Simplified Fault-Finding

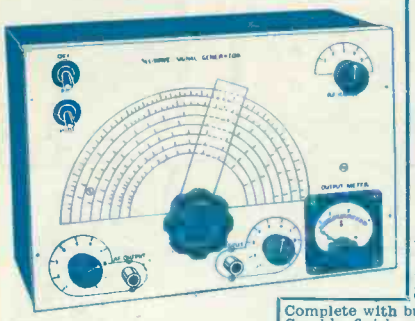
Practical Television

1/3

AND TELEVISION TIMES

JULY 1956

EDITOR: F.J. CAMM



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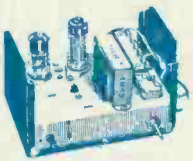

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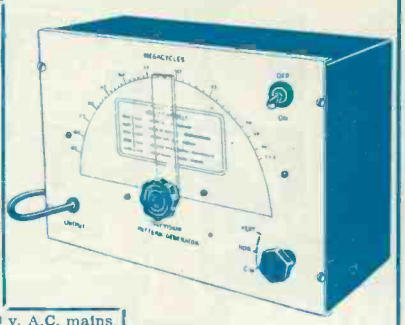

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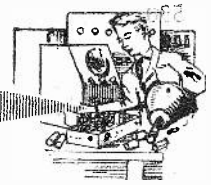
Practical Television



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Televiews

FAREWELL TO ALLY PALLY

IT was in 1936 that the BBC inaugurated the first public television service from their transmitting station at Alexandra Palace, affectionately known to millions of viewers as "Ally Pally." This soubriquet, a sure sign of popularity, has endured through the years, and it is with melancholy regret that viewers said good-bye to it on March 28th when the BBC's new London television station at Crystal Palace took over. The original Marconi-E.M.I. transmitters which have radiated the programmes almost faultlessly for 20 years are now silenced, being superseded by two sets of new Marconi vision and sound transmitters of greatly increased power and incorporating the most advanced techniques. The vision transmitters, each of 15 kW. output, operate in parallel, as also do the 4½ kW. sound transmitters. This ensures continuity of service, for in the event of breakdown in any one transmitter its twin carries on. This means that the programme service continues at half-power until full working is restored. The vision transmitters have been so designed as to be fully capable of handling colour transmissions when they come. The effective radiated power of the Crystal Palace station is 60 kW., later to be raised to 120 kW., and finally to 200 kW.

Ally Pally paved the way for television as we know it to-day, and it was there that most of our leading technicians in television received their training.

TRAINING THE BBC STAFF

IN referring to the BBC technicians we are reminded that nearly 4,000 men and women have passed through the BBC Engineering Training Departments' School, which has just celebrated the 10th anniversary of its foundation. It is in Wood Norton Hall, formerly the home of the Duke of Orleans in the Vale of Evesham. Over 200 students can now reside there, and the number trained in the current year is expected to rise to well over 800. Training covers sound and television, and long-term plans for the introduction of colour television are envisaged by the introduction of a new course this year —a one-week colour television course for the senior staff.

At a recent Press conference the Chief Engineer emphasised that no date could yet be foreseen for the introduction of colour television, and the purpose of the present course is to give the senior executives an awareness of colour television problems well in advance. Each year 40 or 50 students who are still at universities take an eight weeks' vacation course at Wood Norton, and there is a five-week course for staff in sound broadcasting to enable them to qualify for transfer to television. It must be pointed out, however, that only a small proportion of those who undergo courses at Wood Norton are university graduates, and one of the problems has been the imparting of highly technical knowledge to those who are without advanced mathematical training. Those who have such knowledge, therefore, have much greater chance of promotion.

PRINCIPLES FOR TELEVISION ADVERTISING

THE I.T.A. has recently published "Principles in Television Advertising," containing the recommendations of the Advertising Advisory Committee. It is concerned with the legal requirements, the prevention of misleading advertisements, disparaging references, testimonials, guarantees, competitions and advertising in children's programmes. It is laid down as a general principle which will govern all television advertising that it should be legal, clean, honest and truthful, although how advertising can be honest without being truthful is not stated! It is laid down that no advertisement shall contain any statement intended to promote sales by unfair comparison with or reference to competitive products or services.—F. J. C.

SIMPLIFIED FAULT-FINDING

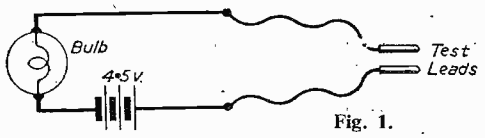

Fig. 1.

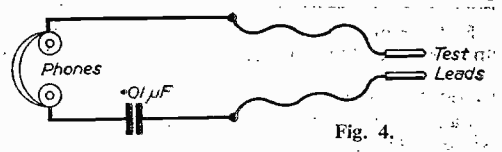

Fig. 4.

IMPROVISED METHODS FOR THE HOME CONSTRUCTOR

By B. L. Morley

THE TV service engineer has to use a number of accurate and reliable testing instruments to enable him to do his job ; a signal generator, first-class multi-meter and an oscilloscope are the tools of his trade and enable him to diagnose rule-of-thumb faults quickly, and also to deal with those rather elusive troubles which necessitate the employment of such equipment.

These instruments are expensive and are not normally possessed by the home constructor, yet quite a lot of work can be done without their aid and although the final tracking down of a fault may take much longer, it is possible, by employment of the correct technique, to trace many of the commoner faults with nothing more than a pair of earphones—or failing that, the pick-up sockets of a broadcast receiver.

In some ways, the home constructor has a more difficult problem to face than the service engineer ; the latter at least knows that the television receiver he is servicing *has* worked satisfactorily and that the derangement is therefore due to a fault developing in a component, whereas the home constructor is faced, when first switching on, with completely unknown quantities, and a fault may be due to a slight mistake in the wiring or mistaken value of a resistor or condenser.

Visual Faults

Television receivers, in spite of their complexity, have some advantages over broadcast receivers as it is often possible to localise immediately to a particular section a fault which reveals itself on the screen.

The skilled service engineer uses the screen in this fashion and certain weaknesses in specified classes of televisors become obvious from the results shown on the screen.

The raster itself reveals much to the skilled man and can provide a very good indication of the direction in which the trouble lies.

A normal raster should appear as a large number of horizontal lines in the form of an oblong which often carries superimposed on it a thicker line which zig-zags from the top to the bottom of the screen. This thicker line is the frame flyback and is generally found to be "cramped" towards the top of the screen.

The line should not appear when a picture is being received as the frame synchronising pulse blacks it out. In some commercial televisors where frame flyback suppression is employed the flyback is not evident.

When it is realised that the line oscillator and associated circuits produce the horizontal line and the frame oscillator the vertical scan we have, at once, an obvious clue to a failure of either section of the timebase.

Where flyback EHT is employed with magnetic circuits then a little more is involved but we will come to that later.

Should a vertical line only be seen on the screen then the indication is that the frame circuit is functioning but the line circuit is not : similarly, if a horizontal line only is seen on the screen then the line circuit is functioning and the frame circuit is not.

We have an immediate indication of the direction in which the fault lies.

If the raster is too narrow then the line circuit, although functioning in some fashion, is not giving its full output : similarly a raster which is far too short indicates that although the frame circuit is functioning it is not giving full output.

A raster which has its sides tending to close in towards the top of the screen has trapezium distortion in the horizontal scan ; the fault, therefore, lies in the line circuits. Similar distortion on the left or right of the picture is due to a fault in the frame circuit.

Where the raster has a wavy edge then hum is reaching the line circuit or the deflection system directly, and where the raster has a dark bar across it then hum is reaching the modulation portion of the tube network.

It is clear that a careful examination of the screen will reveal much to the discerning constructor and will give him a definite indication of the direction of the trouble.

Of course, there are exceptions to the rules and this is one of the things which makes servicing so interesting, but they are exceptions ; the method is to trace the obvious first and then, if this fails, to look for the not so obvious.

Where multi-purpose circuits are used then the boundary between sections is not so clearly defined. Where flyback EHT is employed, for example, a blank raster may indicate an actual failure in the EHT system or a fault in the line oscillator circuit.

Classification of Faults

TV receiver faults can be roughly classified under certain specific headings.

First we have power supply faults and the only reliable method of checking these is with a good class voltmeter.

Second we have EHT faults where the EHT is weak or absent altogether.

Third we have line oscillator and/or amplifier faults.

Fourth there are frame oscillator and/or amplifier faults.

Fifth we come to faults in the sync separator stages which can often prove very elusive.

Sixth there are faults in the vision receiver itself and, seventh, there are faults in the sound section.

Power Supply Faults

Faults in the power supplies are difficult to diagnose without the aid of instruments. The continuity of heater supplies can be fairly easily verified in the case of parallel heaters by use of a six-volt flashlamp bulb.

All that is necessary is to apply the bulb across the heater pins of each valveholder. Where valves are wired in parallel it is surprisingly easy to miss one valve in the chain, which will thereby give fault conditions according to the part of the circuit involved.

A bulb can be used also to check the supply to the C.R.T. heater.

The heaters of the valves themselves can be checked by the simple tester shown in Fig. 1. This is a bulb and battery connected in series with a pair of test leads. If the test leads are connected across the heater pins of the valve, the bulb will light up if the heater is sound. Note that the valve must be taken from the televisor ; it is useless to apply the tester across the valveholder as a continuous circuit is made, irrespective of the valve under test, by the heaters of the other valves in the receiver.

Do not be misled by testing the valve across the valveholder pins when all other valves are removed, as the heater winding of the mains transformer will cause the bulb to light. The only sure method is to take the valve out and to test it outside the televisor.

If there is any doubt about connection of the valve pins and valve sockets, then the test can be made with the valve in its socket, provided all wiring is removed from the heater tags of the valveholder.

The simple continuity tester can be used to test the continuity of all low-resistance circuits where the resistance does not exceed a few ohms.

A heater supply fault which the tester will not reveal is a dead-short-circuit. It is possible for there to be a short-circuit in some part of the heater chain, yet the heaters of the valves will still light up to a certain extent. The only clue to this fault is that a section of the heater wiring will show obvious signs of overheating, or the transformer will start to smoke. It can be verified if the latter is due to a heater short or H.T. short simply by disconnecting the H.T.

Checking the H.T. supply is rather more difficult, and the only reliable method is by use of a voltmeter. A very rough indication that H.T. is present can be obtained by short-circuiting the point to chassis *momentarily* and observing if a spark is produced. The short must be a very rapid flick on and off or damage will be done.

EHT Supply

The service engineer is usually equipped with an electrostatic voltmeter for checking EHT supplies. An ordinary type of voltmeter is of little use because the current taken by the meter is so far in excess of the supply that the voltage drops enormously and an entirely false reading is obtained.

A further point is the possibility of damage to the meter due to arcing of the high voltage.

EHT supplies should be treated with the respect due to them, especially those which are obtained from a mains transformer, and the greatest care should be exercised. It is most unwise to probe around the EHT section when the supply is on.

When the constructor is faced with an entirely blank screen, then the first thought is that the EHT supply has failed. A simple test can be made to verify this if due precautions are taken.

The first step is to test on the tube anode to verify if EHT is at that point. This can be done with the blade of a well-insulated screwdriver. If the blade is tapped on to the EHT terminal it should be possible to draw off a spark from the terminal. The length of the spark will vary according to the value of the EHT. Normally with, say, a VCR97 circuit it should be possible to draw off a ¼in. spark, while some magnetic circuits will give a spark almost ½in. long.

If a spark can be drawn off then EHT is present.

A typical EHT supply for an electrostatic tube is shown in Fig. 2. (This is the EHT circuit of the PRACTICAL TELEVISION Simplex Televisor which has proved so popular with the home constructor.) The points at which the EHT can be tested are indicated by the letters A, B, C, etc.

It should be possible to check the EHT from its source at the rectifier output at " A," through the smoothing resistor Ra to " B " to the " X " shift at " C " and the X2 plate on terminal 11 at " H." Naturally, the spark will be weaker as it passes through the various resistances.

The " Y " shift can be tested at " D " and at " J " on terminal 12 and the EHT bias on terminals 9 and 8 at " K " and " L."

Final anode supplies are checked at " E " and terminals 5, 7 and 10. It should also be possible to trace a weaker spark through " F " and " G," and possibly at " M." Little, if any, spark will be found at the brilliance control, but as this is getting rather beyond the final anode supply it will not often be necessary to check at this particular point. A brief short-circuit tapped to chassis would supply some indication here.

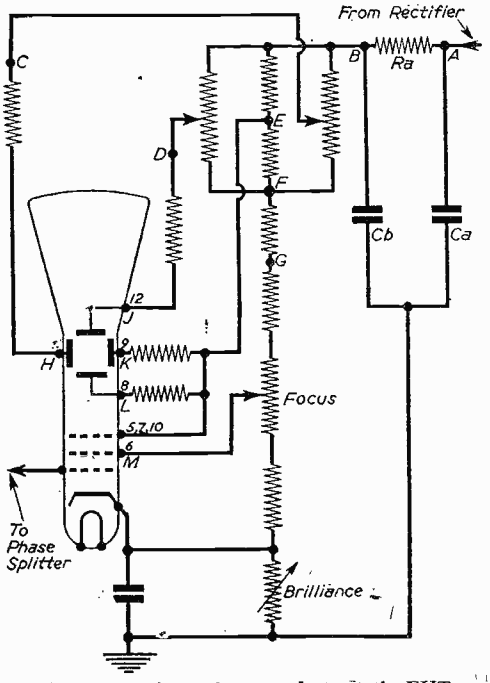

Fig. 2.—Testing points on electrostatic EHT.

Flyback EHT

The testing for EHT obtained from the line flyback is usually very simple. A typical circuit is given in Fig. 3, which shows the EHT circuit of the PRACTICAL TELEVISION Supervisor.

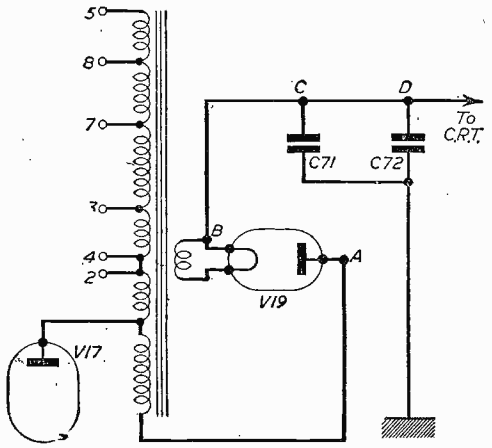

Fig. 3.—Testing points on electromagnetic EHT.

With magnetic tubes no elaborate network of EHT is required for biasing the deflector plates or for focusing, and the testing is therefore very straightforward.

The first check is with the screwdriver on the final anode of the tube. The EHT can then be checked back through to the rectifier valve V19, and it should also be possible to obtain a spark from the anode at "A."

Provided the line oscillator is working at about the correct frequency, then the only major points where EHT fails is in the loss of emission of the rectifier valve (or ageing of a metal rectifier where such is used), or an actual breakdown in the transformer itself, or breakdown to the chassis.

One point to note is that a blank screen does not necessarily mean that EHT is missing or the tube heater supply is faulty, as overbiasing of the tube can cause the same effect. If, therefore, the EHT is present suspect the components in the brilliance network.

Corona Discharge

The EHT can be severely diminished or even totally stopped by discharging to chassis or an earthed point. Usually the discharge can be heard as a "sizzling" sound, and is generally accompanied by a distinct smell of ozone. It is often difficult to locate and if a normal inspection does not reveal its source then two other methods can be employed.

The first method is to examine the chassis in complete darkness. Care must be taken in handling the chassis but it is quite often fairly easy to locate the point as it is seen as a stream of bluish sparks.

The second method is by use of an improvised stethoscope. Simply roll a magazine or piece of stiff paper into a tube and then, by applying one end to the ear the other end can be moved about the chassis until the loudest spot is found where the discharge is taking place.

Again care must be taken and the tube should be at least 1ft. long. It is a nasty experience for the ear to touch, accidentally, an EHT spot!

Line Faults

The obvious line fault trouble is where the line oscillator is not functioning. Where a separate EHT supply is employed then a vertical line only will be seen on the screen. Where EHT is obtained from the line flyback then nothing will be seen on the screen as EHT will be missing if the line oscillator fails.

One of the first checks to make if the line circuit is suspected is to rotate the line hold control (sometimes labelled "horizontal hold"), and to listen for the whistle from the line oscillator.

In magnetic circuits the whistle can emanate from the blocking transformer, if employed, from the output transformer or from the valve direct. In electrostatic circuits the whistle can be heard from the oscillator valve itself.

It is essential to rotate the hold control throughout its travel as in certain positions the whistle may be of such a high pitch as to be beyond the range of hearing. The actual point at which this occurs will vary according to the person, as sometimes one person can hear much higher sounds than another.

If the line oscillator does not appear to be working then a simple tester can be made for checking purposes, as shown in Fig. 4.

The tester is simply a pair of earphones connected in series with a condenser of 0.01μF value. The condenser must be of good quality and known to be free from leakage.

If no earphones are possessed then a loudspeaker can be used, though this is not so effective. Failing a spare loudspeaker then the pick-up sockets of a broadcast receiver can be employed, or even the A.F. section of the televisor itself. In these last two cases use a condenser in each lead.

Application of the tester to a circuit is quite a straightforward business.

In Fig. 5 will be found a typical line oscillator and amplifier and the method of checking such a circuit will be explained in detail. The circuit shown is actually that of the PRACTICAL TELEVISION Simplex.

One of the leads from the tester should be placed on a chassis connection, preferably the lead without the condenser in it. If the other lead is placed on the anode, point "A," then rotation of the line hold control should reveal a whistle. The sync valve should be removed or aerial disconnected so that no confusion arises about the sync pulse.

If the whistle is not received then the valve circuit is not functioning.

If the whistle is received it can be traced through to the deflector plates. Put the test lead on point "B" and verify that the amplitude control Va is functioning, the strength of the sound becoming less as the slider is moved towards H.T.

Check between point "C" and chassis, which will prove that the oscillation is reaching the amplifier valve.

A test on point "D" should reveal a much stronger signal showing that this section of the valve is amplifying correctly.

Check now on point "E," leaving the slider of the linearity control at about midway. Test next on point "F," which will show the signal is reaching

the second grid of the valve. It should be approximately the same strength as at " C."

Finally, check at point " G," and here an amplified signal of about the same strength as at " D " should be heard.

If the EHT circuit is disconnected tests can be made on each side of the condensers Ca and Cb, and then directly on the pins of the tube.

Paraphase Circuits

Many VCR97 circuits employ paraphase circuits, and a typical example is given in Fig. 6, which shows the line circuit of the PRACTICAL TELEVISION Argus.

The method of checking with the tester is similar to that given in Fig. 5.

A check is first made at point " A," and if all is in order then remove the second valve and test at points " B " and " C." This signal should be heard,

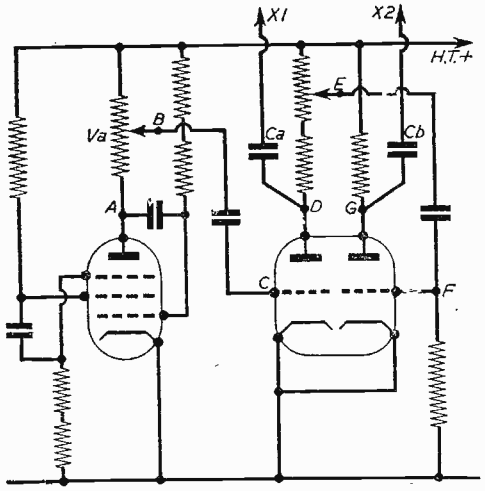

Fig. 5.—Typical line circuit for electrostatic tube.

though rather weaker than at point " A." Now insert the valve and test at point " D." If all is well the signal should be heard here at about equal strength to point " A."

As an example of the utility of this test we could have a case where the raster is rather narrow, due to a failure in Vb circuit. This test will instantly show if Vb is functioning or is giving a weakened output.

Magnetic Circuits

Magnetic line circuits take many forms and it is not possible to cover all of them. The basic principles for testing are similar and so we will describe two most popular circuits in general use.

The first circuit is one which employs a blocking oscillator followed by an amplifying stage. Such a circuit is shown in Fig. 7 and is actually the line circuit of the PRACTICAL TELEVISION Receiver (originally the *Practical Wireless* Televisor).

Va is the blocking oscillator and Vb is the amplifying stage. The first check can be made at point " A " which will confirm if the oscillator is functioning as such. The line hold control should be rotated until the whistle is heard.

The next check is made at point " B " followed by point " C " to verify that the signal is getting through to the amplifier. Next make a check at point " D " to verify that the signal is going through Vb. If a high voltage condenser is available it should be connected in series with the testing lead and a test made on point " E " then point " F " and finally across the scan coil at point " G."

The second type of circuit is that of the single valve where the one valve performs the functions of a *current* oscillator and supplies the coils via a transformer.

No check should be made on the anode of this valve unless a high-voltage condenser is available. Checks can be made across the scan coils themselves to verify that the signal is actually being passed to this point.

Frame Circuits

The different types of frame circuits can be tested in a similar manner though in this case, instead of a

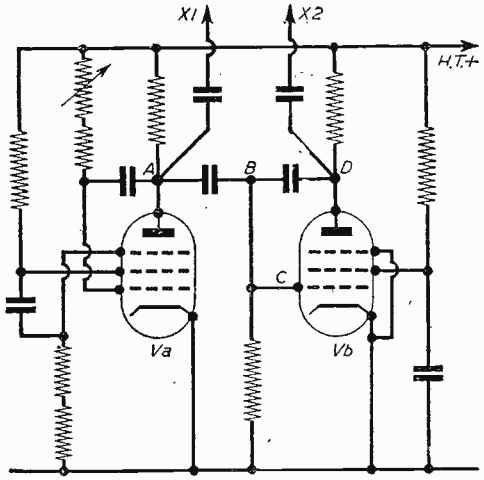

Fig. 6.—Typical paraphase circuit.

high pitched whistle being heard the tone is very much lower and more like a burring sound.

