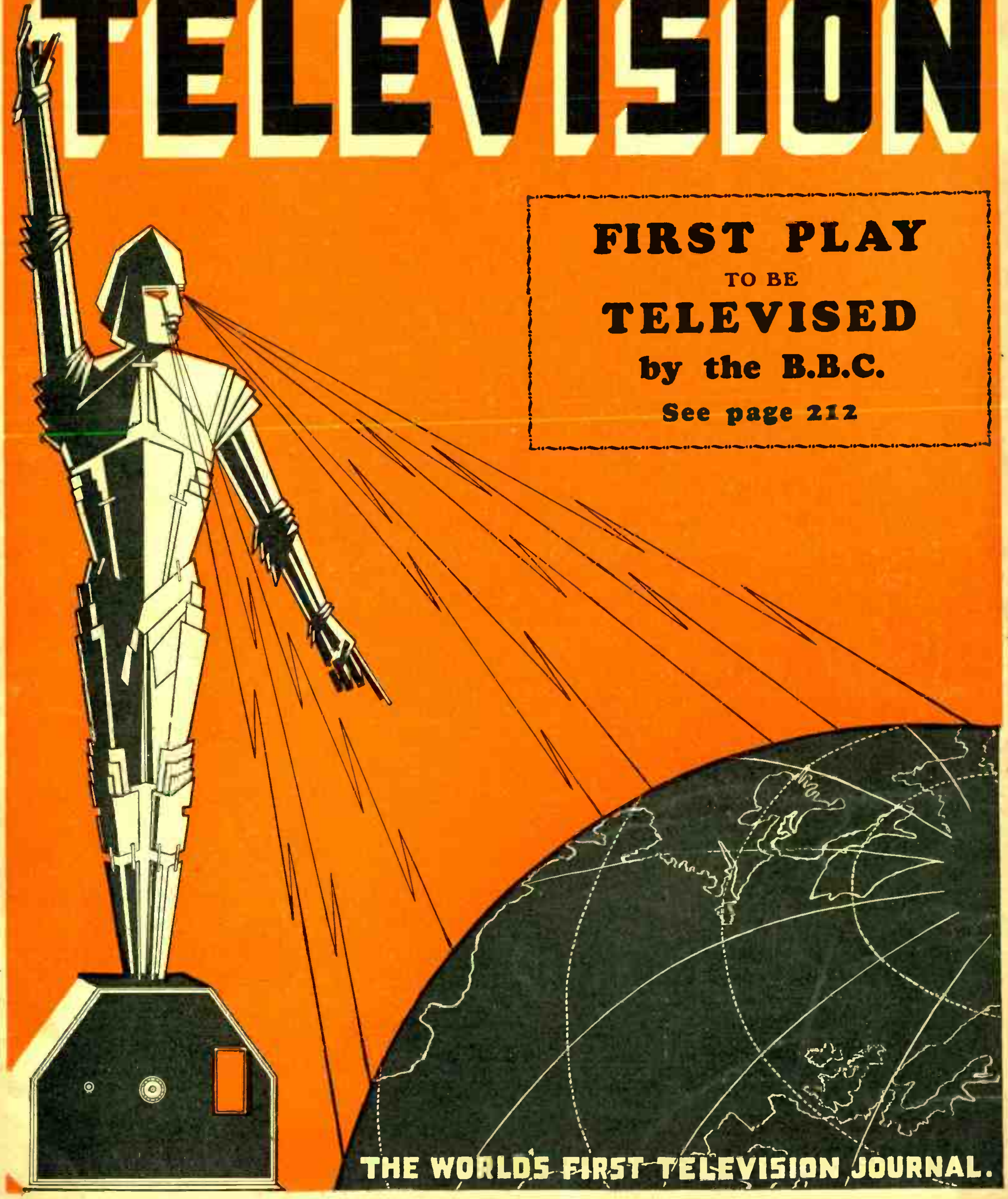
Vol. 3 JULY 1930 No. 29 25 CENTS MONTHLY

TELEVISION

FIRST PLAY
TO BE
TELEVISED
by the B.B.C.
See page 212



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***By* SYDNEY A. MOSELEY**

***and* H. J. BARTON CHAPPLE, B.Sc.(Hons.), A.M.I.E.E.**

PUBLISHED BY - - SIR ISAAC PITMAN & SONS, LTD.,

Obtainable from

TELEVISION PRESS, LTD.

505, CECIL CHAMBERS, STRAND, LONDON, W.C.2.

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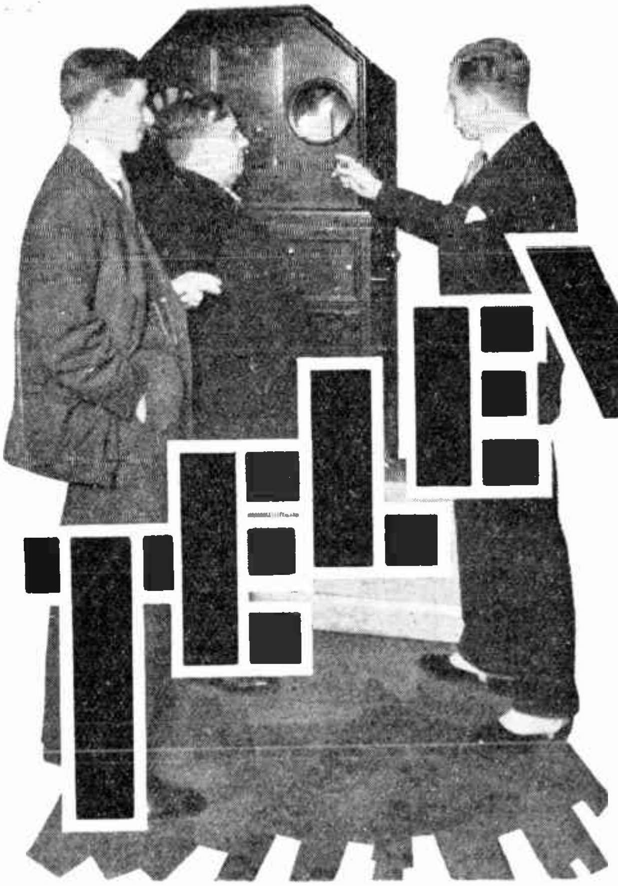

TELEVISION

THE OFFICIAL ORGAN OF THE TELEVISION SOCIETY

SYDNEY A. MOSELEY, *Managing Editor.*

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W. J. JARRARD, B.Sc., A.R.C.S., A.I.C.

VOL. III] JULY 1930 [No. 29

AN EPOCH IN TELEVISION

THE announcement made on another page that the B.B.C., in co-operation with the Baird Company, are putting over the first play to be publicly televised is not only an epoch but an event of particular interest to readers of the TELEVISION magazine.

The play that has the distinction of being the first to be publicly televised, either in this country or anywhere in the world, is that little masterpiece of Pirandello's, "The Man with a Flower in his Mouth."

This has been chosen by Mr. Val Gielgud, head of the Productions Department of the B.B.C., and Mr. Lance Sieveking, another young pioneer of Savoy Hill. This play is certainly ideal for broadcasting, inasmuch as it appeals both to the listener and to the looker-in. Those who have not yet become possessed of a television set may listen-in and enjoy the transmission, while those who are able to receive both sight and sound will certainly get a much better idea of the play. In addition they will have the advantage of seeing some excellent acting, and will realise that without vision the broadcasting of to-morrow will be incomplete.

Readers who turn to the announcement and look at the illustrations will certainly be intrigued, and will, no doubt, make an effort to look-in to this historic play at the showroom of one of the many dealers all over the country where a television set is installed.

The scheme of presenting the play has been carefully thought out, and, whatever the results of this first effort may be, the experiment reflects much credit on the B.B.C. for its enterprise in giving this country the honour of being the first in the world to have a play officially broadcast by television.

Editorial, Advertisement & Publishing Offices :

Television Press Ltd.,

505, Cecil Chambers, Strand, London, W.C.2.

Telephone: Temple Bar 8169

Subscription Rate, 7/6 per annum, Post Free.
American Rate, $2.50 per annum, Post Free.

MSS. and other material for Editorial consideration should be accompanied by a stamped addressed envelope, and should be typewritten.

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Here are some of the artists who have quite recently appeared on your "Televisors," and a number of whom will again be seen and heard during the month of July:

1. *Miss GLADYS MERREDEW, who sings songs of a light character with that facial expression so essential to television.*
2. *Mr. RUPERT HARVEY, a clever cartoonist, who combines singing and amusing chatter with his drawings.*
3. *Miss MERCIA STOTESBURY, the well-known violinist, has the distinction of being first lady violinist to give a television broadcast from London. She possesses a reputation as an artist both here and on the Continent.*
4. *Miss MABEL WILDER, a soprano, who registers distinctly well on the "Televisor."*
5. *Miss ELFRIDA BURGISS, a charming singer, whose higher vocal range is entirely suitable for television broadcasts.*
6. *Miss NANCY FRASER, another artist from the lighter stage, has been most successful in her appearances at the Baird Studio.*
7. *Miss BETTY BOLTON is a clever soubrette of a type not often seen by lookers-in.*
8. *Miss URSULA HUGHES, soprano and leading lady from "The Street Singer" and "Lady Mary," a recent Daly's Theatre production.*

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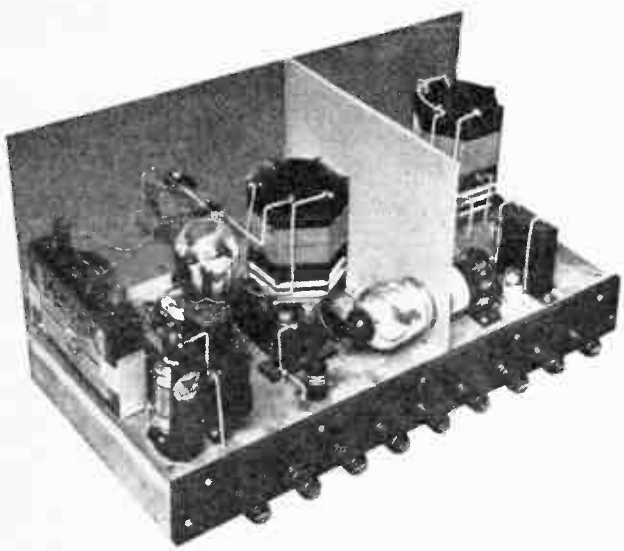


A Wireless Receiver for Television

PART II

By *William J. Richardson*

I DO not know whether any readers made a start on the high frequency and detector unit themselves, but if so I trust they experienced no difficulty in arranging a satisfactory layout. Last month a full list of components together with the theoretical diagram were given, all the salient features being described, so that we can proceed straight away to the constructional side. It is advisable always to digest thoroughly the circuit scheme proposed, for in that way the layout and wiring can be approached in a more intelligent manner.

First of all screw the two side battens to the wooden baseboard, lay on one side and proceed to mark out the aluminium panel. The complete drilling diagram is furnished in Fig. 1, and the measurements should be made very carefully on your metal sheet and the drilling holes centre punched. No hole sizes have been given, as this will depend upon whether you have obtained the components specified or bought substitutes.

Do Not Omit the Bush

In any case, there are only two variable condensers, a three-spring push-pull switch, and a rheostat to mount on the panel, while a clearance hole must be made to allow the spindle of the aerial coupling coil to pass through the panel and be operated from the front. Pay particular attention to the fact that the right-hand variable condenser (facing panel) must be bushed with an insulating washer, as the moving plates are not at earth potential.

Mount the panel components in place, noting the positions of the variable condenser plates, and screw the panel to the baseboard—screw holes shown in Fig. 1. Our next step is to arrange all the baseboard components in place exactly as indicated in the wiring diagram and accompanying photographs. Since the Fig. 2 drawing is to scale it will be of great assistance at this juncture. It is only by the correct positioning of the components that one is able to work the set at its greatest efficiency and avoid any back coupling or spurious oscillations which, of course, would be fatal to the picture.

The Cross Screen

The aerial coil will have to be raised about $\frac{1}{8}$ inch from the baseboard by washers or packing to allow the rotating coil spindle to pass through its panel clearance hole. This will enable you to position exactly this particular component, being sure that the spindle at no time touches the earthed panel. Notice that the specified variable filament rheostat R_2 has a moulded frame and is therefore automatically insulated from the panel. If an alternative has been chosen do not forget to bush it.

The cross screen is very simple and can be seen clearly from the diagrams and photographs. The hole through which the screened grid valve passes is $1\frac{3}{4}$ inches in diameter, while the hole centre is $1\frac{1}{8}$ inches from the bottom screen edge and $1\frac{1}{4}$ inches from the outside screen edge. This screen should be screwed in place before finally positioning the screened grid valveholder. Then place the valve in its holder and allow the cross screen to coincide with the valve screen. The valveholder may then be screwed down to the baseboard.

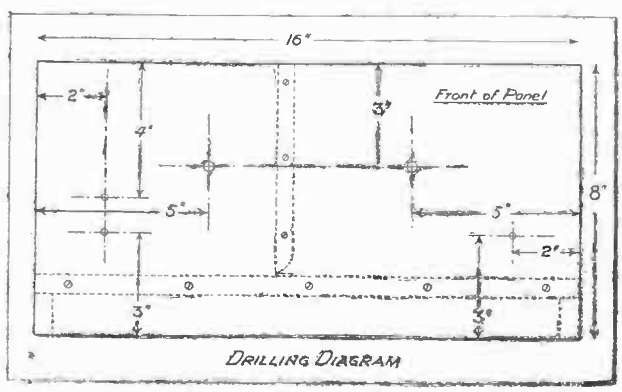


Fig. 1.—All the dimensions for marking out the panel are shown here.

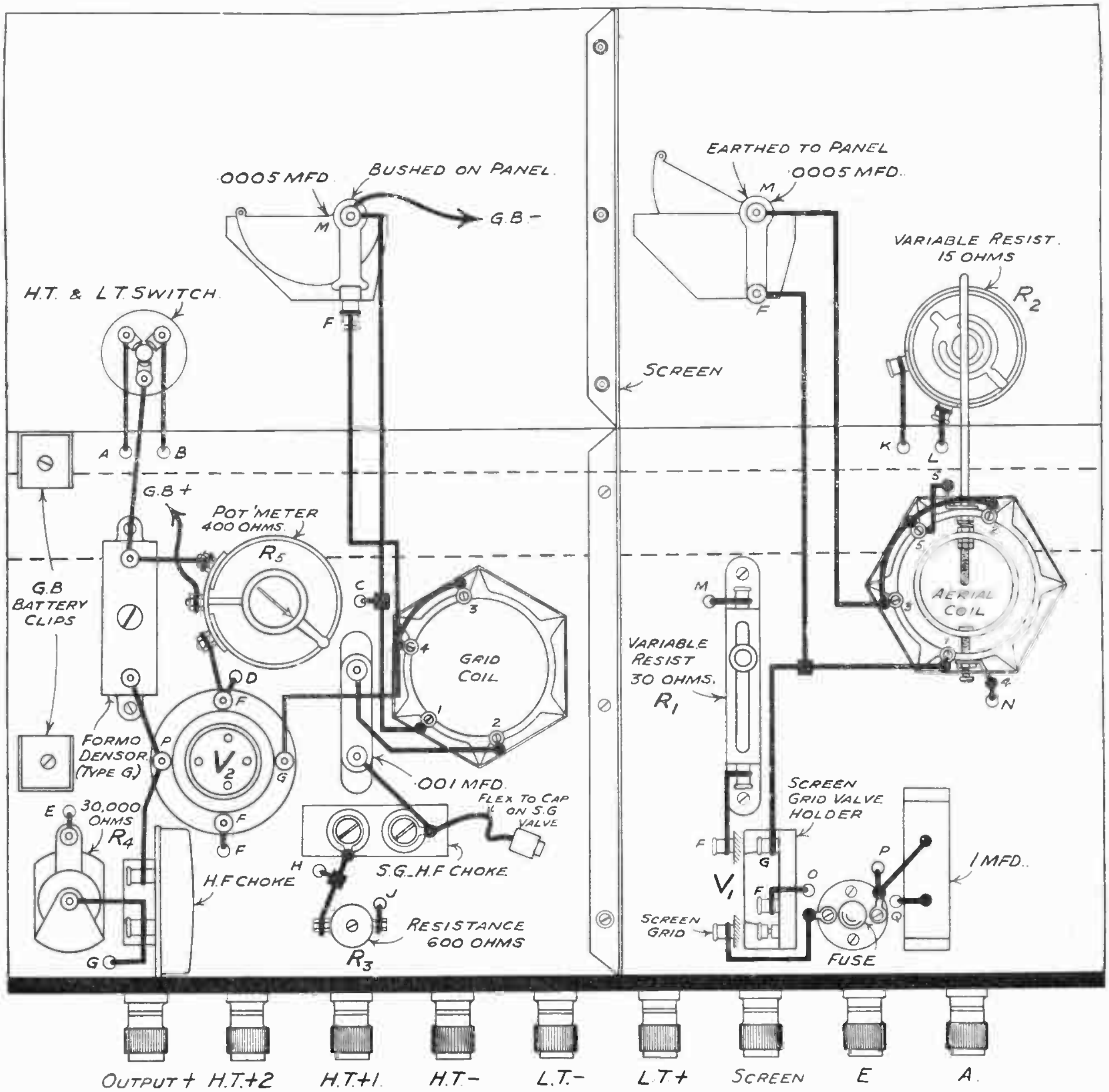


Fig. 2.—The complete wiring diagram for the panel and above baseboard. Note the lettered holes for wires passing through the baseboard.

Starting the Wiring

On the underside of the baseboard must be screwed the two 2 mfd. condensers and the one 1 mfd. condenser. These are shown clearly in Fig. 3, the centre condenser being held in position by a small metal clip as indicated. The other two condensers are screwed to the side batten.

Now make up your ebonite terminal strip, allowing 1½-inch space between each terminal centre with a 2-inch distance between the hole centres of the first and last terminals and the strip ends. Make sure that you fix the terminals in the order shown, the screwed shanks, of course, coming underneath the baseboard for connection (see Fig. 3).

All should now be in readiness for starting the wiring. Remove the panel and cross screen and carry out as much wiring as possible without these in position. Note very carefully the wiring runs from the Fig. 2 and Fig. 3 diagrams, using the photographs to aid you in making the right-angled bends which are so essential if neat wiring is to result. In the actual set illustrated the wiring joints have been soldered, but loops under the terminal heads will serve equally as well.

Note Coil Connections

Pay particular attention to the connections to the pair of coils which are numbered to correspond with

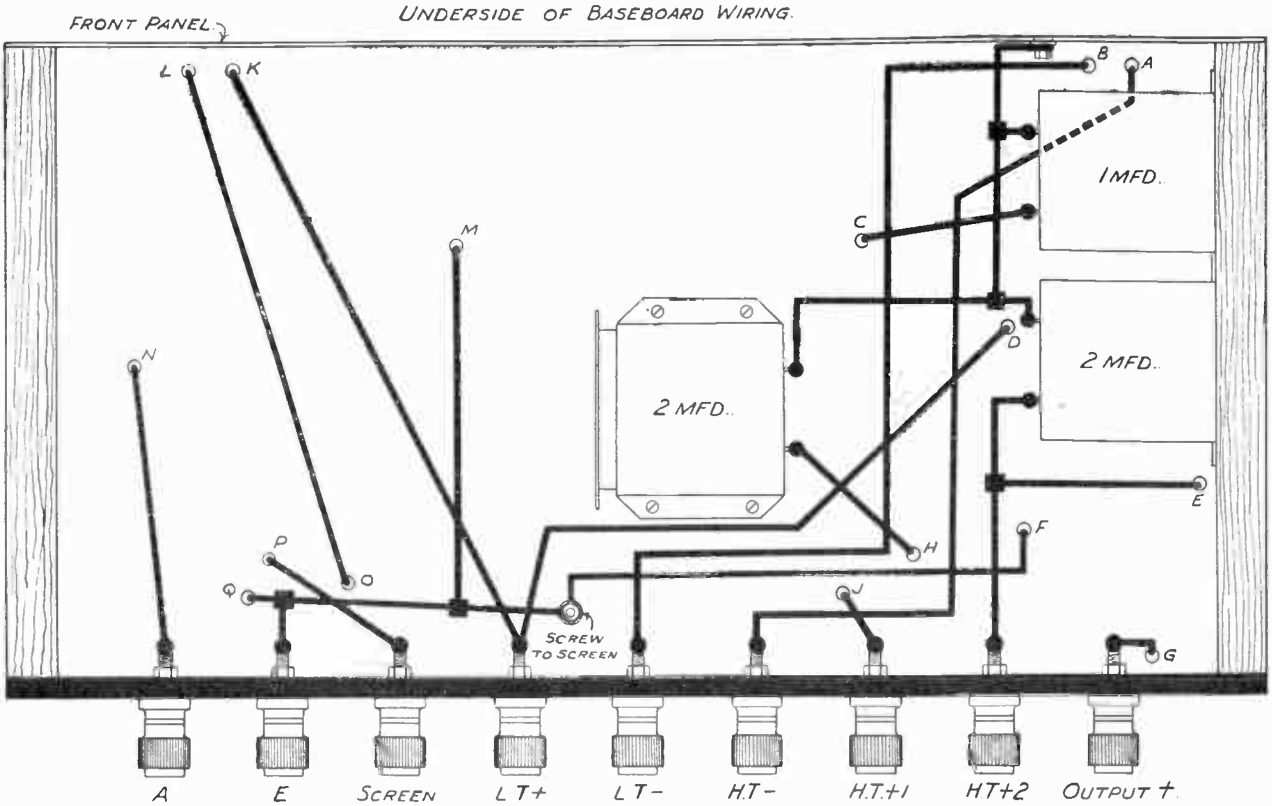


Fig. 3.—Details of the wiring which must be executed under the baseboard. Do not omit the earthing screen screw.

the theoretical diagram of last month. They are set out clearly in Fig. 2. The holes where wires pass through the baseboard are lettered *A* to *Q* with *I* left out, and correspond in Figs. 2 and 3.

