

U-S-W. RECEIVER DESIGN—See Page 451

Practical and Amateur Wireless

3^d
EVERY
WEDNESDAY

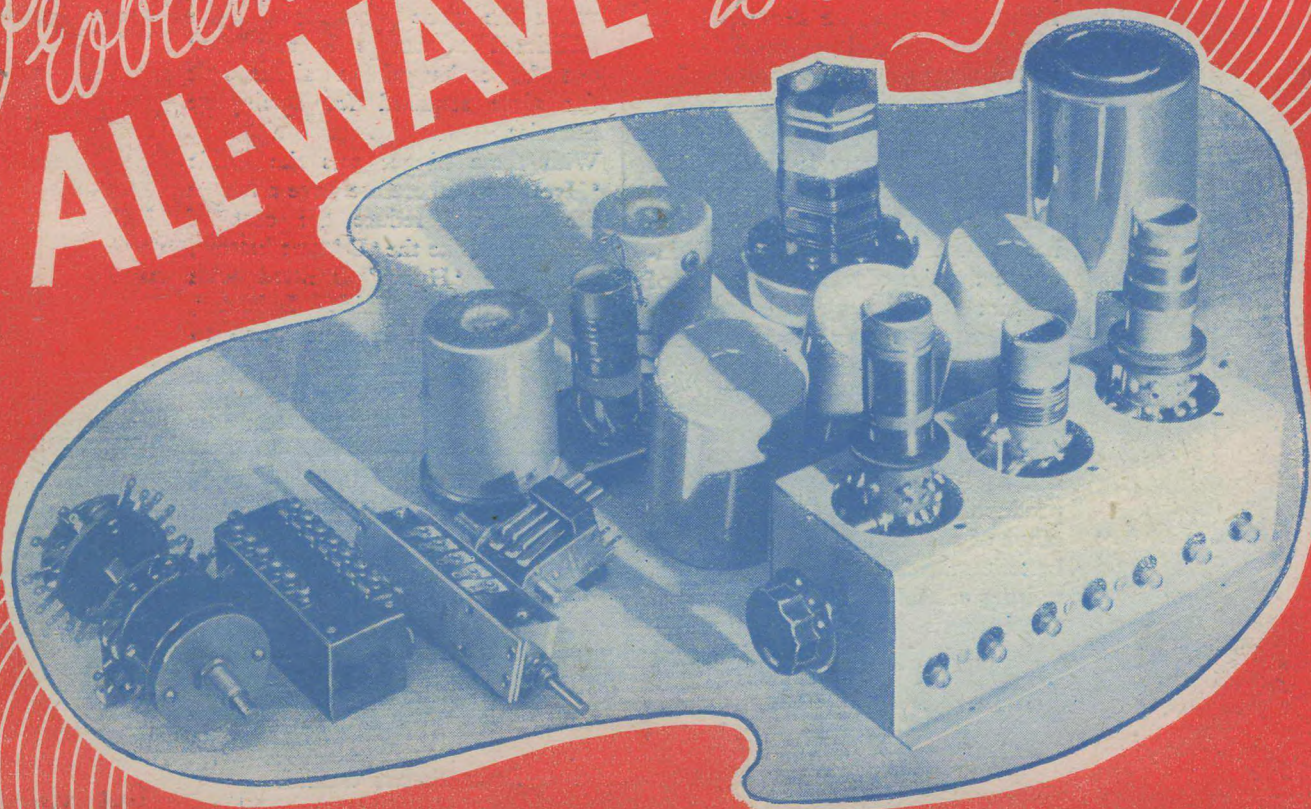
Edited by F.J. CAMM

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NEWNES
Publication

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December 19th, 1936.

AND PRACTICAL TELEVISION

Problems of
ALL-WAVE Design



NEWNES TELEVISION AND SHORT-WAVE HANDBOOK

By F. J. CAMM (Editor, Practical and Amateur Wireless)

Fully
Illustrated

EVERYTHING ABOUT—Drums, Mirror Screws, Scanning Discs and other Scanning Systems, Neon Lamps, the Cathode-Ray Oscillograph. How to build Short-Wave Receivers; How to build Ultra-Short-Wave Receivers, straight and Superhet types.

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BATTERY LIFE IS AFFECTED BY CHARGE LIFE

A fact not generally known

Low tension batteries have undergone the same process of specialisation as most other things and are now produced in various types, each designed to work under certain conditions.

It is, however, not generally known that the life of the battery is adversely affected if it is not used under the conditions for which it is designed. For instance, 'Mass' type batteries containing a few thick plates, such as the popular Exide DTG or DFG, are designed for slow discharge with long periods between recharges. If that type of battery is subjected to cycles of charge and discharge of greater frequency than once a fortnight its life will be shortened. In any case, under those conditions it will not be giving the most economical service, for its full rated capacity will not be obtained.

This type of battery is excellent for small sets with a sufficiently low L.T. current consumption, but lately there has been a marked tendency to increase the size of sets. Over 90% of modern battery sets take 0.4 ampere or more owing to the use of more valves and of illuminated dials.

These loads are too high for the 'D' type of battery and so Exide have produced a new range of multi-plate batteries with characteristics suitable for these new conditions. They are



known as Exide 'Hycap' Batteries. The Exide 'Hycap' will give a higher capacity under these heavy discharges, so reducing the frequency of recharging. Listeners gain from 35% to 90% more listening hours per charge. Due not only to the reduced frequency of recharging, but also to the sturdy construction of the multi-plate assembly, 'Hycap' batteries are considerably more durable than thick-plate batteries operated under the same conditions. An additional advantage is that they can be recharged in about half the time required for thick-plate batteries.

With these bigger sets the Exide 'Hycap' will therefore have a longer life and will reduce the cost of listening. Like the 'D' type battery, the Exide 'Hycap' is fitted with the invaluable Exide Indicator, which tells you in time when to recharge.

Sizes and Prices of Exide 'Hycap' Batteries

Type	Voltage	Capacity in ampere hours at the 20 hr. rate	Price (uncharged)
OCC3-C	2	15	8/6
GFG4-C	2	24	10/6
GKG5-C	2	36	12/6
CZG6-C	2	60	15/6

Obtainable from all reputable dealers or Exide Service Stations.

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TELEVISION IN THE CINEMA—See Page 448

Practical and Amateur Wireless

'Round

Television in Cinemas

IN 1930 an attempt was made to show a large television picture on the stage of the London Coliseum, and the "screen" in this case consisted of over two thousand small electric lamps. In 1932 another large screen was demonstrated at the Metropole Theatre and the finish of the Derby was shown. Now Mr. Baird has gone a stage further, and at a demonstration the other week we saw high-definition pictures on a large screen at the Dominion Cinema Theatre in London. A mechanical system was used, and fuller details will be found on another page. How far distant is the day when we shall be able to see in the cinema a picture in three dimensions and in colour, transmitted by a television system, from some distant point?

Ten Shillings Per Ant

IF you have any white ants to get rid of, Messrs. E. K. Cole will buy them at 10s. per ant. The only restriction is that only fifty are required, and you must supply the purchasers with full instructions for keeping them alive. The reason for this purchase is that Messrs. Ekco are desirous of experimenting with various apparatus to try and solve the problem of making a receiver which is proof against the ravages of these pests. They have tried unsuccessfully for two years to import them, but in view of the difficulty have now made an appeal here. They will take the ants on one month's appo., and if they pass the doctor's test you get a cheque by return! Apparently listeners abroad have found that these ants will attack a radio receiver and eat every particle except the metal, and a dozen or so can make short work of a cabinet.

Carols

"GOOD King Wenceslas" and "Hark! the Herald Angels," need no introduction, but there are many other carols which are not so well known to many listeners in certain parts of the country. The B.B.C. Mobile Recording Unit has been touring Cornwall, Dorset and Somerset and has recorded some interesting carols from the West Country. These will be heard in a programme to be entitled "Sing We Merrily," on December 21st, and should be well worth hearing.

Cinema Variety

THE combination of variety turns and cinema pictures is growing, and many cinemas now make a big feature of their variety "hour." The B.B.C. Variety Director is endeavouring to form a closer link between his department and this section of cinema entertainment, and the first experiment is to be carried out this week.

Edited by
F. J. CAMM.

Technical Staff:
W. J. Delaney, H. J. Barton Chapple, Wh.Sch.
B.Sc., A.M.I.E.E., Frank Preston.
Vol. IX, No. 222, December 19th, 1936.

Wireless

the World of

Sweet, Sympathetic or Swing?

WHAT is the most popular form of modern music? This question is a difficult one to solve, but the Northern station director is endeavouring to find a solution on December 22nd when three popular orchestras will compete for favour. Tommy Matthews and his Concert Orchestra will play symphonic arrangements of jazz (with the accent on "sympathy"), Henry Reed and his Orchestra present swing music, and Richard Valery and his Orchestra, which consists of string instruments only, will play the sweet section.

B.B.C. Talks Director

OVER eight hundred applications were received in reply to the B.B.C. advertisement for a director of talks. The final selection has resulted in the appointment of Sir Richard R. Maconachie, K.B.E., C.I.E. He has had a distinguished career abroad and was for some years in the Indian Civil Service. From 1930 to 1935 he was British Minister at Kabul. Mr. J. M. Rose-Troup, the present temporary Director of Talks, has been appointed Assistant Director of Programme Adminis-

tration, and Mr. G. R. Barnes, a senior Assistant in the Talks Department, becomes Assistant Director of Talks.

Jewish National Station

AN interesting note has been received from Central Europe concerning a proposed broadcasting station for Jewish listeners. It is stated that the proposal has been put forward in an endeavour to counteract the various anti-Semitic broadcasts which are made from certain European stations, and the proposed station is to be erected either in Czechoslovakia or Switzerland.

A Northern Exhibition

IT is stated that next year the North will run its own radio exhibition. At Newcastle the local traders are getting together with a view to making all arrangements well in advance, and it has already been stated that December is to be selected for this show. Will this be the Radiolympia of the North?

New Reproducers

WE have often in these pages commented on the apparent lack of inventive progress so far as the loudspeaker is concerned. Is the present component the best for reproduction? In Japan it appears that a radical departure from convention is being made by a wireless engineer who has evolved an entirely new type of "air-impulser" in which the frequency band covered is vastly wider than that we now take as adequate.

Prague Experimental Broadcasts

PRAGUE is now testing out two new channels for its relay of the medium-wave programmes; they are 25.34 m. (11,840 kc/s) and 49.75 m. (6,030 kc/s). These frequencies were not those originally allotted to the station and, for this reason, may only be used temporarily. Bear in mind that the call mentions *Praha*, and not Prague, even when the woman announcer gives it out in German, French and English in addition to her native language (Czech).

Vienna Also Tries Out New Channel

HAVING increased its power to 1.5 kilowatts the Austrian short-wave station OER3 relays the Vienna programmes daily on 25.42 m. (11,801 kc/s) between G.M.T. 15.00-20.00, with an extended broadcast to midnight on Saturdays. So far I have not picked it up on Sundays. The call is *Radio Veen* (Wien), and the interval signal a fast-ticking metronome as adopted by all other Austrian studios.

GIVE BOOKS THIS CHRISTMAS!

The following Standard Works make ideal Christmas presents. They are all suitable for beginner and expert, lavishly illustrated, well bound, and written by F. J. Camm.

WIRELESS CONSTRUCTOR'S ENCYCLOPEDIA. 4th Edition, 392 pages, 490 illustrations, 5/-, or by post 5/6.

EVERYMAN'S WIRELESS BOOK. 2nd Edition, 288 pages, 243 illustrations, 3/6, or by post 3/10.

TELEVISION AND SHORT-WAVE HANDBOOK. 2nd Edition, 288 pages, 230 illustrations, 3/6, or by post 3/10.

HOME MECHANIC ENCYCLOPEDIA. 2nd Edition, 392 pages, 627 illustrations, 3/6, or 3/10 by post.

ROUND the WORLD of WIRELESS (Continued)

"To-morrow will be Christmas"

ACTUAL last-minute Christmas activities will be broadcast in a programme entitled "To-morrow will be Christmas," on December 24th, when Western Regional listeners will hear the last minute auction sale of turkeys at Bristol Meat Market, a description of the day's activities in some wine cellars, and a broadcast from Corsham Court of the ceremony of the welcoming of the waits.

Pantomime Review

A SPECIAL programme appropriate to the festive season will be broadcast on December 23rd, when listeners will be taken behind the scenes at some West Country theatres, where the final rehearsals for pantomime are in progress.



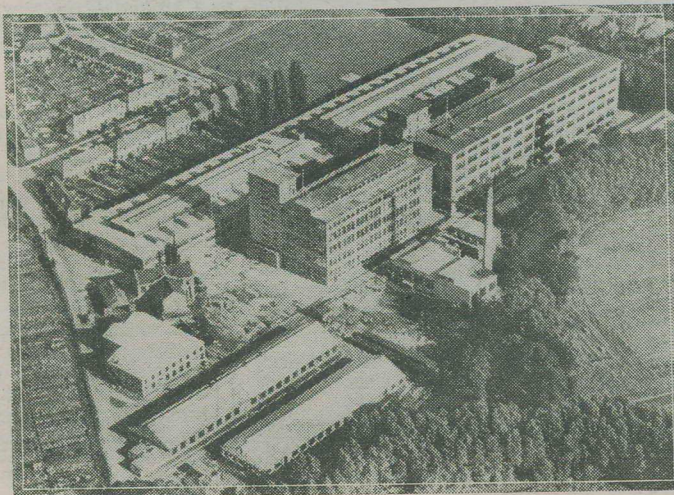
Children delight in identifying stations from all over the world, which can be received on the new "His Master's Voice" Model 482 All-wave Superhet. H.M.V. 482 has six valves and incorporates a new type of fluid light indicator, which gives extreme accuracy of tuning. The price of this receiver is 16 guineas.

Carol Programme

ON Christmas Eve Northern listeners will hear a specially arranged programme of carols by the Newcastle Studio Choir, and the Northumbrian Singers.

Philips Radio Factory Expansion

WE understand that work is to commence immediately on the erection of another big factory block at Mitcham for Philips Radio. The new extension, which has been necessitated by the increased demand for Philips radio receivers, will have a floor area of approximately 60,000 sq. ft., and when com-



An aerial view of the extensive works of Philips Radio at Mitcham.

INTERESTING and TOPICAL NEWS and NOTES

pleted will give employment to an additional 800 to 1,000 workers. The factory already employs 3,500 people. According to an official of Philips Radio this is the fourth extension the firm has been compelled to make in the past four years, and its undoubtedly a heartening sign to the whole British radio industry.

Miss Esther Coleman

WE reproduce on this page a charming study of Miss Esther Coleman, one of the most popular songstresses on the radio, with her new Ekco receiver. Miss Coleman, who has a number of Luxembourg and Radio-Normandie engagements during the Christmas period, is also booked for a B.B.C. show in the first week of the New Year. The receiver shown in the illustration is model AC97, a 9-stage High Fidelity Superhet. In walnut the price is 12½ gns., and in a black and ivory finish, 13 gns.

New B.B.C. Appointment

ACCORDING to a recent B.B.C. announcement, Miss Rose Temple has been appointed Assistant in the London Regional Children's Hour, and will take up her new duties on December 29th, 1936. Miss Temple studied at the Old Vic Dramatic School and has since been engaged as assistant stage manager for productions at Sadler's Wells, the Shaftesbury Theatre and the Old Vic.

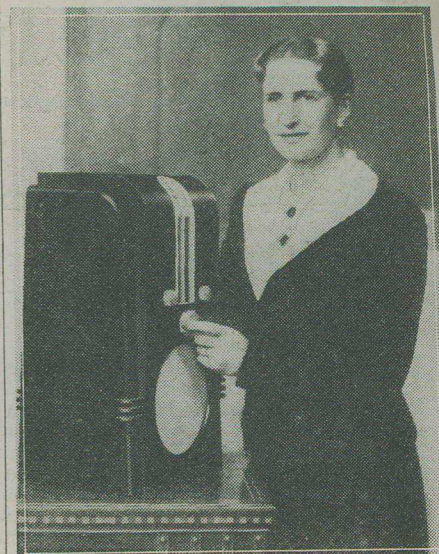
Orchestral Concert

ON December 19th Reginald Burston will conduct the B.B.C. Midland Orchestra in a programme which includes Eric Coates' suite "From Meadow to Mayfair," and a selection from "Mercenary Mary."

Young Artists Programme

SIX young artists, most of whom have broadcast once before, will provide the Children's Hour Programme from the Midland Regional on December 17th. Ronald Cook and Donald Aldrick, of Birmingham, will play piano duets; John Taylor, of Hinckley, the piano accordion; Millicent Phillips, of Redditch, is to sing.

There will be animal imitations by Olive Huntley, a Derbyshire girl, and impersonations by Ronald Bunker, of Warwick.



Esther Coleman, famous BBC singer frequently heard in Variety, Concert and Children's Hour programmes, at home with her Ekco receiver.

Holly Follies

FROM Aberdeen comes the news that an unusual type of Christmas pudding has been compounded for consumption on December 21st. The ingredients are Arthur Black, Tommy Forbes, John Foster, Catriona Scott, the Miller Brothers, the Singing Sisters, and Jimmy Ross and Bill Thomson at two pianos. Moultrie Kelsall is supplying the sauce. This is a light-hearted revue with sketches by Marris Murray, John Black, and Allan Melville; and music by Ruby Duncan and George McNeil.