As with the line circuit it should be possible to vary the pitch of the sound by operation of the hold control.

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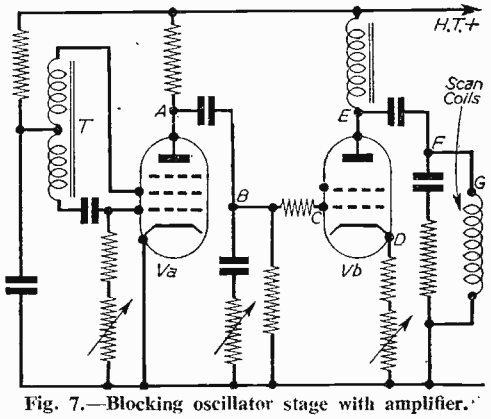

Fig. 7.—Blocking oscillator stage with amplifier.

A Beginner's Guide to Television

A NEW SERIES

4.—INTERLACING—FREQUENCY BANDS—THE RECEIVING AND TRANSMITTING SYSTEMS—PROJECTION RECEIVERS—AERIALS

By F. J. Camm

Interlacing

LAST month I dealt with the avoidance of flicker, pointing out that a repetition frequency of at least 48 frames per second is necessary. I also pointed out that at least 50 frames a second are desirable on 50 cycle power systems, and that such a high frame frequency required a wide frequency band during transmission, and because of this it was undesirable.

This is the reason why interlaced scanning is employed, because it overcomes the difficulty of the high frequency band necessary with 50 frames a second. Indeed, interlacing retains the advantages of it. In interlaced scanning, the picture is scanned 50 times per second, but only alternate lines are traced per scanning period. In the 405 line system at present employed, the odd-numbered lines are scanned first, and then the even-numbered lines (see Fig. 11, June issue), the even lines being placed as it were in the gaps between the odd lines.

Now it must be obvious that each 202½ piece of the picture is transmitted in 1/50th of a second building up a complete picture every 25th of a second. It is difficult to understand why such an odd figure as 405 was chosen, but no doubt it provides the best compromise, and reduces the transmitting problems when a higher number of lines is used. Continental systems and American systems use 525 lines.

Frequency Bands

Television picture signals are radiated in much the same way as for sound broadcasts, by modulating the carrier wave with the video frequency, but with this important difference between picture and sound transmission. In order to transmit a picture with a great amount of detail, a much wider band of frequencies is required than is necessary for the transmission of sound. A trouble in this connection is chiefly experienced with contrasting pictures having areas changing suddenly from black to white. For example, let us presume that a draughts board is being televised. If the width of the scanning line corresponds to the height of the contrasting tones of the board, the defects will be at a minimum, but as the change from black to white increases in depth the defect will be more apparent. In scanning scenes involving very rapid motion minute changes will occur in the picture between the period of the half-frames, resulting in a slight wavy or zigzag appearance of the vertical lines.

By making the frequency band approximately equal to two-thirds of the full frequency band, detail in both directions is balanced up.

Receiving and Transmitting Systems

In a complete receiving and transmitting system, first the image is scanned by the television camera, producing a series of varying currents which are the counterparts of the changes in light intensity along the scanning line. These varying currents are fed to a video frequency amplifier, the output from which is passed to what is known as a limiter, which is really a pulse generating system. The purpose of this limiter, as its name implies, is to prevent overloading at later stages. The triggering impulses operating in conjunction with the timebase are provided by the pulse generator which also superimposes the synchronising pulses on the signal currents.

Further amplification takes place after the limiter

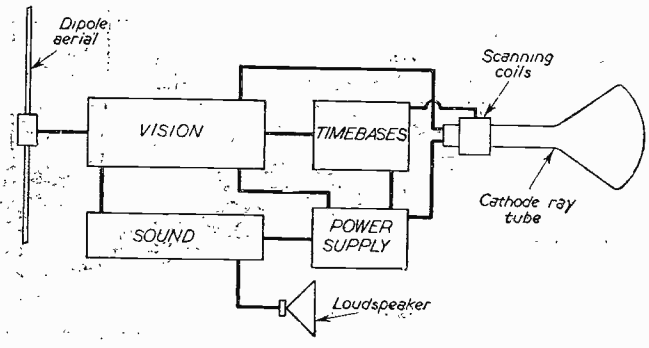

Fig. 15.—Block diagram of a modern television receiver showing the essential sections.

stage and the currents are then used to modulate the carrier wave generated by the oscillator. The modulated carrier is then passed on to the transmitting aerial by means of a radio frequency amplifier.

At the receiving end the aerial system picks up the signals from the transmitter and they are passed through a series of radio frequency stages, the output from which is mixed with that of a local oscillator giving rise to an intermediate frequency. This intermediate frequency is then amplified by a series of intermediate frequency stages.

Projection Receivers

Receivers employing large tubes are known as direct vision receivers. Another system, however, is in use —the projection system, which makes use of a much smaller cathode-ray tube. Its diameter is only 2½in. The small picture received is magnified by optical methods to appear on a large flat screen. It has certain advantages over the direct vision receiver. It is well known that if a viewer stands far enough away from a television picture to render the line structure invisible, the angle it subtends at his eye is fixed and does not depend upon the size of the picture. If the viewer adjusts his distance until he just cannot see the lines he will find that the angle subtended is just the same whether a 12in., 15in., 17in. or even larger tube is employed.

The image thrown on the retina of his eyes is therefore of the same size, irrespective of the size of tube.

Therefore, the most obvious advantage of a large picture, as provided by projection receivers, is the improved angle of view which it permits. Another advantage which is not so obvious concerns the distance at which the eye muscles are at rest. A certain amount of effort is required to focus objects which are very close or very far away. In the region of 20ft., however, the eye muscles are much more relaxed. Another advantage can be considered as purely psychological. On the screen of a projection receiver a head and shoulders shot appears about life size and therefore it brings realism to the view. A "life-size" voice emanating from the mouth of a half or quarter size speaker is unreal.

The Aerial

The aerial, of course, is the device which picks up the sound and video waves and conveys them to the receiver. With television an aerial is required which greatly differs from that used for ordinary sound receivers. It is known as a dipole aerial, and it is used for ultra-short wave reception such as is used in television. It consists of two short lengths of metal rod or wire vertically disposed on the same axis, with a space separating them. The receiver is joined to the centre. The overall length of the aerial must be equivalent to one-half of the wavelength of the transmission. It is also known as a half-wave aerial. Television aerials take one of several forms, both outdoor and indoor.

We know that the waves radiated from the transmitter are similar to those formed by a stone when thrown into still water. The nearer the stone (the transmitter), the more pronounced the waves, which grow less and less discernible as the distance from

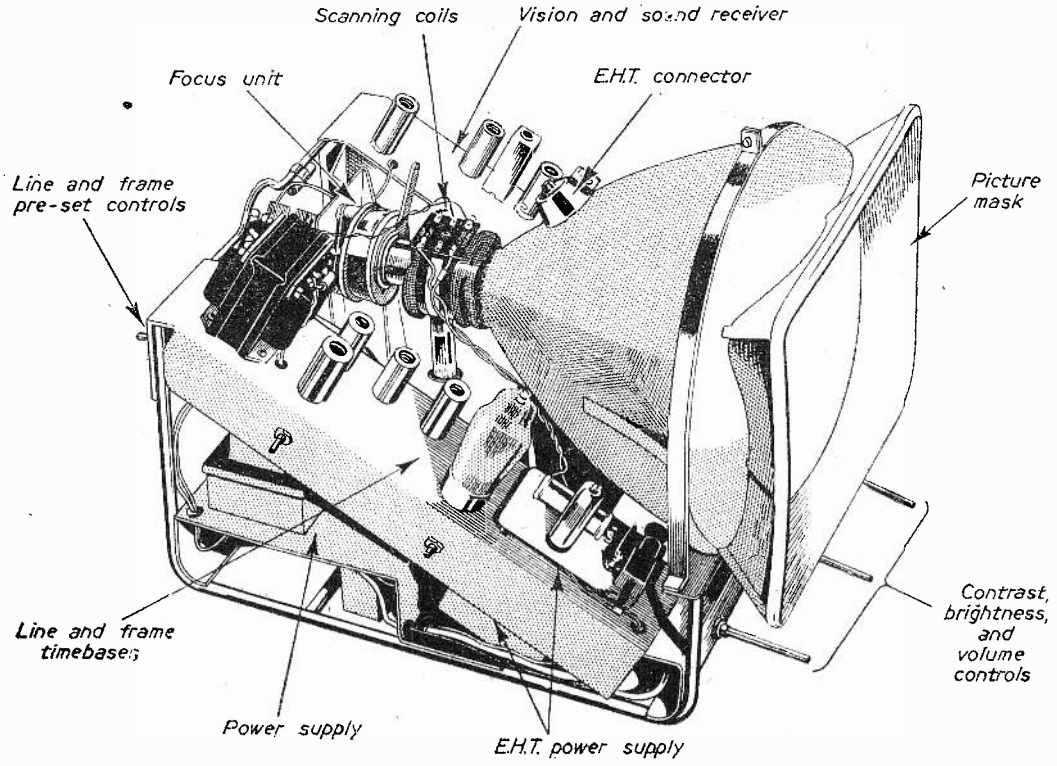

Fig. 16.—A home-built television receiver with the important parts identified.

their source increases. They can also be compared to rays of light in that they are reflected or reduced in strength by intervening objects to a greater extent than the much longer waves used for radio broadcasting.

For these reasons, the strength of the signal depends on the distance between the transmitter and receiver, the contours of the intervening country, the relative heights of the transmitting and receiving aerials, the construction of the building housing the receiver (steel-framed, plain brick, etc.), and the presence of large structures in the vicinity of or which overshadow the receiving site (large buildings, gasometers, etc.).

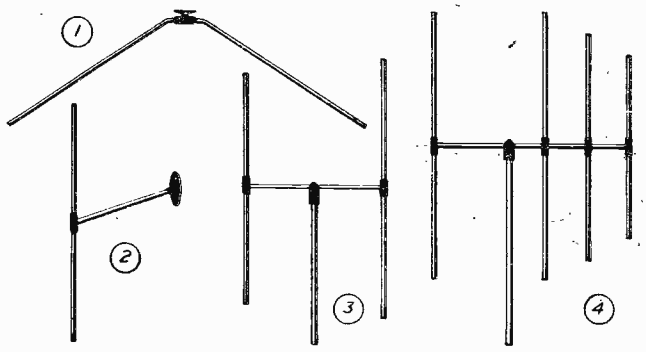

Fig. 17.—A typical range of television aerials. (1) Indoor or loft model ; (2) single dipole ; (3) " H," and (4) " H " with two directors.

There are types of aerial available to meet most reception conditions. They fall roughly into two categories, directional and non-directional. Non-directional aerials respond equally to signals coming from all directions, whilst directional aerials are most sensitive in one direction only. For this reason the latter are used when it is necessary to reduce interference received from directions other than that of the desired television signals. In general, they provide greater signal strength than the non-directional types, thus improving the relative proportion of signal and interference ; and even if the sources of interference are located on all sides of the receiver, directional aerials still reduce the interference from behind, whereas the non-directional types, such as the single dipole, have no such properties. It is for this reason that it is sometimes necessary to use a directional outdoor aerial in a strong signal area near the transmitter. We have seen that the dipole consists of a rod cut to one-half the wavelength of the television transmission, with a connection taken from the centre. As, however, the sound and vision are transmitted on different wavelengths or frequencies, the aerial is cut to a point midway between the two in most cases, although some aerials are cut for vision only, as this is the most critical part of the received signal.

If you make your own aerial you can experiment and find which is the most satisfactory length for your own particular local conditions. For the London transmission the length of the aerial should be about 11ft. and for the Sutton Coldfield about 7ft. 9in. It is important to note that a few inches either way on these measurements may make quite a difference in reception, and best results therefore can only be obtained by careful experiments.

In strong signal areas it is possible to operate a number of receivers directly from one efficient aerial installation. Where this is done it is important that certain technical considerations are observed in connection with the wiring, as otherwise reception may vary from one receiving point to another. It is also possible that the television receivers connected to the system may affect each other. By using an amplifier between the aerial and the receivers to increase the strength of the signal, a large number of receiving points may similarly be supplied by one aerial. Such arrangements are usually referred to as " communal " aerial systems," and are ideally suited for blocks of flats or small individual dwellings situated in close proximity to one another.

The aerial for such systems can be installed in the optimum position, having regard to signal, interference and appearance.

A complete installation of this type can usually be installed at less cost per point than individual aerials. Many such installations have been carried out with most successful results.

As in the case of single installations, each building or group of buildings presents an individual problem, and it is necessary for tests to be carried out before a workable scheme can be put forward.

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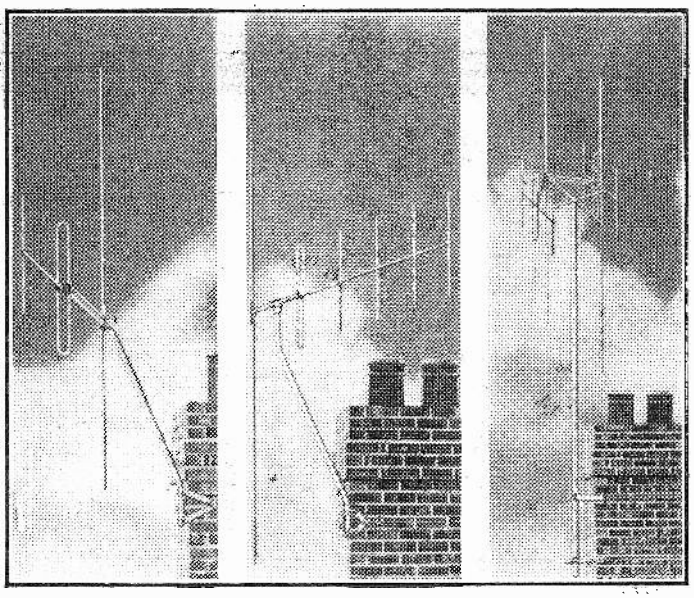


Fig. 18.—Photographs of some combined Band I and Band III aerials.

No. 20.—THE REGENTONE BIG 12

By L. Lawry-Johns

THE receiver incorporates the well-known Plessey Mk. II chassis and because of this these notes may be used in the servicing of a large number of other models, including those in the Argosy, Columbia, Defiant, Marconi, Philco and Sobell ranges. Some variation may be found in various models and we certainly do not imply that the Plessey chassis will be found in all the models of the mentioned manufacturers! The complete circuit diagram and the circuit description have already been printed in an earlier issue (June, 1954). The earlier Mk. I chassis has also been described and bears many of the characteristics of the one to be dealt with. A ready means of identifying the two is the provision of picture shift controls in the later model. These are mounted on the rear of the chassis at the right side, the vertical and horizontal shifts are mounted each side of a 1,000 by 1,000μF capacitor. The purpose of these controls is to regulate the amount of direct current passing through the scan coils. The effect of such a current is to shift the picture according to the current flowing, positive or negative. The receiver circuit is very straightforward, and reliable in operation.

Timebases

The frame timebase employs an oscillator of the multivibrator type using a 6SN7 valve feeding a 6L18 frame output triode. This circuit is fairly trouble free except for a small resistor which regularly changes its value. The effect of this change is a decrease in the picture height as the resistor goes "high." It is the anode load resistor of one of the 6SN7 sections and is coloured brown, green, green (1.5MΩ). In all cases it should be replaced by a larger, ½ watt, resistor of the same value. No difficulty should be experienced in locating the resistor—it is suspended in the wiring and connects directly to pin 5 of the 6SN7 valve base.

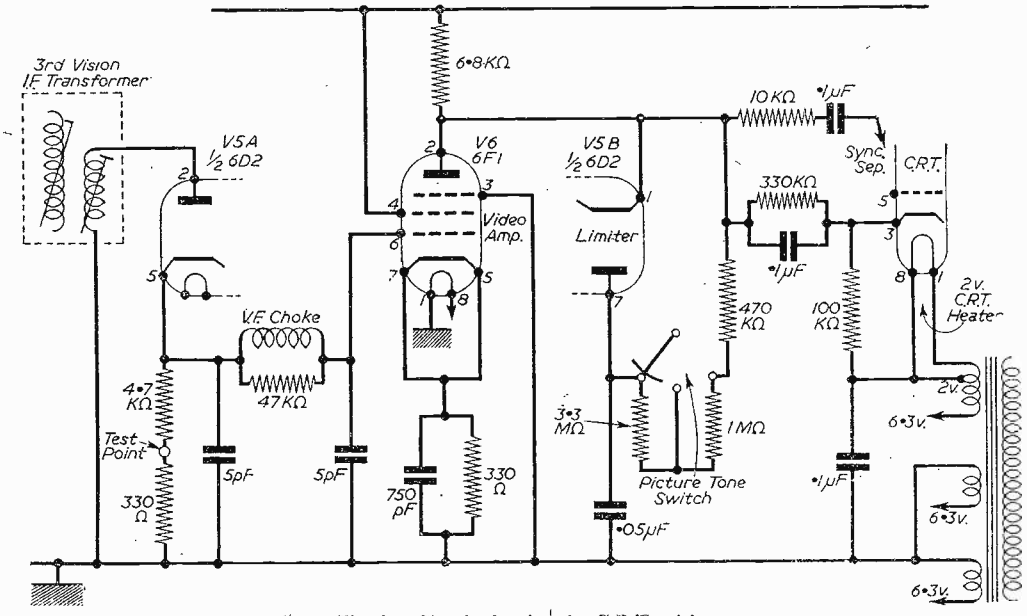


Fig. 2.—Circuit showing the C.R.T. wiring.

Poor frame linearity may be due to incorrect mains voltage adjustment, failing 6L18 valve or an alteration in value of the 2.2MΩ grid leak. It is a characteristic of this circuit that a raster cannot be displayed without a vision signal to supply the sync pulses to the timebase. More will be said of this later.

The line timebase employs an EL38 self-oscillating pentode. No separate oscillator valve is employed and the circuit is shown in Fig. 4. The line hold, line linearity and width plunger are closely related and alteration to the width and linearity will almost always demand a reset of the hold slider.

However, the circuit is stable in operation, but if not a replacement EL38 will usually put things right. The H.T. metal rectifier, which is mounted on the left side of the rear chassis, has a profound effect upon the width of the picture, and this will reduce as the H.T. output voltage of the rectifier falls much below its rated 240 volts.

No EHT

The symptom of no EHT, no line timebase whistle, should direct attention to the EL38 and its associated components, the 6.8 KΩ screen dropping resistor, the controls, etc. It often happens that the line output transformer is at fault, however, and to facilitate the replacement of this a diagram is provided showing the actual connections. The transformer type is SL7 and the part number is CP72036. When fitting observe note on connections 9 and 10 with Fig. 3.

The EHT rectifier valve is an EY51 and if the timebase whistle is audible, but no raster can be resolved, a quick check of EHT voltage will show whether suspicion should be directed to this valve or not. If a spark cannot be drawn from the tube anode cap try again with the cap removed. If there is still no spark disconnect the .001μF EHT smoothing capacitor to prove that leakage through this is not responsible for the low or non-existent EHT. Assuming that this capacitor is in order, it will be necessary to examine the EY51. This is contained inside the line output transformer can. With the chassis removed and the EY51 exposed, test for spark at the anode (single wire end). If a spark can be drawn off, the EY51 will no doubt be in need of renewal. If it is immediately obvious that the valve heater is not glowing the foregoing tests may be dispensed with unless, of course, a replacement rectifier also does not heat up!

Sound and Vision

The actual sound and vision strip gives very little trouble and calls for but little attention. V1 is the R.F. amplifier in a conventional circuit with a sensitivity control in its cathode circuit. V2 is the mixer-oscillator. The oscillator coil is wired in the screen grid circuit. It is shunted by two fixed capacitors. If it is necessary to replace these at any time it is essential to use the identical types as the original. One has a negative temperature coefficient so that untoward oscillator drift does not occur as the temperature of the receiver changes. The oscillator coil is easily identified by its heavy gauge open winding. V3 is the first I.F. amplifier, common both to sound and vision. Sound signals are taken from the anode to the first sound I.F. transformer via a 2 pF capacitor.

The receiver contrast control (on the front of the receiver, the brilliance being at the rear) is wired in the cathode circuit of V3 and thus affects the sound volume as well as the picture signal strength.

V4 is the vision I.F. amplifier and the sound rejector is wired in its cathode circuit. This is L10 and should be adjusted for minimum interference of sound with vision.

The anode of V4 is transformer coupled to the vision detector or demodulator which is one section of V5 (6D2). The cathode of the detector is taken to chassis, via a 4.7KΩ in series with a 330Ω resistor, a test point being provided at the junction so that a meter connected from here to chassis is actually across the 330Ω resistor.

