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AND
EXPERIMENTAL WIRELESS

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DECEMBER 1933

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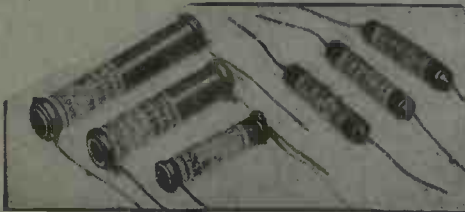
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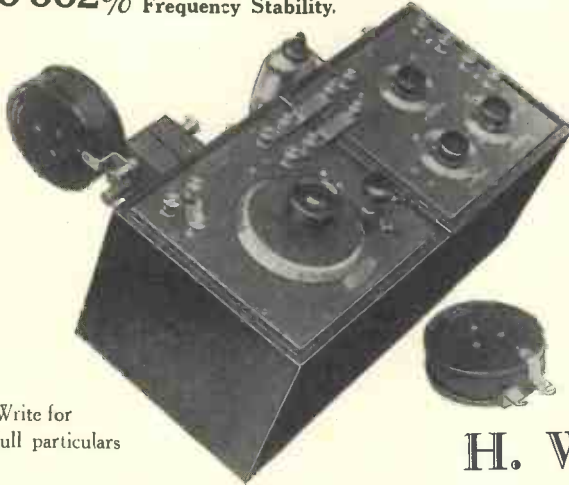
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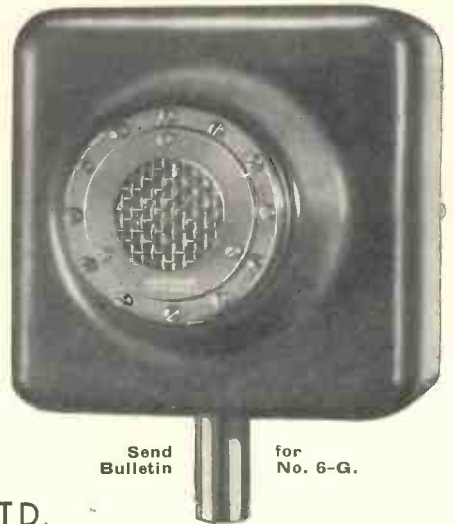
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WIRELESS ENGINEER

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VOL. X.

DECEMBER, 1933.

No. 123

Editorial

Electrical Interference with Broadcast Reception

ABOUT six months ago the Institution of Electrical Engineers appointed a committee to inquire into the subject of Electrical Interference with Broadcasting, and some of the sub-committees of this committee have recently issued a preliminary report. Our readers will be interested in the parallel activities of the "Kommission für Rundfunkstörungen" set up by the Verband Deutscher Elektrotechniker. This committee has, through two of its sub-committees, issued two draft regulations, which were published in the *E.T.Z.* of 28th September, with the request that any objections should be lodged with the V.D.E. before 30th November. These draft regulations cover six pages of the *E.T.Z.*, and go into considerable detail. The first draft deals with the precautions to be taken in lines and networks, and in the receiving set and aerial; the second, which is much longer, deals with the steps to be taken to render electrical apparatus non-disturbing. In each case there is a preliminary statement that the regulations are intended to indicate how, in the present state of the art, interference can be reduced, with due regard to price, practicability and reliability. The draft dealing with networks is subdivided into four sections dealing respectively with power networks, trolley wires, signalling networks and the radio receiving apparatus

itself. In the case of power networks it recommends that all straight-through and tee connectors should be firmly secured, that all contact with tree branches, straw, etc., should be avoided, as should also all sharp points on high voltage wires, clamps, etc. That insulators should be kept clean and replaced if damaged, and that the lines should be run underground wherever possible, especially in thickly populated districts. It recommends that the aerial should be erected as remote as possible from the wiring system of the premises. In connection with trams it points out the necessity of good mechanical construction of the collecting wheel or bow so as to maintain steady pressure and contact, and also the use of materials which do not tend to spark production. It also emphasises the importance of maintaining the overhead wire and the track in good condition in order to avoid sudden blows on the collector with consequent vibration and intermittent contact. A further point is the necessity for maintaining good conductivity at the rails joints to prevent the flow of high-frequency currents through the earth. The recommendations for signalling networks are almost identical with those for low-voltage power networks. For aerials it is recommended that they be as high as possible and kept as far as possible from the house and any disturbing wiring ;

it is also suggested that the lower part may be screened and in some cases the screen used as a counter-capacity instead of

external circuit from disturbances arising at the commutator. Further protection is obtained by connecting condensers of about $0.1 \mu\text{F}$ across the whole machine and, if this proves insufficient, other such condensers across the armature. Finally, if all these prove insufficient, choking coils should be inserted in the supply wires. In all the diagrams the steps are numbered in the order in which they should be applied. Diagrams are given for series and shunt motors, motors with commutating poles and for rotary converters. If the frame of the machine is not earthed, a condenser should be connected between it and some point of the winding to provide a path for high-frequency currents. As an example of the successive application of protective devices diagrams are given for a series motor. As a final step a choking coil is even inserted in the earthing lead from the frame of the motor.

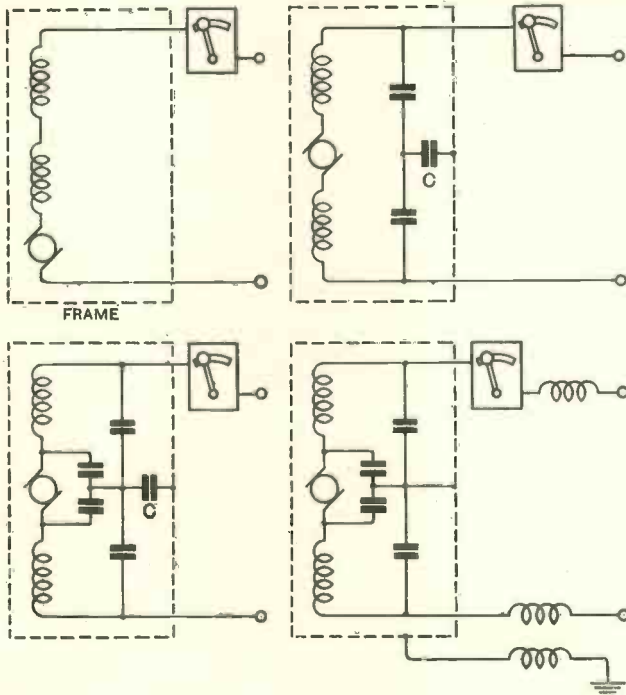


Fig. 1.—If the frame is earthed, the condenser C is replaced by a direct connection.

employing an earth connection. If an earth connection is used, it should be as short as possible, and not parallel to interfering leads. Little is said about the receiving set beyond suggesting screening and the insertion of filters in the supply leads.

The second draft dealing with the steps to be taken to render electrical machines and apparatus innocuous gives a great many diagrams showing how the condensers and choke coils may be connected. It is emphasised that the condensers and coils must be so constructed that they do not decrease the efficiency or the reliability of the apparatus to which they are fitted. Special stress is laid upon the importance in all new construction of the symmetrical distribution of the field windings with respect to the armature. If in a series motor the field winding is divided into two parts with the armature connected between them, they will serve as chokes and protect the

and should be shunted with a condenser; if necessary, a damping resistance should be inserted in series with the condenser. Still further protection is obtained by inserting choke coils on either side of the switch as shown in Fig. 2. This applies also to signalling apparatus in which contacts are made and broken. It is stated that the values of the condensers lie between 0.1 and $2.0 \mu\text{F}$ and of the resistances between 5 and 500 ohms, the best values being determined by experiment in each case. In the case of electric bells

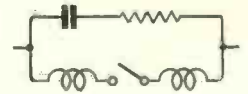


Fig. 2.

the contact should be connected between the windings of the two magnet cores, in addition to being shunted by a condenser and resistance. In extreme cases, choking coils may have to be inserted in the leads and a condenser connected across them as in the

series motor. Somewhat similar precautions should be employed with vibrating contact rectifiers.

Special arrangements are necessary with rotary rectifiers for supplying X-ray and dust depositing plant. High resistances or choke coils of low capacity should be inserted in the leads from the contacts, in addition to filters on the primary side of the transformer. Filters should also be fitted to the primary side of the filament-heating transformer for hot cathode X-ray tubes. If these precautions are insufficient the whole apparatus should be metallically screened in a Faraday cage. It is stated that large mercury rectifier plants do not as a rule cause any disturbance, but that in small ones condensers should be connected between the cathode and the anodes, and, if necessary, high-frequency chokes inserted in the anode leads between the anodes and the condenser tappings. The same applies to any form of gaseous rectifier. In the case of Tesla coil medical apparatus, filters should be inserted between the apparatus and the mains, and the open oscillatory circuit should be "closed" by bringing out a connection from the other terminal of the Tesla coil—if necessary, through a condenser—and using it to screen the working electrode.

Diathermy apparatus is very troublesome, and a filter of several sections should be inserted in the supply wires and kept remote from the high-frequency apparatus and operating leads. If necessary, the high frequency part of the apparatus, including the patient, should be enclosed in a metallic screen.

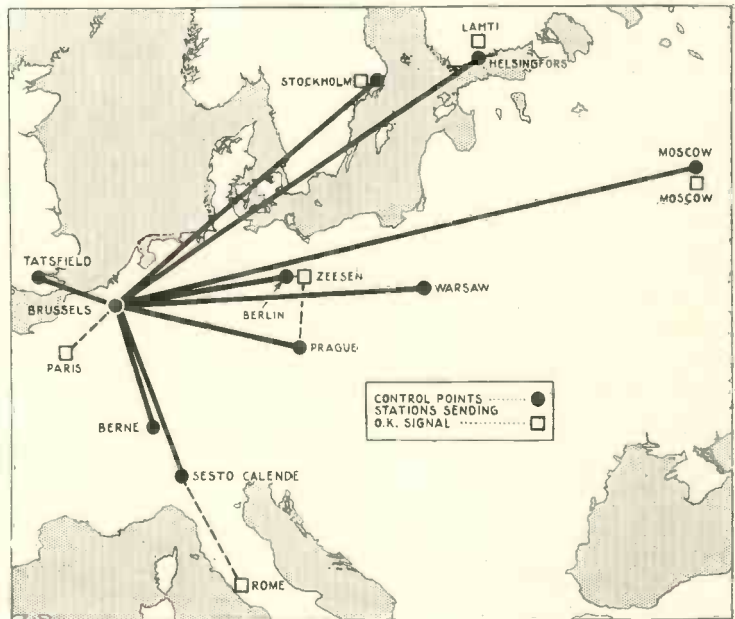
It is pointed out that radio-receiving sets may themselves be the source of interference, not only due to the well-known oscillations set up by excessive back-coupling, but also due to faulty connections in the set or aerial and contact between the aerial and surrounding bodies. It is stated that the latter can cause wide-reaching interference. It is also stated that excessive back-coupling may cause interference in neighbouring receivers even if it is not carried to the point of oscillation. Another cause of interference is the modulation at the supply frequency of the carrier frequency picked up by the supply leads and passed into the rectifier unit.

What legal force, if any, will be given to these regulations when they have been approved we do not know, but they will certainly be useful to any other body, such as our own Institution of Electrical Engineers, which is considering this important question.

G. W. O. H.

Lucerne Wavelength Plan

AT 11 p.m. on 14th January all European broadcasting stations will close down. Then, one by one, in each of seven main groups, they will resume transmission according to special schedules, their new wavelengths being checked at the control points shown in the map. Certain high-power stations, also shown, will broadcast the results of each calibration. The centre of operations will be the Brussels checking station of the International Broadcasting Union.



High Power Pentode as an Electron Coupled Transmitter*

By J. C. W. Drabble and R. A. Yeo, B.Sc.

SUMMARY.—Experiments on electron coupled transmitters, using a silica pentode capable of dealing with an input of 4 kW. are described. Conditions for most efficient working are obtained. Both efficiencies and stability are comparable with those of a two-stage master oscillator transmitter. A method of modulating this pentode is investigated and it is found that it would be possible to modulate this 4 kW. pentode by means of a small receiving valve and transformer. The short wave limitations are discussed and found to be about 15 metres.

Introduction

A CERTAIN amount of work has been done by Lt. J. B. Dow† in America on electron coupled oscillators, that is, oscillators in which the coupling to the output or load circuit is provided by the electron stream reaching the anode of a four-electrode or screen grid valve, the output circuit being connected to the anode and the oscillatory circuit to the two grids of such a valve. This type of circuit has certain disadvantages, the two most important being:—

(1) The proximity of a high potential screen to the anode gives rise to secondary emission effects which are likely to cause considerable trouble.

(2) In order to prevent feed back from the driven to the driver circuit through the anode-screen capacity neutralisation is necessary unless an inverted type of circuit in which the screen is at zero high frequency potential is used.

Preliminary Experiments

The following investigation employing a pentode as an electron coupled oscillator was suggested from consideration of the fact that the earthed or suppressor grid of such a valve would act as an electrostatic screen and make neutralising unnecessary and secondary emission impossible. The work was started before it became known that Lt. Dow had continued his research, using the pentode, but so far as is known none of his results in that connection has yet been published.

The circuit used for the greater part of these experiments is shown in Fig. 1, where it will be seen that the driver circuit is of the Hartley type and is connected between the first and second grids, the output circuit being connected between anode and filament.

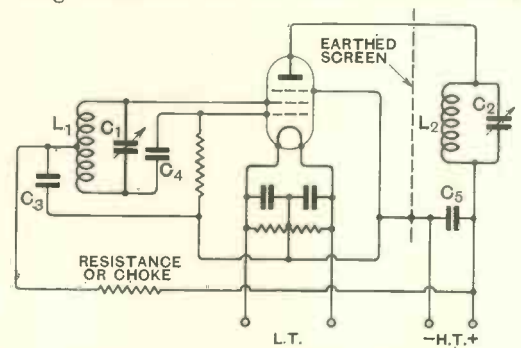


Fig. 1.—Pentode connections for C.W. working.
 $L_1 = 14 \mu H$; $L_2 = 18 \mu H$; C_1 and $C_2 = 0.0001 \mu F$ (max.); $C_3 = 0.0002 \mu F$; $C_4 = 0.0001 \mu F$; $C_5 = 0.001 \mu F$.

In the original experiments small receiving pentodes were used. Very promising results were obtained using a Marconi PT2, a two-volt pentode which works with a maximum potential of 150 volts on screen and anode when used as an output receiving valve. In these tests the potential used was never increased beyond 100 volts on both anode and screen.

With the driver circuit oscillating at a wavelength of 80 metres (3.75 megacycles/sec.) it was noticed that considerable changes in the applied H.T. voltage and in the tuning of the output circuit could be made without seriously affecting the generated frequency of the driver circuit. A 28 per cent. change in H.T. caused a change of 100 cycles/sec. in the driver frequency, representing a frequency change of one part in 37,500. Con-

* MS. received by the Editor August, 1933.

† "A Recent Development in Vacuum Tube Oscillator Circuits."—J. B. Dow, *Proc. I.R.E.*, December, 1931. "Electron Coupled Oscillator Circuits."—J. B. Dow, *Q.S.T.*, January, 1932.

siderable changes in output tuning were made without causing a greater change than 500 cycles/sec. in the master frequency. It was noticed with these small receiving pentodes

placed at right angles to each other, but no screening was used. This precaution would possibly have given still further improvement to the frequency stability and possibly



Fig. 2.—Silica Pentode constructed in H.M. Signal School, Portsmouth.

that the optimum value of the grid leak was somewhat critical, for the PT2 being about 5,000 ohms. The Mullard PM22 would not work satisfactorily with this value of grid leak, but the investigation was not pursued to any extent with these valves as it was desired to proceed to high power as soon as it was ascertained that the circuit functioned as anticipated. A rough comparison was carried out with 100 volts H.T. between the pentode circuit using a PT2 and a two-stage master oscillator transmitter using PM202 valves both as master and output. The efficiency of the pentode circuit appeared to be slightly less but the frequency stability slightly better than the two-stage transmitter.

It should be understood that these tests were only considered to be in the nature of preliminary experiments and no elaborate precautions were taken to obtain the best working conditions with these small valves. The input and output circuits were arranged as far apart as practicable and the coils

to the efficiency. The use of one of the more recent screened pentodes in which the anode is brought out to a terminal on the top of the envelope offers further possibilities for improved working owing to the absence of capacity between screen and anode leads in the pinch.

The work with the small receiving pentodes appeared to be so promising that it was decided to proceed to high power experiments with the largest pentode available.

Description of Silica Pentode

This valve which was constructed in H.M. Signal School, Portsmouth, is illustrated in Fig. 2. The envelope is made of transparent fused silica and is 10 cms. in diameter and 32 cms. in length. Including seals, the overall length of the valve is 60 cms. All seals are of the lead plug type with molybdenum rods as internal conductors and flexible stranded copper external conductors.

The anode and high tension screen seals are brought out at one end, and suppressor screen, grid and both filament seals at the other.

The filament is a loop of pure tungsten wire kept in tension by a spring and has a total length of 30 cms. and diameter of 0.7 mm. This requires a heating current of 28 amps. at 15 volts. The dimensions of the other electrodes which are cylindrical in form are as follows:—

Electrode.	Diameter in cms.	Length. in cms.
Control grid ..	3.0	16
H.T. screen ..	4.5	18.5
Suppressor screen ..	6.0	14.0
Anode ..	8.0	12.0

B

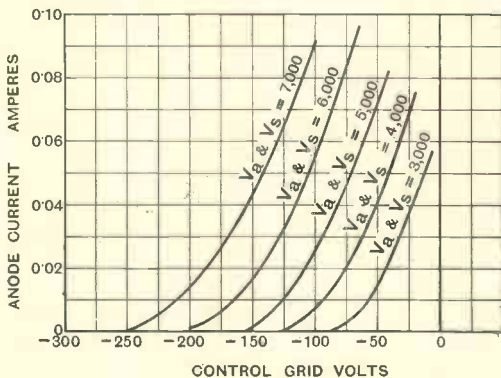


Fig. 3.—Equal screen and anode potentials V_a and V_s .

