

TV



SETS ON TRIAL

Whatever your views

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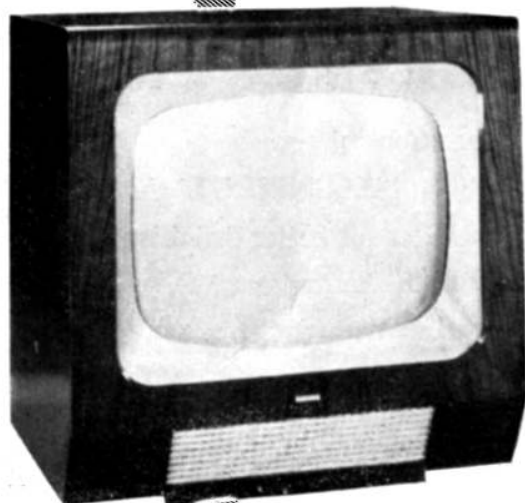
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V.26.

Putting the TV— —Sets on Trial



By RONALD FINNIGAN



Technical Editor of TV NEWS

PURCHASING a Television receiver is certainly a matter which cannot be undertaken lightly. After all, a comparatively large sum of money is involved, and there are many factors which should be taken into account before a particular receiver is chosen.

It is with these aspects in mind that the following reviews have been chosen and assembled in book form, to represent a comprehensive guide to the prospective purchaser.

The receivers chosen for review have been carefully selected from very many models available to-day, and represent a complete cross-section of modern design and construction.

Since the technical aspects of these receivers are dealt with in the reviews themselves, it is proposed, for the benefit of "the man in the street," to devote the remainder of this space to a general survey of present-day attainments in non-technical terms.

Chassis

Whereas, up to quite recently, manufacturers designed their receivers such that all components were installed on one large chassis, to-day, many have departed from this principle and are employing a form of "unit construction." By this method the various sections of the receiver comprise independent units. Generally, the sets are divided up into three units, *i.e.*,

vision and sound strip, time bases, EHT and power unit. The advantages of this principle of construction lie in the fact that should a fault develop, the faulty section can be removed easily and the fault cleared with the minimum of work. It will be appreciated that a reduction in time spent means lower repair bills; a point worth remembering.

It is also obvious that sub-chassis wiring has been receiving a good deal of thought and attention lately, and inspection of these nether regions reveal much "cleaner" layouts.

Great strides have been made in the design and construction of valves specifically intended for use in the modern television receiver, and although of considerably smaller size, this range of valves are extremely efficient and robust.

Reduction of Controls

Manufacturers of TV sets have long realised the advisability of reducing the number of controls necessary for the satisfactory operation of their sets, and to-day, the prospective viewer will find these controls have been reduced to a minimum; in many cases he will find only two necessary for the operation of the set. There are of course many subsidiary pre-set controls, but in the modern receiver these rarely need adjustment, and in most cases these relegated to a panel at the rear of the set.

TV Sound

The quality of TV sound has always been regarded as far superior to that of sound radio, and recent design has shown an appreciation of this fact.

Now that all five of the BBC's TV channels are in operation, set manufacturers are concentrating on designs which permit of easy channel changing. All the latest sets are capable of receiving all five channels, and in most cases the changing from one set of frequencies to another can be performed by the set owner without the necessity of calling upon the services of a TV engineer.

These receivers employ the super-heterodyne principle, since this circuit affords the easiest and cheapest method known, and at the same time is more efficient in operation.

Cathode-Ray Tubes

Whereas up to a year ago, the 12-in. model was regarded as "the latest word" in big picture tubes, to-day the 17-in. tube is fast becoming the standard. Many of these models employ a square face, and all have short necks. The "square" face does definitely seem to have an advantage here, since this permits of a larger picture area, leaving little of the tube face un-used. Again, the short neck ensures that cabinets need be of no greater depth than before. These new tubes are designed to take a much higher EHT (extra high tension) than older models, thereby producing much brighter crisper pictures. The ION TRAP, a device designed to prevent ion burn (that nasty dark spot which developed on some of the older tubes) is now almost universally employed, thus helping to ensure a more efficient product.

The Line and Flyback EHT Transformer, now universally employed, is becoming a more reliable component, and recent research is assisting in the production of a much more robust unit.

Synchronisation

Viewers in what are referred to as the "fringe" areas are no doubt only too well aware of the effects of fading signals and motor car static on their pictures. Quite apart from the picture intelligence transmitted, signals are sent out by the transmitter which are intended to "lock"

the picture steady. If these latter signals become weak, or heavy car static is present, the picture is apt to lose lock, or is tripped by the car static with disastrous results. A circuit has now been devised which largely eliminates this trouble. Basically, the circuit ensures that the time bases run always in synchronism, requiring only occasionally the assistance of the locking pulses. The older system, which required to be kept in step with the transmitter at all times, would lose lock immediately the pulses were missing. The new circuit is also designed to ignore the strong pulses set up by unsuppressed cars. It will be appreciated therefore that even if the locking pulses are temporarily lacking or are very weak, the picture will remain steady.

Automatic Control

For many years the designers of TV receivers have been experimenting with methods intended to automatically control the "gain" of the TV set. Although this principle has been incorporated in radio sets for some time past, the very nature of the TV transmission, very different from sound radio, has, up to recently necessitated many additional valves and quite complicated circuitry. It now appears the designers have largely overcome the initial difficulties, and automatic gain control is now an accomplished fact. A receiver incorporating this principle should appeal particularly to the fringe viewer, and also those who reside near aerodromes, since in both cases a variation in signal strength is almost certain, the former arising from the long reception range, and the latter as a result of the reflected signal from aircraft passing overhead.

Fly-back Suppression

A very simple circuit now incorporated in most new receivers acts as a suppressor of the fly-back lines on the picture. These lines tend to show up during the transmission of dark scenes and can detract from the enjoyment of the picture.

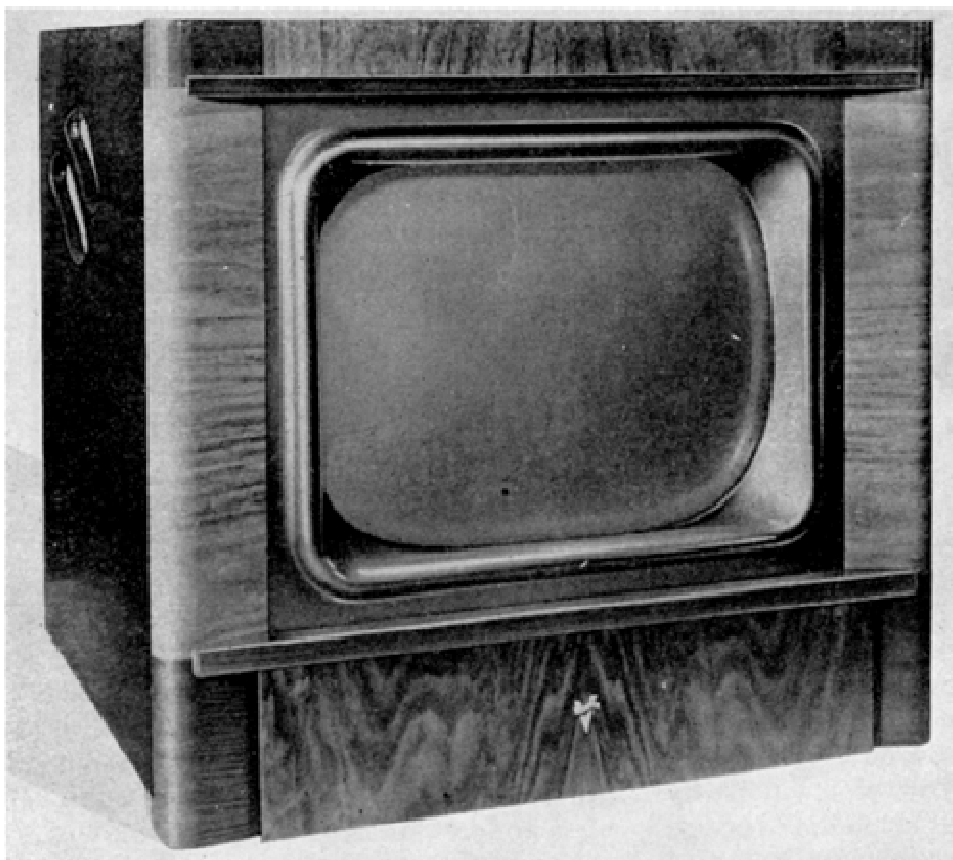
Here then are but a few of the more important advances in TV technique which have been made during the past year or so, and the intending viewer should study each in turn, bearing in mind his own requirements and the area in which he resides.

TV SETS

ON TRIAL

THIS super-heterodyne receiver, which can be tuned to all five BBC channels, employs 14 valves, and can be operated on either AC or DC mains. The voltage range of the instrument is from 195v to 254v on alternating current, and 195v to 255v on direct current supplies. The 12-in. cathode

ray tube is fitted with an ion trap to prevent possible ion burns. Front controls comprise :— *Contrast; Horizontal Hold; Brightness-On/Off; Volume; Vertical Hold; and Picture Height.* Pre-set controls (available to the TV Service Engineer) are :— *Picture Width; Horizontal Linearity Control;*



VIDOR

C.N. 4216

5 Channel

12-inch

Table Model

The Vidor 12-in. Table Model C.N. 4216, 5 Channel Television Receiver is manufactured by Vidor, Ltd., Erith, Kent.

Price: 64 Guineas, including Purchase Tax



Vertical Linearity Control; Vision Noise Limiter; and Sensitivity Control.

The combined sound and vision R.F. signals from the aerial pass through an impedance matching aerial transformer to the R.F. amplifier. Since the receiver is of the "universal" type the aerial is isolated from the chassis by a condenser network, part of which functions as an I.F. filter, a second channel rejector circuit is also incorporated. The amplified R.F. signals from the first valve are then passed to the Colpitts type mixer oscillator, the I.F. signal being passed to a common I.F. amplifier. After separation, the sound I.F. signal passes through a three pf condenser to the grid of the sound I.F. amplifier. The amplified signal from this valve being rectified by one half of a double diode valve, the second half of which acting as a series type noise limiter. Final amplification is achieved by a triode pentode valve, the signal then passing to the sound output transformer.

Noise Limitation

The vision I.F. signal having first passed through a sound rejector circuit, is amplified by a single valve vision I.F. amplifier, after which rectification takes place by the use of a germanium diode, the video signal passing to the video amplifier valve. The amplified video signal is coupled to the cathode of the cathode-ray tube, noise limitation being achieved by half of a double diode, which diode has a three position control for varying the degree of clipping. The synchronising signals pass through the second half of the double diode which is so biased that it only conducts during the synchronising pulses. It is then amplified by a sync amplifier (half of an E.C.L. 80 valve) which provides final separation from the vision signal.

The Frame pulses after integration pass to and synchronise the Frame blocking oscillator (second half of E.C.L. 80 valve). The saw-tooth wave form thus obtained is amplified by the vertical scanning amplifier (half of E.C.L. 80 valve), which in turn is matched to the Frame scanning coils by matching transformer. Height is obtained by controlling the H.T. supply to the Frame oscillator valve.

Vertical linearity, which is adjustable, derives from a variable feedback network. The Line scanning circuit utilises a triode

phase reverser (second half of E.C.L. 80), and a Line amplifier (P.L. 81 valve). The circuit oscillates by feedback from the secondary of the Line output transformer. The Line synchronising pulses feed the anode of the triode section of the E.C.L. 80, and synchronise the Line frequency when the horizontal hold control is adjusted correctly. The Linescanning transformer is of the auto-type, the Line coils being connected to a tapping on the primary winding.

Line Linearity

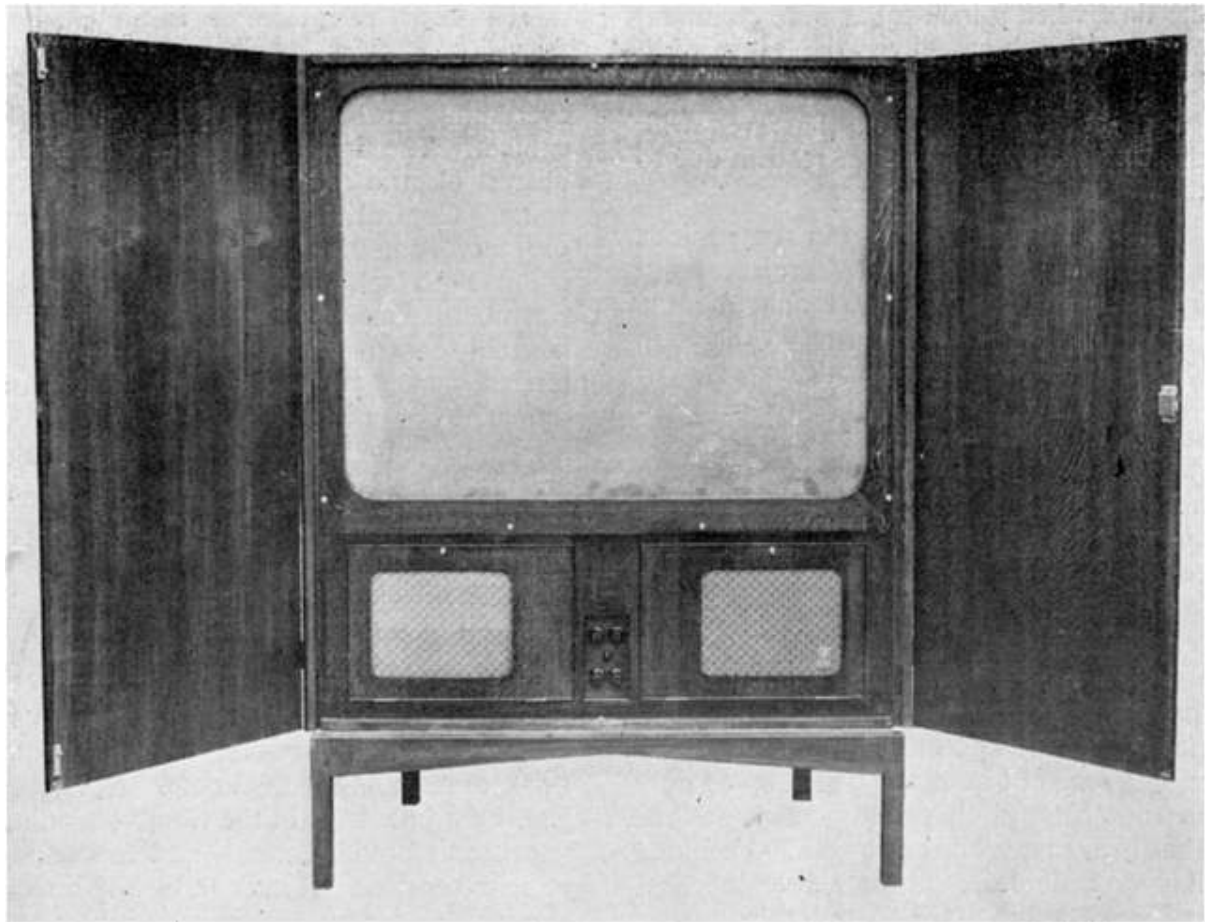
The ratio of turns of the transformer are so arranged that the primary recovery diode is open during the whole of the scan. The boosted H.T. line supplies the video amplifier and the first-anode of the cathode-ray tube. An overwind on the transformer is used to provide, after rectification, the E.H.T. to the cathode-ray tube. A coil acting as a variable inductance over the scanning cycle, being low at the end of the cycle due to saturation, is utilised to provide Line linearity.

Under test the instrument produced a pleasing picture of good quality, the sound being particularly life-like. Manual focusing is utilised, the focus lever being extended through the back cover of the cabinet. The E.H.T. unit being totally enclosed, should greatly restrict radiation, and the separate chassis comprising (a) vision/sound, and (b) power unit and Time bases are particularly attractive, the more so since they will greatly facilitate servicing.

The only adverse criticism to be made is that the main lead is taken direct into the receiver, and terminates in two soldered connections on to the receiver's main fuses. It is felt that movement of the flex might produce trouble at this point.

Viewer's View

It is quite obvious, even to the non-technical viewer, that a considerable amount of thought has gone into the designing of this television receiver. The picture was clear and steady and the sound was of an unusually realistic quality. I noticed that interference from car ignition was much less noticeable than I experience at home in spite of the fact that the set, when tested, was installed in a building on a busy London main road. I understand that this is due to the incorporation of noise limiters in both the sound and vision circuits.



The G.B. Teleprojector is supplied by British Optical Precision Engineers, Ltd.

Price : £225 inclusive of one year's free maintenance.

(Installation 3 guineas; aerial extra)

TELEVISION has come to stay. Who will argue about that ! But whither projection TV ? Those of us who visited the Festival of Britain Exhibition in London, recently, and any one of the shows at the Telekinema, must have realised the vast possibilities afforded by projection television as demonstrated there.

Undoubtedly the "live" performance possesses a value far exceeding the film, particularly when events of national importance are transmitted.

The fact that cinema box-office receipts have not fallen appreciably, despite the almost complete national coverage afforded by TV is, in all probability, attributable to the desire on the part of a large section of the public to enjoy an evening out, the film itself representing but a part of the evening's entertainment. It would be too hazardous a guess to say yet whether projection television will become an essential part of

THE G.B. TELEPROJECTOR

the cinema. Many knotty problems both technical and legal have yet to be settled before such a thing can be considered. But even if the many problems are overcome, it must be obvious that TV will always remain but a part of the cinema's programme.

Undoubtedly projection television as a form of home entertainment came about as a result of the desire for larger pictures. Projection TV models made their bow at

the time when 9-inch tubes were common, and the 12-inch model was the last word in "big" pictures.

Nevertheless, many felt that even with this size there was a lack of realism due to the relatively small picture.