The cathode is coupled to the control grid of the video amplifier through a video choke shunted by a 47KΩ resistor. The choke is actually wound on the resistor. From each side of the choke a 5 pF filter capacitor is taken to chassis. V6 is the video amplifier,

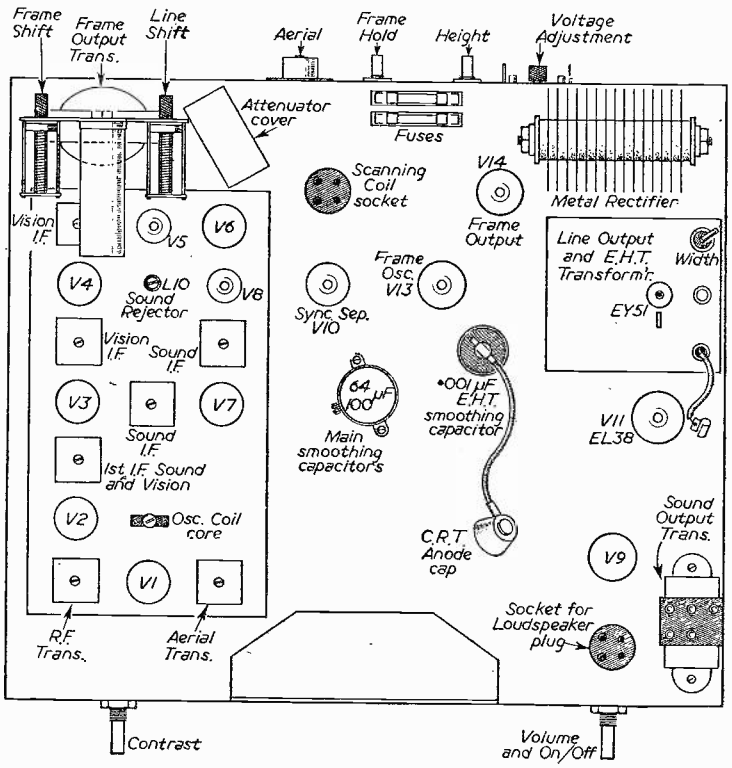


Fig. 1.—Layout showing principal components.

the circuit of which is extremely simple. The anode load resistor is a 6.8KΩ, the bias resistor a 330Ω shunted by a fixed 750 pF capacitor. One connection from the anode is taken to the sync separator via a 10K resistor, another connection is to the cathode of the second section of V5, which functions as the picture interference limiter, whilst a .1μF capacitor, shunted by a 330KΩ resistor, carries the video signal to the C.R.T. cathode.

The anode of the limiter is wired to the cathode via three resistors and is taken to chassis through a .05μF capacitor. The resistors are a 470KΩ, a 1MΩ and a 3.3MΩ.

Either the 3.3MΩ or the 1MΩ may be shorted by the action of a three position switch labelled "picture tone." The switch therefore alters the time constant of the circuit and controls the limiting action of the diode. The operation of the switch will tend to "flatten" the peak whites of the picture content.

Fault Symptoms

In order to describe the most common fault which occurs on this type of chassis it is necessary to examine the C.R.T. wiring.

As may be seen from Fig. 2, the cathode and heater are maintained at approximately the same D.C. potential by the inclusion of a 100K resistor. A .1μF capacitor decouples the heater to chassis. Therefore, should a heater to cathode leak occur, part of the video signal will be shunted to chassis. This has the effect of persistent line tear, where the line hold control has no effect, and close inspection will reveal that some of the picture content is actually missing and the blank parts are discoloured.

Now this well-known effect does not occur so much on this model as on many others, as the frame timebase very quickly "feels" the absence or partial absence of the sync pulses. As previously mentioned, the frame timebase will not function properly unless reliable sync pulses are being applied. Therefore an unstable vertical movement may well herald the imminent necessity of an isolating transformer. When the picture seems to fail completely, with what is left of the raster discoloured and flat, and this constantly building up and collapsing rapidly, the possibility of a heater/cathode short should not be ignored.

With the .1μF disconnected—this is located under the chassis on the mains transformer—the picture should present a more recognisable appearance. The out of focus horizontal bands, the watery appearance of the verticals and loss of line hold being normal symptoms. To rectify this condition readers are referred to the January issue. The fitting instructions for isolating transformers have so many times been described before that we do not propose to repeat them here. The servicing article in the January issue dealt fully with this type of fault.

A word of warning, however; if a steady white line is present across the tube face, this does not indicate a tube fault, and the frame time-base itself will almost certainly be in need of attention. Always check the 6SN7 valve first, ensuring that *both* heaters are glowing, then inspect the 6L18 and make sure that a lead has not been pulled out of the four-pin scan coil connecting plug.

H.T. Supply

The normal H.T. is supplied from a metal rectifier of the 14A100 type. Some receivers employ a standard smoothing choke, whilst others use the field coil of the loudspeaker. Where the energised type is used the choke is omitted and where the choke is fitted a P.M. speaker will be found.

The A.C. input to the metal rectifier is derived from the transformer primary, highest tapping (250 volt). All valves, except the EY51, of course, have their heaters supplied from 6.3 volt windings on the transformer and although the tube heater is rated at two volts this winding is actually tapped, and 6.3 volt is available here if required. This winding has no connection to chassis except, of course, via the .1ΩF capacitor.

As the metal rectifier is fed from the transformer primary the chassis of the receiver is connected to one side of the mains and due respect and caution must be employed when handling under certain conditions.

Some models have extensive modifications such as

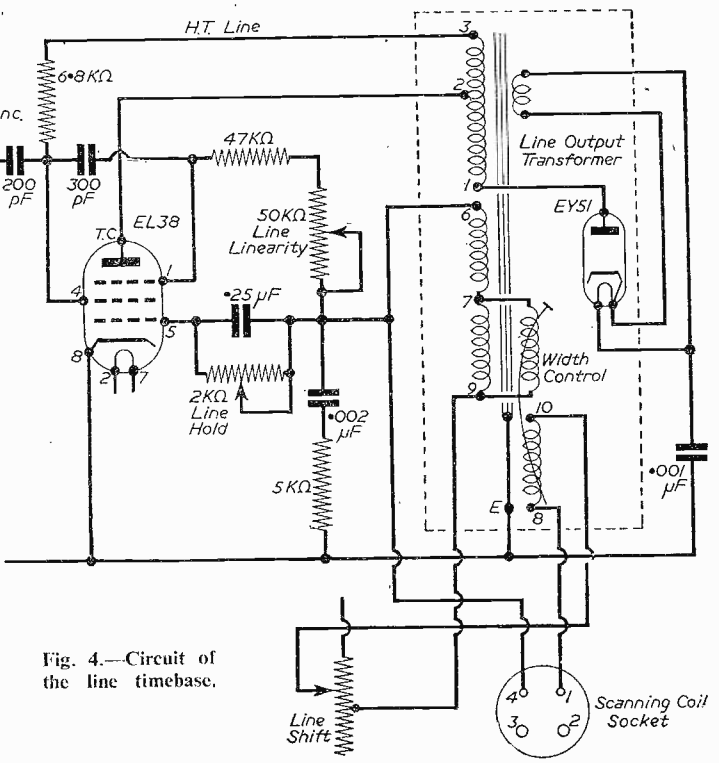


Fig. 4.—Circuit of the line timebase.

rotary controls in place of the slider type, a 12AU7 in place of the 6SN7GT, a Mullard MW31/16 in place of the Mazda CRM121 and the value of several resistors and capacitors may be found to differ, especially where the Mullard tube is employed.

As the MW31/16 has a 6.3 volt heater, the two-volt tapping is not used. This tube is not so liable to heater/cathode leakage as the CRM121, but it does seem to be prone to cathode to control grid failure.

An extremely interesting article by B. L. Morley appeared in the February, 1954, issue, which dealt in detail with the frame multivibrator circuit of this receiver and included instructions for modifying the circuit so that the raster could be observed without the presence of frame sync pulses.

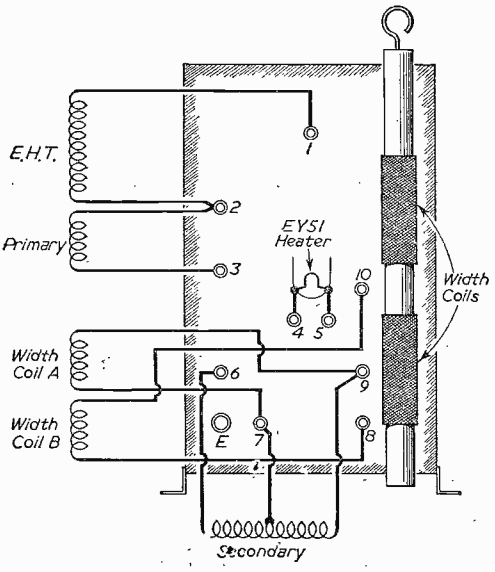


Fig. 3.—Details of the line transformer.

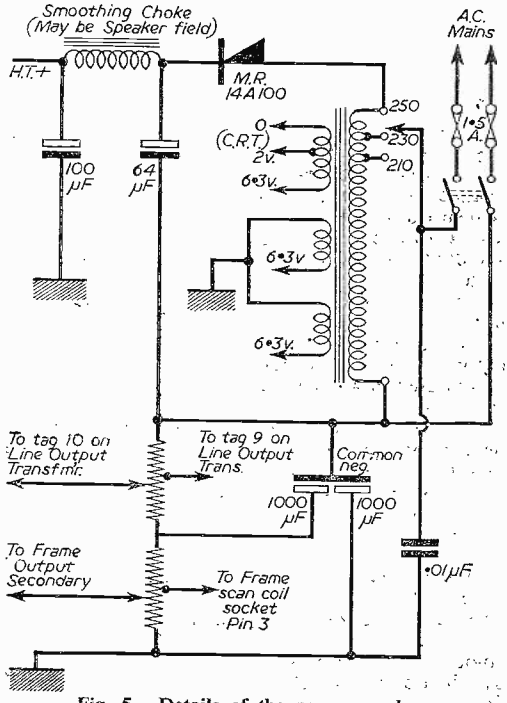


Fig. 5.—Details of the power supply.

TV at Harwell

WHEN the U.K. Atomic Energy Authority opened its doors to visitors at Harwell recently they saw, among the many techniques, the newest application of industrial television.

For the peaceful uses of atomic energy an immense amount of detailed information on the properties of isotopes is essential. To obtain this information, isotopes have first to be sorted out, and this is done in what is called an electromagnetic isotope separator. A critical feature in the process involves keeping ion beams in sharp focus, and this is normally done by an observer watching the changing luminous patterns and telephoning instructions back to the control room operator.

This procedure is impracticable in the Authority's new separator for highly active isotopes, since this machine is built into a large sealed chamber to prevent the escape of any radiation.

A Pye industrial television camera, specially fitted with a shield so that it can operate in the strong magnetic field, has now been installed so that the control room operator can himself watch the luminous beam focus on a monitor screen.

Pye recently developed a special television camera for inspecting the interior of the nuclear reactors at the Atomic Energy Authority's Calder Hall atomic power station, a picture of which was shown in last month's issue (page 512).

Future of BBC Television

MR. GERALD BEADLE, Controller of the West Region of the BBC, who is to succeed Sir George Barnes as Director of Television Broadcasting in July, spoke of the future of BBC television at a dinner recently.

He said he would approach his new duties with zest and with admiration for the splendid achievements of the BBC Television staff so far. He expressed much pleasure at the prospect of working closely with Mr. Cecil McGivern who, he said, was more than any other single individual responsible for the present shape of the Service on the programme side.

"Trying at this moment to peer forward through the mists of time I think I discern two formidable jumps before me. One is a second BBC Television Programme, which is absolutely necessary if a really conscientious service is to be offered to the public. The other is television in colour. When we shall reach them I do not know. The sooner the better as far as I am concerned. I hope we shall come up to these jumps during my term of office. . . ."

Mr. Beadle went on to say that he thought the BBC was in a uniquely favourable position because it had been conceived, borne and nourished through its early childhood by the British radio industry. It was a lusty youngster with a well-formed character of its own when it was taken over in 1927 by the present Corporation.

COLOUR TELEVISION

THE THIRD OF A NEW SERIES DEALING WITH THE PRINCIPLES AND PRACTICE OF MODERN TELEVISION IN COLOUR

3.—A BRITISH SYSTEM

By C. Grant Dixon, M.A.

THE present American system of colour television is a simultaneous compatible system. This means that the information for each colour channel is transmitted simultaneously and not in sequence as in the systems discussed in the last article. The word compatible implies that the same scanning standards are used as for the black and white television system and the transmission is so arranged that the chrominance is separated from the luminance and the latter is transmitted as a signal which will give a normal picture on a black and white receiver. The chrominance signal contains colour information only and is used in a colour television receiver to modify the black and white picture and present it on a special tube in full colour. The following rather simplified description has related this American system to the existing British standards as it appears possible that this may be the system adopted eventually in this country.

The colour camera contains three camera tubes on which are produced optical images of the scene to be televised in each of the three primary colours by a system of dichroic mirrors as described previously. The output signals of these three tubes represent, at any instant, the amount of red, green or blue in the colour of the object which is being scanned—let us call these signals R, G and B. Now the luminance of any particular object is given by the equation $Y=0.30R+0.59G+0.11B$ where Y stands for luminance. This follows from the fact that for equal energy sources of light the green light appears to the eye about twice as bright as the red one, and about six times as bright as the blue one. The output signals from the camera are therefore fed into what is known as a matrix amplifier which combines them in these proportions and delivers a combined Y signal which corresponds to a panchromatic representation of the original scene. This signal is then treated as a normal video signal and is transmitted in the normal way. A black and white receiver will thus display a perfectly satisfactory panchromatic image.

It would seem necessary to transmit three separate channels of colour information in addition to the luminance, but by a very ingenious process all the colour information is condensed into a single chrominance channel which can be transmitted either separately or in the same channel as the luminance. To achieve this latter result, let us see first of all how the combined chrominance signal is produced. The matrix amplifier delivers two further signals R-Y and B-Y. The R-Y signal is the normal signal from the red camera tube with the luminance signal subtracted; this subtraction is brought about by adding a signal of opposite phase, the phase reversal being produced by a valve. The R-Y and B-Y signals thus define the amounts of purely colour information pertaining to the red and blue channels. As the Y signal was originally formed from the R, G and B signals it is clear that a G-Y signal can be obtained by suitably combining the R-Y and B-Y signals. It is therefore only necessary to transmit the two R-Y and B-Y signals along with the luminance channel. The exact

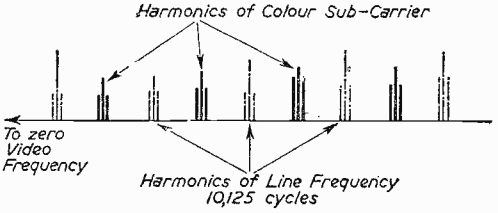


Fig. 1.—Frequency spectrum of the video signal.

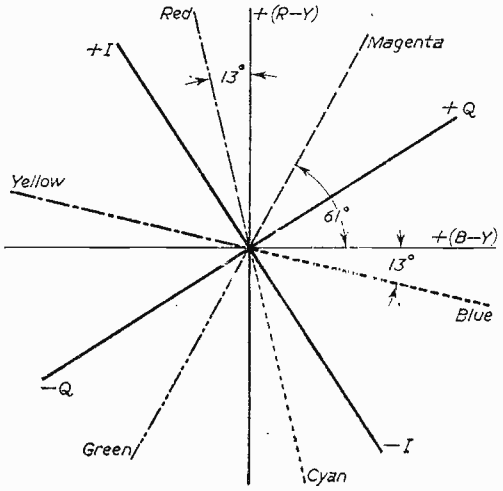


Fig. 2. — Phase diagram showing the relative phase of the (R-Y) and (B-Y) signals, and also of the I and Q signals.

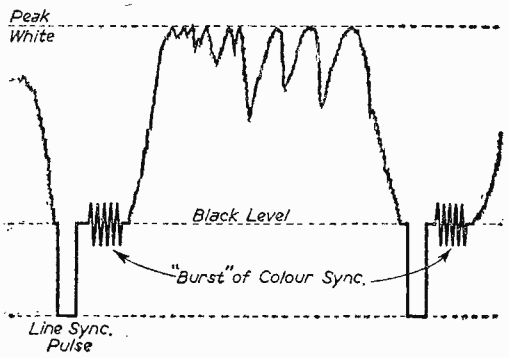


Fig. 4. — Position of the colour sync burst.

way in which these chrominance signals are transmitted is still a matter of experiment in this country; they could well be transmitted on a separate frequency with their own carrier or carriers, but it is naturally advantageous to keep all the transmission within a given frequency channel if this is at all possible. To achieve this the American system uses a reduced bandwidth for the chrominance channel. This would seem to be a disadvantage but, oddly enough, the eye does not see fine detail in colour and this reduction in band-width is therefore permissible without sacrifice of quality. In fact it is really tailoring the transmission to suit the characteristics of the human eye.

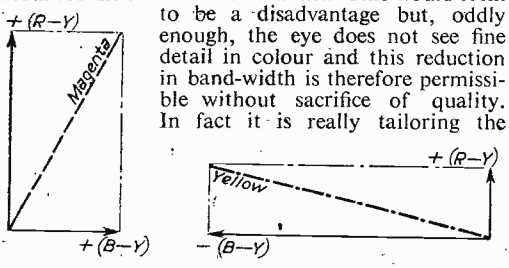


Fig. 3.—Showing how a variation of colour is produced by combining the signals of different amplitudes.

Bandwidth

Having reduced the bandwidth of each colour difference signal it is now necessary to transmit them in the same channel as the luminance signal without mutual interference. If we consider a normal amplitude modulated transmission, it consists of a carrier with two "sidebands" whose frequencies are separated from the carrier by the modulating frequency. For audio transmission these sidebands are about 10 kc/s wide. For a television transmission they are 3.5 Mc/s wide and one of the sidebands is suppressed at the transmitter. But this is not the whole story—the modulating frequency consists largely of the line frequency of 10,125 cycles (in this country) and harmonics thereof, and so the whole of the sideband is not occupied. The energy appears in groups spaced at 10,125 cycle intervals with spaces in between (see Fig. 1). In order to make use of these gaps the modulated carrier which conveys the chrominance information is spaced from the main carrier by an odd harmonic of twice the line frequency; this ensures that the chrominance sidebands, which are similar in nature, interleave the luminance sidebands as shown in the figure. The chrominance carrier is normally generated at 2.65781 Mc/s, modulated with the chrominance signal, mixed with the normal luminance video signal and then passed to the transmitter in the normal way.

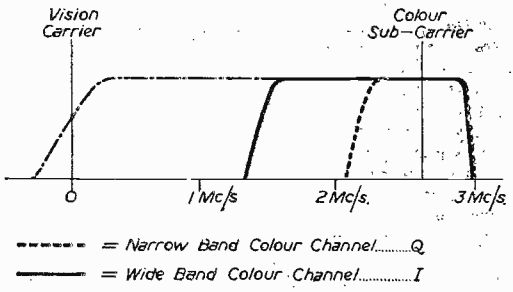


Fig. 5.—Narrow and wide bandwidth response curves.

But there are *two* colour difference signals to be transmitted, and the way in which this difficulty is overcome is one of the triumphs of modern electronic engineering. Each colour difference signal is caused to amplitude modulate a colour sub-carrier of the frequency mentioned above, but the two sub-carriers are 90 deg. out of phase. When these are combined we are left with a signal represented by a rotating vector whose amplitude is proportional to the saturation of the colour, and whose phase with respect to a given reference phase governs the actual hue transmitted. Fig. 2 is a phase diagram showing the relative phases of the different colours, and Fig. 3 shows how different amplitudes of the two colour difference

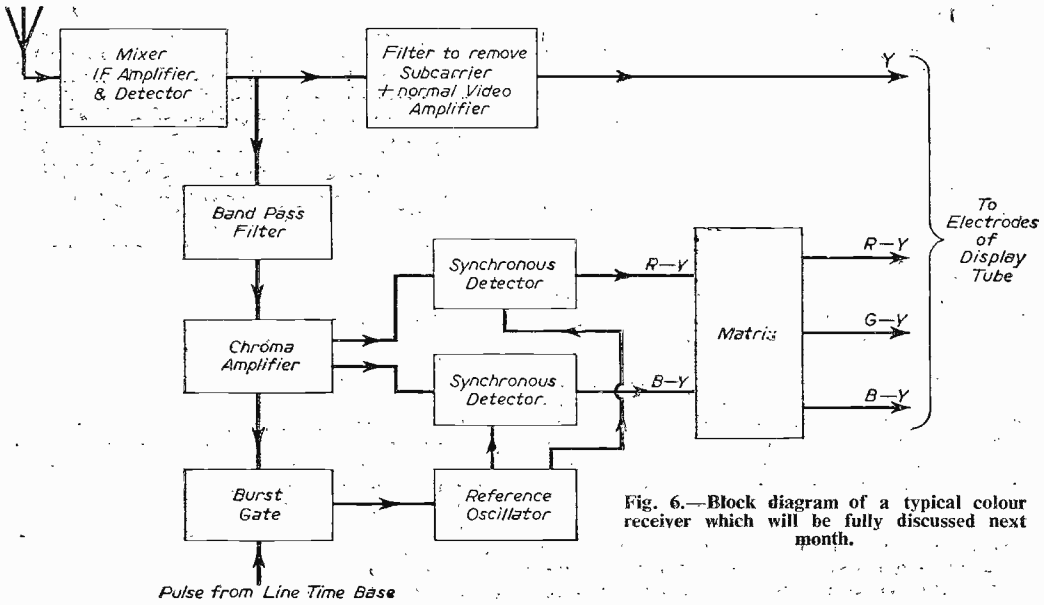


Fig. 6.—Block diagram of a typical colour receiver which will be fully discussed next month.

signals can produce different colours. This modulation is performed in a balanced modulator so that the colour sub-carrier is suppressed and its sidebands only are transmitted along with the luminance video. At the receiver the colour information is recovered by reinserting the carrier, with appropriate phase, in the colour demodulator section. Naturally the phase of the locally generated sub-carrier in the receiver must be the same as that of the original sub-carrier at the transmitter and this is ensured by transmitting a "burst" of about 8 cycles of the colour sub-carrier on the back porch of the line sync pulse (Fig. 4). This is separated out in the receiver and used to lock a crystal oscillator which provides the two demodulating signals (differing in phase by 90 deg.) through a phase shifting network.

Having recovered the R-Y and B-Y signals, these are then added in the proper proportion to give a signal which, when reversed in polarity is G-Y, i.e., $-(G-Y)=0.51(R-Y)+0.19(B-Y)$. The three colour signals are then fed to the grids of a special three-gun colour cathode-ray tube and the luminance signal is fed to the cathodes. Thus the net effect on, say, the red gun is $(R-Y)+Y=R$, i.e., red signal, and similarly for the blue and green.

