done.

(a) The vision receiver can be made to work independently of any of the rest of the televisor (with exception, of course, of power supplies). It is not necessary to have the timebase working in order to receive the vision signal; it is, of course, necessary to have the timebase and CRT network functioning to receive a picture, but the vision signal can be tuned in and the vision receiver adjusted by connecting a pair of earphones across R33 or in series with V6 and R17. It will sound like a very rough hum, which you can verify is the picture signal by disconnecting the aerial.

(b) The sound receiver will work without the rest of the receiver. It should be remembered that the tuning of the sound receiver is affected by L1 and L2. V1 in the vision receiver must therefore be functioning, though the remainder of the vision receiver can be disconnected.

(c) The timebase can be made to work independently of the rest of the circuit. It is not necessary to have the vision receiver working to produce a raster. It is necessary, of course, to have the E.H.T. and C.R.T. network functioning before a raster can be obtained.

(d) The C.R.T. network can be made to function independently of the timebase providing that the timebase H.T. is available at the VR8/9 potentiometer network.

If the timebase is not functioning, a spot will be seen on the tube; the Brilliance control should be adjusted so that the spot is not too brilliant or you will burn a hole in the screen. The spot can be focused, widening out to almost 1½in. in diameter from a mere pin-point, by operation of Focus and Brilliance controls. The spot can be shifted up or down and left or right by the shift controls.

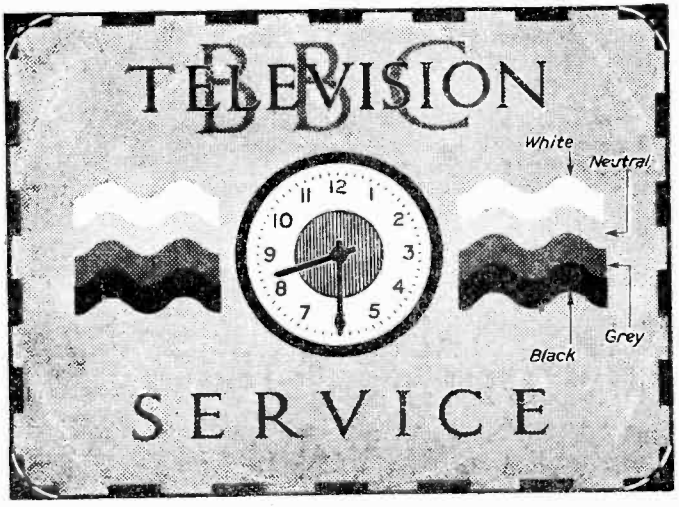


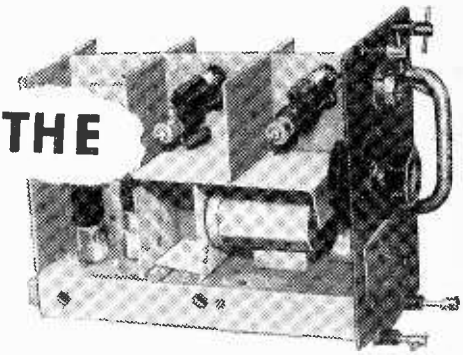
Fig. 3.—Details of the tuning signal.

In each case mentioned above the power pack must not be left too lightly loaded. The H.T. should not be disconnected from more than one unit at any one time.

Do not run the E.H.T. transformer without the rectifier and bleeder network in circuit. Peak voltages are liable to develop and cause a breakdown in the transformer. If it is desired to test the circuit without the E.H.T. supply, then disconnect the supply at R65 but leave the bleeder network VR9, R67, etc., in circuit. Alternatively, disconnect the primary of the E.H.T. transformer.

(To be continued.)

Modifying THE RF24 UNIT



By B. L. Morley

USING THE UNIT TO BUILD TWO A.C./D.C. PRE-AMPLIFIERS, AND TWO SUPERHET CONVERTERS—THIS MONTH WE DESCRIBE THE REMAINING UNITS

(*Continued from July issue*)

THE SP61 is quite a good valve, but its performance tends to fall off at the higher frequencies. The RF24 can be made to give a greater output than that obtained by the modifications given in last month's issue, and although the further modifications are fairly simple a lot more work is involved and extra components will be required.

The new circuit diagram is shown in Fig. 8, and it will be seen that the main alteration consists of using EF54's (VR136) instead of the SP61's.

The unit should be altered on the lines suggested previously, but the two coils L1 and L2 with their associated tuning condensers, should be removed and replaced by new coils wound on Alladin coil forms 3/8in. in diameter.

The two valveholders in V1 and V2 positions must be replaced by B9G valveholders. The change-over of the wiring to the new valveholders is effected as given below :—

1st valve

Wire going to pin 1 (SP61) now goes to pin 1 (EF54).
" " " " 2 " " " " " 4 "
" " " " 3 " " " " " 2 "
" " " " 4 " " " " " 3 "
" " " " 5 is disconnected and earthed.
" " " " 6 " " " " "
" " " " 8 " now goes to pin 9 (EF54).

The EF54 pins 4, 5, 7 and 8 are joined together and the cathode decoupling increased by the addition of another 500 pF condenser.

2nd valve

Wire going to pin 1 (SP61) now goes to pin 1 (EF54).
" " " " 2 " " " " " 4 "
" " " " 3 " " " " " 2 "
" " " " 4 " " " " " 3 "
" " " " 5 " is disconnected and earthed.
" " " " 6 " " " " "
" " " " 8 " now goes to pin 9 (EF54).

The EF54 pins 4, 5, 7 and 8 are joined together and the cathode decoupling condenser is increased by an additional 500 pF condenser in parallel with it. The EF54 pin 6 goes to L2 via a short length of coaxial cable, the outer sheath of which is earthed at both ends.

The coils L1 and L2 are wound on ¼in. coil formers with iron cores, and are mounted in the position shown in Fig. 9. The chassis must be drilled so that the cores can be easily adjusted from the outside. The small coil formers are used so as to keep the coils clear of the chassis.

L1 is wound in accordance with the data given in Table III. The secondary is wound on first, starting from the bottom and winding in a clockwise direction. The primary coil is wound in a similar manner, on top of the secondary, using insulated wire.

The earthy ends of both primary and secondary windings are connected to the chassis by looping under the coil-retaining bolt. The other end of the secondary of L1 goes to the grid of V1 (pin 6). The other end of the primary goes to the aerial socket by means of a short length of 80 Ω coaxial cable which is earthed at both ends.

L2 is wound in accordance with the data given in Table III, and is mounted in the position shown in Fig. 9. The earthy end of L2 is earthed under the coil retaining bolt, and the other end is connected to C6. The other side of C6 is, of course, connected to the junction of R6 and R7.

Coaxial cable is used to connect the top of L2 (i.e., at the junction of L2 and C6) to pin Y of V2. The outer sheath of the coaxial cable should be earthed at both ends.

Components

The component numbers given in Fig. 8 (R2 . . ., etc.) are the same as in Fig. 1, the items which are not used in the new modification being omitted. See list on page 108.

As the EF54's require only 0.3 amp for the heaters, the power supply circuit must be altered. It is best to dispense with the VR65 used as a rectifier and replace it with a small selenium rectifier capable of supplying 30 mA at 250 v. A barretter, type Philips C1C, can be used as a voltage dropper for the heaters. The modified power supply is shown in Fig. 8.

The modified unit now forms a powerful A.C./D.C. pre-amp. which is self-contained. The precautions given in the previous modification regarding the " live " chassis should be observed. If desired, the barretter can be replaced with a small L.T. transformer, thus making the unit purely A.C. operated.

TABLE III

Station	L1 Primary	L1 Secondary	L2
Wenvoe	1½	7½	7½
Sutton C.	1½	8	8
Kirk o' Shotts	2	9	9
Holme Moss ..	2	10	10
Alexandra P. ..	2½	11	10

¼in. coil formers, 22 s.w.g. wire ; primaries, insulated wire.

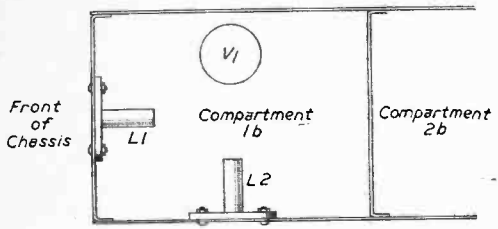


Fig. 9.—Mounting position for L2.

A Superhet Converter for the Experimenter for Use with the R1355

The next modification is to use the RF24 unit as it was originally intended to be used, but covering the TV frequency range.

As new TV stations are opened the number of fringe viewers becomes more, not less, because more areas are brought within the range of fringe viewing.

There are not a few pioneers among the readers of this journal, and correspondence seems to indicate that some inexpensive unit is required so that the experimenter can determine the strength of reception in his area, before venturing into the expenditure involved in constructing a complete televisor.

The RF24 can be very easily and cheaply adapted for this need. The idea is to modify it so that it acts as a superhet converter, providing the TV signal at an I.F. of 7 Mc/s. This can be injected into a broadcast receiver which is tuned to 7 Mc/s.

An inexpensive aerial can be constructed and erected on a long ladder or something similar. Details for the making of such an aerial, costing only a few shillings, have been given in previous issues of PRACTICAL TELEVISION.

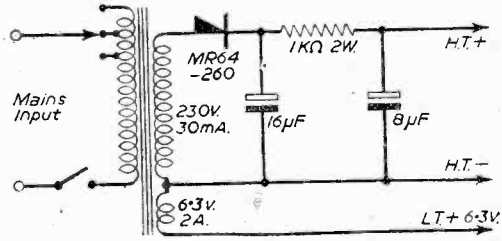


Fig. 11.—Theoretical circuit of the power unit.

LIST OF PARTS FOR FIG. 1
(Last month's issue)

T1 0.30pF		C8 300pF	
T2 0.30pF		C9 300pF	
C1 (see coil data)		C10 300pF	
C2 .001μF		C11 300pF	
C3 300pF		C12 300pF	
C4 .001μF		C13 16μF	} com-
C5 300pF		C14 8μF	} bined
C6 100pF		C15 300pF	
C7 (see coil data)			
R1 47Ω	R6 4.7KΩ	R11 1,000Ω (2 w.)	
R2 100Ω	R7 22Ω	R12	} See text
R3 10Ω	R8 47Ω.	R13	}
R4 10KΩ	R9 2.2KΩ	R14 33Ω.	
R5 22KΩ	R10 2.2KΩ		

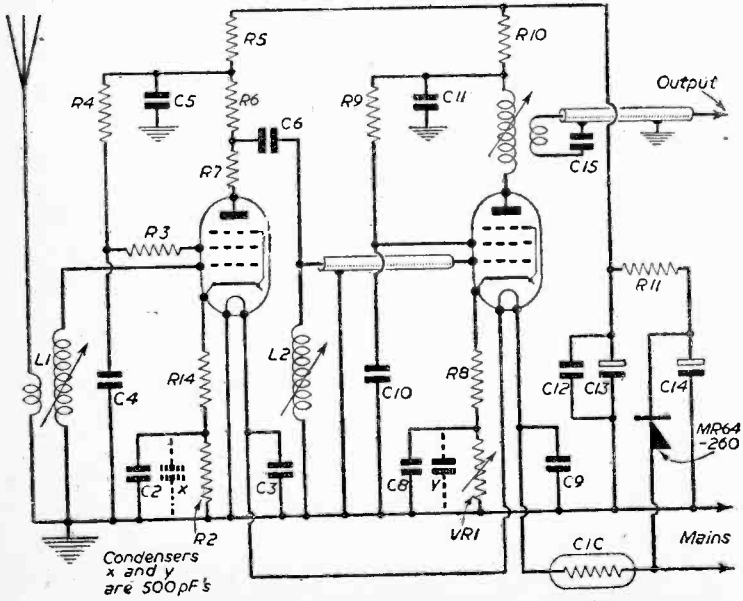


Fig. 8.—Circuit of the two-stage pre-amplifier.

The modifications outlined in the following paragraphs will also make the unit suitable for the reception of sound on a broadcast receiver, and it can then be used solely as a sound receiver in its own right.

The alterations required follow closely the methods given previously. The circuit is shown in Fig. 10.

1. Remove the switch.
2. Remove all components in compartment 1a, except one tuning condenser and the coil. (See Fig. 2.)
3. Remove all components in compartment 2a, except one tuning condenser and the coil.
4. Remove all components in compartment 3a except one tuning condenser and the coil.
5. Modify the coil in compartment 1a in accordance with the data given in Table I. (L1.)
6. Modify the coil in compartment 2a as per the data in Table I. (L2.)
7. Modify the coil in compartment 3a in accordance with the data given in Table IV.

It is important to keep all

wires short and rigid so as to avoid frequency drift. If it is found necessary to remove the connecting bar from the coil to the trimmers in compartment 3a, when removing the switch, it should be replaced.

A power pack must be constructed and can either form a separate unit or can be bolted on to the back of the RF24 unit. Fig. 11 gives the circuit of a suitable power pack.

No other modifications are necessary, but if it is desired to operate the unit as an A.C./D.C. receiver,a power unit can be built as shown in Fig. 12. The heaters of the valves will have to be wired in series.

Having completed the alterations the output on the Jones plug (the coaxial cable tag). should be connected to the input of the broadcast receiver. The connection should be made with 80 Ω coaxial cable and the outer sheath should be earthed at both ends, via a 500 pF condenser.

Set the tuning scale o the broadcast receiver to a quiet spot on the dial at about 7.5 Mc/s. Tune the oscillator in the RF24 unit (the last coil in compartment 3c), for maximum noise. Now tune the mixer condenser for maximum noise and follow this with tuning the first RF condenser for maximum noise.

The next step is to connect an aerial to the input socket of the RF unit, using an aerial of the type in general use in your own locality. For the fringe viewer an aerial with one or more directors and a reflector should be used, erected as high as possible. It should now be possible to tune in the sound channel by means of the oscillator condenser, but do not forget to make certain that a programme is being radiated.

The mixer and RF stages should be tuned for maximum volume.

When the signal has been correctly tuned. the trimmers should be locked in position with a spot of wax.

It is important that the lead from the RF unit to the receiver is well screened. Do not have long ends at the extremities of the coaxial cable or the receiver will pick up strong signals at the intermediate frequency.

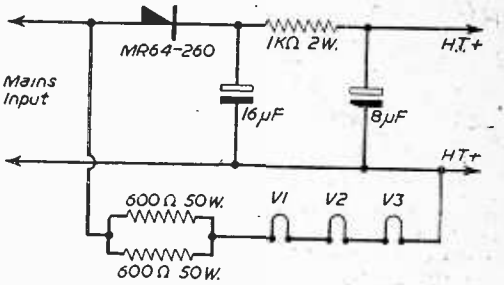


Fig. 12.—Modified circuit for A.C./D.C. use.

TABLE IV

Station	Coil turns	Coil tap	Condenser
Wenvoe	2½	¾	Nil
Sutton C.	2½	¾	15pF
Kirk o' Shotts ..	2½	¾	20+15pF
Holme Moss ..	3	1	15pF
Alexandra P. ..	3	1¼	20+10pF

(If you have difficulty in getting the correct IF, try adding a 10 pF condenser, in addition to the one quoted above.)

The modified unit, without the power pack. can be used in the R1355, with good results. There appears to be a dearth of R26 and R27 units which cover the higher TV channels.