There seems to be doubt in some minds as to whether the home TV projector will increase in popularity. It is felt in some circles that detail and contrast values are lost when viewing projection pictures, but this view is by no means shared by all. In any event, whether TV set manufacturers share this view or not, and although the trend seems to be in the direction of larger direct viewing tubes, there has certainly been no halt in the development of projection receivers.

So far, I have considered the large audience as represented by the cinema, also the small group as suggested by the home viewer. There appears, however, to be yet another class of audience which up to now has not been given serious consideration. That is to say, groups of up to 300 persons likely to be found in canteens, hotel lounges, and small halls. It is to this third group that British Optical and Precision Engineers, Ltd., have turned their attention. This company have just placed on the market a projection TV receiver capable of giving a picture 4 ft. by 3 ft., and known as **THE G.B. TELEPROJECTOR**. The makers claim that this receiver will cater for audiences of up to 350 persons.

The G.B. Teleprojector is an efficient television receiver, which has no separate screen, and apparently no focusing worries—everything is self-contained in a single cabinet. The instrument plugs into the nearest electric socket, and consumes 300 watts. Control is similar to that of an ordinary domestic receiver, the instrument being both self-contained and movable. For maintenance, the chassis, speaker, and internal controls are accessible through hinged panels, secured by quick action screws. The control unit is removable on a 16 ft. cable for ease of picture adjustment, and when replaced, can be locked in so that unauthorised persons cannot upset it.

Twelve months free service and maintenance (including valves, tubes, etc.), is included in the price.

Viewer's View

Of course, this hardly concerns me. It is not the type of receiver which I would think of installing in my home. Nevertheless, I am interested in the future screening television in public places, and this seems to be the answer. If the 4 ft. by 3 ft. screen is adequate for an audience of up to 350 people, then this is the machine for the smaller hall, clubs, restaurants and hotels.

At the present time, television sets installed in places like these are invariably more trouble than they are worth because they are suited only for the average domestic viewing circle, and as soon as the audience starts swelling so do tempers start fraying.

WHEN DO YOU VIEW

!! Could you, if possible, tell me the reason why the morning and afternoon programmes always seem dull. Do you think it is the set? It is a new one.

That is the answer. The set is a new one and, like its owner, has not got used to the idea that the BBC save all the best programmes for the peak viewing hours, which are, of course, in the evenings.

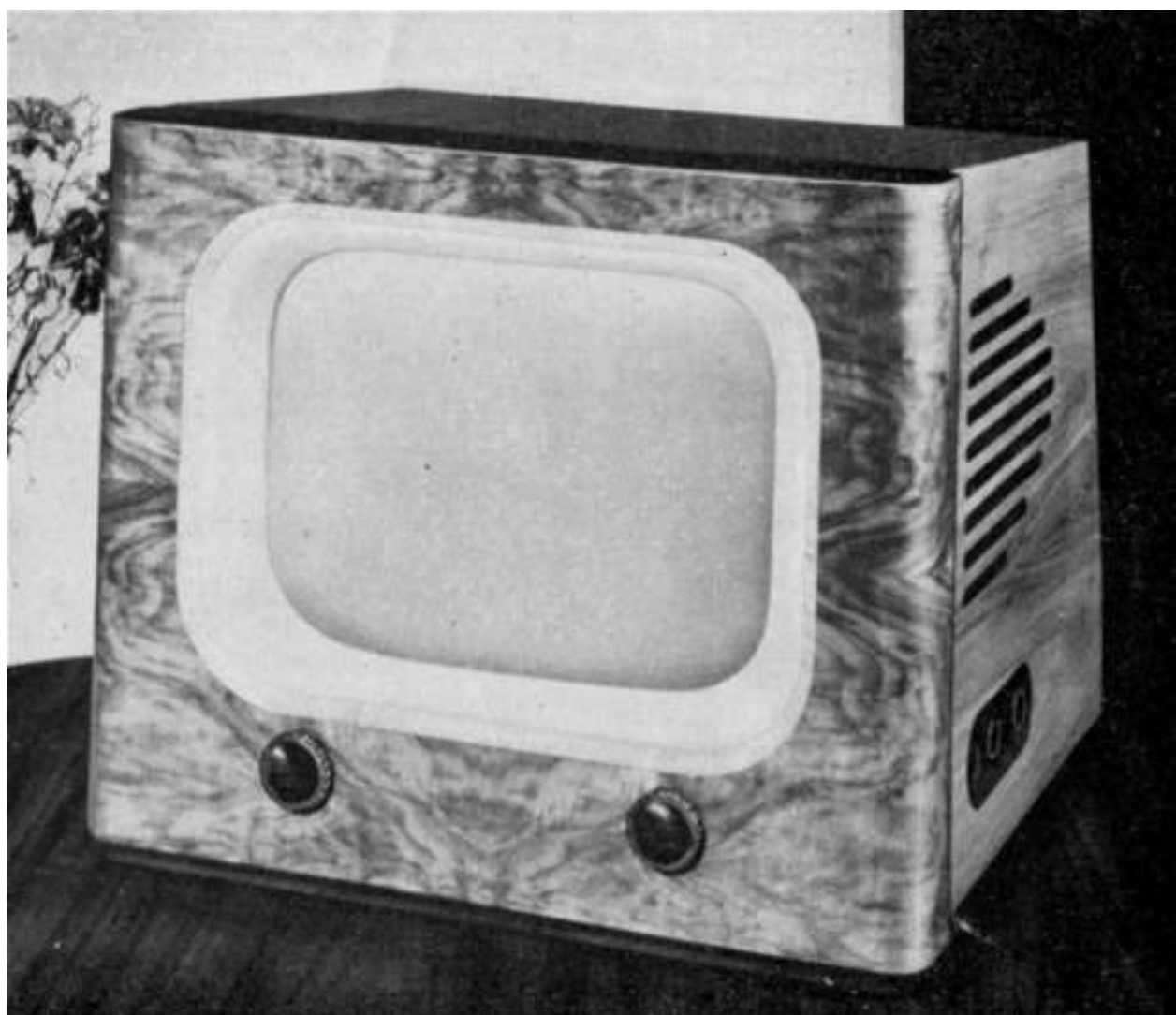
THIS receiver is for AC mains only. It has a voltage range of 180 v. to 250 v. AC, and combines a rectangular 14-inch aluminised flat-faced cathode-ray tube. A new type of laminated filter glass is fitted in front of the tube, thus providing comfortable daylight viewing.

The chassis comprises a 16 valve circuit with built-in variable interference limiter on vision, and a fixed limiter for sound.

PILOT

TV 76

14-inch



The Pilot TV 76—14-inch receiver is manufactured by Pilot Radio, Ltd., Park Royal Road, London, N.W.10. Price : £69 16s. 6d. including Purchase Tax

A.V.C. is incorporated in the sound channel thus providing steady sound reception. A built-in attenuator is incorporated. An 8-inch high-flux permanent magnet speaker, handling approximately $3\frac{1}{2}$ watts, is provided. The fly-back suppression included in this instrument will appeal to viewers resident in areas where conditions of varying transmission occur.

The Pilot TV 76 is a five channel receiver; channel changing is a simple matter calling for the minimum of time on the part of the service engineer, which in turn means smaller bills for those who may have occasion to move about the country and desire to take their TV receiver with them.

Controls available to the user are on the front of the instrument, On/Off Volume and

Brightness, and three controls are situated in a flush-mounting at the side of the instrument, and these comprise, Contrast, Frame Hold, and Line Hold. Rear controls are as follows :— Width, Line Linearity, Height, Frame Linearity, Vision Interference Limiter, Oscillator Tuning Control, and Sensitivity Control.

A voltage selector, covering the ranges mentioned above, is incorporated at the rear of the instrument, and houses its own fuse. The aerial plug is likewise mounted at the back of the set. The receiver employs the modern super-heterodyne principle, that is, one stage of R.F. amplification for both vision and sound, followed by a frequency changer, followed by a common I.F. amplifier for vision and sound. The sound I.F. signals are tapped off this circuit, and are passed to an amplifier, after which detection and audio-amplification take place, the signals then being passed to a sound output stage. Following the first I.F. (vision and sound), the vision signals, as likewise the Line and Frame pulses, are fed into a second vision I.F. amplifier. Vision detection takes place following this stage, after which the signal passes to the video amplifier.

The cathode-ray tube is cathode-modulated, and derives its signals from the anode of this valve.

TV Controls

Incorporated within the instrument are certain controls which should only be adjusted by a qualified TV engineer. These are :— Frame amplitude and Linearity controls, Line amplitude and Linearity controls, Drive control, (this need only be adjusted if a new Line output valve is

changed), and Scan coil capacity balance control.

When tested the receiver gave a brilliant picture with good contrast values, sound being of adequate volume and of excellent quality. I feel it might have been preferable for the mains lead to have been fed to the receiver via a plug, instead of being taken into the instrument and direct on to its terminals within the chassis. I noted with pleasure the ease with which the back of the receiver could be removed, this is held on by clips. This small detail is definitely a time saver. The replacement of some of the valves would appear to require the removal of the chassis from its cabinet, and I feel this to be a slight disadvantage in servicing. The E.H.T. generator is totally screened, thus reducing radiation.

Sub-chassis layout and wiring present a pleasing, clean appearance, and the disposition of components should greatly facilitate servicing.

Viewer's View

This is a very nice looking set and would be ideal for the modern home—one furnished with contemporary furniture, for example.

So far as performance is concerned, the receiver produces a picture of adequate brilliance with a realistic contrast of tones. The sound is of good quality.

Incidentally, it was a good idea to place the side controls in a recess. This certainly guards against accidental disturbance.

Altogether a good receiver for one whose tastes in design are along modern or contemporary lines; for performance—a very good average.

HOME PERM

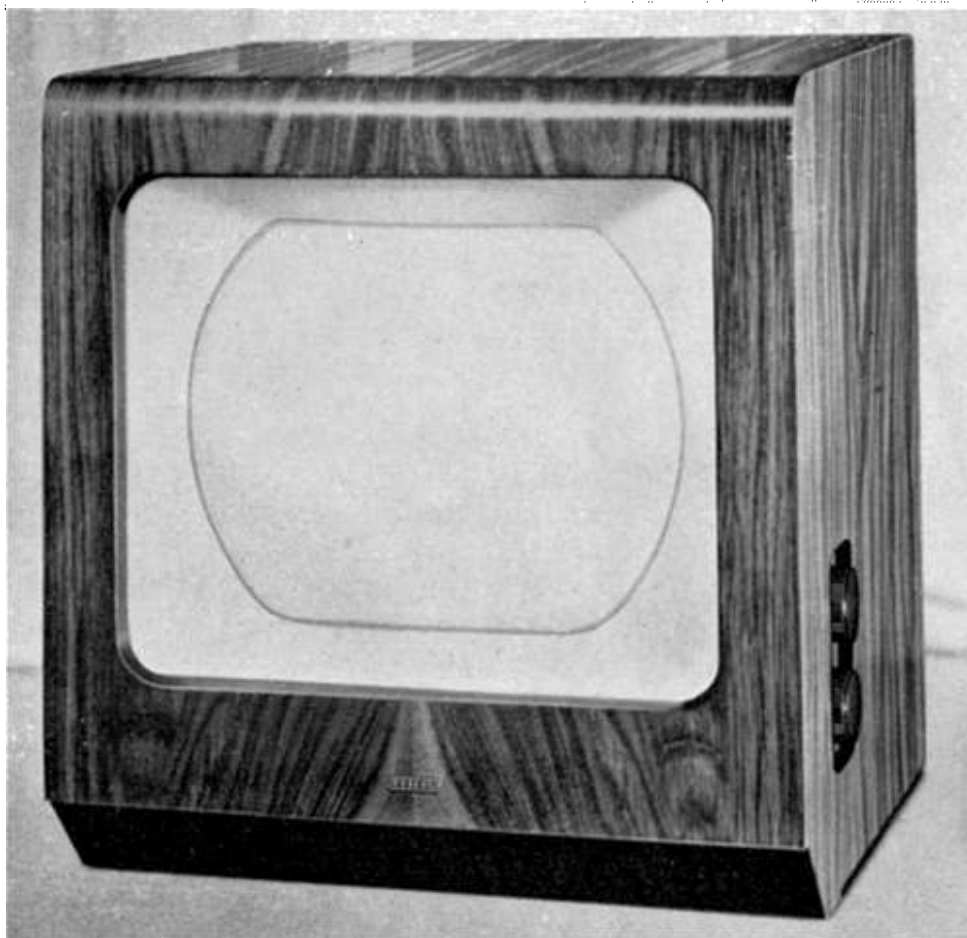
!! My trouble is that if the picture is a full face the hair wanders about from right to left as if being blown about in a high wind.

Check all draughts and if it still happens you are probably right. It is your trouble.

THIS receiver utilising the AC/DC principle comprises 17 valves and a 12-inch cathode-ray tube. It is designed to operate on either type of supply, and has a voltage range of from 200 v. - 250 v.

The 80 ohm co-axial input is fed to a single R.F. amplifier *via* either a connection to the aerial coil or through an attenuator which is provided for use in area of high signal strength. This R.F. valve is anode tuned, the signal being passed to a frequency changer *via* a small coupling condenser.

The I.F. amplifier comprises two valves and band-pass transformer coupling is used to pass the signal on to the vision demodulator diode. Two sound rejection circuits are employed in the I.F. amplifier, the sound I.F. being derived from the first of these. The output from the diode is fed *via* a potential divider to the control grid of the video amplifier. Also in this circuit is located the vision interference limiter, which comprises a germanium diode. The level of interference suppression is obtained by



★

 ★
COSSOR

927

12-inch

★

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**The Cossor 927 12-in. Five Channel Television Receiver is manufactured by A. C. Cossor, Ltd., Highbury Grove, London, N.5.
 Price : 64 Guineas, including Purchase Tax**

The receiver is designed for use on any of the five BBC channels and channel changing is effected by adjusting the cores of the tuned grid coil of the R.F. valve, its tuned anode coil and the coil situated in the tuning circuit of the frequency changer.

The sound and vision signals combine with the oscillator frequency and afford vision and sound signals at I.F. frequencies of 13.6 Mc/s and 10.1 Mc/s.

varying the bias applied to the cathode of this rectifier.

The output of the video amplifier feeds directly to the cathode of the cathode-ray tube, and also is passed through a small condenser to the synchronising separator valve, which is the pentode section of a 6 AB 8 valve. After amplification the synchronising pulses are fed *via* a series condenser resistance network to a cathode-

coupled multi-vibrator, the output of which is fed to the control grid of the *LINE* output valve. The output from this valve utilises transformer coupling to the *LINE* deflector coils.

The efficiency diode output is utilised to boost the H.T. supply on the first anode of the cathode-ray tube, and also the second anode of the *FRAME* multi-vibrator oscillator, and not, as is more usual, to the H.T. supplies to the *LINE* time base. E.H.T. is supplied to the cathode-ray tube from the rectifier which derives its supply from a section of the *LINE* output transformer winding.

The *FRAME* time base obtains its locking pulses from the anode of the synchronising separator after these have passed through an integrating network. The triggering pulses are then fed to a multi-vibrator oscillator. The output from this valve is then passed to the *FRAME* output valve which auto-transformer feeds the frame scanning coils.

As stated earlier, the sound I.F. is derived from the first sound rejector circuit, and is passed to a two stage I.F. amplifier before rectification. After rectification the L.F. signal is passed *via* a series limiting diode to the pentode output valve.

The mains input, AC or DC is taken to the receiver *via* a double pole on/off switch,

each leg of which is by-passed by a 1 Meg ohm resistor. The object of these resistors being to dissipate any static charges within the receiver.

Tested in London, under normal daylight conditions found in the average living-room, the set performed exceedingly well. Contrast values were well preserved, and the 2.5 Mc/s bars on test card "C" were well defined. The layout within the receiver is workmanlike, and servicing problems should be at a minimum.

Viewer's View

This seems to be a good set for the average viewer. The picture was bright and extremely clear in detail. The shape of the screen is different from most other sets I have seen, as the sides of the mask follow the curve of the cathode-ray tube. I think I prefer the more rectangular picture, but this is surely a matter of taste and, of course, does not detract from the performance.

The sound, which is controlled by the on/off switch at the side of the cabinet, is of good quality with an adequate supply of volume.

The other controls, such as brightness, contrast, etc., all respond according to the makers' instructions.

The cabinet is of polished walnut and is well designed to fit in with most furnishing arrangements.

EVACUATION

!! Approximately 20 lines of the picture have moved away from the rest at the top of the screen.

Approximate figures are not good enough. Please check accurately and write to us again.

* * *

!! I find I have an oscillation or warbling whistling noise. When I turn up my brilliance control it is not always there—only occasionally.

A strict watch should be kept.

PHILIPS TV 1437U

14-inch Console Model



The Philips Model 1437U 14-inch Television Receiver is manufactured by Philips Electrical, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.

Price : 74 Guineas, including Purchase Tax

THIS 20-valve super-heterodyne five channel receiver is designed to operate on either AC or DC mains, and has a voltage range of from 200 volts to 250 volts. The instrument incorporates a Mullard 14-inch rectangular cathode-ray tube with ion trap assembly. The instrument, which

is designed for use with 75 ohms screened twin feeder (not co-axial cable), utilises the modern super-heterodyne principle for both vision and sound and comprises one common stage of RF amplification (E.F. 80) feeding into a common frequency changer (E.F. 80).

From this stage are derived both the sound and vision intermediate frequencies. The first sound I.F. stage comprises an E.F. 80, which stage feeds the second sound I.F. and audio frequency stage (E.C.L. 80). The sound detector and interference limiter stage makes use of an E.B. 91 valve. The sound output is obtained from a P.L. 82 valve. The first and second vision intermediate frequency amplifiers utilise E.F. 80 valves, and after amplification, the vision I.F. signal passes to an E.B. 91 valve acting as a vision detector and interference limiter.