Referring back to the phase diagram, Fig. 2, it will be noticed that two lines are marked I and Q. The American system uses the I and Q signals instead of the R-Y and B-Y as it is found that the eye perceives medium-fine detail in colours which range from orange to cyan; colours which are similar to those used in the very early two-colour films. Thus a larger bandwidth is allotted to these colours and they are transmitted as the I channel whereas the green to magenta colours represented by the Q axis are given a narrower bandwidth. The I and Q sidebands and their relation to the main carrier are shown in Fig. 5. Thus for low frequencies (coarse detail) full three-colour rendering is supplied; for medium frequencies (medium fine detail) two colour information is supplied, ranging from orange to cyan; and for high frequencies (very fine detail) only the brightness component remains and the finest detail is rendered in shades of grey. This procedure carries a stage further the process of adapting the transmission to fit the human eye. In actual practice, however, it has been found that very little is lost if the R-Y and B-Y signals are used with equal bandwidth on each channel, and this simplifies receiver circuitry. Time alone will decide which is the final system to be adopted in this country.

To sum up, a block diagram is given (Fig. 6) to show the circuits which are used in a colour television receiver in addition to the normal circuits. Scanning and sync separating circuits are not shown and no details are given of the colour cathode-ray tube which will be considered in the next article.

(To be continued)

Mullard Line Selector

THIS new instrument enables any individual line to be selected from a complete picture signal and displayed on any conventional triggered oscilloscope. The line selector can be used on transmitter or receiver circuits in the examination of depth of modulation, D.C. levels, bandwidth and synchronisation. "Through" or "terminated" (80 ohms co-axial cable) measurements can be made.

Design Features

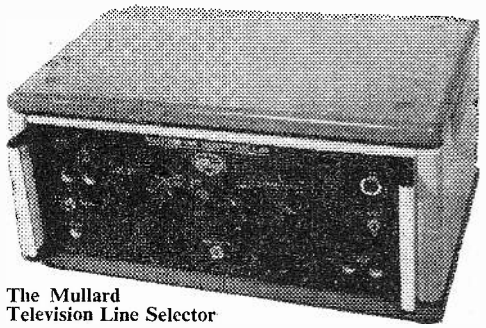
The Mullard line selector provides output pulses of 50 microseconds duration, delayed with respect to the frame synchronising pulses. These output pulses can be used to initiate the trace of a triggered oscilloscope, the sweep duration of which is adjusted to display one or more lines of the video signal.

Stability

The chief problem in a line selector is to provide jitter-free output pulses to trigger the oscilloscope. Since the line selected occurs only once in every complete picture cycle (i.e., on every "odd" frame only or every "even" frame only), the output pulse repetition frequency is 25 per second. The sweep time needed at the oscilloscope to display a single line is only about 100 microseconds. If a sweep expansion of 10 times is used in order to examine in detail a portion of the line, the effective sweep time is only 10 microseconds. This is very short compared with the interval between successive triggering pulses (40,000 microseconds) and a high order of stability of pulse repetition frequency is called for if serious jitter is to be avoided. In the Mullard Line Selector, freedom from jitter is obtained by the use of a special delay circuit and a built-in stabilised high tension supply.

Pulses of either polarity, with sharp leading edges, and a duration of about 50 microseconds, are supplied to the output co-axial sockets. The pulse repetition frequency may be 25 per second, as discussed above, but facilities are also provided for a p.r.f. of 50 per second, initiated by sine or square waves locked to the frame pulse. Suitable 50 c/s sine or square waves are provided by most commercial pattern generators, and enable the line selector to be used for investigating faulty interlacing.

The output pulses are delayed with respect to the frame synchronising pulses which initiate them.



The Mullard Television Line Selector

In order to display single lines when using the 25 p.p.s. repetition frequency, the amount of delay introduced by the line selector is made to vary by discrete amounts, the duration of any particular delay being an integral multiple of the duration of one complete line.

The line selector can operate with positive or negative inputs of 5-50 volts (high impedance input) or 0.5 to 5 volts (low impedance input). The high impedance input (250 kilohms shunted by 12 pF), enables the instrument to be operated from the video stage of a receiver. The low impedance input, which can be switched to 22 kilohms or 80 ohms, is for "through" or "terminated" measurements where the signal is supplied via a co-axial cable.

Analysis of Viewing Audiences

BBC FIGURES FOR THE FIRST QUARTER, 1956

THE following table, issued by the BBC, shows that viewing audiences were much bigger in January/March, 1956, than in January/March, 1955.

Average level of evening viewing among *the adult population :*

	Per cent. of the adult population
January/March, 1956—BBC ...	15.4
—I.T.A. ...	1.6
	17.0
January/March, 1955	14.9

In January/March, 1955, it was normal for some 5,600,000 adults to be viewing. In the same quarter of this year the average was 6,400,000. Of this latter figure viewers of BBC programmes accounted for about 5,800,000—an increase on the previous year, despite the introduction of competition. (The estimate, given above, of the size of the average I.T.A. audience during the past quarter, masks an increase following the opening of the Lichfield transmitter late in February. It is estimated that I.T.A. audiences averaged rather over 500,000 adults between January 1st and February 18th, and nearly 700,000 in the rest of the quarter.)

The following table compares the level of viewing amongst adults with TV receivers at home. The number of such people (the " TV public ") in January/March, 1955, was about 12,100,000 and by January/March, 1956, had increased to about 15,700,000. Since some of the latter could receive I.T.A. programmes as well as those of the BBC a distinction is made in Table IV between viewers who had, and had not, a choice of programme. The number of adults who could receive I.T.A. as well as BBC programmes at home is estimated to have been about 1,900,000 at the beginning of the quarter (when only the Croydon transmitter was transmitting I.T.A. programmes) to just under 3,000,000 at the end of the quarter, by which time the Lichfield transmitter had been open for five weeks.

Average level of evening viewing amongst *the adult television public:*

	Per cent. of TV public *with* choice of programme	Per cent. of TV public *without* choice of programme
January/March, 1956		
BBC	16.5	39.6
I.T.A.	23.9	—
	40.4	39.6
January/March, 1955		43.8

Three points emerge from this table.

(i) Amongst those whose sets could receive BBC programmes only, the average audience was slightly less this year than last. The difference, small as it is, does not, however, represent an equivalent fall in the average amount of time spent in viewing, for the number of hours of programmes was greater this year than last. For practical purposes it may be said that there has been no change in the extent to which this group of viewers watched television.

(ii) The level of viewing of those who *have* a choice differs little from that of those who have not. As was suggested in the report on the October/December quarter, the effect of " having a choice " is not to *increase* the amount of viewing, but to cause viewers to divide the same amount of time among the available alternatives.

(iii) Amongst those adults *with* a choice of programme—most of whom had, of course, deliberately adapted their receivers for this purpose—the average level of viewing of BBC programmes during the January/March quarter is estimated to have been 16.5 per cent., and that of I.T.A. programmes 23.9 per cent. Put another way, for every 41 of these people who were viewing the BBC, it was normal to find 59 viewing the I.T.A.

LIGHTNING

THE following comments have been issued by Messrs. Belling & Lee, Ltd., manufacturers of aerials and accessories. Notices in certain sections of the Press suggest that there is a measure of risk of television aerials being struck by lightning. If there were any significant danger to property, the insurance companies would not be slow in adding a shilling or two to the normal householder's comprehensive premium. Each " Belling-Lee " aerial carries an insurance against damage by lightning and this is passed on to the ultimate user. During the past 17 years well over two million TV aerials and " Skyrods " have been sold by Belling-Lee and erected, but claims for damage by lightning brought to their notice barely reach a dozen, and in no case was damage done to the fabric of the house but only to the receiver. In the same period many thousands of buildings without television aerials have been struck and damaged.

When lightning conductors are fitted to a high building, the conductors are generally of very heavy copper strip, about 1½in. wide and ⅛in. thick. Cost of labour and material would be many more times that of a television receiver and its aerial. Such buildings are not immune, and if the lightning charge is heavy, the copper will melt, but generally the copper is heavy enough to carry the charge. In the case of a television aerial, if the aerial is struck, the feeder (lead-in) generally disappears. It is instantaneously melted, and the charge follows the path of the metallic vapour. A report issued last year by the Fire Research Board confirmed that the presence of aerials has no effect on the prevalence of lightning strikes.

The rising column of smoke, or even air, issuing from a chimney is more conductive than the normal air surrounding the roof. The influence of that smoke or air is greater than any aerial, and if a static or lightning charge chooses to go to earth in the vicinity, it will follow down that conductive air column, and probably shatter the chimney (which is generally a carbon-coated tube), and perhaps destroy the fireplace on the way. In any case, the damage would be much more serious than if a television aerial were struck.

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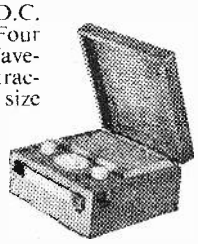

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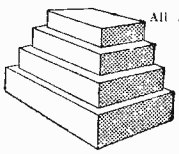

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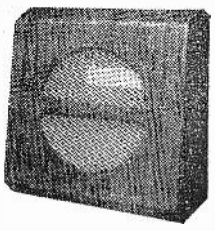

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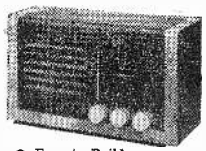

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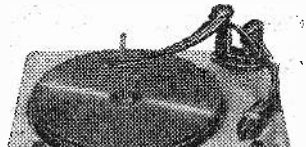

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EARLS COURT
August 22nd to
September 1st

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Aerialite, Ltd. ...	Castle Wks., Stalybridge, Cheshire	51
Airmec, Ltd. ...	High Wycombe, Bucks.	212
Ambassador Radio & T/V, Ltd.	37/39, Thurloe St., S.W.7	43
Antiference, Ltd.	Bicester Rd., Aylesbury, Bucks.	69
Automatic Coil Winder & Elec. Equip. Co., Ltd.	"Avocet House," 92/96, Vauxhall Bridge Rd., S.W.1	3
Balcombe, Ltd., A. J.	52-58, Tabernacle St., E.C.2	61
Belling & Lee, Ltd.	Gt. Cambridge Rd., Enfield, Mddx.	49
Bowmaker, Ltd....	29/30, St. James's St., S.W.1	208
Bulgin & Co., Ltd., A. F.	Bye Pass Rd., Barking, Essex	26
Bush Radio, Ltd.	Power Rd., Chiswick, W.4	17 & 29
Channel Electronic Industries, Ltd.	Dunstan Rd. Estate, Burnham - on - Sea, Somerset	108
Cole, Ltd., E. K....	Ekco Wks., Southend-on-Sea, Essex	24 & 30
Collaro, Ltd. ...	Ripple Wks., By-Pass Rd., Barking, Essex	21
Co-operative Wholesale Society, Ltd.	1, Balloon St., Manchester, 4	35 & 37
Cosmocord, Ltd.	700, Gt. Cambridge Rd., Enfield, Middx.	202
Cossor, Ltd., A. C.	Cossor Hse., Highbury Grove, N.5	57
Cossor Instruments, Ltd.	Cossor Hse., Highbury Grove, N.5	206
Decca Record Co., Ltd.	1-3, Brixton Rd., S.W.9	58
Domain Products, Ltd..	Domain Wks., Barnby St., N.W.1	107
DubilierCondenser Co. (1925), Ltd.	Ducon Wks., Victoria Rd., North Acton, W.3	62
Dynatron Radio, Ltd.	"The Firs," Castle Hill, Maidenhead, Berks.	4
E.A.P. (Tape Recorders), Ltd.	9, Field Place, St. John St., E.C.1	215
E.M.I., Ltd. ...	Hayes, Middx.	16
E.M.I. Institutes, Ltd.	10, Pembridge Sq., W.2	307
Edison Swan Elec. Co., Ltd.	155, Charing Cross Rd., W.C.2	19
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Ferguson Radio Corp., Ltd.	105-109, Judd St., W.C.1	12
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Garrard Eng. & Mfg. Co., Ltd.	Newcastle St., Swindon, Wilts.	50
General Elec. Co., Ltd.	Magnet Hse., Kingsway, W.C.2	53
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Gramophone Co., Ltd.	Hayes, Middx.	28
Hart & Co., Ltd., Alfred	243-249, Upper St., Highbury Corner, Islington, N.1	209
Hunt (Capacitors), Ltd., A. H.	Bendon Valley, Garratt Lane, Wandsworth, S.W.18	25
Independent Television Authority	14, Princes Gate, S.W.7	309, 310 & 311
Invicta Radio, Ltd.	100, Gt. Portland St., W.1	65
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McMichael Radio, Ltd.	Slough, Bucks.	59
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Masteradio, Ltd.	10-20, Fitzroy Place, N.W.1	15
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Name	Address	Stand No.
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Spencer-West, Ltd.	Quay Works, North Quay, Great Yarmouth, Norfolk	211
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Stella Radio & Tel. Co., Ltd.	Oxford Hse., 9-15, Oxford St., W.1	56
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Telerection, Ltd.	Antenna Wks., St. Pauls, Cheltenham, Glos.	18
Telequipment, Ltd.	313, Chase Rd., Southgate, N.14	63
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Waveforms, Ltd....	Radar Wks., Truro Rd., N.22	205
Westinghouse Brake & Signal Co., Ltd.	82, York Way, King's Cross, N.1	102
Whiteley Elec. Radio Co., Ltd.	Radio Wks., Victoria St., Mansfield, Notts.	47
Wolsey Television, Ltd.	43-45, Knight's Hill, West Norwood, S.E.27	2

Television in Malta

MALTA has not yet plunged into the maelstrom of television by erecting its own transmitter, but there appears to be good possibilities of reception there from the new transmitter which is to be erected on Sicily.

The Radio Audizioni Italia (R.A.I.) are proposing to erect a new transmitter on Monte Lauro for television broadcasting.

The site of the transmitter brings it to a height of over 3,000ft. above sea level (actually it is 980 metres), and should radiate over a fairly wide area, though ghost reception is possible in some areas due to reflections from Mount Etna.

The transmissions will follow the usual standard as already existing in Italy, i.e., the 625-line system with negative modulation and frequency modulated sound (the C.C.I.R. system).

At present we have no information on the polarisation but it is possible that this will be vertical as in the case of the Turin transmitter. The C.C.I.R. system generally recommends horizontal polarisation, and this is mostly the standard method in Europe.

The exception to this, of course, is France, which has not adopted the C.C.I.R. system but has her own 441-line and 819-line system, with vertical polarisation. The 441-line system is virtually obsolescent and will eventually be completely replaced by the 819-line system.

The new transmitter in Sicily will operate on channel E5, which is in Band III. Figures given are 174 Mc/s vision carrier with sound on 181 Mc/s.

Vision is to be radiated at a power of 7.5 Kw., the aerial power gain being 12.

Although the transmitter is at a distance of 200 miles from Malta, the fact that some of the distance is over the sea makes it hopeful that reception may be obtainable at high points in the island, and with a good aerial system we think it is possible to get signals under favourable conditions.

Please note that we do not expect anyone to rush to order a television receiver on the strength of this, but we think that the experimenter would find it worth his while.

Circuits used in the British system could be adapted. As negative modulation is employed it would be necessary to reverse the connections of the cathode and anode of the diode detector in the vision circuit. In most cases the line oscillator would cater for 625 lines, but if this is found not to be the case, then a reduction of the discharge condenser should enable the frequency to be covered.

As an example, the condenser in the popular Miller circuit could be reduced to 50pF (the actual value depends, on the value of the associated resistors).

A NEW BAND III CONVERTER

DETAILS OF A UNIT FOR LICHFIELD AND LONDON

By "Serviceman"

NOW that some experience has been gained on the practical use of converters for the ITA, several points have been clarified; some of these points were anticipated in the early stages and were taken care of in the design.

One rather important point which was not fully anticipated by some was the possibility of re-radiation, and this has been a real problem in certain localities. Where conditions have been severe it has been found that the operation of a converter has caused re-radiation of the Band III signal into Band I, with the result that near neighbours have been *receiving the ITA programme superimposed on their BBC picture.*

In Band I there has been comparatively little trouble from re-radiation mainly because of the practically universal use of an R.F. pentode valve as the first valve of the receiver.

Modern technique has developed the cascode circuit so much that it is practically a universal arrangement for the front end of Band III receivers, including converters. The use of the cascode is an obvious choice because of its inherently low-noise characteristics.

In Band III our main noise problem is that of valve noise and the amount of noise generated in the very first valve of a receiver is amplified by all the subsequent stages. It is obvious, therefore, that the first stage noise must be kept as low as possible; the R.F. pentode generates comparatively more noise than the triodes arranged in cascode and hence the development of the latter type of circuit.

Where signal strengths are of an average value then it is possible that a pentode can be used, and trials were made with this class of circuit. The results proved quite satisfactory and the circuit described in these pages was designed.

It is important to realise that with the pentode valve we have the position of two grids between the anode and the grid. In the case of the triode there is nothing between the grid and the anode and so a kind of feedback can and does occur between them. This feedback is the well-known "Miller" effect.

Without delving too deeply into the technicalities it can be said that a signal at the anode of the triode can "get through" to the grid and hence into the grid circuit and the aerial system.

The feedback generally takes the form of oscillation and so when a triode valve is used for high-frequency work some method must be employed to overcome this defect.

A simple method is to feed back a portion of the output signals from the anode to the grid circuit so that it is in opposition to the feedback taking place internally within the valve. The method is termed neutralisation.

Most forms of neutralisation depend upon a tuned circuit and it is very effective at the *frequency to which the input is tuned.* What is not so obvious is that at other frequencies the neutralisation may not be so effective and it is possible for a frequency removed in value from the signal frequency to get back from the anode to the grid of the valve and thence to the aerial system without any apparent ill effect.

Earthing the grid of the valve as is done in cascode circuits is not the complete answer, and even in the cascode circuit which has two triode valves in series so to speak, it has been found that appreciable feedback can take place.

The net result is a radiation from the aerial system

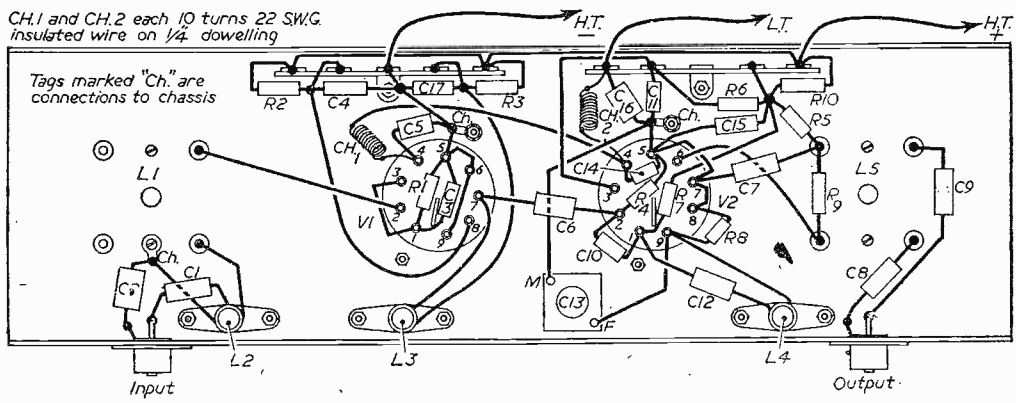


Fig. 1.—Layout and wiring of the converter.

of the Band III signal at the Band I—and protests from the neighbours!

Please note that this is not invariably the case, but it happens far more frequently than is realised.

With multi-channel televisors the problem is not so accute especially where the new standard I.F. is used. Radiation may take place at the intermediate frequency but it is not so likely to cause interference except where a similar receiver has bad screening of its I.F. stages.

When more televisors using cascode circuits and I.F.s at 34.75 Mc/s are in use, then some further troubles from interference may be experienced.

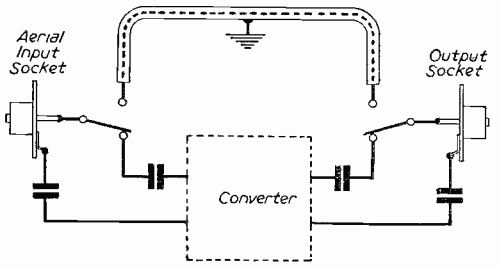


Fig. 2.—Suggested form of aerial switching.

The present design described here has gone back to the use of the pentode to act as a buffer between oscillator and mixer and the aerial circuit.

It will be found that for normal service area working the circuit will prove very satisfactory, but where the signal is weak then a preamplifier can be added, but it is recommended that this is of the cascode type.

The gain of this converter is a little better than the standard cascode arrangement yet it will not be found to be too noisy.

The Converter

The circuit of the converter is shown in Fig. 9. It is a two-valve circuit using an EF80 pentode R.F. amplifier, followed by an ECF82 a triode pentode oscillator and mixer.

The input to the converter is made via a filter circuit L1 C18 which is tuned to reject the local station (in most cases this will be Sutton Coldfield on Channel IV for Lichfield viewers).

It will be noted that the aerial is isolated from the chassis and the receiver by C1 and C2. The reason is to ensure that the aerial itself does not become alive should the feed from the power supply be of the universal type. C1 and C2 should be good quality ceramic type of condensers.

The aerial circuit is tapped into the first Band III coil L2 the tap being made at about half a turn. By this method some stage gain can often be obtained. If little is gained in actual practice then L2 can be substituted with a 100Ω resistor which provides an input (taking into account the input impedance of the valve) which matches reasonably well into an 80Ω feed.

V1 is a conventional R.F. amplifier with decoupled heater supply, this being accomplished by the simply-made choke "CH1."

The output of the valve is tuned by L3, which is at Band III signal frequency. Note that the H.T. feed to this valve is fully decoupled.