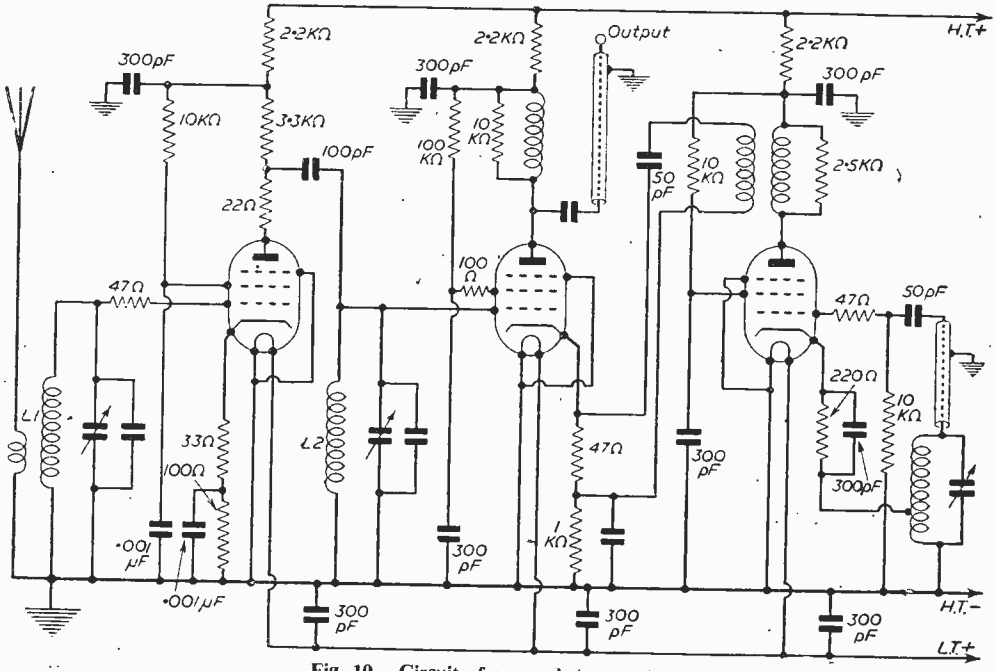


Fig. 10.—Circuit of a superhet converter.

A Long Range Superhet Converter

The R1355 I.F. strip is one of the most powerful of the ex-Government strips on the market. It has six stages of I.F. amplification using five SP61's and is eminently suitable for long-range reception. When used in conjunction with the RF26 or 27, the signal-getting properties are remarkable.

Unfortunately there seems to be very few RF26 or 27 units about, and although the RF24 unit can be used when modified as explained in the previous paragraphs, the RF26 or 27 will pull in a signal which the RF24 cannot touch.

However, it is not too difficult to convert the RF24 into a unit which is almost as good as the RF27, by using EF54 valves in lieu of the SP61's in the mixer and RF stages.

The circuit should be modified as shown in Fig. 8, and the alterations to the wiring in compartments 1a and 2a can be made as already given. Compartment 3a remains as it is and the existing coil which is in compartment 2b should remain *in situ*, the output wires being connected to the new mixer stage, in the same way that they were connected to the SP61.

The power supply section of Fig. 8, should not be used, nor should the heater wiring of the unit be touched.

If it is desired to operate the unit as described in the previous section, for experimental purposes, the power pack data given in that section can be used, but the 600Ω voltage droppers can be replaced with a Philips CIC barretter.

The oscillator coil should be modified as given in Table IV, and in all respects the oscillator circuit should remain as explained in the previous section.

Better results can be obtained by using a VR137 (EC52) as the oscillator valve instead of the SP61. The required circuit is given in Fig. 13. It will be noted that the method of injection of the oscillator frequency is modified.

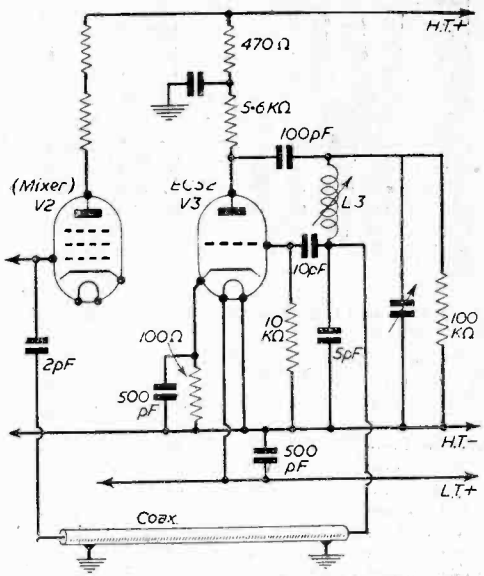


Fig. 13.—Modified oscillator stage. L3 consists of 5 turns 22 s.w.g. on ⅜in. former with iron slug for channels 1 and 2; no slug for channel 3 and brass slug for channels 4 and 5.

Alignment details are the same as those given previously.

Miniature TV Receiver

"HIS MASTER'S VOICE" produced recently a small 1in. tube television receiver for demonstration purposes, primarily to emphasise the large pictures given by the 15in. and 21in. receivers manufactured by the company.

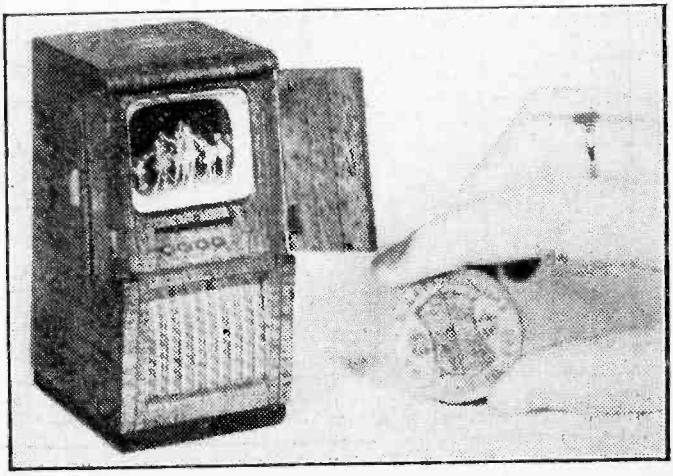
Subsequently "His Master's Voice" approached Her Majesty Queen Mary with a view to providing a similar model for Queen Mary's Doll's House at Windsor Castle.

The Gramophone Co. Ltd. are now privileged to announce that H.M. Queen Mary has been pleased to accept a specially-constructed miniature model for this purpose.

Complete in every external detail the model for the doll's house is an exact 1/12th scale replica of the well-known "His Master's Voice" 15in. console receiver Model 1806.

This miniature model was handed personally to Her Majesty at Marlborough House by Mr. George H. Watson of the Gramophone Co. Ltd., on May 28th.

The Royal Doll's House will thus be keeping apace with modern developments and the small television set will take its place with the scale model gramophone and radio receiver which were previously presented by the company.



INTERNATIONAL TELEVISION TO-DAY

By CECIL MADDEN, Assistant to Controller, BBC Television Programmes

ON August 15th a new television transmitter opens at Wenvoe to serve Wales and the West of England. Then 75 per cent. of Britain will be able to see pictures in the home and join the vast million-and-a-half licence-holding families distinguished by the now familiar television aerial.

Television is expensive in all its aspects, but despite every financial handicap in the world's forward march towards technical progress, the position of international television is very fascinating to watch as it grows steadily more earnest and purposeful. Let us study the European position first as it is the nearest.

Last summer Calais was linked to London for a day ; last month Paris was linked to England and Scotland for a week. This direction is significant as television's tentacles reach out always a little farther. In Europe to-day, France, Denmark, Holland and Italy have already started services, in greater or lesser degree. Spain, Switzerland and Belgium are at the estimate stage. Germany is likewise discussing transmitters. Russia is still something of an unknown quantity. Recent news is that there are plans for television in Turkey.

France

Not all of France is served as yet by Radio Diffusion Française. So far Paris is only joined to Lille in the industrial north. Italy, the latest continental entrant, has new studios and transmitters at Turin and Milan, likewise their industrial north, but Radio Italiana have elaborate plans to open in Rome together with many other cities in 1954. This will be the opportunity for British apparatus and equipment. But it must be remembered that Italy has many special problems in developing television ; there are great riches and much poverty, with huge sprawling distances to cover, many mountainous, and stretching down as far as Sicily. Then Italy has a sunny disposition as well as climate, which encourages promenading out of doors, the very enemy of television, whereas our invariably cold and wet weather drives us in to our TV and teacups. The Italians have a great heritage of art and music, so that when the time comes for more international programme exchanges, whether live or recorded, Italy has much to offer.

Italy

Milan's television transmitter nestles inside an old pre-war tower in the middle of its park. Turin TV programmes are carried up a high mountain (Trivero) and by an engineering feat are passed on to join the Milan output. Both opened simultaneously in April this year for the Milan Fair. It is interesting to recall that the first London transmitter at " Ally Pally " opened for an exhibition, too, in August, 1936.

Sunday Plays

It is fair to say that Britain's television is based on plays on Sunday night—dramatic material in various forms, whether classical, comedy or drama, a decision I myself made very deliberately when programme organiser in charge of the production of the service back in 1938. This has undoubtedly had far-reaching consequences on the nation's life to-day in making the entire country play minded (may I emphasise that I do not mean theatre minded since no playhouse is involved) on the key viewing night of the week, when the whole family can be together. I believe the Sunday play to be my greatest contribution to British television and I am particularly proud of it. Even in 1937 I had seen to it that viewers were already accustomed to full-length plays on four nights of the week, with first showings in the afternoon. It became a question only of changing the days to Tuesdays, Thursdays, and even Saturdays (now these are sometimes serials). This has gone on ever since. On any night it can mean an audience of five to 10 million people for a dramatist. We do not lack actors and actresses : Britain has a wealth of acting talent, and dramatic schools pouring out newcomers regularly. Italy has many famous playwrights and brilliant film directors, but withal no such reservoir of professional stage folk, since all it has are occupied in film and theatre work. So its TV planners will presumably have to look in another direction for its main and staple programme fare, which is more likely to be news telecasting in differing ways.

The Dominions

The Dominions have not appeared in the world scene as yet, but they are not far behind. True, for the time being, Australia has postponed the date for television indefinitely in favour of first things first, but Canada is opening in the east this year. Parts of Canada have, of course, been able to see American television programmes for some time.

U.S.A.

Moving on into the New World the commercial and sustaining television programmes of the U.S.A. have been much publicised and lately discussed in the press and elsewhere. Some stations pour out programmes all day and night, but what is less known is that two thirds of the United States have still only one outlet, a " captive

audience," as it is called there, and thus are in no different state from the United Kingdom viewer. The remaining third has choice, in fact, in New York City a viewer has the choice of six channels.

Latin America

Farther south we come to Mexico, Cuba, Brazil and Argentina with already flourishing daily schedules. Mexico and Cuba can exchange programmes since both are Spanish-speaking. Brazil is so enormous there is room for a great deal of television in its coastal towns alone. So in Latin-America the television race has well and truly begun. All the republics are interested—which country will get in next? Uruguay, Ecuador, Venezuela or Bolivia? And what gear will be used? There is room for interesting competition, taking into account national tendencies, temperament, climates, resources and the remaining imponderables.

The Lighter Side

But there is another, lighter side to the general picture. Television presents some amusing speculations on the new civilisation of the ether. It is presumed that pictures through the air can penetrate even Iron Curtains. Given the possibility of distant choice a Frenchman tunes into London and what does he see? "Café Continental," full of his own favourite artistes. What does the Italian find? Perhaps a Pirandello play in English or an Italian film with sub-titles. A Spaniard looks to London and sees Flamenco dancing. Madame Ashkenazi might tune in to a pantomime on skates or the brothers Karamazov to a blonde announcer grappling with a gorilla. No longer will the three wistful Tchekov sisters look to Moscow as the Mecca of their hopes and aspirations—one will want to join the Twelve Toppers, another to become a Top Ten mannequin, the third in a low-cut V-neck evening dress will be quizzing in a panel show which is really only a modernised version of a children's parlour game. Yes, coaxial or air link travel will set curious new standards of behaviour as well as taste.

Speaking from experience of the now not so new medium of television, as the producer of the very first high-definition programme in the world from the Alexandra Palace studios in August, 1936, and with continuous acquaintance of its operation since, I believe firmly in the future of both regional and international television. It will change our own lives and possibly everyone else's as well. Let us welcome the west with its agriculture, Wales with its mines and song, Scotland with its industry, dramatic scenery and its pipers. All these obvious pictorial riches will add to "selling" Britain to Britain, a desirable result in these days of restricted foreign travel. But this international armchair magic carpet will be something else besides; for the Lancashire lad whose only holiday has been Blackpool, the vista is endless, a vicarious view of Mi-Carême on the Riviera, Holy Week in Rome, ticker tape on Broadway, Folies-Bergère in Paris, Toros in Seville, Mardi-Gras in New Orleans, fishing off Florida, Copacabana Beach at Rio, Gauchos on the Pampas, ski-jumping in Norway. It is quite a novel pastime imagining programmes for other countries and continents.

Our Royal Family

The world, on the other hand, will want to see us in our islands, our Royal Family, our ancient traditions, our "London Town," Trooping the Colour, Changing of the Guard at Buckingham Palace and St. James's, Edinburgh Castle, Blackpool Tower—all manifestations of our unique way of life which means so much to us and is so genuinely envied abroad.

A World Leveller

So it is perhaps not impossible to hope that when we can look into the homes of Marianne and Teresa and Fulvia and Gretchen and Ingrid and Katia and Sadie and Aischa, and their husbands, Alphonse and Luis and Guido and Hans and Henrik and Karl and Hiram and Ali, look into ours and realise that fundamentally we are much the same; that cooking, babies and recreation occur everywhere—though varied by customs and conditions—then as a medium for good television may, indeed, come into its own both as a world leveller and a powerful instrument on the side of humanity.

Cecil Madden talks to Franco Enriquez, Italian television producer, in one of the studios at Lime Grove.

STRAYS AND LOSSES

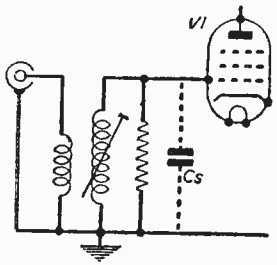
THE IMPORTANCE OF LAYOUT AND WIRING IN THE MODERN RECEIVER

By W. J. Delaney (G2FMY)

MANY constructors spend considerable time in studying articles on television theory, and when they eventually build a receiver, incorporating those principles which they think desirable, are disappointed to find that the equipment does not measure up to their expectations. In most cases this is on account of the fact that they have failed to watch one point which is seldom mentioned in theoretical articles—namely strays or losses. These are encountered mainly in the layout and wiring rather than in the theoretical considerations, and accordingly have not received the prominence they deserve. A simple example will serve to show what is meant by this title. Take the grid circuit of the first stage of a simple television receiver, either straight or superhet. It will consist in the main of a tuning coil with adjustable core, in all probability a damping resistor across it, *and that is all* (Fig.1). The usual tuning circuit consists of an inductance and capacity in parallel, and the principal tuning in the circuit just referred to is effected by the stray capacities, indicated in Fig. 1 by the dotted condenser Cs. It should be obvious from this illustration that, in view of the very small inductance which is used at television frequencies, the magnitude of Cs can have a very marked effect on the minimum range to which the circuit will tune. Most designers base their coil data on average stray capacities not exceeding 20 pF and as an indication of the effect of a small capacity it may be mentioned that a 0.7 μH coil such as might be employed in a London receiver will tune to 45 Mc/s (the Vision frequency) with a parallel (stray) capacity of about 18 pF, whilst if this capacity is increased by only 4 pF it will tune to about 40 Mc/s or below the Sound frequency. These figures ignore, of course, the effects of any iron or brass core which may be included in the coil.