Final amplification (video amplifier) is derived from an E.F. 80 valve, the cathode-ray tube being cathode modulated from this valve. The video wave form from the video amplifier also passes to the synchronising separator (E.C.L. 80), where the picture content is removed, leaving the respective line and Frame wave forms to be passed to their Line and Frame oscillator stages. Both of these stages employ E.C.L. 80 valves as blocking oscillators. The Line amplifier comprises a P.L. 81 valve, and an overwind on the output transformer develops a voltage of 12 kV, which after rectification, feeds the final anode of the cathode-ray tube. The output from the Frame oscillator is amplified by a P.L. 82 valve, the amplified wave form feeding the Frame scanning coils.

The controls available to the user are as follows :— (top left) *Contrast*; (bottom left) *on/off-volume*; (top right) *Brightness*; (bottom right) *Focus*. The four recessed pre-set controls below the controls are screw-driver-adjusted and comprise (left to right) *Width*; *Horizontal Hold*; *Height* and *Vertical Hold*. The makers provide with each receiver an adjusting tool for all pre-set controls. Controls brought out at the

rear of the instrument are :— *Picture Interference Limiter* and *Sensitivity*.

The aerial socket and built-in attenuator are also available at the rear of the instrument.

An attractive feature from the point of view of easy servicing is the easily removable back cover which is held in place by one screw and four quarter-turn clips.

This model develops the unit construction principle for the Time bases and power supplies, and the vision and sound R.F. stages. This form of construction not only presents a clean appearance, but greatly facilitates servicing. Sub-chassis wiring and layout are extremely workman-like, although the mains lead is taken straight on to the receiver's fuses, whereas I feel that it might have been preferable to utilise a plug and socket. The receiver is very efficiently screened against radiation.

On test at the London offices of TV NEWS, the instrument performed exceedingly well, both picture and sound being of high quality.

Viewer's View

A very satisfying set by all standards. The picture was extremely clear and bright and with very good contrast. I found it most convenient to have all the controls at the front, including the pre-set ones. *Contrast* and *Brightness* often have to be used together and it is a welcome change to find them together instead of one back and one front. This also applies to the *Focus*; it's nice to be able to focus the picture *and see it at the same time*. *Interference Limiter* and *Sensitivity* are not often used so they are as well at the back.

One criticism. The screen is too far below eye level, unless one is sitting on a very low chair. This receiver could benefit by raising the screen at least six inches.

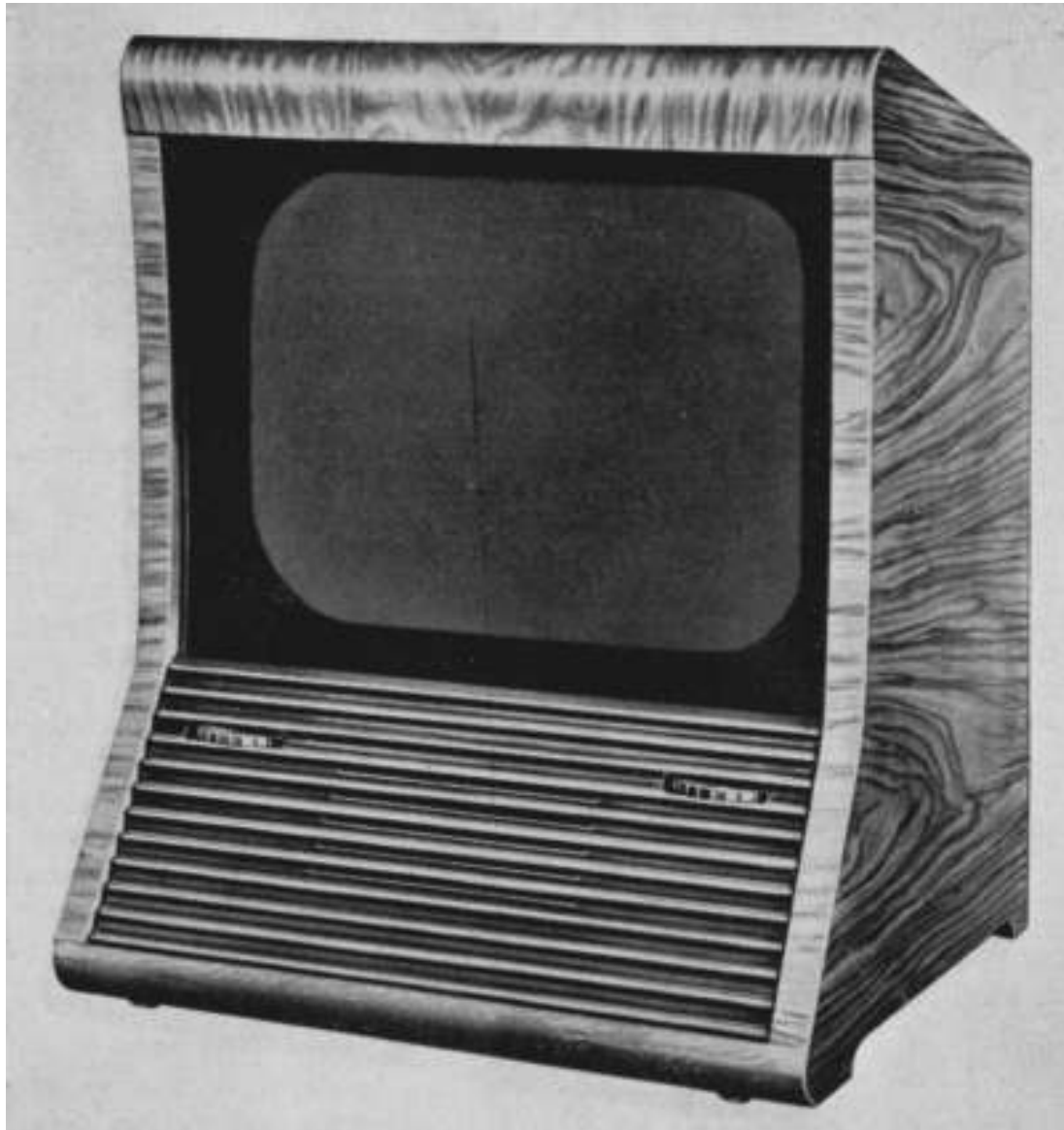
NOW YOU SEE IT, NOW . . .

!! My set is six months old and I have noticed recently that with both contrast and brilliance controls turned off the picture is still there. What should I do?

Turn off the sound and pretend not to notice.

Pye Model V4

14-inch 5-Channel



The Pye Model V4 14-inch 5-channel black screen television receiver with automatic picture control is manufactured by Pye, Limited, Cambridge.

Price : £64 18s. 0d. including Purchase Tax.

THIS receiver is designed to operate on 200-250 AC or 200-250 volts DC. It will function in any of the present TV service areas, that is to say :—Channel 1. Alexandra Palace (London and Home Counties) ; Channel 2. Holme Moss (Northern) ; Channel 3. Kirk O'Shotts

(Scottish) ; Channel 4. Sutton Coldfield (Midland) ; and Channel 5. Wenvoe (South Wales and West of England). It will also operate from any of the BBC's temporary TV stations.

Apart from the special feature referred to as **AUTOMATIC PICTURE CONTROL**,

in many respects the instrument follows the now conventional super-heterodyne principle applicable to 5-channel receivers.

The aerial input after passing through an attenuator network, which is, of course, adjustable, is fed into one common R.F. stage, the signal after amplification, feeding the mixer/local oscillator stage. Both sound and vision I.F.'s are derived from this stage, the sound I.F. being amplified by two stages before passing to the demodulator. After demodulation, the L.F. signal feeds an E.C.L. 80 valve, which acts as an amplifier and output stage, the signal being fed to the loudspeaker from this valve. Automatic gain control circuits are employed to ensure a steady signal. The vision I.F. signal passes through two stages of amplification before demodulation, thence on to the video amplifier valve, which in turn feeds the cathode of the cathode-ray tube via a cathode follower valve. One interesting feature of this instrument is the adoption of a white spot suppressor. This takes the form of a valve, the cathode of which is fed from the video signal, the grid being held steady. The potential of the grid is made variable by the suppressor control, and this control is so adjusted that only the peaks of the interference pulses permit the valve to draw current. These amplified pulses are fed to the grid of the cathode-ray tube, and are in phase with those appearing on the cathode of the tube, but of greater amplitude. Interference which gives rise to pulses of sufficient amplitude to cause this valve to conduct, will appear on the screen as small black dots.

A.P.C. Detector

The method of obtaining automatic picture control makes use of a signal which is transmitted after each line synchronising pulse, this signal representing black level in the transmitted picture. It will be appreciated that this latter signal will only vary in value at the receiver when fading is experienced. An A.P.C. detector is incorporated at this point, and the circuit is so arranged that the action of this detector is suppressed during the unwanted picture portions of the scanning line. The automatic picture control circuits derive their signals from the cathode-follower

valve. The polarity of the signals at the output of the cathode follower is such that the synchronising pulses are positive with respect to the picture. The large pulse voltage induced in the Line output transformer during fly-back periods is fed to a pulse transformer where circuit constants are arranged to delay the pulses such that they occur during the black level period which follows each synchronising pulse. These negative-going pulses are applied to the cathode of a signal measuring diode. This valve, which takes current during the pulse period, connects the cathode of the cathode-follower valve to the cathode of the automatic picture control amplifier during the black level period. The peaks of the delayed pulses are therefore fixed at the potential of the cathode-follower output during the black level period, and this potential will alter as the signal amplitude alters.

The contrast control determines the amount of pulse which is amplified by the A.P.C. amplifier, and it follows therefore that this control functions as a manual gain control, irrespective of whether signal is present or not. The amplified pulses at the anode of the A.P.C. amplifier are rectified by a diode, and the resultant DC voltage forms a negative bias on the grid of the first vision I.F. valve.

An overload diode is employed to prevent overloading of the video amplifier during the warming-up period of the instrument. This is necessary since no bias will be applied to the vision I.F. amplifier until the A.P.C. pulses are available.

Interference

The signals from the synchronising separator stage feed the two Time Bases, the vertical Time Base operating as a multi-vibrator. The horizontal Time Base employs a circuit referred to as "Autosync." This circuit minimises the effects of impulsive interference on the horizontal scan oscillator, and should appeal to viewers in "fringe areas," since its application greatly reduces the tearing effects on verticals. The oscillator in this Time Base again employs a multi-vibrator circuit. An efficiency diode is employed in the Line Time Base, and performs the dual function of damping out unwanted oscillations and also

providing additional H.T. Power supplies are derived from half-wave rectification.

Manual focusing is employed, the adjustment lever being brought out to the rear of the instrument. The cathode-ray tube utilises an ion trap assembly, thus safeguarding it against ion burn. The cabinet interior is adequately screened against re-radiation effects. On/off sound and brightness controls are situated on the front panel of the instrument, all other subsidiary controls being at the rear.

This seems to be a very reliable little set. I say "little" because although it contains a 14-inch tube the receiver does not take up any more room than the average 12-inch or even some of the 9-inch models. This makes it an ideal receiver for those who want the 14-inch picture yet have little room space to spare.

Viewer's View

It is the first set I have seen where the picture face slopes towards the floor. This makes up for the difference in eye level which usually exists between table and floor models. I wonder how many housewives will appreciate the sloping top of the cabinet. Is the sloping top of the Pye meant to discourage the practice of using the top of the receiver to stand anything from flower vases to fish tanks?

So far as automatic picture control was concerned, we had little need to call for this at the time of testing, but we produced our own fading and the set responded most effectively.

In spite of the busy traffic conditions around the TV NEWS office, the picture was clear and bright with good contrast values and the sound was pleasing in quality and adequate in quantity.

A TALL STORY

!! My dealer is unable to come when a programme is on, consequently he never sees any human figures on my screen, only the Test Card. He just hasn't had experience of my problem and cannot help me. All the people on my set have short legs. Can you help me?

We're very much afraid that . . .

SELF RAISING

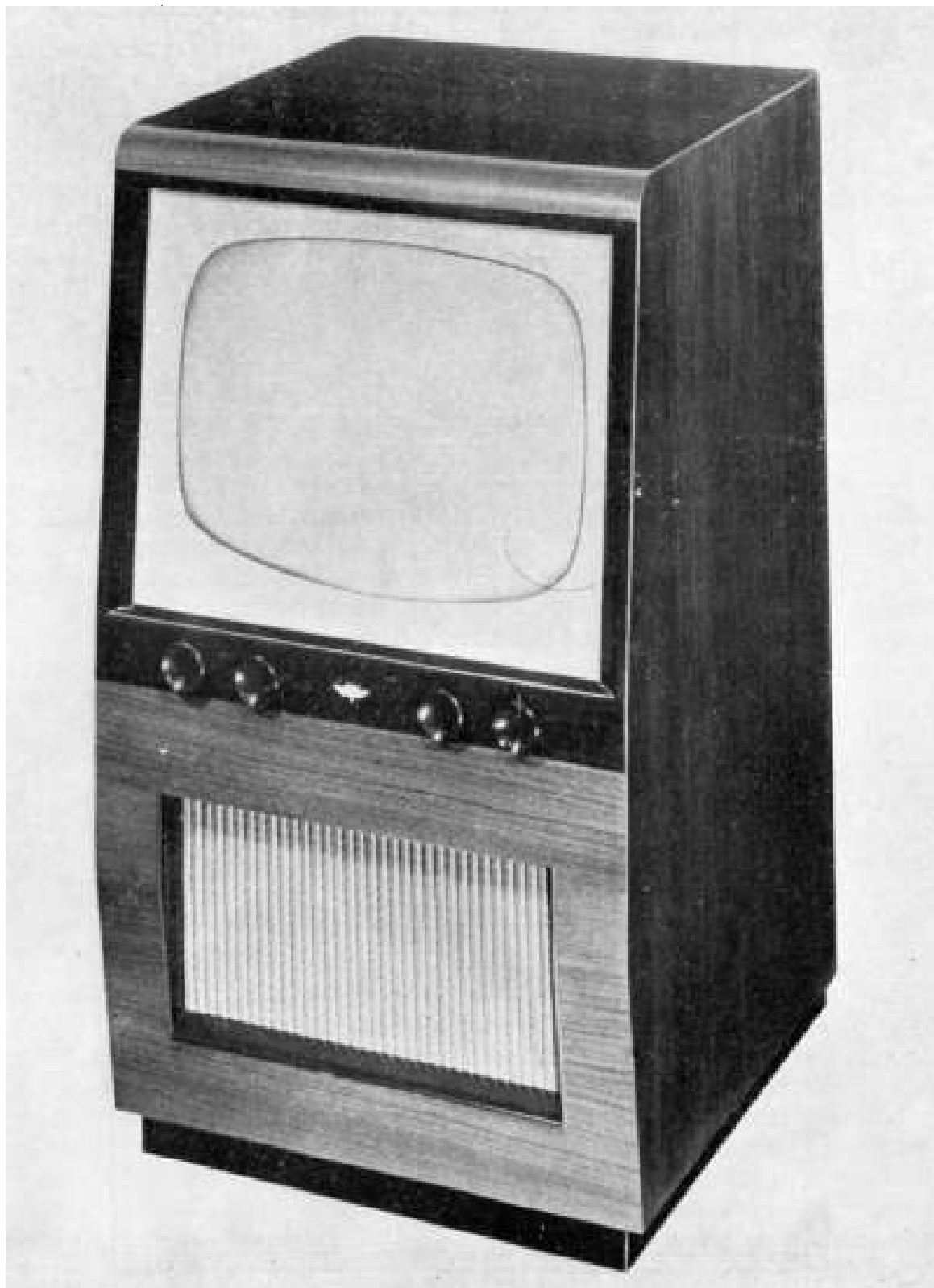
!! When turning on my television set, the picture is quite normal, then within an hour, the bottom of the picture rises an inch, leaving an inch of the picture missing. Can you please tell me what I can do about it? I have tried the back of the set.

We doubt if you will find it there.

THIS 17-inch console super-heterodyne television receiver is the latest model produced by this firm. It is designed to cover all of the BBC's five channels, and operates on 200 to 250 volts AC mains. The consumption of the instrument is 150 watts. One stage of R.F. amplification precedes the local oscillator

KOLSTER-BRANDES

Model K.F. 50 17-inch



**The Kolster-Brandes Model K.F. 50 is manufactured by Kolster-Brandes, Ltd.,
Foots Cray, Kent. Price : 88 Guineas, including Purchase Tax**

(employing a Colpitts circuit) which is used to inject local oscillator voltage to a pentode mixer valve. Two stages of vision I.F. amplification are used, after which the signal is passed for demodulation to the vision detector, and thence on to the video amplifier valve.

The cathode-ray tube is cathode-modulated, and derives its signal from the anode of the video amplifier. The complete wave form also obtained from the anode of the video amplifier is passed to the synchronising separator stage. Horizontal synchronising pulses are obtained from the anode of this valve, and are fed *via* a differentiating network to the horizontal scanning oscillator. The vertical synchronising pulses are fed to a 6 S.N. 7 G.T. valve, which acts as a vertical synchronising amplifier and vertical generator, the output of which being fed to the vertical output amplifier, which in turn transformer-feeds the vertical scanning coils.

Feed-back is employed to eliminate variations of height and linearity arising from increases in temperature, and so increases in resistance of the deflector coils.

Ion Trap Assembly

It should be noted here that in common with modern practice an efficiency diode is incorporated in this circuit. Separation of the sound and vision I.F. frequencies takes place in the anode circuit of the mixer valve, the sound signal receiving two stages of amplification before being passed to a 6 A.L. 5 valve, which acts as a sound demodulator and noise limiter. Two stages of audio-frequency amplification are employed, and feed the loudspeaker.