The three grid structures are built of molybdenum wire, 0.15 mm. diameter, in a 1.5 mm. mesh construction. The anode is made of molybdenum strip wound basket fashion to a cylinder of the size given. During bombardment the control grid was joined to filament and a power of 4.8kW. was dissipated by the other electrodes which were all joined together and to the high tension supply.

This valve was not designed for the purpose outlined in these experiments, having, in fact, several disadvantages from that point of view, the two most important being:—

(a) The H.T. and suppressor screens have a closer mesh construction than is desirable. This will be seen by reference to the static characteristics of the valve which are shown in Figs. 3, 4 and 5. These reveal the fact that with equal potentials on anode and screen, the screen current is in general greater than the anode current. Thus, when this valve is used as an electron coupled oscillator, the driver portion absorbs an unnecessarily large proportion of the total input and so reduces the overall efficiency. These facts are all confirmed in the subsequent experimental work.

(b) In order to obtain the greatest amount of screening between driver and driven circuits, the anode seal should be brought out at one end, all the remaining seals being brought out at the other. In addition to allowing considerable improvements in screening, it would also be possible to obtain a better circuit lay-out of the driver circuit, a point which is of considerable importance when it is desired to work at short wavelengths.

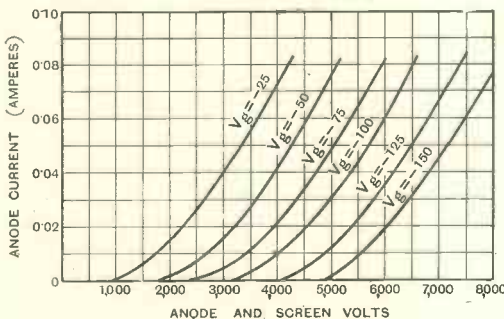


Fig. 4.— $V_g =$ control grid volts.

Optimum Load

In order to obtain accurate figures for the efficiency of this valve, preliminary tests were carried out to ascertain the optimum load impedance for the output circuit. A

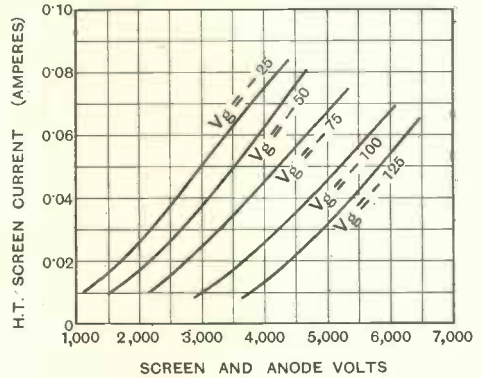


Fig. 5.— $V_g =$ control grid volts.

Hartley circuit consisting of 15 turns of $\frac{3}{8}$ -inch copper tubing on a 5-inch former and 100 $\mu\mu\text{F}$. variable condenser set at maximum was connected between grid and H.T. screen, and this including valve capacities tuned to 80 metres. The output circuit consisted of 9 turns of $\frac{3}{8}$ -inch copper tubing on an 8-inch former and a 100 $\mu\mu\text{F}$. variable condenser. With the latter set at 77 $\mu\mu\text{F}$. this circuit also tuned to 80 metres. A series of readings of input and output power were taken, the variations being made by connecting various values of resistance in the tuned output circuit. These readings are shown plotted in Fig. 6 and indicate that for the circuit used the best output is obtained with a resistance of the order of 9-12 ohms in the output circuit. This corresponds to an output load impedance of from 15,000 to 20,000 ohms taking into account anode-screen capacity in parallel with the tuning capacity, but it will be seen that the value is not very critical. This estimate of optimum anode load impedance was made for three values of applied voltage, both anode and screen potentials being the same. Another estimate of optimum load impedance was made with the screen at a lower potential than the anode. With 3,000 volts on the anode and 2,300 on the screen, the optimum load impedance does not change very considerably, having a slightly higher value.

In this case, the lower screen potential was obtained by inserting a resistance in the H.T. lead from the common supply. It may be mentioned here that it was found necessary to insert a high frequency choke or a resistance of at least 1,000 ohms in this lead in order to eliminate coupling between driver and driven circuits *via* the common H.T. supply; if this was not done, the two circuits combined to form an inefficient oscillatory circuit of longer wavelength than that to which either was tuned.

In all of the subsequent tests on 80 metres (except those on frequency stability), the series high frequency resistance of the output tuned circuit was 9 ohms, a value which was checked in a separate experiment. This is equivalent to a load impedance of about 20,000 ohms and it will be seen that this represents a load fairly near the optimum for most conditions under which the valve was subsequently operated.

Optimum Conditions for the Driver Circuit

The next set of readings was taken in order to determine the best value of grid leak

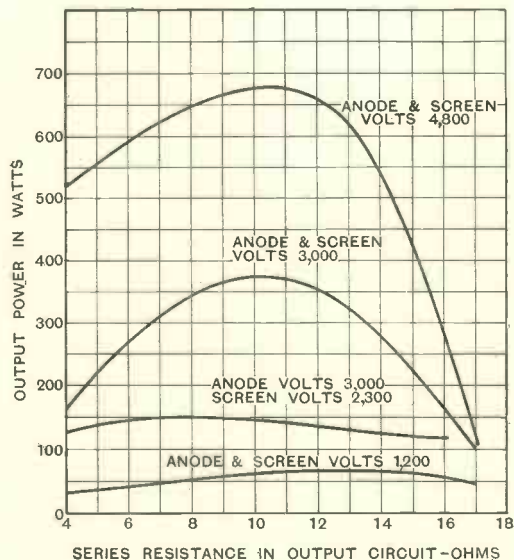


Fig. 6.—Grid leak 2,500 ohms; driver circuit tapping $6\frac{1}{2}$ turns from grid.

resistance and tapping point on the coil of the driver circuit. The anode and screen volts were kept constant at 3,000. Curves plotted from the readings taken are shown in Fig. 7. In determining the best working

conditions of the circuit, it is necessary to take into consideration the four factors: output watts, overall efficiency, efficiency of the output stage, and the ratio of input power to anode stage over total power input. This last factor is of some considerable importance in a circuit of this nature as it

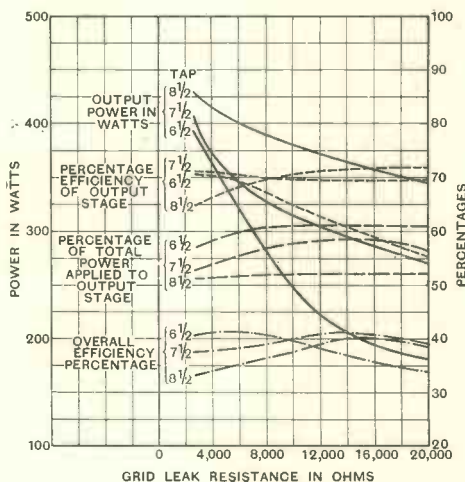


Fig. 7.—Anode and screen volts = 3,000.

gives some indication of the percentage power which is dissipated by the screen which forms the anode of the master circuit. It is quite obvious that as this is of mesh construction, the amount of power which is dissipated by it should be as low as possible and hence the ratio of input power to anode stage to total power input should be as high as possible. This applies more especially to the valve used in these experiments since the H.T. screen was not intended to dissipate a very large proportion of the input. A valve designed for an electron coupled transmitter should have a much more robust H.T. screen built up of thicker wire. On the other hand, the high values reached for the efficiency of the output stage indicate that, if necessary, the anode could be of a much lighter construction than that used, since it is not called upon to dissipate a very large proportion of the input power.

Taking all of the factors into consideration, it will be seen that the best conditions are obtained with a grid leak value of the order of 2,500 ohms and with a tapping on the driver circuit about $6\frac{1}{2}$ turns from the grid end. With these conditions, the overall

efficiency is just over 40 per cent. and the efficiency of the output stage just over 70 per cent. These efficiencies are comparable with those of a two-stage master oscillator transmitting on this frequency, that of the output circuit having reached almost the maximum efficiency of a class B amplifier stage. The percentage of the input power which is absorbed in the driver stage is of the order of 40 per cent. so that it may be assumed that the screen forming the anode of the driver stage is called upon to dissipate not more than 25 per cent. of the total input. The H.T. screen in this valve is just capable of dissipating this proportion of the total input at full load input of 4 kW. With a valve having H.T. and suppressor screens of more open mesh, the proportion of power dissipated by the screen could be reduced considerably and the overall efficiency increased.

It is interesting to note from the curves that as the tapping on the master circuit is moved away from the grid, that is, as the excitation is increased, the maximum value of overall efficiency is obtained with higher values of grid leak. This is what one would expect with a triode oscillating valve.

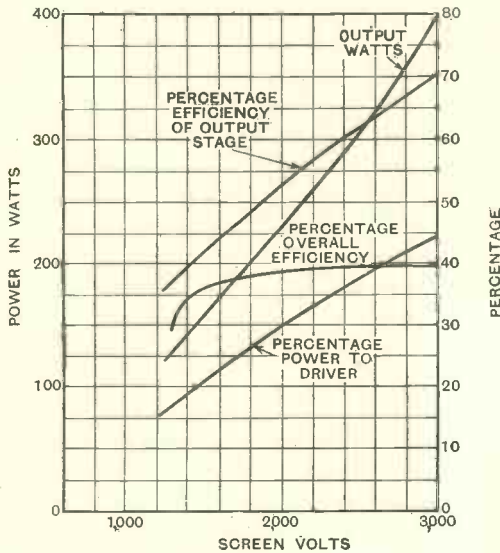


Fig. 8.—Anode volts = 3,000 ; grid leak = 2,500 ohms.

In order to determine the influence of screen voltage on power output and efficiencies, a set of readings was taken and are

shown plotted in Fig. 8. It will be noticed that all of the curves have a rising characteristic although the overall efficiency curve flattens out after the screen volts exceed

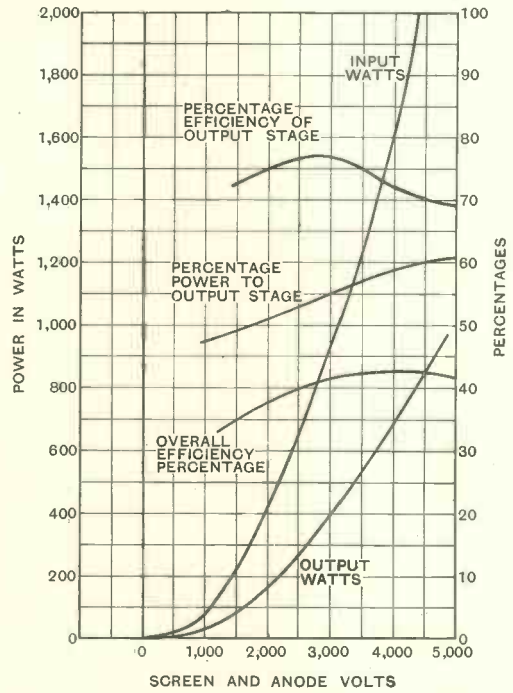


Fig. 9.—Grid leak 2,500 ohms ; driver circuit tapping 6½ turns from grid.

50 per cent. of the anode volts. It is interesting to notice that the output watts rise as the anode volts are raised relatively to the screen volts, and at this point the overall efficiency is also at a maximum. Although the percentage of power absorbed in the driver rises with rise in screen volts, this is counterbalanced by the rise in efficiency of the output stage.

Efficiency when Working with Optimum Conditions

With the valve working with the complete set of optimum conditions as determined in the previous experiments, that is, driver tapping point 6½ turns from the grid, grid leak resistance 2,500 ohms, output load impedance 20,000 ohms and equal voltages on screen and anode, a set of readings was taken to show the variation of efficiency and output with variation of anode and

screen volts. These curves are shown in Fig. 9. The efficiency remains fairly constant at a value just above 40 per cent. when the voltage exceeds 3,000. The efficiency of the output stage reaches the very high value of 77 per cent. at about 3,000 volts potential, but falls off slightly beyond this value. These experiments were carried out in a laboratory fitted with a limited power supply which fixed the upper limit of supply voltage to the valve at about 5,000 volts. It is considered, however, that this voltage could be increased to 6,000 without exceeding the maximum load which the valve is capable of withstanding. The output power would then be about 1.6 kW.

Frequency Stability

Measurements of frequency stability were made at a wavelength of 80 metres. The ratio L/C of the output circuit was reduced considerably for this experiment in order that finer variations of tuning could be made. The constants used were C (including anode-screen capacity) $347 \mu\mu\text{F}$., $L = 5.2 \mu\text{H}$.

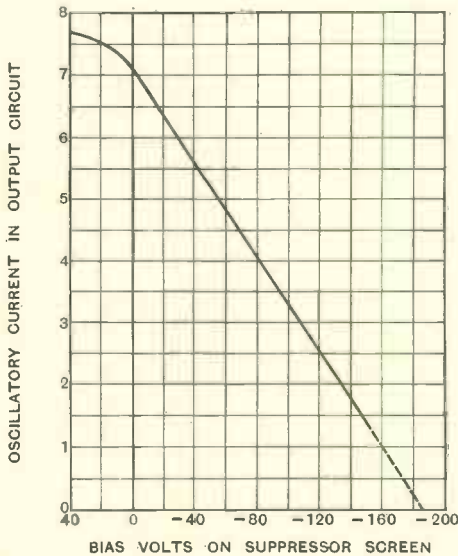


Fig. 10.—Oscillatory current in output circuit. Anode and screen volts 3,000; grid leak 2,500 ohms.

The high frequency resistance of this circuit was such that the anode load impedance was very near optimum value. The tuning capacity of the output circuit was decreased to $306 \mu\mu\text{F}$. and a change in frequency of

1,000 cycles was observed. An increase in capacity from the tuning point to $388 \mu\mu\text{F}$. gave the same change of frequency. Thus a variation of about 12 per cent. on either side of the tuning capacity caused a change of about 0.025 per cent. in the generated frequency. Even with the worst weather conditions, the change of aerial capacity in a ship, due to roll and wind, would never attain this high value.

A variation in H.T. from 1,200 to 4,800 caused a frequency change of not more than 1,000 cycles, the change being in the sense of an increase in frequency for an increase in voltage. This represents a frequency change of one part in 3,750 when the H.T. voltage is varied in the ratio of 1 to 4.

The filament volts were varied one volt on either side of the working voltage, the total change of frequency observed being about 1,500 cycles in the sense of an increase in frequency for a decrease in filament volts.

If the supplies for H.T. and filament were obtained from the same machine, the frequency changes due to variation of these voltages would, to some extent, cancel each other.

Modulation

During the preceding experiments, the suppressor screen was connected to the mid point of an equalising network of resistance and capacity connected across the filament of the valve. Using the original output circuit having an equivalent impedance of 20,000 ohms, a set of readings was taken to determine the relation between a bias voltage applied to this screen and the oscillatory current in the output circuit, the anode and screen potentials being maintained at 3,000 volts. The bias battery was shunted by a fixed condenser. Curves plotted from the readings taken are shown in Fig. 10. Between 0 and -185 volts bias, the oscillatory current bears a linear relation with bias volts. When the bias volts are increased in a positive direction, the curve begins to bend over. Thus, with 3,000 anode and screen volts and a fixed bias of about -90 volts, distortionless modulation for I.C.W. or speech transmission could be obtained with a 100 per cent. modulation, by applying an alternating voltage of 90 volts peak value to the suppressor screen. It will be observed that the

required modulating voltage is a very small proportion of the anode potential and at this point of the investigation, it appeared that a very small valve of the receiving

This curve is shown in Fig. 12 and confirms the results shown in Fig. 11. These curves indicate that a certain amount of power will be absorbed by the suppressor screen when a modulation is applied to it though undistorted modulation of the transmitter still lies within the capabilities of a small receiving valve, possibly of the power type. The fact, however, that the screen did take current when at a negative potential, required some explanation. It was at first thought possible that an electron oscillation of the Barkhausen-Kurz type was being produced. To test for this, the suppressor screen was connected to the filament *via* a pair of Lecher leads bridged by a movable thermo ammeter. A reading was obtained in the ammeter which varied with the anode potential up to 3.5 amps. at 4,800 volts, but this reading did not vary with the position of the ammeter on the Lecher leads. The wavelength of the current in this circuit was measured and found to be 80 metres and is, of course, the capacity current fed from the driver and driven circuits *via* the inter-electrode capacities. It was decided that electron oscillations were not present,

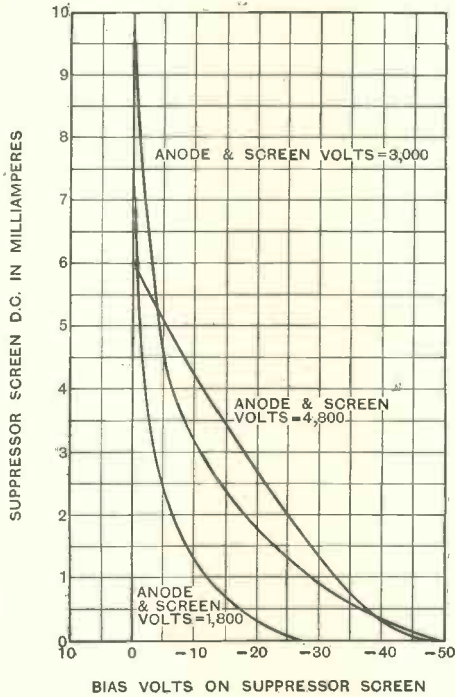


Fig. 11.—Grid leak 2,500 ohms; driver circuit tapping $6\frac{1}{2}$ turns from grid.

general purpose type with its associated transformer would supply the voltage swing necessary to modulate completely this 4 kW. pentode. Before, however, coming to any hasty conclusions, it was considered advisable to ascertain whether any direct current flowed between suppressor screen and filament when the former was at a negative potential with respect to the latter. Readings were taken with three values of anode potential and the curves are shown plotted in Fig. 11. Here it will be seen that the greatest current at zero bias volts was 9.5 m.a. and this was obtained with an anode and screen potential of 3,000 volts. With the higher potential of 4,800 volts, the current at zero bias volts is less; it is also less with 1,800 volts. To check these readings a curve was plotted to show the relation between anode and screen volts and suppressor screen current with zero bias volts.