R.F. Circuits

The stray capacities in an R.F. stage are introduced mainly by the wiring, in view of the very few components which are employed. There is, of course, a difference between a ceramic and a paxolin valve-holder, and slight differences are also introduced by screening cans over coils and also between a metallised and a non-metallised valve. These facts should, therefore, be borne in mind, especially if one is taking a published circuit and modifying it for individual use, or changing a published layout design. In some circuits rejectors and other coils may be found associated with pre-set condensers of about 40 pF and in these, of course, slight additional modifications of stray capacities will not have such a marked effect as the adjustment of the pre-set will enable the change to be covered. Where, however, there is no such condenser care must be taken to try and keep within the stray capacities which have been allowed for by the designer.



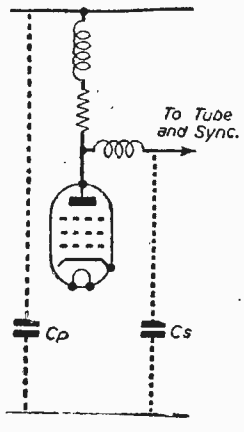


Fig. 1 (above).—Stray capacities (Cs) in an R.F. circuit will affect the tuning range. Fig. 2 (right).—Strays in a video stage will affect picture quality.

Sync Circuit

There is one other part of a modern circuit where stray capacities can seriously affect performance, and that is in the coupling between the video stage and the sync separator. In the video stage there is already a large effective parallel capacity in the power supply and this will produce resonance with any correction chokes which are included in the stage, and in several receivers which have been examined by the writer to find the cause of serious outlining (or black-after-white) it has been found to be due entirely to the stray capacities in the video stage. The correction chokes, again, have no intentional capacities connected to them, and in cases where black-after-white is found to be troublesome a temporary check may be made by short-circuiting any such chokes when it will be found, provided that the tuning circuits are not at fault, that the trouble will be removed, and then, if such chokes are thought desirable, some attempts should be made to reduce the associated stray capacities. The chokes should be mounted well clear of a metal chassis; several connections should not be made to a single point, and the chokes should be made strictly to specification. In some output circuits it may be found that at the video anode there are shown in the theoretical diagram, an anode load resistor, a

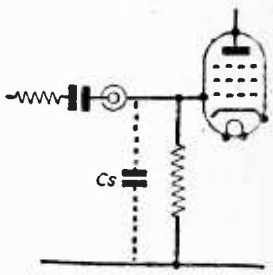


Fig. 3.—Excessive stray capacities in the grid circuit of a sync separator stage may result in lack of control in the time bases.

feed choke to a potentiometer across H.T. feeding the C.R. tube, as well as a connection to the sync separator stage. All these leads should not be bunched and taken to a single point, for instance, the video anode socket connection. It will be found preferable to take a single wire from the latter point to, say, one of the correction chokes, and then along this lead to take off the various incidental connections. Similarly, the lead to the sync separator stage will in most cases be taken through a condenser (and perhaps a resistor) to the separator stage, and this also should have a very low capacity not only in the interests of picture quality in the video stage, but also to avoid losses in the sync pulses. The condenser should, therefore, preferably be of the cardboard case or mica type (rather than a metal-cased variety) and should not be placed close to the chassis. It should be supported in the wiring or mounted on a tag strip or component mounting panel in such a manner that only the end is presented to the metal surface of the chassis and the associated wiring should not run parallel to an earthed wire or surface.

Linearity

Stray capacities in some time base circuits may seriously affect linearity, and where difficulty is experienced in obtaining a linear result from a published design attention should be paid to any parallel stray capacity effects which might exist and call for a modification of condensers which are fitted, or the removal of the excessive strays. In addition to the point mentioned above there is one other associated with capacities and that is leakage in a component such as a paper condenser. These do develop leakage in the course of time and also as a result of overloading, and in quite a number of circuits any leakage which exists may seriously affect the working of the circuit. For instance a leaky coupling condenser may result in a positive potential being applied to a valve grid and prevent the valve from functioning properly. Therefore, any condenser which acts as an isolating medium (rather than one which has a resistor in parallel with it) should be chosen to have as low a power factor as possible and old used capacitors should not be employed in such circuits.

Valve News

DESIGNED to meet the demand for advance or more complete information on Brimar valves, the new Brimar valve application report service has so far covered the following types :

6AM6	6BW6, 9BW6	12AU7	6BA6
6AT6	6CH6	12AX7	6BS7
6AU6	6T8	35W4	6CD6G
6BE6	6X4	50C5	6U4GT
6BR7	12AT7	5763	12AH8

A report on a time base for the C14BM rectangular wide angle C.R. tube has also been published.

Extra copies of individual reports can be obtained for 2s. 6d., or 5s. each, depending on the type, and these are stitched into a protective grey cardboard stiffener.

New American Valves

The Sylvana Company of America announce two new valves, 6BX7GT and 6111/2.

The 6BX7GT is a high perveance double-triode designed for vertical deflection and oscillator service in television receivers.

The 6BX7GT is particularly well suited for reduction of vertical distortion in television receivers due to low plate supply voltage.

The new tube is mounted in a T-9 bulb and is supplied with a short intermediate shell octal base with 8BD base connections. It may be mounted in any position. The tube is 1⅝in. in diameter, 3 $\frac{5}{16}$in. long, and is 2$\frac{3}{4}$in. high when seated.

Electrical characteristics of the 6BX7GT include :

Heater volts	6.3
Heater current, amperes	1.5
Plate volts (each section)	250.0
Plate current, mA (each section)	42.9
Plate resistance, ohms	1300.0
Transconductance, micromhos	7600.0
Amplification factor	10.0

Types 6111 and 6112 are sub-miniature double triodes.

The new triodes were designed for use at relatively high ambient temperatures where long life and stable performance are required under severe shock and vibration conditions in compact, lightweight equipment. Both of these tubes are suitable for use at frequencies ranging up into the U.H.F. region.

Type 6111 is a medium-mu double triode in a T-3 envelope, with characteristics similar to those of type 6SN7GT and may be used for similar applications within the 6111's ratings. Characteristics of the new sub-miniature 6111 include :

Filament, volts	6.3
Filament, current, mA	300.0
Plate, volts (maximum)	150.0
Plate current, mA (maximum)	22.0
Plate dissipation, watts (maximum)	1.1
Transconductance, micromhos	5000.0
Amplification factor	20.0

Type 6112 is a high-mu double triode in a T-3 envelope with characteristics similar to those of type 6SL7GT and may be used for similar applications within the 6112's ratings. Characteristics of the new subminiature 6112 include :

Filament, volts	6.3
Filament, current, mA	300.0
Plate, volts (maximum)	150.0
Plate current, mA (maximum)	1.25
Transconductance, micromhos	2500.0
Amplification factor	70.0

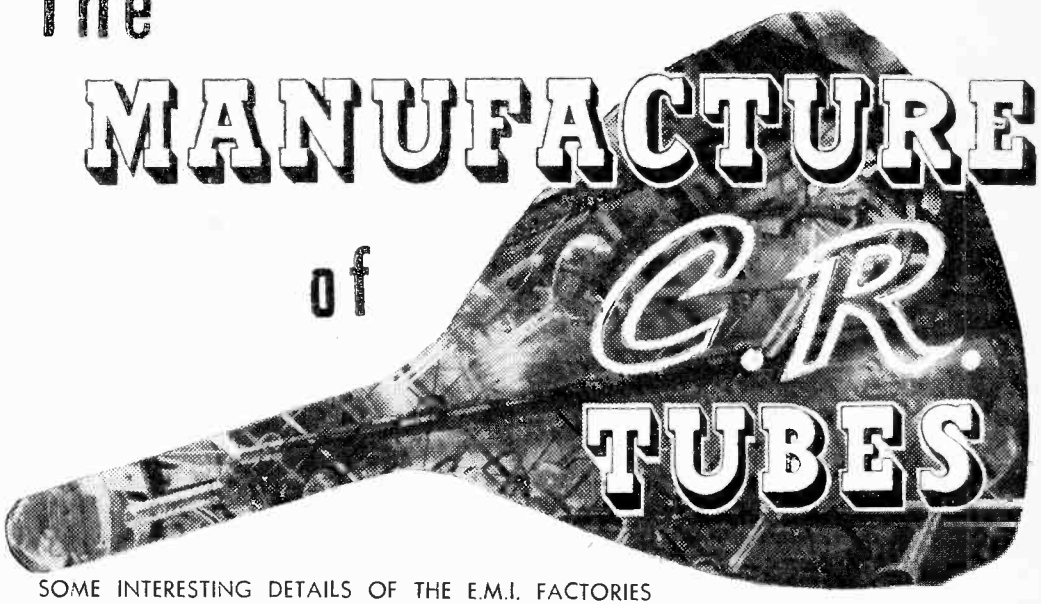
Wenvoe Tests

THE BBC are making daily test transmissions on medium power from the new television transmitting station at Wenvoe, in readiness for the opening of the station on August 15th. The tests normally take place each week-day, apart from the Bank Holiday week-end, between 11 a.m. and 12 noon and between 3 p.m. and 4 p.m., but they are subject to interruption and alterations in timing in accordance with engineering requirements.

The morning transmissions consist either of demonstration film or of still patterns, and the afternoon transmissions of still patterns only.

These medium-power transmissions do not give the full coverage that will be obtained later on high power, and reception is more susceptible to interference.

The MANUFACTURE of C.R. TUBES



SOME INTERESTING DETAILS OF THE E.M.I. FACTORIES

THE rapid growth of television in this country has made the cathode-ray tube almost as familiar an item to the general public as, say, the loudspeaker of a radio set.

The way in which these tubes are made, the host of involved and intricate processes necessary, and the complicated and ingenious machinery required in their manufacture provides a fascinating story.

A striking example of the application of modern mass-production methods to the manufacture of cathode-ray tubes is to be found in the E.M.I. factories plant.

To follow the many processes entailed in the making of Emiscope tubes, an outline of the sequence of operations, and descriptions of some of the numerous items of automatic equipment installed in the plant, are given in the following notes, with appropriate illustrations of certain parts of the process.

Bulb and Neck Welding

The familiar glass envelopes of the tube arrive at the E.M.I. factory in two component parts: the screen and bulb, and the cylindrical neck. Skilled glassworkers operating specially designed lathes weld the parts together to make the complete tube envelopes.

It is worthy of note that in spite of supply difficulties only hard glass is used in the manufacture of these tubes. Hard glass, because of its high resistance to thermal shock, enables much more rigorous and exacting processing to be performed than is possible with normal glass.

Screen Settling

Once the complete tube envelope is assembled, the next step is to apply the fluorescent screen to the face of the tube, but before this is done it is of vital importance that the glass is suitably prepared to receive the fluorescent materials. This is achieved by shaking and rotating the tube so that a quantity of marble chips inserted in the bulb thoroughly cleanses the glass face.

Prior to the advent of the rotary shaking machine this extremely essential operation was performed manually. For the operators employed on this task it was a very strenuous and lengthy business. The tube had to be shaken and rotated at the same time so that the marble chips removed all contaminants from the glass face.

The E.M.I. rotary shaker now carries out this complex process automatically. Its ingenious mechanism not only faithfully reproduces the duplex shaking and rotary action necessary for efficient cleaning, but furthermore, at the pull of a lever the marble chips are ejected and the tube placed in position to receive the injections of acid and demineralised water which complete the operation. Before they are used again for the cleansing of other tubes the marble chips are thoroughly rewashed.

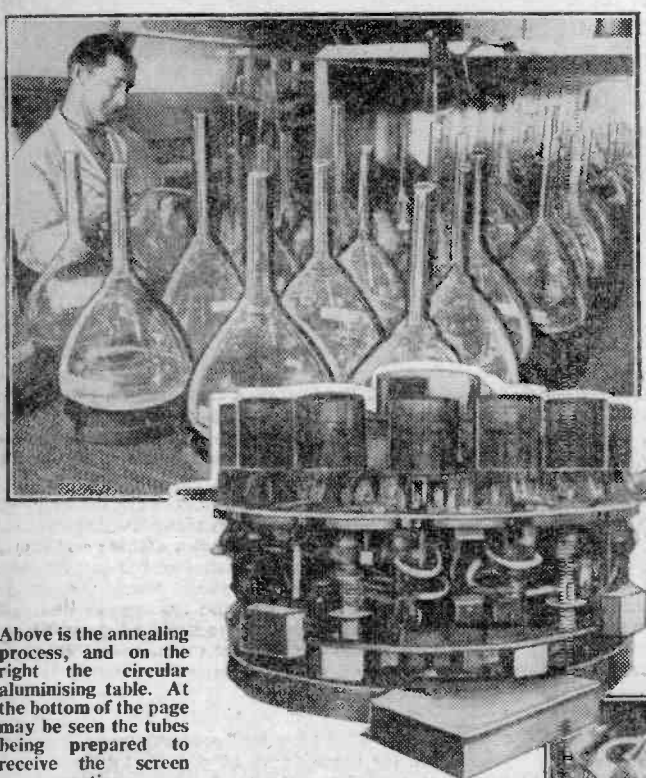
The decontaminated tubes are now almost ready to have the fluorescent screen deposited or "settled" on the glass face. This "settling" process is one of the most intricate in the manufacture of picture tubes and was originally carried out by hand. The process was a lengthy one requiring a high degree of skill, and in order to achieve a high output a large number of operators had to be employed on it. Recent expansions of the E.M.I. plant and the introduction of new manufacturing techniques have lead to the development of the three giant automatic screen settling conveyors now installed in the factory. They are the only machines of this type in Great Britain. Each measures about 60ft. long and 15ft. high and is attended by only three operators.

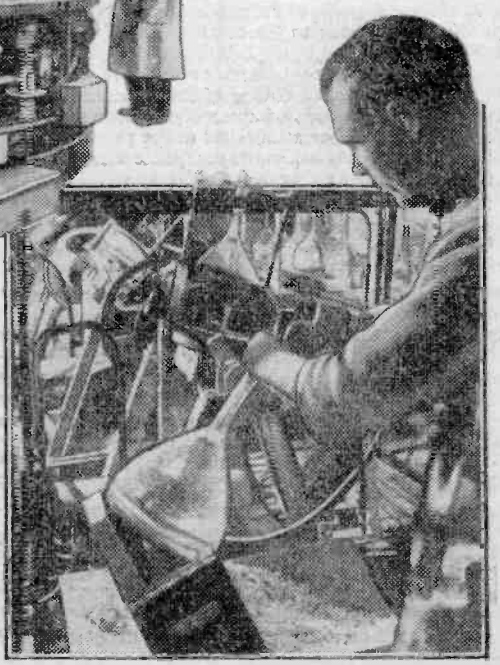
Before the tubes are settled they are given an initial rinse in a concentrated solution of caustic soda, followed by another in demineralised water. Overhead conveyors then carry them from the rinsing bays to the automatic screen settlers.

There they are placed on the moving conveyor belt which, as it travels, carries the tubes past the dispensing heads, where the correct amount of fluorescent screen

material (pre-mixed with demineralised water) is injected. The tubes travel slowly along to the other end of the conveyor to give the screen powder time to settle and then a film of nitro-cellulose is added, which settles on the surface of the demineralised water. (The nitro-cellulose is introduced to provide a suitably receptive surface for the aluminising film which is added later. It is removed during a subsequent stage of manufacture by a baking process.)