Torquay Municipal Orchestra

ELLIS KEELER will be the artist in a concert by the Torquay Municipal Orchestra, conducted by Ernest W. Goss, to be broadcast from the Pavilion, Torquay, on December 22nd.

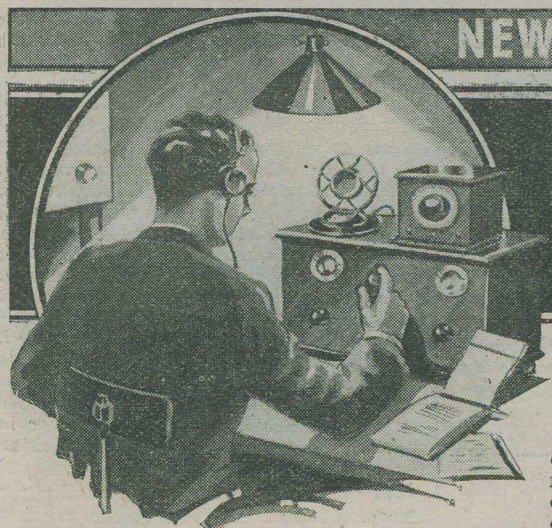
SOLVE THIS!

PROBLEM No. 222.

Gerrard's A.C. mains receiver stopped functioning, and when voltage tests were made it was found that the anode voltages were all very low. It was also noticed that there was a blue glow in the rectifying valve. What was the probable cause of the trouble? Three books will be awarded for the first three correct solutions opened. Address your solutions to the Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 222 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, December 21st, 1936.

Solution to Problem No. 221.

The extension speaker sockets were connected to the speech coil of the set speaker and therefore a low impedance extension speaker should have been used. The following three readers successfully solved Problem No. 220 and books are accordingly being forwarded to them: A. D. Jones, 1, Meyrick Road, Ely, Cardiff; E. Fisher, 33, Freeth Street, Oldbury, nr. Birmingham; J. Pratt, 4, Knight Street, Ferncliffe, Bingley, Yorks.



NEW SERIES

Amateur Transmitting

In this Fourth Article of the Series, Various Oscillatory Circuits, Suitable for Transmitting Purposes, are Dealt With
By L. O. SPARKS

I MENTIONED in the last article that the first requirement of a transmitter is some form of generator of oscillations, and a brief description was given of a simple valve oscillator which depended on the inductive coupling between the grid and plate (reaction) coils.

The circuit, while capable of producing oscillations, is not suitable for transmitting purposes, so we will examine circuits which are suitable, and which are most widely used for the work in question.

It may be said, in a general sense, that there are two types of oscillators, namely, the "self-controlled," or "self-excited," and the "crystal-controlled." Those which come under the first heading can be split into two distinct classes, depending on the method of obtaining the necessary feed-back between plate and grid. There are those which make use of inductive coupling, and others which rely on capacity to provide the feed-back.

The Hartley Oscillator

This is, without doubt, the best-known form of oscillator using inductive coupling, and two types are shown in Figs. 1 and 2, the first being the general Hartley circuit, and the second what is known as the "series-fed" Hartley.

The latter has certain advantages over the original circuit, inasmuch that the losses associated with the high-frequency choke in Fig. 1, where it is actually in shunt with the part of circuit carrying high or radio frequency currents, are considerably reduced—if not completely eliminated—by the series feed of the arrangement shown in Fig. 2.

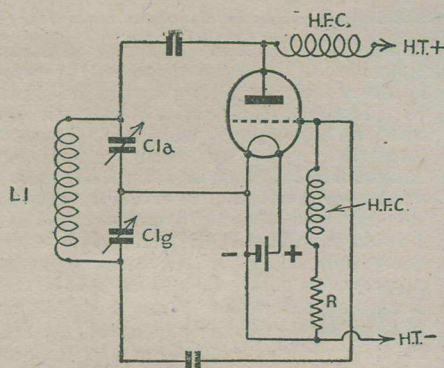


Fig. 3.—The Colpitts circuit.

The first arrangement can be quite satisfactory if the H.F.C. is really efficient and designed to operate at the frequencies under consideration, but the other circuit is the more practical, as the efficiency of the H.F.C. is not of vital importance; in fact, it can be replaced by a resistance H.F. stopper, if so desired.

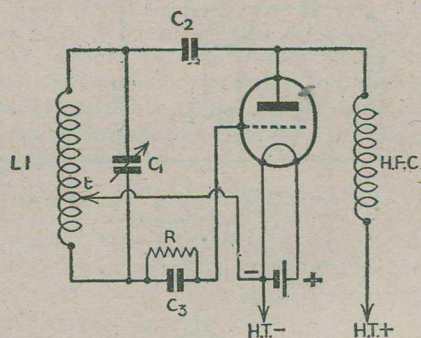


Fig. 1.—The standard Hartley circuit.

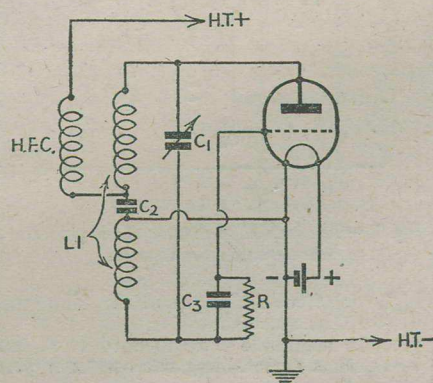


Fig. 2.—A modification of Fig. 1—known as the series-fed Hartley.

It will be appreciated that the condenser C2, which completes the oscillatory circuit, is essential to prevent a shorting of the D.C. plate voltage and the filament supply, and that its value must be such that it provides a low-impedance path for the high-frequencies. Its value is not really critical, a .01 mfd. is a usual capacity, but it should be noted that a mica dielectric type must be used, owing to the characteristics of the ordinary paper condenser not being so suitable or efficient for the work in question.

Inter-electrode Capacity

The variable condenser C1 is placed across the complete coil (or coils) and the frequency of the oscillations depends on the

values of L.1 C.1, although the inter-electrode capacities of the valve can, to a certain extent, influence the result (capacity feed-back).

Assuming that a tapped coil, as in Fig. 1, is in use, it will be found that the degree of "grid-excitation" (feed-back) can be controlled by the position of the tap "t" on the coil L.1. The closer the tapping point is moved towards the plate end of L.1, so will the grid-excitation increase. With an average circuit and valve, satisfactory operating conditions can be obtained with, say, .3 to .5 of the total number of turns in the plate-tap circuit.

In each circuit (Figs. 1 and 2) the grid receives its necessary bias by means of the voltage developed across the resistance "R," the condenser C.3 preventing any D.C. voltage from the filament reaching the grid. The value of C.3 is not too critical, but "R" should be selected according to the type of valve and the actual operating conditions. Its value is often best determined by experiment.

Colpitts Circuit

The Colpitts circuit (Fig. 3) is an example of "capacity feed-back" or excitation, and it depends for its control on the capacity ratio of C.1a and C.1g, the two condensers being in series across the inductance L.1. The smaller the capacity of C.1g compared to that of C.1a the greater will be the excitation of the grid circuit, but the total capacity must be kept constant to maintain the desired frequency.

The Ultraudion

Another circuit, very similar to the Colpitts, is the Ultraudion, Fig. 4, but as it is not widely used, except for ultra-short waves, it is not necessary to discuss, in detail, its operation in this article.

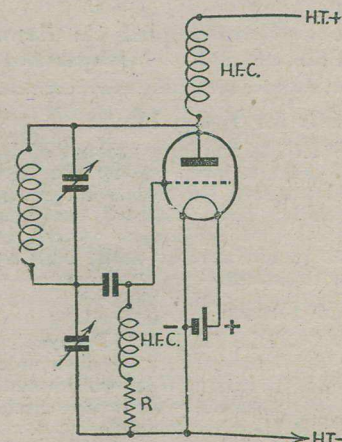


Fig. 4.—This is the Ultraudion circuit.

AMATEUR TRANSMITTING

(Continued from previous page)

Tuned-plate Tuned-grid

This circuit, which is quite popular, is shown in Fig. 5, where it will be seen that its name is obtained from tuned circuits of the plate and grid.

It does not depend on inductive coupling between the coils L1 and L2 for the essential feed-back, but on the capacity existing between the grid and plate elements of the valve.

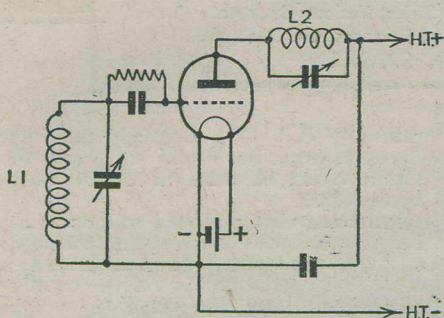


Fig. 5.—The circuit shown here is the tuned-plate tuned-grid arrangement.

A state of oscillation will be reached when both circuits are tuned to a common frequency, although maximum efficiency is only obtained when the two circuits are not "dead" in tune.

The frequency of oscillations is governed chiefly by the characteristics of the plate circuit, the grid circuit not being so critical. The degree of excitation is governed mainly by the constants of the grid-coil circuit, which is usually tuned to a slightly lower frequency than the plate arrangement.

The tuned-plate tuned-grid, or T.P.T.G. oscillator, is not too easy to adjust but it is quite popular, as far better stability can be obtained than with other circuits of a similar type.

T.N.T. Circuit

A variation of the above is the T.N.T. circuit, which is shown in Fig. 6, and it should be noted that the grid coil is no longer tuned by a variable condenser. The circuit (L1) is brought to an approximate resonant state by its self capacity, and the capacity of the valve and associated wiring. The only snag, if it can be called such, is the coil L1, but once suitable dimensions have been determined, the circuit is quite easy to operate and tune, while it is less costly to construct than, say, the Colpitts.

The Electron-coupled Oscillator

If the circuit Fig. 7 is examined care-

fully, it will be seen that it is nothing more than an elaboration of the fundamental inductively-coupled circuit; in fact, the Hartley oscillator can be recognised, as shown below.

The normal control grid, G.C., becomes the oscillator grid, while the screening grid, G.S., serves the purpose of the plate in the Hartley circuit, and the plate proper now acts as the output.

It is usual, in a Hartley circuit, to have the filament tap at earth potential, but such an arrangement is not *vital*, providing the plate, grid and filament are the correct relative potentials.

In the case in consideration, the circuit is modified so that the oscillator anode is at earth potential, from an H.F. point of view, although, as the diagram shows, it is at a

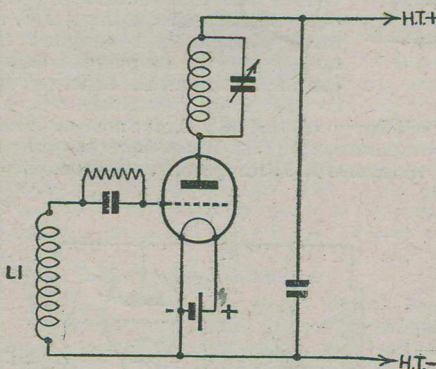


Fig. 6.—This arrangement is known as the T.N.T. circuit.

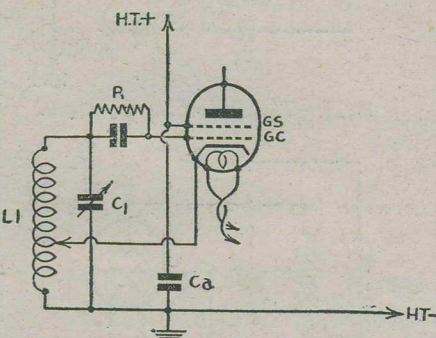


Fig. 7.—The method of coupling here gives rise to the term electron-coupled.

high relative D.C. potential. The condenser C.a. must have a capacity that will present negligible reactance to H.F. currents, thus maintaining the oscillator plate at earth potential.

It will be appreciated that as the plate is not allowed to vary in H.F. potential,

the cathodes H.F. potential will vary, while the heater circuit can still be kept at earth potential. With a battery-operated valve, these requirements present certain difficulties, necessitating the use of suitable H.F. chokes, therefore an indirectly-heated mains valve has definite advantages. If the actual anode of the S.G. valve is given a positive potential it will receive the electrons flowing through the screening grid G.S., which forms the oscillator anode. This flow of electrons will actually be modulated by the oscillations generated in the Hartley portion of the circuit, therefore the output plate circuit current will have a high-frequency component, and if a tuned circuit is arranged in the plate circuit (T.C. Fig. 8) and tuned to the oscillator frequency, then the plate will vary in voltage at that frequency, or in other words, the valve will be acting as an oscillator-amplifier.

An oscillator of this type, providing the screening is most complete and no external coupling takes place, is capable of giving a very high degree of stability, a most important item.

Another very good feature is, that the electron-coupled oscillator is very efficient as regards harmonics of the oscillator frequency. By this I mean the output circuit (T.C.) can be tuned to two, three and four times the oscillator frequency, thus allowing similar frequencies to be transmitted, but it must be appreciated that the efficiency of the output decreases, rather rapidly, above the second harmonic. Such an operation is known as "doubling," but more about that later on in this series.

Next week "Crystal-controlled" oscillators will be dealt with, which will bring us to the stage of considering the constructional details of the first transmitter to be described, making use of a Class B valve and standard components.

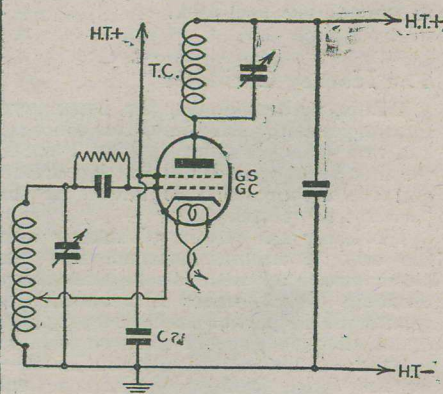


Fig. 8.—A modification of Fig. 7.

Aerials for Every House

OWING to the large amount of damage done to property by the inexperienced erection of aerials on roofs, the Kirkcaldy Town Council has made a proposal that all houses erected in the future should have an aerial built as part of the structure.

Radio Drama

VAL GIELGUD, B.B.C. Drama Director, has successfully implemented his policy of inviting well-known dramatists to write plays specially for broadcasting. Included in his latest schedule is a new script from Lord Dunsany, who has already demonstrated his mastery of broadcasting

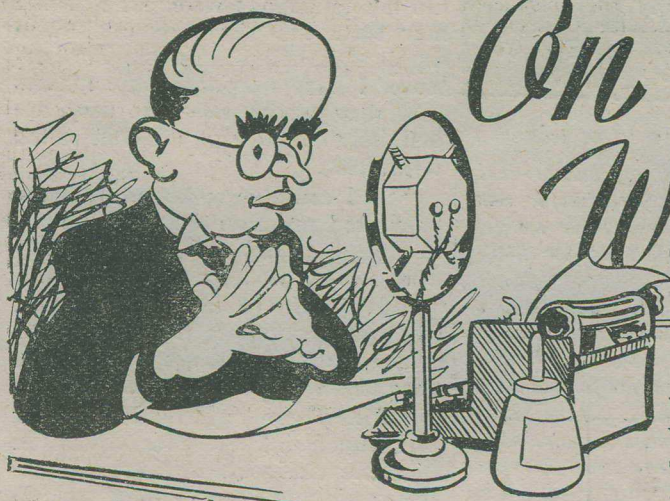
ITEMS OF INTEREST

technique; another experienced radio dramatist in the person of L. du Garde Peach will also be represented.

Those Spanish War Bulletins

Not content with jamming the 40-metre band the warring parties in Spain for the broadcast of propaganda and war news have now invaded the 20-metre amateur "allotment" and you will find in this section repeated "Atencion" calls which in most instances are so distorted that

except for the fact that the Spanish language can just be detected the call-letters of the transmitters are too indistinct to identify. EDZ, Madrid-Vallecas on 31.65 m. (9,480 kc/s) which, for the past fortnight or so, has been transmitting Nationalist bulletins in several languages at more or less regular intervals throughout the day is now badly jammed by EAX, Barcelona, worked by the Government party and which, in its turn, although supposed to work on 31.80 m. (9,434 kc/s) is sending out a flow of morse signals on 31.65 m. for the obvious purpose of jamming its antagonist's transmissions. Reports are also being received of a jamming station which gives no call sign.



On Your Wavelength

By THERMION

A Snob's Club?