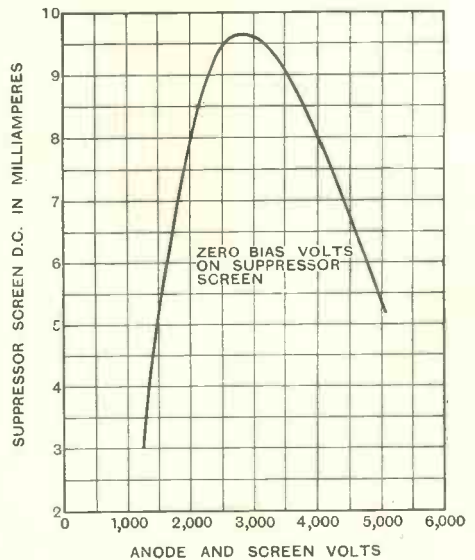


Fig. 12.—Zero bias volts on suppressor screen; grid leak 2,500 ohms; driver circuit tapping $6\frac{1}{2}$ turns from grid.

the current taken by the suppressor grid being accounted for by the fact that the large capacity current from the main circuits

will run this electrode positive during some part of the cycle if any impedance is present in the path from suppressor grid to filament. In the case of the silica valve this path is inevitably somewhat long owing to the length of seals.

The shape of the curve in Fig. 12 cannot be at present explained.

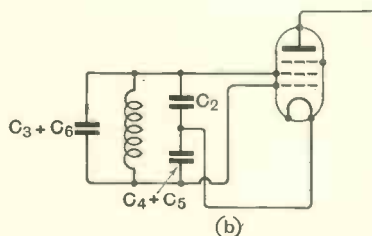
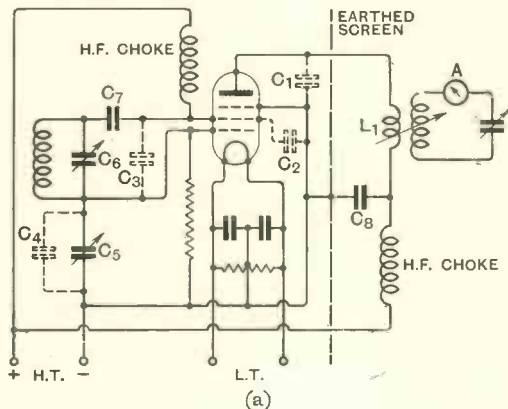


Fig. 13.—*Inter-electrode capacities shown at C_1, C_2, C_3, C_4 .*

At the conclusion of these modulation tests, an observation of frequency stability was made for a change of bias volts on the suppressor grid. The bias voltage was varied from 0 to -150 and no change of generated frequency was observed. Thus, amplitude modulation performed by this method would be entirely free from frequency modulation.

Lower Wavelength Limit

An attempt was made to determine the lower wavelength limit at which this circuit would operate satisfactorily. It soon became obvious that with a Hartley circuit as the driver circuit, the large interelectrode capacities rendered it impossible to obtain satisfactory operation below about 25 metres.

It will be appreciated that the capacity between the suppressor screen and the H.T. screen forming the anode of the driver circuit, which is for this valve about 20 cms., unbalances the driver circuit when the tuning capacity is small. In order to avoid this difficulty, the circuit was changed to that shown in Fig. 13a. In this arrangement, the driver circuit is of the Colpitts type requiring no tap on the coil. The circuit can be redrawn as shown in Fig. 13b and it will be seen that the correct tapping is obtained by adjustment of C_5 . The output circuit was also modified as shown in Fig. 13a, L_1 being a single turn coil of lower impedance than C_1 . With this arrangement the transmitter worked satisfactorily down to 15 metres. Owing to the inevitably large interelectrode capacities in a pentode of this size, it would be impossible to obtain a sufficiently large ratio of $\frac{L}{C}$ for the driver circuit below this wavelength. Frequency doubling was tried but the overall efficiencies were so low, of the order of 5 per cent., that experiments were not pursued in this direction.

Conclusions

1. As a method of securing frequency stability, this pentode circuit compares favourably with a two-stage master controlled transmitter.
2. The ratio input to the driver circuit to total input is undoubtedly higher than in the case where two separate valves are used, reaching values of about 45 per cent. for conditions of optimum output. Owing, however, to the high efficiency of the output circuit, which in some cases reaches a value of 77 per cent., an overall efficiency of 40 per cent. or over can be easily obtained. It is probable that a valve designed without the disadvantages mentioned in the description, that is, with screens of more open mesh, the proportion of power absorbed in the driver could be reduced and the overall efficiency increased.
3. The highest values of efficiency are obtained with low values of grid leak, the driver circuit coil tapped near the centre, and the same voltage applied to both anode and screen.
4. Distortionless modulation up to 100

per cent. for I.C.W. or speech transmissions can be carried out with small expenditure of power and complete absence of frequency modulation.

5. For short wave working, the Colpitts circuit offers certain advantages over any other type of circuit, when used with the pentode as an electron coupled transmitter. Smaller valves having lower inter-electrode capacity would enable shorter wavelengths than 15 metres to be reached. In this connection, a small pentode of the 500-volt type now available on the market,

might find considerable applications among amateur transmitters and others who desire to construct one-valve master controlled transmitters, if valve manufacturers could fetch the suppressor grid out to a separate terminal or pin. A valve of this type could most probably be completely modulated direct from a microphone transformer.

The experimental work on which this article is based has been carried out at H.M. Signal School, Portsmouth, and the article is published with the permission of H.M. Board of Admiralty.

Book Review

Elements of Engineering Acoustics.

By Dr. L. E. C. Hughes. Pp. 159. Ernest Benn, Ltd., 154, Fleet Street, E.C.4. 1933. Price 8s. 6d.

Gramophones, broadcasting, and talking pictures mark the culmination of various stages of development in methods of simultaneously addressing large numbers of people, and in all these stages enormous popular interest has been aroused both on the part of the inventor and the listener. As an almost inevitable result the earnest student has been inadequately catered for and, in default of serious treatment of the subject at the Universities, he has suffered from piecemeal presentations of the more spectacular items in popular journals.

This defect has now been remedied to some extent by the institution of a Course in Electrical Communication at the City and Guilds Engineering College. The neglected child of Physics and Engineering has thus attained to adult dignity worthy of being recognised by the University of London. In the volume under review the elements of the subject of Engineering Acoustics are given by Dr. Hughes, who is Lecturer in the Course referred to, and it is refreshing to find an account of the fundamental principles stripped of the complexities which accrue in the actual design of a system containing a microphone, an amplifier, and a reproducer.

Considerable space is devoted to methods of measuring the gains and losses in the various links of the chain and attention is frequently drawn to the necessity of adhering to a logical system in such measurements. Thus the power level at any stage in an amplifier must be measured when the amplifier is properly terminated with an impedance equal to the impedance of the output load. Also the sound output of a telephone receiver is only of interest when the receiver is held against an artificial ear; results obtained when the receiver is held in open air are valueless.

In quantitative measurements the condenser transmitter is a most useful sub-standard for the calibration of microphones and reproducers. Calibration over a range of frequency at a low power level is not sufficient since amplitude and frequency distortions may arise at higher levels. Thus the amplitude distortion of an average telephone

transmitter, as shown by the curve on p. 83, rises so rapidly with speech level that it is easy to see why little is gained in intelligibility by speaking loudly.

A novel conception appears in p. 111 in the use of the term *acoustic-ratio* to express the gain in decibels of the direct intensity of a sound over the reverberant intensity due to echoes from the walls and contents of a room. When this ratio is high the sound is *hard*, when low it is *mellow*. In the studio the acoustic-ratio is affected by room reverberation and by the directional variation in pick-up of the microphone, while in the auditorium the factors are reverberation and the concentration of high frequencies along the axis of the loud-speaker. The combination of these factors may give the same result as if the listener were placed very close to the source of sound so that the sound is extremely hard for high frequencies but not for lower frequencies—a subtle departure from fidelity which the author calls *acoustic-distortion*. The effect is so serious in talking pictures that the beam effect must be eliminated by pointing the horns towards a wall.

Another useful conception is that of *surface-loudness*, akin to surface-brightness in optics. It is the emission per unit area of the source and is large in speech but small in orchestral music. Hence when an orchestra is reproduced by a small loud-speaker the surface-brightness is excessive and the listener suffers from *sound-dazzle*.

The fundamental ideas, with which the author says he is primarily concerned rather than with formulæ, are clearly expressed and the anatomy of the subject is boldly shown without too much fleshy padding. Nevertheless, the condensation seems excessive and one would welcome larger type, more headlines, an appendix devoted to definitions with numerical examples, and a general expansion in treatment. In the second edition which will undoubtedly soon be called for, this book, which is probably destined to be the standard treatise on Engineering Acoustics, might well incorporate such features to the advantage of its readers. R. T. B.

"The Tilt of Radio Waves and Their Penetration into the Earth," editorial, *The Wireless Engineer*, November, 1933. In the last line of the left-hand column on page 591 "last line but one" should read "last line but two."

Circle Diagrams of Valve Input Admittance and Amplification Factor*

By F. M. Colebrook, B.Sc., D.I.C., A.C.G.I.

1. Object and Scope of the Paper

IN a previous paper¹ the writer has given a generalised analysis of valve input-admittance and voltage-amplification. A recent re-examination of the matter has shown that in certain cases of particular practical interest the variation of both these quantities can be shown very simply on circle diagrams, which have the advantage of clear physical interpretation and which enable the most important features of the variation to be formulated without elaborate calculation.² The particular cases concerned include all those in which the variation of the anode-circuit impedance, with tuning or with frequency, can be represented as that of a constant resistance in parallel with a variable reactance. Examples are tuned anode circuit or tuned-transformer amplifying stages, and audio-frequency intervalve coupling transformers. The object of the present paper is to call attention to the circle diagrams for amplification and input admittance for such cases both for audio and radio frequencies, and to demonstrate by this means the more important practical conclusions.

The discussion applies principally to triode valves, but is equally applicable to screen-grid valves in so far as conditions of operation are such as to give approximate validity to an assumption of constant mutual conductance and internal resistance.

2. The Triode Valve Equivalent Network

The network considered is illustrated in Fig. 1. Though twelve years have elapsed since this equivalent circuit was originally published and discussed by Miller in his

classical paper in the *Bull. of the Bureau of Standards* (Vol. 15, p. 367), no reason has been found to modify it in any essential respect. Hartshorn has shown³ that the interelectrode capacities have appreciable power-factors and also⁴ that they will vary somewhat with the space-charge conditions of the valve. Both of these factors can be allowed for if desired, but the gain in quantitative accuracy is hardly worth the additional complication of the analysis. The equivalence of the network is admittedly approximate, since some of the quantities assumed to be constant are not quite constant in fact, but the network is nevertheless very valuable as a practical simplification of an otherwise very complicated system and is justified by the results obtained.

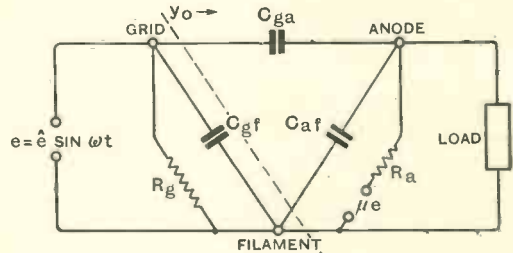


Fig. 1.

The total input admittance will contain terms due to the actual grid-filament capacity C_{gf} , and actual grid-filament resistance R_g , due to grid-filament convection current, if any, or perhaps to an actual grid-leak. There will be in addition an effective admittance due to the so-called "Miller effect," arising from the action of the grid-anode capacity. The paper is concerned with the last only of these components. As a further simplification, the anode-filament capacity C_{af} will be considered as associated with the anode circuit load, and will not be explicitly referred to as a separate component.

* MS. received by the Editor, December, 1932.
¹ "A Generalised Analysis of the Triode Valve Equivalent Network," *J.I.E.E.*, 1929, Vol. 67, p. 157.
² Since the present article was written the author has come across a similar development of input admittance in terms of circle diagrams, by Y. Watanabe (selected papers from the *J.I.E.E., Japan*, No. 21, Dec., 1928). Watanabe has confirmed the theory by measurement at 100 kc/s.

³ *Proc. Phys. Soc., London*, 1926-7, Vol. 39, p. 108.
⁴ *Wireless Engineer*, 1931, Vol. 8, p. 413.

The network is thus reduced to the somewhat simpler diagram of Fig. 2. It will be sufficient to remember that the actual input admittance of C_{gf} and R_g must be added to the effective input admittance of the system to the right of the line \dot{y}_0 as shown in Fig. 2, and that the admittance of the anode-filament capacity

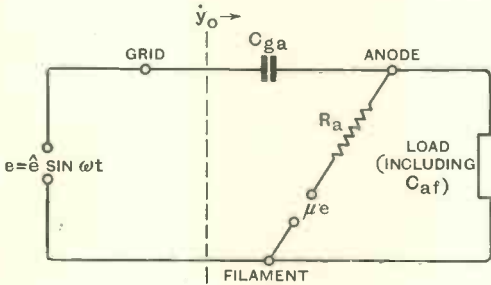


Fig. 2.

must be added to that of the actual anode circuit load. With this understanding the input admittance \dot{y}_0 will be written in the form

$$\dot{y}_0 = G_0 + jS_0$$

and the anode circuit load admittance as

$$\dot{y} = G + jS.$$

The valve a.c. conductance will be written as $G_a = 1/R_a$, the amplification factor as μ , and the mutual conductance μG_a will be written as g . The input e.m.f. is considered to be a maintained e.m.f. $e = \hat{e} \sin \omega t$, represented by the vector e , and the voltage amplification v/e is represented by the operator m .

3. Operational Expressions for Amplification and Input Admittance

The circuit analysis is quite straightforward and is given in the earlier paper. The results are

$$\dot{y}_0 = \left(\frac{g + G_a + \dot{y}}{G_a + j\omega C_{ga} + \dot{y}} \right) j\omega C_{ga} \quad \dots (1)$$

$$m = \frac{j\omega C_{ga} - g}{G_a + j\omega C_{ga} + \dot{y}} \quad \dots (2)$$

Separation of \dot{y}_0 gives

$$G_0 = \frac{\omega C_{ga}(G_a + G + g) + gS}{(G_a + G)^2 + (S + \omega C_{ga})^2} \omega C_{ga} \quad \dots (3)$$

$$S_0 = \frac{(G_a + G)(G_a + G + g) + S(S + \omega C_{ga})}{(G_a + G)^2 + (S + \omega C_{ga})^2} \omega C_{ga} \quad \dots (4)$$

The magnitude of m is

$$m = \left\{ \frac{(\omega C_{ga})^2 + g^2}{(G_a + G)^2 + (S + \omega C_{ga})^2} \right\}^{1/2} \quad \dots (5)$$

$$\approx \frac{g(1 + \omega C_{ga}/2g)}{\{(G_a + G)^2 + (S + \omega C_{ga})^2\}^{1/2}} \quad \dots (6)$$

assuming $\omega C_{ga} << g$.

4. The Anode Circuit Load

As an example of a load circuit which fulfils very approximately the conditions already specified in section 1, we may assume a coil of inductance L and resistance R , tuned by a parallel connected condenser of capacity C . The admittance of such a circuit is given by

$$\dot{y} = \frac{R}{R^2 + \omega^2 L^2} + j \left(\omega C - \frac{\omega L}{R^2 + \omega^2 L^2} \right) \quad \dots (7)$$

i.e., very approximately

$$\dot{y} = \frac{R}{\omega^2 L^2} + j \left(\omega C - \frac{1}{\omega L} \right) \quad \dots (8)$$

if $R^2 << \omega^2 L^2$. This will be abbreviated to

$$\dot{y} = G + jS \quad \dots (9)$$

For variation of C , the admittance is that of a constant resistance (the so-called "dynamic" resistance of the tuned circuit) in parallel with a variable reactance. The same is very approximately true of variation with respect to frequency, since G will change comparatively little over the narrow range of frequency covered by the resonance curve.

The similar description of the tuned radio-frequency transformer and the audio-frequency transformer is quite familiar and need not be detailed.

In the following, therefore, it will be assumed, unless otherwise stated, that G is constant and S variable, either with frequency or circuit tuning.

5. The Circle Diagrams for Input Admittance and Voltage amplification

The complex quantity \dot{r} defined by

$$\dot{r} = (a + b\epsilon^{-j\theta})$$

where a and b are constant complex numbers (or vectors) and θ is a variable angle, describes a circle of radius b (the magnitude of b) having its centre at a . The maximum and minimum values of \dot{r} are clearly $(a \pm b)\epsilon^{j\alpha}$, α being the inclination of a , and occur where $b\epsilon^{j\theta}$ is parallel to and in opposition to a respectively.