Output from V1 is fed directly to the grid of the mixer V2 via the small condenser C6. Note that it is a good precaution to use a screen on this valve in an effort to prevent Band I break-through. L1 must also be screened for the same reason, and for this reason a Haynes type of coil unit is specified.

The second portion of V2 is used in a standard Colpitts circuit C13 forming the tuning capacitor. It was decided to make this a variable component so as to overcome the possibility of frequency drift. It has a maximum capacity of 10 pF and is a Cyldon type number 18/5.

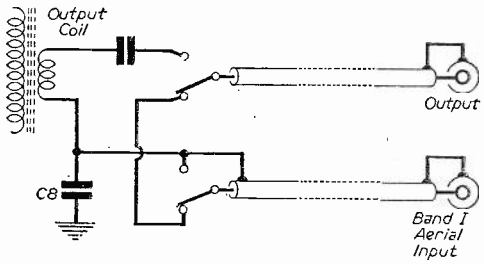


Fig. 3.—Output switching.

The control to this tuner can be brought out on a long spindle so that it can form a user control. After the converter has been lined up, then the capacitor should simply be adjusted for maximum sound.

There should be very little difficulty in this connection, as televisors made for Sutton Coldfield and for Holme Moss employ the single sideband method with the use of the lower sideband.

Output from the oscillator is fed directly to the grid of the mixer portion of V2. There is no internal connection made within the valve itself.

The first portion of the valve acts as a straightforward pentode mixer and the signal at the Band I frequency is taken from the anode coil L5.

Note that the output feed is taken via the condensers C8 and C9 so that the feeding coaxial cable is isolated from the chassis.

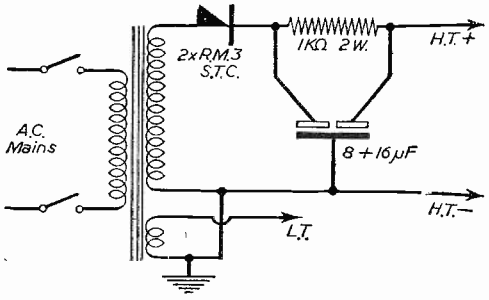


Fig. 4.—Suitable power supply unit.

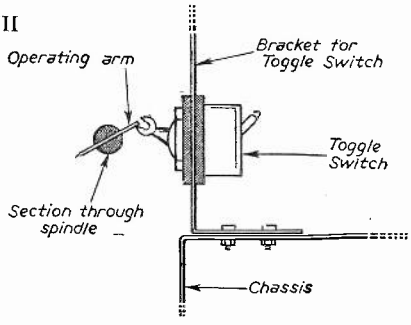


Fig. 5.—Method of mounting power supply switch.

The Aerial System

It will be practicable in many cases for the ITA signals to be received on Sutton Coldfield (Channel 4) aerials. In this case switching could be arranged so that the aerial is switched from the Band III programme to the Band I. A schematic diagram of this is shown in Fig. 2. A two-position two-way switch is required and can be wired as shown in the diagram.

Such a method avoids using a separate aerial for Band III and also avoids the necessity of plugging aerials in and out. The disadvantages are the possibility of feedback causing instability and the losses likely to be incurred in the switch. For the latter reason it is advisable to use a switch of the ceramic type, and one taken from an old R.F.24 or 25 unit will prove of value.

Where a separate power supply is used for the converter, then the changeover switch can be coupled to a toggle switch to switch the power on and off.

The toggle switch can be mounted by means of a simple bracket so that it can be actuated by the operation of the aerial switch. The spindle on the aerial switch is drilled and an operating arm (a small bolt

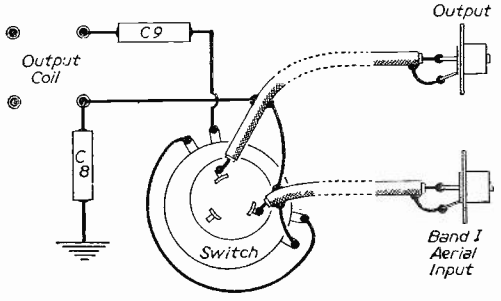


Fig. 8.—Practical arrangement of Fig. 3.

through the drilling) is fitted in such a position that when the switch is in Band III position the toggle switch is operated, and the convertor switched on, or when in the Band I position the converter is switched off.

If this arrangement is tried it is advisable to have a pilot light in a visible position so that the converter is not left switched on unnecessarily.

Generally speaking it is better to control the supply to the converter by the same switch which controls the televisor, but the above method of coupling with the aerial changeover switch can be employed.

Where a separate Band III aerial is used this can be left permanently connected to the converter and, if desired, the output section can be switched as given in the PRACTICAL TELEVISION Band III Converter. The circuit for this arrangement is given in Fig. 3, and the practical circuit as applied to a two-pole double-throw switch is shown in Fig. 8.

If it is desired to use a single feeder for a Band III aerial, plus a Band I aerial, then the arrangement shown in Fig. 6 can be employed.

Note that this arrangement should only be used where there is adequate Band I and Band III signal strength.

The Coils

The coils are made in two kinds; there is L1 (the Band I rejector coil) and L5, which is the output coil, both of these being wound on Haynes coil forms,

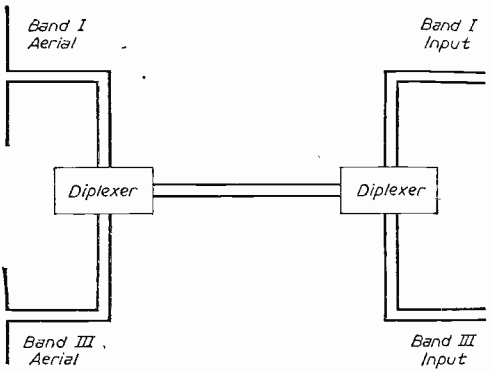


Fig. 6.—Method of using a single feeder.

and there are the signal frequency and oscillator coils which are wound on ¾in. diameter coil forms.

Coil L1

This is the Band I rejector coil and is wound on a Haynes coil former, which provides effective screening. For Channel 4 (Sutton Coldfield) seven complete turns are required. Enamelled wire should be used of about 32 s.w.g. and adjacent turns should touch each other. The opposite ends of the coil are brought out to the side wires and C18 is wired directly across them. It will be found that there is sufficient room within the coil screen to get the small condenser situated comfortably.

If the converter is to be used on a receiver tuned to *Holme Moss*, then nine turns will be required, while for *Wenvoe* six turns are necessary.

If it is intended to use the converter with a five-channel receiver, i.e., one which can be switched over any of the five channels in Band I, then it is a good idea to operate the converter for another channel.

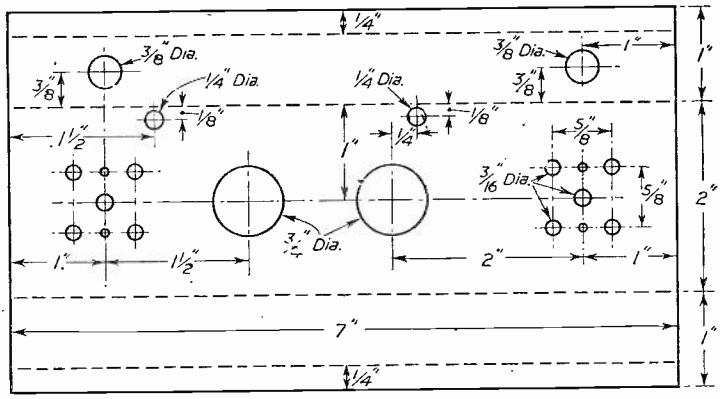


Fig. 7.—Details of the chassis.

For example, if Sutton Coldfield is the local station, then the converter can be tuned for Holme Moss and when in use the televisor can be switched to Holme Moss. This will avoid possibilities of breakthrough.

If the constructor wishes to use the converter on the London (Channel 1) frequency, then the coil should have 11 turns.

Coil L2

This is the primary tuning coil. It is wound with about 22 s.w.g. bare wire on a ¼in. diameter coil form. Two complete turns are required, the spacing between being at ¼in.

To wind the coil, first wind on one turn and mark the half-turn position ; take the wire off and at the marked position make the tap by soldering a short length of wire at that point. Now place the wire back on the former and complete the winding of the two turns.

When the coil is set in position in the unit, then the soldering of the ends should keep the wire in position on the former. Do not use coil dope, though a little dope placed at the bottom end and the top end may be permissible. Dope of the low loss type must be employed.

Coil L3

This coil is wound exactly as L2 except that no tap is made. Two turns spaced at ¼in. are required and coil dope should not be used.

Coil L4

This is the oscillator coil and it is wound, like L2 and L3, on ¼in. coil forms. Enamelled wire should be used and the turns should practically touch each other. 22 s.w.g. wire should be employed.

Coil L5

A Haynes coil unit is used for this coil as for L1. It comprises two coils, the first one (connected in the anode of V2) is wound exactly like L1 and the same number of turns is required.

The second small coupling coil is wound above the main coil, within ⅛in. of it. This means that the two coils must be separated by ¼in.

For channels 3, 4 and 5 two complete turns are required. For channels 1 and 2 only three complete turns are required.

One tuning core is necessary and this covers both coils. In practice only the bigger coil is tuned.

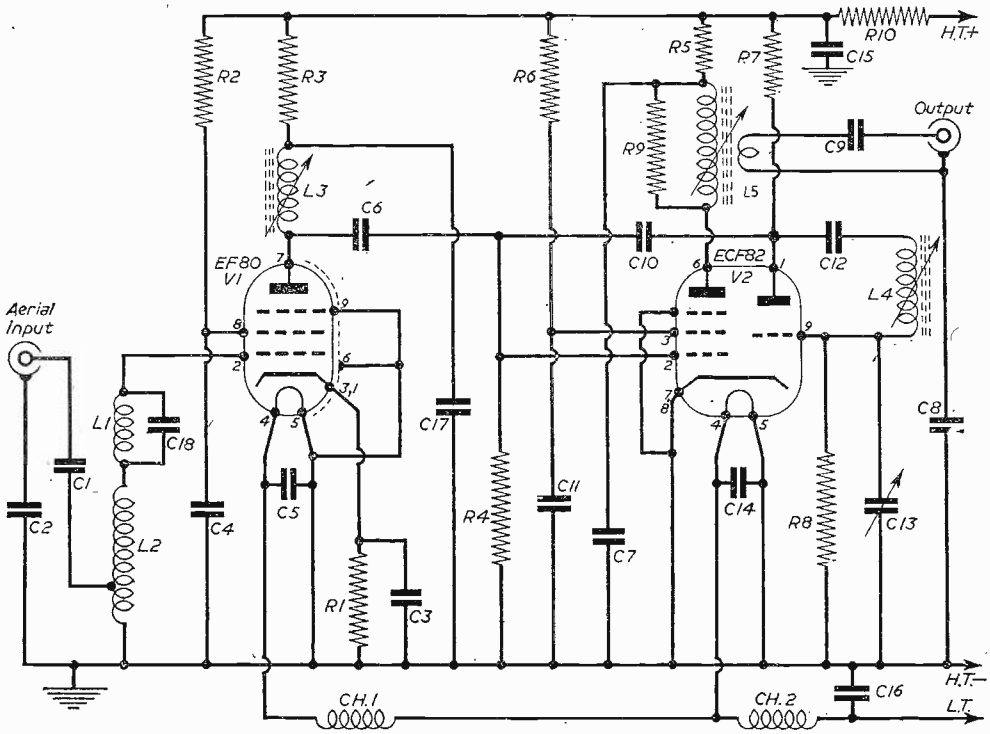


Fig. 9.—Theoretical circuit of the new converter.

CONDENSER AND RESISTANCE VALUES

C1—470 pF	C8—470 pF	C15—1,000 pF	R4—100 kΩ
C2—470 pF	C9—470 pF	C16—1,000 pF	R5—2.2 kΩ
C3—1,000 pF	C10—22 pF	C17—1,000 pF	R6—33 kΩ
C4—1,000 pF	C11—1,000 pF	C18—1,000 pF	R7—6.8 kΩ
C5—1,000 pF	C12—25 pF	R1—180 Ω	R8—10 kΩ
C6—10 pF	C13—0-30 pF	R2—15 kΩ	R9—4.7Ω
C7—1,000 pF	C14—1,000 pF	R3—2.2 kΩ	R10—2.2 kΩ

NOTE.—All resistors ½ W. except R10 which is 1 W.

Construction

The construction of the converter is quite straightforward, the main point being short leads, direct earth connections and chassis ventilation. The latter is to counter any frequency drift though the variable tuner will do much to overcome this.

The chassis can be made of aluminium and the main dimensions are given in Fig. 7. Remember to make ventilation holes.

Haynes coil units can be made up when the chassis has been constructed and then bolted in position. Remember to take note of the pins to which the coil connections are made within the coil can.

Mount the valveholders, the remaining coil forms, the input and output sockets, and the tag strips and then commence the wiring. A wiring diagram is given in Fig. 1.

Keep all leads short and direct and leave no more than ½in. of wire from a component where possible. In order to avoid damaging resistors, etc., with heat the wiring pliers should grip the wire between the component and the soldering point so as to carry away the heat.

When the wiring has been completed check it carefully with the circuit diagram and ensure that all is correct.

Power Supply

It is recommended that a separate power supply is fed to the converter where possible. A small standard power pack for A.C. mains is shown in Fig. 4. The transformer should have an output of 250 v. at 30 m/A and 6.3 v. 1-2 A.

Two metal rectifiers RM3 are used in series to cater for the 250 volts (each rectifier handles 125 volts). Any similar type of rectifier can be used.

Where it is desired to work the unit from the existing power supplies in the televisor, care must be taken as many modern television receivers are working at the limit.

If the power arrangements are D.C. then the D.C. equivalent of the valves must be used of course.

It is important that the power unit is kept well clear of the converter proper, though both can be mounted on the same chassis if desired. The main precaution is to avoid frequency drift due to heating effects.

Alignment

With the power supply connected the unit should be allowed to warm up and then the output can be plugged into the televisor input.

The output coil L5 should now be adjusted until a hissing noise is heard on the loudspeaker of the televisor. Note that as most televisors have the contrast control arranged so that it has some effect on the sound as well as the contrast, then the control should be adjusted for maximum.

It is possible that "snow" may be seen on the screen at this point when normal brilliance is used, but it should be ignored for the time being.

With the Band III aerial plugged in the "fine" tuning control should be set at mid-position, and a non-metallic trimmer should be used to adjust L5 for maximum hiss. Now adjust the oscillator core until the Band III sound is heard in the loudspeaker. If any Band I breakthrough is heard before this stage is reached, then adjust L1 to eliminate it.

When the sound is received then adjust L2 and L3 for maximum sound, watching the screen meanwhile to ensure that the picture signal is not overloading the circuits. The contrast can be reduced to avoid this effect and the volume control adjusted to avoid overloading the sound section.

The next step is to concentrate on the picture, and the tuning cores of L1 and L3 should be set about mid-position so as to effect a compromise between vision and the sound. Finally the output coil L5 should be adjusted, keeping the picture quality at its normal standard and the sound at full volume.

The "fine" tuning control can then be set so as to obtain maximum sound with good picture quality.

Note that it may be possible, in some cases, to get a double appearance of the picture, but at only one setting of the oscillator core will sound and vision be received together.

Aerials

It is not possible to forecast what type of aerial will suit any particular locality as conditions vary so much from one point to another.

In localities close to the transmitter then an indoor aerial will probably be found to be satisfactory, but high signal strength is not the simple deciding factor. The very high frequencies used in Band III are much more prone to reflection than those on Band I and ghosts may be a problem. In this case, a directional aerial must be used, and if the resultant signal strength is too great attenuators can be fitted.

Before investing in a new aerial, viewers who are within the service area can try the converter on their existing Band I aerial. In many cases this will be found satisfactory.

For distant locations then a good Yagi array will be required and it is advisable to use low-loss feeder cable. A 100ft. length of cable which gives a loss of about 2 db. on Band I can give a loss of 8 db. or more on Band III. Such a loss could easily be mistaken for poor operation of the converter.

I.T.A. Northern Region Transmitters

SERVICE AREAS COVERED BY WINTER HILL AND EMLEY MOOR

THE map below shows approximately the areas in which the reception of signals from the authority's television transmitters at Winter Hill and Emley Moor should be possible. Winter Hill operates on Channel 9 and Emley Moor will be on Channel 10.

Provided that the correct type of receiving aerial recommended for the various localities is used and the appropriate conversion of single-channel receivers to obtain the alternative programme is made, reception conditions are expected to be as follows :

Inner unshaded zones (Primary Service Areas)

Most viewers in these areas, unless situated in specially unfavourable positions, for example, immediately behind high ground or screened by high buildings, will receive a satisfactory service.

Shaded zones (Secondary Service Areas)

Within these zones a substantial proportion of viewers will receive a satisfactory service, but there will be some local areas in which reception conditions will be poor.

Outside the shaded zones

Some favourably situated viewers will be able to obtain a reasonable service.

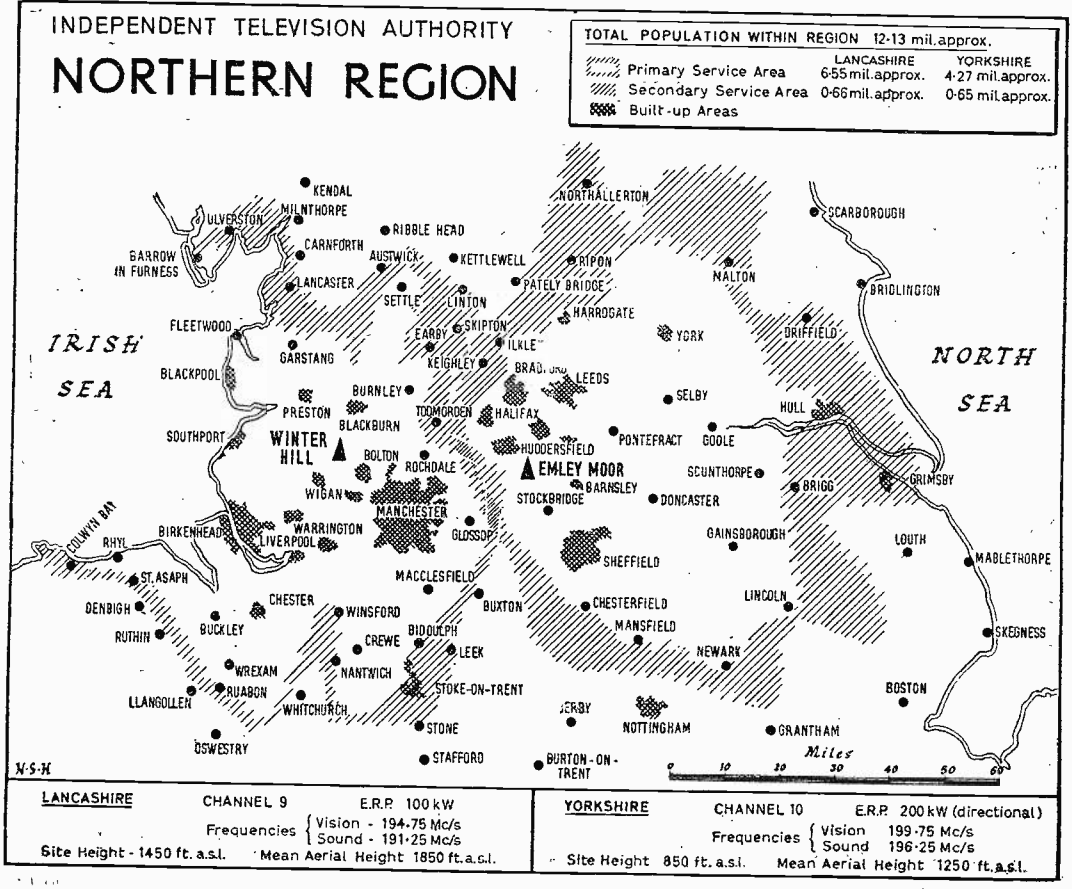
Extent of Service Areas

The Primary Service Area for the Winter Hill Transmitter extends in the north-west as far as Barrow-in-Furness (over 50 miles) ; in the north to Settle (about 35 miles) ; in the east to Glossop (approximately 30 miles) ; in the south-west to beyond Wrexham (approximately 50 miles) ; and in the west to beyond Rhyl (approximately 45 miles).

The Primary Service Area for the Emley Moor Transmitter extends in the north to Harrogate (about 30 miles) ; in the east to Hull (approximately 55 miles) ; and in the south to Newark (approximately 50 miles).

The Secondary Service Areas extend in most districts to places between five and 10 miles beyond the primary areas, but the Secondary Service Area of the Emley Moor transmitter extends to beyond Northallerton in the north and Grimsby in the east.

Special Note : In the central Pennine area, coverage will be " patchy " and some places may have poor reception from one or both transmitters.



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Type A. Low leakage windings. Ratio 1 : 1.25 giving a 25% boost on Secondary.
2 v., 10/6 ; 4 v., 10/6 ; 6.3 v., 10/6 ; 10.8 v., 10/6 ; 13.3 v., 10/6.
Ditto with mains primaries, 12/6 each.
Type B. Mains Input 220/240 volts. Multi Output 2, 4, 6.3, 7.3, 10 and 13 volts. Input has two taps which increase output volts by 25% and 50% respectively. Low capacity, suitable for most Cathode Ray Tubes. With Tag Panel, 21/- each.
Type C. Low capacity wound transformer for use with 2 volt Tubes with falling emission. Input 220/240 volts. Output 2-2½-2½-3 volts at 2 amps. With Tag Panel, 17/6 each.
NOTE.—It is essential to use mains primary types with T.V. receivers having series-connected heaters.