IT is not often that I deign to read or even to comment upon the amateurish tripe usually dished up in club journals. I prefer that my adversaries should be worthy of my fire! There are many people, you must remember, who are not worth powder and shot. A few weeks ago (in October 16th issue, to be exact) I wrote a plain paragraph explaining the present position of the wireless clubs and urging that the club movement should be developed; and I also deplored the fact that there are not so many clubs as formerly. I criticised the conduct of some clubs and suggested that the lack of organisation which signalises many of the meetings was a reason for their early demise. I merely comment on this matter now because my attention was drawn to a libel on readers of this paper which appears in a four-page leaflet, that proudly conveys to the world that it is the Bulletin of the Short-Wave Radio and Television Society of Thornton Heath. I do not know who has authorised this small collection of people to use the word "Society" nor do I know whether they have complied with the usual formalities entitling them to its use. The "editor" of this magnificent four-page affair says that he agrees with the comments of his "contributor," so I must take it that the views which I will quote later are the considered views of every member of the Short-Wave Radio and Television Society of Thornton Heath. From the paragraph you will be excused if you come to the conclusion that members of this Society are a collection of snobs who wish to convey their supreme intelligence and knowledge of wireless by discrediting readers of this paper.

Now schoolboy journalism is all

very well in its way, and one can excuse the vanity and the aploimb of youngsters who think that in order to

become an editor or a journalist, you merely have to know how to dot an *i* and cross a *t*. They are usually inordinately proud of the fact that they have won a prize at school for essay writing and for regular attendance at Sunday school, and think that these are the only qualifications necessary to entitle you to burst forth into the glamorous realms of journalism. Now harken to the vapourings of this youthful member of the Short-Wave Radio and Television Society of Thornton Heath!

(Incidentally, the term B.C.L. is a monstrous abbreviation for Broadcast Listener; the idea being that *broadcast* is two words!)

"Thermion" (a rival commentator and a mere professional!) of PRACTICAL AND AMATEUR WIRELESS, in a recent article lamented the dearth of radio societies. Perhaps there aren't so many as there were in the early days of broadcasting, when the vast majority of sets were home constructed, but there are still many really active societies. Without profound thought I could recite a list of thirty or so, and Mr. Cholot (Messrs. Lissen) mentioned a couple he has recently addressed which I had not heard of before.

"Perhaps the reason for 'Thermion's' innocence is that his particular journal appears to cater largely for the B.C.L. who builds the 'Pumpkin Three' and then sits tight until the publication of the 'Pumpkin Super,' some three years later. However, the 'Pumpkin' constructor is probably a fan in embryo and a special article inviting him to join us appears in this issue."

Bearing in mind that this journal has regularly published the reports of this local club, with its egregious and high-falutin title, evidently

planned to give it an air of importance, and that those reports are sent to us with an idea of recruiting membership from among our readers, I am sure that the latter will resent the supercilious sneer of the local snob who wrote the above paragraph. Our readers will also give any meeting of this local club a wide berth in future, and I publish the paragraph so that they may know the type of individuals with whom they are dealing. I quite expect that most of those who read the paragraph in this club circular still build sets from blueprints, although imagining (such is vanity) that Marconi is on a lesser plane than they. It is just as well for the members of this club to appreciate that they are only a local club and that the world of radio does not gyrate using them as a focus. Our readers could teach them a whale of a lot!

It is rather unfortunate for them that in their self-complacency as "know-alls" they have not taken the trouble to ensure that their four-page rag complies with the rule requiring the printers' imprint thereon. I am sure that they will not welcome the readers of this journal, preferring to remain a mutual-admiration society, lecturing among themselves to demonstrate what really clever fellows they are. Lots of people like to live in similar fools' paradises. Fortunately, most other clubs with which I have come into contact conduct themselves in a vastly different manner, and it is a pleasure to visit them. Incidentally, I would advise my youthful "critic" that there are not thirty wireless clubs in existence, and I challenge him to "recite a list of thirty or so."

I showed this letter to the Editor, who reminded me of a fact which I think you ought to know. This "learned society" recently invited him to deliver a lecture. Apparently the secretary made that invitation in the belief that its members could learn a good deal from the conductor of this paper. I would advise the members of the "Short-Wave . . . etc." to come off their high horse and realise

that they are just amateurs, like the rest of the clubs. It would appear that my readers might usefully form their own club in Thornton Heath.

This is, of course, just *another* friendly tilt!

The Dealers' Side

M B., of Hinckley, presents me with the dealers' side of the question of component shortage. He says that he has had stocks of spare parts in stock costing between £200 and £300, and that he has had to part with them at junk prices. He says that very few people build sets in his district. That is where I think he should come in. He should make people want to build sets. So many dealers merely sit back and wait for the orders to come in. A carefully-planned window display, advertisements in the local papers, and the fostering of interest in the local club would provide him with customers, each of whom would act as a useful ambassador in the cause of home-constructed receivers. This reader has several years' copies of PRACTICAL AND AMATEUR WIRELESS which he will send to any reader forwarding carriage. The first letter with remittance secures them. Mark your envelopes "Hinckley." Unsuccessful applicants will have their money refunded.

Another Moan

F N., of Birmingham, reports as follows:

"Dear Thermion, I have been interested in your comments on the component shortage. I am trying to get the Colvern coils and I.F. transformers for the 'Add-on Superhet Unit' described in the PRACTICAL AND AMATEUR WIRELESS, October 10th, 1936. I wrote to two very well-known advertisers to see if they had them in stock. The first replied at once (November 11th) saying he would do his best to send them in three or four days. I therefore gave him the order which he acknowledged on the 13th, saying, 'Delivery in approx. four days.' The second, who advertised that he quoted by return of post, took three days to tell me that he had the components in stock. However, I left the order with No. 1, telling him that No. 2 could supply the goods. On the 19th No. 1 then wrote me: 'Makers state that they are definitely despatching them to me to-morrow.'

"On the 25th they wrote me. 'Makers advise me that they are held up for some of the material required. I will approach Messrs. Blank and see if they have any in stock—makers advise me that they will certainly be able to supply by



Notes from the Nest Bench

Preset Condensers

THE ordinary type of bakelite-cased preset condenser is a useful component. Some constructors make too free use of it, however, such as for tuning purposes or as an anode coupling condenser following an S.G. valve. This type of preset cannot be relied upon to provide the exact minimum and maximum values marked on its casing and therefore its use as a tuning device is limited. Some models have a compressed cardboard base, which tends to bulge outwards when the condenser control is tightened. This naturally tends to cause a variation in capacity after the condenser has been in use for a short period, and, therefore, if a preset is used for tuning or padding purposes, its adjustment should be checked periodically. When a preset is used as a reaction or coupling condenser, it is advisable to connect a high-capacity fixed condenser in series with it in order to prevent the possibility of a short-circuit occurring. A .01 mfd. fixed condenser is suitable for use in conjunction with a .0003 mfd. preset for this purpose.

The "Limit" Four

SOME readers have complained that they cannot get satisfactory reception on the lower short-wave band of this receiver. This is due to lack of reaction and can be caused by insufficient voltage on the anode of V₂, to a faulty valve in position V₂, or to a faulty reaction winding on the short-wave coil. If reversal of valves V₂ and V₃ does not provide a remedy, resistances R₅ and R₆ should be tested. When these are of too high a value, insufficient voltage will be applied to V₂ anode. If a non-specified detector valve is used, or if the valve used has a slightly low emission, reduction of the values of R₅ and R₆ will prove beneficial. R₅ can be reduced to 25,000 ohms and R₆ to 5,000 ohms without seriously affecting volume on the medium and long-wave bands.

U.S.W. Aerial

GOOD reception on the 5 to 8-metre band can be effected without an aerial-earth system, and it has been proved that an unsuitable aerial can completely spoil reception. If an aerial is used it should not be more than about 10ft. in length and should be very loosely coupled to the tuned circuit. Tight coupling will damp the circuit, thereby preventing oscillation. Sufficiently loose coupling can generally be effected by twisting the end of the aerial lead around a short length of insulated wire connected to the aerial terminal.

Friday of this week.'—(i.e., 27th). On the 30th No. 1 wrote me: No. 2 now state that they are unable to supply these coils from stock. Furthermore, I have telephoned the makers and they advise me that they are definitely despatching the coils to me to-morrow.'

"So I continue to hope. It is the 'definite' promises that I think are so unbusinesslike. I have the letters from which the above are extracts."

And J. H., of the same district, who writes as follows, provides further evidence that things are not quite as they ought to be in Birmingham:

"Dear Thermion, I read each week with much interest your article in the PRACTICAL AND AMATEUR WIRELESS, and must compliment you on your very sane outlook.

"Returning to set building after a few years of 'hardupishness' I was astonished at the difficulty in buying parts, especially in this district. We have some large alleged 'Wireless dealers' in this district who are nothing better than 'set sellers'; it is impossible to buy even spare valve-holders, as I found, to my sorrow, a few weeks ago; in fact, they seem to regard the home constructor as slightly mental, or at any rate not all there.

"Things are not a lot better even in town; I find one of your advertisers quite the best people to deal with, they are always helpful and prompt, and invariably polite, even if they do stock 'clearance.' I have always found it reliable.

"Another grouse I have is that quite a number of firms take anything up to three weeks to even answer a letter. One firm of coil makers, to whom I wrote and asked a question, sent me a catalogue which told me nothing I wanted to know, and ignored my letter completely. I always enclosed return postage, and I do think a reasonably prompt reply should be expected. If I had treated prospective customers like some of these people do, I should be in the workhouse by now; there are, of course, exceptions.

"Your remarks re crooners and dance bands are endorsed. If ever there was over-rated tosh this is it; people seem to have lost all idea of proportion in these times, outside show and bally-hoo mean everything, or so it seems."

These are the final letters which I shall publish on these subjects. Both sides of the various problems have been aired and it now remains for manufacturers to set their houses in order.

Practical Television

December 19th, 1936. Vol. 3. No. 29.

Parliament and Television

A FEW days ago the Lord President of the Council, Mr. Ramsay MacDonald, was asked in the House of Commons whether there was a possibility of both filming and televising the Coronation ceremony. He stated that both matters were under consideration, but nothing definite had yet been fixed. In the case of the latter a lot will depend on the progress made in televising outdoor and indoor scenes with a mobile scanning unit coupled with methods for transferring the generated video signal to the Alexandra Palace transmitting station. If permission is granted and the whole scheme is found practicable, then the television service will be given a considerable boost, for hotels alone will be anxious to install sets for the benefit of their visitors who do not desire to mingle with the crowds to watch a section of the whole proceedings. This is quite apart from the many private sales that will be effected on this score alone.

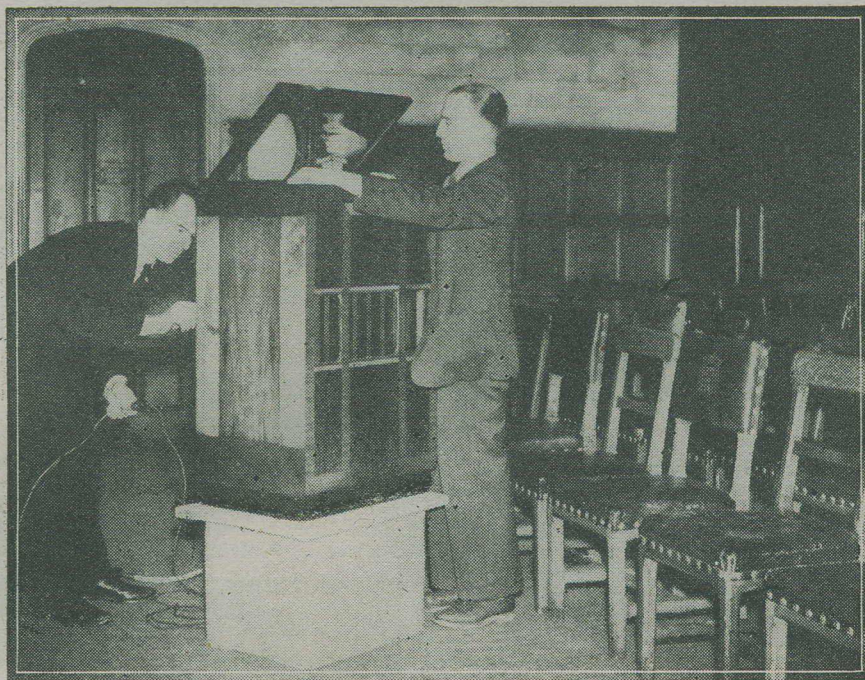
At Westminster Hall

THE interest of M.P.s in television matters has manifested itself to the extent that steps are now being taken to install at least two television receiving sets in the Grand Committee Room at Westminster Hall. The site is by no means an easy one, but such an arrangement was felt to be desirable and of more general interest to members than special visits to the Alexandra Palace station itself. The work is being carried out by the B.B.C. in co-operation with expert service engineers from the supply firms concerned, and there is little doubt that the results will prove satisfactory. In addition, it is also learned that the King himself is anxious to know whether satisfactory television reception can be undertaken at his residence at Fort Belvedere. This is thirty miles from Alexandra Palace, but bearing in mind that sets are working satisfactorily at points nearly fifty miles away there is little doubt that good pictures will be obtained at the King's private home. Installations of this degree of importance will stimulate further sales, and already it has been reported that the number of sets sold is increasing very rapidly each week. Of course, the B.B.C. have helped sales considerably, for apart from the sets housed at Broadcasting House certain officials have them operating in their own private residences so as to obtain first-hand evidence of the consistency of picture quality and the entertainment value of the programmes. This last-named factor is receiving far more criticism at the present moment than the technical standard of the radiated pictures, and it is confidently hoped that the long intervals, too lavish use of films, etc., will be replaced by short and bright variety items. The improvement seen during the last few days in this connection is a welcome sign, and should be maintained.

Picture Size

NOW that many television receivers are on the market, and a considerable number of actual demonstrations under good reception conditions have been staged, it is

possible to make a preliminary assessment of the reactions of viewers to the pictures which they have witnessed. "Far better than expected" is the general comment, especially when the programme material is of such a character that it shows the technical advances to proper advantage. The steadiness of the pictures is contrasted with the hunting action of the low definition prototypes, while the brightness secured with modern cathode-ray tubes evokes favourable comment. Ease of control is another factor which surprises many, particularly when it is realised that the minimum number of valves employed in the set is twenty. Last but by no means least, is the apparent satisfaction with the present picture sizes. So many writers had said that television would not become popular until screens at least three feet square were possible that it is



B.B.C. engineers fixing a television receiver in the Grand Committee Room, Westminster Hall.

gratifying to learn that proper proportions with reference to cinema screen size are now being considered. To enjoy large television pictures in a room it would require dimensions that are not found in the usual household. In a darkened room a picture about a foot square appears larger than the actual inches infer, and although as the scope of the programmes increase to embrace larger scenes with more performers an increase in picture size will be warranted, this will not be to the extent at first thought desirable. At least a dozen people can watch present-day television pictures in comfort, and it would seem advisable to wait until some form of projection is possible whereby the set and picture screen are separate entities before any attempt is made to enlarge the picture materially from its present standard.

In Philadelphia

THE Federal Communications Commission of America has given permission to Farnsworth to establish an experimental high-definition television station at Philadelphia. This is to operate on a power of 1 kilowatt with two carrier frequencies located between 42 and 56 megacycles and 60 to 86 megacycles. Farnsworth has been working on television for a period of eight years, and his contribution to the art has taken the form of electronic multipliers (cold cathode valves) and an electron camera which uses an image dissector tube. The Federal examiners were of the opinion that Farnsworth's programme of research gave promise of material assistance to television's progress.

The Brocken Transmitter

FOR some time the Germans have been conducting television experiments on the summit of the Brocken in the Hartz mountains. This is to be consolidated, for a complete television station is now in course of erection on the site. Situated nearly 4,000ft. high the range of transmission of the ultra-short-wave high-definition signals for a given power input should be considerable, and every effort is being made to expedite progress so that the installation is capable of starting

a regular service by the autumn of next year. Suitable co-axial cable lines will link this radio transmitter with the studios and scanners in Berlin, and in view of the station height it will be interesting to see whether the signals reach this country and, if so, whether they can be resolved into satisfactory pictures.

Providing a Return Path

WHEN considering the action of a cathode-ray tube for reproducing television pictures, many have wondered what happens to the electrons in the cathode-ray beam after they have struck the screen and been responsible for the degree of fluorescence at the point of impact. To operate modern type C.R. tubes but little electrical power is expended, since it is essentially a voltage-controlled

PRACTICAL TELEVISION

(Continued from previous page)

device, and in the case of the high-tension unit providing the anode volts for accelerating the electrons towards the screen, the current consumption is quite small. After leaving the cathode some of the electrons fail to pass through the anode orifice and, in consequence, return to the

cathode via the H.T. unit itself, the low-potential end of which is common with the cathode. In the case of the electrons which proceed to the screen, these then pass on to the inside of the glass envelope on which is sprayed, during manufacture, a thin metallic coating. By joining this coating to an internal terminal on the glass envelope which in turn is joined to the cathode, or joining the far end of the coating to the

cathode internally, a metallic or electrical path is provided for these electrons back to the cathode from which they emanated. This screen current, as it is called, is very minute—a matter of microamps in most cases—but unless the return circuit is provided in this way the interior of the glass envelope would acquire a large negative charge and this would increase progressively and so upset the tube's action.

More Television

It is learned that steps are already being taken to increase the hours of television broadcasting from two per day to three. This would conform to the original suggestion made some months ago and is a direct outcome of the surprisingly large public demand for television sets. Although high priced (the cheapest is 85 guineas), it has been found that the novelty appeal of the new service has exceeded expectations,

not desired to include real built scenery in the staging of plays or sketches. Another outstanding example is the intermediate-film process. A considerable amount of research was necessary before the whole equipment was brought to its present stage

Television Notes

technique for the subjects to be televised by this method, while the evolution of the right type of cameras is yet another phase which illustrates the interdependence of television and photography at the present stage of its development.