At either end of the platform is a large drum. As the tubes, now containing the screen deposit, pass round the circumference of the drum at the far end of the conveyor the demineralised water is automatically tipped out, leaving the nitro-cellulose to settle evenly on the fluorescent screen. After the liquid has been removed the tubes are dried by jets of warm air and are then taken off the conveyor ready for the next stage of manufacture, that of aluminising. One of the settling conveyors has been fitted experimentally with an automatic drying conveyor, which runs in a pit beneath it. From here the dried tubes are transported to the aluminising bays.





Above is the annealing process, and on the right the circular aluminising table. At the bottom of the page may be seen the tubes being prepared to receive the screen coating.

Aluminising

The aluminising of C.R. tubes is a comparatively recent innovation, which E.M.I. were the first to perfect in this country. They have been manufacturing them on a production scale since 1949.

The aluminising process consists of depositing a microscopically thin film of aluminium (about 5 millionths of a centimetre thick) on the face and bulb of the tube, and to spread this film evenly over the tube is a very delicate and refined operation, calling for great care and accuracy. This film acts as a "mirror" to the light produced on the fluorescent screen by the impact of the beam of electrons shot from the electron gun, and by reflecting it in a forward direction towards the viewer, and not allowing any to escape back into the tube, greatly increases the brightness of the picture. Furthermore, whilst being substantially transparent to the light-producing electrons, the aluminium film effectively prevents any ions that may be present in the tube from reaching the screen and causing the well-known ion burn.

To accommodate the vast numbers of aluminised tubes now being turned out, an automatic rotary aluminising machine has been devised, capable of performing this operation on a mass-production basis. Three of these machines —they are the only ones of their type in the country— are now in operation in the E.M.I. factory and between them are capable of aluminising nearly 100 tubes an hour.

The rotary aluminiser consists of a series of head units, each fitted with a sillicone vacuum pump on a rotating circular platform. Tubes are loaded on to the aluminiser and a filament carrying an aluminium pellet of carefully predetermined size and weight is inserted into each tube. As the circular platform rotates, the pumps evacuate all gases from

the tubes until a vacuum is obtained. An electric current is then passed through the filament so that the aluminium pellets evaporate, and, due to the vacuum conditions inside the tubes, spread a microscopic film of aluminium evenly over the faces and bulbs of the tubes. Certain of the head units of one of the aluminisers have been specially equipped to provide for aluminising the neck of the tube in addition to the screen and bulb to enable the graphite coating, normally applied, to be dispensed with.

At this step it is necessary to remove the organic process materials, including the nitro-cellulose film, from the tubes. This is achieved by a rotary pre-bake oven, in which they are heated to a temperature of 450 deg. C.

Inserting the Electron Gun

The glass bulbs, complete with fluorescent screen and aluminising film are now ready to be fitted with the electron "gun" assembly, which shoots the beam of electrons on to the fluorescent screen. This done, the glass "pinch," through which the pins connected to the various gun electrodes protrude, is then sealed on, and the tube has almost assumed its final appearance.

Evacuation and Sealing

The next stages in the manufacture of Emiscope cathode-ray tubes—those of sealing the tubes on to the vacuum pumps, evacuating the tube envelopes, baking, degassing the electrodes and finally sealing up the tube—are all performed by a huge automatic pumping machine. This amazingly complicated apparatus consists of 28 trucks, each equipped to accommodate two tubes. These trucks travel round an oval-shaped track, and as they progress, skilled operators carry out their various processes.

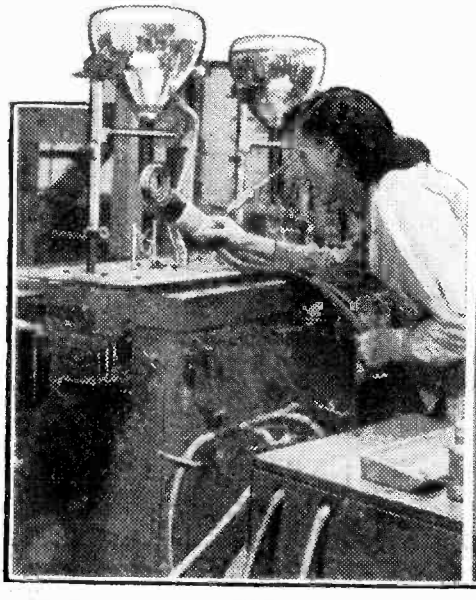
The first of these processes is that of sealing the tubes on to the vacuum pumps so that the air can be evacuated from the envelopes. Then as the tubes travel slowly round the pumping operation takes place. While the pumping is in progress the tubes enter a baking oven where they are heated to a temperature of 500 deg. C. to remove gas from the glass bulb and walls. As the tubes emerge from the oven a high-frequency current from an eddy-current heater is applied to the modulator to outgas it effectively. No actual contact with the metal is made, the high-frequency current from the heater work coil being induced in it from outside the tube neck. It is interesting to note that the high-frequency heaters employed in both this operation and the getter firing process which follows are produced in the E.M.I. factories as part of their wide range of industrial electronic equipment. A cathode surface is then "formed" by passing a voltage through the tube heater.

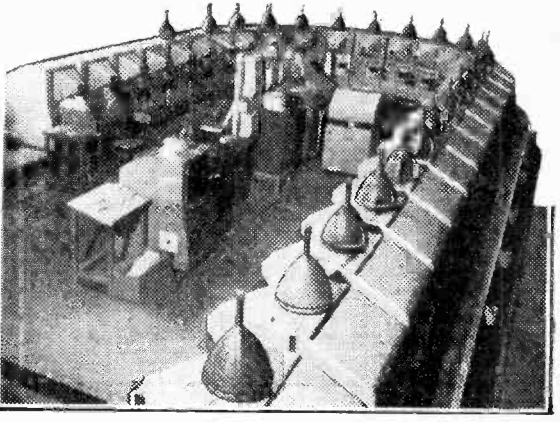
The evacuated tubes are "sealed off" from the vacuum pumps and are then fitted with their anode connecting caps. E.M.I. have developed a novel method of performing this operation quickly, simply and with no risk of damage to the tube. Into the hollow anode cap is inserted a brickette of thermo-plastic conductive cement. The cap is then placed into a heating element which is attached to an electrically heated soldering iron, and applied over the anode contact protruding from the bulb of the tube. The heat causes the cement to adhere firmly to the glass and to the anode contact, electrical connection between the cap and the contact being secured by means of the conducting properties of the cement.

Ageing and Testing

The finished cathode-ray tubes are "aged" and tested on yet another amazing piece of apparatus which might justifiably be mistaken by the laymen for a model railway. It consists of 55 self-contained test cabinets, each carrying a tube, which travels round on an oval-shaped track.

By the time they reach the end of the track the ageing process is complete and the tubes are then meticulously tested for brightness, focus, degree of vacuum, deflection linearity, etc., to ensure that all tubes leaving the factory measure up to the exacting standards of quality and reliability required of Emiscope tubes.

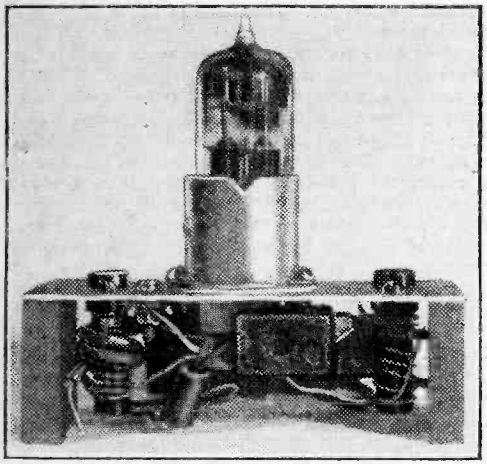




On the left is shown Modulator Outgassing process, whilst on the right may be seen the railway carrying the tubes for the ageing and testing process.

The "ARGUS"

A HIGH-GAIN, COMPACT UNIT FOR THE



The complete Pre-amplifier

ALTHOUGH this pre-amplifier was originally designed for the "Argus" televisor, its compactness makes it suitable for use with practically any televisor—homebuilt or commercial. It uses one of the modern miniature valves (a Mazda 6F12), which provides high gain with low noise.

Fig. 1 shows the circuit. Following the principles of the Argus design, the amplifier has been kept as simple as possible, consistent with good results, so that it can be built with confidence by the novice.

The H.T. and heater supplies are obtained directly from the existing vision receiver, the slight extra drain (300 mA. L.T and 12 mA. H.T.) adding very little to the total load on the mains transformer.

Coil Details

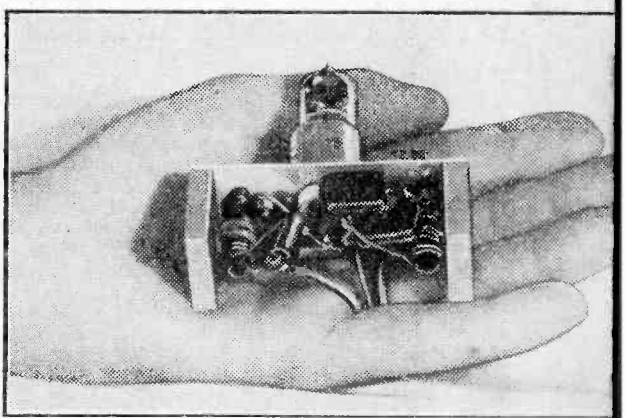
The prototype was designed to work on the Sutton Coldfield transmitter, but the number of turns required for any channel are given in the table.

L1 and L2 are wound in bare 22 s.w.g. wire, the turns being approximately 2 mm. apart, though this figure is not too critical, and it will be found that the Alexandra Palace transmitter will require closer spacing than this to accommodate the turns on the coil former.

The coil formers are ½in. in diameter and are tuned with iron-dust cores. L1 is wound in a clockwise direction starting from the bottom of the coil, the earthy end of the winding being earthed under the coil-retaining bolt. The tap is made while the coil is being wound and it will be found easier to make the windings before the coil is mounted on the chassis. If the bare wire is so wound that adjacent turns are touching, then it will be found they will spring apart when the pressure is released and the correct spacing between turns obtained.

L2 has the primary wound first in bare wire. The primary is the coil with the larger number of turns. The wire is wound in a clockwise direction, but as there is no earthy end the wire should not be terminated under the coil-retaining bolt. The secondary is wound next, the wire (22 s.w.g.) being covered with plastic sleeving. The turns are wound so that they come on top of the existing winding, at the bottom end of the coil. The earthy end is earthed under the coil-retaining bolt.

Fig. 2 shows the coil winding details.



This illustration gives an idea of the size of the unit.

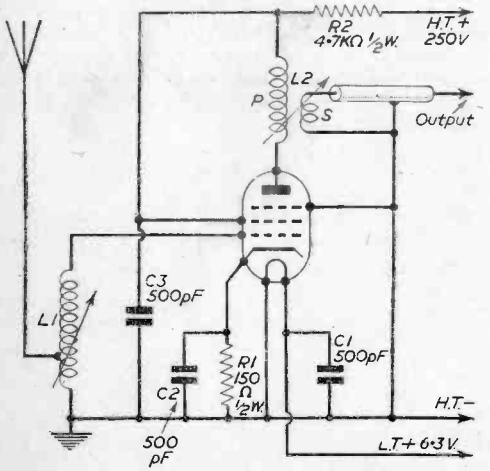


Fig. 1.—Theoretical circuit of the Pre-amplifier.

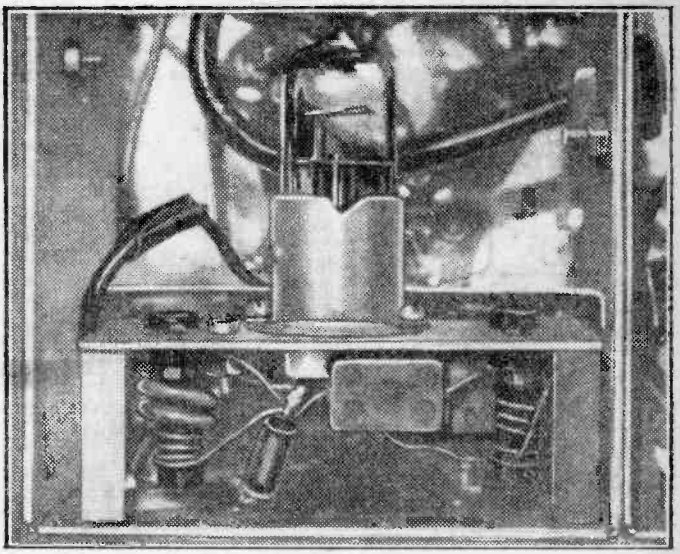
COIL WINDING DATA

Coil	Alex. Palace	Sutton Coldfield	Holme Moss	Kirk o' Shotts	Wenvoe
L1 tap	3	2	2½	2	1½
L1	12½	8	11	9½	6
L2 p	12½	8	11	9½	6
L2 s	3	2	2½	2	1½

½in. coil-formers with iron-dust cores.
Wire, 22 s.w.g. Bare. 2 mm. spacing between turns.
L2 s 22 s.w.g. insulated wire.

Pre-amplifier

"ARGUS" TELEVISOR



The Pre-amplifier incorporated in the Argus.

The Chassis

The chassis is very simple, consisting of a sheet of aluminium measuring 3in. by 1¼in. In the prototype the end pieces were made from hardwood ¼in. thick by 1in. by 1¼in. It is suggested, however, that the aluminium chassis could be extended as shown in the diagram in Fig. 3.

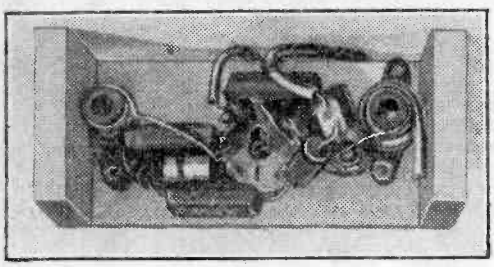
Wiring

The wiring diagram is given in Fig. 4. The only point to remember here is to keep the leads as short as possible. The input to L1 is made by coaxial cable from the aerial socket on the Argus, and the output is also taken via coaxial cable to the first coil in the Argus, where the aerial is normally connected.

If the pre-amplifier is being used with another televisor then the connections will be similar, provided the televisor normally uses coaxial cable. If the televisor is of the balanced twin input type, then the coil circuits will have to be slightly modified as shown in Fig. 5.

Fitting

The unit can be fitted at any convenient point, preferably adjacent to the aerial and clear of power packs and time-bases. A suggested position for the Argus is shown in Fig. 6.



Compare this illustration with Fig. 2 below.

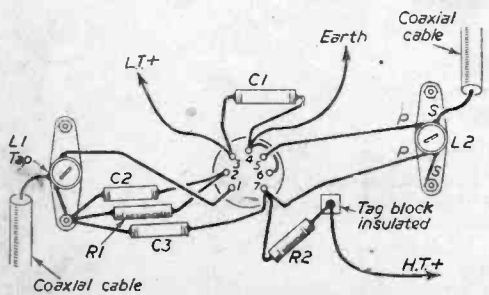
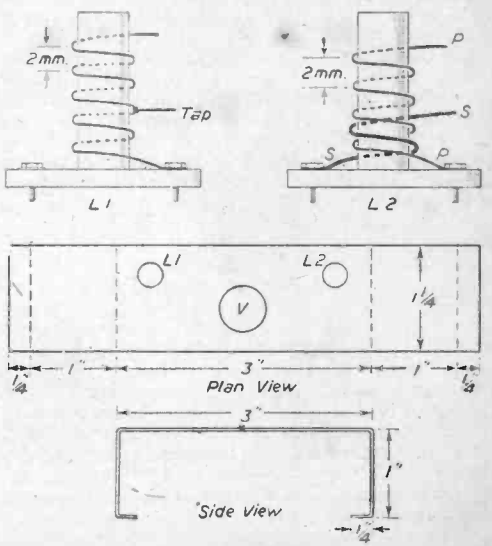


Fig. 4.—Wiring details.