With a large number of wires passing right through the baseboard, the recommended Glazite wire is particularly suitable as it carries its own insulated covering. Bare wire can be used, however, provided you cover the wire with Systoflex sleeving at all these baseboard points and anywhere that the wires are liable to touch one another. Do not forget the screw which earths the cross screen and panel by passing through the baseboard and being joined to an earth wire as indicated in Fig. 3.

Check all Connections

The wiring is quite straightforward and simple and I am sure no readers of TELEVISION will experience the least difficulty in carrying it out. Remember that the screened grid valveholder recommended is a universal type and has five sockets. The centre socket and terminal will, therefore, have no lead joined to it. I mention this in passing, for I came across a case recently where this terminal was wired to in error and one of the other terminals left out of circuit. Of course, the set did not work and it was some time before the constructor spotted his error.

If the wiring is completed and checked over to make sure wires have not been omitted or alternatively wrongly connected, then all is ready for an aerial test.

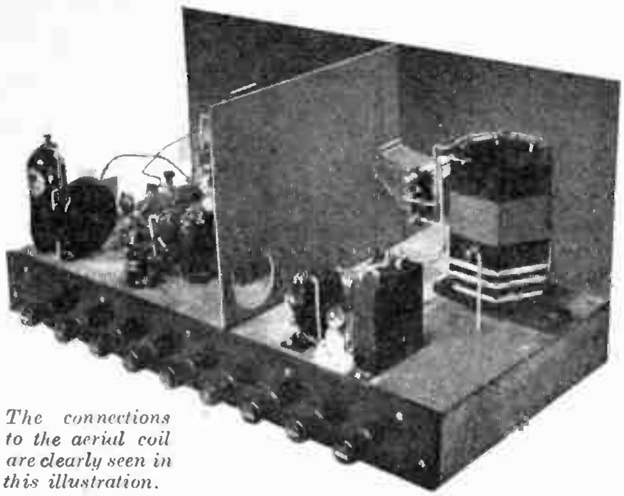
Valves and Voltages

I mentioned last month that the baseboard resistance R_1 was included for those who use a 4-volt screened grid valve in the high frequency position, as the voltage drop across this resistance then serves as a negative bias to this valve. The exact value of this resistance will depend on the valve's filament current. If 100 milliamperes then 20 ohms is required for an applied voltage of 6. On the other hand, if a 6-volt screened grid valve is employed just set this resistance at zero.

Place your screened grid valve in its holder, joining the plate to the safety connector from the screened grid H.F. choke. Set R_1 to its correct value and place a low consumption bulb in the fuse holder. Naturally you have a choice of valves for the detector position. Any good anode bend detector valve will suffice, and one which I have found very successful is a Mullard PM6D with a 30,000-ohm anode resistance for the R_4 position.

Testing

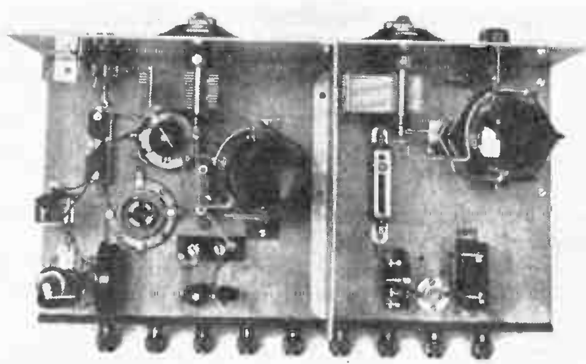
Use a 9-volt grid bias battery and ascertain the best tap value under test. If you have made up the low frequency amplifier I described in the March issue, then use the same H.T. and L.T. supply for both and join the output + terminal to the input + terminal. Six volts will therefore be applied to this unit's L.T. terminals with the screen at 75 to 80 volts, H.T.+1 120 volts and H.T.+2 about 150 volts.



The connections to the aerial coil are clearly seen in this illustration.

This last-named voltage value is by no means definite, and the constructor is advised to try various values under working conditions adjusting the G.B. voltage for anode bend rectification accordingly.

No doubt you will test this complete outfit on a loud-speaker first of all to see if it functions all right, so with the aerial and earth joined to the terminals so marked, and remembering that the grid bias for the last amplifier valve should be much higher for loud-speaker working than is the case for neon working, switch on both this unit and the amplifier.



A plain view showing all the components positioned. Use this illustration in conjunction with Fig. 2.

Signal Adjustments

Tuning-in any of the high-powered medium wavelength stations is, of course, quite simple, while the volume is controlled by the aid of the variable aerial coupling coil or the H.F. valve filament resistance R_2.

If you have followed the instructions carefully there will be ample volume of clear undistorted speech and music. The variable aerial coupling makes the selectivity problem appear non-existent.

Once accustomed to the few controls, attention can be turned to the use of the whole apparatus for the reception of the Baird television transmissions from Brookman's Park. I have received some excellent images using this H.F. and detector unit, the L.F. amplifier and "Televisor" which was constructed from a kit of parts. Ample signal strength was available, the movable aerial coil proving excellent as a volume control.

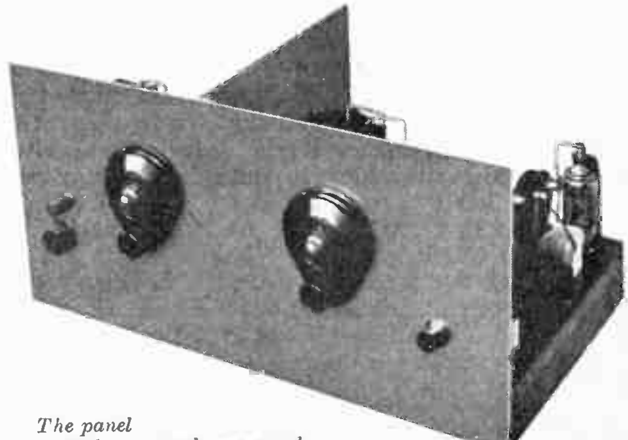
Adjustments on Test

There are a few adjustments which you must make during the course of the transmission to find the best combination. One is the capacity of the type *G* Formodenser situated between detector plate and earth. The others are the best combination of potentiometer setting, G.B. voltage and H.T.+2 voltage to produce the finest image. This is very easily undertaken and the image improvements or otherwise should be definitely recorded as each change is effected. Having found the best, then all is plain sailing, for these adjustments will present no difficulty to readers of this journal.

Final Details

In passing it is as well to note that if by chance you should desire to use this high frequency and detector unit for the reception of the long wave stations, then the aerial coil and the grid coil can be very easily adapted for this purpose. It will be necessary to remove the wires which now short out the long wave sections of these two coils and incorporate, in the case of the aerial coil, a three-spring push-pull switch, and in the case of the grid coil a two-spring push-pull switch. The connections for these were shown very clearly in the theoretical diagram published in the June issue of this magazine.

In order not to spoil the panel layout, I would suggest that constructors who desire to make this alteration, should place the switches one on top of each of the coils by mounting the switch in question on ebonite strips, which they can hold on the coil formers by screws. I would recommend users of this set, in fact anyone who undertakes television experiments, to have by them a reliable high resistance voltmeter. With its aid you can test out on site the various plate and filament voltages, and thus be sure that the valves are being correctly fed from the respective L.T. and H.T. supplies.



The panel controls are neatly arranged.

Broadcasting Television

By *D. R. Campbell*

ANY constant reader of this magazine who is in any way technically minded must by now be pretty well acquainted with the theory of television. To most readers the receiving side is of paramount importance, and TELEVISION has published many practical articles on this subject. On the transmitting side, however, only the theoretical side has been written about, and while few readers will actually want to experiment on the transmitting side, they may find a brief outline of the apparatus now used for the daily transmissions of the Baird Company through the B.B.C. interesting.

First of all one must divide the transmitting gear into two parts, that of the studio, and that of the control room—the latter being by far the larger section. Originally one room, the studio and control room are now divided by two wooden partitions, between which is packed sawdust to deaden noises. In the centre, some four to five feet from the ground of this partition, is an aperture or window. Through this window the light is projected from the control room on to the artist.

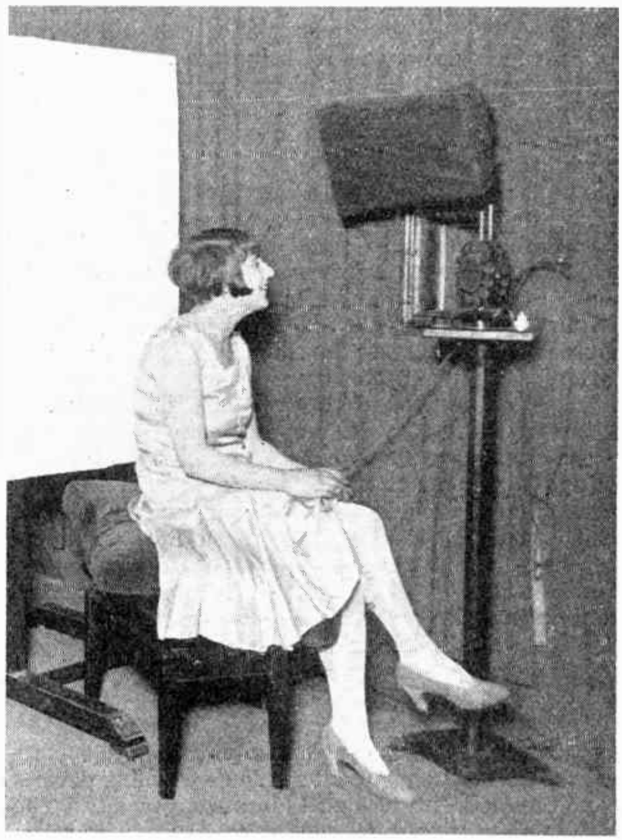
This window is fitted with a glass pane, so as to deaden the sound in both directions, especially from the studio to control room, as voluminous voices are rather prone to cause mechanical vibration in the first vision amplifier, owing to its proximity to the artist just inside the window in the control room. The glass in this window must be thin—thinner than is advantageous, for deadening sound, owing to it absorbing light.

In the studio one has the photo-cells for picking up the vision, the sound microphone, of the transverse current type, and a background. This background is plain white, with an arrangement by which various slides can be drawn across, on which may be set out a drawing, or some printed matter. Of course, there are the usual draperies on the walls, and various signalling lights between studio and control room.

The photo-cells, four in number, arranged in a group, are all but enclosed in a wood-metal lined box, and are fitted on a bracket just above the window into the control room (see accompanying illustration). Fitted on the cell box is a mirror, so that the artists can see if they are in the beam of the scanning light.

The cells are connected to what is termed the "A" or first vision amplifier—which brings us into the control room (for general lay-out, see Fig. 1), where we will first follow out a vision signal. From the "A" amplifier the signal is led to suitable switches which transfer it to amplifiers known as AX1 and AX2. The first is for line demonstrations in the Long Acre premises, the other for broadcasting, or long-line demonstrations. From AX2 the signal goes to a special line corrector, and then to Brookman's Park, via Savoy Hill, where it is further amplified for broadcasting. The sound signal from the microphone passes through an amplifier which has separate outputs, one to Savoy Hill and the other to additional amplifiers for operating loud-speakers for line demonstrations.

The leads which connect the photo-cells to the "A" amplifier are as short as possible and well shielded. This is necessary for two reasons. First, the self-capacity of long leads has a very serious shunting effect on the higher frequencies, which would result in the picture having a blurred or out-of-focus effect. Secondly, long leads are more inclined to pick up interference which, in the usual way, would not be noticed, but owing to the very small initial signal from the cells would have a fatal effect.



Note the position of the cells with reference to the window. They are draped while being photographed.

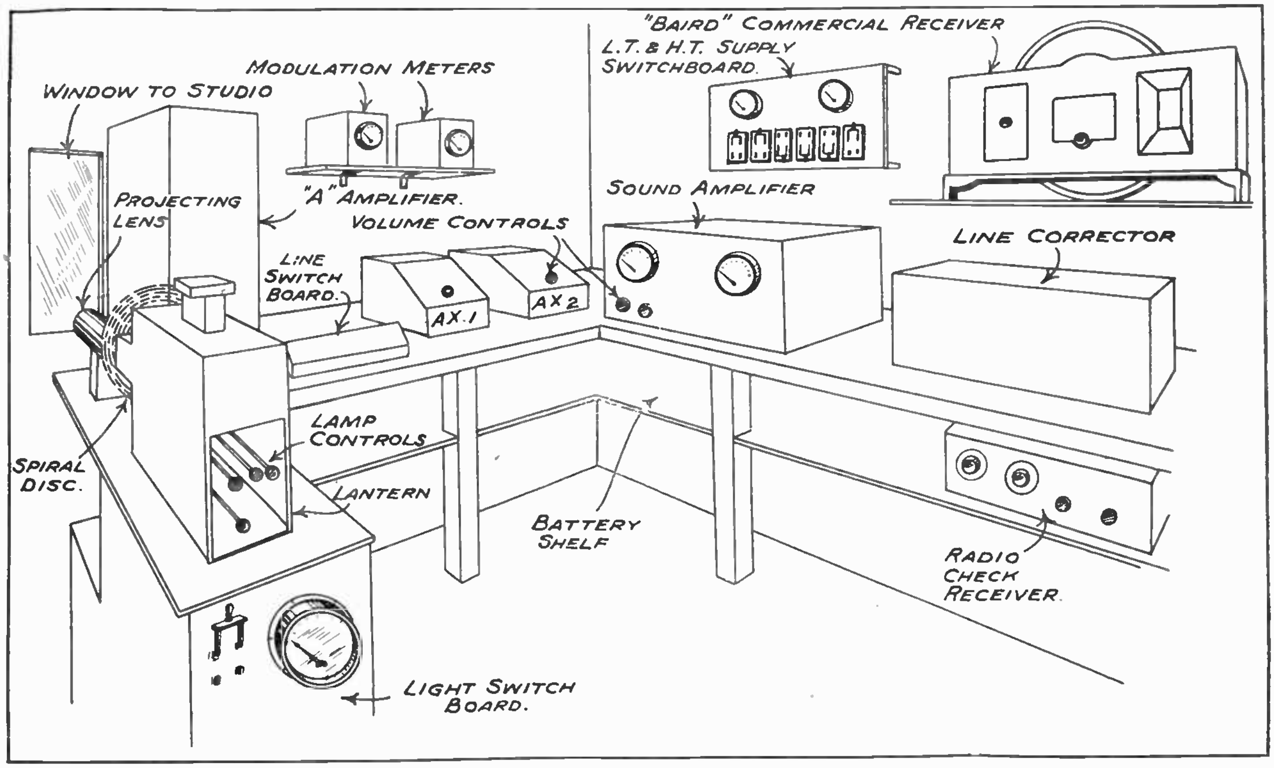


Fig. 1.—The general lay-out of the control room is made quite clear by studying this sketch. All the controls are readily accessible and arranged with extreme care.

Notice how the cells are coupled to the grid of the first valve, no grid condenser being used, as one often sees in diagrams of talking-picture cell amplifier connections. The condenser method is not used, as there would be too much falling off of the lower frequencies, which are so essential for television. The fact that it is necessary to earth the positive side of the high-tension battery which operates the cell often causes considerable worry to those who happen to have just made their acquaintance with this circuit. A sound engineer in a talkie studio, a friend of the writer, told him that one of his assistants point blank refused to connect up an amplifier in which the battery was so connected!

It will be noticed that the "A" amplifier only differs from ordinary R.C. coupling in the addition of the inductance L2 and the tuned circuit made by L1 and C. Owing to the values chosen this arrangement gives a decided rise to the higher frequencies which would be lost in an ordinary R.C. amplifier. In the AX1 amplifier there is another resonant circuit which is unnecessary for broadcasting, as only 9 kilocycles are radiated. The values chosen in the "A" amplifier do not give a large amplification per stage, the static amplification of the valves used being 15 and the working about 6.

The signal for demonstrations is further amplified by a three-valve R.C. coupled amplifier before operating the neon. In Fig. 2 all anode de-coupling devices have been left out, also grid bias arrangements. The high-tension supply is 200 volts from a common battery, and the filament supply 6 volts. Modulation meters are connected at various points.

The apparatus to produce the projected travelling spot of light is like an ordinary optical lantern, except that the disc takes the place of the slide and that there is an adjustable mask which prevents two spots being projected on the screen at once. Though a 900 watts metal filament lamp is used, only a very small fraction is used at any given instant, and the light is not particularly brilliant as projected on to the artist.

The speed of rotation of the disc is 750 r.p.m., which equals 12·5 scannings or complete pictures per second. The disc motor, specially constructed for constant speed, and loaded with a heavy fly-wheel, runs off a 12-volt battery, the speed of the motor being set by a tuning-fork control, operating through a toothed wheel, as in the Baird system of synchronising.

One more piece of apparatus makes up the control room—that is the check vision receiver, which comprises a commercial televisor, a radio receiver, and a three-valve low frequency amplifier. The L.F. section is so arranged that it can be used for line as well as for radio checking.

Some forty-five minutes before the transmission starts the disc motor is turned on, so as to give the windings and controlling resistance time to warm up, and allow the motor to settle down to a constant speed. About fifteen minutes later the spot light is turned on, and the speed of the motor checked by the tuning-fork control. The vision amplifiers are put into operation, and the signal checked at various points. If the meter readings are O.K. the signal is put in the check receiver, while somebody whom the engineers are used to seeing by television is looked at. This is followed by minor adjustments all round, whilst the picture is watched very closely for any signs of interference, such as are caused by a faulty contact in an electric light switch, or dirty fan motors. Sometimes one of the research staff in the laboratories on the floor above causes temporary havoc with some experimental apparatus, and has to restrain his enthusiasm until after the broadcast. About twenty minutes before the scheduled transmission time the lines are "proved" to Savoy Hill, and at the same time activities start in the studio. As all artists, with the present experimental arrangements, have to sit down during their turn, an adjustable chair has to be arranged for their various heights. While these height tests are occurring the final instructions are given, and the microphone positions checked up.

As only one spotlight projector is at present used, the position of the background is generally fixed, for moving it during a broadcast causes considerable delay. Whilst the B.B.C. announcer is announcing—" . . . there will be an experimental television transmission . . ."—a warning buzzer is sounded, both in the studio and on the floor above, so that anything which may cause interference on the photo-cells is shut off.

Immediately the vision signal is faded up to the B.B.C. the first thing to see is if the picture is positive or negative. If negative the vision is momentarily faded out and a switch changes the phase from A to AX2 amplifier (see Fig. 2). Unfortunately it is not always possible to start with a positive picture owing to the number of connections between the television control room and the transmitter which get changed round daily, which, of course, have no effect on sound broadcasting. The standard which is broadcast is such as to give a positive picture with an anode bend detector, followed by 3 stage of L.F., R.C. coupled; gird-leak rectifications with the same amplifier would give a negative. After ascertaining whether the picture is positive, its quality is often improved by adjustments to the line corrector. The quality of the picture varies on the check receiver, and the cause apparently, in nearly every case, is due to the lines connecting studio to transmitter.