Transatlantic Television

A STATEMENT recently made by Marchese Marconi that television will soon span the Atlantic has aroused considerable international interest among radio engineers. Actually television signals from Germany have been picked up in New York.

"We have maintained communication across the Atlantic on short wavelengths," said a G.E.C. research engineer, "and are exploring the possibility of ultra-short-wave transmission for long-distance broadcast for television. We know that a broadcast on 15 metres can get across the Atlantic, but the objection to using this band for television is largely one of cost. Television takes up too much space in the ether. If television were broadcast from this country to America, the space would have to be obtained at the expense of normal wireless telephony communications. Telephony bands are only 10,000 cycles per second apart, whereas television bands are one million cycles per second apart and as much as three million cycles for very high definition.

"The growing use of wireless telephony will make it practically impossible for enough space on the wavelengths now in use to be sacrificed, except perhaps for 90-line television requiring 100,000 cycles per second, which might give a just satisfactory close-up of one person. From the beginning of television, therefore, we have been experimenting on short wavelengths, and it is quite possible we may be able to broadcast internationally pictures of a full 400-line definition in the future."



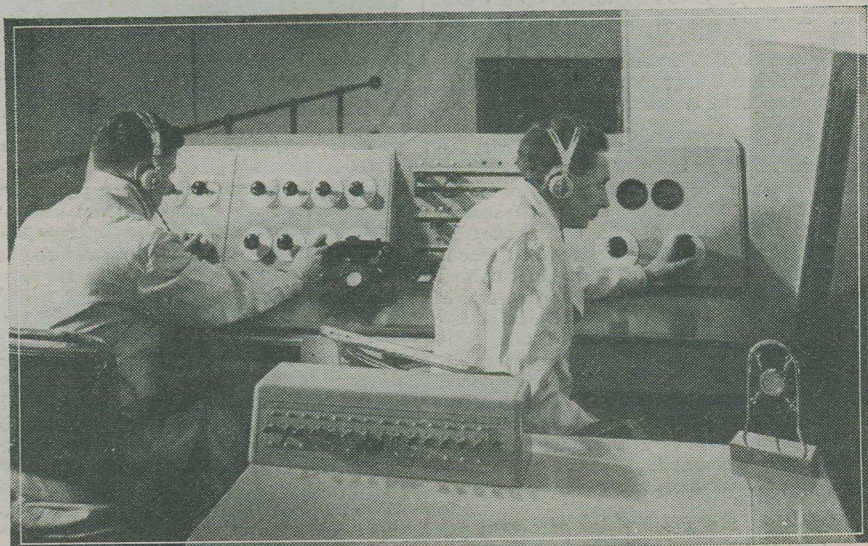
A Coscor Television Receiver entertains guests at the Prince's Lounge, Piccadilly

and the manufacturers concerned are taking immediate steps to put more television sets on to the market at the earliest possible moment. This increased production will reveal itself in a lowering of prices later on. The big factor to consider, however, if the increased programme time materialises, is the additional cost of the television programmes, but no doubt the B.B.C. will find ways and means of meeting this contingency.

Television and Photography

AT the recent annual dinner of the Royal Photographic Society the president, Dr. D. A. Spencer, drew the attention of his audience to the close relationship between photography and television. In his opinion television, for some time to come, would have to depend on the researches made by photographic workers. The truth of this statement is borne out by several factors, for in the case of the transmission of talking films it is becoming increasingly evident that the camera-man will have to bear in mind the dual use of his film (television and the cinema) when taking shots either interior or exterior. A blending of the two requirements will ensure that when used for either purpose the resultant pictures will leave nothing to be desired. Again, photography plays its part in back projection schemes for scenery when it is

of efficiency. The rapidity of the intermediate-film processing made it necessary to produce films having a rapid and sensitive emulsified surface. Time had to be spent in evolving the correct lighting



The Marconi-E.M.I. System at the Alexandra Palace. A view of the control room, showing the control desk, with a corner of the studio viewing window on the right.

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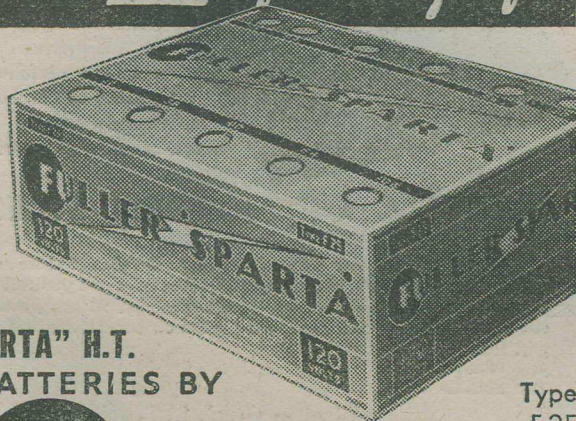
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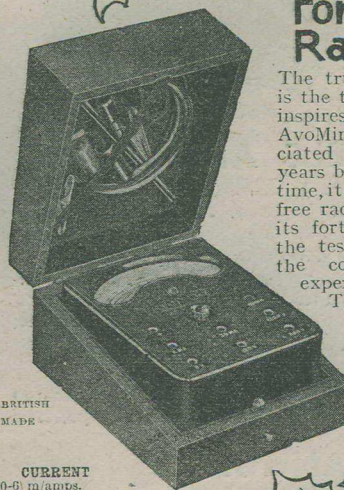
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ABC of the Modern Receiver-11

The Action and Use of Diode, Double-diode, and Double-diode-triode Valves for Second Detection are Explained By FRANK PRESTON

By FRANK PRESTON

IN concluding the previous article of this series, it was mentioned that diode valves are to-day most widely used for second detection in superheterodynes. The simple diode is very similar in its operation to the "Westector" which was dealt with before. This can be seen more easily by referring to Fig. 1, which shows the simplest type of diode detector circuit. Unlike other types of valve, the diode does not require any high-tension supply, but has a filament or cathode of the normal type. There are few simple diodes actually on the market, because it is more convenient and more economical to combine the diode electrodes with those of a triode, tetrode or pentode; the multi-electrode portion can then be used for either low- or high-frequency amplification, according to the particular design.

actual value of the load resistance depends to a certain extent upon the diode used, but .25 megohm, as indicated, is a good average figure. It should be noticed in passing, that the resistance is bypassed by a .0001-mfd. fixed condenser, which serves to allow any residual H.F. currents to "leak" away to earth.

How the Diode Works

The method of operation of the diode is similar to that of a triode which has previously been described: current flows from the negative filament or cathode to the anode. In the present case, since a positive potential is not applied to the anode from the H.T. source, current

an H.F. choke at the point marked X in Fig. 1 to prevent the passage of stray H.F. currents into the L.F. amplifier, but an alternative and more usual method of achieving the same object is to insert a 100,000-ohm fixed, non-inductive resistance at the point marked Y. This resistance is commonly known as a "stopper" resistance.

Although the simple circuit under consideration is intended only as a detector stage, it *can* be used to provide A.V.C. by taking a lead from the top of the load resistance, as shown in broken lines. This is not generally recommended, for when A.V.C. is required it is better in every way to employ a double diode valve, as shown in Fig. 2. In this case, an indirectly-heated valve is shown, because battery valves are not generally made in this type. There are battery valves available, but even these are indirectly heated.

The Double Diode

In Fig. 2 it will be observed that there are two separate anodes, but again neither of them is supplied with H.T. current. One of these—that shown on the left in the theoretical circuit—is used for second detection, and that on the right is for automatic volume control. If the connections to the two anodes are considered separately, it will be seen that they are of the same form as those in Fig. 1. There is again a .25-megohm load resistance between the lower end of the I.F. transformer secondary and the cathode, whilst a similar coupling condenser and volume-control potentiometer are used to feed the low-frequency valve. The A.V.C. anode is fed with H.F. from the primary winding of the I.F. transformer, through a .0001mfd fixed condenser, and also has a load resistance; this time of .5 megohms (an average value only). A “stopper” resistance is shown in the grid circuit of the L.F. valve, and decoupling condenser and resistance are shown for the A.V.C. feed. Values actually indicated in Fig. 2 are those applying to the Osram D.41 valve.

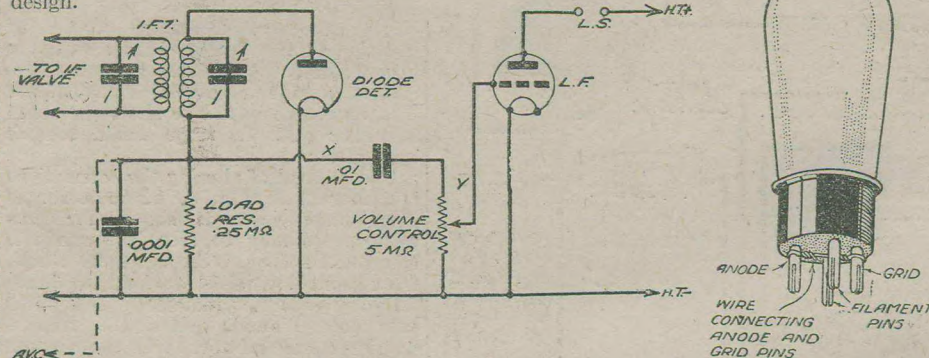


Fig. 1.—The simplest form of diode used as second detector. As shown in the pictorial diagram a triode can be used as a diode by joining together the grid and anode.

Triode Used As a Diode

The diode shown in Fig. 1 might well be a type LF or power triode with the grid and anode pins joined together to form a larger anode, and this arrangement might well be tried by those who would like to experiment. A diode detector is better than one of the leaky-grid type when there is a considerable amount of pre-detector amplification—as there generally is in a modern superhet—for it has a greater “handling capacity.” Additionally, a diode can more easily be used to provide distortionless detection. One disadvantage concerning its use in a “straight” circuit is that it is not an easy matter to provide a really satisfactory reaction circuit. Not that this is impossible, but it is not usually to be recommended. This objection does not, of course, apply in a superhet, since reaction is not employed in any normal case.

It may be seen from Fig. 1 that one end of the secondary winding of the intermediate-frequency transformer is connected to the diode anode, whilst the other end is connected through a fixed resistance to the earth line. The fixed resistance provides a load, such as was seen to be necessary when using a "Westector." In other words, the rectified voltage produced by the diode is developed across this resistance, whence it can be applied to the grid and cathode or filament of the following low-frequency valve, as shown. The

flows when the anode is made positive by the signal voltages. This means, in effect, that current flows only on each positive half-cycle of the signal. The result is that the fluctuating signal voltage is made uni-directional. Referring again to Fig. 1, it should be explained that the L.F. stage shown is actually of normal type, being resistance-capacity coupled to the detector by means of the load resistance and the .01-mfd. fixed condenser. The .5-megohm potentiometer is simply the normal grid leak, but, being variable, it is used as a volume control.

It is sometimes found better to insert

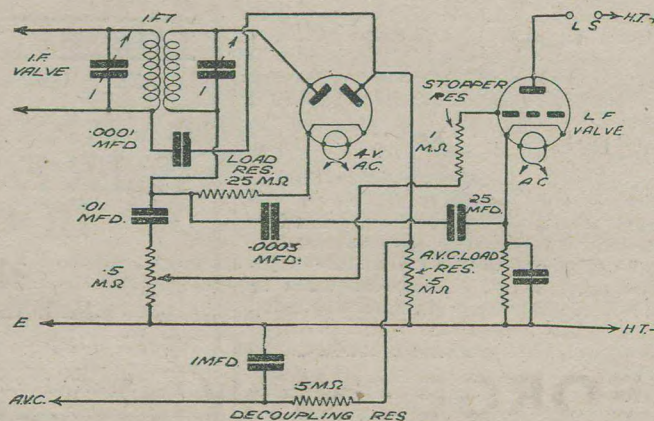


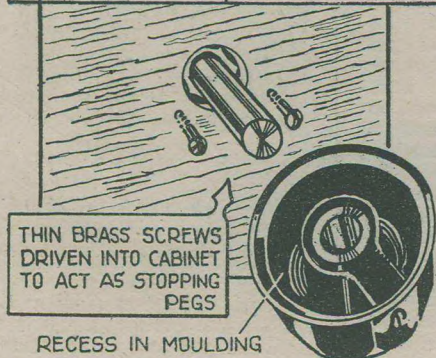
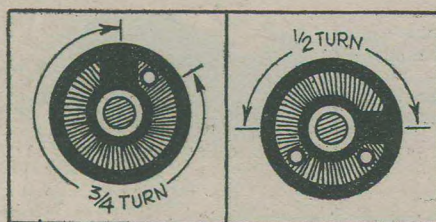
Fig. 2.—Circuit for an indirectly-heated double-diode valve, followed by an L.F. stage.

A PAGE OF PRACTICAL HINTS

SUBMIT
YOUR
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HALF-
GUINEA
PAGE

A Control Knob Dodge

THE minimum and maximum positions for controls nowadays are often indicated by small white spots, the component itself governing the extremities of



A control knob improvement.

movement. This has a tendency to turn the component bodily, and so loosen it upon its bracket, thus necessitating the removal of chassis from cabinet to refix.

In order to prevent this annoyance, thin brass screws were driven into the front of the cabinet, near the projecting spindle, at such a distance as to allow them to project into the recess of the knob. This allows the knob to be turned, but stops it when the solid section of the moulding (grub screw support) comes up against the projecting screw.

The two screws fitted as described will allow of any movement from a few degrees up to about half a turn, but only one screw should be fitted where a three-quarter turn (approx.) is required, as shown by insets in sketch. Care should be taken to see that the screw (or screws) clear both faces inside the recess so as to allow smooth movement of the control.—R. L. GRAPER (Gillingham).

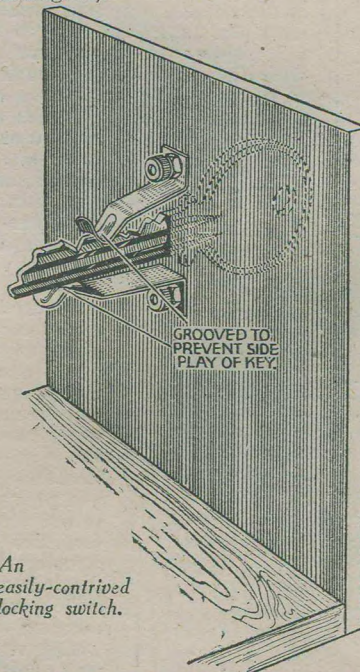
A Locking-switch Device

HERE is a neat and easily-made switch, which, incidentally, also enables one to "lock up" a wireless set. All that is required is a Yale latchkey and a couple of springy brass brackets. Two holes are bored through the panel next to each other and filed to form a slot to take and hold the key, as shown in the sketch. The

THAT DODGE OF YOURS!

Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account by sending it in to us addressed to the Editor, "PRACTICAL AND AMATEUR WIRELESS," George Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2. Put your name and address on every item. Please note that every notion sent in must be original. Mark envelopes "Radio Wrinkles." Do NOT enclose Queries with your Wrinkle.

brackets are then mounted below and above the key, so that when the key is inserted contact is made and a circuit completed. The device can be improved further by making the key rotatable, and adding two other brackets at right angles to the ones shown.—F. G. ARATHOON (Kensington).

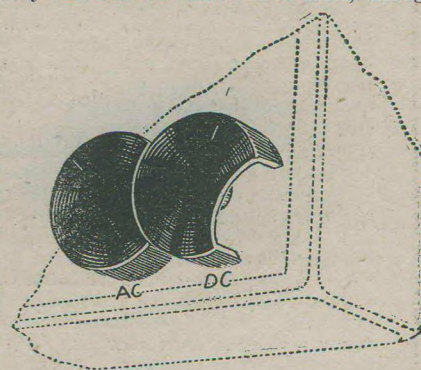


Safety Device for Meter Controls

THE accompanying sketch illustrates an idea which I have found very useful and reliable where there are two selector switches, and it is essential that one shall not be moved till the other is in one particular position, e.g., an A.C., D.C. multi-range meter.

The two ordinary circular knobs have each a sector filed or cut in them with a fret saw, so that they will fit closely, as shown in the sketch. The A.C. knob cannot be

moved until the D.C. knob has been turned back to free it, i.e., in the "off" position. When both are in the "off" position, then only one can be turned at a time, though

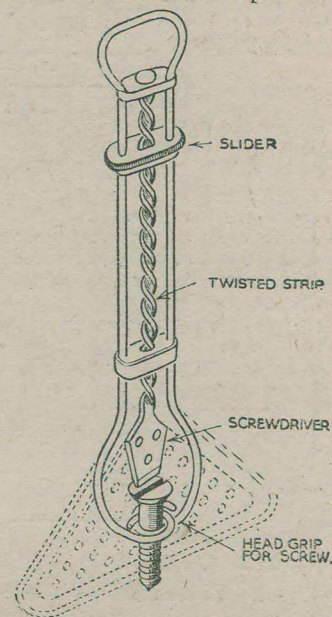


A safety device for two selector-switch controls.

either is free to move. If one desired to have the knobs untouched, then discs fixed to the spindles under the panel (out of sight) would work equally well.—L. KELLY (Thornton Heath).