Electro-magnetic focussing is employed and the cathode-ray tube is protected by an ion trap assembly.

The four controls situated on the front of the instrument comprise :— Brightness-On/Off; Sound-Volume; Contrast; and Focus. The rear controls are :— Height; Width; Noise Limiter; Vertical Hold; Vertical Linearity; Horizontal Hold; and Horizontal Linearity.

The chassis layout presents an extremely pleasing appearance, and sub-chassis wiring is clean. One feature of interest is the care with which the inside of the cabinet has been screened, thus materially reducing the possibility of re-radiation. The writer feels it is perhaps a pity the makers have taken the mains lead straight inside the receiver, and have not employed a plug connector. Also from the point of view of rapid servicing, to have to undo many screws in order to remove the back cover seems a disadvantage.

Viewer's View

A purely functional receiver; nothing outstanding about its appearance, which, of course, is as it should be if it has everything to offer in the way of pure television. And this receiver has a large, clear picture of 157 square inches on a flat-faced tube which was comfortable to view at most angles, even in full daylight. But why this tendency for low screens ?

Another special commendation for putting the Focus control on the front. This idea should be maintained. The need to focus from the rear without being able to watch the picture has always been a nuisance to viewers.

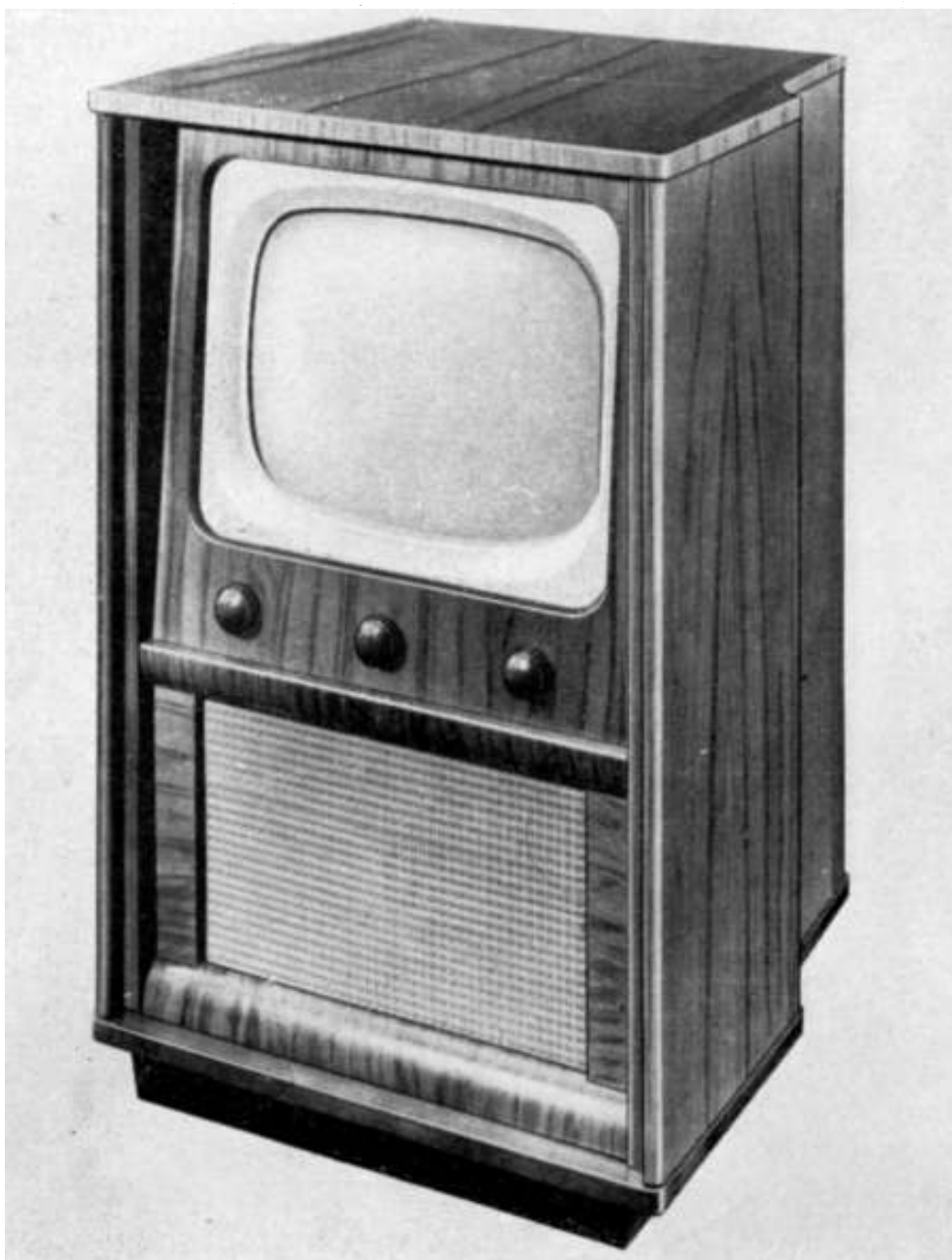
A LIGHT SUBJECT

!! My picture is on the dull side, but when an upstairs light is switched on it brightens up quite a bit. I have had my TV engineer in to look at it but he says it is alright. Unfortunately, I was out when he called.

There are only two things you can do. Move the set upstairs or make an appointment with your dealer for a day when you will be at home.

PETO SCOTT TV 1711

17-inch Console Model



**The Peto Scott TV 1711 17-inch Television Receiver is manufactured by
Peto Scott Electrical Instruments, Ltd., Weybridge, Surrey.**

Price : £124 including Purchase Tax

THIS 17-valve super-heterodyne receiver utilises a 17-inch tube, and is designed for operation on AC mains from 200 volts to 250 volts.

One RF stage of amplification is employed which is common to both sound and

vision frequencies. The gain of this stage can be adjusted by the RF Gain Control which controls the bias on this valve. The frequency changing circuits utilise two pentode valves which operate as high stability oscillator and mixer respectively.

The frequency of the oscillator can be adjusted by manipulation of the Oscillator Coil Core.

The vision IF Amplifier response is 3 mc/s wide being 3 db down at carrier. There is a sharp cut-off at the Sound frequency; the high "Q" rejector circuit in the cathode of the first and second vision IF stages gives an overall rejection better than 40 db. The sound signal is taken from the cathode rejector circuit in the first Vision IF Amplifier, and passed to the sound IF amplifier.

Amplitude Limited

The vision signal is demodulated by a diode, and is taken in a positive sense through a low pass filter to the Video Frequency Amplifier. The Video Frequency output is fed to the grid of the video frequency amplifier, after which the VF signal is passed to the cathode-ray tube, the synchronising separator, and Interference Limiter, the tube being cathode modulated. The amplified composite video signal is passed to the sync-separator, this is an amplitude limiter, and is arranged to clip at 30 per cent. of the modulation level. DC restoration is obtained by the grid-cathode path. Negative going Line sync pulses are passed direct to half an ECL 80 valve which acts as a Line multivibrator. The Frame pulses are integrated and passed to a second limiter stage.

Multivibrator Circuit

The Frame time base consists of one ECL 80 valve (triode half) acting as a blocking oscillator with two ECL 80 pentode sections in parallel as output.

The Line Time Base employs two valves and these work in conjunction with each other forming a multivibrator circuit. The saw tooth waveform at the anode of the Line Output valve produces a high back EMF across the load of the primary of the Output transformer during the fly-back

periods, and these pulses are rectified by an EGH diode. The EHT on load is 14KV.

The sound signal is derived from the cathode of the first vision IF valve, and amplified by two IF stages. Automatic gain control is applied to the first stage. The sound IF signal is demodulated at a high level ensuring no signal pick-up from the time-base. The output power of the sound stage is approximately 1.5 watts. The Line output valve HT is boosted by a diode which also assists in maintaining a linear waveform during the first part of the scan.

On test the receiver gave a good account of itself, the picture being very realistic and the sound of good quality. The tube is mounted on a neat and compact chassis, and sub-chassis wiring is carried out in an orderly and easily accessible manner. The tube employed, a Mullard 43/64 combines an ion trap assembly thus reducing to a minimum the possibility of ion burn. Controls at the front of the receiver comprise :— Brilliance, Contrast and Sound On/Off, all other controls being situated at the rear. Manual focus is employed, the focus lever being brought out at the rear of the instrument.

Viewer's View

A luxury model this, without a doubt. Everything about it is large and luxurious, from the giant 17-inch screen and the larger still speaker front, to the cabinet itself.

Performance first. The picture was bright and clear, even when viewed in full daylight. The sound was good and well toned. It was a welcome change to put *both* the contrast and brilliance controls at the front instead of having to delve at the rear for one or the other.

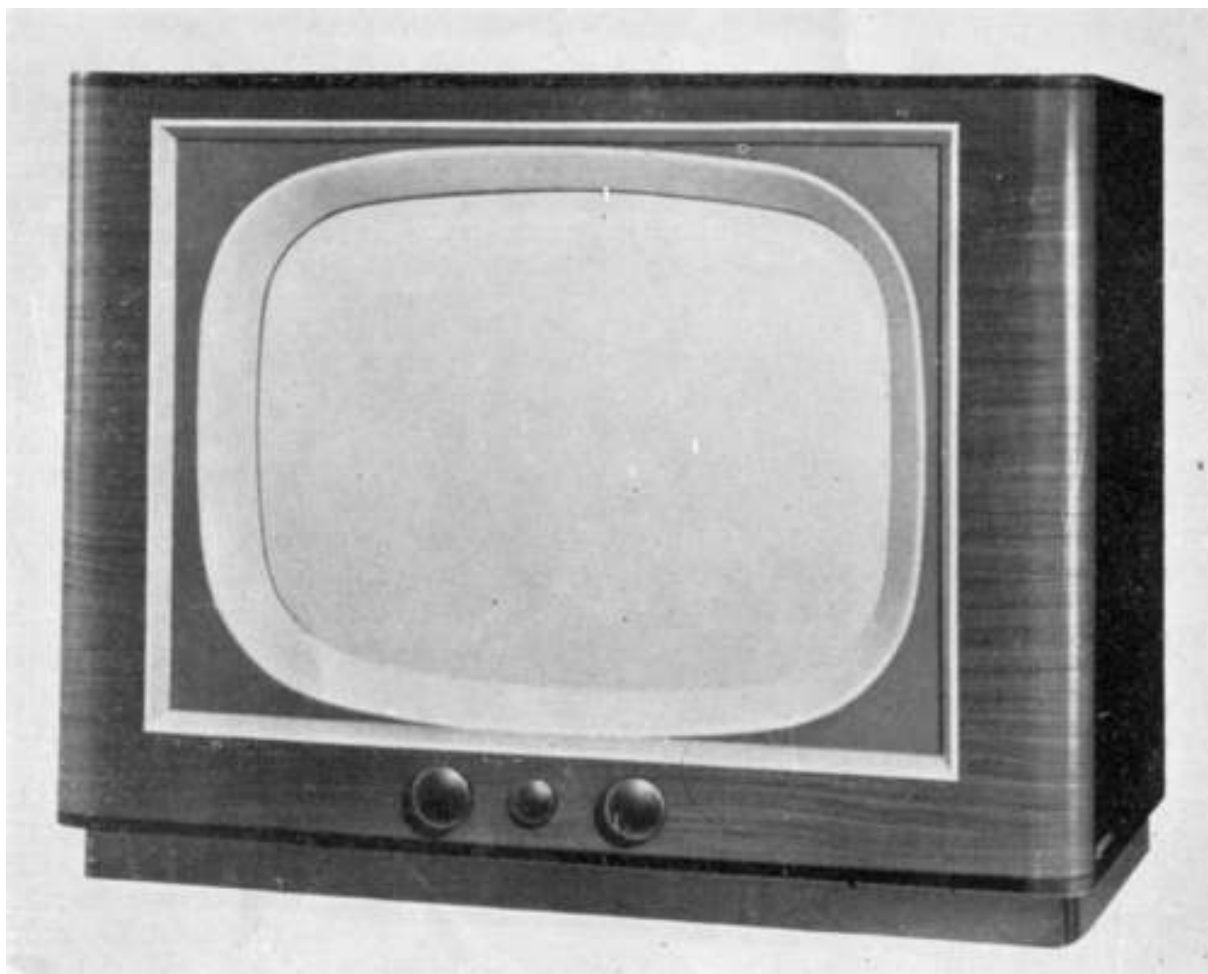
The cabinet makes a handsome piece of furniture, with the doors opening right back against the sides, allowing viewing from any angle. It was thoughtful of the makers to put rubber stops to prevent damage from hurriedly opened doors.



THIS 15 valve super-heterodyne television receiver is designed to cover all five of the BBC's transmission channels. It operates on 200 volts to 250 volts AC, or 200 volts to 250 volts DC. A 17-inch pentode-type cathode-ray tube is incorporated, and an E.H.T. of 14 kV produces a brilliant picture. The cathode-ray tube itself utilises an ion trap assembly, which prevents burning of the tube face. The "receiver strip" employs a permeability-

Ferranti

Model 17 T.3



The Ferranti Television Receiver Model 17 T.3 is manufactured by Ferranti, Ltd., Moston, Manchester, 10. Price: £82 19s. 0d. including Purchase Tax

type channel selector, which can be adjusted to receive any one of the five BBC television channels by means of a single lever.

The output capacity of the video stage is small, and the overall response provides high definition. The Line time base employs an efficiency diode circuit, and stable Line scanning is achieved. The receiver is designed to be fed from 80 ohm co-axial feeder cable.

The valves employed are as follows :— Seven E.F. 80's, two E.B. 91's, two E.C.L. 80's, one P.Y. 81, one P.L. 81, one P.Z. 30, and one E.Y. 51. Fuses are incorporated in both the main supply and also the H.T. supplies to the receiver. The total consumption of the instrument is approximately 140 watts.

The circuit employed is, as previously stated, super-heterodyne in principle. The input to the receiver passes to an R.F.

amplifier which is common to both vision and sound frequencies. After amplification the signal is fed to a local oscillator and mixer valve. The sound and vision I.F. signals are amplified by one I.F. stage, the sound I.F. being tapped off from this stage. The vision I.F. signal receives one further stage of amplification, after which demodulation takes place in one half of an E.B. 91 valve, the second half of this valve being used as an interference limiter. Following on demodulation the vision signal passes to the video amplifier, which cathode-feeds the cathode-ray tube, and also provides the synchronising pulses which are fed to the synchronising separator stage.

Crystal Diode

As already mentioned, the sound signal is tapped off the first common I.F. amplifier, and receives further amplification by one additional sound I.F. valve. The sound I.F. signal is demodulated by a crystal diode, after which it receives two stages of audio-amplification before being passed to the loudspeaker. One half of an E.B. 91 valve is utilised as an interference limiter. Separation of the synchronising pulses takes place in an E.F. 80 valve, the respective locking wave-forms being passed to their respective Line and Frame oscillators.

A diode is used to improve the Frame interlace. The Frame wave-form generator employs a blocking oscillator circuit, whilst the Line time base employs a single valve self oscillator, and a conventional Line efficiency diode is employed. E.H.T. is obtained from an overwind of the Line transformer, and is rectified by an E.Y 5.1 valve.

On/Off sound, Focus, and Brilliance controls, are located in the centre of the

cabinet immediately below the cathode-ray tube. Beneath these are controls for Limiter, Height, Vertical Hold, Horizontal Hold, Contrast and Width. These are recessed in such a way that they are not visible when the receiver is viewed in the normal position.

Station selection is extremely simple, being effected by the adjustment of a lever protruding from the rear of the instrument. Valve and component layout is very pleasing, and should greatly facilitate servicing. Tested at our London offices, the receiver gave a good technical performance.

Viewer's View

As a "big screen" this receiver has a number of advantages from the user's point of view. Usually, models with screens over 12-inches are cumbersome things. They provide good viewing facilities but do not lend themselves to moving about unless they are console models or fitted with castors. The only answer to a table model which is too heavy or cumbersome to move is to stand it on a table fitted with wheels or castors.

It may be that Ferranti had this in mind when they decided to manufacture their sets in such a manner that it is virtually unnecessary to move them at all. On the 17 T.3, all controls are at the front, although this is not apparent at first sight. The main controls—which include Focus—are available as turning knobs, while all the pre-set controls, in the form of slotted wheels, are hidden under the ledge beneath the three main controls. All are easily accessible and permanently labelled. All can be operated while the user watches the effects on the screen. An ideal situation.

WATCH MY LINE

!! My TV receiver gives an excellent picture for the most part, but when the set has been on for about an hour some of the 405 lines seem to light up and flash across the screen.