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RESISTORS. All values. 10 ohms to 10 meg., ½ w., 4d. ; 1 w., 6d. ; 1 w., 8d. ; 2 w., 1/-.
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5 watt } WIRE-WOUND RESISTORS { 1/3
10 watt } 25 ohms—10,000 ohms..... { 1/6
15 watt } { 2/-
15,000 ohms—50,000 ohms, 5 w., 1/9 ; 10 w., 2/3.
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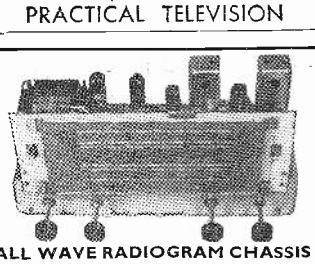

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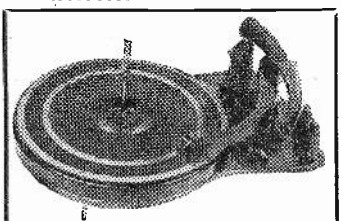

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COILS Wearite, "P" type, 3/- each. Osmor Midget "Q" type adj. dust core, 4/- each. All ranges **TELETRON,** L. & Med., with reaction, 3/6.
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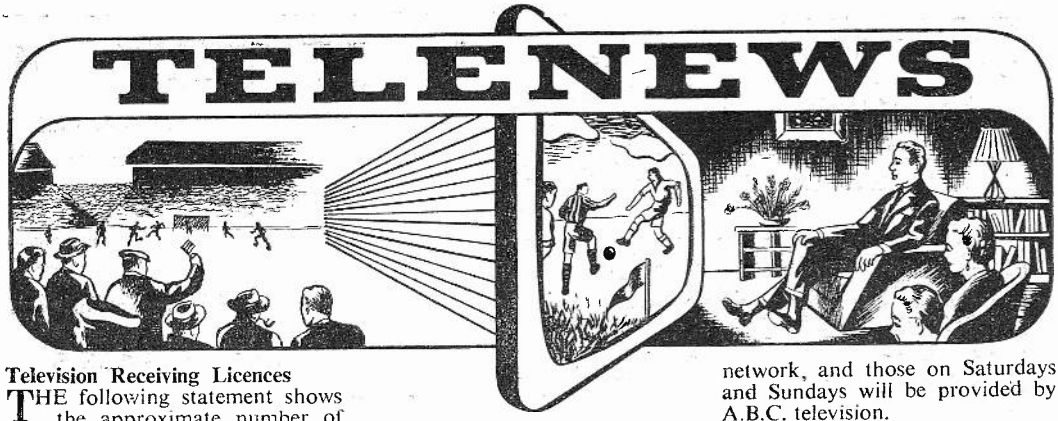
ALUMINIUM CHASSIS. 18 s.w.g. undrilled With 4 sides, riveted corners and lattice fixing holes, 2½in. sides. 7 x 4in., 4/6 ; 9 x 6in., 5/9 ; 11 x 7in., 6/9 ; 13 x 9in., 8/6 ; 14 x 11in., 10/6 ; 15 x 14in., 12/6 ; 18 x 16 x 3in., 16/6.

FULL WAVE BRIDGE SELENIUM RECTIFIERS, 2, 6 or 12 v. 1½ amp., 3/9 ; 2 a., 11/3 ; 4 a., 17/6.
CHARGER TRANSFORMERS. Tapped input 200/250 v. for charging at 2, 6 or 12 v., 1½ amp., 13/6 ; 4 amp., 21/-.
All BERNARDS books in stock.
VALVE MANUALS I & II, 5/- ea. part.
VALVE and **TV TUBE** equivalent's book 5/-.
ACID HYDROMETER. New Ex Govt. Unbreakable. Packed in metal case 7 x 1¼in. dia., 4/6.
WAVECHANGE SWITCHES.
5 p. 4-way 2 wafer, long spindle 6/6
2 p. 2-way, 3 p. 2-way, short spindle 2/6
2 p. 6-way, 4 p. 2-way, 4 p. 3-way, long spindle 3/6
3 p. 4-way, 1 p. 12-way, long spindle ... 3/6
VALVEHOLDERS. Pax, Int. Oct. 4d., EF50, EA50, 6d. B12A, CRT, 1/3. Eng. and Amer. 4, 5, 6, 7 and 9 pin, 1/-. MOULDED Mazda and Inct. Oct. 6d., B7G, B8A, B8G, B9A, 9d., B7G with can 1/6. VCR97 2/6, B9A with can 2/6.
CERAMIC. EF50, B7G, B9A, Int. Oct. 1/-. B7G with can 1/9.
BLACK CRACKLE PAINT, air drying, 3/- tin.

We have no connection with any other firm. Please address all Mail Orders correctly as below.

RADIO COMPONENT SPECIALISTS
307 WHITEHORSE RD., WEST CROYDON
OPEN ALL DAY—(Wed. 1 p.m.) *10 page list 3d.*

Tel. THO 1665. Buses 133 or 68 pass door. **48-hour postal Service.** P. & P., 1/- £2 orders post free. (Export Extra.) C.O.D. Service 1/6



Television Receiving Licences

THE following statement shows the approximate number of Television Receiving Licences in force at the end of April, 1956, in respect of receiving stations situated within the various postal regions of England, Wales, Scotland and Northern Ireland.

Region	*Total*
London Postal	1,309,615
Home Counties	662,938
Midland	1,003,570
North Eastern	885,506
North Western	838,658
South Western	389,005
Wales and Border Counties ...	324,146
Total England and Wales ...	5,413,438
Scotland	355,121
Northern Ireland	43,619
Total	5,812,178

During April the number of television licences increased by 72,585.

Fixed Advertising Positions

TO clarify the position concerning fixed advertising spots, following questions arising out of statements in the House of Commons in March by the Postmaster-General, the Independent Television Authority states that it has informed the programme companies that there is no reason why they should not enter into arrangements for the appearance of advertisements at fixed transmission times.

The practice of selling advertising space at fixed positions is commonplace in all forms of advertising, whether in newspapers, magazines or in outdoor advertising, and its extension into television advertising is a natural and legitimate development. There is certainly nothing which precludes it in the Television Act.

British Television for East Germany

AS a result of the Leipzig Fair last February, Pye, Ltd. have received an order for £30,000 worth of television transmission equipment for East Germany.

Two-thirds of this equipment, which is for studio broadcasting purposes, has already been delivered, and the remainder will be despatched shortly.

During the course of the fair, at which Pye exhibited a wide range of television, telecommunications and scientific instruments, many useful business contacts were made with the U.S.S.R., Poland, Czechoslovakia, Rumania, Bulgaria, China, India and Hungary, from whom Pye have already received an order for a television outside broadcasting van.

I.T.A. Northern Region (Lancashire) Transmitter

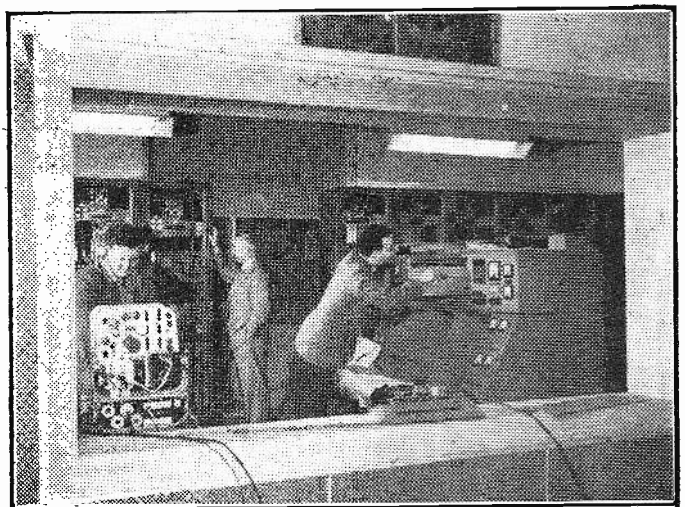
THE first Northern transmitter at Winter Hill, near Bolton, opened on Thursday, 3rd May. The programmes on all weekdays will be provided by Granada TV network, and those on Saturdays and Sundays will be provided by A.B.C. television.

The transmitter operates on Channel 9 (vision 194.75 Mc/s, sound 191.25 Mc/s), and will have an effective radiated power of approximately 100 kilowatts. It is expected that viewers in most of Lancashire and Cheshire and parts of North Wales and Westmorland will be able to receive satisfactory signals.

BBC Colour Film Record

THE first film series to be made in colour by BBC television will be of Mrs. Doris Langley Moore's collection in the Museum of Costume at Eridge Castle, near Tunbridge Wells. Filming will begin in the summer.

There will be six 15-minute films, covering fashions from Elizabethan to modern times. A BBC spokesman said the films



The Transmitter Control Room at Winter Hill during installation tests. Mr. P. A. T. Bevan, Chief Engineer of I.T.A., is in the centre.

would be shown in black and white "probably in the autumn."

They are to be made in colour as a permanent record of the collection, which suggests that the corporation is preparing to build up a film library in colour ready for regular transmissions. An optimistic date for colour television would be 1959.

King Feisal making the inaugural broadcast when the new television station was opened at Baghdad in May.

Audience Research

THE A. C. Neilsen Co. on the completion of the first of its regular surveys in the Manchester area (at the end of April) reported 351,000 households ready to receive programmes from Granada TV network at Winter Hill.

This survey measured the number of homes equipped as of a mean date of March 28th, 1956.

It is pointed out that the first Neilsen survey in the London area prior to the opening transmissions revealed only 188,000 households, and in Birmingham the first survey revealed 245,000 households. Granada TV network therefore start with a big audience level advantage.

Baghdad TV Station

ON Wednesday, the 2nd May, which is the birthday of King Feisal of Iraq, the Middle East's first television station was opened in Baghdad by the King.

The majority of the programmes will be educational. It is planned to operate what will be the first primarily educational service concentrating on child and adult education programmes. The Iraq authorities will be giving a television service, which, in the educational sense, will be greatly in advance of anything available in Great Britain, and without parallel anywhere else in the world. Pye supplied the equipment and are manning the station for the time being.

Obituary

THE death of well-known TV and radio handyman W. P. Matthew in March came as a sad surprise to his many friends, his colleagues in the publishing world and thousands of radio and TV fans.

Mr. Matthew's name was almost synonymous with Do It Yourself —he was, in fact, one of the first handymen to develop and encourage the post-war vogue which has now swept the country. More recently his Saturday afternoon Do It Yourself programme on ATV had made him almost a family friend to thousands of home-builders.

Portuguese TV

THE Radio Corporation of America and General Electric of America have submitted lower tenders than Marconi and Pye of Britain for a television transmitting system for Portugal. The bids and delivery times were: R.C.A. £398,060—five months; G.E.A. £433,030—one to four months; Marconi £478,865—12 to 19 months; Pye £556,508—nine to 18 months.

Party Political Broadcasts, 1956-57

AFTER joint consultations with the Government and the Opposition, the following arrangements for party political broadcasts in the year April 1st, 1956, to March 31, 1957, have been made by the corporation and the authority, in conjunction with the Independent Television programme companies.

There will be two series of party political broadcasts:

(1) *Sound*

Government	...	4
Opposition	...	3
Liberal ...	...	1

(2) *Television*

Government	...	4
Opposition	...	4
Liberal ...	...	1

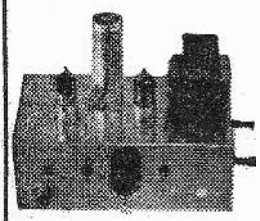
The maximum duration of the sound broadcasts will be 20 minutes. They will normally be given as hitherto at 9.15 p.m. in the BBC's Home Service. They will be repeated, in sound only, at the end of the BBC and Independent Television programmes.

The television broadcasts will be transmitted simultaneously in the BBC and Independent Television programmes. Their duration will be 25 minutes for two each of the Government and Opposition broadcasts and 15 minutes for the remainder. The longer broadcasts will be given at 7.05 p.m. and the shorter ones at 7.05 p.m. or at 7.15 p.m.

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.

BAND 3 T/V CONVERTER — 183 Mc/s-196 Mc/s
£2-5-0 post free.

Suitable for London, Sutton Coldfield and Northern Transmission.



This Unit, comprising drilled chassis, 7in. x 4in. x 2½in., two miniature valves and met. rect., wound coils, res., cond., etc., is a slightly modified version incorporating variable oscillator tuning of the circuit shown in *Wireless World*, May, 1954. It has proved itself highly successful—over 5,000 sets have already been sold to buyers all over England. We invite you to visit us and see it in operation for yourselves. Suitable for most types of T/V Sets. T.R.F. or Superhet. Blueprint and circuit details will be sent on application by return of post, 1/6, post free. Supply voltages required 200-250 v., 20 mA H.T. 6.3 v. 1 a. L.T. **Power pack components to fit chassis as illustrated, 30/- extra. Complete set wired, tested and aligned ready for use 20/- extra. Band 1, Band 3 Ae switching can now be added, switch kit, 6/6.** Full range of Band 3 aerials in stock. Adaptors from 7/6 per set, dipoles—indoor 6/6, outdoor with cable 13/9. **Band 1-Band 3 Cross-over filter unit, from 10/6.**

B.B.C. BREAK-THROUGH FILTER. Tunable filter unit for B.B.C. pattern rejection, **8/6.**

Volume Controls

Midget Ediswan type. Long Spindles. Guaranteed 1 year. All Log values 10,000 ohms to 2 Meg-ohms.

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

Linear type volume controls 50,000 ohms to 2 Megohms less switch only 4/- each.

CJAX PLUGS 1/2
COUPLER 1/3

80 ohm CABLE COAX

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

8d. yd.

SPECIAL. — Semi-air spaced polythene, 80 ohm Coax ¼in. diam. Stranded core. Losses cut 50%.

9d. yd.

SOCKETS 1/-
OUTLET BOXES ... 4/6

TWIN FEEDER, 80 ohms, 6d. yd.; 300 ohms, 8d. yd. **TWIN SCREEN FEEDER**, 80 ohms, 1/- yd.

TRIMMERS, Ceramic, 4 pf.—70 pf., 9d. 100 pf. 150 pf., 1/3; 250 pf., 1/8; 600 pf., 1/9. **PHILIPS** Beehive Type—2 to 8 pf. or 3 to 30 pf., 1/3 each.

RESISTORS.—Pref. values 10 ohms 10 megohms.

CARBON		WIRE WOUND	
20% Type. ¼ w., 3d.; ½ w., 5d.; 1 w., 6d.; 2 w., 9d.		5 w.	25 ohms—10,000 ohms 1/3
10% Type, ½ w., 9d.; 5% Type, ½ w., 1/-. 1% Hi-Stab, ½ w., 2/-.		10 w.	10,000 ohms 1/6
		15 w.	15,000—33,000 ohms 1/9
		5 w.	15,000—33,000 ohms 1/9
		10 w.	25 ohms—10,000 ohms 2/3

WIRE-WOUND POTS. Pre-Set Min. T/V. Type. Knurled Slotted Knob. All values 25 ohms to 30 K., 3/- ea. 50 K., 4/-. Ditto Carbon Track 50 K. to 2 Meg., 3/-.

3w. LAB COLVERN, Etc. Standard Size Pots. 2¼in. Spindle. High Grade. All Values. 100 ohms to 50 K., 5/6; 100 K., 6/6. **W/W EXT. SPEAKER CONTROL.** 10 Ω, 3/-.

CONDENSERS.—Mica or S. Mica. All pref. values. 3 pf. to 680 pf., 6d. each. Ceramic types, 2.2-5,000 pf., as available, 9d. each. **Tubulars**, 450 v. Hunts and T.C.C., .0005, .001, .005, .01, .02 and .1 350 v., 9d., .05, .1 500 v. Hunts Moldseal, 1/-. .25 Hunts, 1/6. .5 Hunts, 1/9. .1 1,500 v. T.C.C. (Simplex). 3/6. .001, 6 kV., T.C.C., 5/6. .001 12.5 kV., T.C.C. 9/6.

SILVER MICA CONDENSERS.—10%. 5 pf. to 500 pf., 1/-. 600 pf. to 2,000 pf., 1/3. 1% 1.5 pf. to 500 pf., 1/9. 515 pf. to 5,000 pf., 2/-.

ALUMINIUM CHASSIS.—18 s.w.g. Plain, undrilled, folded 4 sides and riveted corners lattice fixing holes. Strong and soundly constructed with 2½in. sides. 7in. x 4in., 4/6; 9in. x 6in., 5/9; 11in. x 7in., 6/9; 13in. x 9in., 8/6; 14in. x 11in., 10/6; and 18in. x 16in. x 3in., 16/6.

CARBON MIKE INSERT.—Superior quality type 2½in. x 1in. Brand new and boxed only, 3/6 each.

BRIMISTORS.—CZ1 for .3a heater chains, 3/6. CZ2 for .15 a., or .2 a., 2/6. CZ3 (Pilot Lamp), 1/6.

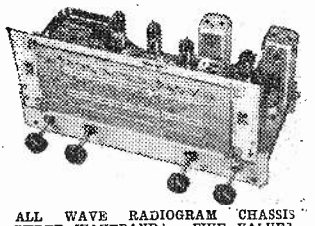
COPPER ENAMEL WIRE—¼ lb. 14 to 20 s.w.g., 2/-; 22 to 28 s.w.g., 2/6; 30 to 40 s.w.g., 3/6.

SWITCH CLEANER Fluid, squirt spout, 3/9 tin.

TWIN GANG TUNING CONDENSERS.—375 pf., Midget, 6/6; ditto, with dust cover and trimmers, 8/6. .0005 mfd. Standard size with feet, 8/6.

3 VALVE AMPLIFIER.

With variable Tone and Volume controls, 3 Midget B.V.A. valves. 4 watts output. Neg. feedback. Chassis isolated from Mains. A.C. 200/250 v. A quality amplifier at an economical price. **PRICE £3.19.6.** Carr. 2/6. Wired and tested, 15/- extra. Circuit and instr., 1/6, free with kit.



ALL WAVE RADIOGRAM CHASSIS THREE WAVEBANDS. FIVE VALVES.

S.W. 26 m.—50 m.
M.W. 200 m.—550 m.
L.W. 800 m.—2,000 m.

LATEST MIDGET B.V.A. SERIES.

Brand new and guaranteed. A.C. 200/250 v. 4 pos. W/C sw. S.Med.L.Gram. P.U. connections. High Q dust core coils. Latest circuit technique, delayed A.V.C. and Neg. feedback. Output approx. 4 watts. Chassis 13½in. x 5½in. x 2½in. Glass Dial—10in. x 4½in. horizontal or vertical type available, lit by 2 Pilot Lamps. 4 knobs supplied, walnut or ivory to choice. Aligned and calibrated ready for use. Chassis isolated from mains. **PRICE £9. 15. 0** Carriage and Insurance, 4/6.

8in. or 10in. speakers to match available.

Now Available. DE LUXE 7 VALVE push-pull version of above chassis, £12.10.0, carr. ins. 5/-.

QUALITY FLUORESCENT FITTINGS

Ideal for home or workshop. 4 ft., 220-250 v., complete with tube, ballast unit, etc., ready for use. Famous manufacturer's surplus offered at approx. half price. Starter switch type, 42/-. Quick start type, 47/6. Carr. and ins., 7/6 extra.

NEW BOXED VALVES ALL GUARANTEED

1R5	7/6	6Q7	8/6	ECH81	12/6	EY51	12/6
1S5	7/6	6SN7	9/-	ECL80	12/6	EZ40	10/-
1T4	7/6	6V6	7/6	EF39	7/6	MU14	8/6
1S4	7/6	6X4	8/6	EF41	10/6	PCC84	12/6
3S4	8/-	6X5	8/-	EF50		PCF80	12/6
3V4	8/-	EA50	2/-	Sylv.	10/-	PCF82	12/6
3D6	3/6	EABC80	12/8	EF50		PL81	12/6
5Z4	8/6	EB91	7/6	Equip.	5/6	PL82	10/-
6AM6	8/6	EBC33	8/6	EF80	10/6	PL83	12/6
6AT6	8/6	EBC41	10/6	EF86	13/6	PY80	11/-
6CH6	10/6	EBF80	12/6	EF91	8/6	PY81	12/6
6H6M	3/6	ECC83	12/6	EL41	11/6	PY82	10/-
6K7	6/6	ECH35	12/6	EL84	12/6	SP61	6/6
6K8	9/-	ECH42	10/6	EM80	12/6		

SPECIAL PRICE PER SET
1R5, 1T4, 1S5 and 3S4 or 3V4 ... ... 27/6
6K8, 6K7, 6Q7, 6V6, 5Z4 or 6X5 ... ... 35/-

SPEAKER FRET. Expanded Bronze anodised metal 8in. x 8in., 2/3; 12in. x 8in., 3/-; 12in. x 12in., 4/3; 12in. x 10in., 6/-; 24in. x 12in., 8/6, etc.

TYGAN FRET (Murphy pattern).—12in. x 12in., 2/-; 12in. x 18in., 3/-; 12in. x 24in., 4/-; etc., etc.

ELECTROLYTICS ALL TYPES NEW STOCK

Tubular Wire Ends		Can Types, Clips., 3d. ea.	
25/25 v., 50/12 v.	1/9	8+8/450 v. T.C.C.	4/6
50/50 v., 4/500 v.	2/-	8+16/450 v. Hunts	5/-
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8/500 v. Dub.	2/6	16+16/450 v. B.E.C.	5/6
8+8,500 v. Dub.	4/6	16+16/450 v. Dub.	6/-
8+16 450 v. Hunts	5/-	32/350 v. B.E.C.	4/-
16/450 v. B.E.C.	3/6	32+32/450 v. B.E.C.	6/6
16/500 v. Dub.	4/-	60/350 v. B.E.C.	6/6
16+16/450 v. T.C.C.	5/6	60+100/350 v.	11/6
32/350 v. B.E.C.	4/-	60+250/275 v.	12/6
32/500 v. Dub.	5/-	64+120/275 v.	11/6
32+32/350 v. B.E.C.	5/6	100+200/275 v. B.E.C., 12/6	

SENTERCEL RECTIFIERS. E.H.T. TYPE FLYBACK VOLTAGES.—K3/25 2 kV., 4/3; K3/40 3.2 kV., 5/-; K3/45, 3.6 kV., 6/6; K3/50 4 kV., 7/3 K3/100 8 kV., 12/6; **MAINS TYPE.**—RM1, 125 v., 60 ma., 4/-; RM2, 100 ma., 4/9; RM3, 120 ma., 5/9; RM4 type; 250 v. 275 ma., 16/-.