A Handy Screwdriver Tool

HERE is a handy combination tool, which is easily made from an old rotary whisk as shown in the accompanying sketch. With a little wire-twisting the whisk can be converted into a very handy wireless tool. The wire loops at the end grip the screw and the remnant of the plate is filed to



A handy screwdriver tool made from an old rotary whisk.

act as a screwdriver. For light work the tool is very handy in inaccessible corners.—W. G. GEDDES (Sunderland).

LATHE WORK FOR AMATEURS

by F. J. CAMM

1/- or 1/2 by post from

George Newnes, Ltd., 8-11 Southampton Street, Strand, W.C.2.

PRACTICALLY without exception every manufacturer to-day makes an all-wave receiver. Although one or two firms have concentrated on a single receiver of this type, others have designed two or three different models in which the tuning range embraces the now popular short waves. The receivers described in this journal have also of recent months been of the multi-waveband type, now referred to as all-wave, although this is not strictly a correct term. I believe I am right in saying that at the present moment there is only one all-wave receiver on the market, and this is the Invicta Model AW57, which tunes from 13 to 2,000 metres with only one vacant part in this wide waveband. This is carried out in five steps, namely from 13 to 27, from 25 to 75, from 75 to 200, from 200 to 550, and from 746 to 2,000 metres. The majority of the remaining receivers of the so-called all-wave type generally have another vacant band from 100 metres or just below up to 200 metres or so.

In tracing out the history of this type of receiver we find that what might be termed the first all-wave receiver consisted of a standard broadcast receiver with a short-wave adapter or converter added to it. This combination gives practically all that is required, but has the inconvenience that the adapter or converter has to be disconnected when ordinary broadcast reception is required. A switch may be incorporated to carry out this operation, and thus the receiver is more or less a standard all-wave set with all wave-change switching carried out by switches. But when we come to include all of the coils

Problems of A

The Increasing Popularity of the All-wave Receiver Demands a Design which are Involved. Some of the Difficulties Encountered

germ of the idea is the broadcast receiver plus a short-wave converter, and this idea is still retained in practical form in one commercial set. That is to say, on broadcast bands the set is a straight arrangement, but when switched to the short waves it becomes a superhet. This type of circuit can be made very simple, but the switching offers some difficulties. Similarly, when a straight or superhet circuit is to be built to cover all waves, obviously the most important part is the switching, as it is necessary to change the coils for each waveband.

Multi-contact Switches

The introduction of special switches, a group of which may be seen in the illustration on our cover this week, has gone a long way towards solving the problem, and the introduction of special intermediate-frequency transformers has enabled the superhet circuit to be employed in this type of receiver without encountering difficulties from break-through or whistles. In Figs. 1 and 2 extracts are given from two commercial receiver circuits showing the

tremendous complication of the tuned circuits, and it will be seen from this that the home-construction of such a circuit is not a very simple matter. The losses introduced on the short waves by the wiring to the switches can assume such proportions that the receiver may be nearly worthless as a short-wave set, but again one manufacturer has stepped into the breach and solved this difficulty for the home-constructor by building the coils on top of the switch assembly and carrying out the wiring as a complete unit. This is, of course, the B.T.S. unit which has proved so successful in our Record All-wave receivers, and the group on our cover shows this unit on the extreme right. It will be noted that the short-wave coil is included in the centre of the unit and is individually screened.

In early all-wave receivers it was customary to wind a single coil (or connect the various coils in series on a single former) and to short-circuit the unwanted portion, one of the earliest coils of this type which

proved successful being the Lissen, seen in the background in our cover group. This covered two short-wave ranges in addition

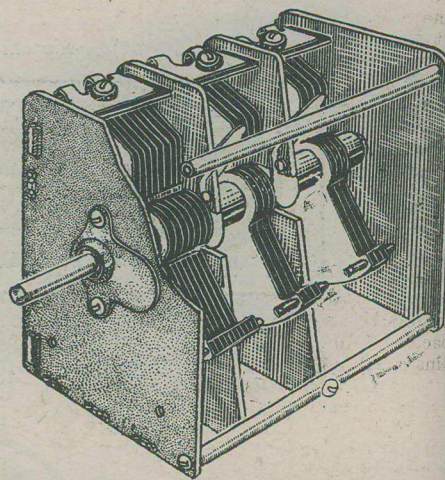


Fig. 3.—This special type of condenser made by Jackson Bros. has been incorporated by us in the Record-Receiver seen below.

to the broadcast medium and long waves and the self-contained switch simply short-circuited the coils one after the other. The losses occasioned by the earthed section of coil were not serious, but they did have an effect on the lower of the short-wave ranges, whilst the slight capacity

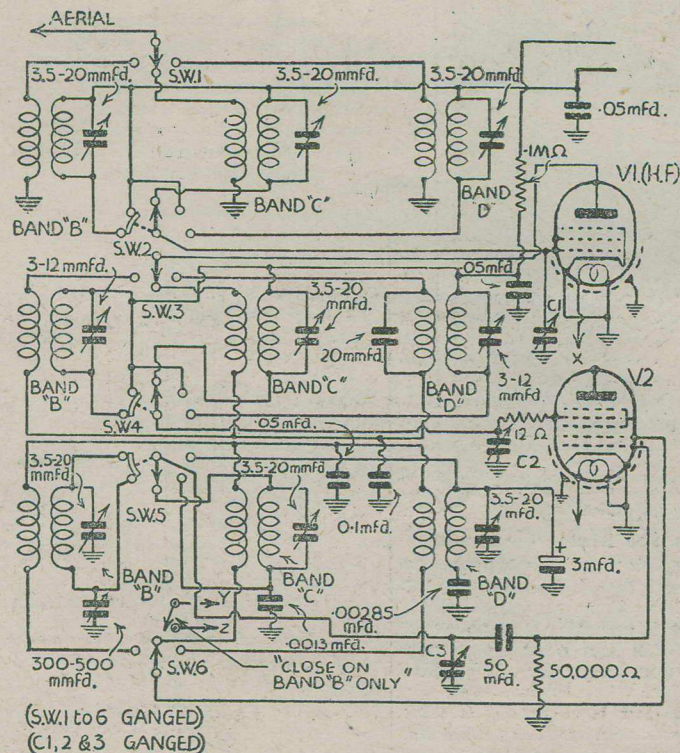


Fig. 1.—This extract from a commercial All-wave circuit shows some of the intricate switching which has to be carried out.

and valves in a single receiver and arrange for the switching to be carried out by a single control, there are several snags to be overcome.

As mentioned previously, the

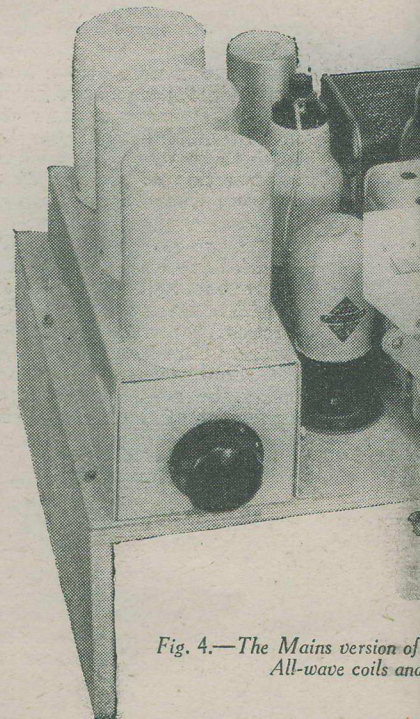


Fig. 4.—The Mains version of All-wave coils and

Wave Design

at the Constructor Shall Understand the Many Points in
and are Given in this Article - - - By W. J. DELANEY

ses introduced by the wave-change
itch also took their toll. In the modern
emes the short-wave coils are completely
parate, and a further instance of this coil
he Bulgin C type, which is the remaining
it in our cover group, and here again
parate screens cover the coils.

Circuit Faults

Another difficulty with the short-wave
tion of an all-wave set is the tuning, as
is not practicable to incorporate separate
tuning condensers. It is now well known
at for short-wave tuning a low-capacity
ndenser is required and even then a good
w-motion drive has to be employed.
idea which works quite well, and which is
orporated in the kits supplied by Ostar
nz, for instance, is to include a very low
capacity condenser in parallel with the
inary ganged condenser, so that on
ort waves a band-spread device is intro-
uced, and the small condenser is used as
ind of vernier. A better scheme, and one
hich is seen in the Limit and Record
eivers designed by us, is the use of a
pecial ganged condenser in which two of
e sections are of low capacity (actually
0.025 mfd.), and these are connected to
e wave-change switch in such a manner
on short waves they are employed
ividually for tuning the short-wave coils,
hilst on the broadcast wavebands they
e connected in parallel, thus converting
em into a single .0005 mfd. condenser
roviding standard tuning. This follows
e earlier scheme where a special short-
ave condenser was mounted on the

extended spindle of the ordinary ganged
condenser.

So far there is only one receiver which
tunes down sufficiently low to enable the
television programmes to be heard in
addition to the standard broadcast wave-
lengths up to 2,000 metres, and the stray
capacities introduced by the multi-switch
units and screens, etc., at the moment
preclude the possibility of ever getting down
to the real ultra-shorts. Perhaps a new
circuit design will be evolved eventually
to enable this to be done, although it will
be found that the ultra-shorts alone will
provide adequate programme material for
all ordinary domestic requirements. There
is always a feeling
that when some wave-
band cannot be
covered something is
being missed, and on
this account the real
all-wave set will no
doubt eventually be
the only one worth
while, but the con-
structor will find it
difficult to build a
set of this nature
from standard parts
without introducing
some new circuit
design.

Probably one of
the simplest solutions
for the amateur who
wishes to get the
maximum from an
all-wave receiver,
and who is not
therefore prepared to
consider expense, is
to build the set in
two parts. The L.F.
section could be
built as a single
unit at one end of
a large baseboard or
chassis, but the H.F.
and detector portions
of the receiver
should be duplicated.
For the broadcast
bands the standard
arrangement could
be employed, whilst
for the short-wave
bands a complete
H.F. and detector
section (or a superhet
if the constructor
prefers that type of
circuit) should be
built on standard
short-wave lines. To
ensure stable opera-
tion and complete
avoidance of interaction and losses, each
of these sections should be separately and
entirely screened. That is to say, the two
separate portions could be built one behind
the other, with a vertical screen running

between them and also between
both of them and the L.F.
section. The components should be
mounted on metal or a metallised
chassis, and metal lids should be fitted
over them. Separate controls would,
of course, be needed for such an arrange-
ment, and an experimental model built on
these lines some time ago was so arranged
that the short-wave section was farthest
from the panel, and the operating extension
rods passed across the broadcast section
and had separate control knobs on the
panel. The receiver was naturally very
bulky, but it definitely performed as a
perfect multi-range set, with the only diffi-
culty that plug-in short-wave coils were used.

Unessential Wavelengths

It might be agreed that certain parts of
the frequency range are unnecessary,
in view of the fact that there is little to be
heard upon them. Thus the ordinary
aircraft or ship wavebands will not offer
entertainment for normal domestic purposes
although the various signals will no doubt
be interesting to those who are keen to
follow them. For this reason they may, of

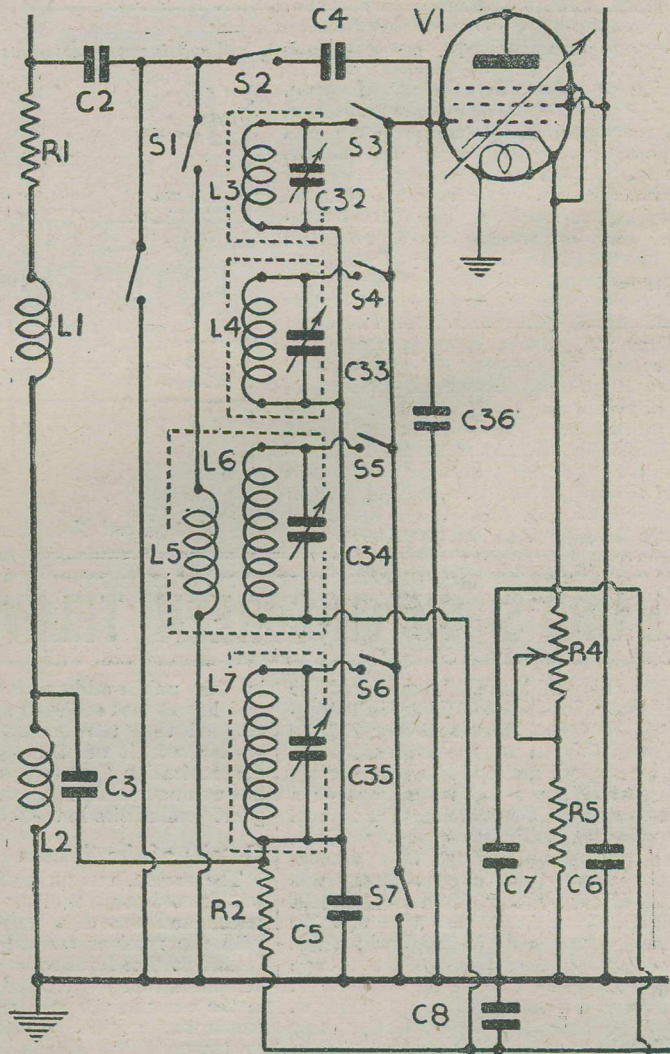
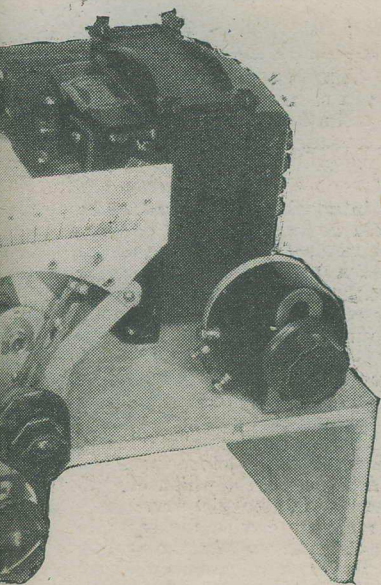


Fig. 2.—Another commercial circuit in which the coil switching has been simplified.

course, be ignored in designing an all-wave
receiver, and this naturally accounts for the
gap in the wave-range of the Invicta
receiver referred to in the opening
paragraphs.



ord All-waver, in which the special B.T.S.
B. condenser have been utilised.

Two Interesting Circuits

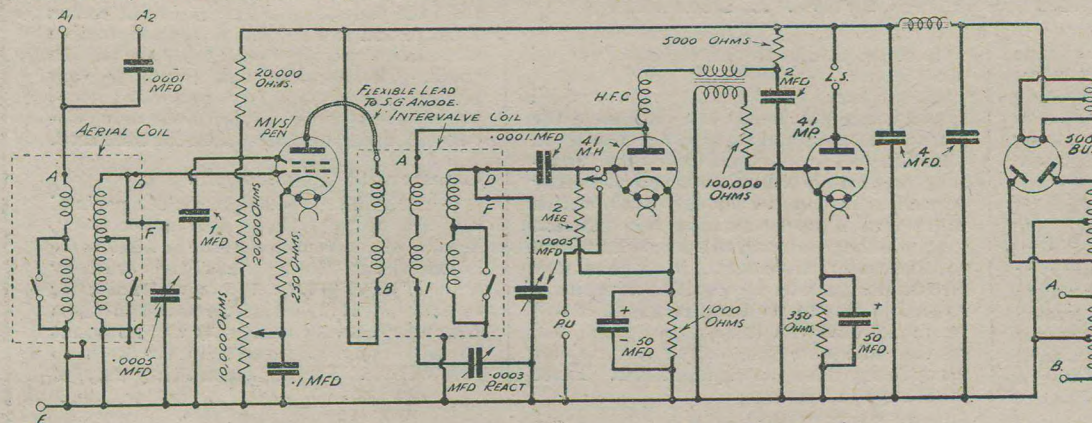
IN response to several requests we give herewith two circuits in which the new Varley coils are embodied. The first is a mains three-valver, in which the BP.114 two-gang coil unit is used, and it will be seen that a straight arrangement is embodied, which may be regarded as

Employing the New Varley Coils,
These Two Circuits will be Found
Very Efficient and Simple to Build

centric with the main knob, thus enabling the two circuits to be balanced at all settings of the dial.