Alignment

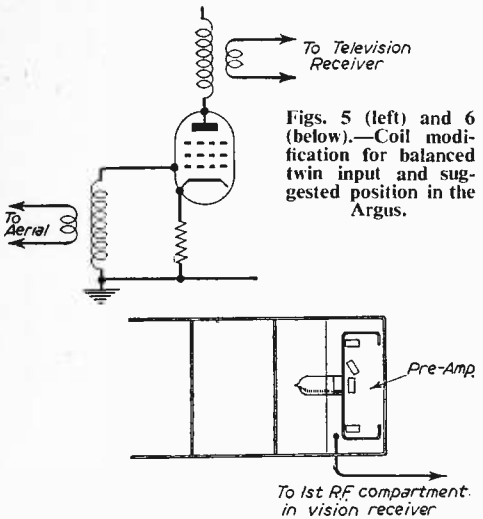
Alignment is extremely simple; all that is necessary is to adjust the iron-dust cores for maximum vision. The best method of doing this is to adjust Brilliance and Contrast controls until a normal picture is received, and then to turn down the *Brilliance* control until the high lights of the picture can just be seen. It is preferable to do this on test card C, or even the opening tuning-in signal, as the high lights vary with picture content during the programme.

By adopting the above method it is then quite easy to obtain maximum picture amplification, the Brilliance control being reduced as the screen brightens.



Figs. 2 and 3.—Coil-winding details and chassis data.

It will be found that the tuning is not sharp, the amplifier passing a good bandwidth. On London, however, it may be found that the sound is not amplified sufficiently and the tuning should therefore be adjusted to obtain the best balance between sound and vision.



Figs. 5 (left) and 6 (below).—Coil modification for balanced twin input and suggested position in the Argus.

If the bandwidth is found insufficient it can be broadened by connecting a 4.7 KΩ resistor across L1 and another across the primary of L2.

Once the best tuning position has been obtained the cores of the coils should be locked in position with a drop of wax.

General

H.T. and L.T. supplies are obtained from the Vision receiver supplies L.T. from pin 1 V1, and H.T. from any convenient point on the H.T. plus line.

If the pre-amplifier is being used with a televisor other than the Argus, then the L.T. will be obtained from the televisor's normal supply. If the valves are wired in parallel, then the L.T. is taken to the "live" L.T. line and H.T. to the H.T. plus line, the chassis of the unit being earthed to the chassis of the televisor. If, however, the valve heaters in the televisor are wired in series then the position is a little more difficult.

One method is to take two leads from the heaters of the 6F12 and insert them in the series chain at some convenient point. One side of the heater of the 6F12 which is at present earthed must be *disconnected* from earth. The valve takes 0.3 A., which is the current generally flowing in series heater chains in televisors, but the dropping resistor at the end of the chain will have to be adjusted to compensate for the added heater. The method of making this adjustment will, of course, depend upon the televisor being used.

There should be no difficulty in finding the H.T. line, the H.T. plus from the pre-amp. being connected to this line. The chassis of the pre-amp. will have to be connected to the chassis of the televisor.

If the constructor is doubtful about interfering with the existing L.T. line, then an inexpensive L.T. transformer can be used to supply heater current. Its output should be rated at 6.3 v. 0.3 A.

German Show Postponed

ACCORDING to a decision made by the Exhibition Committee of the German Radio Industry in co-operation with the Nordwestdeutsche Ausstellungs-Gesellschaft in Düsseldorf the "Great German Radio and Television Exhibition" which was to take place in Düsseldorf from 22nd to 31st August will now be held from 27th February to 8th March, 1953.

The Department "Radio and Television" of the Main Union of the German Electrical Engineering Industry informs us that the Exhibition will offer a comprehensive show of the capacity of the German receiver manufacturers and, in addition, feature receiving sets fully developed for ultra-short wave reception. It will also demonstrate the latest technical developments in respect of magnetophones and gramophones and, at the same time, be the start of regular television programmes in Western Germany.

As the North West German Radio will not be in a position to enable television programmes to be broadcast throughout the whole of Western Germany before spring, 1953, the Exhibition has been postponed until this date.

Although wireless sets have the main appeal to the ear, whilst television sets appeal to the eye, and that in consequence thereof there is a considerable difference between "electro-acoustic" and "electro-optical" sets, it would have been possible to arrange for a Great Radio and Phono Exhibition to be held at the fixed date, and to dedicate another show to television when the regular German television transmissions start in spring, 1953. In order, however, to restrict the number of German exhibitions as far as possible, the German Radio Industry prefers to postpone the whole arrangement.

Training for Wenvoe Dealers

THE new BBC Television Station at Wenvoe is scheduled to commence transmission on August 15th and will create an urgent need for many expertly trained television service engineers to deal with the installation and service problems which will arise.

E.M.I. Sales and Service, Ltd., the distributing and servicing organisation for the H.M.V. and Marconiphone companies, are beginning a series of "on-the-spot" training courses for dealers and members of their service staffs. Suitably equipped premises are being taken over in Cardiff at 31, Clare Street.

Free

These courses will be free of charge, and in addition to giving a general theoretical background of television, will familiarise dealers with the circuits, features and operation of all current "His Master's Voice" and Marconiphone Models. Courses of 10 days' duration are being arranged, scheduled to commence July 7th, July 21st, August 11th, August 25th and September 8th.

Accommodation

Local accommodation will be found for those attending the courses who may have some distance to travel into Cardiff.

"His Master's Voice" and Marconiphone dealers may obtain details from Mr. A. J. Lillicrap, Training Division, E.M.I. Sales and Service, Ltd., Sheraton Works, Wadsworth Road, Greenford, Middlesex.

Franco-British Joint Television Programmes

DETAILS OF THE COMPREHENSIVE NETWORK USED FOR THIS MEMORABLE BROADCAST WEEK

SOME 17 programmes were televised from Paris between July 8th and July 14th.

The programmes were arranged jointly by the BBC Television Service and Radiodiffusion et Télévision Françaises, and were seen simultaneously by viewers in both countries.

The Link-up

Since the Press demonstration at Alexandra Palace on April 21st at the conclusion of the technical tests between Paris and London, discussions continued between engineers of Radiodiffusion et Télévision Françaises and the BBC. It was concluded that the technical methods adopted during the test period were basically satisfactory, and the same methods were followed for the week of the programmes just given.

The technical arrangements were as follows:

Paris

From the O.B. points vision signals were conveyed to a receiving point at the Eiffel Tower by radio link. Three 9,000 Mc/s radio link units were used, manufactured by the Compagnie des Compteurs. The programmes were broadcast to French viewers in the Paris Region from the two RTF transmitters in Paris, one operating on the 819-line system and the other on the 441-line system (the old French standard). The RTF converter developed by the French firm Radio Industrie was used to convert the 819-line pictures to the 441-line standard.

Paris-Lille (136 miles)

The 819-line vision signals were carried by the RTF experimental radio link with intermediate stations at Villiers-Cotterets (44 miles north-east of Paris) and Sailly-Saillissel near Peronne (50 miles from Villiers-Cotterets and 42 miles from Lille). This radio link worked on a frequency of 900 Mc/s approximately and was manufactured by Compagnie Française Thomson Houston. This link was used by RTF to supply programmes to the Lille television transmitter until the permanent radio link now being installed by the French Post Office is ready.

Lille

The programmes were broadcast from the RTF transmitter at Lille for the benefit of viewers in that area.

Cassel

The Lille transmissions on 180 Mc/s approximately were picked up at Cassel by a special receiver manufactured by Société Desmet. RTF also installed a temporary radio link working on 9,000 Mc/s approximately, manufactured by Compagnie des Compteurs. The signals thus received were fed to the converter developed by the BBC Research Department, for changing pictures from French standards to British standards (819-405 lines).

Cassel-Alembon (18 miles)

BBC radio link on 7,000 Mc/s approximately. Equipment manufactured by Marconi's Wireless Telegraph Co., Ltd.

Alembon-Swingate (Dover) (40 miles)

BBC radio link on 4,500 Mc/s approximately. Equipment manufactured by Electric and Musical Industries, Ltd.

Swingate-Wrotham (49 miles)

BBC radio link on 4,500 Mc/s approximately. Equipment manufactured by Electric and Musical Industries, Ltd.

Wrotham-London (23 miles)

BBC radio link on 4,500 Mc/s approximately. Equipment manufactured by Standard Telephones and Cables, Ltd.

At various times during the week four different types of camera equipment were used, namely :

Manufacturer	Type
Pye, Ltd.	Image-Orthicon
Radio Industrie	Image-Orthicon
Compagnie Française Thomson Houston..	Photicon
Radio Industrie	Image-Iconoscope

Pye Cameras

Camera equipment, manufactured by Pye of Cambridge, was used for all the outside broadcasts in Paris. Pye engineers, with a complete Pye Mobile Television Station, designed to work to the French 819 line system, passed Television pictures simultaneously into the French and British Television networks. The pictures seen by British viewers were passed from Paris to London, through the series of special micro-wave links mentioned on page 123.

Studio Reconstructions

For part of the programme " Paris of the Arts," which viewers saw on July 9th, a typical existentialist club was reconstituted in the studio. It was representative of all the Caves of St. Germain des Prés and gave a glimpse of the unique form of entertainment to be found there.

Night Club

The outside location for the cabaret programme on July 12th was " La Nouvelle Eve," the first elegant night club to open in the Pigalle district of Montmartre since the war. It is typically French and cosmopolitan, and it became instantly fashionable.

Radio Technicians May Get Deferment

TO increase the number of technicians available in the radio industry, the Radio Industry Council, in agreement with the Ministry of Labour and National Service, is introducing a scheme of training for radio technical and laboratory assistants which may qualify them for deferment of military service. Trainees will register with the R.I.C. at the age of 16 or up to 17 and will be issued with a nationally recognised certificate on completion of training at the age of 21. Trainees will apply for deferment of military service in the normal way, with R.I.C. support. In a letter to member-firms the Secretary of the R.I.C. states :

" *Not only will the long-term effect of the R.I.C. scheme be beneficial to the industry, but, in the short-term, the fact that the scheme has the approval of the Ministry of Labour means that trainees under it will be eligible for deferment from military service, thus maintaining the numbers already in training.*"

In a memorandum to its officers throughout the country the Ministry of Labour states that :

" *Trainees are to be given progressive training through workshops, followed by a period in test departments and/or laboratories. The trainee should not normally be employed on lengthy repetition work except where such work is progressive and only as a stage in the training. The final year should be spent in the laboratories or test-room or on test-equipment maintenance or prototype construction ; all work being arranged in stages so as to provide an orderly course of training to the technician level as defined.*

" *Trainees are to be released from one day or two half-days per week for training in* (1) *A National Certificate Course in Electrical Engineering,* (2) *An Internal Grouped Course of the City & Guilds of London Institute in Telecommunications Engineering, or* (3) *Such other course for the training of radio technicians as may be later determined by the Technical Training Committee of the Radio Industry Council in conjunction with the Ministry of Education.*"

The scheme, which has been approved by the four constituent associations of the R.I.C., lays down only the broad lines on which training should progress and does not supplant any training scheme operated by individual companies and recognised by local offices of the Ministry of Labour, the intention being to provide a national scheme embracing existing ones.

The Ministry of Labour defines a radio technician thus :

" *A radio technician is a person who carries out in a responsible manner approved techniques which are either common knowledge amongst those who are technically expert in his branch of industry or specially prescribed by professional radio engineers. These techniques are not those of the craftsman, though they may involve manual skill ; in many cases they include the skilled use of delicate and complicated instruments and may also require the intelligent and accurate use of approved methods of calculation. They involve practical experience of some limited branch of radio-engineering combined with the ability to complete the details of a project using well-established practice.*

" *To become a radio technician a person must have received a technical education up to a standard at least, and preferably beyond, that of the Ordinary National Certificate in Electrical Engineering, and in addition must have had training and experience in the particular sphere of radio-engineering in which he is to work.*"

Canada's First TV Station

CANADIAN television is due to begin this month and the first test signal was recently transmitted from the Mount Royal station.

One of the test patterns was an Indian's head which may become Canada's television emblem.

Colour Trend

THE annual report issued of the Comptroller General of Patents, Designs and Trade Marks, Sir John L. Blake, states that the general trend in television invention and research during the past year was towards colour pictures and also more compact receivers with iron-cored transformers omitted, making them safer and cheaper.

Kirk o' Shotts High-power Transmitter

AT a meeting of the annual congress of the Radio Industries Club of Scotland, Mr. Melville Dinwiddie, Controller of the BBC, Scotland, said that it was hoped that the high-power Kirk o' Shotts transmitter would be in operation by August and that a new O.B. unit would be ready early in the same month in time for the Edinburgh International Festival.

Surgical Operations Televised

A MARCONI television demonstration team, which has just returned from a 10-weeks tour of 19 Danish communities in addition to supplying outside broadcast programmes to the Copenhagen television transmitter, has gone to Brussels to televise surgical operations at an international medical conference.

So that delegates can watch new operating techniques in comfort—it would not be possible to accommodate them all in a normal operating theatre—a camera has to be set up in one theatre of each of three main hospitals. Six large screen monitors in adjoining lecture theatres provide the means of viewing.

Wreck Discovered by Underwater Camera

AT the first public demonstration of the new Pye deep-sea television camera, given recently in Falmouth Bay on board H.M.S. *Reclaim* (Lt.-Comm. Bathurst, R.N.), an unknown wreck was discovered at a depth of approximately 240ft. Pictures of the superstructure and rigging were clearly visible on screens fitted on the bridge and in the wardroom. Lt.-Comm. Bathurst has said that the uncharted wreck discovered by the camera was probably that of some merchantman sunk during the last war.

The camera is capable of efficient operation at depths of 1,200ft., and has special facilities for lens changing and focusing by remote control.

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

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

Engineering Division Appointments

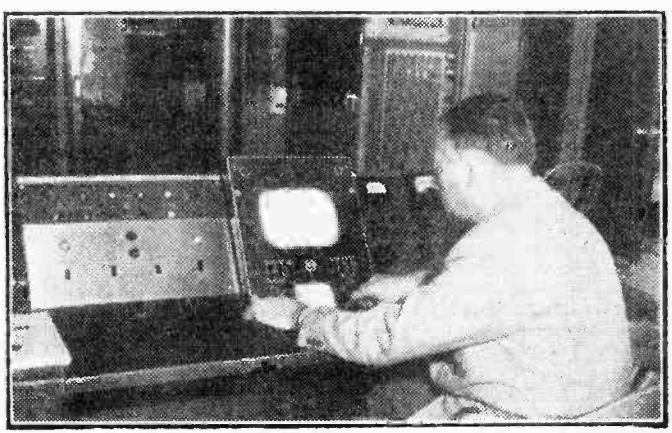
THE BBC announces that Mr. J. P. Broadbent has been appointed Engineer-in-Charge of the new television transmitting station at Wenvoe, near Cardiff.