Two engineers are normally required for the present experimental transmissions. One looks after the sound and sees that the vision signal on the meter is up to strength. The other watches the picture and makes any minor adjustments that may be required, signals to the artists if they should stray out from their position in the beam of light, moves the microphone when necessary, and is generally prepared for any emergency that may come about during the birth of a new technique—television broadcasting.

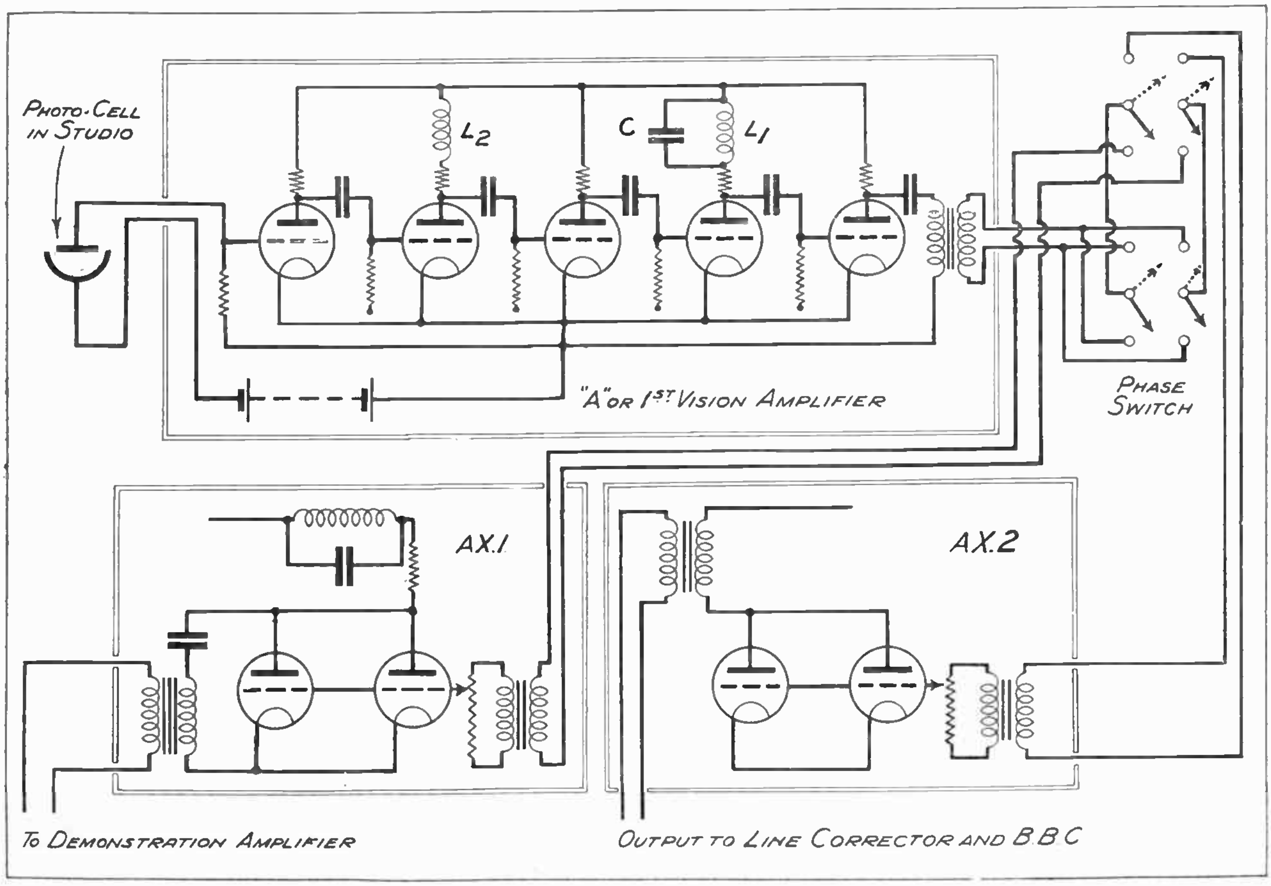


Fig. 2.—Special amplifiers are required for handling the vision signals with a change-over switch for line demonstrations or B.B.C. working.

Possible Television Developments

By *H. J. Barton Chapple*,
Wh.Sch., B.Sc.(Hons.), A.C.G.I., D.I.C., A.M.I.E.E.

WHEN we think of communication between places we naturally give birth to the cognate subject dealing with the rate at which the passage of signals can be undertaken. In the telegraphic and telephonic mediums, especially the former, any means which can be adopted for increasing the rate constitutes a big step forward. We know that the land lines can be loaded with several messages at once and duplexed, that is, worked in both directions at the same time, thus increasing the amount of traffic that can be handled for a given expenditure of cable installation.

Conveying Intelligence by Television

Now the advent of television has given to the commercial world another means for conveying intelligence between stations separated by many miles. In consequence wise heads are turning their attention to means whereby the process of transmission can be expedited.

Ruminating on these lines, and seeking further information, I was most intrigued by the details of a scheme put forward by the Baird Company which, of course, they have suitably protected. I felt that every good purpose would be served if the germ of the idea was passed on to readers of this journal as it would give them food for thought and perhaps suggest other developments.

Simultaneous Exploration

It is advantageous from the point of view of transmission that a picture or scene should be explored in a number of different sections simultaneously. Unfortunately this scheme of simultaneous exploraton necessitated a corresponding number of lines in the case of wired transmissions or of separate wavelengths for wireless purposes. Obviously this is not a reasonable proposition and the Baird scheme I want to describe is designed to overcome this defect.

The invention deals with a method for transmitting a plurality of individual signals consisting in recording them simultaneously or in concurrent groups on a record element or elements and afterwards reading these records in succession, generally at a higher speed, by a device which is operatively connected to the transmitter. These records can not only be " read " but afterwards the impressions may be erased so that the original records are available for fresh recording.

Magnetic Recording

Various methods can be adopted for putting this into a practical form and a reference to Fig. 1 shows one of these. Magnetic recording is used here and we have a series of discs made from steel or other magnetic material mounted on a shaft which can be rotated at any suitable speed. Of course the number of discs is equal to the number of sections in which the picture is explored and one disc is appropriated to each section.

The signals derived from the photo-electric cells for each section are applied respectively to the magnetising coils shown as *A*, *B*, and *C* in Fig. 1. Each of the discs has associated with it a search coil *D*, *E*, and *F*, the coil being so mounted that it can be rotated in the opposite direction to the disc and at a higher speed. Thus in the case illustrated, where three discs are shown, the search coil will rotate at three times the speed of the disc.

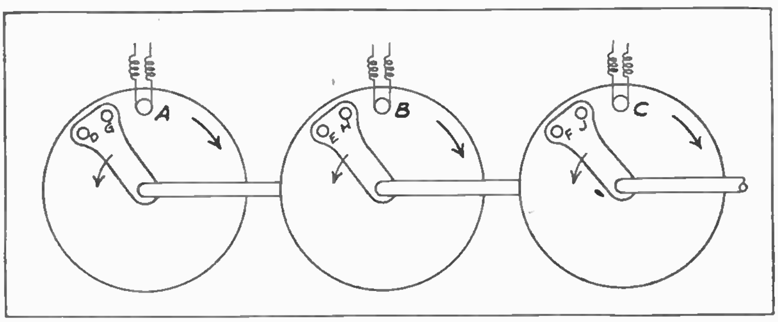


Fig. 1.—Indicating in diagrammatic form how magnetic recording is carried out for expediting the transmission of television signals.

An " Eraser "

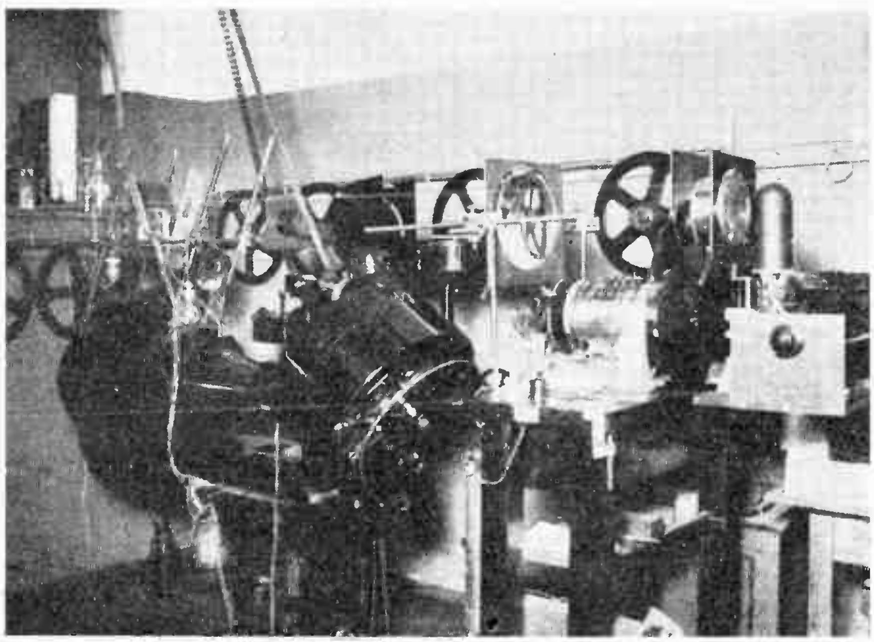
Rotating immediately behind each search coil is a wiping out coil (*G*, *H*, and *J*), energised by alternating current. By this simple means it is possible to erase a record after it has been read, and leave it " magnetically clean " for the reception of new signal impressions.

Now in operating this device the records for the three sections of the subjects being transmitted are made concurrently and impressed upon the respective discs as record elements. When the record on, say, the first disc has been completed the search coil *D* is connected in circuit so that on its next revolution it reads this record and simultaneously coil *G* erases it. But since this coil *D* is rotating at three times the speed of the disc it completes the reading during one third of a revolution of the disc and is thereupon disconnected. The search coil E is instantaneously connected in the transmitting circuit in its place and this reads and transmits the second disc, and so on for the third.

A Continuous Process

The record on the first disc was wiped out immediately after it was read and the coil A impressed a new record upon it, the recording commencing immediately after the reading of the previous record commenced and continuing whilst all three records on the disc are being read and transmitted. But since the search coils rotate at three times the speed of the disc, the first disc will have had a full record impressed upon it by the time the search coil F has finished reading its disc. The cycle of operations of reading the three discs in succession can therefore be repeated and in this way the magnetising coils are in operation practically continuously and each search coil is reading and transmitting a record for one revolution in three.

For all practical purposes the whole process of recording, reading and transmitting is substantially a continuous one and the rate of transmission of the set of signals constituting a complete picture (made up of three sections in the case cited) is three times as great as it would be with a single exploring and transmitting device.



An interesting photograph showing some of the apparatus used in Berlin for the broadcasting of cinema films by the aid of television. Strictly speaking, this is called Telecinematography.

In order to obtain a cyclic series of operations, it will be seen that each search coil in its rotation should meet the head end of the record it is to read at an appropriate time, and the simultaneous records on the three discs should therefore be started 120 degrees apart.

Other Schemes

Of course other arrangements can be adopted for putting the scheme into operation, the diagram (Fig. 2) being almost self-explanatory. One disc is used with three magnetising coils A, B, and C, spaced 60 degrees apart, while one search coil and one wiping out coil are respectively arranged as shown. The disc is rotated at such a speed that the exploration of each section (and therefore the exploration of the whole area) takes place whilst the disc is rotating through an angle of 60 degrees.

The reading of these three linked sections is then undertaken by the search coil and passed through suitable amplifiers to the transmitting aerial or land line, as the case may be, and of course the erasing follows. It will be appreciated that as soon as the tail end of the record made by C has passed the coil A, a second exploration and recording of the signals derived therefrom may be commenced on that half of the disc which was idle during the previous operation. This sequence of operations may be repeated indefinitely.

Other illustrations need not be mentioned as enough have been given to explain the practical working of the scheme. Whilst it is not intended that the records should ordinarily be other than transient, it will be appreciated that permanent records of a view or picture may be made and reproduced at any subsequent time in addition to an immediate transmission taking place. It cannot be denied that the idea underlying the scheme is most ingenious and may in the future play its part in the normal and, let us hope, rapid development of television to a very high standard.

Two Wavelengths Required?

I suppose it is a natural human inheritance to desire the greatest gain for the least expenditure of energy or money, and for that reason some people have levelled at the present dual transmission of sound and vision what they term an objection. It lies in the fact that two wavelengths are required for transmission purposes and therefore two wireless sets to receive the separate signals to be passed on to the loud-speaker and the "Televisor" respectively.

That this will not be the case always is the logical anticipation of everyone, and perhaps the day is not far distant when it will be possible to effect simultaneous transmissions of vision and sound and yet use only one channel of communication. Many solutions will no doubt be proposed and it remains to be seen which will stand the rigours of commercial use. Again the Baird Company have protected a rather intriguing idea and for the reasons suggested in the opening paragraphs of this article, I will briefly describe the plan.

Using One Communication Channel

Put simply, the invention comprises a system which at the transmitting station gives a means for recording the sound signals at the rate at which they are produced and means for transmitting these signals at a higher rate than that at which they were produced, and intercalating them with the vision signals whereby the same channel of communication can be used for both. Then at the receiving station there must be a way for recording the sound signals at this higher rate

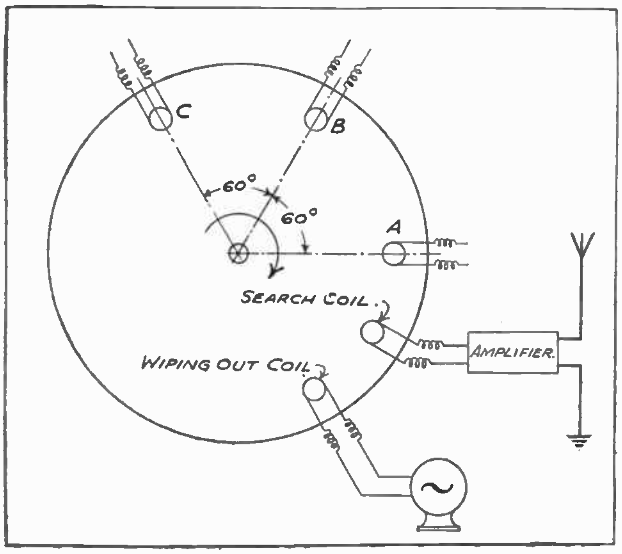


Fig. 2.—Another suggested method whereby a magnetic disc is employed for simultaneous exploration.

and a means for reproducing the vision signals and simultaneously reproducing the sound signals at the rate at which they were recorded at the transmitting station.

An example of the system is one in which at the transmitting station the sound is recorded during nine-tenths of a second upon a recording device and the recorded signals then sent along the channel of communication during the following one-tenth of a second. At the receiving station the reverse holds, that is, the signals are recorded in one-tenth of a second and reproduced during nine-tenths of a second. The communication channel is thus occupied for only one-tenth of each second for sound, the remaining nine-tenths of the second being available for the vision signals. To ensure continuity in the reception of these sound signals, two recording devices may be employed alternately so that one may be recording the signals while the record on the other is being transmitted.

Further Developments

Any suitable recording device for the signals may be employed, such as a steel or other magnetisable strip, a wire, cylinder or disc of the same material, or a wax cylinder, photographic film, etc., the record being formed on and read from such device in the usual manner.

A system similar to that described for the simultaneous exploring could be fitted up, and while at first sight this may seem a little complicated, bear in mind that it is a law of nature that we never secure an advantage without an accompanying disadvantage. In any case, the ideas are put forward as indicative of possible developments and serve to show that television is by no means at a standstill and we must be prepared for expansion in all directions and indeed welcome them.

Professor : " What game does television remind you of ? "

First Student : " Hide and seek."

Professor : " No."

Second Student : " Golf."

Professor : " Why ? "

Second Student : " Because it depends on a spot, holes and a pitch."

* * *

Percy : " I woke up last night with the feeling that my television receiving set was gone. The impression was so strong that I got up to look."

Henry : " Was it gone ? "

Percy : " No, but it was going."

To My Readers

by

Sydney A. Moseley

IT is a pleasure now to deal with some of the interesting letters that have reached me in the past few weeks.

In my long experience of journalism and book-writing nothing has been more pleasant than the intercourse between my readers and myself, and when I ask for views they are not always favourable, thank heaven! It is delightful, of course, to hear from people who are in agreement with you, but it is equally useful to hear contrary views from well-disposed people who do not see eye to eye with you.

* * *

Therefore, the first letter I shall quote will be one in an unfavourable sense. I will give it exactly as it stands: "Congratulations on the news given in this month's TELEVISION that you are working on an item with the B.B.C. on a date in July—it will be a great boon if this is during the hours of the B.B.C. programme. The television transmissions ordinary times are not very convenient to many people. I also welcome the fact of the television programmes appearing in some of the daily papers. This is a big step towards publicity regarding television, of which invention many people know little or nothing yet. You invited opinions on the programmes put over from Long Acre studio, and as an ordinary person I consider they are good with one exception. I refer to some of the male entertainers, whose humour is of a low order. It would be better from all points of view if one could feel safe from this type of song when the Baird transmission is in progress. There are a large number of artists who have performed since the great day of March 31st who give pleasure to all and everyone and who create a desire in a listener to see them. This morning we enjoyed the half-hour, and the announcer had an extremely pleasant voice, which came over perfectly. In conclusion, may I assure you of great admiration felt for your championship of this great invention in the past and very sincere hopes of continued success in every way?—'E. L. G.,' Bognor Regis."

* * *

Now, I should like the views of my readers in regard to this point. I was one of the earliest critics of wireless programmes myself, and have been regarded by lowbrows as a highbrow, and by highbrows as a low-brow! But I prefer the title which a reader gives me in one of the latest letters I have received—"a no-brow," which fits the bill inasmuch as I appreciate everything worth while that comes over the ether. There are some people who do not like anything in the nature of popular appeal.

The music-hall type of song, the funny comedian, the song-with-a-chorus—these do not appeal. That there will always be two tastes with regard to music goes without saying. Even Wagner is to-day regarded by highbrows with toleration and patronage. Because I myself do not—as my correspondent does not—care for comic songs I do not think that is a reason why one should debar them from the general listener, who appears to like them well enough.

* * *

I agree, however, one should see that nothing of a coarse nature should creep into such songs. Up to now I have erred on the side of severity, and two prominent artists at least were debarred from appearing before the television transmitter because I disapproved of their songs.

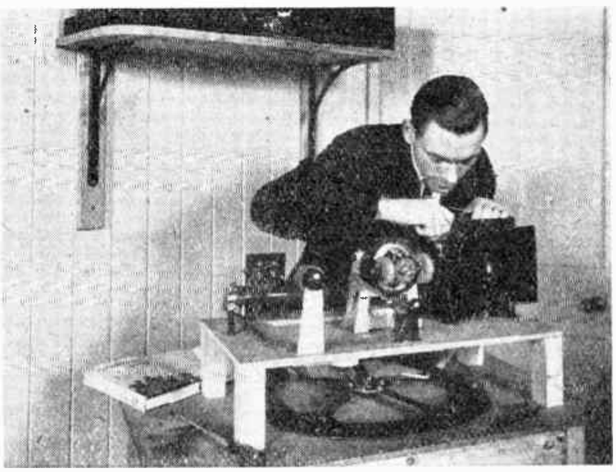
Well, here are some valuable views from Mr. Allan D. Macmillan, of Glasgow Road, Barrhead, who is also interested in the programmes.

"My opinion is," he says, "that your broadcast items mostly contain subjects in which the sound portion is more important than the sight. I think you should contrive to arrange subjects by which those conditions would be reversed. In other words, some attempt should be made to 'get across' something which could not be done by sound alone."

These views are concrete enough and Mr. Macmillan can be assured that they are being given every consideration.

* * *

Those who were able to listen to my talks will remember I had something to say about the marionettes. Now here is an extraordinary thing. In judging the results I find that the transmissions received abroad were in some cases better than those we obtained in the demonstration room at Long Acre,



Busy with the construction of a Baird "Televisor" from a kit of branded parts.

which was two doors away from the studio itself! Like wireless transmitting in the old days, results are often mystifying and varied. It is not always the best set that gets the best results, and I suppose that even to-day there is a good deal of luck in it.