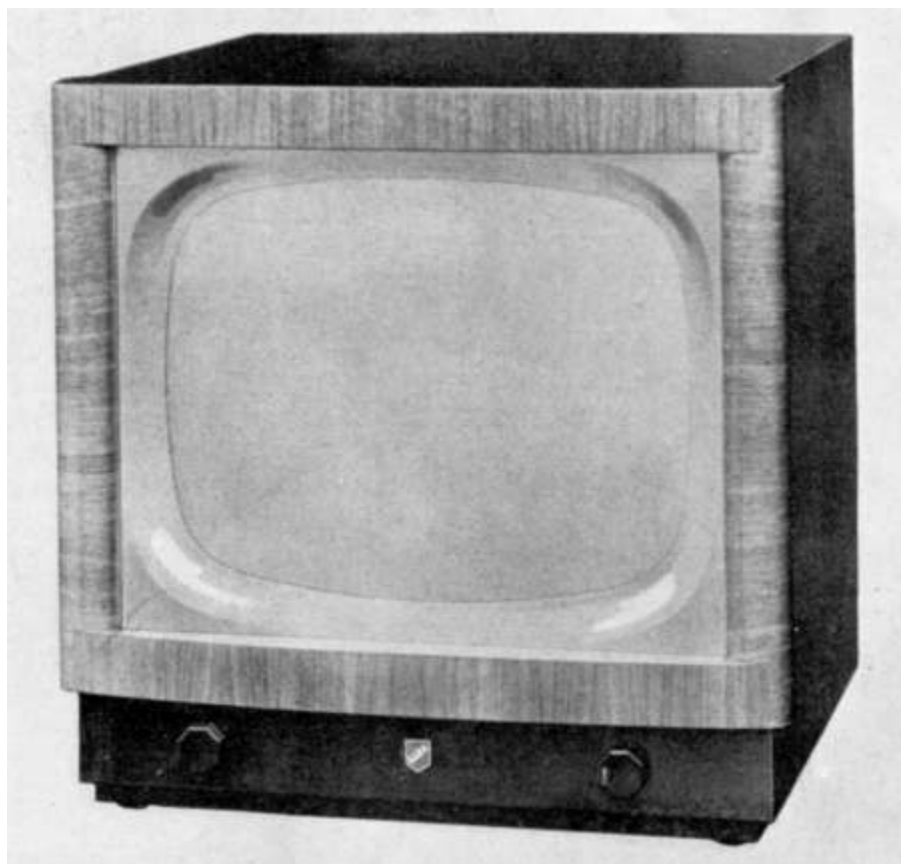
How many?

THIS super-heterodyne receiver is built on the AC/DC principle, employing 18 valves, and has a voltage range from 200v.—250v. The instrument is tuneable from 40 to 68 Mc/s, thus embracing all BBC channels. Fly-back E.H.T. is employed, and an economy diode is used to boost the LINE scan circuit.

A 17-inch rectangular tube fitted with an ion trap is installed.

the anode *via* a 39 pF capacitor to the LINE oscillator valve. FRAME pulses are fed *via* a .02 Mfd. condenser and passed to a pulse clipper pentode (half of an ECL 80 valve), thence through a 250 pF condenser to the FRAME oscillator transformer and valve (second half of ECL 80 valve).

Sound is derived *via* a coupling condenser fed from the anode of the vision



★

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ALBA
T394
17-inch



The ALBA T394 17-inch is manufactured by A. J. Balcombe, Ltd., 52/58, Tabernacle Street, London, E.C.2. Price £93 9s. 0d. inc. P.T.

The input signal, fed *via* an 80 ohm co-axial feeder, is injected into an R.F. amplifier, which has a tuned anode circuit. R.F. signals are then passed to a single valve frequency changer, which in turn is link transformer-coupled to the first vision I.F. amplifier. A second vision amplifier is similarly coupled to this stage. A link transformer is again employed to couple the second I.F. amplifier to the vision detector, the signal then passing to a cathode compensated vidio-amplifier.

The sinc separator stage utilises a single valve, the LINE sinc pulses being fed from

frequency changer, the signal passing to the tuned grid circuit of the first sound I.F. stage. This in turn is double-tuned transformer-coupled to the grid of the second sound I.F. amplifier, the signal then being passed through a choke-capacity coupling to the double diode sound detector noise limiter valve. A single stage L.F. pentode is used to amplify up the signal, which is then passed to the P.M. loud-speaker.

The FRAME circuit utilises a normal blocking oscillator, the output valve of which transformer-feeds the FRAME

scan coil. A variable linearising network utilising negative feed-back is employed.

The LINE time base blocking oscillator feeds in the conventional way, the output stage, which utilises a Ferroxcube core auto-transformer with reclaim diode.

H.T. supplies are obtained by employing two PY 82 valves in parallel as half wave rectifiers. On 200v.—210v. D.C. these valves are switched out of the circuit, the supply in this instance being fed direct to the main smoothing choke.

The valve and tube heaters, protected by a shunted Thermistor, are series connected, a tapped volt dropper being employed to obtain correct voltage adjustment.

The receiver is completely protected by fuses in each leg of a double pole on/off switch, the mains being fed to the receiver via a choke filter input.

When tested, this receiver gave a good quality picture of balanced contrast, although some slight de-focusing was noticeable at the sides.

The adjustment necessary for reception of all BBC channels is a simple operation requiring the minimum of time on the part of the servicing engineer.

The controls situated at the front of this model are : On/Off-Volume and Brilliance.

All normal pre-set controls available to the owner of the receiver are brought out at the rear and comprise Horizontal-hold,

Vertical-hold, Picture Height, Vertical-form Spotter, Contrast. Focusing is manual and again the focus lever is available to the user.

The line transformer, line output valve and diode are situated in a screened can, thus reducing radiation.

The layout and sub-chassis wiring is clean, and should make for easy servicing.

This is another of those "extra big" screen sets which have become so popular during the past few months. I liked the quality of the picture although, in fairness, I should say that I was viewing in a large room. I am not sure that this set would be suitable for my small flat as the lines were so prominent at close quarters. On the other hand, I was able to sit 14 ft. away without the intense concentration which is sometimes necessary with close-up viewing.

The sound quality is pleasing with a more than adequate supply of volume just as adequately controlled by the on/off-volume knob.

The design of the cabinet is purely functional with no space taken up by unnecessary trimmings. Its two tones of walnut should fit in with any furnishing scheme.

The controls are easily accessible and react well according to the advice and instructions issued by the makers.

THE MUSIC WENT . . .

!! After my set has warmed up my picture starts jumping up and down (not round and round) and I have to take my contrast back to stop it.

You should on no account take your contrast back. He will want to see the whole set. Of course, if you should want your picture to go round and round we would recommend one of the TV turntables which have been on the market for some time.



The Invicta Model T.115 is manufactured by Invicta Radio Ltd., Parkhurst Road, London, N.7. Price £70 14s. 2d. including Purchase Tax

THE T.115 is a 19 valve five channel super-heterodyne receiver utilising a 14-inch tube, and is suitable for DC or AC mains supplies between voltage ranges of 200v. to 250v. Sound/On/Off and Contrast controls are situated at the sides of the cabinet, and are flush-mounted, thus preserving a clean appearance. Pre-set controls mounted at the rear of the cabinet comprise :— Sensitivity, Brightness, Noise Limiter, Frame Hold, Frame Amplitude, Line Hold, Line Amplitude, Frame Linearity, Line Linearity.

The co-axial input feeds into a rejector circuit, which is tuned to an I.F. frequency of 34.5 Mc/s, the signal feeding into the tuned grid circuit of the first valve, (Mullard E.F. 80), which operates as a wide band amplifier, and this latter coil is tuned to the

Invicta

Model T.115

station frequency required. The second valve in the chain (Mullard E.F. 80), comprises the mixer stage, and vision and sound I.F. frequencies feed their respective amplifiers from this stage, in the case of the sound I.F. passing first through a sound rejector coil. The gain on these two valves is controlled by a potentiometer, which becomes

the Sensitivity Control. The third valve (Mullard E.F. 80), is the local oscillator, and is tuned to the frequency desired, i.e. 34.5 Mc/s above the carrier frequency of the station required. The vision I.F. amplifier comprises two valves, (E.F. 80's), and is tuned to a frequency of 34.5 Mc/s. The gain of the amplifier is controlled by applying a positive bias to the first of the two valves, thus preserving the shape of the response curve at all settings of the contrast control. Also incorporated in the circuit associated with the first I.F. amplifier is a sound rejector tuned to 38 Mc/s.

The amplified I.F. signal is transformer-coupled to the demodulator, (Mullard E.B. 91), after which the signal is fed to the video amplifier, (E.F. 80), the anode of which being directly coupled to one half of a double triode cathode follower stage (Mullard E.C.C. 82), the second half of which acts as an interference limiter. The signal developed at the cathodes of this valve feeds the cathode-ray tube, and also the grid of a Mullard E.C.L. 80, which acts as a synchronising separator stage and Frame-blocking oscillator. The saw-tooth output from the oscillator is fed to the Frame output valve (Mullard P.L. 82), *via* a wave form shaping network, and the output is auto-transformer-coupled to the Frame scan coils.

Fly-back E.H.T.

The Line synchronising pulses pass to a discriminator valve (E.B. 91), where, after rectification, the DC is fed to the multi-vibrator oscillator valve (Mullard E.C.L. 80). This voltage locks the speed of the oscillator, and with the help of a stabilising coil tuned to 8.25 K/cs., stabilises the oscillator, should the H.T. Line volts vary, or the valve age.

After passing through a wave shaping network, the output from the oscillator passes to the Line output valve (Mullard P.L. 81), where, after amplification, the wave form is transformer-fed to the deflector coils *via* the Line output transformer. Fly-back E.H.T. is employed, the

rectifier, (Mullard E.Y. 51), delivering 14 K.V. to the cathode-ray tube.

A Mullard P.Y. 80 valve is utilised as an efficiency diode, the output from which boosts the H.T. supply to the Line output valve. A small metal rectifier is also employed to boost the H.T. feeding the first anode of the tube.

The removal of the back cover to the receiver is easily achieved, the cover being held in place by two large screws. The removal of this cover disconnects the mains supply to the receiver, thus adding to the safety of the instrument. Channel changing is easily effected *via* two knobs, on the vision/sound chassis, their settings corresponding to markings on an indicator plate. Manual focussing and picture centering are employed, the focussing lever being brought through the back cover. The 14-inch tube employs an ion trap assembly. The E.H.T. unit is totally enclosed, thus reducing possible radiation. All valves are readily accessible without resort to the removal of the chassis, and the sub-chassis wiring is carried out in a clean manner.

Viewer's View

This set is the happy medium between popular 12-inch model and the large-screen sets which have been making their appearance lately. The 14-inch makes just that little difference for those who find the 12-inch tube somewhat exactly small. On the other hand it does not extend to the limits of the 17-inch, or even the 15-inch tube—it is surprising what a difference one solitary inch can make.

The picture was of good quality with a pleasing degree of contrast, due to some extent to the tinted tube which allowed comfortable viewing in pure daylight.

The idea of recessing the two main controls—sound/on/off and contrast—should obviate the possibility of accidentally altering the controls.

The cabinet, with its two tones of walnut is of good functional design and should fit happily into any furnishing arrangements.



THIS latest edition to the Baird series is a 15 valve super-heterodyne receiver for use on AC mains of from 200 v. to 250 v., and employs a 15-inch wide angle circular aluminised cathode-ray tube. All five channels are catered for by means of plug-in units which incorporate the R.F. amplifier and mixer stages. Owing to the high gain of the instrument, there will be many instances where, although operating in a

strength or heavy interference, an outside aerial is necessary, provision is made for the employment of such an installation.

A three-position aerial attenuator is incorporated, which should be employed to produce the best results.

In "fringe" areas an improvement in signal-to-noise ratio of approximately 4 db. can be obtained by the removal of the aerial attenuator from the aerial circuit, and the



BAIRD MODEL C.1815



The Baird Model C.1815 also known as the "Coronation 15-inch" Console," is manufactured by Baird Television, Ltd., Lancelot Road, Wembley, Mddx.

Price : 97 guineas, including Purchase Tax

"fringe" area, a preamplifier may prove unnecessary.

Electro-magnetic scanning and permanent magnet focussing are employed, the focussing lever being brought out at the rear of the receiver. What is known as a double-D mask is used, thus giving maximum picture area. The tube employed has a filter-glass face, and a clear implosion guard is fitted.

In areas of high signal strength, no exterior aerial is necessary, the "Baird Self-Contained Aerial" being employed. In areas where, for reasons of poor signal

use of the "distant" position of the aerial socket.

Controls available to the user and flush-mounted on the right hand side panel of the instrument, comprise :— Sound and On/Off; Light (Brightness); Shade (Contrast). Four additional pre-set controls flush-mounted and screw-driver adjusted, comprise :— Picture Height; Frame Form; Frame Lock, and Line Lock.

Signals from the mains aerial or external aerial pass to a band-pass transformer, and thence to the grid of the R.F. amplifier. Variable bias is applied to this valve by the

Shade control, and provides contrast variations. The cathode resistor of this valve is un-bypassed, the negative feed-back so developed counteracting the change in input capacity which could otherwise occur at different gain settings.

The vision and sound signals from this valve are fed via a band-pass transformer to the grid of the mixer section of the frequency changer, the second section being a triode, functions as a Colpitts oscillator. The combined vision and sound signals at the I.F. frequency are amplified by a pentode using band-pass transformer coupling, and variable cathode-bias from the Shade control is applied to act as a Contrast control. Vision signals are further amplified by a second pentode, and then applied to the diode detector. A resonant circuit in the cathode circuit of this latter pentode is tuned to the I.F. frequency, producing negative feed-back at this frequency, thus eliminating the sound signal from the vision channel.

The sound I.F. amplifier valve acts as an intermediate frequency and audio frequency amplifier. After amplification, the sound signals are transformer-coupled to the diode detector and noise limiter. After amplification in the sound I.F. amplifier valve, (already described), the audio signal is passed to an output tetrode valve, which provides the audio power for the loud-speaker.

The vision I.F. frequency, after demodulation by the diode, is direct-coupled to the grid of a pentode, which acts as the video amplifier.

The video signal and positive-going synchronising pulses are applied to the grid of a pentode acting as a synchronising pulse separator. Grid current drawn by this valve sets up a bias, which cuts off the valve while the picture signal is present, but permits the valve to conduct when the positive-going synchronising pulses appear. Line synchronising pulses are taken from the anode of this valve, and are applied to the screen of the Line generator valve. The Frame sync pulses being applied through a .001 mfd condenser to the Frame saw-tooth oscillator, the Frame scanning waveform so developed being further amplified by the Frame output valve, the signals

from which being transformer-fed to the Frame deflector coils.

Two valves are used to generate the Line scanning power, a self-oscillating tetrode, and an energy-recovering diode. The scanning wave-form being fed to the Line deflector coils from balanced tapping on the diode winding of the Line transformer, Amplitude control being obtained by a variable series inductance, and variable linearity by variable damping. The positive voltage pulse occurring at the fly-back stroke is increased in amplitude in a tertiary winding on the Line transformer, and after rectification provides the E.H.T. for the cathode-ray tube.

When tested on the third floor of our premises in Victoria Street, London, the receiver gave a perfect performance on both vision and sound, with no aerial other than its own mains aerial system. It will be appreciated that in this area of London interference signals are fairly high, yet, despite this, and the fact that our outdoor aerials were not employed, no appreciable interference signals were apparent on the picture, and were almost completely absent from the sound.

Wiring and chassis lay-out are extremely pleasing, making for easy servicing. The mains lead terminates in a plug, which can be removed from the receiver, thus eliminating the necessity for the removal of the chassis when mains lead renewal becomes necessary. The back cover is held in position by clips, which again assists in rapid removal for servicing or adjustment.

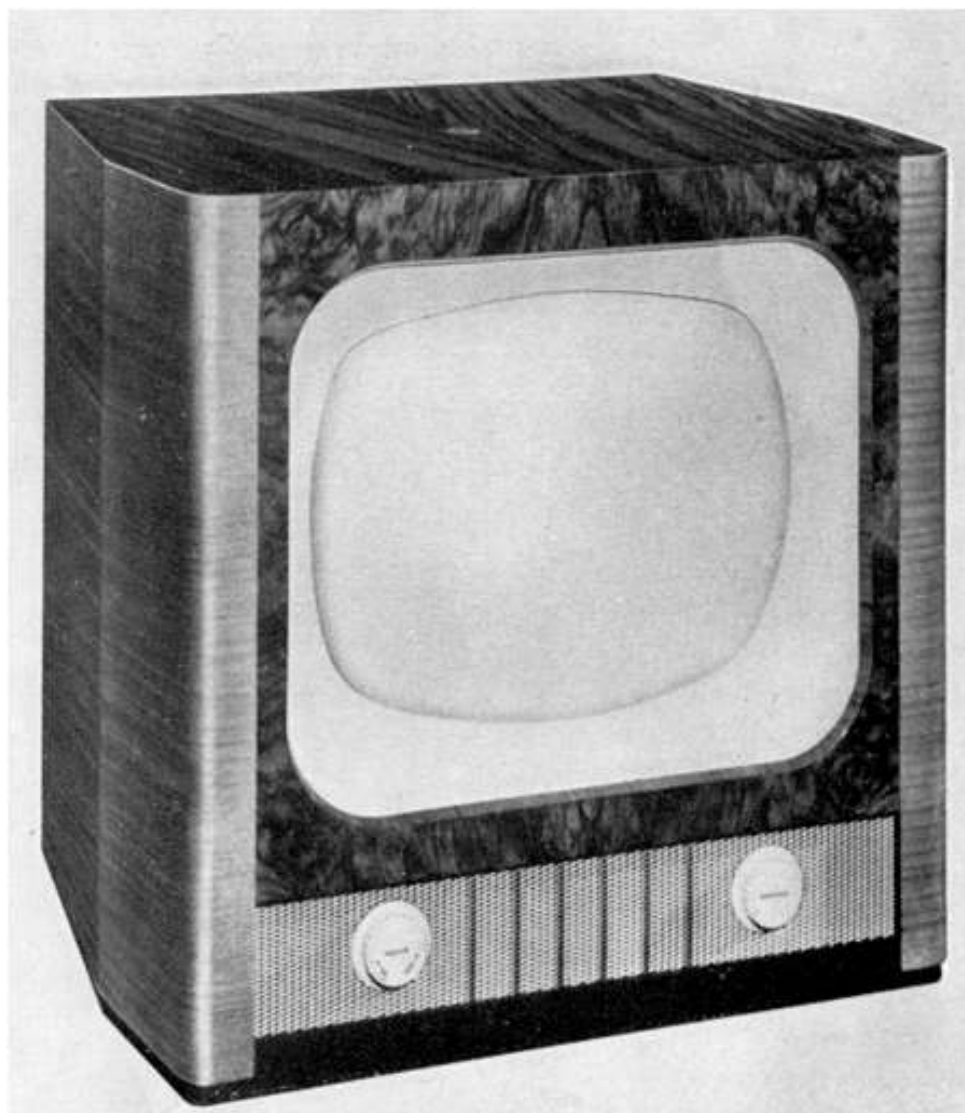
Viewer's View

A remarkable set. One cannot enthuse enough about a set that can be wheeled from room to room on casters and plugged into the mains with no aerial worries—providing the signal strength is high enough.