Mr. Broadbent joined the staff of the BBC in 1931 and served at the Moorside Edge transmitting station until 1935 when he was transferred to Droitwich. In 1951 he was at the television transmitting station at Sutton Coldfield for a short time, and later became Assistant Engineer-in-Charge at the Holme Moss television transmitter and has held this post until his present appointment.

"Of Mice and Men"

WHEN the BBC televised "Of Mice and Men" recently, it was the first full-length feature film to be shown in an evening's programme for some time.

Made in 1940, the film is an adaptation from John Steinbeck's book which was published in 1937,



Mr. Roland Beaulieu, CBC technician at the controls of the reception panel in the Mount Royal transmission station, looks at one of the test patterns on the screen.

and, in dramatised form, won the New York critics' prize for the best play of 1937-38.

Many thought, however, that the rough talk of the two wanderers around whom the action is centred would never pass the Hays Office and that to film it would be more than a gamble. But director Lewis Milestone and Hal Roach took the gamble and hired the Agoura Ranch of William Randolph Hearst at 25 dollars a day, prepared a script in collaboration with Steinbeck and with Burgess Meredith, Betty Field and Lon Chaney Jnr. in the leading roles shot the story in 42 days.

"Stories in Stamps"

"STORIES in Stamps" a new series of programmes for Children's Television will begin in October, the BBC announces.

Previously, the series was planned to start in June.

Broadcast Receiving Licences

APPROXIMATELY 12,691,000 broadcast receiving licences, including 1,523,000 for television, were current in Great Britain and Northern Ireland at the end of May, 1952.

The number of television licences increased by about 36,000 during the month.

Motorists are again reminded that they need a separate broadcast receiving licence for a wireless set fitted in a car.

H.M.V. Trademark

LEAVING its normal place of safety for only the second time in its existence, the original painting of the H.M.V./E.M.I. trademark was flown across the Atlantic by Pan-American Clipper recently.

Although the true purpose of its journey has not yet been announced, it is understood that E.M.I. held a conference in New York, probably with the R.C.A.-Victor, and that the painting was taken over as a publicity deal.

Also on the Clipper was Mr. David Bicknell, recording manager for E.M.I., who took part in the conference. He returned with the painting on the following Sunday.

Hangar to House Unit?

THE BBC is considering, among other possible sites, a hangar at Whitchurch airport as a means of housing a BBC outside broadcast unit to serve South Wales in conjunction with the new Wenvoe transmitter.

It is understood that the BBC has applied for use of the site but has not yet obtained planning permission.

Protests Against "Piped" Service

HULL's scheme to provide "piped" television to its people by means of a telephone network system has met with opposition, particularly from Rediffusion (Yorkshire), Ltd., the Radio and Television Traders' Association, the Relay Services Association of Great Britain and the Hull Chamber of Commerce.

The service would be cheaper than buying a commercial set although a special receiver would be necessary.

Eight-month Search

FOR eight months, viewers in Port Jefferson, Long Island, U.S.A. were constantly annoyed by blackouts on their screens until the mystery was solved by the local citizens' committee.

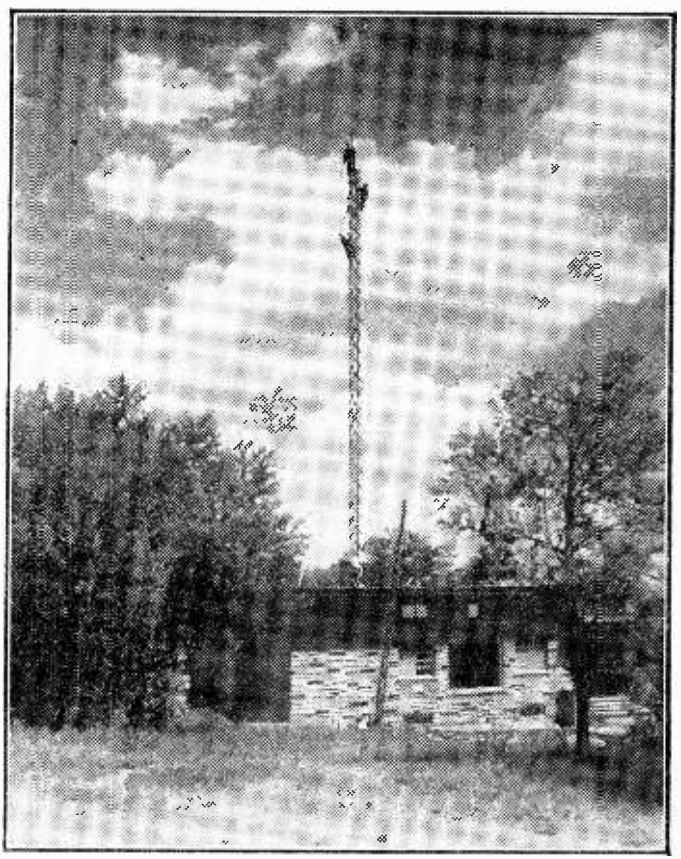
A railroad company was able to prove that its new diesel engines were not to blame, so a team of special engineers was brought from Washington.

They found the cause of the interference to be a street lamp with a faulty insulator which had been damaged by vibration.

Wenvoe Coverage

ACCORDING to the Assistant Postmaster-General, Mr. L. D. Gammans, the boundary line of the area to be served by the new Wenvoe transmitter is expected to run through Barnstaple, Tiverton, Teignmouth, Swanage, Marlborough and Gloucester, and just north of Brecon, Carmarthen and Tenby.

As there are many mountainous districts in the area, reception quality may vary, especially during the first few months when the station will be operating on low power.



Workmen make last-minute adjustments to the mast at the Mount Royal transmission station before Canada's initial television try-out.

TRADE TOPICS

Cinesmith Chassis

THE 12in. television chassis offered by Cinesmith Products is a high-performance full bandwidth superhet receiver for use on 200/250v. A.C. or D.C. mains. The 12in. G.E.C. aluminised tube employed shows a large clear picture 11¾in. x 9in. of exceptional brightness and contrast range due to the aluminised screen and full bandwidth plus good resolution.

Any of the five TV channels can be received by means of plug-in coils; the receiver is quite simple to operate, having only two main controls for day-to-day use, Brilliance On/Off and Volume set at the side, and usual pre-set controls at rear of the chassis.

Hard valve time bases with fly-back E.H.T. and efficiency boost, permanent-magnet focusing, interference limiters, and Brimar all-glass valves are features of the chassis whilst the neat and compact layout is the outward and visible sign of thorough design and careful assembly.

During the past 15 months considerable numbers of these receivers have been used daily in Yorkshire and London, and field tests carried out in all TV areas ensure reliable performance. The chassis is fully guaranteed and is factory assembled, wired, aligned, and "soak tested" for six hours. It represents excellent value to all potential viewers who have facilities for fitting it into a piece of furniture, wall, cupboard, or cabinet of their own choice or construction. Fully dimensioned drawings of an easily constructed cabinet are supplied with the chassis on request. Price of the chassis with tube, valves and speaker, aerial tested and ready for use, is £54, including P.T. It is also available in a table model cabinet of handsome appearance in figured walnut veneer, piano finished. Price 65 gns., including P.T.—**Cinesmith Products, Britannic Works, Regent Street, Barnsley, Yorks.**

Change of Address—R.C.E.E.A. Moves to Mayfair

THE Radio Communication and Electronic Engineering Association (Secretary, S. Neill Christie) moved from 59, Russell Square to larger premises at 11, Green Street, London, W.1, on June 24. The new telephone number is Mayfair 7874/5.

Decals or Transfers

MANY constructors are interested in marking their apparatus, either for pointer indications or for particular uses of switches, plugs, etc. Hitherto, it has not been a simple matter to obtain a "professional" look in such marking and transfers which were popular before the war are not now readily available. Messrs. Alexander Equipment, however, have now produced a neat book of such transfers in which the six pages are divided up into groups. Page 1 is primarily for use with communications equipment, amateur transmitters and audio amplifiers; page 2 oscilloscopes and television; page 3 radar and navigation; page 4 general electronics, and pages 5 and 6 general. The price of the book is 4s. 9d. or 5s. by post, and all that is necessary to use them is to clean the surface of the panel or dial thoroughly, wet both the transfer and the dial, place the transfer or decal, as the makers prefer to call it, in position, squeeze away surplus water and leave to dry for half an hour or so. The backing paper is then removed, the decal wetted and the thin tissue covering slid away, leaving the lettering in white. The size of the lettering and style is thus: AERIAL.

—**Alexander Equipment, Ltd., Child's Place, Earl's Court, S.W.5.**

E.M.I. Lower TV/Radio Prices

EARLY in April the "His Master's Voice" and Marconiphone companies introduced new "popular-priced" television models.

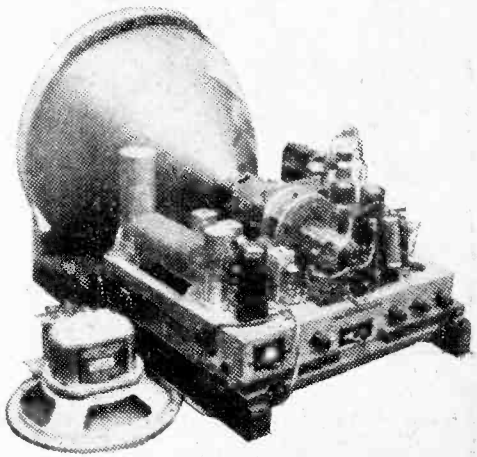
The public reaction to these new low-priced high-quality models, coupled with the current expansion of the television service to Scotland and the South Western area, has resulted in a great stimulus to E.M.I. television production, particularly in the popular-priced fields.

By providing a far larger coverage for development and other overhead costs this increased production has enabled E.M.I. to ease materially the general level of their radio, radiogram and television prices.

Effective from June 30th, 1952, the new prices show reductions of up to 65 gns. in the case of the combined de Luxe TV/Radiogram.

Radar Kilovolter

AS most readers are aware, it is not possible to measure E.H.T. output with ordinary types of meter, usually an electrostatic instrument being employed. The Kilovolter, however, makes use of an old principle adopted by most service engineers, namely the production of a spark from the E.H.T. terminal. Experienced servicemen often place the tip of a screwdriver on the E.H.T. or tube anode terminal and withdraw it slowly, when an arc takes place, and the length of the spark enables them to estimate the approximate E.H.T. voltage. In the Kilovolter two spherical balls are fitted, one rigidly mounted on the projecting point and the other being adjustable by rotating the insulated head of the instrument. Attached to the moving rod is an indicator travelling over a scale reading from 3 to 30 kV., and in use a clip attached to the instrument is tapped on to the chassis or other earthed part of the set and the balls adjusted until an arc takes place. The contacts are then separated gently until the arcing ceases, when the voltage may be read off the scale. The instrument is very accurate in spite of its simplicity and the price is £3 17s. 6d.—**Waveforms, Ltd., Radar Works, Truro Road, N.22.**



The 12in. TV chassis marketed by Cinesmith Products.

Television in the Classroom

SOME POINTS OF VIEW ON A PRESENT-DAY CONTROVERSIAL SUBJECT

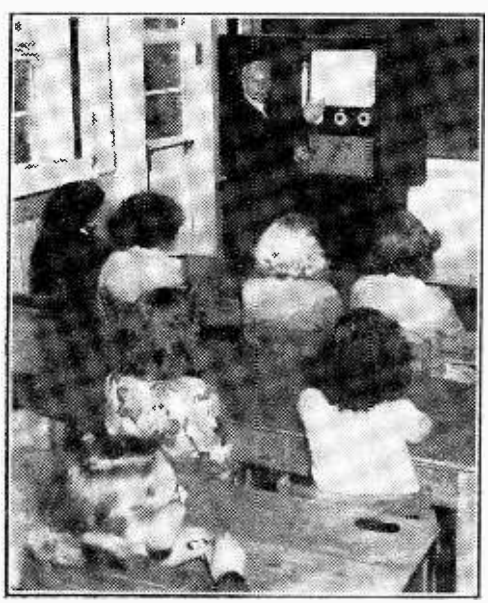
By A. E. Tongue

MUCH ill-informed rubbish is written in the popular press about both education and television. But when the question of TV as an educator arises, prejudice often takes complete control, and those with no practical knowledge of either stand up and condemn without evidence or common sense. We feel, therefore, that PRACTICAL TELEVISION readers would welcome the views of someone who is both a qualified radio engineer and a school teacher in the type of school at present co-operating in the first experimental transmissions.

The problem must be clearly seen in two separate aspects. Firstly, is television in the school desirable at all? Secondly, if it is desirable, what technical problems are posed?

Progressive teachers welcome the present experiments, and they feel that, properly used, television can be of great benefit. But many are violently opposed to it as their predecessors opposed the introduction of sound broadcasts to schools. We hope that Middlesex will show positively that the Jeremiahs are wrong again.

But to prove them wrong, the themes chosen for the schools' programmes should be peculiar to the new medium, and should not encroach upon the established visual techniques. Projectors for film strip, micro-slides and moving film are well tried allies in the school, and the teacher has direct control over them. What can television provide that these aids cannot?



A view of the classroom in Arnos Secondary Modern School where the first television for schools test was tried out recently. Explaining the set to the children before the lesson is Mr. Archer Hoare, chairman of the Middlesex Education Committee and vice-chairman of the M.C.C.

" Live " Programmes

The great thrill of " actuality " cannot be realised, for interesting events may not be scheduled for 2-2.30 p.m. ! With the excellent BBC repertory company at hand, however, scripture, history and literature could receive unique treatment. In science it would be possible to present a first-class series, using expensive apparatus not available to the school, together with speakers of high scientific repute. As we write the first experimental science lesson has been screened. It was a lesson which could have been equally well given in an average school, using apparatus on the premises—the very type of programme that will give the prejudiced a legitimate objection ! The method of presentation, therefore, seems clear. Leave out anything that the teacher can do equally well by other, and cheaper, means.

The technical problems do not present much difficulty. The screen needs to be large enough to give detail to a group of between 30 and 40, brightness must be adequate to permit some room lighting during the lesson, and the controls must be simple and foolproof. The cabinet should be extra strong and there should be locking, protective doors over the screen face and the controls. Adequate maintenance arrangements are of paramount importance to prevent unnoticed picture deterioration.

There seems little doubt that if television is introduced to the classroom with knowledge, enthusiasm and vision, our children will be stimulated to action and creative thinking. If mishandled they will revert to mere passive viewers and a great opportunity will have been lost. Let us hope that does not happen.

Kinematography and Television

TO meet the desires of members and to provide a suitable avenue for a closer co-operation between those engaged in kinematography and television, a Television Division of the society has been inaugurated.

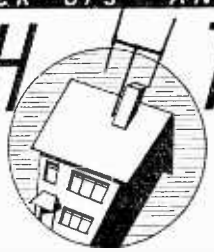
There is a large area of common interest to technicians and others engaged in both the kinematograph industry and in television and the activities of the division will enable the knowledge and experience gained in these two sister arts and technologies to be pooled for the benefit of both.

The division will operate similarly to the other divisions, Film Production, Theatre and 16mm. Film, and enrolment will be open to all members of the society who are occupied or have an interest in any branch of television technology.

Further particulars are obtainable from: The Secretary, The British Kinematograph Society, 164, Shaftesbury Avenue, London, W.C.2.