* * *

There is an interesting letter from Mr. H. R. Jeakings, of Messrs. Jeakings, Son & Co., of Bedford, who says: "We have just received the television transmission of 'London Marionettes.' On the whole, the transmission came through very well and the marionettes could be quite clearly made out. There was, of course, not much detail, all of the images appearing to be out of focus, the only thing being really in focus was the curtain in front of the stage. However, we could make out one of the marionettes in what appeared to be a sailor's get-up, and towards the end a clown with a donkey, which he mounted. We held the transmission quite steady for the full thirty minutes, and had very little difficulty at all. We have during the past few weeks received very good images of all artists, many of them being free from the usual band which encircles the head. We would suggest that your announcer would help us if he gave a short summary of the previous day's transmission each morning—such as faults due to fading, image out of focus, detail, half-tones, etc. This would be of great service to us, as when we make any alteration to our receiving apparatus it is very often difficult to know if we have made any improvement, especially if the transmission turns out to be faulty."

These comments are very useful, and Mr. Jeakings' suggestion that the announcer should give a summary of the previous day's transmission shall be acted upon as soon as possible.

* * *

On the other hand, here are Brown Brothers, of Great Eastern Street, London, who say: "Our opinion is that this transmission was *not* nearly so good as the ordinary transmissions. It needed a lot of imagination to tell what the marionettes were. There was a greater lack of detail than ordinarily displayed."

Mr. L. Ruda, of the Economic Lighting Stores, Fulham Palace Road, found "the images very faint compared with that of the announcer."

Mr. Charles A. Anderton, of Edgware, Middlesex, also had bad luck, but J. L. Wagley, S.E.1, found the whole thing "tremendously interesting."

* * *

In my last talk I referred to the altered wavelengths, and remarked that the first two mornings after the change took place the vision improved a good deal, but since that time results had varied a lot.

It is only by noting these things closely that those who are pioneers in looking-in can help to perfect conditions. Guernsey, for instance, has had good luck.

F. T. Bennett wired from there: "Congratulations, this morning's transmission best yet received. All details quite distinct." His letter of confirmation went on to say: "The change in wavelengths is a marked improvement from my point of view; we get very much less interference on this band from electrical apparatus, and, as stated above, results were by far the best yet received. The artiste with the large white bow was remarkably clear, the ladies and movements of hands, the announcer and the screen news were very distinct; picture was also steady. I sincerely trust you will be able to continue using the arrangement you used this morning."

Another message from W. A. Page (Norwich) was as follows: "The results are very good considering all the parts are home-made and very hurriedly built. Persons are easily recognisable and the listening quite clear."

* * *

Why the pictures fell off after the first two days I cannot understand. It is a technical mystery that I suppose will be cleared up in due course. But my contention is that if it is possible to get a more or less perfect picture even for five minutes, it should be also possible technically to give a good picture *all the time.*

W. B. Weber (Bristol), for instance, has something to say on this point. In his message to me he says: "Synchronisation was the best I have had. In fact, only once during the first artist's transmission was it necessary to bring the televisor back into step. This was at your end, as it went out all at once with a rush."

* * *

When I talk about the extraordinary contrast in reception readers will understand what I mean when I quote the following two letters which reached me by the same post.

One is from the Cardiff branch manager of Brown Brothers, who tells me that the reception of vision on the 356·3 metres is inefficient in the Cardiff district.

"For the last few days," he writes, "transmission of vision on the 261 metres wavelength was exceptional, reception being almost perfect, with all detail as to features, teeth, waves in the hair, movements of mouth, etc., very clear."

As against this there is the letter from Henry H. Lassman, of the East Ham Wireless Supplies, Barking Road, who writes: "In answer to your remarks this morning asking for reports on the transmissions, I am very pleased to inform you that the transmission this morning was excellent. The gentleman playing the mouth-organ and the young violinist came through remarkably well. I notice when people read from a paper and incline their heads that this has a detrimental effect upon the vision. I think that a great deal can be done by suitably screening the artist so that shadows of light do not spoil the vision at the receiving end. I suppose I am a little critical, considering the excellent transmissions we are getting. The only complaint I have to make is that we are not getting at least an hour's transmission so as to give people a chance to carry out a few experiments."

All these letters, readers will see, are of immense importance, as well as general interest. It is only by working together as we are that this great problem is going to be overcome. I may add that my technical friends of the B.B.C. are as interested in these letters that we are publishing as we are at Long Acre.

* * *

I have no space, I am afraid, to quote the letters that complain of the hour of transmissions. That is a problem I do not wish to go into at the moment.

I must refer, however, to a big point made in a letter from M. S. Kealey, of Walker Wireless, Newcastle-on-Tyne, who states categorically that "Newcastle area is outside of the range of the television broadcast."

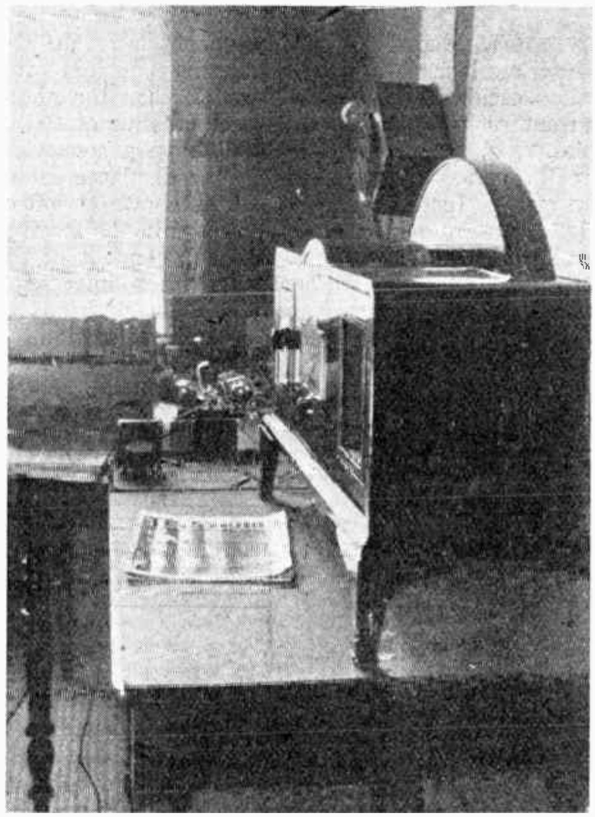
"We suggest," he adds, "that if the B.B.C. could be persuaded to allow the midday transmission on Daventry 5XX wavelength the results would be very much more satisfactory, as even with the midnight transmission the fading from the 261-metre station is very bad."

* * *

No article of mine dealing with correspondence would be complete without reference to the always welcome correspondence of "Uncle Tom," of Newcastle-on-Tyne. In his latest letter Mr. Payne says he is pleased to inform me that at their Dublin branch, situated in the centre of the city, they have succeeded in receiving television of very good quality at both evening and morning transmissions.

I am glad to hear this, "Uncle Tom," and I hope you will go on getting good results. Incidentally, several letters have reached me in regard to the TELEVISION magazine. The same writer in another letter says: "Congratulations on this month's issue of TELEVISION. It is of interest from beginning to end."

I hope it is. Readers will know that since the magazine started some $2\frac{1}{2}$ years ago much money



Here we have Mr. J. W. A. Van Schie's apparatus with which he has received good images in Holland.

and effort have been expended towards giving readers the latest and best in the field of television. The TELEVISION magazine is the first of its kind in the world, and any observant reader must have noticed that a good deal of pioneer work has had to be done. As the advertising columns would have shown, there has been little return for the immense spade work done from the beginning.

* * *

All sorts of suggestions have been made to me in regard to the magazine. Several readers have suggested that the magazine is well worth a shilling, and a good many others have expressed views as to the

(*Concluded on page* 225)

Reproduction and Amplification in Television Receivers

By *Dr. Fritz Schröter*

(Continued from June issue)

HOW does this displacement look in the receiver? If the scanning devices run oscillation-free on both sides, then the photo current rush, which occurs at each crossing of PQ in lines 1, 2, 3 and following, will have a somewhat greater period than l/v_1 during the displacement of the strip. Instead of appearing as shown at left of Fig. 17, the moving strip will appear in the receiver as shown in Fig. 17, right. As each element of the strip is only transmitted once, this picture impression is transitory in contrast to the plain positions of repose which are portrayed in constant repetition.

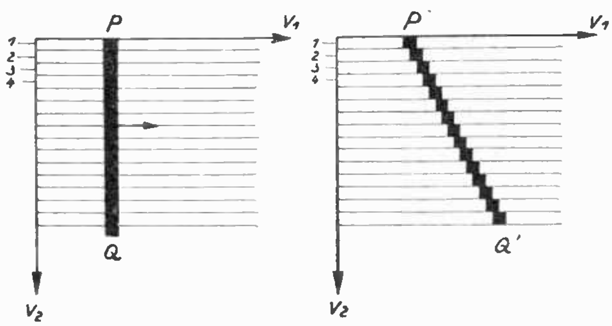


Fig. 17.—Illustrating movement in the scanning direction.

If the displacement of PQ in the picture field is $\geqslant I/n$'s, the movement lasts, therefore, during several scannings, thus the distortion phenomenon represented in the right portion of Fig. 17 is multiplied, that is to say, there is seen between the positions of repose a transitory series of oblique parallel rows of points, which blend into the cinematographic impression of the strip displaced in tilted form.

As can be seen from Fig. 17, the strip PQ has moved further round small section $<q/k$ during the time period l/v_1 of a picture line, so that we get $c_1 < \frac{q}{k\,l} v_1 < v_1$. If the distortion of the movement is to become unnoticeable it must be required that the obliquity perceived in accordance with Fig. 17, calculated over the entire height of the distant picture, shall be at most of the width q/k of a surface element. The strip PQ should therefore only complete the section q/k in the time $\frac{k\,l}{v_1}$, that is, we should get $c_1 \leqq \frac{q}{k^2 l} v_1$. In accordance with this supposition the individual phases, seen from picture to picture, of the displacement unite with the "natural" impression of the strip displaced parallel to itself. For larger values c_1, on the other hand, the transition commences to be misleading through the distortion of the picture point distribution in the reproduction.

If we apply this consideration to the Nipkow disc (1, 3), taken as a basis further back, we get

$$c_1 \leqq \frac{v_1}{2000} \text{ mm. } s^{-1}.$$

For $f = 1$ mm. and $n = 16s^{-1}$ we get v_1 from the fundamental frequency of the transmission $v_m = v_1/2f$ as follows: The picture point number is 2000, accordingly, $v_m = 16000 Hz$ and $v_1 = 32000$ mm. s^{-1}. Therefore we get

$$c_1 \leqq 16 \text{ mm. } s^{-1}.$$

Under the assumed conditions the movement in the received image would be visible practically undistorted, if the strip covered in 1 s less than half the picture field width.

It seems important to emphasise this state of affairs by way of contrast to cinematography. In the latter case we see individual pictures stationary for a short time in the correct perspective arrangement. On the basis of the stroboscopic phenomenon we then perceive the path of each picture point as continuous and co-ordinate-true. In television and telecinematography there occur, on the other hand, between the initial and final position of the displacement the co-ordinate distortions resulting from the final scanning speed, which distortions awaken the impression of unnatural transition positions.

In the case of contrary-wise displacement of the stroke PQ in Fig. 17 the oblique position of the transition figure $P'Q'$ on the receiver side would be the opposite, as is easily comprehensible, as then the period of the portraying rushes of current (picture impulses) during the movement would be $<l/v_1$. A reciprocal motion of PQ will, therefore, generally yield a broken line in the received picture, whereby according to the time period, or the period of the reversal of movement, singly or multiply broken strokes (rows of points) would occur in the singular or plural number.

If in this connection, moreover, the speed constantly changes, such lines appear bent. Fig. 18 explains this in the special case where the parallel displacement of line $A\ B$ in the direction of v_1 takes place between the limiting positions $A'B'$ and $A''B''$ periodically in accordance with a sine function, and where, further, the picture frequency n stands in a

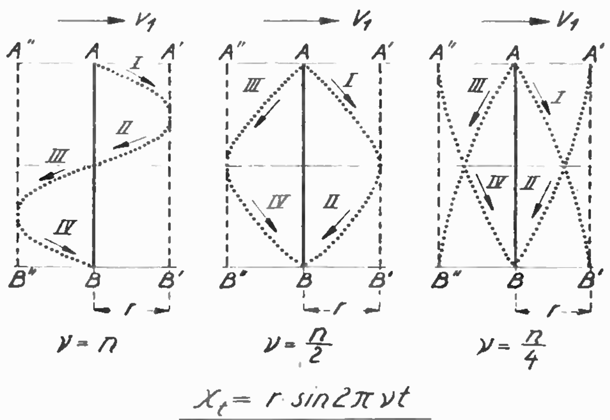


Fig. 18.—Periodical movements.

whole-number relationship to the frequency v of that reciprocal motion. Let the greatest distance from the centre position be r, and let the scanning begin in the uppermost line when $t=0$. In the function

$$x_t = r \sin 2\pi v t$$

v in the left part of the drawing corresponds to the value $v=n$, in the centre $v=n/2$, in the right $v=n/4$. The sinusoidal lines represented by dots perceived in the receiver arise accordingly from a complete reciprocal motion of the line $A\ B$ in the transmitting picture field during exactly $1/n$ or $2/n$ or $4/n$'s. The displacement of the path sections becoming visible on the receiving picture screen, and denoted by I, II, III, IV, corresponds to the four quarter periods I to IV. Such pictures naturally occur particularly plainly, as the transmitted picture rows are "standing" figures owing to the selected relationship between n and v. If no suitable number-ratio (integral) exists between n and v, the result is complicated, even grotesquely distorted, distant pictures of the simple parallel displacement of the stroke, especially if the previously neglected movement components $\| x_2$ are taken into consideration and the speed is allowed to vary from place to place in accordance with complicated laws.

The displacement of a figure $\| v_2$ can, as it takes place rectangularly to the direction of motion of the scanning aperture, yield no distortion of form in accordance with the example in Fig. 17. On the other hand, the picture defects indicated in the following are possible. c_2 and v_2 are first rectified:

(a) $$c_2 > v_2.$$

No transmission will occur if the object to be reproduced moves more rapidly than the scanning mechanism. If it lags behind it, then that part will yield a light impression in the receiver which catches up with the aperture. A reproduction cannot, however, take place, as the object traverses a greater number of picture lines in the time unit than the scanner can meantime break up, that is, more or less surface elements are filled in.

(b) $$c_2 = v_2.$$

One and the same line of the original is transmitted in all lines of the receiving picture field.

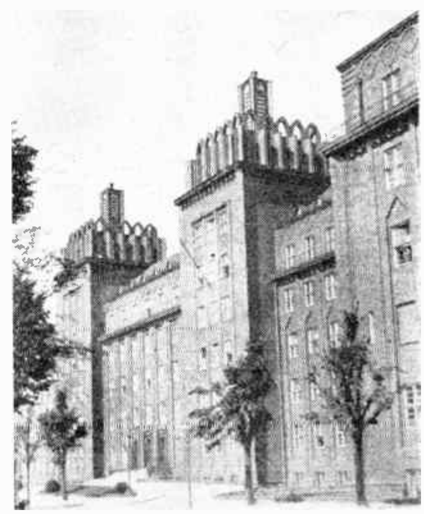
(c) $$v_2 > c_2 > \frac{1}{k} v_2.$$

This most important range for practice shall be discussed here on the basis of two typical cases both for the agreement and disagreement of c_2 and v_2.

Case 1: The figure to be reproduced is a stroke $\| v_2$. In the movement phase it is reproduced lengthened or shortened according to whether it is displaced with or against the direction of scanning.

Case 2: The figure to be portrayed is a stroke $\| v_1$. It moves after each transmission by more than one picture width upwards or downwards, before it is again scanned by the scanning aperture. There thus arises a system of stroke pictures which on the coalescence or fusion produces the normal stroboscopic

The main entrance to the German Post Office, where television research is being carried out very extensively.



movement effect without distortion of position or movement; that is to say, the observer perceives the parallel displacement of the original in the receiver in natural form. If the figure, instead of being a stroke, is a surface taking in several line-widths, the individual pictures may overlap, which alters nothing in the phenomenological respect.

(d) $$c_2 \leqq \frac{1}{k} v_2.$$

The length alteration during the displacement of a stroke parallel to v_2 becomes unnoticeable, as according to supposition the figure progresses by not more than one line-width during $1/n$'s. A stroke parallel to v_1 therefore becomes freshly reproduced in each line; its displacement is accordingly perceived as flicker-free.

(To be concluded.)

No. 1.

The First B. to be B by Tel

ADVANCE

Exclusive to T

The first Television Play will be transmitted at 3.30 p.m. on 14th July, from the Baird Studio at 133, Long Acre. The play is called "The Man with the Flower in his Mouth," by Luigi Pirandello.

The Man - - -	VAL GIELGUD.
A Customer -	LIONEL MILLARD.
The Woman - - -	(*not yet cast*).

Adapted and produced by Lance Sieveking (B.B.C.) and Sydney A. Moseley (Baird Television).

Scenery by C. R. W. NEVINSON.

EVERY new thing has its beginnings, things on which at a later date it is interesting to look back, which seem, in retrospect, amusingly primitive.

There are two kinds of people without imagination. The first kind cannot appreciate the fact that the new thing is primitive and elementary, but thinks that it is born in a state of perfection. The second kind of unimaginative person is unable to perceive the inevitability of the ever-developing presence of the new thing. He dismisses it as a clever toy for fun in the laboratory. But those with imagination and vision (that is to say, the readers of TELEVISION) not only realise that the new thing is in a primitive

No. 3.

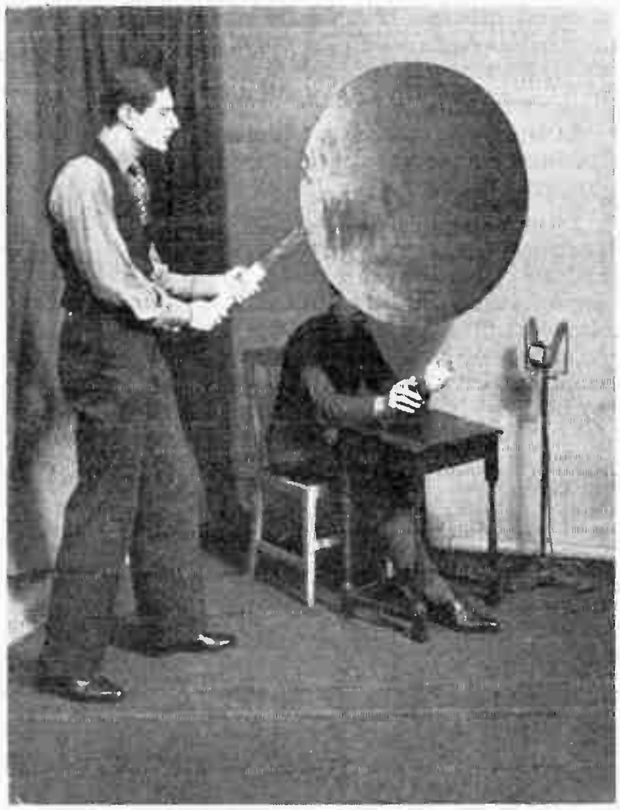
B. C. P*lay*

roadcast

evision

DETAILS

elevision R*eaders*



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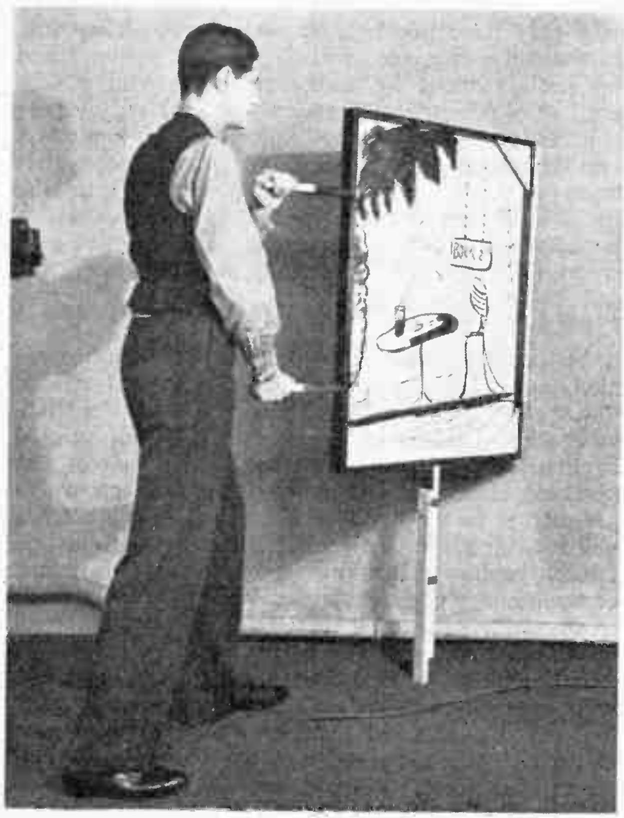


No. 4.

condition, but see it in their mind's eye as it will be when later developments have brought it to its fullest function. These people are interested and amused to be kept *au fait* with the early stages as they occur—just as the unimaginative world is eager to know about the early days of things which have years ago indisputably come to stay.