The picture was exceptionally clear and bright and the sound magnificent.

The design of the cabinet with its two doors, makes this a handsome piece of furniture. There is one criticism though. The hinges allow the doors to swing right back—presumably to give a clear view of the screen from all angles—but as there are no stops of any kind there is a danger of the doors damaging the side of the cabinet if they are opened hurriedly.

REGENTONE *BIG 15/5*



The Regentone Big 15/5 is manufactured by Regentone Radio and Television, Ltd., Eastern Avenue, Romford, Essex.

Price : 86 Guineas, including Purchase Tax

THIS receiver utilises 14 valves, making use of a super-heterodyne circuit employing the lower side-band only, and can be adjusted for any of the five BBC TV channels. The AC/DC principle is adopted, but the cathode-ray tube heaters are fed via a small mains transformer. Fly-back E.H.T. (13 Kv) feeds the aluminised 15-in. picture tube. The controls comprise *FRONT* :— Contrast; Volume - On - Off. *REAR* :— Focus; Brightness; Line-hold; Frame-hold; Height; Vision Interference Suppressor; R.F. gain; Frame linearity.

Other controls available to the Service Engineer are :— Width; Line linearity; Line-drive; Frame wave form; Horizontal shift; Vertical shift; Line scan; Balancing trimmer.

The set is designed for AC operation only, and has four adjustable tapplings within a range of 200-250 volts. The consumption of the instrument is of the order of 150 watts.

Sound rejection is obtained by a series resonant circuit connected to the control grid of the vision I.F. amplifier. A second

band-pass filter couples this valve to the germanium diode, which serves as the video detector. The detector load is coupled to the grid of the video output stage through a damped choke, which, in combination with by-pass condensers and the grid capacity of the video amplifier, act both as video frequency corrector and I.F. filter.

The synchronising separator valve receives positive sync pulses at its grid, the peaks of the pulses being clipped by the valve's grid current. Picture content is eliminated by the very short grid base of this valve.

The Line sync pulse is of negative polarity and is fed to the Line blocking oscillator transformer. Correct Line frequency is obtained by adjusting the grid bias of the blocking oscillator valve, and the output of this valve is fed to the grid of the Line amplifier valve.

Suppression

The H.T. supply to the Line amplifier is obtained via a tapping on the Line output transformer, an efficiency diode, part of the linearity control winding, and Line shift control.

Adequate suppression of parasitic oscillation is obtained as a result of the high impedance Line scan coils being connected across the efficiency diode.

Width control is obtained via a variable inductance in shunt with a winding on the Line output transformer.

Line Shift is obtained by a variable resistance, the adjustment of which varies the amount and polarity of a direct current flowing in the scanning coils. "Ringing" is avoided by a trimmer condenser in series with a fixed condenser placed across the Line scan coils.

Frame synchronising signals are developed across an integrating circuit in the anode of the sync separator valve. After further integration, employed to reduce the ill-effects of impulse noise and interference, and to remove any residual Line pulses, the Frame sync pulse is fed to the anode of the Frame blocking oscillator. Correct frequency adjustment is obtained by varying the bias on this valve, and represents the Frame Hold control, the saw-tooth voltages from this valve being fed to the grid of the Frame output amplifier.

Wave form correction is secured by a resistance-capacity network, one of the resistors being a variable potentiometer, whose effect controls in the main the linearity of the bottom of the picture.

An additional potentiometer providing adjustable feed-back corrects the scan at the top of the picture. The Frame Shift control operates in a similar fashion to the Line Shift control in providing a varying amount and change of polarity of direct current through the Frame scanning coils.

Frame fly-back suppression is dealt with by a negative going signal derived from the Frame time base charging circuit and being applied to the grid of the cathode-ray tube during the fly-back period. This system ensures the elimination of the white fly-back lines from the picture during black level transmission.

The general layout of components and wiring is effected in a clean, workmanlike manner which should offer an easy approach to fault finding and servicing.

Viewer's View

When tested, the instrument provided, under normal daylight conditions a good quality picture of adequate brilliance, the sound being of particularly high fidelity.

The Regentone Big 15/5 is undoubtedly a family model. It is a set for those who cannot or do not wish to sit huddled round the screen from "Big Ben" to the weather report. With its 15 in. tube it gives a picture that can be appreciated from the farthest corner of the room and seems to be ideal for the larger family where it is not possible for everyone to sit near the set.

So far as the controls are concerned, I found that once they had been adjusted it was not necessary to go to the back of the receiver at all, but if this should be necessary at any time, the three controls at the back—line hold, frame hold and brilliance—are quite accessible and the knobs are large enough to be manipulated without uncomfortable "fiddling."

I was particularly impressed by the appearance of the polished walnut cabinet, and thought the location of the speaker most ingenious. Situated behind the narrow strip at the bottom it is effectively hidden—the two front controls detract attention from the speaker—and considerably aids the illusion of the talking picture.



H.M.V. Model 1824 5-Channel Television Receiver is manufactured by E.M.I. Sales and Service, Ltd., Hayes, Middlesex. Price 60 Guineas, including Purchase Tax

THIS 14-inch table model is one of the latest of a new range just released by these makers. It is designed for use on either alternating current or direct current mains, 200 v. to 250 v. DC, or 200 v. to 250 v. AC 50 cycles. The instrument comprises 15 valves and an Emiscope cathode-ray tube. Very high sensitivity is claimed by the manufacturers for this five-channel receiver. Under test at our London premises the receiver gave a good performance, although interlace might have been better on the model under review.

Two main controls are situated on the front of the instrument: on the left, Brightness On/Off, and on the right, Sound volume. Between these two controls and hidden by an attractive hinged cover are the normal pre-sets, and these comprise:— Vertical Hold, Contrast, Horizontal Hold, Height, Sensitivity, Interference Limiter and Width. Unlike some receivers, this set does not incorporate a built-in attenuator, the makers claiming that, despite its high

H.M.V. Model 1824

5-channel

14-inch Table Model

gain, the receiver's contrast control will take care of all normal operating conditions. It is interesting to note that this receiver employs a black mask as opposed to the more common cream-coloured variety. I observed that, in common with many other makes of receiver, the mains supply lead is taken straight into the receiver, and I repeat what I have said before, that there may be some small disadvantage in this when this lead requires replacement. The plug-in type of lead has the advantage that flex replacement may be effected by

anyone who has ever undertaken such jobs as fitting new iron leads, etc., whereas in the case of this instrument, mains lead replacement will require the services of a TV engineer.

Novel Features

There are several novel features incorporated in this instrument, among them being a sliding bottom panel, which when removed, exposes most of the instrument's wiring, thus facilitating servicing. An easily removable chassis is locked in position by two screws. A totally-enclosed scanning coil and focus assembly unit is included, and on the instrument under review the manufacturers had employed fixed focus, there being no provision, as is more usual, for focus adjustment. Picture shift adjustment and picture "squaring," normally only require attention upon installation, are obtained by small levers protruding through the assembly casing, and it was noted that these controls were entirely satisfactory in operation.

The cathode-ray tube, an aluminised non-ion trap rectangular tetrode model, is easily removable together with the scanning coil and focus assembly, and it was observed with satisfaction that the method of suspension employed metal bands as opposed to the webbing type of suspension used in earlier models. A small ring magnet, not an ion trap, situate near the base of the tube, which

can be orientated to remove corner shadows.

A thorough examination of sub-chassis work was carried out, and this was found to be clean and easily accessible. The interior of the cabinet was proved to be adequately screened against any possible re-radiation. It was also noted that the pre-set control panel assembly could be released by the removal of two screws.

Mounted within the receiver are to be found certain pre-set controls, normally only requiring adjustment upon initial setting up, and these comprise:—Vertical linearity, Line drive, and Horizontal linearity.

Technically, the circuit does not depart greatly from present-day practice covering the more reasonably-priced five-channel receivers, but it should be noted here that suppression of the Frame fly-back trace on the screen is achieved.

Viewer's View

As an average viewer, I regard this receiver as well up to average standard in picture quality except that the "striations"—as I believe the vertical lines on the left are called—were rather uncomfortable at times. However, at a given degree of brightness they were almost invisible.

The design of the set was most pleasing, and I applaud the idea of having the pre-set controls at the front, and so ingeniously concealed.

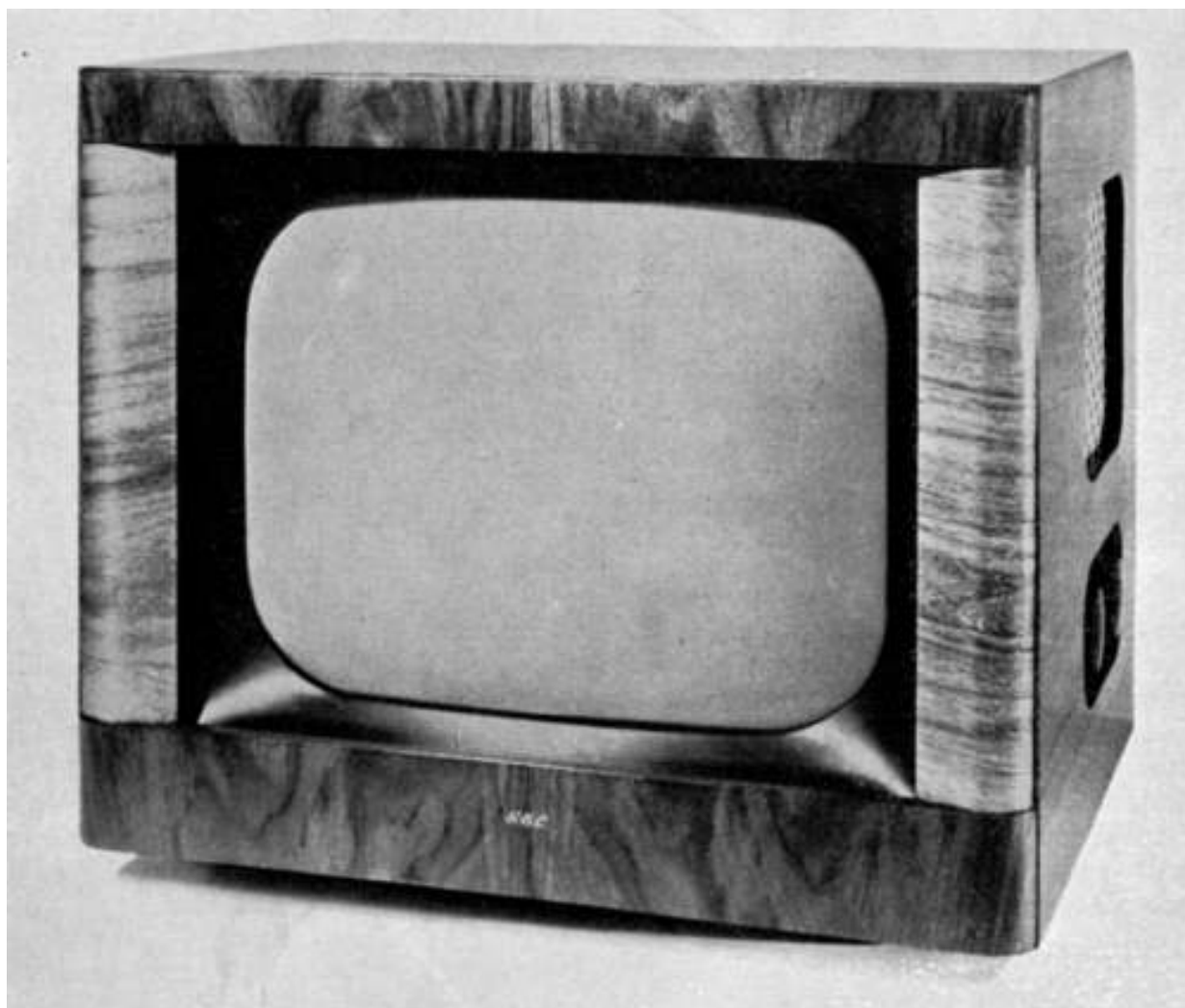
INTERFERENCE?—COULD BE

!! I am getting good pictures but am having a terrific—I repeat terrific—experience because it does really terrify one to view between 9.30 and 10.30 each evening. It has a crashing noise and streaks three inches wide across the screen. It resembles motor tyre marks on a road after a skid. What shall I do?

Jump.

G.E.C. MODEL B.T. 5147

★ ***14-inch Table Receiver***



The G.E.C. Model B.T.5147 14-inch table model is manufactured by General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2. Price: 60 guineas, including Purchase Tax

THIS new receiver by G.E.C. is designed to operate on AC, 200 to 250 volts, or DC, 200 to 250 volts. The instrument comprises a 15-valve super-heterodyne receiver, with permanent magnet focusing, fly-back E.H.T., and efficiency diode. Its power consumption on AC mains is approximately 180 watts, and on DC mains approximately 140 watts. The receiver may be tuned over all five of the BBC's TV channels, and possesses a sound output of 1.5 watts.

The input signal is fed into an RF stage, which in turn feeds the frequency changer employing a colpitts oscillator circuit, and the IF's emerging from this valve are further amplified by one common IF stage. The sound IF signals are extracted from this latter valve and receive further amplification before being passed to the diode section of a D.H. 77 valve for demodulation. The LF signal is thence fed to the triode section of a D.H. 77 valve via a noise-suppression circuit utilising a germanium

crystal. After amplification at audio-frequency by the triode of this former valve, the sound signals are passed via a volume control in the grid of the output stage, after which the signals are passed to the loudspeaker. As is common practice today, an A.V.C. circuit is incorporated in the sound receiver.

Reverting to the vision channel, the vision IF signals derived from the frequency changer are passed to a vision IF amplifier through a sound rejection circuit, after which the IF is passed to a germanium crystal which functions as a video detector. The video signal, after passing through a compensating network, is fed to the video amplifier. This valve amplifies the video frequency and applies a negative-going signal to the cathode of the cathode-ray tube. A vision interference limiter of the manually operated type is employed, and comprises one half of a D.77 valve. A Z. 77 valve acts as a synchronising separator, the combined picture and synchronising signal derived from the video output stage being fed to its grid. After the picture content has been removed, the line synchronising pulses developed across the valve's anode load resistor are fed directly via a small condenser to the line time base. The frame synchronising pulses are derived from the screen of this valve. The attenuated line synchronising pulses still remaining are eliminated by half of a D. 77 (diode), and the frame synchronising pulses only are then passed to the frame time base. The line synchronising pulses are applied to the screen grid of a Z. 77 valve, which is maintained in self-oscillation by the coupling between its screen grid, control grid, and its associated transformer.

Frequency of oscillation is manual, and this latter control represents the horizontal hold control. In essentials this valve functions as a grid-blocking oscillator, but a pentode valve is employed instead of the more usual triode. The object of this is to secure faster fly-back, which permits of more efficient operation of the E.H.T. and efficiency diode circuits. The line time base output valve, a K.T. 36 valve, produces a greatly amplified standing wave-form, in association with its output transformer. The purposes of this transformer are three-fold, and are as follows: To provide

matching between the valve and the deflector coils, to provide an E.H.T. supply of 13 kV in conjunction with the E.H.T. diode rectifier, and to produce a boost voltage from the fly-back pulses, which are fed into the HT supply to the line output valve after rectification by an efficiency diode. By means of a carefully designed compensating network, the adjustment of the width control does not affect the E.H.T. voltage, and therefore the brightness of the picture and the focus remain unaffected by any changes made with this control. A tapped variable inductor operates as a tuned circuit of limited range to secure horizontal linearity control.

The frame time base employs a multi-vibrator type of oscillator, employing a triode pentode valve. This oscillator does not itself generate the saw-tooth wave-form required, but acts as an electronic switch to discharge a condenser at the correct intervals. The wave-form of appropriate shape and frequency appearing across this condenser drives a P.L. 82, which acts as the frame output valve. This valve is transformer-matched to the deflector coils. A negative feed-back network is employed in this latter stage to correct distortion introduced by the output valve and transformer. Pre-set vertical form controls are incorporated in this circuit.

The makers have departed, in this instance, from the conventional horizontal chassis, the chassis, in fact, being mounted vertically with the base of the tube protruding through it.

Viewer's View

A purely functional set with not an inch of space wasted for trifles. The cabinet, while far from austere, is almost a tight fit around the tube; in fact, it is the smallest 14-inch set I have seen. This makes it ideal for those who want the bigger picture without taking up too much space.

The cabinet is in two tones of walnut with the two main controls recessed at the side, just below the speaker. The four pre-set controls are positioned in such a way that they may be operated from the viewing position.

The rectangular tube provides a good quality picture, supported by an extremely well-balanced sound system.

20th National Radio and TV Show

Technical Editor of "Television News," Ronald Finnigan, reports on what he saw at the 20th National Radio and Television Show. As he had anticipated, it was a TV paradise.

I HAVE just returned from what must be the greatest show ever. Nowhere else in the world has there been such a vast demonstration of sound and television broadcasting through every stage from studio to the domestic receiver.

Upon entering the main hall I was immediately aware of what was the central feature of the Show, a giant 30 ft. radio mast surmounted by a three-face clock 3 ft. 6 in. in diameter, controlled by radio signals from Rugby. Around the tower were the exhibitors' stands in a wonderful variety of design and colour, and surrounding the walls, the demonstration rooms.

I noticed that the Radio Industry Control Room, the nerve centre of the whole Show, had two cameras operating this year, and a new piece of experimental apparatus known as the *Telescribe* for scanning still captions.