TELEVISION PICK-UPS AND REFLECTIONS

UNDERNEATH THE DIPOLE



By Iconos

HORSES ON THE SCREEN

THERE seems to be some kind of magic about the horse when viewed on the television screen. It does not seem to matter whether the horse appears solo, ridden by a policeman in a crowded street or in large numbers, as in a musical drive at the Royal Tournament at Earls Court or with the elegant, high-stepping of the hackneys at the Richmond Royal Horse Show—they all rivet the attention of viewers. Then there are the racing events, so well covered by the BBC newsreel and by direct transmission from race-courses near London, the most important being the Ascot meetings. Here, the arrival of the Royal carriage is the most delightful picture, and the sight of the Queen's carriage drawn by dignified greys, preceded by prancing outriders, always gives a thrill, the climax of which is an unforgettable close-up of the Queen as the Roya vehicle turns off the course towards the Royal box. The Queen's horse, Winston, attracted much attention at the Trooping of the Colour.

TV IN THE RING

IT cannot be denied that the horse has become the most popular animal to appear on the TV screen, and the BBC are giving us plenty of chances to see it. They used to say that the horse was made for Technicolor because the first really successful colour films were those about horses — black horses (usually the "villain's"), bay and chestnut mares (with long-legged foals), greys (ridden by the soldier-heroes, either Confederate or Federal, American Civil War) and, of course, piebald, the wonder pony of the circus heroine, or skewbald, favoured by film Red Indians for their alleged (but highly improbable) feats of speed.

These film conventions arise chiefly on account of the differing colour values, and the fact that various shades of brown seem to register well on most colour film systems.

THE HORSE IN BLACK-AND-WHITE

ON television, however, the horse has had to start from scratch. It is a strange fact that the horses seen in the ring and also in a coloured film or still photograph also register the best in black-and-white TV. The relay from the Richmond Horse Show was excellent in the relative monochrome renderings of the infinite variations of shades of brown and black of the horses and their equipment. The hackney event was seen at its best when the competing horse had four white legs ("white sox"), which emphasised for the viewer the elegance of the high-stepping action. As usual, one of the most gripping features was the horse-jumping. The "ahs!" and "ohs!" of the huge crowd must have been echoed in thousands of homes as horses cleared or tipped the hurdles and walls. The television technical work was remarkable: smooth and steady panoraming of the camera, using long-focus lenses, kept the horses in close-up most of the time they were moving from jump to jump. The only confusion was when cuts were made from a camera with the horse going from right to left to another camera set-up, and continuing the event with the horse travelling in the reverse direction. This is a very small criticism, however. On one very dull evening, when viewing the picture on a set not many miles away from Richmond, I was very impressed by the technical excellence of the transmission under very dull lighting conditions. The sensitive cameras, suitably adjusted for contrast, gave the effect of a bright sunlit scene—but without shadows!

CHILDREN'S TELEVISION

THE children are receiving very special attention from the BBC and, apart from their own special newsreels, are frequently served up with plays which adults would enjoy. C. E. Webber's *The Florentine Painting* was an example of a very well-produced and well-acted play which was put over to the children on a Sunday afternoon. Benvenuto Cellini was once again the principal character in the story, delightfully and wittily played by John Slater, who is also making such a big impression on sound-radio. *The Bishop's Treasure* was another excellent playlet in the children's television hour, based upon an incident in Victor Hugo's *Les Miserables*. The Bishop was played by Harcourt Williams and the convict by Patric Crean. Many years ago the BBC Amateur Dramatic Society put this play on under the title *The Bishop's Candlesticks*, and the principal parts were played by Sir John Reith (then plain "Mr." and managing director of the British Broadcasting Company Limited) as the convict and Admiral Carpendale (then BBC Controller) as the Bishop. The play was not broadcast, but the privileged audience were able to appreciate very fine performances by these distinguished amateur actors. Staff shows and birthday parties were broadcast from time to time in those early days and had a glorious, abandoned impromptu atmosphere, especially when the chief engineer, Capt. P. P. Eckersley, was at the microphone. This phase in the development of television seems to have been missed. Everything is very professional, indeed, and the children's hours have their full quota of professional actors and actresses—which, of course, is as it should be.

GENTLE VULTURES

MENTION of the British Broadcasting Co. Ltd., predecessors of the British Broadcasting Corporation (Unlimited), draws attention to certain similarities between it and the new unnamed company which has recently been formed to make sponsored films for home and abroad, together with "the provision of services for this country as envisaged by the Government's White Paper on broadcasting." The original BBC was a combination of five or six of the leading electrical and wireless equipment companies—Marconi's Radio Communication Co., G.E.C., B.T.H. and, I think, Standard Telephones and Cables, who subscribed much of the original capital; but shares could also be purchased by other companies or individuals. This company obtained the original concession to construct eight main stations of 1½ kW. each by Act of Parliament, and appointed an independent Board of Governors; J. C. W. Reith was managing director.

Revenue was obtained from licences and from a royalty upon all sets and certain classes of components. The latter method of collection was soon found to be impractical, since the royalty payments were evaded in a wholesale manner! In the case of the first sponsored television company, the board includes Sir Alexander Aikman, chairman of E.M.I., Sir Robert Renwick, director of Associated Electrical Industries, Sir Alexander Korda, the film producer, Mr. Norman Collins, chairman of High Definition Films and an ex-head of BBC television, Viscount Duncannon, the banker, and Mr. C. O. Stanley, chairman of Pye Radio and president of the Television Society. These are the people to whom one politician in Parliament referred as "vultures." Personally, I think that the first entry into the field of sponsored television could hardly be made by a more responsible combination of brains than these emminent men, and the public judgment should be reserved until results can be seen. There is no doubt that the advertising splurges, feared by many people, will be handled with extreme discretion—and, in any case, if we don't like their programmes, we can always switch over to the BBC TV.

In the meantime, there has been quite a stir-up in the engineering side of the BBC, and several key men have accepted positions with one or other branch of the new organisation. Competition for the services of personnel will precede competition for the viewing public; but I have no fears that the responsible persons on the board of this first British sponsored TV company will pander to the lowest tastes, as do certain daily and Sunday newspapers.

Many names have been considered for the new company, and the choice of a proper name which slips easily from the tongue, with suitable initials, still eludes them. I put forward these suggestions: "British Electronic Entertainments" (B.E.E.); "Television Corporation of Britain" (T.C.B.); or "Publicity Entertainment Proprietors" (P.E.P.). T.V.C. could stand for "Television Vultures Corporation," but I am sure that no vultures will fly over this gentlemanly body.

Interference Suppression

THE following notes have been submitted by the Chief Engineer of Messrs. Denco (Clacton), Ltd., for the guidance of readers who are experiencing trouble due to electrical interference.

It does not appear to be widely appreciated that whereas a considerable amount of interference at broadcast frequencies is carried from the source to the receiver by the mains wiring system, at television frequencies almost all such interference is radiated at the source and is picked up either on the television aerial or within the receiver itself. From this it can be understood that systems of filters are, to say the least, quite inadequate when connected in the mains leads of television receivers

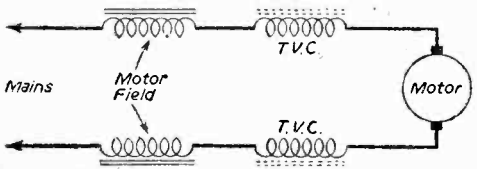


Fig. 1.—Simple form of suppressor.

and even when located at the mains socket supplying the interfering motors of vacuum cleaners, hair dryers, etc.

Principle

Basically the method of suppressing television interference consists of fitting two inductors, one in each lead, as close as possible to the source which, in the case of most household appliances, is the sparking brushes of an electric motor.

The inductors used are arranged to have a high impedance at television frequencies and their construction to correctly proportion self capacity and inductance is quite critical. Suitable components are, however, marketed and are included in the range of Denco products; TVC.1 and TVC.2 being of one and two amp rating respectively.

Where interference is not too severe the chokes by themselves will often give adequate suppression.

It cannot be over emphasised, however, that to be effective they must be close to the source of interference and the best connection, as shown in Fig. 1, is between the motor field and the brushes.

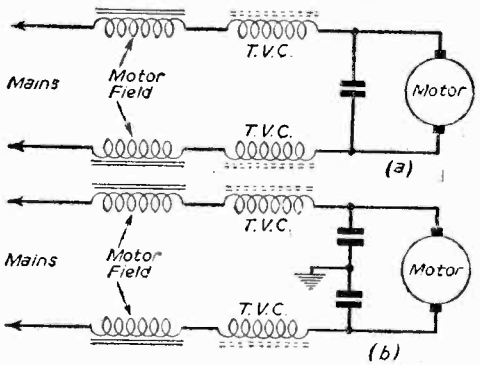
Where interference is more severe or is not sufficiently suppressed by the chokes alone, a decoupling condenser or condensers may be included as in Figs. 2(a) or (b).

The condensers should be approximately 500 pF and must be 2,250v. D.C. test in order to comply with the regulations laid down in British Standards specification B.S.613.

It may be found in some cases that better suppression is obtained if the condensers are connected on the mains side of the chokes but this is largely a matter for experiment in individual cases.

Vibrator motors used in electric shavers may be suppressed in the same manner where space allows.

Switches and controls which cause clicks and buzzes can often be dealt with by fitting a condenser in the order of .25 μF in series with 10 to 20 ohms across the



Figs. 2(a) and (b).—More comprehensive circuit arrangements.

contacts. Where this is found to be inadequate television chokes may be inserted in the circuit leads as close as possible to the switch.

Warning

Finally, a word of warning: the leads in which the chokes are fitted are at mains potential, so ensure that a well insulated joint is made between the wire which is removed from its usual terminal and the free end of the choke, particularly if there is any chance of it touching the metal frame of a motor as in the case of a vacuum cleaner.

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).

COST OF UPKEEP

SIR,—May I be permitted to reply to the letters by E. E. Fenn and A. B. Chinn, published in your June issue.

Valves replaced, as explained in my previous letter were as follows :—

Free under Guarantee	Paid For
1 C.R.T.	4 Z66
4 Z66	2 D77
	2 U52

In addition to the valves a number of condensers and resistors have been replaced.

I am not an engineer and the receiver was serviced by the dealer. On two occasions, however, it was necessary for the *maker's engineer* to execute repairs on the spot, as the dealer was unable to diagnose the trouble, although in the second instance his attention was drawn to the article in your January, 1951, issue under the heading of "Mains Hum," and the trouble was discovered in the E.H.T. supply for which the makers charged the amount of £3 18s.

While appreciating and agreeing with most of the information contained in Mr. Chinn's letter, I would like to know if he considers that replacement of 12 valves in two years, whether under guarantee or not, is fair and should be considered normal maintenance for any type of television receiver.—H. COLLIER (Oxford).

SIR,—Regarding maintenance costs of TV sets, in "Televiews," May issue of PRACTICAL TELEVISION, I would like to state my experience.

I constructed a 9in. job based on the Electronic Engineering circuit, in March, 1949, using ex-Government valves throughout with the exception of the gas-filled triodes, which were 1 T41 and 1 GT1B.

The C.R.T. is a pre-war Mazda 9MH (Serial No. E2829) and to my knowledge had been in use for two years prior to my acquisition of it. The base was originally a 7-pin, which I changed to a Mazda octal, so that a modern tube could be substituted for it if desired.

The E.H.T. transformer is the original which came with the tube, and the E.H.T. is augmented with line output boost.

The set transformer was wound to my own specification, and electro-magnetic focusing is employed, the field of which is energised by the sound receiver H.T.

This set has been in constant use for three years and the total replacements during this period have been 1 5U4 and 1 EF50 valves.

In the light of our readers' experiences, either I have been very fortunate, or it obviously pays to build ones own set. Personally, I think it is the latter reason, for the following points. First—the set is A.C. operated. Second—higher wattage resistors are used than are found in the usual commercial set. Third—the mains transformer was wound to run well within its limits, and finally a home-built receiver is easily modified should the need arise.

I would like to add, in conclusion, that C.R.T. manufacture appears to be a lost art, when one considers the age of mine.—E. J. WALKER (S.W.12).

POOR SYNC

SIR,—Re G. Shore (Huddersfield), in June issue, if the two sync valves (V1 and V2) are VR65s, then change them to VR116. The book states 6 VR65s on time base. Premiers had these two valves altered. Remaining four, are as stated, VR65.

The condenser C1 (small trimmer) underneath T/B is connected one end to anode and R5 and C20 (V1). This should be adjusted to lock picture. Also check C20 for wrong connections.

When picture revolves, frame-hold control should be rotated till picture holds.

If picture still "breaks," and streaks and dots appear, adjust line hold control to bring picture back ; if still no result, try moving the EF50s in their sockets, especially V2 and V4 ; these holders are tricky. I myself (through a hint in your column) used the Paxolin holders EF50 ; these hold the valves better.

But I think there appears poor sync on both time bases. If G. Shore has VR65s as sync valves 1 and 2, he should change them to VR116, which can be obtained cheaply. Hoping this will be of service to him.

I built the Premier 6in. (V.C.R.97) 1½ years ago. I still use the same tube with good results.

I have just completed a 9in. or 12in. Magnetic "Denco" receiver—results, excellent. I would also humbly say that I have only one arm.—J. R. HARDY (New Malden).

REVENGE !

SIR,—May I, through the courtesy of your columns thank your contributor, Mr. E. N. Bradley, for his article on the Grid Dip Meter and Bar Generator.

As a result of his article I have built a similar generator to the one he describes, and it has given every satisfaction.

Incidentally, I have found that, if the screening of the oscillator is removed while unit is in operation, people for miles around complain that it interferes with their cars and vacuum cleaners !—P. C. MERRIMAN (Upminster).

"QUALITY RECEIVER" SUGGESTION

SIR,—I read with considerable interest Mr. Allisstone's letter suggesting that you publish a design of a "Quality TV Receiver." Probably, like myself and many others, he started with radar conversions and small tubes, subsequently scrapping them and building better sets with larger tubes. I heartily agree with his suggestion of your publishing such a design and would like to make one or two suggestions.

First, in my opinion, the tube should be mounted on an open framework such that all the chassis can be slid therein and interchanged as desired. Secondly, time bases and tuning units should be separated on small chassis, again for interchangeability. Thirdly, there should be no attempt to cut down the number of variable controls as it is much better to have permanent preset variable controls than subsequently to replace them by fixed resistors, and it is quite unimportant how many variables exist.

Provision should be made for alternative insertion of a low gain local receiver or a high gain fringe receiver. Provision should also be made for a black level clamp, optional spot wobble, adjustability of scan and E.H.T. to suit any tube and the most up-to-date arrangement to give good regulation of E.H.T., presumably an R.F. unit or separate flyback generator.

I think if other people would suggest suitable specifications you could then carefully examine them and

get together an ultimate result that would satisfy the most fastidious amateur.—G. T. LAYTON (Urmston).

AN AERIAL PRE-AMPLIFIER

SIR,—With regard to the criticisms by Mr. S. West, in the July issue, of my article of the aerial pre-amplifier, I thought that I had made the reasons for the use of such an amplifier sufficiently clear. It is obvious that in fringe areas the greatest signal-to-noise ratio is required *at the input terminals of the televisor.*

If I can make use of Mr. West's simple arithmetic, then, supposing a signal of 1 volt is picked up by the aerial, and the noise picked up en route to the input terminals of the televisor is ½ volt, then the signal-to-noise ratio at the input terminals is 2 : 1. If now a pre-amplifier is connected to the line giving a gain of, say, five times, then we shall have 5 volts of signal to 2½ volts of noise at the amplifier's output.