We show you here several photographs. Nos. 1, 2 and 3 demonstrate the use of the fading board (as Mr. Sieveking calls it) which was made two days ago. In the first, Mr. Gielgud, the productions director of the B.B.C., is seen seated in front of the television transmitter, with the sound microphone beyond him on the left. He is just coming to the end of a speech in "The Man with the Flower in his Mouth," which is the cue for the appearance of another character in the play. In the second picture Mr. Sieveking is seen fading Mr. Gielgud out, who in the third picture is seen *hastily but silently* making way for whatever is to succeed him in the visible side of the play. In No. 4 you see Mr. Sieveking holding his scenery frame in front of the transmitter. It has, as the photograph shows, a sliding leg used for adjusting the height of the frame according to how much it is desired to show. The scenes or objects are going to be painted by Mr. C. R. W. Nevinson, the famous artist, on thick pieces of millboard, and slid in and out at the side of the frame farthest from the handles. Mr. Nevinson, in exploring this new field of art, will be to a certain extent bound by the limitations imposed by the present stage of the transmission, which will only permit of designs of the boldest and simplest nature. *It is hardly necessary to add that the scribble contained in the frame when the photograph was taken was not by Mr. Nevinson, but hastily dabbed in by Mr. Sieveking as an indication.*

In No. 5 the same frame is seen reversed and used for titles and captions. [The caption has nothing to do with the play on July 14th.]

As regards the fading board itself, this may possibly be regarded in a year's time as a clumsy and antiquated method of fading things in and out during television programmes, but it is essentially the most practical method with which to begin. To have a small metal shutter or contracting iris (once much used on film cameras) was deemed unsuitable to begin with, for two reasons. The first is that it

No. 5.

would be a difficult and unsatisfactory job to manufacture a contracting metal iris of sufficient dimensions to mask the photo-electric cells, and, if made, would probably be rather hard to use, though this will be experimented with. Also, the movement of the shutter close to the cells would set up reactions very difficult to control, so that the next object to be televised after the shutter opened would be subject to a number of distortions and shadows before it became clear. To avoid this, it was thought better to have a fading board operated within the same focal distance as the various objects to be seen both before and after its interception.

The second reason is that from the non-technical point of view (namely, the artistic side) the producer will have the fading apparatus under his own control, and be able to slide the actors, the scenery frame or anything else, to and fro in such a way as to ensure the smooth continuity of the play.

It is probable that several devices will be made, not only improvements on this, but to suit fresh necessities as they arise.

A Question of Colour

Research is also being carried out on the question of what colours transmit most successfully. The actual moving picture transmitted contains all shades from absolute white to absolute black, but in many cases various shades of green, blue and yellow create a far more intense reaction in the cells than actual black, grey or white.

Mr. Sydney Moseley, Mr. Sieveking and the productions director are therefore experimenting with all the varieties of grease paint make-up which are possible. It might be found, when they conclude their inquiries, that the make-up required for the cinema is not so suitable for the television transmitter, though, at the present moment, it seems likely to be so, with certain accentuations, such as the strengthening of all the raised lines of the face (nose, chin, and temples) with strokes of blue or dark green.

It should not be forgotten that the television play will be to the familiar broadcast play roughly what the talkie is to the silent film. That is to say, that the ordinary B.B.C. listener, though he will be able to get the audible side of it on 261.3 metres, will obviously find it less complete than the plays to which he is accustomed; and the same with those who only have television receiving sets. They will, in the same way, see something which cannot stand by itself without its complement of sound. The method of production, therefore, which Mr. Sieveking is investigating will demand a good deal of ingenuity, and the script of the play will be a cross between that of an ordinary radio play and the scenario of a talking film, with certain additions. A more elaborate technique than the mere televising of the face of each successive speaker will obviously come into use.

Looking Forward

As the play proceeds the audible side will contain announcements, dialogue, music, and sound effects, under the direction of Mr. C. Denis Freeman, while the visible side will be made up of printed captions, scenery, the heads and shoulders of the speakers, close-ups of their hands, and objects which are related to the play. For example, the spectator will see sometimes the speaker's face, sometimes the face of the man he is addressing, sometimes his hands, or the scene which the speaker is contemplating, and so on, while between all these things the fading board comes down and goes up.

It is possible to look forward to a day when the fading technique of the multiple studio play, familiar to B.B.C. listeners, will be in use elaborated by means of multiple television transmitters, fading into and across each other. Perhaps, too, we shall live to be audiences of a television which transmits the actual colours, and then . . .

Television for the Beginner

PART VII

By *John W. Woodford*

WHEN studying the light source at the receiving end in last month's instalment I pointed out that a form of illumination was necessary which was instantaneous in its response to the current variations produced in the wireless receiver by the television signals. Now the theory underlying the working of the neon tube, which, apart from the Kerr cell, has proved the only suitable light source to fulfil the stringent conditions imposed by television, is most interesting.

A Colour Effect.

Since it is, however, outside the sphere of this elementary series to talk about negative glow, the Crookes dark space, ionisation, positive columns, etc., all of which come within the purview of the neon lamp's characteristics, we will just state and accept the facts. It is, therefore, merely necessary to say that

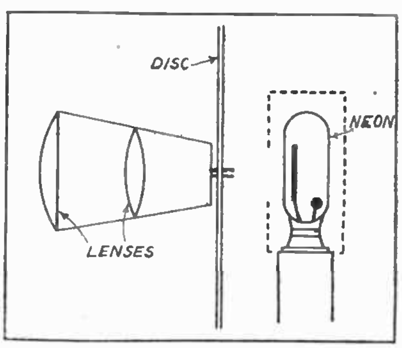
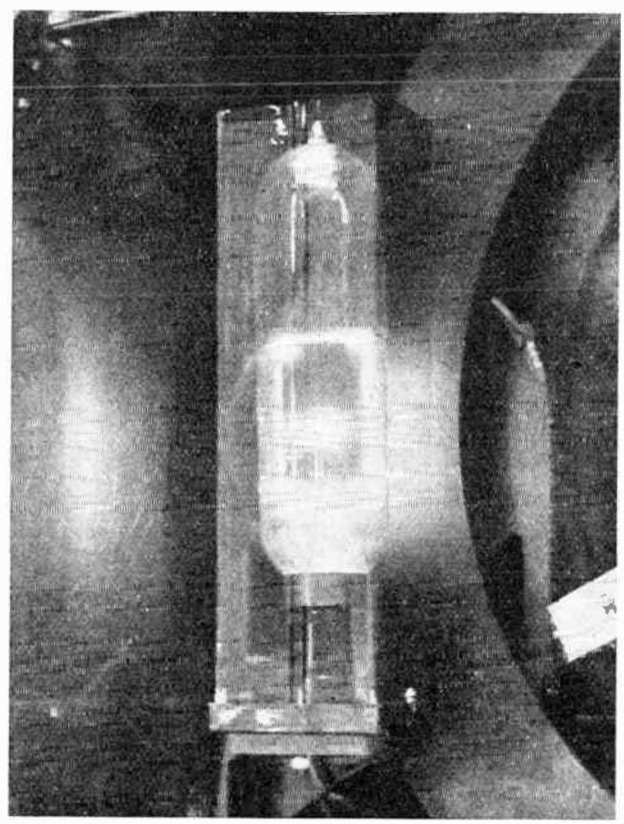


Fig. 1. The relative positions of neon, disc and lenses are shown in this simple diagram.

the lamp itself is filled with a gas called neon at a very low pressure, and for proper functioning this pressure should have a certain exact value for each type of lamp. By applying a "striking" voltage of the order of 160 to 180 volts between the electrodes, a current is made to pass. The neon atoms become heated through atomic bombardments and ionisation and glow with the familiar reddish orange colour.

Some critics comment unfavourably about this colour of the television image, but if the complete vision apparatus is used in a room illuminated with diffused red light, then the images acquire a black and white tinting effect and in this way appear more natural. The colour problem is in no way a serious one, being largely a matter of opinion.

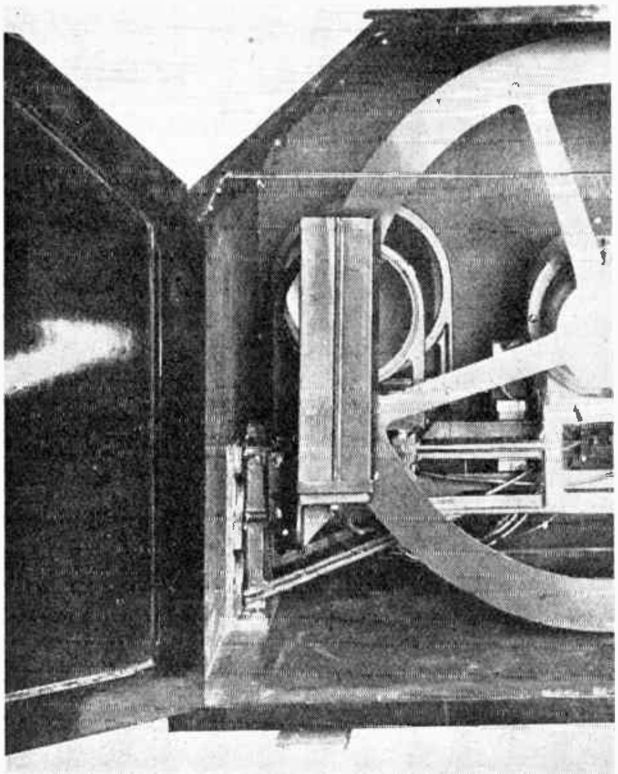
Since it has been demonstrated that it is possible to render incandescent and extinguish this neon lamp one million times per second, no further evidence is required to prove the absence of time lag or inertia in the response to current variations. Furthermore, and this is very important, the intensity of the neon glow is directly proportional to the current strength. We shall realise this more when we discuss a little later in the article the building up of the television



Showing a flat plate neon being scanned while glowing.

image. The plate type of neon which is used in the "Televisor" has a short metal rod (positive electrode) mounted behind a flat rectangular negative electrode, see accompanying photographs.

Having dealt with each part separately let us now see how they can be assembled to make visible the images from the transmitting end.



This photograph will be useful in enabling the reader to picture mentally how the earlier Baird model "Televisors" were made up.

I have endeavoured to show in Fig. 1 the relative positions of the neon, disc and lenses, and this should be studied in conjunction with the photograph displaying part of the inside of an earlier model Baird "Televisor." The neon lamp is mounted vertically, being held on a frame or support so that its centre is on a line with the motor shaft. Viewed from the front the motor is positioned on the left of the neon and when rotating in an anti-clockwise direction the disc, secured to the motor shaft, allows its spiral of holes to pass in front of the neon plate and hence scan the surface.

A shaped mask is usually fitted to avoid any visible light spread and one or two lenses are placed in front of this to give the required magnification. The photograph previously referred to shows this quite plainly, while a further illustration of an assembled Baird kit indicates where the rheostat for speed control is positioned as well as the synchronising and framing gear.

Handling the Vision Signals.

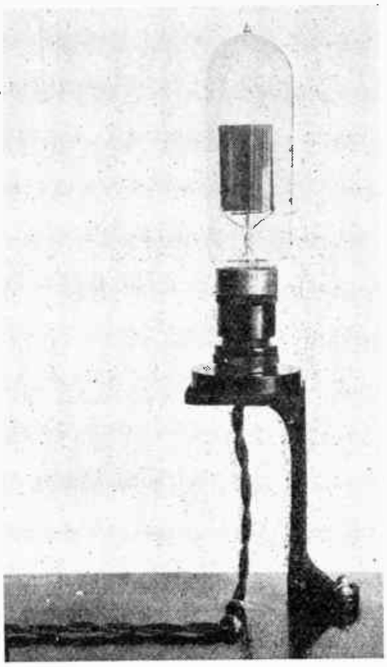
Now what happens when the received wireless vision signals are passed from the output stage of the set to the neon and synchronising mechanism in much the same way as ordinary broadcast signals are handed on to the loud-speaker? Why, the neon changes the intensity of its illumination in accordance with the signal strength and with the same rapidity. This continuous change in neon glow on the negative plate is watched through the perforations in the rotating disc. We will assume that the transmitter and receiver discs are in exact synchronism. Under these circumstances a hole in the receiver disc will expose a very small area on the neon plate corresponding to a similar position then undergoing exploration at the transmitting end.

But the neon glow at this instant bears a direct proportionality to the amount of light reflected from the illuminated spot of the image or scene being televised. A degree of light or shade is, therefore, observed of corresponding intensity and we really produce at the receiving end the same effect as is taking place at the transmitting end.

An Image from Light Strips.

In undergoing its motion from bottom to top the hole in the disc exposes a strip of neon plate and reproduces all the light and shade existing at the transmitting end. As soon as this aperture has completed its upward scan the next hole undertakes an exactly similar piece of work, following faithfully the movement of its "partner" at the transmitting end.

A complete area is thus built up from the thirty strips lying side by side and renders the effect of an intelligible image to the observer. At first one might imagine that since the process is essentially mechanical in character the image would only possess crude detail. This is quite erroneous, however, for the scanning is effected at such a rapid rate that the mechanics are almost lost on the person viewing the picture. With twelve and a half complete pictures of thirty strips presented to the eye in the short space of one second it is possible to show all the light, shade, contour and movement of the person or subject before the photo-electric cells at the transmitting end.



Mounting the neon on some form of stand must be undertaken carefully to ensure that the whole of the plate is scanned by the perforated disc.

A Softening Effect.

Sharp corners or edges are softened somewhat, but anyone who has seen a television image cannot fail to be struck with the intimate detail revealed. Of course, improvements will still be effected, for no one can say the process is perfect, but at its present stage television gives educational and entertainment value in a manner which must be *seen* to be appreciated.

There are various effects or phenomena which may occur with your apparatus, but I feel that these are best dealt with after we have examined that very important subject of synchronism, as many of them are brought about through an inability to appreciate what is happening to make your television image "hold steady" behind the lens. I will, therefore, make it my business to explain synchronism in the simplest possible language.

What is Synchronism?

If you turn to a dictionary for enlightenment as to the meaning of synchronism you will not get much satisfaction, at least as far as the application to television is concerned. I have just looked up the word, and found the expression "a concurrence of events in time." To clear the air let me take one or two examples, for there are two conditions which have to be fulfilled if true synchronism is to be established.

Imagine two accurate clocks, one situated in, say, San Francisco and the other doing duty on your own dining-room mantelpiece. If their accuracy is beyond dispute, both the minute and hour hands of each clock will go through similar movements, or, in other words, the angular movement of the hands will be identical. On the other hand, the times registered by each clock at the same instant will obviously be different, for noon at San Francisco occurs at a different time to noon in England.

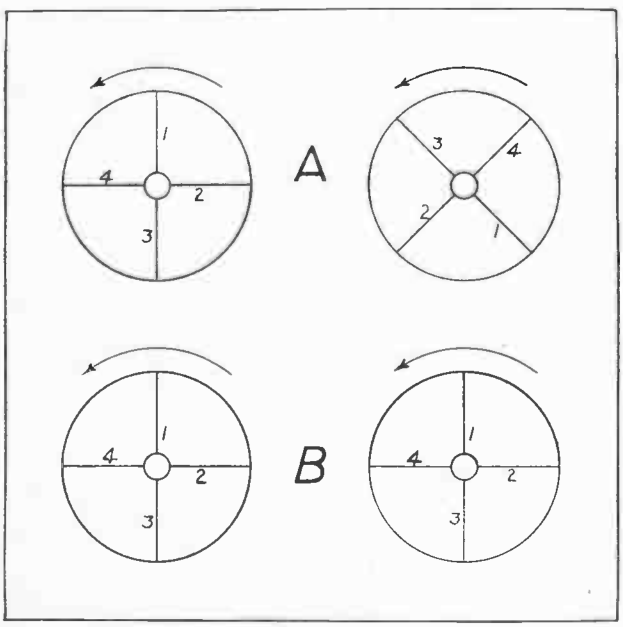
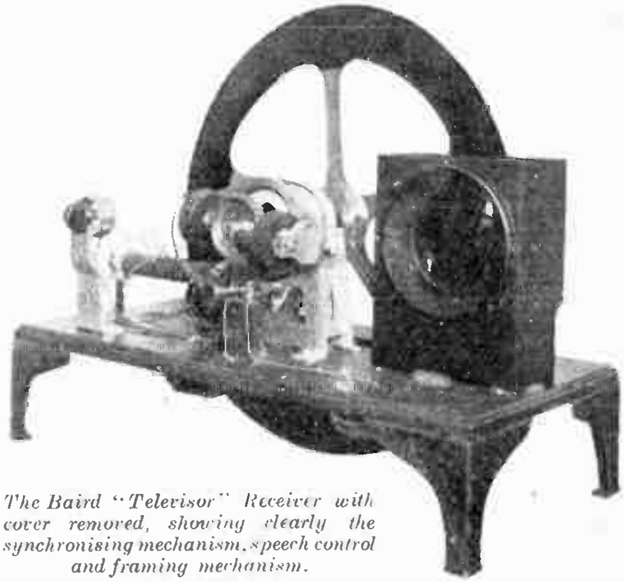


Fig. 2.—Synchronism is established at B but only isochronism at A.



The Baird "Televisor" Receiver with cover removed, showing clearly the synchronising mechanism, speech control and framing mechanism.

Equal Speeds.

If you consider a couple of wheels on the same motor-car travelling along a straight stretch of road, they will obviously be rotating at the same speed, but it is most unlikely that No. 1 spoke on the first wheel will be at the same angular position as No. 1 spoke on the second wheel (see Fig. 2-*A*).

In the two cases quoted synchronism has not been established, but only the condition of equal speeds. This is known technically as isochronism.

Now let us return to our two accurate clocks, and suppose one is in the dining-room and one in the drawing-room of the same house. The hands will then not only move at the same rate but point to the same time at every instant. They are "in step," or bear the same phase relationship to one another as well as possessing identical movement. Synchronism will be established under these circumstances, for you have fulfilled the necessary double condition. Fig. 2-*B* shows simply the establishment of synchronism between our motor-car wheels, the No. 1 spoke of each wheel being at the same angular position at the same instant in their motion along the road.

Ingenuity.

We see, therefore, that while it is possible to achieve isochronism without being in synchronism it is impossible to establish synchronism without having first brought about isochronism. In our television system we achieve the former, namely, isochronism, through the agency of the mechanism incorporated in the apparatus, and this is done automatically. The phase relationship of the disc holes at the transmitting and receiving ends, however, is brought about by a manipulation of one of the controls, as we shall see later. The ingenuity of the arrangement adopted reflects great credit on the genius of Mr. Baird and his engineers, a point about which I am sure all readers will agree when I unfold the story in next month's issue.

The Nature and Properties of Light

PART IV.

By *H. Wolfson*

WE are all familiar with the colours produced when thin films of oil are allowed to spread out on the surface of a wet road, and the wonderful iridescent colours of the soap bubble. In Newton's time these phenomena were explained by Newton's theory of "Fits," to which reference was made in an earlier article. The Newtonian theory of light having been conclusively disproved,* some other explanation must be sought from the Wave Theory of Light.

That branch of the subject which deals with this and other problems is the study of the so-called "Interference" effects. The theory attached to this subject is usually extremely cumbersome, and is difficult to be easily comprehended by those who have not received a thorough scientific training. My object in the present article is to serve up this really interesting topic in a more or less palatable form.