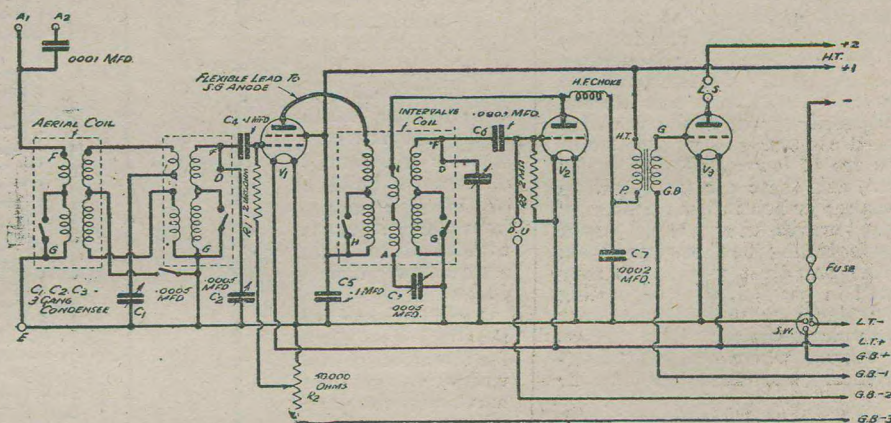
A Battery Three

In the second circuit a battery receiver is indicated, and here the BP.113 coil unit is incorporated. This is a three-gang unit, and the first two coils are coupled to form a band-pass tuner, thus providing a high degree of selectivity. The windings are so designed that a square tuning peak is obtained, giving maximum selectivity and high quality. The H.F. valve is of the variable-mu type.



The BP. 114 two-gang coil unit is employed in this 3-valve mains receiver.

fool-proof in action. The coils are, of course, complete with wave-change switch, and the various terminal numbers of the coil base are clearly shown in the circuit diagram. All values are given in the diagram, and all resistors are of the 1 watt type. There are no special components to be recommended, and the only precaution is to see that the condensers are of good type designed to work at the various voltages applied. The mains section can be incorporated on the same chassis, or may be built up as a separate unit, connection between the receiver and mains section being carried out by means of a multi-cable and multi-plug such as can be obtained from Messrs. Bulgin, Ward and Goldstone, etc. As there are only two tuned circuits, no trimming difficulties should arise, and the two-gang condenser should be of the J.B. type, having a separate trimmer operated by a knob con-



A simple and efficient 3-valve battery set incorporating the Varley BP.113 three-gang unit.

BAIRD'S SUPER-SCREEN TELEVISION

ON Sunday of last week we visited the Dominion Cinema Theatre in Tottenham Court Road and saw Baird's latest contribution to the television art. Here, briefly, we saw the heads of variety artists and of Mr. Baird reproduced on a large screen erected on the stage, and heard them speaking as in an ordinary talkie. The novelties underlying this demonstration were that the system was mechanical (as distinct from the present electrical systems) and that this was the first demonstration of its kind which has been produced in the entire world. Although attempts have been made in the past to show a television picture to a large audience, the results have not been in any way comparable to this latest demonstration. In the earliest "big-screen" television a battery of electric lamps was employed and these were operated by a multi-selector switch, but the system employed was the old low-definition 30-line scheme. A later demonstration also utilised this scheme, but Mr. Baird has been experimenting with a view to embodying high-definition system

in this public-address type of apparatus and has at last achieved success. It is not claimed that the present arrangement is perfect, and it was impressed on us at the demonstration that it was an early result, but we must confess that there are obviously great possibilities in the scheme.

Details of the System

The screen, measuring 8ft. by 6ft. 6ins., was erected in place of the standard cinema screen and was of a translucent material, with the receiver erected in a large room behind it. The transmitter in this particular demonstration was erected in another room in the cinema, although when the arrangements were originally made it was proposed to transmit the signals from the Baird laboratories at the Crystal Palace. The fire had, however, destroyed the transmitter and we thus had to be content with a land-line transmission. Only close-ups were shown, but no make-up of any kind was employed and the particular system enables this to be dispensed with. It was stated that extended scenes (or long-shots) can

be shown. The system incorporates a combination of a mirror-drum and scanning disc and the definition is 120 lines with 16 pictures per second.

Interlacing

A form of interlacing is employed, and a secondary field is formed of two or more primary interlaced scans. This scanning is then repeated a number of times, being displaced at each repetition. The secondary scan actually consists of two 20-lines intermeshed to form a scan of 40 lines. This 40-line field is then repeated three times and each time it is displaced laterally by means of the scanning disc to interlace with the other fields, and so forms a final field of 120 lines. There is practically no flicker, but in the demonstration picture there was the slight "floating" effect which characterised the earlier 30-line pictures. Furthermore, the picture carried the separate lines running vertically across the picture similar to the older system, but we were assured that this was due entirely to the experimental form of the apparatus being used and that eventually the lines would be obliterated and that the picture would remain perfectly steady. Further technical details of the system will be given in a forthcoming issue.

THE BRITISH LONG DISTANCE LISTENERS' CLUB

More News from India

MR. ADAMS, of the C.I.D. (Bombay), sends us some interesting news and snaps. In his letter he says, "Thanks a lot for that topping little certificate that arrived here safely a couple of weeks ago. It's a fine bit of work, and well worth preserving; more so in view of the fact that it comes from a *British Club*. Honestly, never for a moment did I imagine that such an organisation would take a hold in England. I thought that the States had the monopoly of DX Clubs, and it is really good to find that we are at last to have something that we can call our own."

"From what I read things are going really well with the Club, and it already holds the position of being the largest in Europe. It's just a matter of time ere it becomes one of the largest in the world."

"I have put in for my licence, and expect to be on the air in the not too distant

I am sorry I have not a decent snap of the corner as it stands to-day, as the array of cards is now vastly more imposing and the quality more varied."

For Wiltshire Readers

MR. J. OVERTON, of 24, Bridge Street, Taunton, Som. (B.L.D.L.C. No. 2,521), would like to correspond with any one interested in amateur short-wave listening, living in Salisbury or anywhere in the county of Wiltshire. If any local reader is interested perhaps he will get into touch direct with Mr. Overton.

A.E.L. All Empire Listeners

AS an extension of the facilities of the B.L.D.L.C., a new special feature is to be included. Any member who can produce five verifications showing that he has received British Empire Stations in five different continents will receive a letter from the Secretary "conferring" the A.E.L. of the B.L.D.L.C. upon him.

Amateur Report Wanted

MR. CHAPLIN, of Hucknall, has written as follows: "I have before me a QSL and letter from W9MXW in which he thanks me for my report on his fone signals, and adds that although he has worked two G's on C.W. he never has had the pleasure of a 2-way fone QSO and would very much appreciate a shout if any G ham should hear him calling on 14 m/cs. He is using 200 watts input and at present is coming over very well. On my report I gave him R7 QSA5 QSB nil on a 1.v.1 battery no A.V.C."

"I am sure W8MXW would, like myself, be very pleased if you would kindly publish this letter in PRACTICAL AND AMATEUR WIRELESS."

"VE4QY, Manitoba on 14 m/cs fone, 35 watts input, is asking for reports, as apparently according to his QSL I am the only one to report his signals on fone, and he would like to know if his signals are being received consistently."



Mr. S. R. Neale, of India, holding a midjet transmitter which he has built.

future, but do not think that I'll ever lose my interest in the S.W.L. side of it. It's too darned interesting to throw over as easy as all that.

"I enclose a couple of snaps that you may like to make use of and which are sure to interest readers."

"I am also sending you a photograph of my DX corner as it stood at the end of last year in the hopes that you might be able to squeeze it into some odd corner."



The wireless den of Mr. Adams in Bombay. See his letter above.

PETO-SCOTT

COLT ALL-WAVE 3

KIT "A" CASH or C.O.D. CARRIAGE PAID £3:2:6

Or 5/- down and balance in 11 monthly payments of 5/9.

Author's Kit of first specified parts, including plywood base-board, less valves, cabinet and speaker.

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KIT "A" Author's kit of first specified parts, less valves, cabinet and speaker. Cash or C.O.D., £3:18:6, or 12 monthly payments of 16/3.

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or 12 monthly payments of 19/6.

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KIT "A" Author's kit of first specified parts, less valves and speaker. CASH OR C.O.D. £4:2:6, or 12 monthly payments of 7/6.

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MODEL 37S. Amazing reproduction provided by new magnet and exponential moulded cone. Microphone matching device. Cash or C.O.D. Carr. Paid, £2:2:0. Or 2/6 down and 11 monthly payments of 4/-.

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TWO NEW H.M.V. RECEIVERS

THERE are two interesting new models in the H.M.V. range, both of which are here illustrated. The radiogram is an all-wave model, designed for

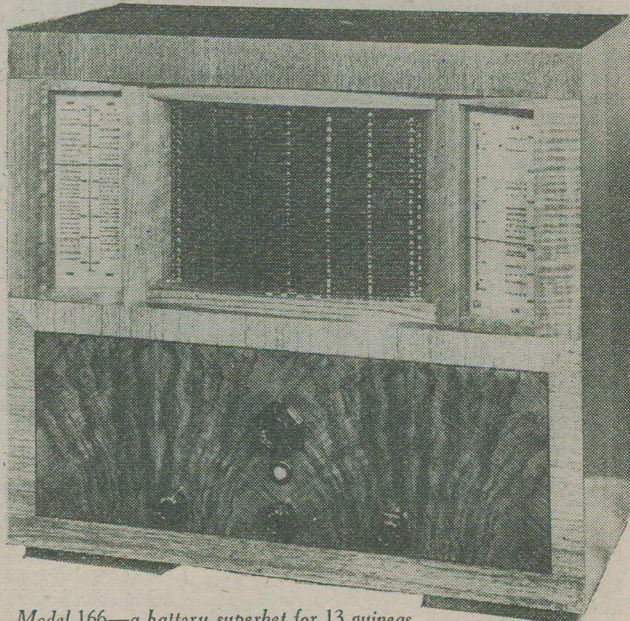


This is the Universal All-World Radiogram.

use on any mains, either A.C. or D.C., without alteration. It embodies all the latest circuit refinements and costs only 25 gns. complete. The other model is a battery all-wave superhet, covering three wavebands, namely, 18-50, 195-580, and 840 to 2,000 metres. The two tuning scales are arranged on either side of the loudspeaker opening in a vertical position, and the left-hand scale covers the medium waves, whilst the right-hand one covers short and long wavebands. There are four controls: volume, tuning, waveband switching, and tone. The on/off switch is combined with the volume control, and the waveband switch has a fourth position to effect a change-over for gramophone record reproduction.

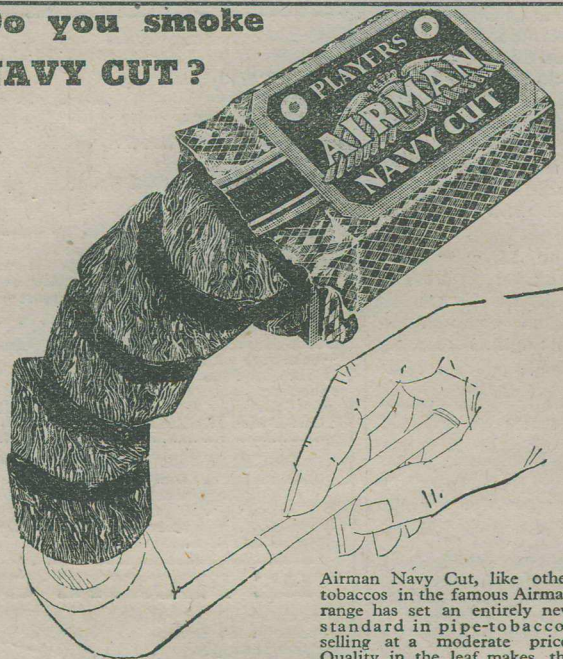
A small pilot lamp is mounted behind a red-glass window below the tuning knob to show when the receiver is switched on, and this is a novel refinement. A special nickel-aluminium-cobalt magnet is employed for the loudspeaker, and it is claimed that a flux-density of over 8,500 lines per square

cm. is obtained. The output is of the Q.P.P. type, delivering approximately $1\frac{1}{2}$ watts. To ensure good selectivity the input is of the bandpass type fed direct to the frequency-changer stage, and the intermediate frequency adopted in this particular receiver is 465 kc/s. A double-diode-triode is employed for second detector and A.V.C., and the triode portion feeds the output stage. The L.T. consumption is .8 amps. and the average H.T. consumption 7 mA. The price of the receiver is 13 guineas, and the model number is 166.



Model 166—a battery superhet for 13 guineas.

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NAVY CUT?**



Airman Navy Cut, like other tobaccos in the famous Airman range has set an entirely new standard in pipe-tobaccos selling at a moderate price. Quality in the leaf makes the value exceptional.

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AIRMAN
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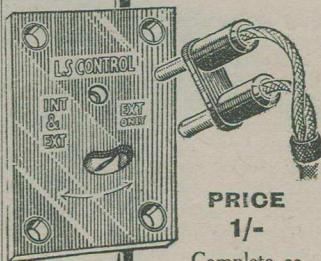
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"A useful device for fitting to a receiver so that an external loud speaker may be used in conjunction with the internal one, or without it, or the internal loud speaker used alone, has been evolved by Lectro Linx Ltd."

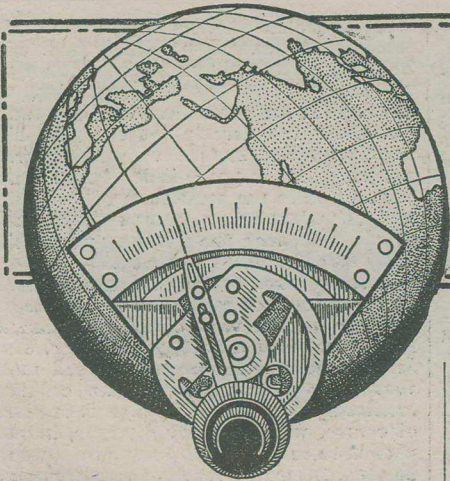
Easy to fit. Simple diagram showing how to connect is supplied with each control.

Yours faithfully

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SHORT WAVE SECTION

ULTRA-SHORT-WAVE RECEIVER DESIGN

WHEN the short waves were first "discovered," short-wave receivers were freaks, indeed. They bore little resemblance to the general-purpose receivers of the time, and now that we are all thinking in terms of ultra-short waves, we find that the ordinary short-wave

transmission was a little scratchy parasite that bobbed up and down in the band, and it was pretty weak at that, even at close quarters.

The Super-regenerator

Someone then had the brain-wave of using the old Armstrong super, or a modification of it. You will remember that the principle of the super-regenerator involves keeping the detector in its hyper-sensitive state, right on the threshold of oscillation, by shooting it backwards and forwards

It was with gear of this type—unstable transmitters and broad-tuning receivers—that all the early 5-metre records were set up. It is also of interest to note that such gear still proves efficient enough to be used by several public services.

Circuit Details

The need for super-regenerative receivers having been thus explained, we can talk about them for a bit. Fig. 1 shows the original type, consisting of a straightforward detector circuit with a separate valve, arranged as an oscillator, modulating the detector anode supply by a simple series arrangement.

The particular detector circuit used need not concern us at present; anything that worked on 20 metres could be made to work on 5 metres if the layout and components were efficient enough.

A little later someone discovered that our old friend, the Split Colpitts circuit, very popular among transmitters, made a really excellent detector circuit for the ultra-short waves. Not only was it a nice-looking and easily-handled circuit, but it really lent itself to an amazingly simple and compact layout.

Fig. 2 shows the circuit, and Fig. 3 the kind of practical arrangement that is often made of it, from which it will be seen that the layout really is good. The next stage in the development of these circuits was to dispense with the separate "quench" valve, and to arrange the two long-wave circuits in the H.T. and grid-return leads of the detector itself, thereby making it do both jobs.

This particular variety of the super-regen. is quite well known, and need not be discussed further, except to remark that general experience shows that it is *not* so sensitive as that in which two valves are used—one for each purpose.

Yet another "self-quench" circuit was evolved, operating on the "grid-blocking" principle. Broadly speaking, the recipe

(Continued overleaf)

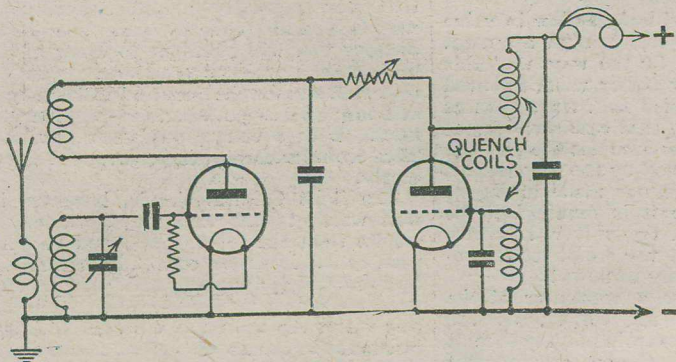


Fig. 1.—The simple super-regenerative receiver with separate quench valve.

receiver has settled down into a very straightforward affair, devoid of frills and unnecessary gadgets, while the ultra-short-wave receiver is rather out of the ordinary.

This, I suppose, is natural. No one imagines that we know all about these ultra-short waves yet; and even when we do it will be some time before we settle down to a conventionalised technique in our receivers and transmitters.

Let us, therefore, look at some of the types of receiver suitable for use "in the present state of the art," as the Patent Agents so aptly remark. I intend to keep away from the superhet and to deal with two types of set, the "straight" receiver and the super-regenerator.

The amateur's first attempts at getting down to 5 metres with a straight receiver were somewhat discouraging. It got down there all right, and it oscillated, and the reaction control worked nicely, but there simply wasn't anything to listen to. By and by, a few amateur transmitters built some low-power gear and started putting out telephony transmissions on the 5-metre band.