By simple manipulations, which are detailed in an appendix, the expressions (1) and (2) for \dot{y} and \dot{m} can be put in the above form, thus

$$\dot{y}_0 = \frac{\omega C_{ga}}{2(G_a + G)} \left[\{ \omega C_{ga} + j(g + 2G_a + G) \} + (\omega C_{ga} + jg)\epsilon^{-2j\phi} \right] \dots (10)$$

$$\dot{m} = \frac{j\omega C_{ga} - g}{2(G_a + G)} (1 + \epsilon^{-2j\phi}) \dots (11)$$

where

$$\tan \phi = \frac{S + \omega C_{ga}}{G_a + G} \dots (12)$$

These expressions look somewhat cumbersome, but the corresponding diagrams are quite simple in form. They are shown in Figs. 3 and 4. (The quantity ωC_{ga} is here considered as a constant. The circular form will be very approximately valid even when ω is the variable, provided, as is usually the case, the variation of ϕ (*i.e.*, of S) with frequency is very much more rapid than that of ω .)

It will be seen at once that the input admittance has a positive component (corresponding to a capacity) and a conductance component which may be negative over a considerable range of load variation.

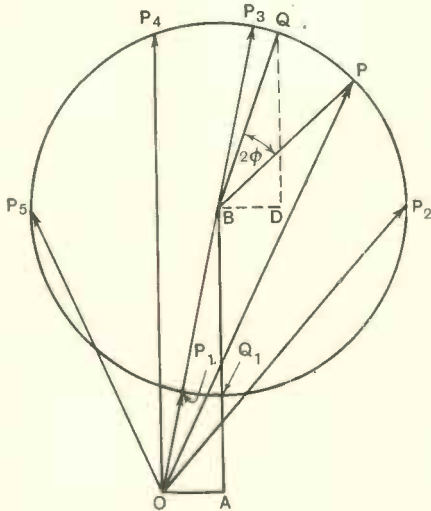


Fig. 3.— $OA = BD = k \cdot \omega C_{ga}$; $AB = jk(g + 2G_a + G)$; $DQ = jk \cdot g$; where $k = \frac{\omega C_{ga}}{2(G_a + G)}$; $OB = k \cdot \{ \omega C_{ga} + j(g + 2G_a + 2G) \}$; $BQ = k \{ \omega C_{ga} + jg \}$; $OP = \dot{y}_0$.

The relative magnitudes involved in the above diagrams will, of course, depend on

particular cases. For illustration, the following valve quantities will be assumed.

$$G_a = \frac{I}{R_a} = \frac{I}{50,000} \text{ ohms} = 20 \times 10^{-6} \text{ ohms}^{-1}$$

$$g = 1 \text{ m.a. per volt} = 1,000 \times 10^{-6} \text{ ohms}^{-1}$$

i.e., $\mu = 50$
 $C_{ga} = 4\mu\mu F.$

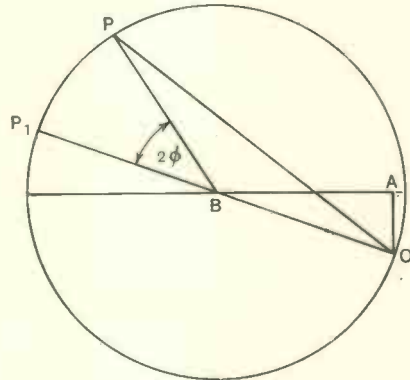


Fig. 4.— $OA = j\omega C_{ga}$; $AB = -g$; $OB = BP_1 = j\omega C_{ga} - g$; $BP = (j\omega C_{ga} - g)\epsilon^{-2j\phi}$; $OP = \dot{m}$.

The constant value of G (the conductance component of the anode circuit admittance) will be taken as

$$G = \frac{I}{200,000} \text{ ohms} = 5 \times 10^{-6} \text{ ohms}^{-1}$$

The forms taken by the diagrams for audio- and radio-frequencies will be considered separately.

6. The Circle Diagrams for Audio-Frequencies

At audio-frequencies ωC_{ga} will be negligible compared with g . Thus at 10 kc/s. ωC_{ga} will be only about $0.25 \times 10^{-6} \text{ ohms}^{-1}$. The diagrams are then as shown in Figs. 5 and 6. The following particular points may be noted.

(a) G_0 is negative for all negative values of ϕ , *i.e.*, for all inductive loads. The maximum negative value of G_0 occurs when $2\phi = -\pi/2$, *i.e.*, $G = -S$, and is given by

$$G_0(\text{neg. max.}) = \frac{g}{2(G_a + G)} \omega C_{ga} \text{ ohms}^{-1} \dots (13)$$

This is $5 \times 10^{-6} \text{ ohms}^{-1}$ (*i.e.*, a shunt resistance of 200,000) for the typical case quoted.

(b) The maximum positive value of G_0 is as in (a).

(c) The maximum value of y_0 is capacitive and occurs when $\phi = 0$ (i.e., $S = 0$, the load being tuned or purely resistive). It is given by

$$y_0(\text{max.}) = S_0(\text{max.}) = \frac{(g + G_a + G)}{G_a + G} \omega C_{ga} \quad (14)$$

This is equivalent to $164\mu\text{F.}$ for the numerical case.

(d) The maximum value of m occurs when $S = 0$ (i.e., when the circuit is tuned) and is given by

$$m = \frac{g}{G_a + G} \quad \dots \quad (15)$$

In an article on "Oscillation in Tuned Radio-frequency Amplifiers" (*P.I.R.E.*, Vol. 19, pp. 421-437) B. J. Thompson gives a limiting stability formula for a tuned r.f. stage using a screen-grid valve, derived from considerations of energy. His formula is immediately derivable from eq. 13 of sect. 6. Thompson gives very satisfactory experimental confirmation of the formula.

7. A Screen-grid Valve at Radio-Frequencies

As already pointed out in section 1, the quantities μ and G_a are far from constant

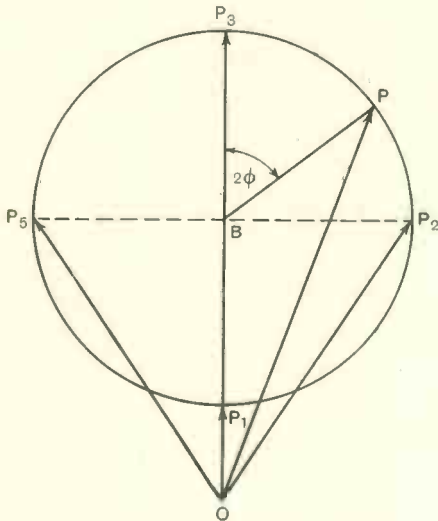


Fig. 5.— $OB = jk(g + 2G_a + 2G)$; $BP_3 = jkg$;
where $k = \frac{\omega C_{ga}}{2(G_a + G)}$; $OP = y_0$.

in a screen-grid valve, and will vary appreciably with conditions of operation. Within these limitations, however, the smallness

of C_{ga} in the screen-grid valve, and the consequent smallness of ωC_{ga} even at radio-frequencies, makes this case comparable with that of the ordinary triode at audio-

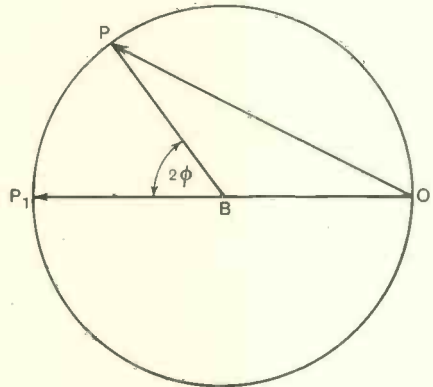


Fig. 6.— $OB = -g$; $BP = -g^{-2j\phi}$; $OP = \dot{m}$.

frequencies. The conclusions of section 6 can, therefore, be taken as, at least, an indication of the nature of the variation of the input admittance and amplification of the screen-grid valve.

8. Triode Valve at Radio-Frequencies

At a frequency of 10^6 cycles per second, ωC_{ga} for the example given in section 5 will be 25×10^{-6} . This is comparable with G_a . The circle diagrams will therefore be as in Figs. 3 and 4, except that in these diagrams OA and AQ_1 are somewhat exaggerated relative to AB for the sake of clearness. The following particular points may be noted for comparison with corresponding conclusions of section 6.

(a) G_0 is not negative for all values of inductive anode load, but only for those for which P lies to the left of O . The maximum positive and negative values of G_0 are given by

$$G_0(\text{max.}) = \frac{\omega C_{ga}}{2(G_a + G)} \{ \sqrt{\omega^2 C_{ga}^2 + g^2} \pm \omega C_{ga} \} \quad \dots \quad (16)$$

For the numerical example

$$G_0(\text{max.}) = + 525 \times 10^{-6}; - 475 \times 10^{-6}.$$

Thus the negative input shunt resistance reaches in this case the very low figure of about 2,000 ohms. It is, of course, this low negative input resistance which accounts for the instability of un-neutrodynd tuned-circuit triode-valve amplifying stages.

(b) The maximum value of m is

$$m \text{ (max.)} = \frac{\sqrt{g^2 + \omega C_{ga}^2}}{G_a + G} \quad \dots \quad (17)$$

and occurs when $\phi = 0$, *i.e.*,

$$S + \omega C_{ga} = 0 \quad \dots \quad (18)$$

(*i.e.*, the circuit is tuned by its own capacity plus the grid-anode and anode-filament capacities). For the numerical example

$$m \text{ (max.)} = 40.$$

(c) The input admittance at maximum amplification is given by

$$\begin{aligned} \dot{y}_0 &= \frac{(\omega C_{ga})^2}{G_a + G} + j \frac{g + G_a + G}{G_a + G} \omega C_{ga} \quad \dots \quad (19) \\ &= 25 \times 10^{-6} + j 1025 \times 10^{-6} \end{aligned}$$

i.e., a resistance of 40,000 ohms in parallel with a capacity of 164 $\mu\mu\text{F}$.

(d) The maximum value of y_0 is not that associated with maximum amplification, but the difference is very little in practice (*c.f.*, OP_3 and OQ in Fig. 4).

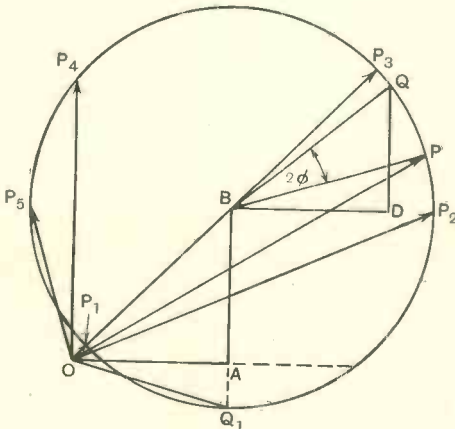


Fig. 7.— $OA = BD = k \cdot \omega C_{ga}$; $AB = j \cdot k(g + 2G_a + 2G)$; $DQ = j \cdot k \cdot g$; where $k = \frac{\omega C_{ga}}{z(G_a + G)}$; $OB = k\{\omega C_{ga} + j(g + 2G_a + 2G)\}$; $BQ = k\{\omega C_{ga} + jg\}$; $OP = y_0$.

Of the above, the most important points are the low value of negative input resistance for an inductive load, and the fact that at the maximum amplification setting the input conductance is positive and not very large, the input admittance being practically capacitive.

9. Input Admittance and Amplification at Very High Radio-Frequencies

At very high frequencies (*e.g.*, 10^7 c/s.) ωC_{ga} becomes correspondingly large (250×10^{-6} for the case considered in (6)). The input admittance diagram will then become as in Fig. 7. The conclusions of section 8 are not thereby modified, but it is interesting to note that there is a possibility of a range of negative (*i.e.*, inductive) values for the input admittance for large values of 2ϕ (*i.e.*, for large values of the susceptance components of the anode circuit admittance). The point is, however, mainly of theoretical interest. Of more practical interest are the very low values reached by G_0 at the maximum positive and negative conditions. For the typical numerical example these values correspond to input shunt resistances of about ± 150 and -250 ohms respectively.

10. Summary

In a triode valve amplifying stage of which the external anode circuit admittance, including the anode-filament capacity, can be represented as a constant conductance G in parallel with a variable susceptance S , the variation of the principal part of the input admittance, *i.e.*, that part which is due to coupling through the grid-anode capacity, can be represented by means of a simple circle diagram. The voltage amplification given by the stage can be similarly represented.

The principal formulæ derived are restated here for convenience of reference and comparison.

$$\text{Load admittance} = G + jS.$$

Valve conductance, G_a ; mutual conductance g ; grid-anode capacity C_{ga} .

$$\text{Input admittance} = G_0 + jS_0.$$

(a) The maximum positive and negative values of G_0 occur when $G = \pm S$ approximately, and are given by

$$G_0 = \frac{\omega C_{ga}}{2(G_a + G)} \left\{ \sqrt{\omega^2 C_{ga}^2 + g^2} \pm \omega C_{ga} \right\}$$

In most practical cases, this is very approximately

$$G_0 = \frac{g}{G_a + G} \frac{\omega C_{ga}}{2}.$$

(b) The maximum amplification occurs when $S = -\omega C_{ga}$.

Putting M for this maximum value,

$$M = \frac{\sqrt{g^2 + \omega^2 C_{ga}^2}}{G_a + G}$$

$$= \frac{g}{G_a + G} \text{ very approximately.}$$

(c) At maximum amplification

$$G_0 = \frac{(\omega C_{ga})^2}{G_a + G} = \frac{M}{g} (\omega C_{ga})^2$$

$$S_0 = \frac{(g + G_a + G)}{(G_a + G)} \omega C_{ga} = (M + 1) \omega C_{ga}.$$

(d) For any values G and S (anode circuit conductance and susceptance)

$$G_0 = \frac{\omega C_{ga}(G_a + G + g) + gS}{(G_a + G)^2 + (S + \omega C_{ga})^2} \omega C_{ga}$$

$$S_0 = \frac{(G_a + G)(G_a + G + g) + S(S + \omega C_{ga})}{(G_a + G)^2 + (S + \omega C_{ga})^2} \omega C_{ga}$$

and

$$m = \left\{ \frac{(\omega C_{ga})^2 + g^2}{(G_a + G)^2 + (S + \omega C_{ga})^2} \right\}^{\frac{1}{2}}$$

APPENDIX

Derivation of circle diagrams for \dot{y}_0 and \dot{m} .

$$\dot{y}_0 = j\omega C_{ga} \frac{(g + G_a + G) + jS}{(G_a + G) + j(S + \omega C_{ga})}$$

$$= j\omega C_{ga} \left\{ 1 + \frac{g - j\omega C_{ga}}{(G_a + G) + j(S + \omega C_{ga})} \right\}$$

$$= j\omega C_{ga} \left[1 + \frac{g - j\omega C_{ga}}{2(G_a + G)} \left\{ 1 + \frac{(G_a + G) - j(S + \omega C_{ga})}{(G_a + G) + j(S + \omega C_{ga})} \right\} \right]$$

$$= j\omega C_{ga} \left[1 + \frac{g - j\omega C_{ga}}{2(G_a + G)} (1 + \epsilon^{-2j\phi}) \right]$$

where $\tan \phi = \frac{S + \omega C_{ga}}{G_a + G}$

$$= \frac{\omega C_{ga}}{2(G_a + G)} \{ (\omega C_{ga} + j(g + 2G_a + 2G)) + (\omega C_{ga} + jg)\epsilon^{-2j\phi} \}$$

The derivation for \dot{m} is similar.

Naval Wireless

I.E.E. Wireless Section, Chairman's Address

THE opening meeting of the I.E.E. Wireless Section was held on 1st November, when Mr. G. Shearing, O.B.E., B.Sc., M.I.E.E., delivered his inaugural address as Chairman of the Section.

In introducing his subject, the speaker referred to the ramifications of modern wireless and to the connections with physics and engineering practice in modern wireless work.

He then proceeded to give a broad account of naval wireless practice, beginning with a map of naval wireless stations throughout the world. The traffic concerned was long-distance point-to-point work from these stations to England, as well as traffic between ship and shore, and traffic between ships of a squadron, etc. The long-distance point-to-point work was done mostly on short waves, but the medium wave region was still of considerable importance in ship working.

The lecturer then described the equipment of ships, giving general information as to the type of transmitters and receivers used. Communication was practically entirely by telegraphy, radio-telephony being only very slightly used. Reception was entirely by earphone so that no great attention had to be paid to a power output-stage at the receiver. This also had the merit of keeping down the number of stages and giving a low noise-level. The standard types of naval receiver cover the range of 15 kc/s to 23 Mc/s. W/t offices on ship are usually below deck and at some distance from the aerials, and the lecturer discussed the cabling arrangements feeding the aerials into the apparatus. A slide was also displayed illustrating the number of aerials and the difficulties of wireless installations on H.M. ships.

The speaker also discussed shadow and screening effects due to ship structure and superstructures, giving a theoretical reasoning which was well confirmed in the case of the particular ship for which it was calculated. Interference between transmitters and receivers on the same ship was also discussed; this was usually helped by the frequency separations involved, but precautions had to be taken against spurious radio-frequency noises generated in machine-leads. Voltage supplies to transmitters were now mostly by high-tension alternators at 500 c/s, and receivers were increasingly using indirectly heated cathode valves deriving l.t. and h.t. from alternators.