To help you to understand the problem in a few moments, I would like all my readers to perform this simple experiment. No "apparatus" is required other than is found in every home. Fill a large bowl, or other similar receptacle, with water. Now arrange some device for setting up two sets of ripples from different points *at the same time*. This is most conveniently done by driving two long, thick nails through a piece of wood, so that the points both project the same distance, say a couple of inches, and so that they are about three inches apart. If the points be now dipped into the water with a constant frequency, say twice per second, trains of waves will originate from the two points. The larger the surface of the water, the better the experiment is likely to succeed.

Some of my readers may find it easier to produce well-defined ripples if they use two fingers on the same hand to serve as sources of waves; whichever method is employed, however, it should be quite easy to observe the interference effects produced by the two sets of waves. These effects are exhibited by certain well-defined strips of the liquid surface being quite free from disturbance, while the neighbouring strips are in well marked agitation. This is illustrated diagrammatically in Fig. 1.

* TELEVISION—December, 1929.

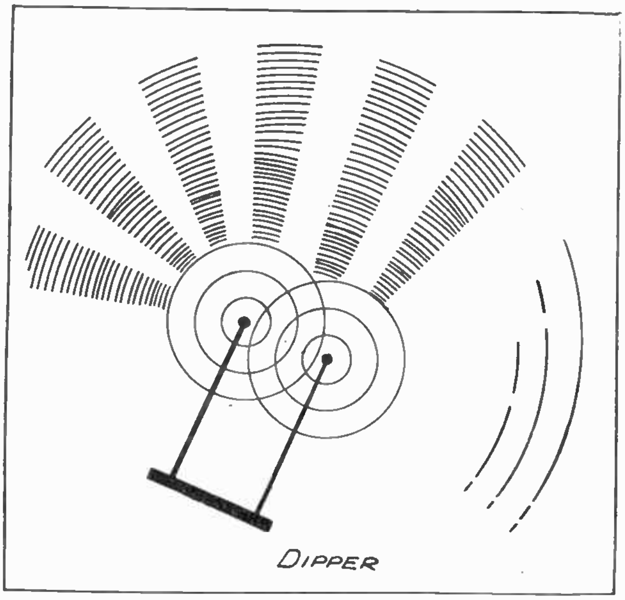


Fig. 1.—Picture of interference fringes on the surface of water or mercury.

For those who have more facilities at their disposal, I would suggest that the experiment be tried using a shallow tray full of mercury and a two-point dipper actuated by one prong of a tuning fork. The effects obtained in this case are so well marked that it has been found possible to take photographs of the mercury surface, the alternative strips of calm and disturbed surface being clearly visible.

From the experiment just described we learn the most important condition which has to be satisfied in order to obtain interference effects, *i.e.* the sources of the disturbance must be in the same phase. In the water experiment this is ensured by operating both dippers at the same time. In the case of light waves, which we shall consider in greater detail shortly, various schemes must be resorted to in order to satisfy this condition of phase relationship. It is thus absolutely impossible to obtain interference effects from two separate sources of light, such as two electric lamps or two stars, since these have absolutely no phase relation.

Returning now to our experiment, we must pursue the analogy between the water waves and light waves a little further, in order that we may arrive at some satisfactory explanation for the strange behaviour of

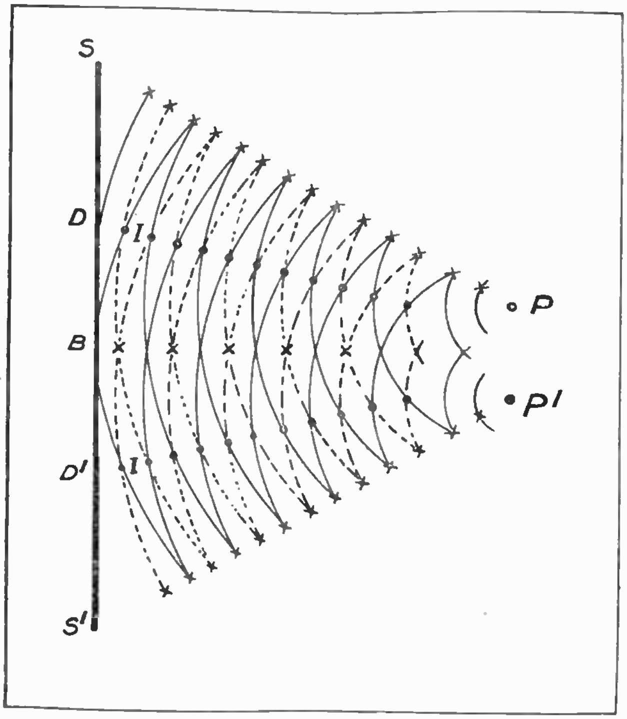


Fig. 2.—Illustrates the interference of waves.

two sets of waves which have a phase relationship. Let P and P^1 (Fig. 2) be the two points on the liquid surface from which the waves or harmonic disturbances, equal in amplitude and in phase, are propagated. Let us represent the crests and troughs of the waves by continuous and dotted lines, respectively. It is only necessary to draw part of the waves, represented by the arcs of circles, though it is to be understood that the waves are propagated in all directions, and the diagram thus shows only a section of the surface. At all points through which two crests or two troughs are passing at the same time, as indicated by the intersection of similar arcs, let us draw a cross. At these points the amplitudes of the waves will add or reinforce, so that two crests produce a crest of double the original amplitude, while two troughs produce one trough with double the original amplitude. If we join the neighbouring points by straight lines we shall obtain points of maximum disturbance (amplitude) or maximum energy. It is to be noted that the energy varies as the square of the amplitude, and at the points marked with a cross will be four times that due to a single wave. The distance between successive crosses is equal to half the period of the waves, since adjacent crosses are produced by the action of a crest and a trough alternately.

Those points which are marked with dots are points where the surface remains undisturbed, due to the cancellation of a crest and a trough. Along these lines of zero displacement (stationary surface) the waves are said to interfere with each other. Of course, no loss of energy occurs in the process, since the energy which is missing along these lines of zero displacement is simply transferred to the points of maximum energy and displacement.

Since light consists of waves, it ought to be possible to obtain interference effects by the use of two sources which emit light of the same *frequency and the same phase*. It is impossible to use two separate real sources, and the only way to deal with the problem is to employ a real source and a virtual source. By this is meant the use of, say, a point source of light and its image in a mirror. The various devices used for this purpose will be indicated later on. The second important consideration arises from the fact that the wavelength of light is small, and it will be necessary, therefore, to place the sources very near together in order that the angular distances between the lines of maximum displacement shall be appreciable. In this connection it should be noted that the distances between PI and P^1I (Fig. 2) only differ by half a wavelength.

We have to realise, also, that while it is very easy to observe a wave motion of low frequency and low velocity on the surface of a liquid, it is impossible to observe directly the motions of the ether responsible for the production of light waves. The most we can do is to observe the luminous effects produced at a point by the passage of billions of waves every second.

Returning again to Fig. 2, suppose now that the sources P and P^1 represent sources of light arranged to be of the same phase, frequency and amplitude. Imagine that a receiving screen is placed in the position SS^1 to receive the light from the two sources. Then the space between the two positions of interference or zero displacement, $i\,i^1$ will be illuminated. At the same time the points D and D^1 will receive no light, and will thus give dark bands at these points. The point B midway between these two points will be brightly illuminated. If the size of the

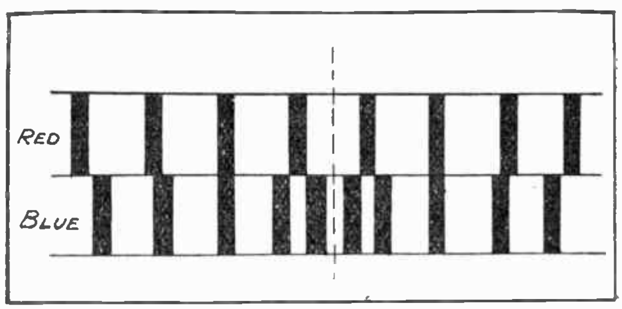


Fig. 3.—Interference fringes produced by red and blue light.

diagram had been greater, it would have been possible to show a number of other points on the receiving screen, the nett result being that we should have alternate dark and bright bands, or fringes as they are called. The next bright bands would be at S and S^1 as shown.

We use the term *interference fringes* to designate the effect. Now we can proceed to show the dependence between the breadth of the fringes and the wavelength of the light which is used. The point B (Fig. 2) is equidistant from P and P^1, and thus, whatever the

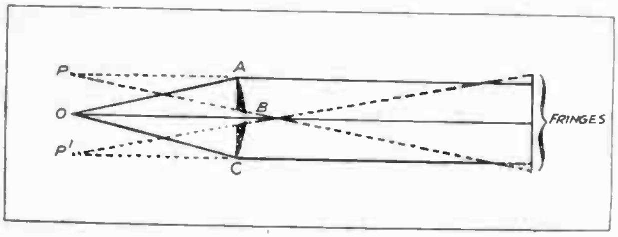


Fig. 4.—Fresneal biprism.

wavelength of the light, there will be, of necessity, reinforcement at B, which is termed the central (bright) interference fringe. The first dark band will appear at D, so that $DP^1 = DP + \frac{\lambda}{2}$, where λ is the wavelength. On decreasing the wavelength, we shall at the same time diminish the distance BD, thus we see that the breadth of the central fringe ($=2BD$) depends on the wavelength of the light. At S the wave from P^1 arrives just one period later than that from P, and therefore we can say that $P^1S = PS + \lambda$. By decreasing the wavelength we shall decrease the distance BS, *i.e.*, the distance from the middle of the central fringe to the first succeeding bright fringe.

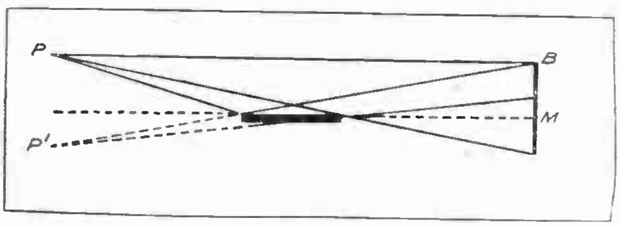


Fig. 5.—Lloyd single mirror method for fringes.

By a chain of reasoning after this manner, we see that the position of the central bright fringe will be unaltered by changing the wavelength of the light, but those fringes formed by interference of short waves will be closer together and narrower than those formed from longer waves. I have made an attempt to represent this pictorially in Fig. 3, which shows the relative sizes of fringes produced by blue and red light. Since blue light is a shorter wavelength than red light, the resulting fringes are narrower than those from red light. Since the width of bright fringes associated with any particular wavelength is constant, it is not possible to tell which is the middle fringe if monochromatic light is being used, but with white light the central fringe is white, and the others are coloured and are distributed symmetrically on either side of the central fringe.

For the rest of this article we will consider some of the methods used to produce these fringes. One of the best known methods is by means of the Fresnel biprism. This consists of two acute angled prisms, ground from the same piece of glass, placed face to face. This is shown in Fig. 4. Light from the source O, which is in practice a slit, falls on the biprism ABC, and produces two virtual images or sources by refraction, at P and P^1 The narrow fringes are observed by means of a lens system.

Lloyds' single mirror fringes are of interest, both in appearance and in the method employed for their production. Light from a narrow slit is split up into two narrow beams, one direct and the other produced by reflection from the polished surface of a piece of black glass. Fig. 5 shows the state of affairs. P is the slit and P^1 is the virtual image of the slit, which is so adjusted as to be parallel to the reflecting surface. The mid point of the receiving screen will lie in the plane of the reflecting surface, and thus we see that the central fringe is not formed, since it is not illuminated by the reflected light. By inserting a half wave plate of mica or glass in the path of the directly transmitted beam, we shall introduce a half-wavelength retardation, and the central fringe is displaced towards B. Dr. Lloyd, who originated the method, observed that the central fringe is black instead of white, while on either side the central fringe is a white fringe. This is indicative of the fact that when light is reflected from an optically denser medium, the phase of the reflected waves is different from that of the incident ray by π (*i.e.*, 180°).

Interference fringes may also be produced by the divided lens method invented by Monsieur Billet. A convex lens is cut in halves, and the two halves are so mounted that their distance apart can be adjusted at will. They are illuminated by light from a slit. Two separate images of the slit are formed at P and P^1 and these will produce interference fringes in the usual manner (see Fig. 6). We can with the aid of this arrangement perform an experiment of great importance.

Suppose that we place a Nicol prism between the source of light and the slit, thus polarising the light. We shall find then that interference fringes are still produced. If, however, two exactly similar Nicols are placed at P and P^1, which are really, one might say, the foci of the two pieces of lens, it will be found that when the optic axes of the Nicols are at right angles no fringes are produced, though if the two Nicols are

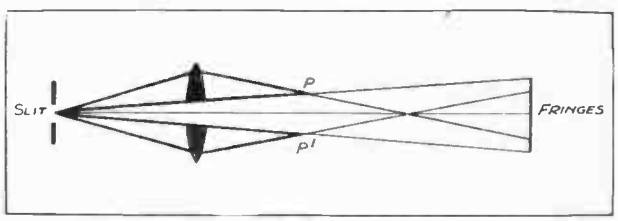


Fig. 6.—Billet's split lens method. P and P^1 are the two sources.

placed with their axes parallel the ordinary interference effects still manifest themselves.

Newton's rings are also an interference effect, and these are obtained by placing a thin lens on a piece of plane glass and illuminating the arrangement with monochromatic light for preference. The arrangement is viewed through a low-powered microscope.

(*Concluded on page 227.*)

A Crystal Detector for Television Images

By *William J. Richardson*

THE science of television opens up unending possibilities to the experimenter who is keen on getting the best from the transmissions now being offered to us, and as the columns of TELEVISION reveal, many and varied are the ingenious schemes put forward to overcome handicaps which the absence of spare cash inevitably brings in its train. Any method which will bring about a saving of money, therefore, holds out an appeal which is worthy of consideration.

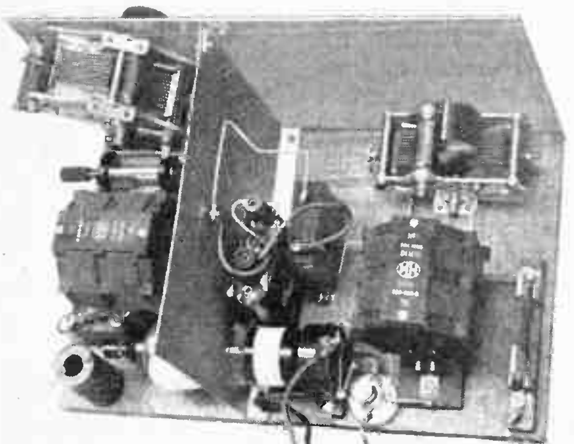
No doubt readers saw in last month's issue a stop press notice intimating that the humble crystal, almost despised in these days of multi-valve sets, had been doing its bit by providing television images. During the course of my investigations I have been trying out many different schemes, and the results of some of these have been recorded in this journal, and it is especially gratifying to learn that the low frequency amplifier has achieved a fair measure of success.

Importance of Detector Stage

When dealing with the wireless receiver which is going to handle the vision signals before passing them on to the "Televisor," it is really difficult to assign the greatest measure of importance to any one of the three vital sections, H.F., detector, or L.F. Each has its own special sphere to fulfil, so that the stages blend and give results traceable to "team spirit," if one can use this phrase for wireless sets. A great deal depends upon the detector stage, however, for no matter how perfect the L.F. amplifier may be, unless the input signals derived from the rectifying section show an absence of distortion, imperfect images are the only reward.

I have therefore devoted a great deal of time to this section, trying out various circuits in an effort to achieve the best results. Many interesting conclusions have been arrived at, but perhaps one of the most outstanding experiments was that in which an ordinary crystal detector was used for rectification purposes in lieu of the valve and its associated apparatus. The results obtained with this arrangement were really first-class—indeed I think I should be quite justified in saying that, used in conjunction with the low frequency amplifier published in the March issue, I derived the best images I have seen so far.

I quite agree that there may be drawbacks to this idea, but there are still a large number of people who claim that for quality reception in the sound sense the crystal detector finds no equal. It is not my purpose to enter into arguments for and against this conclusion, there will always be protagonists of both sides, but I felt it might open up some new avenues of thought for readers if I recounted my work, and incidentally the use of a crystal represents a considerable saving.



The H.F. and Crystal Detector Unit which was used during the course of Mr. Richardson's experiments.

Since there is the continuation of my constructional article dealing with a wireless receiver for television, appearing in the current issue of the magazine, a description must be held over until the August issue. By way of interest, however, an illustration is given showing the experimental set which enabled me to conduct the work. I shall describe fully the different valve and crystal detector circuits which I have used from time to time, in the hope that this will assist other experimenters.

Four Main Schemes

There are, broadly speaking, two main detector schemes using three electrode valves, namely, leaky grid and anode bend. In addition due attention must be given to the "diode" arrangement, so often neglected but possessing characteristics which have only to be tried to be appreciated. Then, of course, there is the crystal detector. Having been able to try out each of these arrangements with various modifications for actual television purposes it has made the work particularly interesting, and since we have so much to learn on this side of the subject there is ample scope here for the keen wireless fan.

The Enthusiast Sees it Through

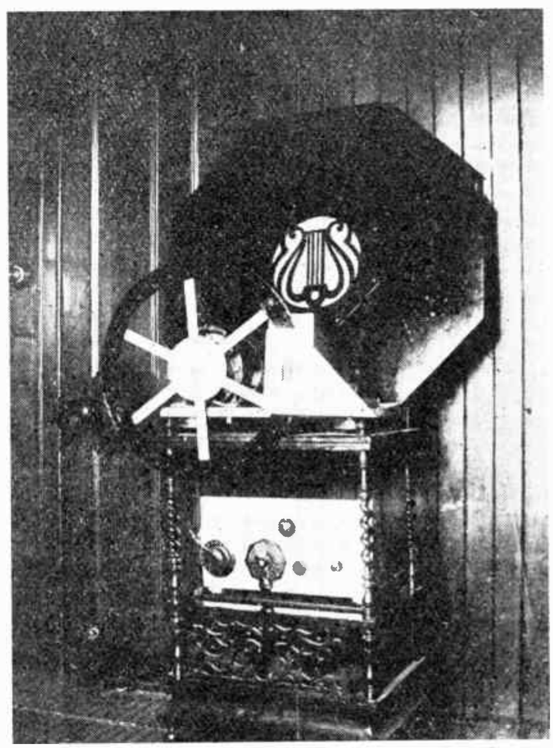
SOMETHING attempted, something done, is perhaps a very apt phrase to sum up the activities of our many readers, who are overcoming any difficulties that may arise in connection with the reception of the Baird television transmissions from the Brookmans Park stations. We feel justified in sharing the pride displayed by these enthusiasts when they describe their results, for the columns of TELEVISION are devoted to helpful and practical articles, which we know render assistance to all. The intimate relationship that has existed between readers and ourselves we know will continue, and we welcome the reports of their work and are anxious to help.

Glasgow Reports Progress

In sending best wishes to the journal Mr. A. H. Mason, of 30, Marlborough Road, Cathcart, Glasgow, forwards an interesting photograph of his apparatus and says :—

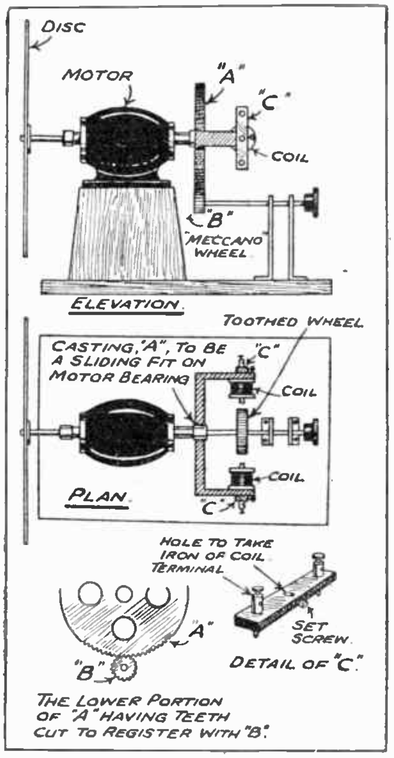
" It may be of interest to some of your readers to know how another amateur is receiving the television transmissions in the 'far north.' The receiver I use has one screened grid H.F. valve, anode bend detector, two resistance coupled L.F. stages, followed by a transformer coupled stage. The output valve is a Mazda P.650 with H.T. supply of 250 volts from accumulators, and the neon is an ordinary commercial Osglim lamp. It seems to me that most amateurs are afraid to use metal for the scanning disc, thinking, no doubt, that paper is easier to mark and cut out. I use 26 S.W.G. aluminium, which is obtainable from the British Aluminium Company and costs about 2s. 6d. for a sheet 22 inches square. Great accuracy in the marking-out can be obtained if sharp steel points are used instead of the comparatively blunt end of a pencil. Incidentally, compasses to draw circles of 20 inches or so in diameter can be simply constructed from three-ply wood with gramophone needles for scribing points. The scanning holes are drilled with a spear-point drill, and squared with a watchmaker's square file.