Here was the chance for the owner of the straight receiver; but, unfortunately, the straight receiver just couldn't make anything intelligible of them. The transmitters had not, at that time, succeeded in putting out a crystal-controlled, or frequency-stabilised, signal; and the thing they did put out was so hopelessly wobbly that a reacting receiver simply wouldn't look at it!

All that one could hear of a telephony

across that spot several thousand times per second.

In other words, its H.T. supply is modulated by what is really a short-wave oscillator, using a frequency of 15,000 kilocycles or something of that order. One then hears a nice hefty background through which it hardly seems possible that any sig-

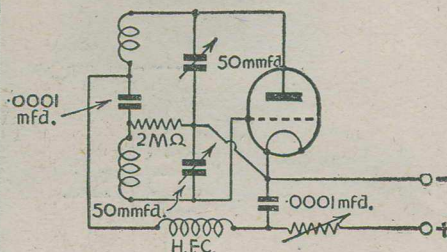


Fig. 2.—The Split Colpitts circuit.

nal would penetrate, but as soon as a signal arrives that is strong enough to "trigger" the arrangement, the mush disappears and we have a strong, readable signal.

This worked out extremely well for 5-metre work. The super-regenerator was simple to construct and to operate; it was easily made portable, and taken out into the high hills; and it was sufficiently "flat-tuned" to make something of the wobbly transmissions with which it had to cope. Incidentally, its broad-tuning properties were responsible for the ease of operation, and slow-motion dials could be dispensed with in the most amazing way.

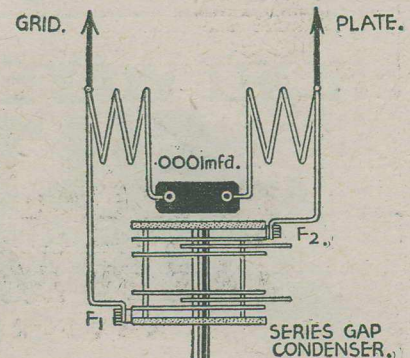
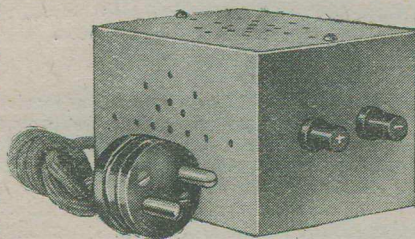


Fig. 3.—Practical arrangement of the Colpitts tuning circuit.

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SHORT-WAVE SECTION

(Continued from previous page)

was on these lines: Take an ordinary reacting detector; increase the size of the reaction condenser until the thing breaks into an audible howl, so fiercely is it oscillating; then gradually reduce the value of the grid-leak until the howl goes up just out of audible frequency. Then you have your detector "supering" nicely, and, if anything, with less background noise than one usually associates with the other methods.

Again, a single-valver operating on this principle is not so efficient as a set using a detector and separate "quench" valve, but, on the other hand, a two-valver using a self-quenching detector and an L.F. stage is undoubtedly more useful than the other type of two-valver.

The set shown in Fig. 4 is a single-valve receiver operating on this "grid-blocking" principle. Here, again, the "Split Colpitts" arrangement is used. The large condenser on the remote side of the ultra-short-wave choke is responsible for the fierce oscillation, and the .5-megohm grid-leak shifts the "hoot" out of audibility.

Component Values

In some cases grid-leaks as low in value as 100,000 or even 50,000 ohms are used. It should be noted, by the way, that this circuit works rather better when followed by a resistance-coupled L.F. stage than as a detector only. In that case a resistance of about 30,000 ohms occupies the position in the circuit now filled by the 'phones.

This particular set was made in single-valve guise because it is required to be really portable. A two-valver, however, with another Midget valve and resistance-coupling, would hardly be large!

It is usual to use a condenser of the "series-gap" type for tuning, as the moving plates and control knob are then at earth potential. Such an arrangement would be absolutely essential in a straight circuit, or the frequency-changer of a superhet, to avoid hand-capacity troubles. With the flat tuning of the super-regenerator, however, it does not matter. This little midget set tunes nicely over the 5-metre band with just the plain knob on the

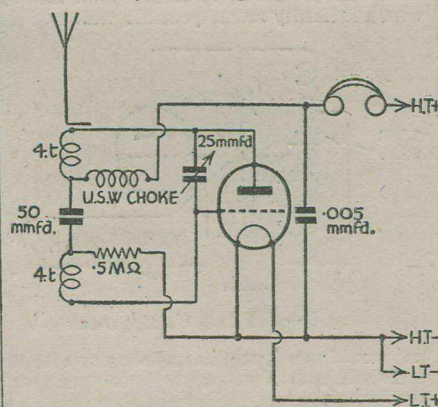


Fig. 4.—A novel single-valve circuit.

variable condenser—no slow-motion or even a large dial.

Aerial coupling is arranged by clipping the aerial lead-in on to the insulating "spider" of the variable condenser in such a way that the crocodile clip is parallel with the fixed plates. This provides sufficiently loose coupling to allow of the use of a full-length outside aerial. For use with dipoles it is, of course, essential to provide a proper coupling winding, preferably between the grid and anode coils.

The trouble with most super-regenerative receivers is excessive background hiss. This may be caused by a variety of things—unwise choice of quench-frequency, too much H.T. on quenching valve, detector oscillating too fiercely (at the ultra-high frequency), and so on. Where a separate quench valve is used, it is always worth one's while to use some form of oscillation control, whether by means of variable coupling between the two long-wave coils, or by an adjustable condenser.

A variable resistance, as shown in Fig. 1, for controlling the oscillation of the detector (not the quench valve) is also invaluable. It is a fact that a super-regenerator, carefully tuned up and operated, need make very little more noise than an ordinary oscillating detector. The signals it gives, of course, will be vastly stronger, in proportion to the noise, than those that would be obtained with a reacting detector only.

Unfortunately, most of the "supers" that one hears seem to generate a most intolerable racket, through which only the very strongest signals could possibly be heard.

The Straight Sets

And now, a few more words about the "straight" receiver. The same circuit that you normally use for short-wave reception will probably suit you best, because you will have got to know of its little habits. Very small coils will be required, and for the 5-metre band a couple of 4-turn coils of $\frac{1}{2}$ in. diameter are generally used. With a tuning condenser of about 25 micro-microfarads, these cover the band nicely.

The Split Colpitts circuit, however, is well worth trying, and may give better results than the others when you become used to it. Reaction cannot be controlled by substituting a variable condenser for the fixed condenser between the two coils, for this varies the tuning as well. A variable resistance in the anode circuit, as shown in Fig. 2, is the best way of doing it. Incidentally, this may have to be shunted by a 1-microfarad condenser to insure quiet operation.

Tuning with this circuit on its own is a very different matter from the handling of a super-regenerator. It is decidedly sharp, and a good slow-motion dial and a large quantity of dexterity are required. Furthermore, the layout must be so planned that hand-capacity is entirely absent, even if this means mounting the condenser well back from the panel and using an extension rod for its control.

Unless you are listening to frequency-stabilised transmissions, you will be disappointed. Speech from unstable transmitters, unless it is very strong, is not often understandable. Until reaction is slackened right off, it is just a confused scrape; with reaction right back it is inaudible.

The obvious solution to these difficulties is to use a suitable type of superheterodyne, and I shall deal with the problems attendant upon the design of such a set in another article.

For the present, if you are really keen on ultra-short-wave work, you will be well advised to build either a straight receiver or a "super-regen," to get the feel of things.

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LEAVES FROM A SHORT-WAVE LOG

Another Question of Interference

UNDOUBTEDLY the daily increasing number of transmitters in the sanctioned broadcasting bands is making matters very difficult for the authorities whose duty—and privilege—it is to allot the channels. During the past week or so, although the reception of programmes from WIXK, Millis (Mass.), on 31.35 m. (9,570 kc/s) has been such on most nights that signals were captured at full loudspeaker strength, interference from a South American station has been noticed on several occasions. The culprit would appear to be HJ2ABC, Cuvuta (Col.), which, originally working some kilocycles away, has cut down the separation to barely 2 kilocycles. Careful listening will reveal in addition to an unpleasant hum and “judder,” the chimes (c, d, e, f, c) used by the South American as an interval signal. Listen for them in the background of the Boston broadcast.

Havana Broadcasts Heard Nightly

Although Cuba is distant from the British Isles by about 4,700 miles, it is surprising how transmissions from Havana, and other places in the island, are now being heard all over Europe. Almost nightly it is possible to log five or six different broadcasts. Try for COCX, 25.7 m. (11,675 kc/s); COCQ, 30.77 m. (9,750 kc/s); COCH, 31.8 m. (9,430 kc/s); COKG, temporarily on 48.31 m. (6,210 kc/s); and COCO, on 49.92 m. (6,010 kc/s). All are in Havana, with the exception of COKG, situated in Santiago. Their programmes, with a few exceptions, are very similar; they broadcast interminable rumbas interspersed with “puffs” for local or other products, radio sets, automobiles, and so on. Many of these transmissions may be held steadily from G.M.T. 22.00 until the early hours of morning.

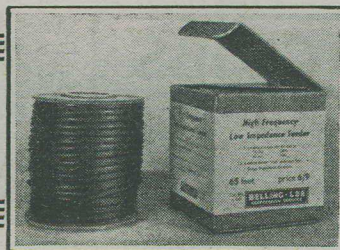
A Very Busy Channel

The wavelength of 31.28 m. (9,590 kc/s) is one which should be carefully registered, as it is shared by several important broadcasters. On this channel you should log transmissions in both Dutch and English. Of the former you may tune in PKYDB, Soerabaya (Netherlands East Indies), which is the key station of the N.I.R.O.M. East Java network, or PCJ, Eindhoven (Holland), on the air every Sunday between G.M.T. 19.00-20.00; on Mondays between 00.00-01.00; Tuesdays from 18.30-20.00; and on Thursdays gives a longer broadcast, namely, from 00.00-03.00. Transmissions in English on this channel may be from VK2ME, Sydney (N.S.W.), or from W3XAU, the short-wave outlet of WCAU, Philadelphia, in the Columbia Broadcasting system's hook-up. There can be no hesitation in identifying them, as the American station, in a similar way to that adopted by W2XE, Wayne (N.J.), gives a multilingual call, in this instance in English, French, German, and Spanish. I also learn that the new Perth (Western Australia) 500-watt short-wave transmitter VK6ME, is likely to use the same channel.

Siam Tries Out a New Channel

HS8PJ, Saladeng, Bangkok, has been logged with a broadcast between G.M.T. 13.00-15.00 on Thursdays using a new frequency, 9,350 kc/s (32.09 m.). Announcements in Siamese, English and French. Following a transmission of English or American music a twenty-minutes' news bulletin is given.

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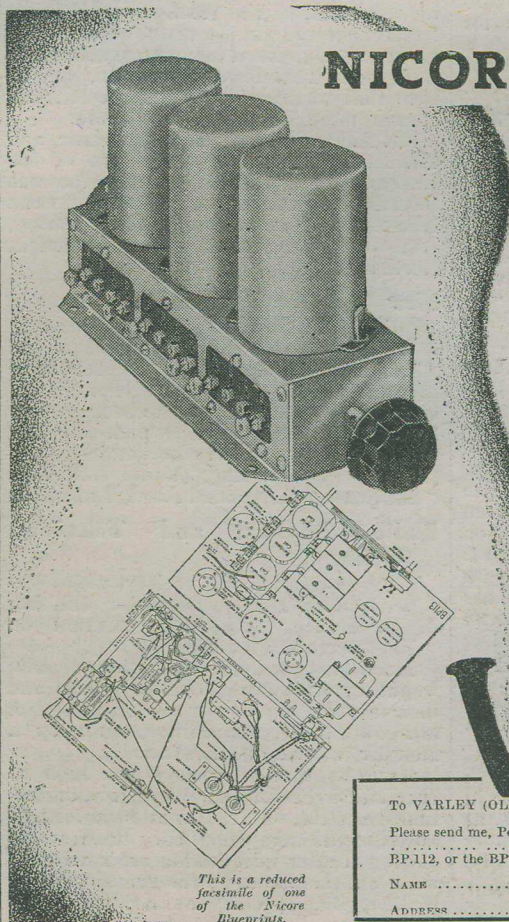
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remittance enclosed.

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A HEAD of their time—that's how we class these new Coil Units of ours. We sincerely believe that they will make a good deal of difference to any home-constructed set. And to build a set round one of the Nicore Units is to open the door to Radio's best. For your especial benefit we have recently published four brand-new circuit blueprints, which are giving excellent results with these ganged units. No. 1 (BP.111) Mains superhet for 110 K.C. No. 2 (BP.112) Battery superhet. for 465 K.C. No. 3 (BP.113) 3-valve mains receiver with band-pass tuners. No. 4 (BP.114) S.G. Battery 3 with Pentode. You can have one of these blueprints (and they're really worth having) for 6d. (The BP.114 is 3d.) The postage is free.

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Alternatively the BP.113 may be used in a battery-operated circuit and the BP.114 in a mains-operated circuit.

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To VARLEY (OLIVER PELL CONTROL, LTD.), BLOOMFIELD RD., WOOLWICH, S.E.18.
Please send me, Post Free, the following blueprint(s). (Put List No. here)
I enclose 6d. in stamps for either the BP.111 BP.112, or the BP.113, or 3d. in stamps for the BP.114.

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RADIO CLUBS AND SOCIETIES

Club Reports should not exceed 200 words in length and should be received First Post each Monday morning for publication in the following week's issue.

Exeter and District Wireless Society

AT the last meeting of this society, held at No. 3, Dix's Field, Exeter, Mr. F. Thorn demonstrated the full range of modern receivers, and also gave a very instructive lecture on the erection and uses of the dipole aerial. The practical use of this aerial system was ably demonstrated, and the members were able to hear for themselves the difference between the dipole and the ordinary broadcast receiving aerial. Secretary, W. J. Ching, 9, Sivell Place, Heavitree, Exeter.

Sutton-in-Ashfield Radio Society

THIS club, which was formed about six months ago, is making considerable progress. At the present time members are busy assembling various types of short-wave receiving apparatus. Two classes are being run teaching morse, one for juniors and the other for senior members. The club has been affiliated to the Radio Society of Great Britain, and an experimental transmitter's licence (artificial aerial) has been granted for the use of the club, the wavelength allotted being of the order of 7,070 kilocycles, and the call-sign is 2AAAT. Interested persons are invited to write to the chairman of the society, Mr. A. R. George, "Lynton," Peveril Drive, Sutton, Notts.

The Croydon Radio Society

FEW members miss the Croydon Radio Society's loudspeaker night, and for that event on Tuesday, December 1st, a large meeting gathered to sit in judgment on the various models brought by members. All this took place in St. Peter's Hall, Ledbury Road, South Croydon. The feature of the evening was the "come-back" of the Vice-President's, Mr. G. S. Vellacott's, home-made loudspeaker. This unique instrument had won many such contests in the past, but lost during last year against up-to-date makes. A guitar recital proved the undoing of Mr. Webster and Mr. Jones, and in the speech test section, Mr. Ménage emerged successfully. The Technical Adviser's special oscillator was a severe test, and all models had to give of their best before being permitted to pass on. Here Mr. Webster scored many points. Five loudspeakers reached the final, including Mr. Clarke's Oval, Mr. M. G. Firmin's home-made, and Mr. Vellacott's. All gave such good results that no one claimant could be given the verdict. Even so, Mr. Vellacott was congratulated on doing so well with his speaker, so old as it was, compared against the modern designs present. The first half of the session has now been concluded, but PRACTICAL AND AMATEUR WIRELESS readers are invited to apply for the fixture card giving programmes from January, 1937, onwards.

Hon. Publicity Secretary, E. L. Cumbers, Maycourt, Campden Road, South Croydon.

Radio Society of Northern Ireland

THE above society, which has been in operation now for over two years, at their monthly meeting, held on November 4th, in the City of Belfast Y.M.C.A. Radio Clubroom, elected their officers for 1937. This very active Northern Ireland society has now over fifty members, and out of this

total there are twelve transmitting operators holding G1 call-signs. The society hold their monthly meeting on the first Wednesday of each month in the City of Belfast Y.M.C.A. Radio Clubroom (G16YM), Wellington Place, Belfast. Slow morse practice classes are held weekly for the benefit of all members, and all who have attended

these classes have made good progress. At the club station, G16YM, a powerful new rotary converter has been installed, and within a few weeks the call-sign of the club will be heard on the air. Any reports on these transmissions will be gratefully received and acknowledged. Station visits and lectures have been arranged for the winter months, and further information as to the activities of the society may be obtained by writing direct to the Hon. Secretary, Frank A. Robb (Radio G16TK), 46, Victoria Avenue, Sydenham, Belfast, N.I.

Wellingborough and District Radio and Television Society

THE fortnightly meeting of the above society was held at The Midland Hotel, Wellingborough, on Wednesday, December 2nd, and a crowded meeting listened to an excellent lecture given by Mr. F. Stafford (G2TD) on problems of electrical interference.

Mr. Stafford commenced his talk by explaining that there were two distinct types of interference, and that both types were often caused at once by the same source of interfering machinery, or whatever it was that caused the interference. He mentioned that one type often travelled from the source via the electric mains wiring, and into the receiver by way of the power supply, the other type being radiated through space in the form of a magnetic wave; this latter component being picked up by the aerial of the receiver. The interference received via the mains could nearly always be suppressed in a simple manner to a degree that rendered it harmless, but the type that was received via the aerial was always more difficult to eradicate.