The lecturer next discussed direction finding practice, which had, in the Navy, several important applications in addition to that of navigation. Various types of ship d.f. installations were described, with a discussion of the field-distortions giving rise to quadrantal error. Methods (due to Mr. C. Horton, of H.M. Signal School) were also described for correcting these errors. An automatic direction-finder was also described and demonstrated in operation on a local signal.

Dealing with recent advances in wireless generally, the speaker referred particularly to various new types and tendencies in valves. He then discussed some of the recent progress in working on wavelengths below 10 metres, describing several new methods of generating greater power at these ultra short waves. A new magnetron for about 1 metre working was demonstrated in operation. Finally, the lecturer dealt briefly with the changes of frequency-allocation arising out of the Madrid Conference and Lucerne plan.

Correspondence

Letters of technical interest are always welcome. In publishing such communications the Editors do not necessarily endorse any technical or general statements which they may contain.

Beat Frequency Oscillator

To the Editor, The Wireless Engineer.

SIR,—In your issue for September is an article by M. F. Cooper and L. G. Page, which describes an audio-oscillator, and contains an oscillogram of the ripple in the high tension supply.

Present with others is a component having a frequency of 3.3 to 3.4 kc. This, we are told, "is a record of the valve hiss." No possibility exists that it may be anything else; in spite of the fact that valve hiss, like the surface noise picked up from a gramophone record, is an aperiodic phenomenon, and the recorded wave shows a very definite form even on the half-tone illustration, those responsible for the statement jump thoughtlessly out of the frying pan of improbability into the all-consuming fire of assertion.

Even in the improbable event of the recording oscillograph resonating at so low a frequency, or of some suitably placed LC product being maintained in oscillation at its natural frequency by the valve hiss, the statement to which objection has been taken still cannot be justified, since the oscillogram would be in no wise a record of the valve hiss, but merely of its presence.

It would therefore clear matters up if the authors would put forward their grounds for making the statement.

ARCHIBALD W. STEWART.

Whitefield, Manchester.

Applications of the Dynatron

To the Editor, The Wireless Engineer

SIR,—In his very interesting article on "Applications of the Dynatron," published in your issue dated October, 1933, Mr. Scroggie describes an application of the technique of automatic gain control to the dynatron circuit. He refers to a paper by Arguimbau (*P.I.R.E.*, Jan., 1933) as being, to his knowledge, the only paper describing a similar idea. It may therefore be of interest to him and to your readers to know that Dr. J. Groszkowski has already published a description of a dynatron oscillator with automatic grid-bias control, the circuit being essentially the same as that arrived at independently by Mr. Scroggie. Groszkowski's paper also contains experimental data illustrating the great improvement in frequency-stability with respect to operating conditions which is obtainable in this way. The paper is, unfortunately, in Polish (*Przegląd Radiotechniczny*, May 15th, 1933), but it is hoped to arrange for the publication of an English version in the near future.

I may say that after the publication of Arguimbau's paper, I carried the amplitude-control idea described in it a stage further, and constructed a self-maintained triode oscillator circuit in which very full control of the amplitude was obtained by means of an associated automatic-volume-control type of amplifier, having a controllable maximum output-voltage. With this arrangement it was

possible to maintain oscillation over almost any desired range of the so-called "straight" part of the oscillator characteristic, however small. It is hoped to publish a brief description of this work at a later date.

In the course of his article, Mr. Scroggie referred to certain papers of my own on the characteristics and advantages of the dynatron circuit. While I am prepared to endorse practically everything Mr. Scroggie has said about the merits and practical usefulness of this very attractive circuit, I must confess that my earlier enthusiasm has been tempered somewhat by subsequent experience, at least as far as frequency stability is concerned. It is true that the frequency can be made very satisfactorily independent of small changes in the supply voltages, but in some cases I have encountered a small but persistent frequency drift which appeared to be due to a corresponding small but steady change in secondary emission (the agency responsible for the negative-resistance characteristic). The variability of the secondary-emission effects as between different valves of the same type, a point mentioned by Mr. Scroggie, suggests that secondary emission is critically dependent on the nature of the surface of the emitting electrode which surface may itself be affected by the intensity and duration of the secondary emission. It would be interesting to know if Mr. Scroggie has any data on the long-period constancy of secondary emission in small receiving tetrodes. It is true that the direct effect on the frequency of any consequent variation of the negative slope of the characteristic may be expected to be very small, but there is a larger indirect effect on frequency arising from the dependence of interelectrode capacitance on the space-charge. (See Baker, *J.I.E.E.*, August, 1933).

F. M. COLEBROOK.

Teddington, Middlesex.

To the Editor, The Wireless Engineer

SIR,—I am obliged to Mr. Colebrook for drawing my attention to Groszkowski's paper on oscillation amplitude control. Unfortunately, the Polish language has been outside my education, and in any case the paper appeared some months after my own was submitted. Quite a number of valuable contributions, more especially on the frequency maintenance question, have appeared since; and some of these were included in my bibliography.

As the great bulk of the literature on the subject is either purely theoretical, or refers to extremely precise and specialised practice I felt that there was room for information of a more workaday character. My references to frequency stability must therefore be interpreted on this understanding, and I would not presume to give an original opinion as to the possible degree of constancy. I understand, however, that Mr. Griffiths's recent paper on this subject is founded on extensive experience of the work in which Mr. Colebrook expresses interest.

My own less systematic work does nevertheless support Mr. Colebrook's statement that the secondary emission is critically dependent on the nature of the surface of the emitting electrode; which may be considerably changed, or even ruined, by over-running the valve: hence my advice to limit the screen current.

I am interested to learn that Mr. Colebrook has carried into effect the idea of amplified amplitude control. My attempts to obtain extreme constancy in this way failed, because the time constant of the bias control circuit, which had to be sufficiently great to prevent amplified oscillations from being fed back to the oscillator, led to intermittency of oscillation. In fact, stable control appeared to be possible only if the control rectifier damped the oscillatory circuit to a certain minimum extent; which was one of the things the system was designed to avoid, with the object of minimising harmonics.

These tests were confined entirely to dynatron oscillators; which appeared the most hopeful by reason, among other things, of the high degree of control exercised by the grid bias voltage. I very much hope that Mr. Colebrook's work on triode oscillators will be published.

I am also hopeful that those better qualified than myself may be able to explain satisfactorily the apparent discrepancy between theory and practice, noted towards the end of my paper; as it is of some practical importance.

M. G. SCROGGIE.

Upper Norwood, S.E.19.

To the Editor, The Wireless Engineer

SIR,—In your October issue M. G. Scroggie described the single circuit S.G. precision radio oscillator. Passing on to my double circuit oscillator (radio and audio) patent 310915, he says: "the precision is lower." If an audio circuit is put in series with the radio circuit there is a slight frequency change. But if the double circuit oscillator is calibrated as such, the precision is alike in the two cases.

It may be of interest to remark that crystal control is treated in 310915 (claim 6), and I have used it experimentally. Fig. 11 of Mr. Scroggie's article is a modification of Fig. 4 (claim 9) of 310915 of which he was obviously unaware.

Referring to the use of valves having low anode to grid capacity for precision oscillators, the first valve of this kind was made to my specification by the Osram Co. in 1929. It was used by Messrs. H. W. Sullivan in their oscillator at the Physical Society Exhibition in January, 1930.

London.

N. W. McLACHLAN.

Philips's Receiver—Dynamic Resistance

To the Editor, The Wireless Engineer

SIR,—I beg to refer to a statement regarding Philips's 634 Superinductance Receiver, appearing in the October issue of THE WIRELESS ENGINEER. The paragraph concerned reads as follows:—

"But in a number of receivers tuned circuits of high dynamic resistance are secured by operating the radio frequency amplifier with a controlled amount of regeneration. For example, Philips's

634A Superinductance Receiver, in addition to exceptionally good coils, has a potentiometer ganged to the tuning control which, by varying the bias of one of the H.F. valves, keeps the receiver just within the limits of stability throughout the waveband . . ."

Your statement gives the impression that reaction is an essential feature of the design of the Philips's 634 receiver and that the high dynamic resistance of the tuned circuits in this set is obtained by deliberate and controlled regeneration. This is not the case. The exceptional efficiency of these circuits is obtained by careful electrical and mechanical design and by highly specialised methods of production, whereby the electrical losses in all components associated with the tuned circuits are reduced to an extremely low value.

The actual purpose of the coupled potentiometer is to produce even sensitivity over the waveband by reducing the excessive gain which would otherwise occur on the lower wave lengths with a circuit arrangement of this nature.

London, W.C.2.

A. B. CALKIN,
Philips Lamps, Ltd.

Double Channel Transmission

To the Editor, The Wireless Engineer

SIR,—I hope you may see your way in the near future to give space for discussion on an old subject which seems to be receiving more attention of late. There are several points obscure to me which if ever I venture to mention are usually "side tracked." Are engineers afraid to tackle them?

What is "stereoscopic" effect? Is it not in itself an illusion, if so would not any other successful illusion answer as well or better? The stock explanation is the "one eye—two eye" analogy. Am I abnormal when I claim to be able to see perfectly well with *one* eye and that the only difficulty is of focusing; one eye alone is capable of appreciating "depth." I suggest there are infinitely more than "double channel" lines of vision which enable us to appreciate perspective. Just the same with the ear for which member the focusing difficulty only is more apparent. Music seems no less real to me heard with only one ear. We do have reason to believe that each frequency is conveyed separately to the brain while it is not dangerous to assume, as is done, that we are so tolerant of phase displacement in reproduction?

I humbly suggest that radio engineers might aim higher than the "double channel" idea and concentrate on what constitutes perfect reproduction of sound not forgetting at the same time that certain illusion might be permissible as a means to an end.

Quite obviously the microphone has similar defects to a photographic plate but why assume that two microphones or two transmission lines to two ears are likely to be a good solution to the problem?

The need seems to be to contrive a "microphone" which is in itself a perfect "ear" and works on similar principles to the human organ, to "scan" if necessary the audio frequencies and render them separately as far as is possible at the producing end. Failing all this at least to *try* the effect of faithful phasing.

Ware.

GERALD SAYERS.

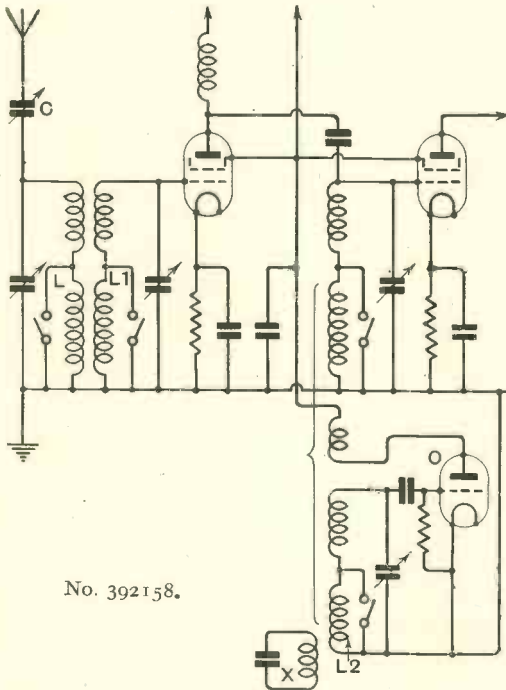
Some Recent Patents

The following abstracts are prepared, with the permission of the Controller of H.M. Stationery Office, from Specifications obtainable at the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1/- each.

SUPERHET RECEIVERS

Application date, 9th November, 1931. No. 392158

In order to preserve a constant ratio between the tuned input and local oscillator circuits in a superhet set, so as to permit single-knob tuning over both the medium and long wave-bands, a "compound" impedance (preferably a loop circuit of inductance



No. 392158.

and capacity) is coupled to the long-wave or loading inductance of one of the circuits. As shown, the aerial is connected through a condenser C to a band-pass input comprising switch-operated loading-coils L, L1, the auxiliary "compound" impedance X being coupled to the loading-coil L2 in the grid circuit of the local oscillator valve O.

Patent issued to The Plessey Co., Ltd., and C. E. G. Bailey.

PREVENTING MAINS "HUM"

Convention date (Germany), 23rd November, 1931
No. 393495

In certain types of mains-driven valve, the filament and cathode are separated by a discharge space which carries a minor or auxiliary electron stream. Since the latter fluctuates with the potential

and temperature of the filament, it tends to set up "hum." According to the invention this is prevented by tapping-off, from a resistance inserted between the anode and cathode, a biasing potential sufficient to saturate the discharge-space in question. A different tapping from the same resistance supplies the biasing-voltage for the control grid.

Patent issued to Telefunken Ges für drahtlose Telegraphie m.b.h.

H.F. AMPLIFIERS

Convention date (Germany), 29th February, 1932
No. 393553

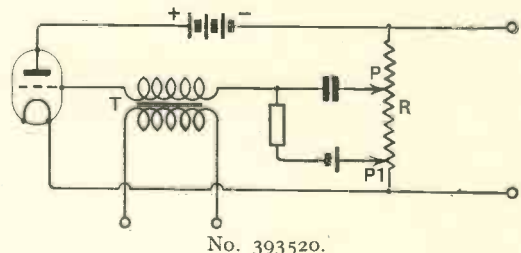
When using screen-grid valves for amplifying ultra high frequencies it is desirable, in order to avoid undesirable reaction effects, to maintain the screen-grid as nearly as possible at the same high-frequency potential, i.e., for the working frequency. In order to achieve this result the screen grid is connected to the cathode through two condensers in series, and the anode is connected to the cathode through a third condenser. The inherent capacity between the screen-grid and anode inside then forms the fourth side of a balanced bridge, and the output impedance is connected across a diagonal.

Patent issued to Telefunken Ges für drahtlose Telegraphie m.b.h.

AMPLIFIER CIRCUITS

Convention date (Germany), 29th December, 1931
No. 393520

Distortion due to curvature in the valve-characteristic, or to some undesired variation of the external circuit impedance, is compensated by feeding-back to the grid from a tapping P on the resistance R an AC component in phase-opposition with the AC component to be corrected. Another tapping P1 supplies grid-bias voltage through the output transformer T. In a modified arrangement



No. 393520.

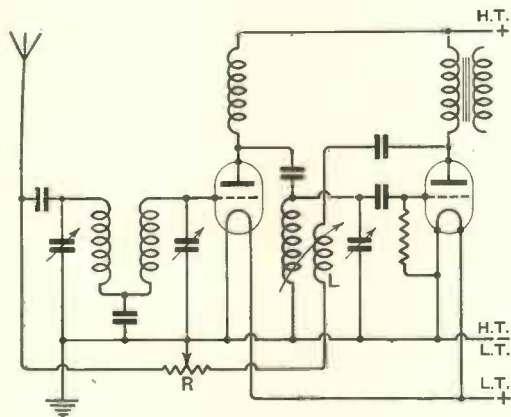
the two tappings are taken from different parallel resistances, both shunting the anode-cathode circuit.

Patent issued to Telefunken Ges für drahtlose Telegraphie.

VOLUME CONTROL

Application date, 23rd September, 1931. No. 391469

Part of the volume-control potentiometer *R* is arranged in shunt with the aerial circuit, whilst the remainder is in series with the reaction coil *L*. As the earthed tapping-point is moved to the left to reduce volume, the series resistance in the re-



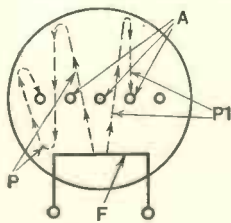
No. 391469.

action is increased, thereby preventing overloading. Patent issued to The Paragon Rubber Mfg. Co., Ltd.

SHORT-WAVE GENERATORS

Convention date (U.S.A.), 4th December, 1930. No. 392533

As shown in the Figure the electron emitter *F* co-operates with a second electrode *A*, which may be a perforated plate or any similar grid-like structure, provided the total area of the spaces or perforations is large compared with the projected area of the solid parts. The frequency and amplitude of the generated oscillations are determined by the potential applied across the "grid" *A* and filament *F*, and are due to the elongated path taken by the bulk of the electron stream, as indicated at *P* and *P1*.



No. 392533.

Patent issued to Marconi's Wireless Telegraph Co., Ltd.

SHORT-WAVE SYSTEMS

Application dates 5th November and 18th November, 1931, and 4th March, 1932. No. 392210

Relates to a system of generating and receiving ultra-short waves by the Barkhausen-Kurz method. The valves are operated in push-pull and are

coupled through tuned Lecher-wires to dipole aerials of various forms, some of which are designed to produce high-directive effects. Two or more pairs of valves may be coupled together by connecting the filament circuits through tuned Lecher-wires. Various methods of applying the necessary operating potentials are described, together with a special "optical image" arrangement of the valve electrodes to ensure symmetry. Modulating signals may be applied either to the plate or grid, and the receiving circuits may be designed to give super-regenerative amplification.

Patent issued to Marconi's Wireless Telegraph Co., Ltd., and G. A. Mathieu.

TELEVISION RECEIVERS

Convention date (U.S.A.), 15th January, 1932. No. 392869

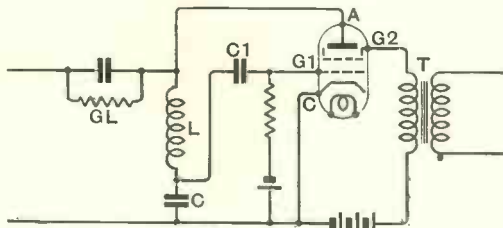
The characteristic greenish appearance of the picture reproduced on the fluorescent screen of a cathode-ray television receiver is converted into a more natural and pleasing colour by projecting on to the screen, simultaneously with the received picture, a beam of unmodulated monochromatic light, preferably complementary to the fluorescent colour. The compensating light is derived from one or more auxiliary lamps mounted in close proximity to the receiving surface, but screened from direct observation. A similar method may be used to offset the characteristic colour effect due to Neon and similar lamps used in other types of television receivers.