The studio attached to the Control Room was larger than last year, and apart from housing the two cameras, also possessed a baby grand piano, and a position for the announcers.

Under Control

Those of you who visited the Show last year will remember the studio was situated centrally between the two equipment bays. This year however, all the equipment was installed in one big bay, the studio being at one end. This re-arrangement made sure that the Programme Officer was able to produce his programmes with a visual sight of the studio, and at the same time have all his other equipment under immediate control.

Much of the technical apparatus which was under the control of the Announcer in past exhibitions had been removed, leaving her very little to do except make her

announcements, and occasionally play gramophone records.

"Television Avenue" on the first floor, was bigger and better than last year. Forty booths were installed, and inspection of sets on show seemed to me much easier.

Adjoining the R.I.C. control room was once more to be found the Celebrity Dais, from which celebrities are interviewed, and Messrs. Pye Limited had supplied one of their cameras which feeds pictures back to the control room.



H.M.V. Model 1826, 17-inch receiver.
Price : 76 Guineas, including tax

The *Telescribe* loaned by Mullard I found of particular interest. This piece of equipment enables written announcements or photographs to be transmitted over the closed circuit network without the necessity of having special slides made, and was well worth examining.

Once again the BBC occupied the whole of the west end of the first floor, and for the first time, a limited number of stands had been erected in which smaller firms were showing their products.

The BBC's studio was something which was well worth visiting at the Show. The clarity with which I was able to view the scene selected for transmission on the giant

21 ft. by 16 ft. screen installed above the proscenium was astounding. It was indeed fascinating to sit there among some 1,000 other visitors, watching the operations in the studio, and observing at the same time, the picture chosen by the Programme Producer for transmission. I was sitting half-way back from the studio stage, but it would have made no difference should I have found myself in one of the front rows, since installed on either side of the stage were two additional projectors showing the picture on screens measuring 4 ft. by 3 ft.

I was interested to observe that once more the wider aspects of radio and electronics were being demonstrated at the exhibition—medico-electronic equipment for testing



Bush Model 32, 14-inch table receiver.
Price : 60 Guineas, including tax

heart and lungs; electronic equipment for the factory and office; a microscope with a television-size screen; the National Physical Laboratory's machine which plays (but never loses) games of noughts and crosses with visitors; one of the Ministry of Supply's guided missiles, and some of the plastics-encased electronic components on which Britain's lead in this branch of defence largely depends.

The Army and Royal Air Force were demonstrating communication and electronic equipment, and six technical training establishments were showing some of the highly technical apparatus they use.

As might be expected, television was predominant; there were well over 120 different models in the Show, more than half of them being seen for the first time.

Larger and steadier, brighter and sharper pictures, and easier-to-adjust receivers—these were the television achievements presented by this year's Show.

Larger Pictures

The 17-inch rectangular tube, first seen last year, has proved extremely popular. It is now in big-scale production, but set makers cannot get all they want. Virtually every set maker is introducing table and console models with the 17-inch tube. At least two makers (**Cossor** and **H.M.V.**) are showing sets with 21-inch tubes.

Projection Receivers

These provide yet bigger pictures this year. One **Philips** domestic rear-projection set has a perfectly flat, reflectionless screen 23-inches wide and a **Ferranti** model shows a 22-inch picture. For forward-throw sets, the wall screens have been developed to give increased brightness. **Philips** use a glass-bead screen, 4 ft. by 3 ft., and **Valradio** a special screen up to 6 ft. by 2½ ft. **Baird** enter the field with a *Kinevisor* giving either a 5 ft. or 4 ft. wide picture; they also introduce a domestic model. The **Decca** type 1000 provides a 4 ft. picture.

Steadier Pictures

Automatic picture control, the major circuit development of the year, keeps the contrast and brightness of the picture steady despite large variations in the strength of the transmission. It is primarily of value to viewers in those districts where the signal is apt to fade, and where fading or flutter is caused by aircraft. **Pye**, **Dynatron**, **Ecko**, **Invicta**, **Peto Scott**, and **Pilot** are among firms fitting automatic picture control.

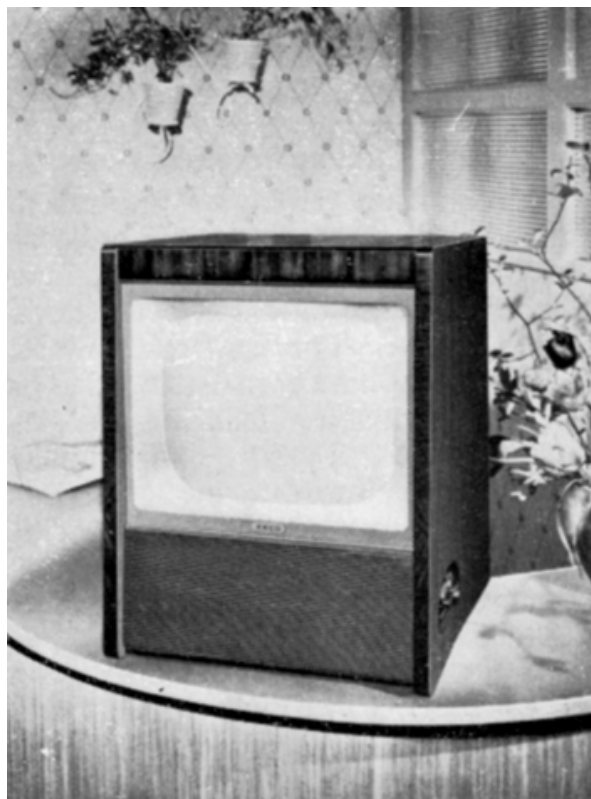
Easier to Adjust Receivers

Several firms, among them **H.M.V.**, **Marconiphone**, **Peto Scott**, and **Pilot** are using flyback suppression—this increases the range of operation of the brightness control and helps the viewer get a pleasing picture when, for one reason or another, reception conditions are difficult. **Masteradio** have introduced a brilliance-

compensated contrast control so that one has only to adjust the contrast occasionally, not both contrast and brightness. Focus controls are more accessible (**Ferranti**) and picture centering made easier (**H.M.V.**).

For Fringe Area Viewers

The automatic picture control is the greatest possible aid to easier control. It takes over the entire job of regulating contrast and brightness to compensate for fading flutter. Two things making for sharper pictures are improved focus systems and flywheel synchronising. New



Ekco Model T.207, 15-inch table receiver.
Price : 76 Guineas, including tax

magnetic systems, such as the *Ferroxdure* (**Philips**, **Stella** and others) ensure finer lines, extending right to the edges of the screen, and clearer detail. **H.M.V.** have developed an automatic focus circuit. *Flywheel synchronising* is another boon to fringe-area viewers; it prevents interference from jiggling the lines sideways, and therefore keeps the picture sharp. **Pye**, **Ferguson** and **English Electric** have models using this circuit feature.

Brighter and steadier pictures are also resulting from improvements to the circuits generating the EHT (extra high tension) for the tubes. These not only give higher

voltages, but maintain the voltage more evenly, so keeping the picture steady in size and correctly in focus, even in the brightest parts. **Philips** and **Stella** are among firms giving special attention to this feature.

I noticed more manufacturers are adopting the ion trap—a simple magnet system placed round the neck of the tube to deflect ions and prevent them bombarding, and “burning” the screen. Often, aluminising of the screen has been used to protect the screen from the ions as well as to improve the brilliance of the picture. Now it is quite common to find tubes both aluminised and with ion trap.

A hard-working part of a TV receiver is the line output transformer. Makers now take great care to ensure that these are dependable. Among firms using new “tough” designs are **Alba**.

The *quality of TV sound* transmissions is better than that of ordinary sound broadcasts. **Philips** are among firms taking special care to see that sound reproduction is good. Their 14-inch table set, for example, incorporates a 10½ inch elliptical loudspeaker. All **Sobell** sets have acoustically designed cabinets. In a table model they use a new type of elliptical speaker.

“*Instant*” tuning is provided in **Ferranti** sets, Mono-knob control in **Cossor** receivers and several other firms such as **Bush**, **Peto Scott**, **Valradio** and **Ultra** also enable any of the five wavelength channels used by the BBC for TV to be tuned in by operation of a single knob.

Ediswan are showing a 21-inch rectangular tube as well as a 17-inch aluminised rectangular model. They also have a new 14-inch round tube giving a larger picture than the usual 14-inch rectangular type. This firm has recently completed a country-wide organisation, unequalled in scope, for the rapid handling and testing of new and replacement tubes.

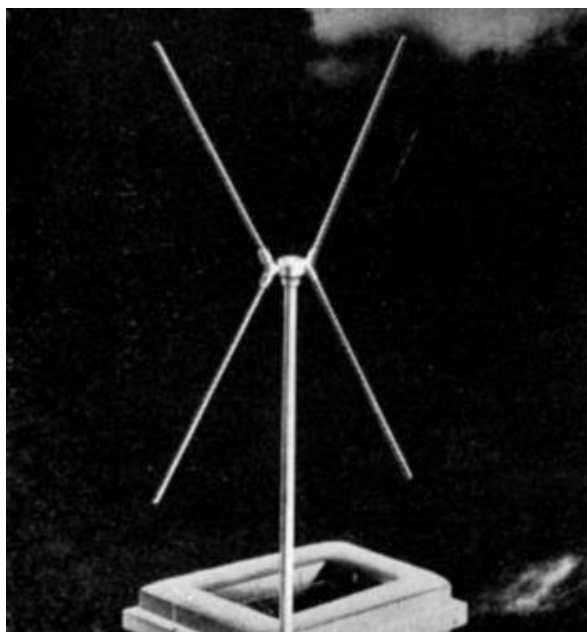
For Simpler TV Service

Side-suspended tubes and two section chassis are a feature of **Baird's** sets; the **Philips** unit construction; **Ecko** “Triple-link” construction, and the use, by **Peto Scott**, of flat-mounted, well spaced and ventilated strips to carry all small components.

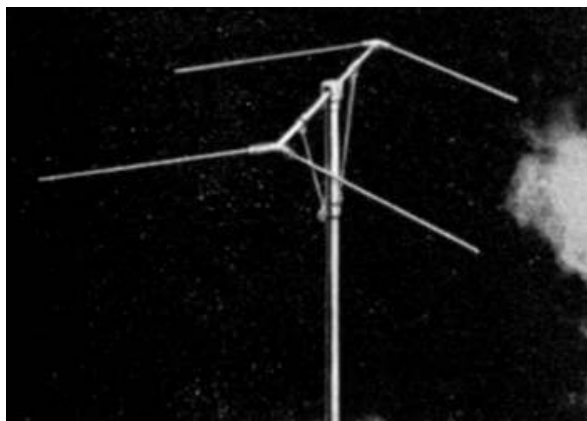
One of the *least expensive* of TV receivers is the **Bush** 9-inch table model.

Another keen-price model is their 14-inch table set in moulded cabinet.

A new type TV focus unit exhibited by **Goodmans** employs original means for focus control and picture centring. Already adopted by leading set makers, it is now available to amateur set builders. **Goodmans** also introduces a microphone designed for hand, desk, table-stand and pocket-attachment use.



Two TV Aerials by Telerection Ltd.



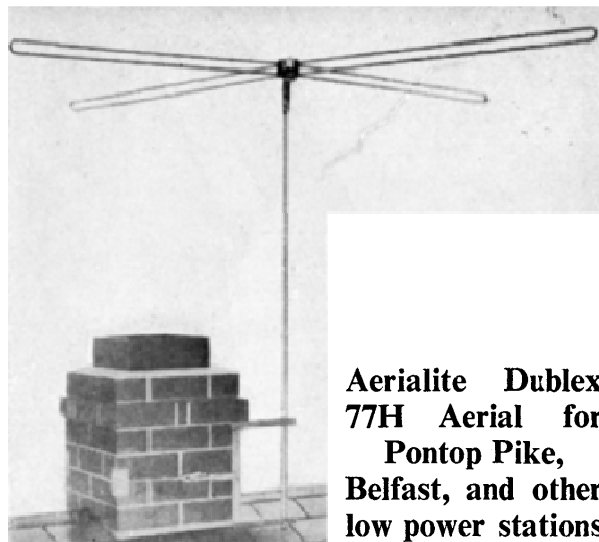
Television Aerials

Television aerials are becoming easier to assemble and erect—which should reduce their cost to the viewer.

Belling-Lee have a new “Kayrod” which utilises the chimney-mounted “mast” as part of the aerial; also it has a ratchet-type bracket for simple fixing.

Antiference are introducing an “Univex” aerial which can be completely assembled at the factory, used in either room or loft, and quickly adjusted for direction and to suit the required channel. **Aerialite**, like other

firms, produce horizontal aerials for the Newcastle and Belfast districts; their “Dublex” is a robust and competitive design. A distinctive “flat-arrow” aerial first made by **Telerection** for the horizontal-polarisation regions is now being made in a vertical type; it is particularly effective, it is claimed, in excluding interference. **Wolsey** have developed a range of “Quick-fix” aerials comprising pre-assembled rods, a pre-assembled junction box secured by two wing nuts, and a new one-bolt mast clamping bracket. This bracket includes a rubber buffer to prevent mast vibration and howl.



Aerialite Dublex 77H Aerial for Pontop Pike, Belfast, and other low power stations

Loudspeakers

Three firms, all with over 25 years' experience of making loudspeakers, have combined to put their resources and knowledge into a super-range of speakers. They are **Celestion**, **Rola** and **Truvox**. One model is especially suitable for commercial uses, as in intercom. sets.

Four high-fidelity speakers, designed to enable advantage to be taken of the higher quality available from TV sound transmissions and from the latest gramophone records while yet remaining in the popular price category, are being produced by **Whiteley Radio**. A new type cone is made from uncured cambric and bonded pulp by a specially evolved process.

Silencing of the internal speaker is a detail appreciated by **Sobell**, when using extension speakers.

Improvement of reproduction receives the attention of set designers as well as of radiogram designers. The new **Pilot 85** set incorporates a special high-quality speaker and uses it in a cabinet of generous proportions.

★ *exits and entrances . . .*

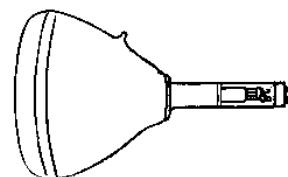


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Your TV Problems

Answered

IN this feature, a team of TV experts answer some of the more interesting and common problems posed by viewers during the year.

? I live in a high signal strength area, and although I have reduced my contrast control to minimum, I am still getting too much signal. Can you tell me what I can do? B. R., London.

If your receiver is not fitted with an attenuator, an attenuator unit should be purchased, such units now being available. The unit should be installed between the receiver and its feeder cable.

? I have recently had my tube replaced, the dealer having returned to me the old one. Does this mean that the old tube can be put to some use? T. T., Cambridge.

Once a tube has failed there is no further use for it as far as your set is concerned. Since tubes are highly evacuated, there is danger of implosion if they are knocked. It is recommended that the old tubes be placed in a stout sack and then subjected to a blow from a hammer. This will destroy the tube, the sacking preventing personal injury from flying glass.

? All my pictures seem to show a black line wherever the object is white. Can you tell me whether this is a fault, and if so, what is wrong? B. M., Richmond.

Although there are several possible causes for this fault, the most likely would relate to the R.F. circuits in your receiver, (vision). It is possible that this section of the instrument needs re-alignment.

? Of late I seem to have lost the highlights in my picture, the pictures appearing "black." Adjusting the contrast control does not really effect a cure. Can you tell me what is wrong, please? T. F., Rugby.

The fault here could relate to:—One of the valves in the vision section of the receiver overloading, the vision interference

limiter having been incorrectly set, or possibly the emission on the cathode-ray tube beginning to fail.

? I have recently removed from one district in London to my present address, and upon re-installing my set I find that my picture no longer occupies the space in the mask, some of the picture being, as it were, round the corner. Can you tell me how this is likely to come about? F. F., Deptford, London.

Probably during removal your set has received a certain amount of vibration, and this may have altered the position of the focus assembly, and/or the ion trap magnet, if installed. Adjustment of either of these components should put things in order again.

? My dealer tells me that the emission of my tube is failing, the picture having become faint lately. Can anything be done to repair my tube? D. G., Wenvoe.

Whilst it is possible in some cases to "re-activate" the cathode in the tube, this should only be regarded as a temporary expedient. A new tube is the only sure way of dealing with this problem.

? My picture has become too large in the vertical sense, the "lines" now being very wide apart. I have turned down the height control to the minimum, but the picture is still much too big. Can you tell me what has gone wrong, please? F. A., Charlton.

The fault here probably relates to trouble in the negative feed-back network associated with the Frame output valve. A check on this circuit will probably disclose a faulty component.

? I am having to constantly adjust the Line hold on my receiver. This has only recently developed. What is likely to be the cause of this? S. A., Walsall.

In all probability a fault has developed in the synchronising separator stage in the

receiver. A check should be made upon the separator valve, and/or its associated components.

? My neighbour's sewing machine badly interferes with my reception of TV. How can this be stopped? C. O., Eastbourne.

This type of equipment can be suppressed, but as yet the owner of the offending apparatus cannot be compelled to undertake suppression. If your neighbour is prepared to suppress the machine, your local G.P.O. Radio Interference Section will undertake this work (on a chargeable basis) if called upon to do so.

? My picture is not true black and white, being sepia in colour. Is this a fault? I would also add that not all the picture is in focus. My dealer says he is unable to call upon me. Should I communicate with the manufacturers?

Your set may have been fitted with a sepia tinted tube. Some viewers prefer this tone to the black and white. The defocusing you mention is probably a matter of adjustment, and any competent TV engineer could advise you upon this.

? I have a pre-war TV receiver, and it is not fitted with interference suppressors. Can such be fitted?