" Being an amateur wireless transmitter, I had a spare $\frac{1}{4}$ H.P. 250 volts motor, and this run from the domestic 250 volts 25 A.C. mains in series with a carbon lamp, and 50 ohms variable filament resistance drives the disc fairly steadily although its maximum power is far in excess of my requirements. From the photograph enclosed it will be seen that quite



Mr. Mason's receiver, which he describes in his letter.

a lot of metal has been cut out of the disc to cause it to run more truly, and I found that it was necessary to clamp it at the centre with small discs to stop a wobble which started at high speeds. The cutting-out was easily done with a Hobbies metal cutting fretsaw blade, and the small discs were discarded 6-inch aluminium gramophone records.



Details of the synchronising arrangements used by Mr. Rose.

"The results at first were rather disconcerting, as I got what appeared to be a display of conjuring tricks or handshaking for the whole of an all-too-short half-hour period. My suspicions were naturally aroused, and I discovered that the 'picture' was a negative, upside down, and of wrong proportions, with some distortion from a hurriedly constructed receiver thrown in!

"With good conditions I have had fine reproduction of faces and, of course, printed words are very clear, although, like another enthusiast, I would like the letters lower down in the frame. Fading was pretty bad at times when the National sent the vision, but now that the Regional has taken over the job it is a veritable nightmare to try to get a few minutes' decent reception. No doubt the change was made to suit Southern 'scanners,' but the National is much better here than the 'fadeful' Regional.

"On the principle of 'the more the merrier,' I have endeavoured to get various local leading lights in radio interested in the subject of television, and to this end I took along a scanning disc (fixed to a bicycle front spindle and running on ball bearing, with the *hub* screwed to a wooden block) to the last monthly 'rag-chew' (meeting) of Scottish transmitting amateurs. Great interest was shown in my exhibit, and I was surprised to find that no one else had taken up the good work. Let us hope that this state of affairs will soon be altered." [A hope which we all share.—ED.]

Overcoming Difficulties

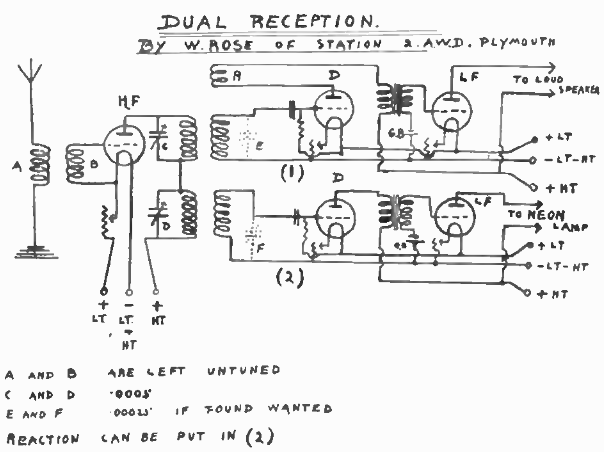
That good results can be secured from home-made apparatus is borne out by the efforts of Mr. W. Rose, of 5, Henders Corner, Compton, Plymouth. In addition to a photograph of his machine, he sent us diagrams depicting his synchronising arrangements in the hope that they will prove of assistance to other enthusiasts.

In the course of his letter he states:—

"I have much pleasure in sending you a photo showing how far I have progressed with my 'Televisor.' Most of the parts are home-made, the motor being a 6 to 8 volts one, and when running cannot be heard. The disc is of aluminium, with thirty one-millimetre square holes. I expect the part of interest to other amateurs is the synchronising gear and the method of attaching same to motor. I enclose rough sketches of this. A pattern was cut, and a casting made in iron. The teeth were cut in the casting for rocking in with a file and hacksaw, while the wheel for engaging with it is a Meccano one. The making of the 30-tooth wheel presents the biggest difficulty, as I have no lathe. I should be pleased to see anyone in this district who is interested in television. In the photograph can be seen a plain disc behind the synchronising coils. This I use to press on with a finger to hold the picture until I get the wheel finished. I may say to anyone who is thinking of starting that the signal I obtain on a four-valve set at this distance of 200 miles is enormous. The lamp used is an Osglim, and I want a flat plate lamp now, but funds are low."

Scotland to the Fore Again

Scotland comes to the fore again in the person of Mr. S. W. Macdonald, of 55, Bellwood Street, Shawlands, Glasgow. He is a little handicapped at the moment, as he is awaiting the delivery of certain important synchronising parts, but even so he feels not a little proud of his results. What defects are

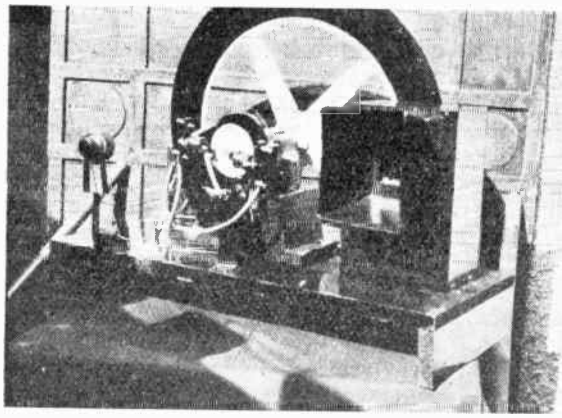


The circuit adopted by Mr. Rose for the dual reception of sound and vision.

present in his received images are being overcome with the enthusiasm which one automatically associates with Scotchmen, for was not J. L. Baird a native of that country? In writing to us he says:—

"I have no doubt you will be pleased to have a report from a Scottish amateur 'looker-in.'

"I enclose herewith a snap of my home-made 'Televisor.' I don't suppose you will see much difference between this and any other, but at the same time I feel not a little proud of its results.



The complete vision receiver of Mr. Rose.

"I am using six valves at present, consisting of a straight S.G., det., L.F. 3-valver, transformer coupled, and a two-stage, 3-valve R.C. amplifier, with roughly 210 volts on the anodes of two P.M.252 valves in parallel. I get exceptionally good illumination on an ordinary Osglim neon with this arrangement.

"My machine has been in use twice a week, at nights, for about a month now. At first I had great difficulty in getting up the revs.—the motor wasn't man enough for its job; however, I have a fairly decent one which I obtained from a 'Baby Cine' projector.

"The second night I tested out I was successful in receiving a good image of a young lady. I was struck with the detail in hair and top features in the face (I don't know yet what happened to the lower part of that face, it seemed to split half-way down), the waves being very distinct. The other images received were blurred, or only perhaps one side of head being at all clear. I daresay it was for want of some synchronising gear; however, I hope to overcome these effects. As shown in the photo, I have started to fit a control similar to the 'Baird' system, and I am just waiting for the necessary 30-tooth wheel.

"I will be pleased to report further on my tests of this gear, and wish the magazine every success."

How Holland is Faring

Mr. J. W. A. van Schie is one of the keenest television fans in Holland, and is tackling the problem of the reception of the Baird dual transmissions in a thorough businesslike manner. Like many others, he expresses regret at the short duration of these transmissions, and states his case for an extension of the evening transmissions. We print below his letter just as received by us, and extend to him our best wishes for his continued success.

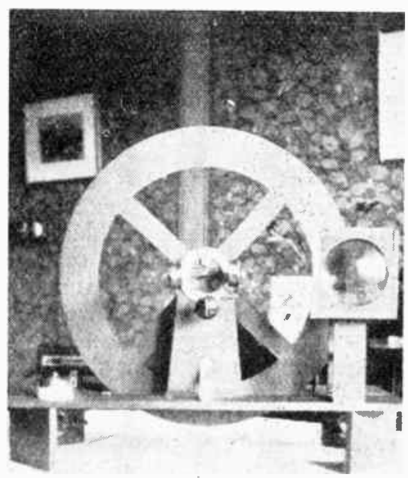
"As soon as I got advice that the apparatus from the Baird Co. had been sent to me I set to work making a suitable receiver. I chose a 4-valve amplifier, resp. two stages R.C. coupled amplification and one stage push-pull. The high tension available was 200 volts, double rectified. This amplifier gave quite a good signal, the only drawback being, however, that I used two transformers for the push-pull. As a push-pull amplifier does not allow an open plate circuit, I had to use the secondary of the output transformer, with a separate rectifier for the neon tube, as per one of the wirings of the Baird booklet.

"I have tried twice to get results with this amplifier, both times in vain. I only saw black shadows, of which I could not make anything, even with the best imagination.

"As I principally blamed the transformers for this bad result, I immediately set to work making another amplifier, with a Telefunken R.E. 604 as power valve. This valve is capable of passing an anode current of 40 milliamps. by 250 volts. As this combination could not be fed by one rectifier, I used one rectifier for the H.F. detector and one valve R.C. Another 200-volt rectifier fed the following two valves R.C., whilst a special 250-volt rectifier was exclusively used for the power valve. This amplifier gave a very quiet reception, absolutely free from any humming.

"Immediately I tried this amplifier I got the 'Televisor' synchronised. The picture I saw, however, was a splendid negative one. This gave me at least the assurance that the amplifier was working O.K., and the only thing I had to do was cutting out one stage R.C. I am now using the same number of valves, but I have simply placed the second and third amplifier parallel, and this set has given quite good results.

"The position of Continental television amateurs, however, is far worse than that of their English confreres. Although I receive London 1 with a good strength, I have continually observed a bad fading, which makes it necessary to adjust the 'Televisor' every moment. Maybe this is also due to the fact that the synchronising device is not fed by a separate



Mr. Macdonald is naturally proud of his handiwork and has started to fit a toothed wheel synchronising arrangement.

valve, but is simply placed in series with the neon tube. As, however, I have a 12-watt gramophone amplifier, which Messrs. v. d. Heem & Bloemsma, The Hague, have placed at my disposal, my next experiment will be to feed the synchroniser via this amplifier. I shall publish the results obtained in a future issue of TELEVISION.

"I only wish to express my regret that there are so few television transmissions. In the mornings I and many others are busily engaged earning our daily bread, so that we can only see-in to two transmissions a week of half an hour each at 12 p.m. E.S.T., which is equal to 12.20 Dutch summer time. It is to be hoped that shortly we will get more evening transmissions."

To My Readers

(*Concluded from page 209*)

contents of the magazine. I shall deal with these in a future issue, but here let me say that the letters, some expressing preference for the technical articles and others for general articles, were astonishingly divided. The only way to please both sides is to give readers some of each!

But I wish to make an appeal to that large body of readers who have supported the magazine from the start to help me in my work as Managing Editor by filling up the subscription form which they will find on page 193 of the magazine, thus ensuring a regular delivery and at the same time helping me to economise by not over-printing.

Few people in Fleet Street would believe that this paper has had many thousands of *regular* readers even during the period *before* television sets were placed on the market.

* * *

Obviously now this magazine is going to repay those readers who have supported us from the beginning by giving the most up-to date news and developments. Therefore it will repay you to make certain of receiving a copy by taking a year's subscription. *At the same time, should it be decided to increase the price of the magazine to a shilling those who have taken an opportunity of a year's subscription at the present rates will benefit by it.*

And in this connection I want to pay a tribute to Mr. Dinsdale, whose work as Editor of the magazine will be remembered by many readers. Mr. Dinsdale has done a good deal of lecturing, and in relinquishing his position as Editor he will no doubt expand his talents in this direction.

* * *

I beg to draw the special attention of readers to a competition which will be announced in the next issue of the TELEVISION magazine. If you want a free "Televisor" here is your chance.

I welcome letters and suggestions, etc., from readers, which should be addressed to me at the Television Press, Ltd., 505, Cecil Chambers, London, W.C.2.

Television Society Notes

THE summer meetings will take place on July 16th and 19th, when members will visit the Central Telegraph Office, G.P.O., London, to inspect the apparatus installed for the transmission and reception of photo-telegraphy.

Notices, with particulars for assembling, will be sent to members applying for tickets. Each party is limited to twenty members.

The publication of the proceedings quarterly has been decided upon by the council, and a publications committee has been formed for this purpose. It is intended that all Fellows and Associates shall regularly receive a copy as and when published.

Group centres are sending in their reports. It is noteworthy that the Hastings members have decided to take part in a television exhibit, including the work of members, at the science exhibition to be held at the White Rock Pavilion next September.

The Southend group have held various meetings and were active, with honourable mention, at the Society's recent exhibition.

At Birmingham interest is sustained by Mr. Kramer, M.I.E.E., who has been extremely active in giving very successful lectures and demonstrations of television.

Mr. Farmer reports prospects of the development of this group centre next session.

In a long report Mr. Wolfson gives particulars of very successful meetings of the Leeds group centre. The meetings are held at the Leeds University Buildings.

All interested in the formation of group centres should communicate with the Joint Hon. Secretaries, 4, Duke Street, Adelphi, W.C.2

J. J. DENTON, A.M.I.E.E.,
W. G. W. MITCHELL, B.Sc.,
Joint Hon. Secretaries.

Baird Studio Topics

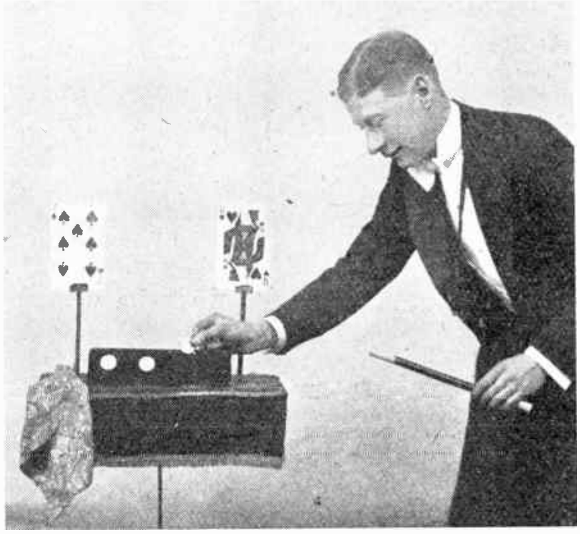
By *Harold Bradly*,

Studio Director

THE close relationship which exists between television and talking films becomes more apparent as time goes on, and one is compelled to recognise this comparison even in the studio. For instance, I will describe how, during a period of transmission from the Baird Studio, it is obviously quite impossible to give special verbal instructions to artists and staff while the microphone is "alive." We, of course, cannot close down during a television broadcast. On the other hand—and this is where talkie production differs slightly—it is possible when a film is being taken to break off when any hitch occurs.

To overcome this difficulty on our side satisfactorily it has been found necessary to introduce a novel method of conveying instructions, which has been designed with a view to avoiding any distraction to an artist who may be performing at a time when an essential communication must be made. This has been got over by means of a very simple method of light signals, and I have discovered that at no time when any signal is in operation has an artist been "put off." Any complicated system of this kind would undoubtedly cause discomfort to most artists, for it is a fact that almost the smallest interruption will invariably result in an artist "fluffing."

And this brings me to the subject of television nerves, which I should say is akin to microphone fright. Now this should not be confused with stage fright, which is really the fear of facing an audience, particularly for the first time. Experienced artists, of course, soon overcome this first fear of the footlights, although, on the other hand, very few are completely at home with themselves on a first night. But almost every seasoned artist—if I may use the word—appears to suffer from a certain nervousness when facing the flickering light of the transmitting apparatus.



Mr. Jack Stuart has been inventing some ingenious tricks specially suitable for the new television technique.

Of course, this is a new technique—the subject of my last article—to which they are unaccustomed, and whether it is the flickering light that causes the trouble or a touch of that "first night feeling" I cannot quite say. Probably the latter. However, I suppose the former has a certain disturbing effect, and my ears are now attuned to the heavy sigh that often emanates from more or less relieved artists at the conclusion of their performance. Indeed, I have many times observed a fit of trembling when it is "all over." It is a noticeable fact that during later appearances this trouble does not recur to anything like the same extent.

And now a word about voices. Comparable to the voice demanded by the talking films, the television artist should possess one of similar qualities. There is, however, no definite ruling in this matter of quality, although in most cases it should have the essential tones which give the most satisfactory broadcasting results. But there are certain performers who, although they do not possess those accepted speech qualities which are considered ideal, nevertheless "get over" with what may be called the "personality voice." Now these voices are a law unto themselves, and contain that indefinable something that lifts them out of the ordinary or commonplace. No one, for example, would claim for Miss Tallulah Bankhead, with her well-known husky drawl, that her voice possessed all or even any of the qualities that experts could by any stretch of imagination call perfect, and yet it has that peculiar attraction which, when reproduced, might unanimously be termed fascinating. The sound-film version of a scene from "Her Cardboard Lover," in which she appears, went to prove this. And at that I will leave this subject for the time being.

I think a short review of the type of entertainment now being put over the ether from the Baird Studio would prove of interest to readers of this magazine.

Most lookers-in have, no doubt, been amused and at the same time mystified by the conjuring feats of Mr. Jack Stuart. Now, Mr. Stuart has put in some good work recently by studying the technique required by television in order to get the best results from his art. Some ingenious tricks have been designed and invented by him and have got over exceptionally well.

The producers of the "London Marionettes" have also made a special study of our transmissions, and are even now busy experimenting in order to give lookers-in a novelty that can be fully appreciated.

Mr. Sydney A. Moseley has already given his views on this particular art, both in this magazine and in an occasional talk with you over the ether.

Ventriloquists, jugglers and cartoonists—the latter of whom has a very able exponent in Mr. Rupert Harvey, who has also made a special study of our requirements—have all done their bit to make our programmes varied and interesting.

The British Heavyweight Boxing Champion, Phil Scott, has promised to be "televised" during the week commencing July 21st. Compare this photograph with the image on your "Televisor."

Young Stribling, who has also promised to appear at the Baird Studio for "televising" in the week prior to his fight with Scott.

The Nature and Properties of Light

(*Concluded from page* 220)

The rings are alternately bright and dark, with a central dark spot. From the diameters of the rings it is possible to calculate the wavelength of the illuminating light with considerable accuracy. If $\frac{D}{n}$ is the diameter of the nth ring, and R is the radius of curvature of the lens, $\lambda = (D_n)^2/_2R(2n+1)$.

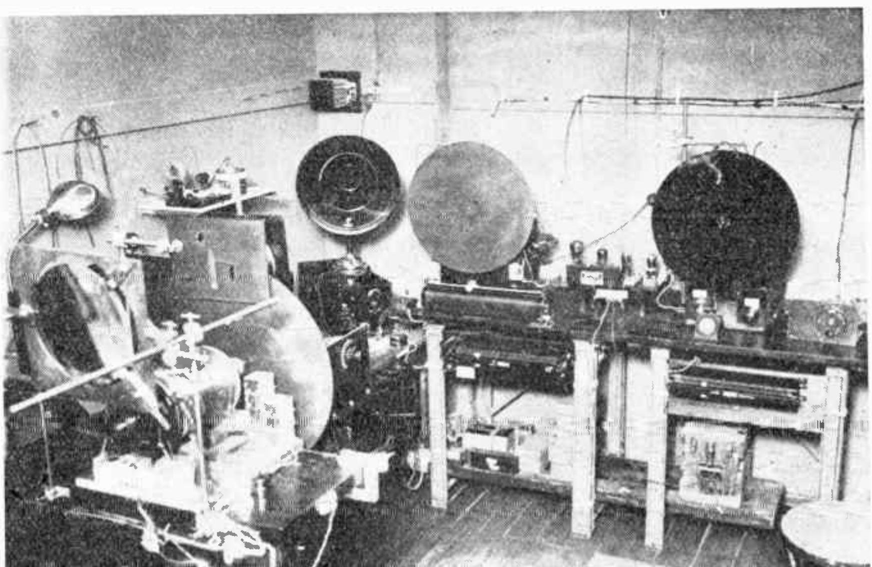
Perhaps the most interesting application of this phenomenon is Lippmann's colour photography. Briefly, the method is as follows. A photographic plate is placed in contact with a clean mercury surface, and then exposed, through the glass, in a camera in the usual manner. After development, the silver salts which have not been decomposed by light are dissolved out in the usual manner. The film now comprises a number of transparent layers of gelatine separated by thin films of silver. The thickness of each gelatine layer is that of the wavelength of the light which illuminated it during exposure. If the film is now viewed by the aid of white light, the natural colours are seen, since the waves, reflected from any two adjacent silver layers, suffer a phase change on reflection, which means that their final phase difference was due merely to their path difference.