Patent issued to Marconi's Wireless Telegraph Co., Ltd.

DETECTOR-AMPLIFIERS

Application date, 13th May, 1932. No. 391979

A screen-grid valve of normal type is used as a combined diode rectifier and L.F. amplifier. The



No. 391979.

modulated signal energy is applied across the anode *A* and cathode *C* through a grid leak combination *GL*. Rectified currents are fed from the junction of a coil *L* and condenser *C* (forming a radio-frequency shunt) through a condenser *C1* to the control grid *G1*, the usual screen-grid *G2* being coupled to the next stage through a low-frequency transformer *T*. If a pentode valve is connected up in a similar manner, the extra electrode can be used as a space-charge grid.

Patent issued to Marconi's Wireless Telegraph Co., Ltd.

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- [Australian] Radio Research Board: Fourth Annual Report (for Year ended 30th June, 1932) [Fading: Lateral Deviation of Sky Wave on Broadcasting Frequencies: Directional Properties of Short Horizontal Aerials: Atmospherics, etc.], p. 265.
- Direct-Ray Broadcast Transmission [and the Prediction of Field Strengths at Distances up to 2 000 Kilometres for Wavelengths from 60 to 2 000 Metres].—T. L. Eckersley, p. 29.
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- Measurements of Dielectric Losses in Castor Oil [Confirmation of Debye's Formulae for Anomalous Dispersion and Absorption, for Wavelengths 200–2 000 Metres].—Snoek, p. 93.
- Dielectric Polarisation in Solid Bodies.—Errera, p. 498.
- Characteristics of Differential Systems, and the Propagation of Waves.—Levi-Civita, p. 321.
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- Optical Dispersion: Quantum Theory of Dispersion. [Surveys].—Korff and Breit: Breit, pp. 31 and 150.
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- Short-Wave Dispersion [in Polar Liquids].—Luthi, p. 321.
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- Some Remarks on the [Japanese] Earthquake of 2nd March, 1933.—Brazier and Génaux: Maurain, p. 267.
- Abnormally Good Reception from W3XAL (16.87 m) in England on Eve of Californian Earthquake, p. 321.
- Periodic Components in Love Waves [from the 1922 Formosa Earthquake Records].—Labrousse, p. 561.
- Considerations for the Explanation of World Space Echoes, the Aurora and Magnetic Disturbances. Part I.—Dostal: Störmer, p. 31.
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- Echo Measurements on the Ionised Layers of the Atmosphere [on Six Rapidly Changed Wavelengths between 40 and 1 000 Metres].—Goubau, p. 383.
- A Method of Automatically Recording Echoes from the Ionosphere [using a Cathode-Ray Oscillograph and capable of recording Simultaneous Tests on Several Wavelengths].—Goubau and Zenneck, p. 320.
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- Recording Wireless Echoes at the Transmitting Station.—Mitra and Rakshit: Watson Watt and Bainbridge-Bell, p. 386.
- The Effect of the Sun's Eclipse on Radio Waves [Facsimile Observations on about 35 Metres and Aural on 30 Metres: Effect of Electronic Shadow Found].—Alexanderson, p. 91.
- New Radio Field Stations; Measurements during Eclipse.—Bureau of Standards, p. 30.
- Measurements of Ionisation in the Kennelly-Heaviside Layer during the Solar Eclipse of 1932.—Henderson, p. 264.
- Fading and Signal-Strength Measurements taken during the Solar Eclipse of August 31st, 1932.—Henderson and Rose, p. 264.
- Observations of the Effective Height of the Kennelly-Heaviside Layer and Field Intensity during the Solar Eclipse of August 31st, 1932.—Kenrick and Pickard, p. 386.
- Eclipse Cinematography [Technique, and Importance as Aid in Determining Exact Times of Contact and Duration].—Korff, p. 265.
- Photometric Study of the Partial Eclipse of the Moon, 14th September, 1932 [and Deductions regarding the Ozone and Heaviside Layers].—Link, p. 150.
- Photometric Theory of Lunar Eclipses [Leading to the Deduction of an Absorbing Layer at about 150 Kilometres].—Link, p. 207.
- The Eclipse of the Sun of 31st August, 1932, and the "Sounding" by Atmospheric Parasites.—Lugeon, p. 92.
- Observations in Transmission during the Solar Eclipse of August 31st, 1932.—Martin and McCuskey, p. 387.
- Continuous Kennelly-Heaviside Layer Records of a Solar Eclipse [with Suggestions of a Corpuscular Effect on Appleton Layer].—Mimmo and Wang, p. 386.
- Effect of the Solar Eclipse on the Ionosphere.—Mitra, Rakshit, Syam and Ghose, p. 614.
- Observations on the Kennelly-Heaviside Layers during the Solar Eclipse of 31st August, 1932 [Investigation of "Corpuscular Eclipse" Effects on 60-Metre Wave Reflection].—Paul, p. 320.
- Radio Observations on the Upper Ionised Layer of the Atmosphere at the Time of the Total Solar Eclipse of August 31st, 1932.—Rose, p. 264.
- An Effect of the Recent Solar Eclipse on the Ionised Layers of the Upper Atmosphere [supporting Ultra-Violet Light as Ionising Agency for Lower Layer].—Schafer and Goodall, p. 91.
- The Photometry of Solar Eclipse Phenomena.—Sharp and others, p. 561.
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 2. Studies of Fading in Victoria: a Preliminary Study of Fading on Medium Wavelengths at Short Distances.
 3. Studies of Fading in Victoria: Observations on Distant Stations in which no Ground Wave is received.—Green and Baker: Cherry and Martyn: Cherry, p. 385.
- Selective Fading Phenomena and Height Measurements of the Ionosphere [Fictitious Heights liable to be obtained by the "Pulse" and Other Systems].—von Handel and Plendl, pp. 383 and 497.
- Investigation of Selective Polarisation Changes and Fading, by Frequency-Change and Pulse Transmissions.—von Handel, Krüger and Plendl, p. 558.
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- Fading**: see also Australia, Downcoming, Polarisation.
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Field-Strength Measuring Set for Ground and Sky Waves, and Some Results of Practical Tests.—Green and Wood, pp. 574-575.
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Records of the Effective Height of the Kennelly-Heaviside Layer [Frequencies 2 050 and 4 095 kc/s].—Kenrick, p. 496.
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A Balanced Receiving Circuit for Kennelly-Heaviside Layer Observations [Avoidance of Paralysis by Direct Radiation].—Mimno and Wang, p. 439.
Heaviside Layer Height Measurement: A Pulse-Generating Circuit using the Intermittent Discharge through a Gas-Filled Triode.—Verman and Mahomed, p. 497.
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The High-Frequency Discharge [and the Formation of "Plasmoids" at Mid-Points of the Internodes of the Standing Waves].—Chenot: Wood, p. 498.
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The Geophysical Significance of Radio Measurements of the Ionised Layer [and a Discussion of Bartel's Correlation Methods and Tests for Harmonic Components].—Tuve: Bartels, p. 265.
Wireless Studies of the Ionosphere [including a Section on the Magneto-Ionic Theory and an Extension of the Lorentz Dispersion Theory].—Appleton, p. 30.
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Studies of the Ionosphere and Their Application to Radio Transmission [Measurements of Critical Frequencies: the F Region composed of Two Layers by Day: Skip Distances as Absorption, not Penetration, Phenomena].—Kirby, Berkner and Stuart, p. 438.
Measurements of Echoes from the Ionosphere at the Summer Solstice [1933: Broadcast and Short Waves].—Mögel, p. 613.
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- The Discontinuous Nature of Love Waves.—Coulomb, p. 616.
- Propagation of Waves: Work of Special Committee at Lucerne [Qualifying and Amplifying Madrid Committee's Reports], p. 560.
- The Propagation of Waves: an Account of Work carried out at Madrid [Field Intensities for 1 kw Radiated, Wavelengths 150-2000 Metres: Limiting Ratio of Fields of Two Stations on Same Wavelength], p. 319.
- Propagation of Waves of 150 to 2000 Kilocycles per Second (2000 to 150 Metres) at Distances between 50 and 2000 Kilometers [Madrid Sub-Committee Graphs of Average Data].—van der Pol, Eckersley, Dellinger and le Corbeiller, p. 560.
- The Surface of Waves in a Liquid submitted to the Action of a Magnetic Field.—Cotton, p. 321.
- The Effect of the Earth's Magnetic Field on the Propagation of Short Wireless Waves.—Ratcliffe and White, p. 559.
- The Magneto-Ionic Theory.—Ratcliffe, p. 495.
- A Simple Method of Producing and Projecting Mercury Ripples.—Harmon and Brinsmade, p. 150.
- Meteors and the 80-90 km Layer of the Earth's Atmosphere.—Malzev, p. 561.
- The Theoretical Frequency Distribution of Photographic Meteors.—Millman, p. 207.
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- Further Results in the Study of Apparent Variations of the Vertical with the Hour-Angle of the Moon.—Stetson: Loomis and Stetson, p. 615.
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- The Absorption of Oxygen in the Ultra-Violet [and the Existence of an O₄ Molecule].—Herman, p. 498.
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- The Bright and Dark Fringes on the Edges of the Penumbra thrown by an Opaque Body illuminated by a Large Source of Light.—Wollers: Demetrovic, p. 31.
- Some Common Periodicities in Radio Transmission-Phenomena [Solar Rotation Period and Its Prominent Third Harmonic: Lunar Period, with Prominent Second Harmonic suggesting a Kennelly-Heaviside Layer Tidal Effect].—Kenrick and Pickard, p. 265.
- The Influence of the Earth's Magnetic Field on the Polarisation of Sky Waves.—Baker and Green, p. 385.
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- North Atlantic Ship-Shore Radiotelephone Transmission during 1930 and 1931 [Analysis of Short-Wave Data: Field Strength Contour Diagrams, etc.].—Anderson, p. 206.
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- Some Results of a Study of Ultra-Short-Wave Transmission Phenomena [Effect of Reflection Components: Three Reflection Surfaces even in Hill-to-Hill Transmission: Comparison of Methods of Field Strength Measurement: etc.].—Englund, Crawford and Mumford, pp. 318 and 381.
- Propagation Tests with the 1.3-Metre [Ultra-Short] Wave.—Esau and Köhler, p. 381.
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- Some Characteristics of Five-Metre [Ultra-Short-Wave] Transmission.—Kraus, p. 558.
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- Ultra-Short-Wave Tests from Summit of Mount Snowdon [Five-Metre Signals to Hoddesdon, Herts, 200 miles away].—O'Hefferman and Myatt, p. 558.
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- Ultra-Short-Wave Propagation [with Methods of Measuring Attenuation and Field Strength: Important Action of Regular Reflection and of Diffraction: etc.].—Schelling, Burrows and Ferrell, pp. 318 and 381.
- The Propagation of Ultra-Short Waves.—Smith-Rose, p. 148.
- Notes on Propagation of Ultra-Short Waves below Ten Metres in Length [Empire State Building and Other Transmissions].—Trevor and Carter, pp. 334-335.
- The Propagation of Ultra-Short Waves through Oil and Water.—Uda and Takao, p. 31.
- Experiments with Ultra-Short Waves: Demonstration [on 65-cm Wavelength: including Imitation of Fading].—Yates-Fish, p. 494.
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- Experiments on the Propagation of Ultra-Short and Micro-Waves in Tunnels [the Shafts and Galleries of Mines and a Concreted Tunnel].—Arenberg and Peickov, p. 558.
- Considerations on the Propagation of Ultra-Short and Micro-Waves.—Pession, p. 493.
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- Present Knowledge of the Upper Atmosphere.—Appleton, p. 30.
- A Survey of the Physics of the Upper Atmosphere.—Bartels, pp. 92 and 262.
- Discussion on Papers by Bartels and Rukop on the Upper Atmosphere.—Bartels: Rukop: Lassen: Franck, p. 382.
- The Existence of More Than One Ionised Layer in the Upper Atmosphere.—Builder, p. 148.
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- General Theory on the Propagation of Radio Waves in the Ionised Layer of the Upper Atmosphere.—Namba, p. 265.
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- Radio Communication by means of Very Short Electric Waves [around 50 Centimetres].—Marconi, pp. 91, 153-154, 207, 266, 267, and 493.
- New Range Tests with Very Short Waves of 60 Centimetres.—Marconi, p. 615.
- Progressive Periodic Waves at the Surface of Water in a Shallow Container [Verification of Kelvin's Formula].—Baurand, p. 387.
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- The Influence of the Weather on the Propagation of Radio Waves.—Fuchs, p. 438.
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- On Winds in the Upper Atmosphere [Meteor-Train Observations agree with Theoretical Inferences: Desirability of Meteor-Train Observations during Magnetic Storms].—Hulbert, p. 266.

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- An Extremely Simple Method of Periodogram Analysis [taking One-Third the Time taken by Correlation Periodogram: Calculations made on ordinary Adding Machine].—Alder, p. 323.
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- Weather Forecasting by Atmospherics.—Ashwin, p. 323.
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- On the Rapid Variation of Atmospherics at Sunrise [and Lugeon's "Sounding" of the Upper Atmosphere].—Bureau: Lugeon, p. 440.
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- Records of Atmospherics [Pic du Midi, Nov. 1931 to Aug. 1932: Lugeon's "Vertical Sounding" of the Atmosphere].—Link: Lugeon, p. 31.
- Sources of Atmospherics observed between England and Australia, using the Cathode-Ray Direction Finder.—Munro and Huxley, p. 32.
- Atmospherics in Australia—I. Radio Research Board, Report No. 5.—Munro and Huxley, p. 267.
- Atmospherics ["Fulgurs"] in South-Eastern Australia, measured on a Frequency of 200 Kilocycles per Second.—Munro and Green, p. 561.
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- The Most Important Results of Aurora Borealis Research.—Störmer, p. 389.
- The Horseshoe Aurora.—Hill: Störmer, p. 268.
- The Auroral Spectrum and Its Interpretation.—Vegard, p. 617.
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- On the Absorption of **Cosmic Radiation** by the Atmosphere [Support of the Writer's View of Radioactivity of Free Protons as Ionising Agency and Extra-Nuclear Electrons as Agency for Absorption].—Sevin, p. 388.
- Spectrum of **Cosmic Radiation**.—Skapski, p. 33.
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- A New Method of Direct Determination of the Natural Angular Distribution of **Cosmic Rays** [Rotatable System of Tube Counters of Varying Lengths].—Tuwim, p. 499.
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- The Eclipse of the Sun of 31st August, 1932, and the "Sounding" by Atmospheric Parasites.—Lugeon, p. 92.
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Lightning Research. American and Continental Observations.—Influence of Radio-Activity in the Soil—Explanation of "Dowsing" [Summary of Papers at the International Electrical Congress].—Peek, Fortescue, Dauzère, Bogoiavlensky and Chatelain, Rudenberg, and others: Lehmann, p. 32.

Gaseous Breakdown at Normal Pressure [Application to Growth of **Lightning Flash**].—Sämmer, p. 616.