ENGRAVED CONTROL KNOBS for ¼in. Spindle. 1¼in. diam. Walnut or Ivory. Gold filled. 16 Standard engravings, 1/6 ea. Plain knobs to match above, 1¼in. 10d. ea., 1½in. dia., 8d. ea. Walnut or Ivory, 1½in., 1/- ea.; 1in. 9d. ea. Pointer Knobs Black with White Line 9d.

WEARITE "P" TYPE COILS. All ranges. 1 to 7, 2/6 ea. Osmor Q Series Coils. Slug tuned. All ranges from 3/6. Full range popular Coil Packs.

I.F. TRANSFORMERS — 465 k/cs

Brand new ex-manufacturer's midget I.F.T., size 2½" x ¾" x ¾", dust core tuning, Litz wound coils, High Q. Bargain offer, 7/6 pair.

MAINS TRANSFORMERS.—Made in our own Workshops to Top Grade spec. Fully interleaved and impregnated. **RADIO AND AMPLIFIER TYPE.**—250 v., 60 ma. F.W. sec., 5 v. or 6.3 v. 1 a. rect. 6.3 v. 2.5 a. set Htrs., 21/-, etc. **C.R.T. HTR., ISOLATION TYPE.**—Low leakage with or without 25% sec. boost voltage. Ratio 1:1 or 1.25, 2 v., 10/6; 4 v. 10/6; 6.3 v., 10/6; 13.3 v., 10/6 Ditto with mains primaries 200/250 v., 12/6. Specials to order.

L.F. CHOKES.—10 H/ 65 ma., 5/-; 15 H. 100 ma., 10/6; 10 H., 120 ma., 10/6; 20 H. 150 ma., 15/6; Simplex, 10/6; Soundmaster, 10/6.

ERSIN MULTICORE SOLDER 60/40. 18g., 3d. per yd.; 16g. 4d. per yd.; ½lb, 2/6.

LOUDSPEAKERS P.M. 3 OHM. 5in. Celes., 17/6; 6in. Celes., 18/6; 7 x 4in. Goodmans Elliptical, 18/6; 8in. Elac., 20/-; 8in. Goodmans special, 21/6; 10in. R. and A., 25/-; 12in. Plessey, 35/-; 8in. M.E. 2 k. ohms field, tapped O.P. trans., 24/6.

RECORDING TAPE.—1,200ft. reels, Scotch boy, 30/-; good quality paper tape on standard plastic reels, 12/6.

F.M. TUNER-UNIT (87 mc/s—105 mc/s) by Jason.—As tested and approved by Radio Constructor. Complete Kit of parts to build this modern highly successful unit, drilled chassis and J.B. dial, coils and cans. 4 BVA miniature valves and all components, etc., for only **£8.19.9.** post free. **SUPERIOR TYPE GLASS DIAL.**—Calibrated in Mc/s and edge lit by 2 pilot lamps, 12/6 extra.
Illustrated handbook with full details, 2/- post free.

TRS RADIO COMPONENT SPECIALISTS (Est. 1946)

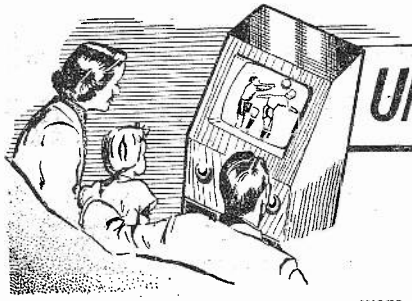
70 BRIGSTOCK ROAD, THORNTON HEATH, SURREY (THO 2188)

50 yards Thornton Heath Station. Buses 130A, 133, 159, 166 & 193

Listed above are only a few items from our very large stock. Send 3d. stamp today for Complete Bargain List.

Hours: 9 a.m.—6 p.m., 1 p.m. Wed. OPEN ALL DAY SAT.

Terms: C.W.O. or C.O.D. Kindly make cheques, P.O.s, etc. payable to T.R.S. Post/Packing up to ½lb. 7d., 1lb. 1/1, 3½ 1/6, 5½ 2/-, 10lb. 2/9



UNDERNEATH THE DIPOLE

TELEVISION PICK-UPS AND REFLECTIONS

By Iconos

"TOP TOWN"

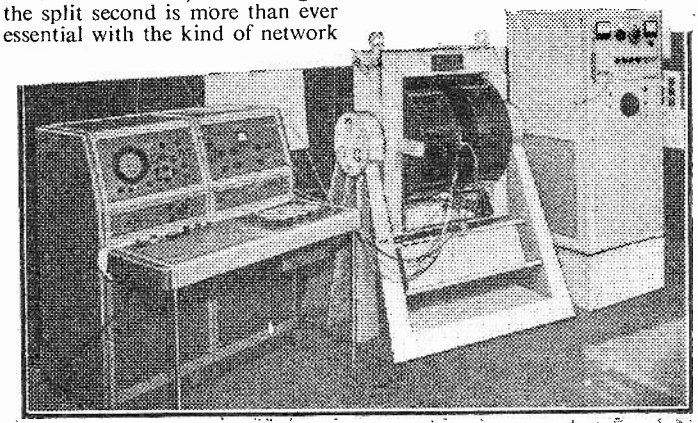
THERE was no roughness or amateurishness about the "Top Town" show which the BBC put on at the Royal Hall, Harrogate, when Blackburn contested with Stoke-on-Trent in the battle of entertainment of the amateur field for 1956. Both teams put up very creditable performances with a wide variety of musical, dancing, magic and comedy acts, not to mention one or two surprise novelties. Amateur shows of this type are sometimes rather boring, but a high standard of talent and the excellent high-speed production work of Barney Colehan gave this "Top Town" show a gloss and polish which surpassed many professional variety shows. The excellent BBC Northern variety orchestra, conducted by Alyn Ainsworth, made a major contribution to this success, and sound reproduction on my set was excellent.

SOUND QUALITY

THE picture quality of commercial TV continues to improve at the same time as the sound seems to be deteriorating. Even the London Palladium Show appears to have a rough sound quality from time to time, with occasional bursts of excessive "top." One recent Sunday the Palladium orchestra seemed to be overcrowded with scratchy violins, so peaky was the sound pick-up of the higher frequencies. In common with many other viewers, I repeatedly changed over to the BBC to check whether the sound side of my receiver had developed trouble or that it had become detuned. Not enough trouble is taken with mixing on the sound side, in any case. Take Rediffusion's excellent presentation of the Hallé Orchestra, for instance. Marvels are accomplished with the picture. When Ravel's "Bolero" was played, ingenious montages and superimpositions were employed, with close-ups of individual instruments. The balance of the sound had no connection with the picture. Instruments prominent in the picture should be given emphasis (but not too much emphasis) in the associated sound. Reproduction from sound film continues to be below par, and this is not always due to deficiences in the original photographic sound track. Cue marks on the picture for the ends of film sequences in news items, feature programmes or advertising spots should be abolished. They are intended as warnings or signals for change-overs to another reel (as in the cinemas) or to a following "live" sequence. It would be quite easy to fix metal staples in the film perforations which would complete an electrical circuit to ring a bell or buzzer—or even to actuate switches to make such change-overs entirely automatic. Presentation of TV shows is worked out in seconds. If the shows are run to time, then automatic switching is the only answer. The human element, the variation in the reflexes of different engineers, cannot be relied upon all the time. Engineers, like actors, sometimes "fluff" their lines, and timing to the split second is more than ever essential with the kind of network operation now being organised by the commercial TV companies.

SPLIT-SECOND TIMING

A-R's ambitious production of "Hamlet," with Paul Schofield, ingeniously gave the highlights of the Bard's work by truncating about three hours playing-time into an hour and a half. At least, nearly an hour and a half—for the final soliloquy after Hamlet's death was cut short and had to be faded out to give way to a timed commercial. This incident raised a chorus of protest in some quarters, which I think was a little unreasonable. The split-second timing necessary for network transmissions, with local interpolations at provincial stations, is unavoidable with commercial television, and producers will have to get used to the idea that they should rehearse and time the show to give a few minutes' leeway in the case of long, dramatic productions. In any case, the bloodthirsty last scene, the climax, had been magnificently played and came over with the horrific punch of an American gangster film. After this, and Hamlet's death, the rest—to me, at any rate—is anticlimax.



One of the latest electronic devices—a nuclear-magnetic-resonance spectroscope seen at the second international instrument show in London.

"Hamlet" on commercial TV was highly successful, in which the rather over-busy foreground movements were considerably helped by the simple background designs.

MIDLANDS TV

CONGRATULATIONS, too, to the commercial TV contractors in the Midlands area—A.B.C. TV and A.TV—for their smooth start-up in the Birmingham area, where the I.T.A.'s Lichfield transmitter seems to have been well received and welcomed. Already can be seen the pattern of programme exchanges between the provincial and London contractors, with consequent economies for all parties. As was to be expected, the Palladium Show and "I Love Lucy" went out from the Midlands transmitter and several of the Birmingham items (from the former Astoria, Aston) were networked through to London. I liked A.B.C.-TV's "Film Fanfare" with its clever interpolation of new and old films, but some of the Birmingham light musical programmes have been rather below standard in presentation, slickness and general appeal. However, it will be remembered that the BBC's TV presentations in Manchester, first in the old Rusholme film studio and then in their TV theatre at Hulme, both started off with a roughness of both technical values and production technique. Now, both BBC centres in Manchester turn out a fine polished job. I don't suppose many weeks will pass before the commercial TV theatres in both Birmingham and Manchester will be settling down to a steady output of slick, well-presented and entertaining shows. The bottle-neck will then be scripts; there is no dearth of scripts and material for sketches and revues, but the quality of material sent in has been very poor indeed. The Head of Associated Rediffusion was quite correct when he publicly stated this fact. The only way to obtain a sufficient supply of script material is to employ regular staff writers by the dozen. There is a tendency for the few good ones to write themselves dry.

A view during the opening of a transonic wind tunnel. H.R.H. The Duke of Edinburgh opened this new site and watched the results televised to another part of the building.

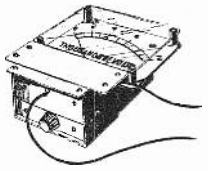
COMEDY

THE bright long evenings of summer are yielding a rich harvest of comedy. The I.T.V. companies seem to be convinced that viewers will stay indoors only if it's laughter they're after, to borrow Tommy Trinder's slogan. And the crazier the show, the more popular it seems to be. Some features are so surrealistically crazissimo as to defy all descriptions. Such a show was "The Idiot Weekly," now superseded by "A Show Called Fred," in which Peter Sellers and his team of goons put over slick impressionistic comedy and burlesques in a most unorthodox manner. This show has improved week by week and, I am told by many viewers, is an acquired taste, like caviar or gorgonzola. So far as I am concerned, I am not very partial to either of these delicacies, but I certainly have acquired the appetite of a gourmet for this weekly dish of nonsense. The shows are put over at a tremendous pace and the burlesque items strike a new vein of comedy, possible only with the technical gadgetry of television. The burlesque of "Dragnet," for instance, in which the usual goon gang—Peter Sellers, Spike Milligan, Kenneth Connor and Valentine Dyall—were assisted by guest artists Paul Carpenter and Irene Handl, struck a new "high" in non-corny humour. I took a tape recording of the sound of this show, by the way, and find the playback (sound only, of course) just as funny as the original. Perhaps this is because I remembered the screamingly funny visual so well.

COMICS GALORE

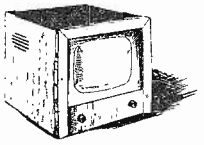
COMEDY is not the monopoly of the I.T.V., however. Norman Evans was back again in "The Norman Evans Show" on the BBC, assisted by Betty Jumel and Mrs. Shufflewick, in several amusing sketches and in his own inimitable "Over the Garden Wall" spot, in which he plays the garrulous dame. Norman's style of comedy is strictly conventional, in the music hall tradition, but his perfect timing of gags, his clowning and his warm personality come over TV excellently. The production, by Richard Afton, was carefully planned and skilfully directed, and though the emphasis was naturally on comedy, there were pleasing ballet items by Nadia Nerina and Alexis Rassine, dancing routines by the Television Toppers and a knockabout act by Desmond and Marks. Another first-class BBC laughter show was the Saturday "Comedy Hour," in which Ted Ray and his brother-in-law, Harold (Kenneth Connor) scored heavily with a simple sketch about a drawer that wouldn't open, and also "M.I. 5½," in which Greta Gynt, Cameron Hall and Jimmy Wheeler assisted in a mix-up with pills of the same size intended for different purposes. A welcome guest, who stooged with Ted Ray before breaking into song, was Jack Buchanan.

HIGH VOLTAGE TESTER



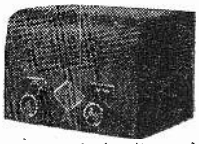
An instrument that will measure voltages up to 10,000 but which draws no current from the source. will probably be a valuable addition to your workshop equipment. It can be made entirely from odds and ends. Booklet giving full instructions, plans, etc., 2 6 post free.

14" T.V. CABINET



14in. T.V. cabinet of the latest styling made for one of our most famous firms—beautifully veneered and polished —limited quantity—19/6 each. Carriage and packing 3/6 extra.

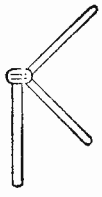
THE CASCODER



Of the several circuits used for Band III conversion at aerial frequencies, undoubtedly the most popular is the Cascode circuit. We can offer a very good converter suitable for any Band I to any Band III station, in a very neat, polished cabinet with fine tuning, on/off mains. Band I-III contrast switches. Price £7/10/0, post and packing 2,6.

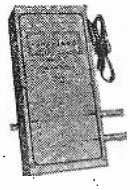
CRT VCR139A
New, unused and guaranteed, 32/6, plus 2,6 post.

Band III Aerial Kit

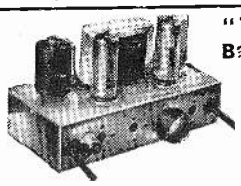


"The Folded V" was described in the July number of this magazine. We tried this and found it to be most efficient. The kit comprises alloy elements and connectors, neat plastic centre piece and saddle for mounting. 8/6, post 1/6.

BAND III PRE-AMP



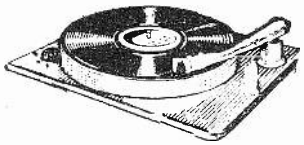
In difficult areas it will be necessary to increase the signal level and this is the ideal unit for this purpose. It is A.C. mains operated and is fitted with input and output coax. plugs. Price £4, post and packing 3/6.



"The ESTRONIC" Band III Converter

To-day's best value in Band III converters suitable for your T.V. or money refunded. Complete ready to operate, 59/6 non mains or 85/- mains, post and insurance, 3/6.

RECORD PLAYER £4-10-0



3-Speed Gramophone Motor

Latest rim drive 3-speed motor with metal turntable and rubber mat. Small mod. makes speed easily variable for special effects and dance work.

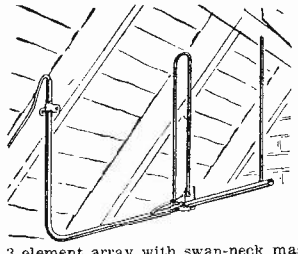
Hi-Fi Pick-Up
Using famous Cosmocord Hi-G turn-over crystal. Separate sapphire for each speed. Neat bakelite case with pressure adjustment.

Special Snip Offer This Month
The two units as illustrated £4/10/- or made up on board as illustrated £5/10/- plus post and insurance.

THE "CRISPIAN" BATTERY PORTABLE

A 4-valve truly portable battery set with very many good features as follows:
Ferrite rod aerials.
Low consumption valves.
Superhet circuit with A.V.C.
Ready built and aligned chassis if required.
Beautiful two-tone cabinet covered with I.C.I. Rexine and Tygan.
Guaranteed results on long and medium waves anywhere.
All parts, including speaker and cabinet, are available separately or if all ordered together the price is £7/15/0. post & insurance 3/6. complete ready built chassis 30/- extra. Instruction booklet free with parts or available separately, price 1/6.

BAND III AERIALS



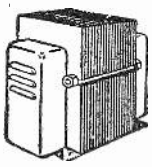
THE INDOOR

This is a ¼ wave, 3 element array. Of all alloy construction, the aerial is completely assembled and ready for instant mounting in loft, bedroom cupboard, window frame, etc. Price 12/6, plus 2/6.

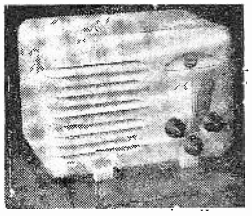
3 element array with swan-neck mast with "U" bolt clamp for fitting to existing masts from ¾in. to 2in. dia. 41/6
3 element array with cranked mast and wall mounting bracket 42/6
3 element array with cranked mast and chimney lashing equipment 65/-
5 element array with swan-neck mast and "U" bolt clamp for fitting existing mast from ¾in. to 2in. dia. 52/6
5 element array with cranked mast and chimney lashing equipment 67/-
8 element array with swan-neck mast and "U" bolt clamp for fitting to ¾in. to 2in. dia. mast ... 69/-

TRANSFORMER SNIP

11/6
Post 2/-



Fully shrouded—standard 200-250 v. primary 280-0-280 at 80 m/a. 6.3 v. at 3 amp., 5 v. at 2 amp.



MAINS-MINI

Uses high-efficiency coils, covers long and medium wavebands and fits into the neat white or brown bakelite cabinet—limited quantity only. All the parts, including cabinet, valves, in fact, everything, £4/10/0, plus 3/6 post. Constructional data free with the parts, or available separately 1/6.

MISCELLANEOUS BARGAINS

Valves.—Most types available, many at really bargain prices.
Coaxial Cable.—Cellular polythene—super low loss for Band III—11d. per yard.
200 m/a Chokes, 8/6.
Mu-Metal Screens for VCR97, etc., 8/6 per pair.
Resistors.—½ and ¼ watt, 5d.; 1 watt, 6d.
American Microphone Inserts—4.6 each.
Condensers.—3 - per dozen.
1,000 pf. Ceramic Condensers.—6/- per dozen.
Extra High Voltage Condensers. .001 mfd. 28,000 volt test (20,000 volt) working at 8/6 each.
Silver Mica Condenser.—50 assorted containing (3 of each) values from 2 pf. to 2,000 pf., 10/-. 100 assorted containing (3 of each) values from 2 pf. to 2,000 pf., 17/6.
Metal Rectifier, 250 volt. 250 milliamps, 12/6 each; 300 volt 60 m.a., 5/6 each.
S.P.61 Valves, brand new and perfect, 4/6 each, 48 - per doz.
Potted E.H.T. transformer, 1,500 volt at 5 m.a. and 2 v. at 2 a., 12/6, plus 2/6 post.
Block Condenser, 1 mfd. 1,000 v., 2/-; 4 mfd. 400 v., 1 6; 4 mfd. 750 v., 2/6; 1 mfd. 2,000 v., 5/-.
Miniature American relays double pole, 4/6 each.

STOP PRESS SNIP
.1 MFD. 350 v. Tubular Metal Case Condenser, 3 - per dozen, gross lots post free, otherwise add 1/-.

CORRESPONDENCE

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

A READER'S SUGGESTION

SIR,—I have recently had an idea for prolonging the life of cathode-ray tubes. Why not have an "auxiliary" filament next to the usual one. This could be wired to separate pins and when the tube started to fail or the filament actually broke the wiring could be changed to the auxiliary filament.

This arrangement could also be used in expensive power valves as well.—A. J. PASSER (N.W.11).

AN OSCILLOSCOPE FOR TV

SIR,—It has been brought to my notice that in Fig. 1, page 458, May issue, pins 9, 10 and 11 of the VCR139A are not shown connected to chassis. They should, of course, all go to chassis. —J. HILLMAN (N. Ireland).

COAXIAL TIP

SIR,—The quickest, cleanest, safest and easiest way of stripping the polythene insulation from the end of the inner core of coaxial is: Prick round the polythene by pressing between thumbnail and index finger, then twist off the polythene sheath by giving it plenty of turns between thumb and finger, while withdrawing. This twists the multiple fine wires together and gives a lovely end for threading and for soldering with no danger of either melting polythene or cutting any wires.

Welcome back to PRACTICAL TELEVISION! I was using my "Viewmaster" on Alexandra Palace and Band III with Band III converter. Now that the BBC is on C.P. and lower sideband I only get a bandwidth of one Mc/s. Is there any alternative to the conversion described in Dec./May issue, and if so has it been described in any past issues? If not I suppose I must dispose of my converter. Maybe many more readers are in similar circumstances now.—E. J. FISHER (Chiswick, W.4.).

TV BREAKTHROUGH

SIR,—I am very interested in radio and am a keen reader of your excellent magazine. I was listening on 84 metres when I picked up the TV sound channel of the Kirk o' Shotts transmitter. The signal was about strength 2-3 with heavy background noise. I wonder if any other reader has had the same experience or could explain how this happened. The TV was on in a different room.—VICTOR W. STEWART (14) (Edinburgh).

TURRET TUNER TROUBLES

SIR,—I have found with turret type tuners which use pre-aligned clip-in coils that the tags of adjacent coils are liable to touch and this can give rise to some very elusive interference showing as patterning and flashing on the screen.

As the fixing of the coils in these turrets is not very positive the interference may be intermittent and difficult to trace.

The fine limits worked to when producing these coils make it essential that the tags are bent inwards and the minimum of solder is used and even so, because the coils tend to float contact may still be made.