Supposing the amplifier were put at the aerial end of the circuit, then the signal passed to the transmission line would be 5 volts, and at the input terminals we should have a signal-to-noise ratio of 5 : ½ = 10 : 1. A five-times amplifier now connected at the televisor would give at its output 25 volts of signal against 2½ volts of noise.

The above has assumed that no signal attenuation takes place along the line. In actual practice it does, of course, and, as mentioned in my article, increasing the height of the aerial naturally means an increased length of transmission line with the result that part of the benefits of increased height is offset by the increased length of line. Moreover, a long line will pick up more noise than a short line, and it is possible for the signal-to-noise ratio to be the same for the higher aerial as for the lower aerial with the shorter line.

It should be quite clear, therefore, that an aerial pre-amplifier in such cases is of greater benefit than one fitted at the televisor.

With regard to the method of feeding the power to the amplifier I should consider that there would be some danger from mains-borne interference if the signal wire also carries the heater supply.—B. L. MORLEY (Bristol).

STEREOSCOPIC TELEVISION

SIR,—I have the strongest doubts as to the efficacy of reader A. V. Tomlinson's suggestions (July issue) as he does not appear to comply with the fundamental requirements of stereoscopic representation. These insist that the two eyes of the viewer shall be presented with a view separate and exclusive from each other, the illusion of solidity being built up in the mind. For convincing results it is also desirable that the scene viewed should fill the field of vision.

These requirements are adequately met by the old-fashioned stereoscope with its monotonous diet of still-life photography. The replacement of the twin photographs by twin miniature screens, either cine or television, would yield animated stereoscopy at its best. The cost, however, would be prohibitive, every viewer in the family requiring a separate and complicated viewing instrument.

Stereoscopic entertainment is usually conceived as utilising a single screen for communal viewing, and here the problems are much the same for television as for the cinema. Most readers will at one time or another have witnessed three-dimensional films in which the projected twin scenes are sorted out by special spectacles worn by the viewer. Fascinating though this idea can be as a novelty, it has not been accepted for general programme purposes, and would probably prove irksome for television viewing.

The sorting out could also be done by the use of lenticular screens, dispensing with individual optical attachments, but I think that whilst this may work for still pictures, it would be found that the inherent unsteadiness of the normal projected picture would be great enough to render impossible any accurate registration of picture with screen elements, and entertainment would turn into headache.

Most important of all is the question of whether viewers would like stereoscopy if they had it. A twelve-inch screen certainly does not fill the field of vision, and a televised three-dimensional play might present a somewhat uncanny appearance with the actors taking the form of puppets suspended somewhere in the space between the viewer's nose and the back of the receiver cabinet!—F. D. SIMPKINS (Rugby).

COMPONENT TESTING

SIR,—I should like to report upon a small matter which gave me considerable trouble in my commercial receiver. I had it back to the makers three or four times and always had a form of distortion on the frame scan which did not satisfy me. Finally, the guarantee expired and the dealer had it for three weeks, finally sending it back as O.K. Within a week it developed the same trouble, but this rapidly grew worse and eventually there was a very cramped band at the bottom. I wrote to you for advice thinking I might be able to do something myself and you advised me to check three condensers, one of which was the bias condenser in the frame output stage. I had no tester suitable for condensers, so took a chance and purchased a new condenser for each position. The first one I put in was the electrolytic bias condenser, as you suggested this was a very likely cause of the trouble, and when I switched on the picture was perfect. This was six months ago, and the set has performed perfectly ever since. Surely dealers and manufacturers can test an electrolytic condenser, or is it the fact that they do not care? Anyhow I thank you for your advice.—H. G. HUMBERSTONE (Leicester).

MAINTENANCE COSTS

SIR,—Re TV Maintenance Costs, May, 1952, page 531, and L. R. (S.E.23), July, 1952, page 92, of PRACTICAL TELEVISION.

I have also had the same difficulty in obtaining a service manual, and also further difficulty in obtaining replacement parts. The manufacturers will only supply through an agent or dealer. In view of this I suggest all experimenters to build their own sets, such as the Viewmaster or the sets described in PRACTICAL TELEVISION.

I have been experimenting in radio since the days of Spark Morse transmissions from Poldhu, Eiffel Tower and Cleethorpes, with the zincite and bornite detector.

My first valve sets used the old R type valve. After years of experimenting, it is exasperating to be checked from making a repair to my own TV set by the lack of a service sheet or a replacement line transformer.

In view of these experiences, I am in favour of the suggestion that you should publish a design of "A Quality TV Receiver."—HAROLD A. HILL (Liverpool, 18).

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VIEWMASTER Televisor and Short Wave Radio Components, Service Aids, Valves, Speakers, etc. Send for free list. RADIO EQUIPMENT COMPANY (P.T. Dept.), Castor Rd., Brixham, Devon.

HOUGHTON OSBORNE T/V Kit, B'ham, partly built, 21 valves; instruction book; no tube; offers. Box No. 132, c/o PRACTICAL TELEVISION.

WANTED

WANTED, Valves, small or large quantities, 6K8, 6V6, 5Z4, 6AC7, 1R5, 1S5, FW4/500, 6Q7, 12K8, 80, VU39, EBC33, 3S4, etc., etc. Prompt cash. WM. CARVIS, 103, North Street, Leeds, 7.

WANTED, Constant Voltage Transformer, 150w 230v. TRAFFORD, 38, Sutton Ave., Tarleton, nr. Preston, Lancs.

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The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64, inclusive, or a woman aged 18-59, inclusive, unless he or she, or the employment is excepted from the provisions of the Notification of Vacancies Order, 1952.

TECHNICAL ASSISTANTS required for work of importance on electronic equipment in well-equipped laboratories situated in S.W. London. Ability to read circuit diagrams and experience in wiring and sheet metal work essential. Age 35 or under. The work is of an interesting nature and calls for men with initiative. Permanent posts, good prospects. Canteen facilities. Write Box 131, c/o PRACTICAL TELEVISION.

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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.

FAULTY ELECTROLYTIC

I have a Baird (Townsman) television and for 14 months everything has been all right, but now the picture has started breaking up. It starts on the right-hand side of the screen, which seems to indicate trouble in the line scan. When I took the set out I found that the electrolytic capacitor had broken down on the 120 μF, yet the 64 μF side was intact, and it was quite hot to touch (smoothing capacitors in the H.T.). I tested other components but everything seemed all right, so I purchased a new capacitor and put in same.

When I switched on I got a perfect picture which lasted for two hours, and then the trouble started again.

I switched off and found that the capacitor was running hot once again, so could you help me find the trouble ?—John E. Brettle (Birmingham).

It is possible that the new electrolytic had had a long shelf life at the shop where you purchased it and it broke down when put into use without gradual polarisation. If you get another condenser, polarise it on a low voltage (say 50 volts) for a half-hour or so, gradually increasing this voltage to the maximum rated working value, if possible. Observe correct polarity, of course. If the condenser was new, however, the breakdown could be the result of excessive ripple current, and your main rectifier may be at fault, having suffered damage when the original condenser failed.

LINEARITY FAULT

I should be extremely obliged if you could help me with a little trouble I am in with my Viewmaster, i.e., a vertical line about 3in. from the left side of the picture, also a dark band 1½in. or so wide at left edge of same. The picture itself is very good but distorted or disappears on the line. My width has also narrowed about 2in. to 3in. Height is O.K. I have been given to understand this is a fold-over on the scan. Both line valves have been replaced, a new choke for width control fitted, resistances to anodes, etc., of valves increased and decreased, extra small resistances of various sizes connected in series with width control condenser and var. resistance as suggested in your P.T.s, but the line still remains. No adjustment of the controls will remove same. I am using a 12in. aluminised G.E.C. tube, extra E.H.T. and all modifications for extra frame and line amplitude as per your "P.T.", June, 1951. Have removed the 1 MΩ resistance as stated to remove line but no success. The width was O.K. up to a fortnight ago but I cannot account for any reason why it has suddenly narrowed. Control responds to make it narrower still, but no wider.—H. Wilkes (Nottingham).

From your description it is evident that V10 is being over-driven and it is necessary to increase slightly the value of R46. We suggest that this be done by connecting a .1 MΩ variable resistor in series with R46, and adjust the variable resistor for best linearity with freedom from fold-over. A sudden fall in line amplitude will be due to either V10 having lost emission and requiring to be replaced or rectifier MR4 becoming faulty, causing a fall in voltage, and also having to be replaced.

LOW FRAME AMPLITUDE

I am writing to ask your advice on a problem that has arisen with my Viewmaster.

I am using a 12in. tube, but the picture will not fill the screen area. The top and bottom edges of the picture do not reach the edges of the mask by about ¼in., and the bottom edge shows a bright line. R65 and R64 are turned and adjusted to their full extent. I have tried changing the two 6K25 valves round, but this makes the picture still smaller. Looking at the screen from the viewing position, the three lines on the right-hand side of the tuning clock have always been cramped or smaller than the ones on the left.—F. A. Farnworth (Blackburn).

Frame amplitude may be increased by slightly reducing R56, and deleting R67. Before doing this it will be necessary to carry out voltage measurements on the V11 and V12 stages to make certain that there are no faults, particularly in the cathode of V12 (we assume, of course, that the specified valves, scanning coils and frame transformer are being used).

To improve line linearity it is necessary in the first place to check that the voltages are close to the specified values; if, for instance, the mains voltage is low, it will have the effect of lowering the D.C. voltage in the receiver. It is also possible that rectifier MR4 is faulty and has an excessive voltage drop. If voltages are found to be correct, then R46 should be reduced to 47 KΩ and a .1 MΩ variable resistor connected in series, this being adjusted for best linearity.

LONG TUBE

I have built a set using the Viewmaster time base and a 1355 vision receiver, modified as a straight set using cathode follower and D.C. restorer. The tube is grid modulated. The problem is this—my old tube, a Cossor 108K, gave perfect pictures but this tube developed a fault and it was necessary to get a new one. I decided to have a 12in., so I obtained a Mullard MW31/18. Now when I get the new tube in focus the 2.5 lines on the tuning signal disappear, but if I have it just off focus, you can see them quite plain. The tube has been back to the makers and they say that it is O.K. I borrowed another Cossor 108K and this gave perfect pictures again.

I have earthed the outer coating on the new tube so this cannot be the trouble. I should be obliged if you could help me solve this problem.—G. W. Lawson (High Wycombe).

The peculiar effect on focusing which you describe is due to astigmatism caused by an uneven focusing field. The Cossor 108K is a long tube and the focusing arrangement is such that the field is further back from the screen than with the Mullard tube. We are not clear whether you are using the specified focus ring and scanning coils, but if not, this may be necessary, whilst a further slight improvement may be obtained if the focus ring is mounted further back by means of spacers approximately ¼in. thick.

FRAME HOLD

On switching on my television receiver (Marconi VT730A) I find that the picture rolls in the vertical direction and to stop this I have to alter the Height control (the vertical

hold having no effect except to make it roll faster), but when it holds, the picture is too small, vertically. After the set has been on an hour or so the picture gradually increases in height until it almost fills the mask. The next time I switch on I have to do the same procedure again. I should like to mention that the pre-set controls are all at the ends of the slides.—R. C. Clark (Wolverhampton).

Both the Frame Hold and the Height controls are wired across the H.T. supply line, and it appears that, if the Hold control exercises no effect on the picture, the chain associated with this control is open-circuited. The Hold control is a 25 KΩ pot., and has a 10 KΩ fixed resistor in series on one size, the other side going to the Height slider and the frame oscillator blocking transformer. Check on all these components for continuity, including a 2 MΩ resistance in the Hold slider lead.

TINTED SCREEN

I have a Baird Townsman Television set, 12in. Mazda tube, which is about two and a half years old. I would like to change to a black tinted tube ; is there a tube which would be suitable ? I have tried a tinted glass screen, but this does not make much difference in daylight. Is it possible to fit a 15in. tube instead of a 12in. and where would there be any alterations to make to the circuit ?

I also get a lot of car interference although I am in a good area. Is there anything I can do about this ?—M. Timms (South Ruislip).

You will have to use a tinted filter, and there are several reliable manufacturers to choose from, a few of whom advertise regularly in PRACTICAL TELEVISION. It is not advisable to attempt to fit a 15in. tube in the Townsman receiver as some major modifications would be necessary, and the receiver is already working at a maximum efficiency for the number of valves used. The sound receiver incorporates a series type diode limiter stage ; this may not be effective due to a fault in an associated component.

VIEWMASTER FOR D.C.

With reference to your article in June, 1952, issue of PRACTICAL TELEVISION.

You state that the Viewmaster cannot be operated on D.C. without modifications.

Other than the heater chains and the omission of R71, no mods. have been carried out.

This T.V. is working on 220 v. D.C. in Swindon.

The aerial is a home made multi-array similar to Belling Lee, and using co-ax. input. The pre-amp is from PRACTICAL TELEVISION, June, 1950, which comprises three stages.

If you have any information which would improve the efficiency of the receiver, it would be most welcome.—R. J. Evans (Swindon).

The timebase valves used in the Viewmaster are unsuitable for series operation in view of the high heater currents, as well as the different values required for each of the valves, hence this arrangement is not recommended. Also, there is a very likely chance of a heater cathode breakdown in the valves which are not intended for large voltage differences on these electrodes. We have no doubt that it is possible to work individual receivers, but in view of the points raised above we naturally cannot recommend them. Furthermore, since the H.T. available cannot exceed the mains supply voltage, the receiver will work under adverse conditions with an E.H.T. voltage of only about 5 kv. or even less.

We regret that we have no further information to improve operation.

AERIAL PRE-AMPLIFIER

I have had a Premier 12in. Magnetic Television Kit in operation for about five months, and I am unable to obtain good definition.

I have tried staggering the circuits, and adjusting the cores, and have been told that I have insufficient gain.

The aerial is a three element array, home-made, and is a big improvement over the " H " I had in use previously. We are approximately 65 miles from the Holme Moss transmitter, at sea level.

I have been rather disappointed with the results so far, could it be that I need a pre-amplifier fitting ?—R. V. Hunter (Morecombe).

A pre-amplifier of the type that can be fitted to the mast head is the best solution of your problem, and a design as given in the centre pages of the May, 1952, issue of PRACTICAL TELEVISION should be ideal.

FAILING ELECTROLYTICS

I have a Ferguson television—model 842T (9in. tube)—which has worked very well for the last three years, but during a period of about a month it has developed a fault which I should like you to help me with and I will try to describe.

I think the best description I can give is a rumbling noise more or less in the background on the sound, which at intervals develops short sharp spasms of the same noise, only much louder, but at the same time alters the focus to a marked degree.

After the focus has been readjusted, this will remain set until the noise becomes louder again in the short spasms, and the focus will have to be altered again, this happens very often at intervals of minutes only, but some nights are better than others, although the background noise is still there.

I have tried several alterations in the valves, including the rectifier, but still with the same results. I have wondered whether it may be one of the electrolytics gone down.—A. J. Hickwell (Sidcup)

In the Ferguson 842T receiver, the focus is obtained from a 470Ω focus coil which is shunted by the focus control, a 500Ω potentiometer in series with a 470Ω fixed resistor. The trouble would appear to be a breaking down electrolytic condenser ; the main smoothing condensers are a 60+100 μF and a 16+16 μF and you should check on these by temporary replacements. You should also check on the sound section itself, as the current for this section passes through the focus coil, and the breakdown of a valve or condenser could lead to the sounds and defocusing effects you mention.

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