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- The Screen-grid Valve as a Frequency-Changer in the Super-Het [Theoretical Treatment and Practical Conclusions].—White, pp. 99 and 157.
- Screened Aerial Down Leads.—Brigham, p. 325.
- Reducing Man-Made Static [The Use of a Screened Lead-In and the Calculation of the Appropriate Impedance-Matching Network].—Browning, p. 157.
- The Question of the Screened Aerial Lead [and the Recommendations of the Association of German Electricity Works].—Nentwig, p. 157.
- Screened Cable for Down Lead [Capacity under 30cm/m: Weight 160 gm/m].—Telefunken Company, p. 325.
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- Why Does the Low-Frequency Amplifier Howl? Tests on the Static Screening of A.F. Transformers.—Piesch, p. 448.
- Second Channel Suppression.—Kinross, p. 446.
- A Practical Criterion of Selectivity [Unsatisfactory Nature of I.R.E. Practice and of Thomas' Method: Need of Arbitrary Limit defining "Just Appreciable" Interference: Suggestion of 10% Relative Audio Volts Output].—Callendar, p. 100.
- Selectivity in Broadcast Reception. 1. Band-Pass Filters. 2. Tone Correction.—Davidson: Bell, p. 326.
- Average Selectivity Curves of 1931-32 Superheterodyne and Tuned R.F. Receivers.—Horn, p. 326.
- The Representation of [Single-Peak] Resonance Curves by "Selectivity Indexes".—Kafka, p. 448.
- Systematic Study of Short-Wave Triode Amplifying Circuits by "Neutralisation" [particularly the Bridge Method].—Haraguchi, p. 39.
- Short-Wave Two [with Screen-Grid Valve as Regenerative Detector].—Dent, p. 39.
- Short-Wave Transoceanic Telephone Receiving Equipment.—Polkinghorn, p. 327.
- Practical Short-Wave Reception.—Whitehead, p. 393.
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- High-Speed Telegraphic Reception on Short-Wave Transoceanic Services [with particular reference to the "Double Undulator" System for Combating Fading and Atmospherics].—Mögel, p. 503.
- The Radio Receiver Characteristics related to the Sideband Coefficient of the Resonance Circuit.—Takamura, pp. 38 and 156.
- Sideband Splash.—Hallows, p. 157.
- A Long-Wave Single-Sideband Telephony Receiver for Transatlantic Working: Hill and Page, p. 566.
- Improved Smoothing in Mains Receivers by connecting Valves as Series Elements of Anode-Current Filter Chain.—TKD, p. 448.
- The Problem of Stability [in Radio Receivers].—Chrétien, p. 448.
- Stability Problems of Tuned R.F. and Superheterodyne Receivers.—Place, p. 623.
- A Superheterodyne Receiver with Several Frequency Changes in the I.F. Circuit.—Aigner, p. 566.
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- Selected Problems from Broadcast Receiver Technique, with Special Reference to the Superheterodyne Receiver.—Clausing, p. 623.
- Monodial D.C. Super.—Cocking, p. 100.
- The All-Wave Monodial Super.—Cocking, p. 213.
- The New Monodial Super.—Cocking, p. 504.
- New Ideas for the Superheterodyne [including the Pentagrid Valve as Frequency Changer].—Cocking, p. 504.
- The Di-Super-6 [Superheterodyne] Receiver with Double Frequency Change [avoiding "Double Image" Trouble without Defects of Usual Methods].—De Giorgi, p. 39.
- Straight Sets versus Superheterodynes: Correspondence.—Elliott, p. 326.
- A Note on Interference Tones in Superheterodyne Receivers.—Floyd, p. 504.
- Papers on the "Single-Signal" Superheterodyne Receiver.—Lamb, pp. 39, 327, 446 and 504.
- The Single-Signal Receiver at Work: The Single-Signal Super in Another Dress.—Parmenter: Lusk: Lamb, p. 101.
- A Superheterodyne Receiver using the New "Fading Hexode" and "Mixing Hexode" Valves.—Wigand: Telefunken, p. 446.
- A Screen-Grid-Valve Dynatron Oscillator Circuit for Superheterodynes, Free from Harmonics, p. 157.
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- Tuned-Transformer Coupling Circuits [Low-Loss Air-Core Transformers, as used in I.F. Amplifier of Field Strength Measuring Set].—Christopher, p. 326.
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- On the Modulation of an Ultra-Short Wave by a [Modulated] Medium Wave, and its Detection.—Ataka, p. 620.
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- An Unusual 56Mc [Ultra-Short-Wave] Super-Regenerative Receiver: Details of a Portable Set with Self-Quenching Detector.—Haydock, p. 567.
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- Is the Problem of the Communal Aerial Solved?—Noack: Philips' Company, p. 624.
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- Theory and Practical Application of Directed Radiation [Comprehensive Survey of Beam Aerial Theory: Calculation of Radiation Diagram of Zeesen Short-Wave Broadcasting Aerial].—Ochmann and Rein, p. 567.
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- Phase Synchronisation in Directive Antenna Arrays, with Particular Application to the Radio Range Beacon [using the "Transmission Line" Antenna, Adcock Principle].—Kear, p. 625.
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- A New Type of Directive Aerial [with Radiating Elements of Progressively Increasing Length: Especially Suitable for Ship-Shore Working].—Walmsley, p. 101.
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- An Experimental and Analytical Investigation of Earthed Receiving Aerials: Corrections.—Colebrook, p. 327.
- The Effective Combating of Short Range Fading in Broadcasting, by Special Transmitting Aerial Systems [for Space-Wave Suppression].—Harbich and Hahneman, p. 40.
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- The Effective Combating of Near Fading in Broadcasting by Transmitting Aerials of Particular Design [Elektrotechnischer Verein Discussion].—Hahnemann, Harbich, Runge, Gothe, Plendl, Krüger, p. 158.
- Field Tests on Radio Communication over Long-Distance Aircraft Routes [including the Reduction of Short-Wave Fading by Alternate-Aerial Transmission or Reception].—von Handel, Krüger and Plendl, p. 557.
- An Anti-Fading Aerial consisting of a Wire wound into a Spiral.—SFR, p. 273.
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- Radiation Characteristics of Beam Antennas [and the Dispersion of the Beam by the Heaviside Layer]: Errata.—Minohara, Tani and Ito, p. 40.
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- Reply to Mr. Hallén's Remarks on my Paper "The Free Electrical Vibrations of Rod-Shaped Conductors."—Lindman, p. 101.
- A Method of Measuring the Sag of Telephone Lines [Depending on the Velocity of Propagation of a Transverse Wave].—Thomas, p. 160.
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 Observations on Filmed and Filtered Vowels.—Benton: Paget, p. 44.
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- The Special German P.O. Section for Television at the 9th Great German Radio Exhibition.—Kette, p. 46.
- Television at the 1932 Berlin Radio Exhibition.—Traub, pp. 108 and 630.
- Television Exhibition, pp. 336 and 399 (two).
- The Dependence of the Optical Threshold of the Eye on the Visual Angle, and Its Relation to the Visibility of Weakly Lit Elements in Television Reception.—Peters, p. 630.
- The Eye: a Link in the Television Chain.—Wright, p. 108.
- Switching Arrangement at Facsimile Receiver to ensure a Strong Start-Stop Signal without Too Strong a Picture Signal.—Siemens & Halske, p. 167.
- Fading Elimination, especially in Phototelegraphy.—Int. Gen. Elec., p. 279.
- The Photoelectric Properties of Alkali Metal Films as a Function of Their Thickness.—Brady, p. 107.
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- Optical and Photoelectrical Investigations of Thin Metallic Films.—Schulze, p. 170.
- The [Constant Quantum] Efficiency of Fluorescence of Sodium Salicylate.—Dubouloz, p. 454.
- The Determination of the Highest Frequencies to be Transmitted and the Influence of Phase Distortion in Television.—Fayard, p. 399.
- Light Emission from Gas Discharges especially from Resonance Lines [Theoretical and Experimental Treatment of Neon Sodium Vapour Lamp, etc.].—de Groot, p. 168.
- The New Gas Discharge Tubes, and Their Application to Television.—Harris, p. 278.
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- Electrical Cinematography [Images recorded on Gramophone Records].—Hémarinquer, p. 632.
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- The Occurrence of Image Errors in Television, Phototelegraphy, etc.—Thun, p. 631.
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- Light Modulation. Improved Method for Use in Television—Brighter Images [Use of Kerr Cell without Nicol Prisms].—Myers: Wilson Laboratories, p. 106.
- A Note on the Kerr Cell [and the Distortion due to the Curvature of Its Characteristic].—Wright, p. 612.
- A Method of Measuring the Maximum Intensity of Light from the Photoflash Lamps or from Other Sources of Short Duration.—Forsythe and Easley, p. 48.
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- New High Intensity Light Sources for Television Receivers [especially the "Linear" Lamp for Mirror Helix, with Modulated D.C. to Internal Electrodes and R.F. Control to External Ring Electrodes].—Scholz: Leithäuser, p. 48.
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- Sight and Sound on One Wave [Sound Impulses converted into Light Impulses which are used as part of the Scene to be Televised].—Wood, pp. 279 and 399.
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- Investigation of Barrier-Layer Photocells [Effects of Electrode Thickness and of Nature of Gas used in Sputtering Process, etc.].—Borissow, Sinehnikow and Walther, p. 400.
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- Photocell and Amplifier Combination with Very Short or No Connecting Leads, by use of Valve with External Control Electrode.—Tonbild-Syndikat, p. 454.
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- On the Confirmation of the Existence of a New Photoelectric Phenomenon [Effect of Intermittent Illumination on Thin Platinum Films on Glass].—Majorana, p. 170.
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- Photoelectric Emission from Different Metals.—Rentschler, Henry and Smith, p. 169.
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- On a Working Régime of Gas-Filled Photoelectric Cells [the Hemispherical Dunoyer Cell "SCAD Series S"].—Dunoyer and Paouloff, p. 278.

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- The Effect of a Magnetic Field on a Gas-Filled Photoelectric Cell.—Fourmarier, p. 168.
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- Photoelectric Cells: Their Properties and Uses.—Stoodley, p. 335.
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- Photovoltaic Cells and Their Applications.—Boutaric: Audubert, p. 336.
- Papers on Photovoltaic Cells of Salts of Copper.—Audubert, p. 455.
- Comparative Characteristics of the Copper Oxide and "Photronic" Cells: The Weston Photronic Cell in Optical Measurements: A New Photo-Cell Photometer [using two Photronic Cells].—Bartlett: Shook and Scrivener: Gleason, p. 47.
- The Variation in Sensitivity of the Photronic Cell with X-Ray Wavelengths.—Gleason, p. 631.
- Notes on the Weston Photronic Photoelectric Cell.—Romain: Bartlett, p. 277.
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- Phototelegraphic Recorder with Stylus tracing a Sine Wave of Amplitude dependent on the Absorption offered to the Scanning Light Spot.—Burlin, p. 632.
- A.C. Rectification by Photosensitive Aggregates [Objections to Eccles's Thermoelectric Theory of Crystal Detector: New Theory].—Barnard, p. 400.
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- Experiments and Measurements with Selenium Barrier-Layer Photocells.—Bergmann, p. 335.
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- The Conductivity of Electronic Semi-Conductors in a Magnetic Field.—Bronstein, p. 400.
- The Discontinuities of Potential at the Contact of a Semi-Conductor and a Metallic Electrode.—Déchêne, p. 455.
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- Report on the Theory of Semi-Conductors.—Fowler, p. 515.
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- A **Synchronising System** for Electrical Transmission of Pictures.—Niwa, p. 108.
- The present Position of **Telefunken** Television Broadcasting.—Schroter, p. 629.
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- A New [Television] System? [Numerous Photo-sensitive Elements each controlling Amplitude of One Particular Note: Corresponding Conversion at Receiver].—Owen, p. 108.
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- Synchronous Electric **Time Service**.—Warren, p. 109.
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- On the Piezoelectric Properties of **Tourmalin**.—Fox and Underwood, p. 338.
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- Electrical and Magnetic **Units**.—Griffiths, p. 280.
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- Correction of Frequency Error in Moving-Iron **Voltmeters**.—Campbell: Carter, pp. 50 and 280.
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- Cathode-Ray Oscillography [Physical Society Discourse].—Watson Watt, pp. 172 and 224.
- Applications of the Cathode Ray Oscillograph in Radio Research.—Watson Watt, Herd and Bainbridge-Bell, p. 402: see also above (G.W.O.H.).
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- Balancing Device for Rotating Condensers, etc., by Separately Screw-Adjusted Segments of a Slotted Stator Plate.—von Kramolin, p. 638.
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- A Note on the Magnetic Susceptibilities of Cuprous Oxide Films.—Bhatnagar and Mitra, p. 515.
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- Commercial Dielectrics: the Factors concerned in Their Dielectric Losses: Electro-Osmotic Mechanism, and Semi-Permeability: Intense Polarisation retained by a Dielectric solidified in an Electric Field: etc.—Lahousse, p. 516.
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- The Dielectric Losses in Impregnated Paper.—Whitehead, p. 340.
- Calculation of the Dielectric Constant of a Salt from a Single Measurement of a Mixture of Air and the Salt.—D. A. G. Bruggeman, p. 637.
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- Dielectric: see also under "Propagation of Waves."
- Study in the Discharge in an Ionic Tube with the help of a Cinematographic Apparatus.—Dolejssek and Dráb, p. 224.
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- A Compact [Oil-Cooled] Electromagnet for General Purposes [giving 32 500 Gauss].—Bates and Lloyd-Evans, p. 578.
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- The Foundations of Geometrical Electron Optics.—Brüche, p. 224.
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- Electron Optics: On Electron Beams in High Vacuum.—Davison: Zworykin, p. 459.
- The Geometrical Electron Optics of the Electromagnetic Field with Axial Symmetry [and the Avoidance of Aberration and Distortion].—Glaser, p. 399.
- Contributions to the Theory of Geometrical Electron Optics.—Picht, p. 224.
- On the Theory of Electron Optics.—Picht: Scherzer, p. 458.
- The Theory of the Lens Errors in Electron Optics.—Scherzer, p. 224.
- On Electron Optics [Survey of the Focusing of Electron Beams].—Zworykin, p. 578.
- Self-Focusing Electron Streams [e.g. in Cathode-Ray Tubes].—Bennett, p. 635.
- The Cathautograph: an Electronic Pencil [using a Fluorescent Screen with a Decay Period of about 30 Seconds].—Du Mont, p. 224.
- Class "B" Eliminator [using special Neon Tube Stabiliser].—Page, p. 341.

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- How Ferrocart is Made.—Schneider, p. 281.
- Ferrocart.—Schneider, p. 515.
- "After-Effect" Losses in Ferromagnetic Materials for Weak Alternating Fields.—Goldschmidt, p. 112.
- Comparison between Cascades of Tuned R. F. Amplifiers and the Band-Pass Filters of Cauer and of Jaumann.—Baerwald, p. 516.
- The Properties and Calculation of the Multiple Bridge Filter.—Cauer; Jaumann, p. 228.
- Critical Reviews of Books and Papers on Electric Filters.—David, p. 443.
- A Recent Contribution to the Design of Electric Filter Networks [Cauer's Method in Simplified Form of Sufficient Accuracy for Most Cases].—Guillemin; Cauer, p. 52.
- A Filter for an X-Ray Power Supply [Greinacher Rectifier Circuit and Balanced Pi-Type Low-Pass Filter].—Hoag and Andrew, p. 225.
- A Filter for the Intermediate-Frequency Amplifier [of a Superheterodyne Receiver].—Piesch, pp. 211-212.
- The Construction and Balancing of Intermediate-Frequency Band-Pass Filters.—Sturm, p. 638.
- Filters: see also under "Reception," "Acoustics and Audio-Frequencies."
- The Efficiency of Fluorescence of Sodium Salicylate.—Doubouloz, p. 458.
- The Variation of the Intensity of Fluorescence with the Wavelength of the Exciting Radiation [and the Effect of the Solvent].—Fabrikant, p. 578.
- Quantitative Study of the Inhibiting Action of Certain Ions on the Fluorescent Power of Uranine [the Sodium Salt of Fluorescein].—Bouchard, p. 284.
- A Spectroscopic Method of Determining the Excitation of Luminescence [for the Rapid Choice of the Ultra-Violet Wavelength suitable for Various Fluorescent Substances].—Heyne and Pirani, p. 225.
- The Spurious Ring exhibited by Fluorescent Screens.—Hughes, p. 517.
- A Simplified Frequency-Dividing Circuit [using One Pentode Valve: for Frequency-Measuring Equipments].—Andrew, p. 578.
- Taylor's Frequency Tripler [Explanation of Action].—Pillai and Mowdawalla, p. 515.
- "Wax-Operated Switches" and Metallised Wax Strips as Fuses for Instruments, Fractional-H.P. Motors, etc.—Bullen, p. 578.
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- The Physical Foundations of the Grid Control of Gas-Discharge Tubes [including Mercury-Vapour Rectifiers with Grids].—Glaser, p. 111.
- The Mode of Action of Gas-Discharge D.C. Converters.—Laub, p. 636.
- Grid-Controlled Gas Discharge [Thyratron] as Alternating Current Resistance which can be Regulated.—Lenz, p. 516.
- The Control Curves of Intermittently Controlled Gas Discharges [in Grid-Controlled Rectifiers, etc.].—Lübcke, p. 226.
- AEF Provisional Resolutions on Names and Definitions relating to Gas Discharges of Various Types, p. 636.
- A Method of Control for Gas-Filled Tubes [by "Repeated Transient" Voltages].—Stansbury, p. 339.
- Prevention of Glow Discharge at Hot Cathode of Gas-Filled Discharge Tube by use of a Suppressor.—Telefunken; Bräuer, p. 339.
- The Ignition Process and Power to the Grid in Hot-Cathode Gas-Filled Relays [Thyatron, etc.].—Klemperer and Steenbeck, p. 636.
- Gaseous Discharge Tubes for Radio Receiver Use [as Visual Tuning Indicator with or without "Noise Gate"].—Dreyer; Senauke, p. 272.
- The Dielectric Losses of Glass and Their Dependence on Its Composition.—Keller, p. 282.
- The Dielectric Strength of Thin Layers of Glass and Mica.—Alexandrow and Joffe, p. 637.
- The Control and Extinction of a Glow Discharge in a Tube with Mains-supplied Cathode and a Third Electrode.—Badareu, p. 284.
- A Unipolar Form of "Gliding Corona" [a Kind of Glow Discharge; and a Criticism of Gemant's "Electrophotography" of the Porous Structure of Insulating Materials].—Coehn and Ziegler, p. 577.
- The Theory of Glow-Discharge Valve Tubes [for Protecting Devices: Possibility of Using Greater Electrode Gaps].—Heer, p. 578.
- The Heavy-Current Glow Discharge at Atmospheric Pressure: A New Type of Discharge.—Heer and Thoma; Krug, pp. 112 and 228.
- The "Stabilisator" [Glow-Discharge Potential Divider and Voltage Regulator].—Körös, p. 226.
- The Provision of Several Different Anode Voltages by the "Stabilivolt" Glow-Discharge Tube.—Körös, p. 577.
- A New "Amplitude-Limiting" Glow-Discharge Lamp Type AR 220 for Preventing Excessive Output from an Amplifier, p. 113.
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- A Photoelectric-Mechanical Harmonic Analyser.—Dietsch and Fricke, p. 53.
- A New Harmonic Analyser [Synchronous Disc and M.C. Voltmeter].—Gates, p. 228.
- Harmonic Analysis of Oscillatory Phenomena (Mathematical Processes: Methods of Pichelmayer and Schruttkka and of Zipperer).—Kronert, p. 517.
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- Hypernik—Its Uses and Limitations.—Wentz, p. 52.
- The Control of Ignition-Coil Discharge Characteristics.—Finch and Sutton, p. 282.
- A New Type of Impedance Unit [Filter Unit from Twisted Pairs of Conductors Encased in Shielding].—Allen, p. 577.
- Prevention of Frequency Variation due to Thermal Expansion and Contraction of Inductance Coils with Varying Loads, by means of a Compensating Current.—Telefunken; Roosenstein, p. 284.
- Variable Inductors for Bridge Measurements [10:1 Ratio, 0.005 to 500 Millihenries].—Burke, p. 53.
- The Electrical Strength of Insulating Materials under Mechanical Strain.—Akahira and Gemant, p. 637.
- Insulating Materials—Some Recent Developments [Elephantide Press-Papers, Alkyd Resins, etc.].—Dunton, p. 227.
- A New Industrial Insulating Material: the Lambert Insulating Concrete.—Ferrier, p. 516.
- Losses in Commercial Insulating Materials [and a Comparison between the Maxwell-Wagner and Debye Theories].—Kirch, p. 52.
- A New Compressed Insulating Material [Synthetic Resin and Linen Aggregate].—Römmeler Company, p. 460.
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- An Efficient Insulating Device for Electrostatic Work [Quartz Insulators with Surface Films eliminated by use of Heaters].—Telang, p. 340.
- The Properties of Electrotechnical Insulating Materials and Their Measurement.—Wagner, p. 340.
- Calan, a New Insulating Material for High-Frequency Engineering, p. 402.
- "Calit" and "Calan," Two New Ceramic Insulating Materials, p. 460.
- A Symposium on Insulating Materials and Their Uses, p. 516.
- High-Frequency Ceramic [Insulating] Material [giving Accuracy of Dimension, High Dielectric and Mechanical Strengths].—p. 340.
- Insulating Materials: see also Dielectric, Glass and Mica, Glow Discharge, Insulation, Insulators, Kolonit, Mycalex.
- Insulating Suspensions or Supports for Short-Wave Components, to avoid Dielectric Losses: the Use of Metallic Windings of High Inductance as Insulators.—Telefunken Company, p. 227.
- A Summary of Year's Insulation Research.—Whitehead and others, p. 227.
- Capillary Action in Impregnated Paper Insulation.—Whitehead and Greenfield, p. 227.
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- New Liquid Insulator Devised for Transformers [Will Not Mix with Water: Decomposes into Non-Combustible Gases].—Clark; GEC, p. 112.
- Research brings Remarkable New Liquid Insulator—"Pyranol."—GEC, p. 112.
- Critical Remarks on Some New Researches on the Breakdown of Solid Insulators.—Inge, Walther and Wul, p. 516.
- The Molecular Orientation of Liquid and Viscous Insulators and Its Influence on the Anomalous Properties of these Dielectrics at High Frequencies.—Kostomarov, p. 637.
- On New Integrations of the Askania Works [Differential-Integrating, Prism Derivator, etc.].—Picht, p. 173.
- New Instruments for Mechanical Integration, Differentiation, and Harmonic Analysis on the Principle of "Rolled-Up" Abscissae.—Boisseau, p. 517.
- The Relaxation Inverter and D.C. Transformer.—Reich, p. 339.
- The Parallel Type of Inverter [3-Electrode Hot-Cathode Gas-Filled Tube: including Use for Supplying Power from D.C. Systems to A.C. Radio Sets].—Tompkins, p. 402: see also Converter, Thyatron.
- Iodide Cells—An Investigation of Cadmium Iodide and Zinc Iodide Types.—Salazar, p. 459.
- Curves for the Determination of the Permeability of, and Losses in, Iron Sheet.—Arkadiew, p. 578.
- The Magnetic Properties of Electrolytic Iron [in Very Thin Layers].—Grigorow, p. 578.