As these tuners are normally supplied with coils only for the appropriate Band I channel and two channels in Band III, the easiest remedy is to space out the coils, leaving a gap between each one, adjust the stops and reconnect the wires to the appropriate tags where separate gain controls are used.

I hope this may be of help to some of my fellow readers.—PETER ADKINS (Belvedere).

I.T.A. SOUND QUALITY

SIR,—I should like to make my protest regarding the quality of sound on the commercial channel. The programme material for the most part is satisfactory, but the "commercials" are, for the most part, intolerable from a quality point of view. One of my main grouses is that so many of the male speakers in these advertisements shout. It would almost seem as though they think that they will reach a larger audience if they raise their voices. This is particularly noticeable on one particular firm, and I think such a tendency to raucousness will lead to the introduction of "commercial killers" as in the States. These cut out the speech and the result will, therefore, be that the advertisers will reach a much smaller audience—in other words, if they go on shouting and making these adverts noisy they will kill the goose that lays the golden eggs. At my home we like one or two of these commercials, mainly because they are tuneful and the announcement is made in a quiet conversational tone. The moment the "shouters" come on we turn off the volume. —D. DOWLING (East Ham).

I.F. TRIMMERS

SIR,—I wonder if you would allow me to air a grievance or make an appeal to manufacturers of screened coils and I.F. transformers. I recently built your "SuperVisor" and found the trimming a most dangerous and awkward performance. This is due to the fact that the screened coils have trimmers at both top and bottom, with the result that you have to prop the set up on its side and work first on one side and then the other. I have found this applies to almost every commercial set also, and I would have thought that in these days it would be quite a simple matter to wind coils which could be mounted in a horizontal position on an insulated strip held in a vertical position in the cans, and thus have both trimmers accessible from the side of the can. This would enable all trimming and realignment to be effected without carrying out juggling feats with the weighty chassis. What about it, manufacturers? —H. J. P. NORRIS (York).

AN Oscilloscope FOR TV

SOME FURTHER NOTES AND SOME QUERIES ANSWERED

VERY few queries have arisen from the details which have already been given in the past two issues on this particular test instrument, although there are one or two points which need further explanation. In addition, there are two small misprints to point out. These occurred in the illustration of the circuit, Fig. 1 on page 458 of the May issue. In the circuit pins 9, 10 and 11 are shown connected together, but the earth connection was omitted from the junction point of these three electrodes. In other words, pins 9, 10 and 11 are all joined to earth. In the list of parts which appeared below this diagram, resistor R23 was wrongly indicated as being a pre-set. It is, of course, a normal ½ watt fixed component.

Controls

Fig. 3 of the May issue indicated a drilling arrangement for the panel and in the prototype the controls were arranged as shown in the diagram on this page. The illustration which was originally in the heading is unfortunately not sufficiently clear to enable the individual markings to be identified, and so the illustration given here shows how all the various holes are utilised—including a number of earth sockets which will be found extremely useful. It will be noted from the heading illustration already referred to that pieces of paper have been fixed to the panel beneath some of the indicating knobs and scales or indicating points drawn. It is, of course, possible to obtain transfers having scale form, and these present a much more professional appearance. Transfers are also available with letters or words so that other indications may also be made to give the finished instrument a professional finish.

Regarding Fig. 10 on page 459 of the May issue, the seven large holes are for the international octal valve-holders, and accordingly the diameter should be 1⅛in. The small hole on the upper portion is ⅜in. in diameter.

Finally, whilst we are always willing to assist readers to overcome difficulties met with in the building or operation of apparatus described in these pages, we regret that we cannot, for obvious reasons, give instructions for modifying a published circuit or using components and valves other than those specified. Whilst it might appear from a study of the circuit that a proposed modification might be in order, it is generally necessary to carry out a bench test in order to make certain that some unexpected trouble does not arise and obviously we cannot do this for every proposed modification.

The layout is not critical and although no practical layout or wiring diagram is given the two pictures of the top and underside of chassis on pages 456 and 457 of the May issue should enable the reader to make up the instrument.

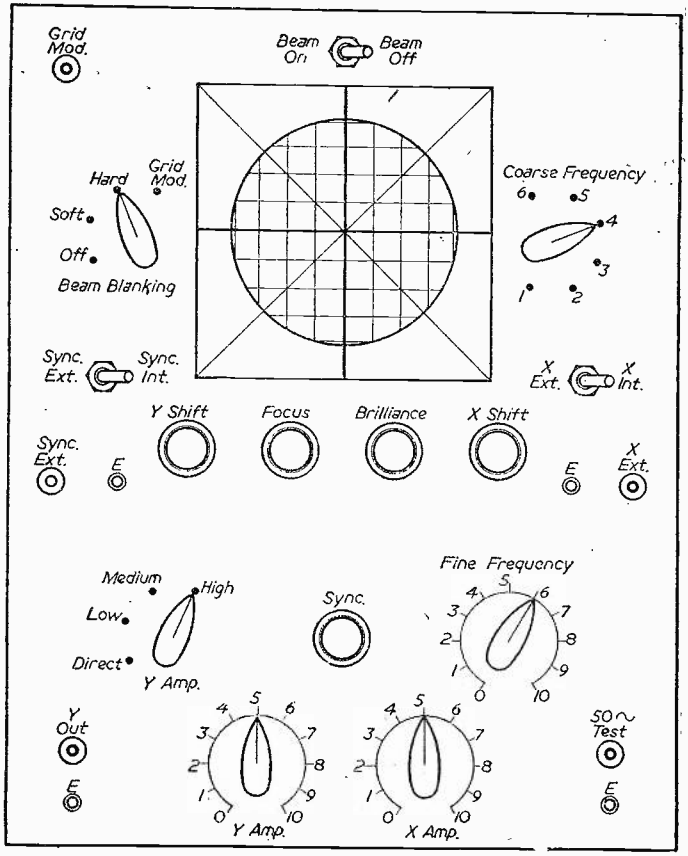
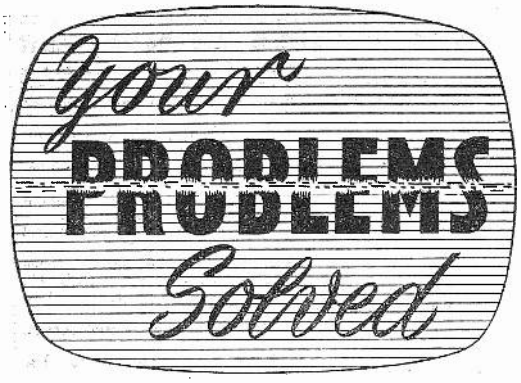


Diagram of the controls for the finished instrument.



Whilst we are always pleased to assist readers with their technical difficulties, we regret that we are unable to supply diagrams or provide instructions for modifying surplus equipment. We cannot supply alternative details for constructional articles which appear in these pages. WE CANNOT UNDERTAKE TO ANSWER QUERIES OVER THE TELEPHONE. The coupon from p. 575 must be attached to all Queries, and if a postal reply is required a stamped and addressed envelope must be enclosed.

MARCONIPHONE VT85A

When I switched off last night the picture and sound were perfect, but now there is sound only. The screen is absolutely blank, but sound is O.K. As the tube is only a few months old I wondered if the EY51 rectifier valve could be the trouble, if so, how would I test same and would the heaters be alight ? Both fuses in set are O.K. Therefore, if you can suggest cause of blank screen, no picture or raster I will be very pleased. —F. Tonkin (Grangetown).

In all probability the EY51 is at fault. We would suggest you make a spark test at the C.R.T. anode. If none is available, inspect the EY51, which is inside the can of the line output transformer (left side behind metal rectifier) and ensure its heater is glowing. As the valve is operated purely by the line timebase, the characteristic whistle of this should be listened for. If operation of the line hold control does not make this whistle distinctly audible, check the EL38 line oscillator and output valve. If the whistle is audible, but the EY51 is not being heated, it is advisable to replace this valve before proceeding further. A further possibility is that the .001μF EHT smoothing capacitor may be leaking. This carries the tag to which the tube anode lead is connected.

RGD 1800

I have a RGD television model 1800 which has developed trouble, namely low vision and low sound, either of which can be cured by the three trimmers at back, i.e. osc. trimmer for loudest sound, R.F. and aerial 1.5 Mc/s less vision carrier.

I find by juggling with these three trimmers I can either get normal sound or normal vision or both very poor. Also there is a slight fuzziness on the screen although outlines seem clear enough.

Could you please diagnose the trouble ?—W. T. (Sittingbourne).

The oscillator trimmer should be adjusted for maximum sound consistent with minimum sound on vision, and the aerial and R.F. trimmers for a compromise between sound and vision. If the performance is still poor, we would suggest that you check the aerial system, as it would seem that the trouble lies here, particularly in view of your remarks concerning "fuzziness" of the picture.

PYE MODEL LV30C

The line hold breaks up with a loss of focus. This persists for a few seconds and then clears, leaving the picture perfect as before. Sometimes the picture starts to pull slightly before the above fault comes on, but other times the fault starts without warning.—A. B. (Dartford).

If the definition of the picture, as distinct from the focus of the raster, deteriorates when the fault occurs, then we feel that the trouble may be caused by a heater to cathode leak in the picture tube. You could check the condition of the video amplifier stage, when working normally and under the fault condition, in an endeavour to establish whether the trouble lies in this section. The associated valve may be intermittently defective as this sometimes causes the same effect and tends to break up the line synchronising.

ULTRA V600

I have an Ultra V600, and I am having trouble with loss of picture height; the sides and bottom of picture stay normal.

I have changed the frame amplifier (V4) and have also changed C8, but this has not cured the trouble. I would therefore be very pleased to hear your comments on this.—J. S. (Dover).

Check the condition of the 6K25 and the resistors associated with the height control. Often, either this valve or one or more of the associated resistors becomes defective and causes a reduction of frame scan amplitude.

EKCO TC138B

I have a Teletron Converter and the only way I could cut out BBC was by soldering a length of coax. cable about 15in. long to the conversion chassis and then soldered to the convertor output lead; this cuts out BBC. At times the picture is very good, sometimes lines. I think it is BBC still breaking through. Can that short length of cable cause any trouble in the set ? It has been working a month now. My aerial is a three-element inside the roof.—S. P.

The coaxial stub will not harm the receiver, but, as well as cutting out the BBC, may attenuate the ITA. If you are getting enough signal, however, we hardly feel that you need worry.

KB FV30B

I am repairing a television for a friend of mine and replaced the faulty line output transformer as well as the valve EY51 which had a burnt out heater. I replaced valve 6J5 and 6BG6 both 30 per cent. I cannot trace the trouble now which is no heater in EY51. In every other valve, including tube, I have heaters working.—G. M. (Newark).

This indicates that the line timebase is inoperative. If the associated smaller components, such as resistors and capacitors, are in order, then you will probably find that the line scanning coils have a shorted turn, assuming, of course, that the replacement line output transformer is in good condition and that it has been correctly wired in the circuit.

FERGUSON 988T

When the set is switched on the picture narrows with large blank spaces at the top and bottom. The picture heightens as set warms up; when fully warmed up the top of picture will rise or fall in a spongy fashion. To keep picture at reasonable shape I have to adjust vertical hold at intervals and occasionally the linearity control at the base of the set.

Sometimes, if left, the top of picture will heighten till objects on the screen become long. To bring the top down again I have to turn vertical hold clock-wise, then wait a short time till picture slips, then lock, the picture will then decrease in height leaving a gap again at top.

Incidentally, when height control is operated to decrease height the bottom alone comes up and is sometimes accompanied by a violent shivering up and down.

There is no effect on sound except for a scratching noise when volume is turned to switch off.—M. P. (Dagenham).

Check the condition of the two ECL80 valves situated in line on the left-hand side of the picture tube. These valves are concerned with the frame timebase; the one nearest the potentiometer (frame linearity control) is the frame amplifier. Also check the condition of the grid resistors and coupling capacitors.

ALBA T411

The picture develops the annoying fault of fly-back lines appearing as set runs for a time. All the valves have been renewed except the two EL33s, one of these, I believe, being the frame output. Both run very hot—is this in order? Furthermore, there are two EA50 valves that have not been replaced.

Tube has been fitted with isolating trans. Both brightness control and contrast appear to be in order, but set at minimum lines consistently appear. I trust you can help me.—F. H. (Peckham).

This is probably due to the picture tube having altered characteristics or impaired vacuum. The fact that you are employing an isolating transformer indicates that the tube is, in fact, defective. Unfortunately, masking one fault often causes another.

COSSOR 926

I cannot get a black and white picture when I advance the contrast control; the picture is grey and white, and when control is retarded the picture is clearer but dark, but since the Crystal Palace transmitter has been working the definition is slightly better. Could you please tell me if you think it is the tube at fault or the valves in the vision?—G. S. (Streatham).

Without making tests it is impossible for us to give you the information required, but if the general brightness of the raster is normal on advancing the brightness control with the aerial removed and the contrast turned right down, then the trouble may lie in the vision I.F. strip or video amplifier stage. If the raster is weak, however, and the picture tends to turn peak white or negative when the controls are adjusted for a bright picture, then the tube is probably failing.

MURPHY V240C

I wrote to you several months ago concerning a fault on my Murphy V240C set.

You advised me to change the frame output valve (20P3). The fault was that the picture shrank back at the bottom of the raster by about ½in. after the set had really warmed up. I replaced the valve as suggested, and an immediate improvement resulted, but after about a week or so the fault came back again. I have since tried the original 20P3 in a friend's set, and it has given him no trouble at all.

Could the trouble be that the resistance of the frame scan coils is altering due to the rise in temperature as the set warms up?—R. J. T. (Ashton-under-Lyne).

A slight alteration in frame scan amplitude occurs on almost all sets due to an increase of resistance of the frame scan coils as the set warms up. Unfortunately, there is little that can be done to alleviate the effect. If it is excessive, however, a definite fault in the frame timebase circuits should be suspected. The 20P3 valve is a frequent offender, and while it may cause the symptom on one type of set, it may work perfectly in another set of different characteristics. Ensure that the mains voltage tapping corresponds closely to the mains voltage in your area.

BUSH TV53

My Bush TV53 has been back to the dealer four times in the first three months of its life. The trouble is loss of picture (no raster). The first three visits to the dealer no faults were found. The fourth visit to the dealer the EY51 was replaced. The fault has returned again (two months later) and I would appreciate your view on the trouble.

The service sheet for this model states that early models had EY51 fitted, and later models EY86. Is there any connection between my trouble and this modification? What modification is required to the set to replace the EY51 with an EY86, other than the base connections?—C. M. W. (Guisborough).

We do not think that the installation of an EY86 will solve the problem. In the majority of cases we have found that the intermittent collapse of EHT is due to a cathode-to-control grid short in the MW36-24 picture tube. We would, therefore, recommend you to call in your dealer and, if necessary, have the tube replaced within its guarantee period.

DEFIANT 1252

When set has been switched on and running for approximately five minutes or so, the brightness reduces, sometimes quickly, sometimes gradually. It can be restored with contrast sometimes, but on others, the picture becomes flat and brightness has to be increased. Increasing R.F. gain also has this effect (flatness). The picture still, even after these adjustments, has lost the crispness it had to start with.

Frame and line fill the tube. There may be a tendency to increase slightly. Three broad, whitish lines, apparent on whites only, on left half of the picture (line ringing?). Sound rather low.

Aerial, home made, in loft. T-match for best picture, T-match well towards centre. Is this in order?—N. L. (Saltburn).

We would suggest you first replace the 10F1 video amplifier valve which is in the centre of the chassis. If matters do not improve, inspect the underside of the receiver. On or near a tag strip on the rectifier side of the mentioned 10F1 is the vision detector crystal diode. This is a CG6-C. Quite often a defect in this crystal will produce the effect complained of. When replacing, note polarity, i.e., red end.

RX159, 160/220 mc/s, with 1/VR91, 1/VR65, 1/CV66, **12/6**; I.F. Amplifier 178 (for this), 16.5 mc/s, with valves, **15/6** (postage 2/6 each). R1355, new improved type, **37/6** (carr. 7/6). Condensers, Bak, tubular, 0.1/1.2 kV; .5/800 v.; .25/800 v., **9d.** each; .03/2.5 kV; .05/3.5 kVw; .25/1.5 kVw, **1/-** each. Responser, RDFI, new, 160/220 mc/s, 12 valves, **15/-** (carr. 7/6) or ZC3931, 9 valves, **25/-** (carr. 6/-). Relays, 6v. 2 break **1/6**. R1355 I.F. Strips, only, complete new with valves, **25/-**; less valves, **12/6** (post 2/6). R.F. Units, Types 26 or 27, **27/6** (postage 2/6); RF24, RF25, soiled, **10/6**. Motors, synch 3,000 r.p.m., 10 VA, 100 v. 50 c., new, **10/-**. I.F.T.'s 10/13 mc/s, canned, new, **1/3**. Power Pack, new, 200/260 v. A.C. input, outputs 250 v. D.C., 80 mA., 6.3v., 3A and 24 v. 1A, D.C., **40/-** (carr. 2/9). Receivers, miniature, 100/145 mc/s. Valves: 3/EF91, 2/EL91; I.F. 9.72 mc/s, new, **37/6**; less valves, **7/6** (post 2/9). List and enquiries. S.A.E., please! Terms, c.w.o. Postage extra. Immediate despatch. Closed week prior to Aug. Bank Holiday. W. A. BENSON (PT), 308, Rathbone Rd., Liverpool, 13. (STO 1604.)

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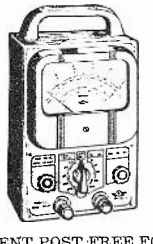

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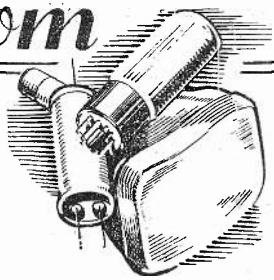
News From the Trade

LABGEAR INTERFERENCE SUPPRESSOR



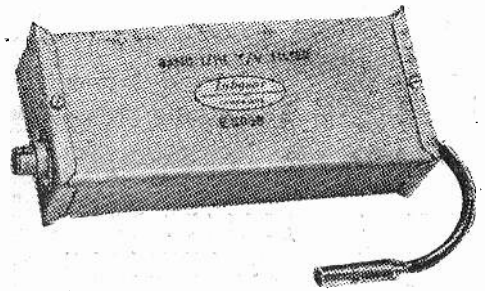
THE well-known Labgear range of interference suppressors and filters has been expanded and several of the earlier models superseded by improved designs.

The TV receiver filters plug into the TV receiver in between the aerial socket and aerial feeder. Three models are available.

Model E.5031, for the suppression of V.H.F. break-through has a cut-off at 70 Mc/s and negligible insertion loss over Band I.

Model E.5037 is a combined high-pass and I.F. filter. It is inserted in the aerial feeder lead and has a cut-off at 40 Mc/s. Negligible insertion loss on Bands I, II and III and provides complete protection against I.F. break-through. Very effective for removing patterning caused by R.F. heating, diathermy equipment, etc. This model has superseded earlier models E.5027 and E.5028.

Model E.5038; this is the latest composite Band I/III filter, and is illustrated below. It employs a

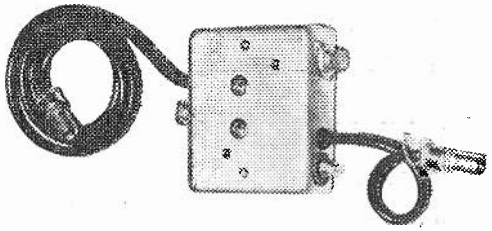


Labgear Interference Filter, Type E.5038

printed circuit arrangement, and simply plugs in series with the aerial lead to the TV set and allows only Band I and Band III signals to pass; interference arriving at all other frequencies is effectively suppressed. Owing to the complexity of this model, there is slightly higher insertion loss than that obtained using either model E.5031 or E.5037. However, this is not serious except under extreme fringe conditions where the signal is very weak. Labgear filters require no form of adjustment whatsoever by the user and can be installed in seconds. —Labgear (Cambridge), Ltd., Willow Place, Cambridge.

SPENCER-WEST PATTERNING REMOVAL UNIT

WHEN employing an aerial type Band III Converter unit, patterning results when the receiver has a residual Band I signal present. This residual signal can be due to a number of causes, the chief one being that due to direct pick-up on the circuitry of the receiver. Other causes are pick-up on the lead between the converter and the receiver, and "break-through" through the switching and other circuits of the converter unit. It is not a simple matter to avoid these residual signals particularly where they are due to direct "pick-up" on the receiver. The Spencer-West type 54 and 54A patterning removal units provide a solution to the problem in the following manner: A signal equal in amplitude and 180 deg. out of phase with the interfering signal is fed into the aerial socket of the receiver. This signal is



The Spencer-West Pattern Remover

obtained from the Band I aerial and is then derived from a network which with two controls permit the required neutralising signal to be readily adjusted. The unit will remove completely the interfering signal, the only essential requirement being that the Band I aerial should be a properly installed one. Two types are available, the type 54 is for use at the receiver and provision is made for securing an isolated connection to the chassis of the receiver, thereby complying with the regulations applicable to A.C./D.C. type chassis. The type 54A is intended for use with converters whose output consists of a co-axial socket. Both the types 54 and 54A are priced at 25s. retail.—Spencer-West, Ltd., Quay Works, Gt. Yarmouth, Norfolk.

"VIEW MASTER" BAND III TUNER

MESSRS. DENCO are now supplying three kits—Modification Coil Set, Tuner Coil Set, and Switch and Fine Tuner Set—for the modification of this popular set. The coil set costs 20s. and includes all the parts as described in our December, 1955, issue, whilst the Tuner Coil set with screens, etc., costs 30s. A separate packet of switch parts—platforms, copper, spring wire, etc., costs 27s.—Denco (Clacton), Ltd., 357/9, Old Road, Clacton-on-Sea, Essex.

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