Suppression of vision interference should not prove very difficult, but suppression on the sound channel is more involved. We recommend you communicate with the makers of your receiver and ask their advice.

? My picture has recently taken on a slight sloping condition. Can you tell me the cause and cure?

This is undoubtedly caused by the wrong setting of the scanning coils which are situated around your tube. Adjusting these coils should put things in order.

? I have an indoor aerial situated behind the window curtains. Lately, whenever the curtains move there are flashes on the screen accompanied by crackling on the sound. What causes this?

In all probability there exists a bad connection between the feeder cable and the di-pole. We suggest you dismantle the aerial and thoroughly examine same.

? Can I purchase a TV aerial which will cover all the BBC wavebands?

No. This is not possible. TV aerials are designed to operate on specific frequencies. Operating an aerial on frequencies other than those for which it is designed would lead to a loss of signal, ghosts, etc.

? Does it harm a set to move it when it is working? I have been told to do so under no circumstances. I cannot understand this as I have from time to time moved my radio set when it has been working without ill-effect. M. R., Birmingham.

No damage should accrue providing normal care is taken when moving the instrument.

? My set, nine months old, has been working perfectly until recently. I now find I am constantly having to adjust the focus control. My dealer, who has recently had the set in for inspection, said there was a loose connection, but the fault is as bad as ever. Your help in this regard would be appreciated. S. H., Lincoln.

The fault as outlined in your letter would seem to suggest shorted turns in the focus coil, and a check by substitution is recommended.

? Vertical objects on my pictures appear bent. No adjustment I make puts things right. My dealer tells me that the fault lies in the BBC's cameras. Is this likely to be the case? H. W., Cheshire.

The fault here probably lies in the synchronising separator circuit, possibly the valve itself. Try replacing this valve, if this does not correct the fault, then the components associated with this valve should be checked.

? During the last few weeks my picture has lost contrast. Can you tell me what is likely to be wrong, please?

A. D., Middlesex.

Whilst there are several possible causes, the fault may relate to one of the valves in the "vision" section of your receiver, possibly the video amplifier valve. As a preliminary we recommend these valves should be checked.

? The oil in my enlarger lens has become very discoloured after only about three years. Can you tell me the cause of this, please? H. O. S., Worthing.

Discoloration of the oil in the lens is probably brought about through the action

of sunlight or electronic bombardment from the tube.

? Before I turn up the sound on my set everything is normal with my picture, but as soon as I turn up the sound my picture jumps about. What is likely to be wrong?

T. H., London.

In all probability you have a microphonic valve in the vision section of your receiver, and replacing same would put things in order again.

? I have noticed the last three years around this time of the year, my picture will fade, sometimes completely. Can this be caused by a large tree which grows some 200 feet from my house? The set is 3½ years old. P. B., Yarmouth.

We note you are in a "fringe" area, and in all probability this fading is seasonal. Your tree would have no bearing on this trouble.

? My picture tends to get larger and smaller according to the brightness of the scene. I also observe that I can make the picture larger if I turn up the brilliance more than normally necessary. My dealer suggests I need a new tube. Do you think this is right? A. O., Herts.

Whilst one cannot discount the tube we do not think that the tube is at fault in this regard. The fault would seem to indicate faulty EHT regulation, and the replacement of the EHT rectifier will probably clear up the trouble.

? I have a TV receiver 3½ years old, and it has given excellent results up to recently. The trouble now is that at times the sound goes faint, and I have found that by knocking the side of the set the sound will come back for a time. Can you tell me what is likely to be the matter, please?

F. R., Liverpool.

There probably exists a "dry" joint somewhere in the sound receiver and tapping the set restores the connection, but only temporarily. This section of the set requires examination with this possibility in mind.

? I have recently installed an aerial, and have not got the results I expected. On the one hand, I am told the aerial should "face" the transmitter, on the other hand, it should be towards the source of interference. Can you please advise me? P. K., London.

The aerial should point in the direction of the transmitter. If there exists a source of interference in the direction of the transmitter it might be found advantageous to turn the aerial slightly away. To point the aerial at the known source of interference would increase the trouble, not lessen it.

? Will I have to do away with my TV set when the BBC start transmitting pictures in colours, or can existing sets be converted? R. M., Bognor.

Many technical problems will have to be overcome before Colour TV becomes a standard practice. Probably several years will elapse before such is the case. Without going into technicalities, it is highly probable that the form of transmission will permit the use of black and white TV receivers on the colour transmission, as well as those designed to receive pictures in colour. It is too early to give an opinion as to whether sets existing at the time of the change-over to colour could be converted or not.

? I have recently acquired a television receiver and note there is no provision for an earth. I always have understood that during stormy weather the aerial should be earthed. Can you tell me how my set should be earthed when thundery conditions prevail?

E. R., Birmingham.

If you are anxious concerning the risk of lightning striking your aerial, we would point out that the odds are several million to one against. You could, of course, remove the aerial plug from the receiver; this would then isolate the set against any charge which might be built up in the aerial system. If it is the aerial you are concerned about, we would add that lightning is not "attracted" by an aerial, the aerial is only likely to be affected should the lightning flash occur very near your premises, in which case it is just as likely to hit your chimney-stack. One well-known maker of television aerial suggests, in the event of anxiety over the aerial, that the connections to the di-pole elements be reversed, i.e., the top elements being connected to the outer screening of the co-axial cable, and the bottom element to the centre feeder. In this case the outer covering of the cable should be bared just before it enters the house, and a length of heavy

copper wire connected to the bared part, the other end being taken to a good earth point in as straight a line as possible. If this course is adopted, it will be very necessary to cover the joint on the cable with some good insulating material to prevent the ingress of water.

? A black bar keeps jumping across my screen. Is there likely to be something wrong with my set? V. G., Ford.

It would seem your LINE HOLD control needs adjusting. This control is easily located and no damage will result from any adjustment you make.

? My picture keeps turning over and over, and although adjustment of the Frame hold control will stop it for a short time, the trouble starts all over again, the picture then going in the opposite direction. Can you tell me what is likely to be wrong?

The fault on this receiver is probably in the synchronising separator stage. A trial by substitution of the appropriate valve may effect a cure, although a coupling condenser may have broken down.

? I am experiencing what I can only describe as a number of lines which appear on my set whenever there is a loud passage of music. I can, I find, produce these lines by banging the side of the cabinet. Can you tell me what is wrong, please?

J. B., Barnsley.

It is difficult to judge from your description the exact cause of your trouble, but from what you say, it would seem probable that one of your valves is microphonic and needs replacing.

? Can you tell me if TV reception in the Great Yarmouth district will be improved in the near future?

N. M., Prestwich.

We regret to inform you that there is no likelihood of conditions improving in the Great Yarmouth district in the near future, although representations are being made to improve reception in this "fringe" area.

? My aerial has become black as a result of the effects of the smoke from the chimney to which the mast is attached. Is this detrimental? F. A., Manchester.

The effects of smoke on the aerial system could prove detrimental under certain circumstances, and you would be well

advised if the deposits are considerable, to take your aerial down, clean it thoroughly, and paint the rods. Care should be taken, however, not to paint the di-pole insulator. If it is possible to move the aerial to a position a little away from the chimney, this would be an advantage.

? I live 150 miles from the Holme Moss transmitter, and although I get fairly good results, there are times when the picture fades out completely. Is there anything I can do to stop this trouble? Would a pre-amplifier help? My aerial is fixed to the chimney-stack. J. M., King's Lynn.

Nothing can be done to produce a picture on your set when no signal exists. You could, however, with advantage, combine the fitting of a pre-amplifier together with the raising of your aerial. The greater the height of your aerial the better.

? I get a terrible buzzing sound in my loud-speaker, which is continuous throughout the programme, although varying somewhat in its intensity with changing scenes. The only way I can reduce this noise is to turn down my contrast control. This so reduces the picture as to make it almost worthless. Can you tell me what I can do to put things right?

J. C. G., Richmond.

The sound you are noticing is referred to as vision breakthrough. This trouble can be cured by the realignment of your receiver, which work, incidentally, can only be carried out satisfactorily by a skilled engineer.

? At the end of some programmes the BBC give details of artists taking part and I have noticed recently that as these details move up my screen, at one point the words wave slightly back and forth, and then continue in their proper fashion. Can you tell me what is wrong, please?

S. J. S., Chester.

We think that your trouble relates to 50 cycle "hum" in the Line time base. If, after narrowing the picture slightly so that the sides are visible within the mask, you observe the edges to be curving in and out instead of straight, this would confirm the above. The cure for this trouble will necessitate an examination of the time base of your receiver by a qualified TV Service Engineer.

A Glossary of Technical Terms

THE following is a Glossary of Terms—in non-technical language—comprising most of the terms likely to be encountered by viewers when confronted with a problem and seeking an answer.

Aeroplane Effect. The flutter on the picture and on sound due to a reflected wave arriving from aircraft, which wave interferes with the direct signal received.

AC/DC Receiver. A type of TV set designed to operate on either alternating or direct current mains.

Attenuator. A device inserted between the aerial and the receiver for reducing the signal to the set.

Balanced Feeder. A type of cable used to connect the aerial to the receiver, the two conductors of which having an equal capacity to earth.

Brilliance Control. A device for varying the intensity of the electron beam (the invisible ray which lights your tube), in the cathode-ray tube.

Cathode. A component in a valve or cathode-ray tube which, when heated, gives off a stream of what are called electrons.

Cathode-Ray Tube. That expensive "piece of glass" upon the end of which your picture should appear.

Channel. The word used to indicate the "wave-length" for any particular TV transmission. Five channel sets are those designed to function on all the BBC's TV stations.

Chassis. The metal "box" upon and under which the valves and components of your set are assembled.

Co-Axial Cable. A type of cable used to connect the aerial with the receiver, and having an inner and outer conductor,

separated by a material of high insulation value.

Condensor. A component in your set which has the property of accepting and holding an electric charge.

Contrast Control. A device incorporated in a TV receiver whereby the operator may vary the "gain" of the set.

Converter. A machine for converting alternating current to direct current, or the other way round (sometimes used to drive an AC receiver from direct current mains).

Corona Discharge. A discharge of electricity which can sometimes be seen, and sometimes smelt (ozone), and which may occur around the extra-high-tension components in a television set. Needless to say, there is something wrong if the foregoing is observed.

D.C. An abbreviation for direct current.

Definition. A term used to describe the degree of detail in your picture.

Deflector Coils. The coils situated around the neck of the cathode-ray tube, the functions of which being to deflect the cathode-ray both horizontally and vertically, thus enabling the picture to be formed on the face of the tube.

Diode. A type of valve found in television sets and possessing two elements or electrodes, *i.e.*, an anode and a cathode.

Direct Viewing. A term generally used to describe the type of receiver where the viewer observes the picture directly from the face of the tube (as opposed to projection TV).

Electrostatic Deflection. A method of deflecting the electron beam by the use of deflector plates, as opposed to scanning coils.

Emission. The stream of free electrons flowing from the cathode in a valve or cathode-ray tube when the cathode is heated.

Fading. Variation of signal strength arriving at the aerial.

Feed-back (Negative). A method whereby energy is taken from the output of an amplifier and fed to the input. This system is used as a means of correcting non-linearity.

Feeder. The name given to the cable connecting the television aerial to its receiver.

Filter. A system which permits radio waves between certain frequencies to pass freely, but which blocks other frequencies lying outside the range or ranges chosen.

Fluorescent Screen. The screen upon which the picture is formed in a cathode-ray tube.

Fly-back E.H.T. A means of generating Extra High Tension voltage for the cathode-ray tube, the supply being taken from an "overwind" on the Line output transformer.

Focus. A means of narrowing down the electron beam to a fine point at the fluorescing screen of the cathode-ray tube. (A), permanent magnet, or (B), electro-magnetic.

Focus Coil. The name given to unit employing electro-magnetic method of focusing.

Frame Time Base. The part of the circuit in a television receiver which generates the wave form which, when fed into the Frame scanning coils, causes the electron beam to travel in the vertical plane.

Full Wave Rectifier. A device for producing Direct current from Alternating current supplies, and using each half cycle of the AC wave.

L.T. The term used to describe the electrical power used to heat the valves and cathode-ray tube.

Magnetic Focusing. A means whereby the electron beam in the cathode-ray tube is focussed.

Magnifier. A lens placed over the front of the cathode-ray tube to produce a magnified picture.

Mains Aerial. A system employed in certain receivers whereby the house wiring becomes the aerial system. This, of course, can only be used in areas of high signal strength.

Mc/s. The abbreviation for Megacycles per second.

Microphonic. A valve or tube is said to be microphonic when vibration causes movements of the electrodes.

Negative Feed-back. A circuit whereby a proportion of the output signal is fed back to the input side of the amplifier in such a way that the output signal opposes that feeding the amplifier.

Noise Limiter. A circuit for reducing the effects of impulsive interference (car ignition) in a television receiver.

Open Circuit. A circuit whose path has been broken such that no current can flow.

Oscillator. In a television receiver, a valve which generates the scanning waveform, e.g., LINE OSCILLATOR, FRAME OSCILLATOR.

Output Valve. In a television receiver, the final valve in the Line and Frame time bases. This would equally apply to the final valve in the sound receiver.

O.B. Abbreviation for Outside Broadcasting, that is to say, a transmission which takes place outside and away from the studio.

Pentode. A type of valve having five electrodes.

Permanent Magnet. A piece of steel or special metal, which, after being magnetised, continues to contain magnetic properties.

Persistence. (Vision.) The image which the eye appears to see after the image itself has disappeared. Without this property, or failing of the human eye, TV in its present form would not be possible.

Picture Frequency. The speed at which the television picture is repeated. Each picture is repeated at a rate which gives the effect of continuity.

Picture Ratio. The dimensions of the actual picture on your screens.

Plastic. The effect seen on some TV sets and generally caused by the mis-tuning of the vision receiver.

Power Pack. The name given to the unit which supplies H.T. and L.T. to the receiver.

Pre-Amplifier. A small unit which is inserted between the aerial and the TV receiver in order to increase the signal to the set.

Quarter-Wave Aerial. An aerial the length of which equals one quarter of the wave received.

Raster. The screen when illuminated by the scanning lines but devoid of an actual picture.

Rectifier. A device for converting alternating current into unidirectional current.

Rectifier Valve. A valve designed to convert alternating current into unidirectional current.

Reflected Wave. A television signal which arrives at the aerial from a different direction to that of the transmitter, the signal having "bounced" off some nearby object. Generally, this second signal produces the familiar "ghost" effect.

Rejector Circuit. A circuit comprising capacitors and inductors which, when tuned to a pre-determined frequency, does not allow their passage, and hence rejects them.

Resistor. A component in a receiver which, as its name implies, offers a resistance to the flow of current in the circuit into which it is inserted.

Scan. The trace formed on the cathode-ray tube as a result of the movement of the cathode beam.

Screen. The prepared face of the cathode-ray tube upon which the pictures are formed.

Secondary Winding. Generally referring to the winding on a transformer from which power is taken, or across which a voltage occurs when the primary winding is supplied with energy.

Super-heterodyne. A circuit in which a local oscillator (valve) is caused to beat with the incoming signal, thus producing an intermediate frequency, which latter signal is then, after amplification, demodulated.

Service Area. The area around a transmitter which is recognised by the transmitting authority as possessing a sufficient signal strength to guarantee adequate reception.

Signal to Noise Ratio. The ratio of the power in the wanted signal to the power in the waves which interfere with this signal.

Slot Aerial. A type of aerial sometimes used in the reception of TV. In essentials this aerial comprises a large sheet of metal in the centre of which a slot is cut out, the feeder cable being connected to the edges of the slot.

Soothing Circuit. The part of the mains unit which substantially reduces the alternating current component remaining after rectification, and which conveys the direct current.

Speech Coil. The coil in the loudspeaker in which speech currents are generated.

Straight Receiver. A type of receiver which does not employ the super-heterodyne system.

Static. Another name for atmospherics.

Super-heterodyne Receiver. A type of receiver in which the TV signal is converted to an intermediate frequency, and after amplification is demodulated.

Synchronisation. The locking of the TV receiver to the transmitter.

Synchronising Pulses. The pulses sent out by the transmitter and designed to "lock" the receiver in step with the transmitter.

Synchronising Separator Valve. The valve in a television receiver the function of which is to separate the Line and Frame locking pulses.

Tetrode. A valve with four electrodes.

Thyratron. A special type of gas-filled valve. Used as an oscillator in some types of TV receiver.

Time Base. The part of a television receiver which generates the voltage or current necessary to deflect the cathode-ray in the cathode-ray tube.

Trace. The horizontal line produced on the screen of the cathode-ray tube as a result of the flying spot.

Transformer. A component in which two coils are coupled inductively to one another.

Transformer-Coupling. A means whereby energy is transferred from one circuit to another by means of a transformer.

T.R.F. A term used to denote a "tuned radio frequency" receiver, as opposed to the type of receiver utilising the super-heterodyne system.

Trimmer Condenser. A small condenser connected in parallel with a large one, and so designed that by its adjustment the total capacity of the two can be very finely adjusted.

Triode. A valve possessing three electrodes.

Tube. A name sometimes applied to the cathode-ray tube, and in some cases used in place of the word valve.

Tuning. The process of bringing a circuit or circuits into resonance with a particular frequency.

Twin Feeder. A type of feeder cable possessing two conductors.

Ultra High Frequency. Frequencies between 300 and 3,000 megacycles.

Unidirectional Aerial. An aerial designed to receive with maximum efficiency in one direction only.

SPECIAL EFFECTS?

!! My TV set seems to be suffering from fits of some kind. Sometimes the programme starts quite well and then suddenly turns into what I can only describe as a venetian blind gone mad.

Comment here can, of course, be easily misconstrued without the signatures of at least two witnesses.

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TV SETS



ON TRIAL.....