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- Magnetisation of Iron by the Superposition of an A.C. Field on a Constant Magnetic Field.—St. Procopiu, p. 515.
- Physical Properties and Structure of the Binary System **Iron-Cobalt**.—Kussmann, Scharnow and Schulze, p. 52.
- The "Fer-X" [**Iron-Cored**] H.F. Transformers.—Budich Company, p. 579.
- Remarks on "**Iron Cores for High-Frequency Coils**" [Vogt Iron (Ferrocort)].—Nissen: G.W.O.H.: Schneider, p. 515.
- Calculation of **Iron-Cored Coils** simultaneously traversed by A.C. and D.C.—Matteini, p. 52.
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- A **Permanent Oxide Magnet** and Its Characteristics.—Kato and Takel, p. 579.
- The Problem of Unipolar Induction and the Electrical Surface Charges on Rotating Magnets.—Slepian, p. 579.
- New **Magnetic Materials** for Pupin Coils [Isoperms].—Dahl, Pfaffenberger and Sprung, p. 637.
- Isoperme, a **Magnetic Material** for Telephone Engineering.—Goldschmidt and Pfaffenberger, p. 281.
- A New Method for **Magnetic Measurements** on Strips of Sheet Metal.—Hermann, p. 226.
- Commercial Materials of Great Magnetic Softness** [and a Quick and Accurate Method of Measuring Small Coercive Forces].—Stablein, p. 112.
- The Production of **Homogeneous Magnetic Fields**.—Bühl and Coetier, p. 52.
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- The Significance of Internal Tensions in the Theory of Magnetisation Curves.—Preisach, p. 52.
- Mechanical Models** for the Investigation of Electrical Stability Problems.—Darricus, p. 404.
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- The Theory of Rectification in **Hot-Cathode Mercury Vapour Tubes**.—Brandt and Smith, p. 111.
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- X-Ray Study of the Density Distribution in a [Mercury Vapour] Discharge Tube.—Ishida and Suetsugu, p. 402.
- On the Possibility of **Binding Mercury Vapour** and other Unwanted Vapours in Air by Photochemical Methods.—Klumb, p. 112.
- The Extinction of **Anode-Current Arc** by Polarised Grid in **Mercury Vapour Tubes** [Contrary to Usual Belief: New Possibilities].—Kobel, p. 636.
- Investigations on **Mercury Vapour Discharges**.—Lübcke, p. 111.
- Physical Processes in **Low-Pressure Mercury Vapour Arcs** [Mercury Vapour Rectifiers].—Lübcke, p. 577.
- Magnetic Control of Mercury Vapour Rectifier Tubes** [instead of Grid Control].—Reich, p. 339.
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- The Importance of **Temperature Regulation** in the use of **Mercury Vapour Rectifiers**, and a Device for this Purpose.—Stansbury and Brown, p. 459.
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- Types of **Very Small Motors** [500 Watts downwards].—Bunzl-Geemen, p. 281.
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- Neon-Lamp Method** [Relaxation Oscillation Circuit] for the Measurement and Registration of Photoelectrically Active and Ionising Radiations.—Stäger, p. 112.
- A Theory of **Neon Tube Operation**.—Summers, p. 112.
- A Method for Calculating **Transmission Properties of Electrical Networks** consisting of a Number of Sections.—Alford, p. 638.
- On the Structure of the **Nickel-Iron Alloys**.—Broniewski and Smolinski, p. 515: see also Iron-Nickel.
- The **Contact Rectifier as Noise-Limiting Device** for Telephone Receivers.—Kallmann, p. 636.
- The **Suppression of Disturbing Noises** by Gaseous Discharge Cut-Outs.—Werrmann, p. 403.
- Control by "**Non-Linear**" Circuits [Transformer Combinations, etc.].—General Electric Company, p. 227.
- The **Electrical Conductivity of Thin Films of Mineral Oils**.—van Arkel and Koopman, p. 637.
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- Electrical Breakdown in Air and Transformer Oil under Pressure**.—Walther and Inge, p. 637.
- The **Electrical Strength of Liquid Insulating Materials** [Oil and Xylo] at High Frequencies [and the Thermal Breakdown Effect].—Schlegelmilch, p. 578.
- Two New Oscillators for the Radio-Frequency Range**.—Grant, p. 341.
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- A **Fast and Economical Type of Photographic Oscillograph**.—Draper and Luck, p. 636.
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- Calculation of the **Permeability and Losses in Ferromagnetic Sheets** at a Given Frequency [with Formulae and Curves].—Arkadiew, p. 340.
- On the **Permeability of Iron at Ultra-Radio Frequencies**.—Arkadiew, p. 460.
- Permeability of Iron at Ultra-Radio Frequencies**.—Hoag and Jones, p. 226.
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- The **Sensitization of Ordinary Photographic Plates to Wave Lengths below 2500 Å**: A Simplified Method of Preparing Schumann Plates.—Allen and Franklin: Hopfield and Appleyard, p. 52.
- The **Photographic Emulsion**—Variables in Sensitisation by Dyes: the Mechanism of Hypersensitisation.—Carroll and Hubbard, pp. 52 and 284.
- The **Effectiveness of Photographic Layers in Spectrography of All Wavelengths** [including Cathode Rays: a Survey].—Eggert, p. 459.
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- The **Photographic Action of Electrons** [and the Effect on the "Threshold" of the Sensitising Process of Oiling the Surface of the Film].—Whiddington and Taylor, p. 52.
- An Arrangement for **Introducing Photographic Plates into a High Vacuum** and for Removing Them therefrom.—Andresen, p. 284.
- Photography of Faint Transient Light Spots**.—Richardson, p. 284.
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- The **Darboux-Koenigs Planigraph**.—Nyström, p. 228.
- On the Theory of the **Luminous Arc Plasma**.—Gábor, p. 111.
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- The **Crystalline State of Thin Sputtered Films of Platinum**.—Thomson, Stuart and Murison, p. 516.
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- The Application of the **FP-54 Photron** to Atomic Disintegration Studies.—Hafstad, p. 636.
- New Phiotrons, Cathode-Ray Tubes for X-Ray Analysis, Thyratrons and Phanotrons**.—Hull, p. 173.
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- Logarithmic Protractor.—Yearian, p. 638.
- A New Exhaust Pump for High Vacuum [Cenco Aristovac Pump, Molecular Drag Principle].—Cadwell, p. 112.
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- A Pen Recorder for D.C. Millivolts and Microamperes at Energy Levels of 4–5 Microwatts.—Bernade and Lunas, p. 227.
- A New Electronic Recorder: New System of Recording using Electronic Means.—Bernade and Lunas, p. 338.
- The Field of Application of the "Pegelschreiber" [Automatic Level Recorder] in Telephone Engineering.—Fenyó, p. 638.
- A Round Chart Indicating Recorder.—Leeds and Northrup Company, p. 460.
- Analyses of Rates of Rotation of Recording Drums.—Blake and McComb, p. 635.
- On the Driving Mechanism of Recording Apparatus.—Baltzer, p. 579.
- Rectifier Valve with Cylindrical Anode and Cathode of Tungsten Wire wound round a Calcium Cylinder and continued to a Point near the Anode.—Abadie, p. 110.
- The Properties of Copper-Oxide Dry-Plate Rectifiers under Prolonged Test.—Böhm, p. 110.
- A Rectifier System for [Plate Voltage Supply of] Broadcast Speech-Input Equipment, using the New -83 [Mercury-Vapour Rectifier].—Bradner Brown, p. 636.
- [The Construction of] the Tantalum Rectifier for Battery Charging.—Colebrook, p. 515.
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- Current and Potential Relations in Grid-Controlled Rectifiers.—Dällenbach, p. 111.
- Theory of [Mercury Vapour] Arc Rectifiers with Retarded Commutation.—Demontvignier, p. 111.
- The Selenium Rectifier [Comparison with Copper-Oxide Type].—Fukuda and Saito, p. 515.
- Selenium or Selenide Rectifier?—Gripenberg, pp. 53 and 282.
- The Copper-Cuprous-Oxide Rectifier and Photoelectric Cell.—Grondahl, p. 515.
- Copper-Oxide Rectifier used for Radio Detection and Automatic Volume Control.—Grondahl and Place, p. 39.
- The Mercury Vapour Valve with Control Grids, and Its Use as a Reversible Rectifier.—Hafner, p. 111.
- Fundamental Characteristics and Applications of the Copper-Oxide Rectifier.—Hamann and Harty, p. 637.
- Thyratron-Controlled Voltage Rectifiers [for Laboratory Use: employing Selysyan Transformer].—Hartman, p. 282.
- The Stopping Layer of Rectifiers.—Jusé, p. 636.
- The Current Rectifier as an Alternating Current Load.—Klemperer, p. 111.
- The Current Rectifier with Capacitative Load.—Klemperer and Strobl, p. 577.
- The Ignitron—a New Controlled Rectifier [Arc started by Spark between Carborundum and Mercury].—Knowles: Westinghouse Company, p. 577. See also below (Slepian).
- Tests on the New Arc-in-Air Rectifier for Very High Voltages and Powers.—Marx, p. 459.
- Measurements on Barrier-Layer Rectifiers [New and Aged: Bergstein's Classification: Wagner's Theory].—Meyer and Schmidt, p. 225.
- [Experimental] Comparison of the Rectifying Characteristics of Hot-Cathode Mercury-Vapour Rectifier Tubes and High-Vacuum Diodes.—Miura and Utsumi, p. 111.
- The Current and Voltage Ratios of the Grid-Controlled Rectifiers.—Müller-Lubeck and Uhlmann, p. 459.
- Investigation of the Copper Oxide Rectifier at High Voltages [Contradiction of Cold Emission Theory and Agreement with Joffé-Frenkel Gas Theory].—Nasledow and Nemenov, p. 402.
- Metal-Clad Mercury Arc Rectifiers in Broadcast Stations.—Sidler, p. 339.
- A New Method of Starting an Arc [High Resistance "Starter Rods" of Carborundum, etc., for Controlled Rectifiers].—Slepian and Ludwig: Westinghouse, p. 636. See also above (Knowles).
- Gas and Vapour Tube Multipliers for Indicator Use [The Use of Grid-Controlled Rectifiers for Amplification of Small D.C. Voltages, as from Thermocouple Pyrometers].—Weiler, p. 459.
- Data of Rectifier Valves, Philips, Rectron, Telefunken and Valvo, p. 110.
- Rectifiers: see also Converters, Crystal, Cuprous Oxide, Inverters, Mercury Arc, Mercury Vapour, Relays, Voltage.
- Three-Phase Transformer Connections and Their Application to High-Voltage Rectifying Circuits.—Epperson, p. 459.
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- Gasfilled Relays. Part II.—Practical Applications.—Lewer and Dunham, p. 53.
- Non-Linear Circuits [Saturating Reactors in Resonance Circuits] Applied to Relays.—Suits, p. 403.
- The Performance of Relays [as regards Variability in Time of Operation].—Tomlinson, p. 578.
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- The Measurement of the Phase Angles of Shielded Resistors.—Berberich, p. 227.
- A Resistor for High-Voltage Measurements [made from Thin-Film Carbon Resistances].—Bowdler, p. 637.
- The Constant Paramagnetism of Metallic Rhenium.—Perakis and Capatos, p. 281.
- Rhenium, Its Properties and Application, p. 281.
- An Improved Rheostat [with Screw-Drive Mechanism].—Whitson, p. 113.
- Anomalous Dispersion of the Dielectric Constant of Rochelle Salt.—Busch, p. 637.
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- Radio International [a Five-Language Dictionary giving 900 of the Most Important and Commonly Used Radio Terms].—Pariser, p. 640.
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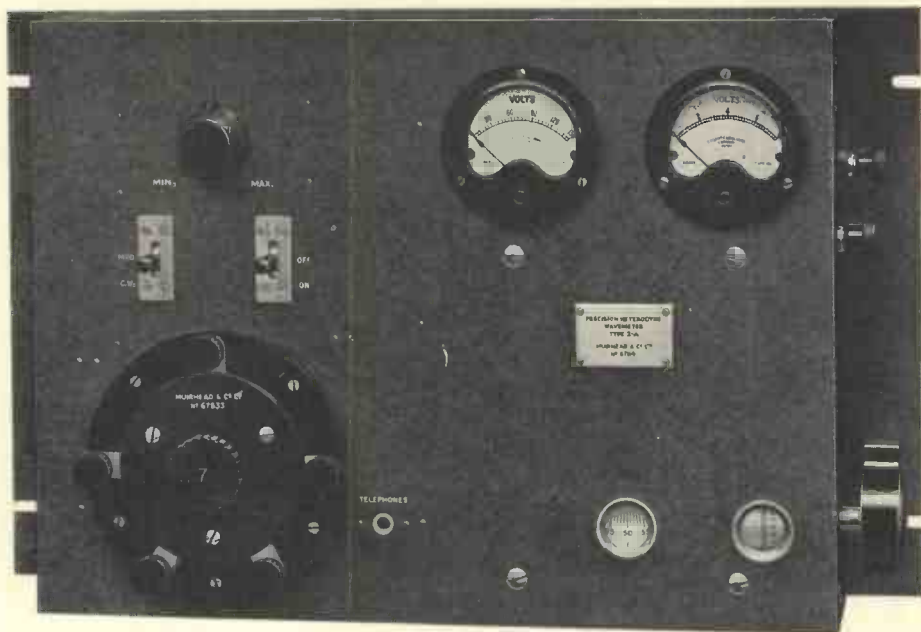
- The **E.M.Fs** developed by **Man** in Contact with a Metallic Conductor [and Their Diurnal Variation].—Vlès and others, p. 463 : see also Growth.
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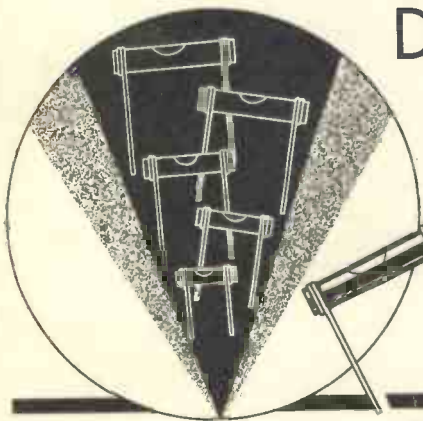
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