The "Radio Times" on The B.B.C.'s Forthcoming Television Play

(Reproduced from the *Radio Times*, June 27th, 1930, by courtesy of the Editor)

Make-up for Television

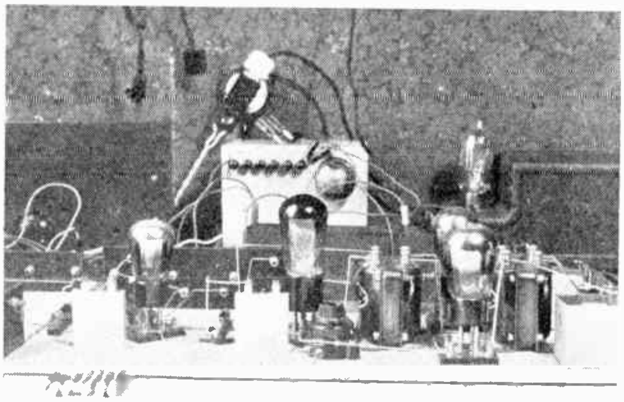
WE were present this morning at the settling of a new problem: "What make-up should be worn by the actors in a television play?" The first television play to be publicly broadcast is to be seen and heard on Monday, July 14th next—a date which may, perhaps, be memorable. Mr. Sydney Moseley, Mr. Sieveking, and the Productions Director sat before a television receiver, while a member of the B.B.C. repertory company, somewhere at the far end of a telephone line, plastered his face with yellow, brown and blue paint in an endeavour to solve the problem of "make-up." After exhaustive experiments it was discovered that the case was met by treatment similar to that required for the cinema, the actor using yellow paint for his face and touching up his lips and eyes with blue. Some make-up is required, since television reproduces the colour red as dead white. A final strengthening of the lines of the nose with streaks of blue achieved a result far superior to the unadorned images transmitted in the daily television broadcasts. The play chosen for July 14th is "The Man with the Flower in his Mouth," by Luigi Pirandello—a piece which has several times been broadcast in the normal way. It was no doubt selected for its suitability to the limited resources at the producer's disposal; it demands but two characters, while the scene is constant throughout. From the technical point of view the method of presenting the first television play will be the same as that used for the normal daily broadcast—that is, vision will be transmitted on 356.3 metres, while the sound will be heard on 261.3 metres



Some of the transmitting and receiving apparatus in use at the German Post Office.

Problems of Production

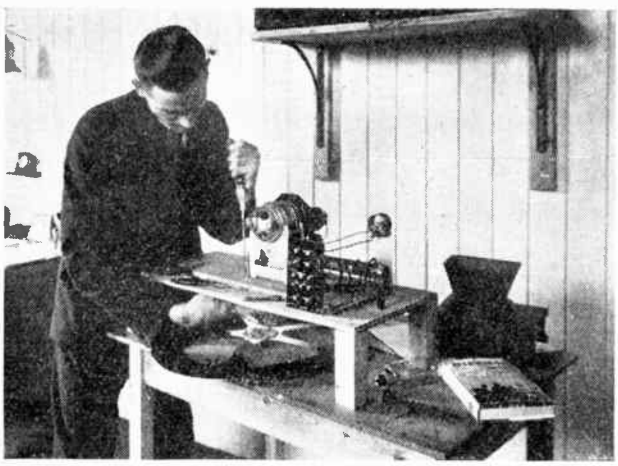
More novel and interesting in that it is entirely experimental is the method of production. Mr. Lance Sieveking, the producer, is now engaged upon the preparation of a script which will be a cross between that of an ordinary radio play and the scenario used for film production; Mr. Moseley, as joint producer, is co-operating for the Baird Company. The limitation of the resources at the producer's command demand great ingenuity. The size and range of the field in which he has to work are not extensive; they are represented by a head-and-shoulders picture of an actor sitting before the "Televisor" (with the alternative, naturally, of scenery or inanimate objects of about the same size and at the same distance). Mr. Sieveking will have to decide how to make the most entertaining—and expressive—use of his medium. From the point of view of "sound," he will be on familiar ground; but in the department of "vision," he is faced with a blank page. So far nothing more ambitious has been attempted by Mr. Baird than the presentation of a single human image—an artist singing or a lecturer talking. But in presenting a play it would hardly be possible to hold the listener-spectator's interest by simply televising the face of each speaker in turn.



Mr. J. W. A. van Schie has made up this amplifier for use in connection with the reception in Holland of the Baird television broadcast.

"Close-ups" and Scenery

The method of production used in the forthcoming experiment will, we understand, be roughly as follows: Announcements will be given in two forms; they will be spoken by an announcer and shown also as printed captions. As the dialogue of the play proceeds, images of various kinds will be televised—not only the faces of the actors but "close-ups" of their hands, the gestures they make, the glasses they drink from and other objects which illustrate and lend point to the dialogue. There will also be "scenery," though this must be of the boldest and simplest nature, since few lines of elaborate detail do not "come over" distinguishably. Mr. C. R. W. Nevinson will be responsible for this. The division between the short visual scenes will be marked by the masking out of one image and the withdrawal of the mask to reveal its successor. "The Man with the Flower in his



Busy with the early stages in the construction of a Baird "Televisor" from a kit of parts.

Mouth" will be broadcast between 3.30 and 4 o'clock in the afternoon of July 14th. Listeners who are not equipped with television sets will be able to hear the aural part of the play only, on 261·3 metres; in view of the experimental interest of the occasion many will do their best to follow the broadcast with complete apparatus. Although television has not yet reached the "service" stage, it is gratifying to note the pre-eminence of the Baird system—a real case of "British and Best."

Seeing by Wireless

By Ralph Stranger.

Ralph Stranger's Wireless Library for the "Man in the Street" is, no doubt, well known to many readers of TELEVISION. The series has now been added to by volume No. 7, which is entitled "Seeing by Wireless (Television)."

Mr. Stranger's happy knack of imparting scientific information in simple language which all can understand is fully borne out in the pages of this new volume. The subject of television is handled in a masterly way, and with well chosen diagrams and photographs the author veritably takes the reader by the hand and leads him through theoretical and practical intricacies without effort. Being right up to date, we can recommend the study of its pages by our readers, for even if it does not add to the knowledge of the advanced television fan it presents the facts of the science in a very readable and entertaining form.

Published at 1s. by George Newnes, Ltd., Strand, W.C. 2.

To Wireless Traders

The Radio Association, the oldest listeners' organisation in this country, has been reorganised, and from September 1st next will put into operation a national scheme for the maintenance of listeners' radio sets. In connection with this the Association invites the co-operation of reputable wireless traders throughout England and Wales, and applications for trade details should be addressed immediately to The General Secretary, Radio Association, 22–23, Laurence Pountney Lane, London, E.C. 4.

Owing to the organisation work involved in order to ensure the smooth working of the scheme in the coming autumn, broadcast listeners are requested *not* to apply for membership details until August next!

Letters to the Editor

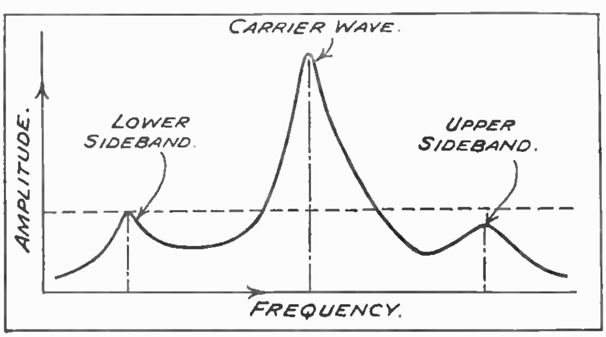
The Editor does not hold himself responsible for the opinions of his correspondents. Correspondence should be addressed to the Editor, TELEVISION, 505, Cecil Chambers, Strand, W.C.2, and must be accompanied by the writer's name and address.

MR. SPREADBURY TAKEN TO TASK.

To the Editor of TELEVISION.

DEAR SIR,—There are, unfortunately, large numbers of amateur wireless (and television) experimenters who, although they may have a sound knowledge of practical details, appear to be remarkably ignorant of the theoretical basis of wireless. Many of these experimenters are, no doubt, deeply interested in the controversy which is raging upon the "waveband theory," and, owing to their incomplete theoretical equipment, they will be easily influenced by the opinions of experts. Viewed in this light, and because authors have a certain responsibility to their less informed readers, the article by R. S. Spreadbury, "Where are the Sidebands?" in the May number of TELEVISION calls for criticism.

In his prefatory remarks, the writer puts aside the mathematical formulation of the waveband theory as a mere artifice, useful only to critical mathematicians. This attitude towards mathematics is only too prominent, especially amongst wireless enthusiasts. It is time that they realised that mathematics is not a mere tool of the physicist, to be discarded after use, but is an integral part of all theoretical structures. In support of this, I would point out that the resolution of an amplitude modulated carrier wave into sidebands is not merely a convenient procedure: it is the *only* known way of solving the relevant differential equation.



An asymmetric resonance curve showing amplitudes and relative sharpness of the upper and lower sidebands.

It is, however, the practical portion of Mr. Spreadbury's article which demands most comment. If the article is intended (as I presume it is) as a contribution to our knowledge of the subject, it suffers from the defect of being inexplicit. Whilst the writer describes briefly the circuit of his oscillator, he makes no mention of the structure of his receiving circuit, neither does he say what instrument he used to measure the response of his receiver. Did he use a thermionic voltmeter or just a telephone? If he used the latter, the experiment loses all its value from the quantitative aspect. The omission of these details makes it difficult to reproduce his results.

The obtaining of only one sideband (the lower one, 5,500 kc.) instead of two, is not difficult to explain either on practical or theoretical grounds. It will be found, on examining the solution of the differential equation for a circuit "forced" by an amplitude modulated oscillation, that the resonance amplitudes of the two wavebands are not equal, and that the resonance amplitude of the *lower* waveband is always greater than the upper. This result is confirmed by experiment, for an asymmetric resonance curve as shown above will be found for any simple circuit.

Moreover, the lower sideband gives sharper resonance than the upper. It may be then that Mr. Spreadbury's instruments were insufficiently sensitive to detect the upper waveband. This conclusion is rendered the more probable since the lower sideband was itself very weak.

Again, the writer of the article mentioned in his first experiment that "having discovered one sideband the absence of the other was puzzling, until finally the discovery was made that whilst the 6,000 kc. was modulated by 500 kc. the two frequencies were superimposed," producing a heterodyne effect. Unless I misunderstand him, he appears to be surprised at getting the very thing he wanted, for the synthesis of two different oscillations to form a single modulated oscillation is nothing more than the interference (heterodyning) of the two oscillations. In eliminating the heterodyne frequency he is removing his modulated oscillation.

In his procedure Mr. Spreadbury seems to have overlooked the fact that trouble might arise from interference between the 6,000 kc. frequency and the *tenth harmonic* of the 500 kc. frequency. This might be precluded by making the modulating frequency exactly 600 kc., one-tenth of the carrier frequency.

Yet another criticism of the experiment is that both carrier frequency and modulating frequency are radio frequencies. Results of greater importance and perhaps different complexion might be obtained if the modulation had been of audio frequency. Mr. Spreadbury's results do not, as they stand, apply to broadcasting. The results of his second experiment appear to be inconclusive.

In conclusion, I would like to mention that the inability of a certain circuit to respond to wavebands affords no disproof of their existence, for, as in the analogous optical example of a spectrometer and diffraction grating, the circuit may not have sufficient resolving power to separate the wavebands.

In any case Mr. Spreadbury will have difficulty in refuting the experimental evidence mentioned by Professor Fortescue (*Nature*, February 8th, 1930), and the results of work at the National Physical Laboratory discussed by Mr. F. M. Colebrook (*Nature*, May 10th, 1930).

Yours faithfully,

MERLIN S. JONES.

Morlais House, 229, Chepstow Road, Newport, Mon.
May 20th, 1930.

THE SIDEBAND THEORY.

To the Editor of TELEVISION.

DEAR SIR,—The letter by Mr. C. E. G. Bailey in your June issue is interesting, but I think he has not fully appreciated the statement in the clause numbered (2) of his article. He says: "When two qualities are adequately represented by algebraically identical expressions they are not distinguishable by any physical process." As a statement this may be true, but it does not follow that the two expressions he gives in clause (1) are *adequate* representations of what he assumes them to represent.

Furthermore, it is not exactly clear what is meant by "distinguishable by any physical process." The ability to perceive distinctions depends upon the method or means of comparison.

I might write down an equation, 2 buses+2 trams=4 vehicles. Algebraically this is quite correct, and it is possible to imagine a receiver in the form of an untutored savage who would not appreciate the difference between a bus and a tram. So far as he is concerned the two sides of the equation are not distinguishable by any physical process, and I suggest that the sideband theory is somewhat similarly hampered. I do not deny the algebraical equivalence (not identity) of the two modes of expressing a modulated wave, but I do suggest that an ordinary present-day receiver *may* not be capable of distinguishing between them, whereas some day a receiver may be evolved which *can* distinguish between them. It would be a receiver which would distinguish between a single modulated wave giving, say, a single pure note, and two waves which heterodyne one another to give the same pure note.

Obviously, a receiver which is perfectly selective and will not receive anything other than one specific frequency might receive the modulated carrier-wave, but it could only receive one of the heterodyning waves, and so could not reproduce the beat note of the heterodyning waves.

Yours faithfully,

J. C. RENNIE.

22, Thurlow Road, Hampstead, N.W.3.
June 3rd, 1930.

MR. SPREADBURY REPLIES TO HIS CRITICS.

To the Editor of TELEVISION.

DEAR SIR,—In reply to your correspondents, Messrs. C. E. G. Bailey and Merlin Jones, I can assure them that I have not forgotten the mathematical aspect of sidebands, and am familiar with the equation they quote. This equation is applicable to simple wave motions, such as height or pressure waves, but when applied to electro-magnetic waves it becomes less than one-half of the truth. What grounds are there for applying this equation to wireless waves, the very nature of which is obscure, and which comprise two entirely independent waves, namely, electric and magnetic waves, having a phase difference of 90°? A modulated frequency is not identical with superimposed frequencies, and this has been proved.

[*P. & A. Photos.*

Mr. Philo Farnsworth, a twenty-three-year-old San Francisco experimenter, with a new television receiver which he has made.

Can either of your correspondents explain how, supposing the existence of sidebands, it is possible to receive a transmission which is within the sideband of an adjacent transmission without interference?

A property and defect of slightly damped oscillatory circuits is that they will respond to non-existent frequencies. Thus, if impulses of one micro-second duration be applied to such circuit at intervals of one milli-second it will respond if tuned to any frequency which is a multiple of one kilo-cycle. Similarly, it will respond to non-existent sideband frequencies, in which case it will receive one effective impulse every K cycles where K equals the tuned frequency in cycles per second, divided by the modulating frequency in cycles per second. I expect Mr. Bailey used such a circuit in his receiver, when he repeated my first experiment. If he substituted a circuit sufficiently damped to give good modulation response at 500 kc., or better still employed a filter circuit, he would lose his sidebands.

I am afraid I cannot agree that my modulation was too weak, since, when tuned to the carrier frequency, detection by rectifying this frequency reproduced the 500 kc. frequency at good strength.

Finally, I would ask Mr. Bailey how, as explained in his final paragraph, two different superimposed frequencies can be made to neutralise each other, no matter how the individual phase be altered.

Yours faithfully,
R. S. SPREADBURY.

30, Holmesdale Road, Teddington, Middlesex.
June 5th, 1930.

A YOUTHFUL READER'S PROGRESS.

To the Editor of TELEVISION.

DEAR SIR,—I was greatly impressed with an article in the June issue (1930) on water-motors, because I am experimenting with this method of motive power as I have neither "mains" nor accumulators to drive an electric motor. Furthermore, may I say that I also find the letters in your correspondence columns most useful, especially those dealing with details of lamps, lenses, etc. ?

I am hoping that more information will be given in future about different types of lenses, water, glass or liquid, etc., as this is a subject which has not been dealt with fully before. (This was also suggested by Mr. S. G. Ford in June, 1930, issue.)

I am making good progress with television, although I am only 18, and still at school up to end of this summer, and therefore I have not very much spare time or money.

For the good of any other television enthusiasts similarly situated, I would say that a water-motor, even if constructed from Meccano parts, as mine is, works very well with a good reserve of speed.

I have an ordinary Osglim neon lamp (beehive type), and a straight-forward four-valve set (H.F., Det, L.F., and power or super power), and am hoping to achieve as good results as other amateurs seem to be getting. If you think it worth while, I will let you know how my television set "works."

Wishing every success to your splendid magazine, and hoping that television transmissions will soon be extended to more "reasonable" times through the co-operation of the B.B.C and Television Company.

Yours faithfully,
C. J. HARDING.

120, Glenthorn Road, West Jesmond,
Newcastle-on-Tyne, *June 8th*, 1930.

[We shall welcome reports of how Mr. Harding's television set works and wish him all the success he deserves.—ED.]

SHALL WE HAVE OBSERVER ?

To the Editor of TELEVISION.

DEAR SIR,—The point raised by your correspondent, Mr. C. H. Keeling, is interesting, as he is searching for a word which is bound to be used a great deal in the future.

"Se-er-in" is, of course, impossible, though some people are using it already: though perhaps it is grammatically permissible, a short word containing two "hiccups" is too ridiculous.

Mr. Keeling asks whether "looker-in" is good English. But he must remember that such an expression, being very new, almost, in fact, coined for the occasion, may always be used in inverted commas. But as to its adoption to a permanent position in Television language, I agree with him that a one-word phrase is better.

"Scanner" is not bad, but, as he says, it may be confused with scanning discs, and, in any case, it is nearly always used in such phrases as "scanning the horizon," so that perhaps something better might be found.

"Gazer" is not so good. Its application to astronomy was contemptuous.

But perhaps "Observer" is better in some ways. It, again, is not perfect, but I think it would come into use quite quickly. It has also been applied to astronomers, but in a more honourable sense than "gazers."

Perhaps somebody will find a better suggestion.

I cannot help feeling that these discussions, and the searching out of appropriate words, do tend to help towards inspiring confidence in the public mind. It is a psychological fact that many people are impressed by the appearance of some new word *without inverted commas.*

True, it is rather foolish, but it is a fact, so that this standardization of terms may help to stimulate what a recent Editorial called "Television-mindedness."

Yours faithfully,
A. J. C. SHERER.

Dundaff Muir, Camberley, Surrey.

A SUGGESTION FROM MR. WOODFORD.

To the Editor of TELEVISION.

DEAR SIR,—I noted with interest the remarks of your correspondent, Mr. C. H. Keeling, in the June issue of this journal. He apparently takes me to task for suggesting the name "Looker-in," but I am afraid that the two names that he suggests, namely "Scanner" and "Gazer," are not so well suited as my original suggestion. In any case the question of Television nomenclature will have to be settled at a very early date, and I understand that a Committee of the British Electrical Standards Association has the matter in hand. We shall look forward to the results of their deliberation with the keenest interest, and in the meantime perhaps your correspondent and other readers would prefer "Televiewer."

The comments of your readers would be appreciated.

Yours faithfully,
JOHN W. WOODFORD.

London.

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Printed by HAZELL, WATSON & VINEY, LTD., 52, Long Acre, London, W.C. 2, and published for the Proprietors, TELEVISION PRESS, LTD., 505, Cecil Chambers, London, W.C. 2, by THE ALDINE PUBLISHING CO., LTD., Crown Court, Chancery Lane, London, W.C. 2. Address for advertisements, "TELEVISION" ADVERTISEMENT DEPT., 26, Charing Cross Road, London, W.C. 2. Sole Agents for America, THE INTERNATIONAL NEWS COMPANY, LTD., 131, Varick Street, New York, U.S.A. Registered for transmission by Canadian Magazine Post. Entered as Second Class Matter, March 15, 1929, at the Post Office at Boston, Mass., under the Act of March 3, 1879 (Sec. 397, P.L. and R.).