Mr. A. E. Fletcher was in the chair, and Mr. R. Bradshaw was in charge of the lantern. A lantern slide for this lecture was loaned by PRACTICAL AND AMATEUR WIRELESS.—Hon. Secretary, L. F. Parker, 127, Jubilee Crescent, Wellingborough, Northants.

New Club for Whitstable

A NEW Radio Club is being formed in Whitstable, under the name of the "Tankerton Radio Club." Its chief interest will be short-wave transmitting and receiving. Meetings are to be held every Saturday evening at 7.30 p.m. Further details of this club may be obtained from the Secretary, J. Elvy (Radio G-2AMY), "Shirlmere," Northwood Road, Tankerton.

Radio, Physical and Television Society

AT a meeting of this society, which was held on Friday, December 4th, Mr. J. G. Hobbs, A.M.I.R.E., lectured on "Short-wave Transmitters."

Methods of producing oscillations of radio frequency were dealt with in general and demonstrated by means of apparatus. A low-power C.W. transmitter, built by a member, was also demonstrated.

Meetings of the society are held at 72a, North End Road, West Kensington, London, W.14, on Fridays at 8 p.m. Light refreshments are supplied. Readers requiring further information are invited to write to the Hon. Secretary, Mr. V. R. Walker, 49, Fitz James Avenue, West Kensington, London, W.14.

REPLIES IN BRIEF

The following replies to queries are given in abbreviated form either because of non-compliance with our rules, or because the point raised is not of general interest.

F. G. (Worthing). The receiver is not one of our designs, and we can therefore give you no details concerning it.

R. C. (Colchester). It would appear that the detector valve needs replacing, or that one of the anode components has become faulty.

G. B. C. (S.E.4). You cannot modify the current or voltage output as you suggest. A better scheme is to fit a load resistor to the switch circuit so that when the amplifier alone is switched on the resist or is automatically brought into circuit. The value should be such that it consumes as much current as the H.F. amplifier. You must calculate the grid swing of the output valve, and then work backwards to find the necessary stages and couplings to give a fully-loaded stage.

V. R. R. (Madras). The apparatus may be used as you suggest, and further details will be given in our pages at a later date.

I. H. H. J. (Sidmouth). You could use a short-wave converter with the set, but it would probably be preferable to dispose of the receiver in view of its age, and build a modern all-wave set. We cannot recommend a blueprint to use up the old parts of the 5-valve set. Again, the parts are now obsolete.

A. H. (Lerwick). So far as we have been able to trace, no English valve manufacturer can supply you with the valves mentioned. The alternative solution is to remove the present valveholders and fit those for English valves, replacing the various stages by standard English valves, but the performance will probably be changed owing to the different characteristics.

A. G. G. (Halifax). Messrs. Electradix Radios can supply you with details of microphones which will no doubt be found suitable for your needs.

M. C. N. (Dromod). The constructional articles which appear in our pages should be adequate for your requirements. No further information is necessary, and when you find a set which suits you, you will find that all necessary constructional details are given.

J. M. (Bournemouth). You do not state what type of set you require. Is the Colt All-Wave three described last week of any use in your case, or do you need a broadcast receiver only—without the short waves?

S. A. B. (W.14). You will find there are seven two-valve battery blueprints in our Blueprint list, and no doubt any one of these would be suitable for you. The type of circuit is given after each name in the list.

G. A. H. (Exeter). The "Wireless Constructors' Encyclopedia" is probably the best book for you, as it explains all the terms, and is profusely illustrated. The Prefect S.W. Three is the nearest of our receivers to the specification outlined by you.

B. R. (Rhuddlan). It would certainly appear that the valve is microphonic, but this may not be the only trouble. As it is a commercial receiver, we advise you to get into touch with the makers or their nearest local service agent.

A. McL. (Glasgow, E.1). The only solution is to modify the degree of aerial coupling. You do not show a tuning condenser in the detector circuit, but presumably you omitted to sketch this, and we assume that one is used in the receiver.

F. G. (Bury St. Edmunds). The wood referred to may be obtained from F. Romany, Ltd., 52, High Street, London, N.W.1. Their catalogue may be obtained for 6d.

A. T. (Liverpool). Unfortunately the issue in question is now out of print, but we hope to describe a similar unit in the near future.

B. M. M. (Repton). The noises may be due to faulty components in the set, or to mains-borne interference. You do not state whether the set is mains-operated, and therefore we cannot advise definitely. If the noises exist in a battery receiver, when aerial and earth are disconnected, a fault is present in the receiver, and a milliammeter in each anode circuit may enable you to trace the faulty part by indicating a fluctuating current in that stage.

J. M. (E.7). The details in our Christmas number will no doubt have enabled you to carry out the desired amplification.

K. W. (Hove). The substituted valve may be the cause of the trouble, and that is why we always advise constructors to adhere to the parts specified.

W. A. C. (Islington). The coil may be obtained direct from Messrs. Peto Scott.

S. C. J. G. (Belfast). You should find one of the latest all-wave interference-free aerial systems most suitable for your locality.

K. H. (S.E.11). See the reply above to F. G., of Bury St. Edmunds.

A. A. T. R. (Dagenham). The microphone may be faulty, as your connections were quite correct.

D. C. (Birmingham, 19). You should not have damaged the eliminator by ordinary use. Perhaps one of the condensers has broken down or a resistor may have failed. Check the output with a meter.

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Facts and Figures

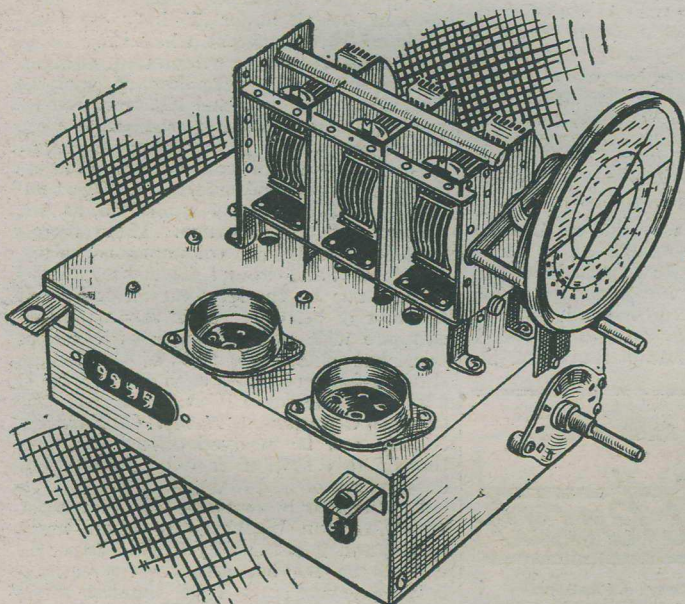
COMPONENTS TESTED IN OUR NEW LABORATORY

Belling-Lee Low Impedance Feeder

IN the recent articles on dipole aerial systems we have shown how the signals are fed from the centre of the dipole to the receiver, and it has been stated that various methods of feeding the signal may be adopted. A fairly common method of carrying out this part of the system is to use ordinary lighting flex, whilst another popular scheme is to use a single cable of the screened type, employing both the wire and the screen in various combinations. Messrs. Belling-Lee have, however, been investigating the problem and have now evolved a new type of feeder which has been found to provide a very much improved result, which is especially noticeable in television installations. The improvement in this case takes the form of a clearer

The "Radio-Heart"

MANY constructors hesitate to build a superhet owing to the apparent difficulty of accurately ganging the various circuits, and it is, of course, well known that unless the circuits are correctly ganged the superhet is no better than any ordinary circuit. Selectivity also depends upon the number of tuned circuits, and unless the tuning condenser is correctly chosen for the particular coils used it is not possible to use a correctly calibrated tuning scale. All of the difficulties may be overcome by employing one of the special built-up radio units which may be obtained from Messrs. R. A. Rothermel. The illustration on this page shows the complete arrangement, from which it will be noted that the valve-holders for the frequency changer and signal H.F. stage are also included, and this particular unit incorporates all of the early components and is completely wired and ganged, thus removing all difficulties associated with correct design and construction. The chassis is of heavy cadmium-plated steel (not aluminium) and is 5½ in. by 7½ in. by 2½ in. with mounting feet fitted to the top edge. The idea underlying this is that the entire unit may be mounted in the centre of a standard wooden or metal chassis and rubber grummetts may be interposed between the feet so that the entire unit is "floating" and tuning shifts due to vibration are there-



The Radio-Heart tuning unit, consisting of all components ready wired for the H.F. and frequency changing stage of a Superhet.

picture, with freedom from interference which may normally be picked up by the feeder wires.

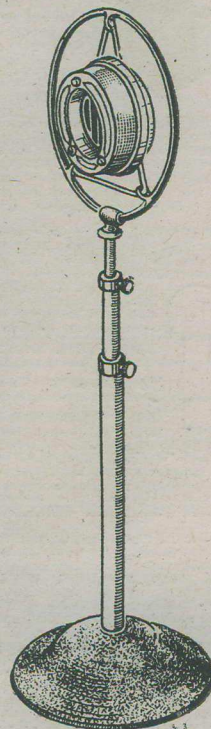
This new cable consists of two 26 gauge enamelled wires laid parallel but separated from each other in a special insulating material known as "Telconax." The main physical details of this cable are as follow: Spacings between centre of wire .035 in.; overall dimensions of the complete cable .1 in. by .15 in. (elliptical section); weight per 100 ft. .85 lbs.; breaking strain 20 lbs., at which the conductors break before the covering. The surge impedance is 75 ohms, and the loss in decibels per 100 ft. at 45 megacycles is 1.4. The standard method of supplying this cable is on a reel of 65 feet and the price is 6s. 9d., but longer lengths may be obtained to special order. For transmission purposes the feeder may also be employed and it will carry 1.5 amps. H.F. suitable for feeding a transmitting dipole.

by avoided. The three-gang condenser tunes nine H.F. coils wound with Litz and heavy-gauge copper wire, according to the particular wavelength covered, and the under side is divided by metal partitions into four separate sections thus entirely screening the various coils and associated circuits. Mica dielectric is employed for the trimmers, and the entire unit is ganged and trimmed by the manufacturers and is thus accurately adjusted in such a manner that no modification can take place due to any additional wiring which would normally have to be added by the set builder. A multi-contact wave-change switch is fitted, and there are seven separate sections to this, six of which carry out the change-over on the various coils, whilst the seventh is extended to the rear of the chassis for radio-gram switching. Silver-plated contacts are fitted, and the ranges covered are 16.5 to 52.6 metres, 167 to 555 metres and 780 to 2,140 metres. The price of the complete

unit with illuminated four-range dial is £5 17s. 6d.

Bulgin Microphone Stand

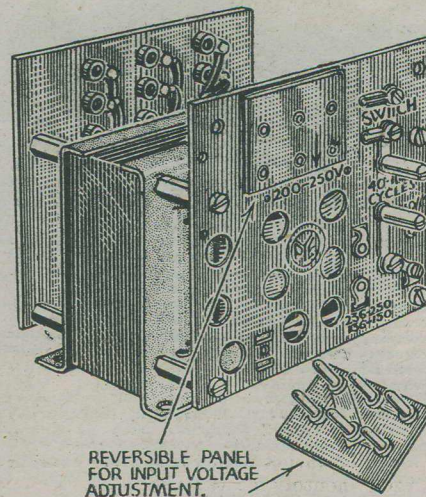
A PART from the fact that a stand for a microphone should be efficient in use, providing adjustments for height, stability, and so on, it is also necessary that the general appearance shall be good, as it is usually placed in a very prominent position. The Bulgin stand illustrated embodies all these points, and is finished in a neat chromium plate. The base is heavy enough to provide perfect stability when the stand is extended to its full height of 5 feet and a heavy microphone is carried in the mounting ring. When fully reduced the overall height is only 20 in. In the illustration the Bulgin condenser microphone is shown mounted in the ring, but it will carry practically any type of instrument, three fixing rings being provided for this purpose. The price is 60s.



Kabi Multi-contact Switches

FOR use in modern all-wave circuits and other similar arrangements where multi-switching is needed, the Kabi components will be found extremely useful. These are of the rotary type with self-cleaning contact studs, and a positive "click" action is provided for each position of the contact or wiper arm. To avoid slipping the arm is keyed to the operating spindle but is insulated from it so that several units may be operated by a common spindle. The switch plates are available with various contact points from 2 up to 19, and with either brass or German silver contacts. The prices vary, from 2s. 6d. to 7s.

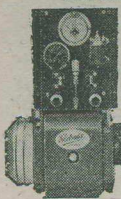
Bulgin Microphone Stand, shown complete with the Bulgin condenser microphone.



REVERSIBLE PANEL FOR INPUT VOLTAGE ADJUSTMENT.

This is the new Pye Mains Transformer which was reviewed in our issue dated Nov. 28th last.

ELECTRADIX



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Selenium Raycraft, 21/-; Kingston, 15/-.

Raycraft outfit with relay and amplifier, 45/-.

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X-RAY TUBES. Large 7in. bulb. New, 25/-.

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Quality reproduction of speech and music guaranteed.

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8in. with transformer, 15/-.

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100/250 volts, 11in. cone with transformer, 30/-.

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100 volt, ditto, 7in. cone, 20/-.

100 volt A.C. 8in. cone with transformer, 21/-.

BATTERY ENERGISED SPEAKERS.—Goodman's 6 volt, 8in. cone with transformer, 7/6.

Jensen 6 volt, 7in. cone with transformer, 7/6.

K.B. 6 volt, 8in. cone, 8/6.

Hegra 6 volt, 9in. cone, with transformer, 10/-.

Brown 6/12 volt, 11in. cone, with H.R. speech coil, 17/6.

R. & A. 12 volt, 8in. cone and transformer, 10/-.

New Sonocorde, P.M., "Class B," fitted transformer, 20/-.

P.M. CABINET SPEAKERS.—Hegra P.M., in oak cabinet, 12in. x 12in. x 12in., 25/-.

P.M., heavy duty, 5 watt with transformer, 50/-.

A.C. energised, 200/250 volts, 5 watts, with transformer, 65/-.

Hicoma Magnet table, 5/-.

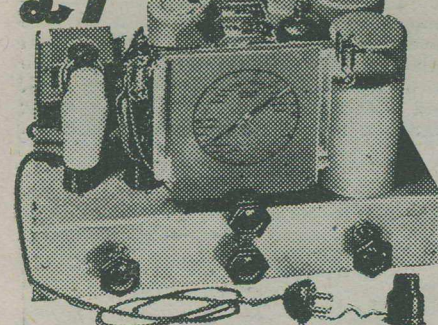
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LETTERS FROM READERS

The Editor does not necessarily agree with opinions expressed by his correspondents.



All letters must be accompanied by the name and address of the sender (not necessarily for publication.)

Our All-wave Battery Sets: Mains Version

SIR.—There has been much correspondence in your paper recently about a good mains set, and what I would suggest is as follows:—

A superhet for A.C. mains covering all waves, with A.V.C. and visual tuning designed on the lines of the "£4 A.C. Superhet 4." It could have an output of 3-4 watts and an energised M/C. speaker; furthermore, it should be reasonable in price.—J. D. MORRIS (Stockport).

SIR,—I also agree with Mr. R. Staggs's request for an all-wave mains receiver, and would suggest a triple tuned bandpass receiver, as this gives that extra measure of selectivity over the two-circuit receiver so appreciated by the critical constructor. May I add my appreciation of your efforts with regard to the production of cheaper components for the battery user. I only wish you could do the same with those components used in mains receivers.—W. ATIXEO (Birmingham).

Radio in China

SIR,—Having been a reader of *Amateur Wireless* to the extent of a dozen copies or so, I naturally switched over to PRACTICAL AND AMATEUR WIRELESS when the two papers were merged. Before becoming a regular reader of your paper I relied on American Radio Mags. for in-

formation on the best hobby yet! And, of course, I used American tubes, components, etc.

However, a friend of mine, Mr. G. Kemp, of Shanghai, told me all about English valves and their complete reliability. So I rebuilt my short-wave set, using Marconi and Osram valves, and I was amazed at the improved performance, and the small drain on the H.T. battery.

Since then I have built two superhet receivers (battery operation) for use on the broadcast (medium wave) band, and all the information has come from PRACTICAL AND AMATEUR WIRELESS.

I am now in Shantung, the tobacco-growing province of China. The distance from Shanghai "as the crow flies" is approximately 400 miles, and the maximum power of one of the five foreign stations in Shanghai is 1 kW! The other four stations are all under .75 kW. So I am using a 5-valve superhet, which has a tuned H.F. stage before the octode freq. changer. The circuit is a modification of your £4 Superhet. The coils and I.F. transformers are of Chinese make (American style!) the 3-gang tuning condenser Japanese, also all the small components, such as fixed condensers and resistances. The total cost was \$75, or just under £5 at the present rate of exchange. These figures include everything, components, valves, loudspeaker and cabinet, the last mentioned being made by the local carpenter here at the cost of 3s. 6d.! How this set would compare with your £4 superhet I cannot say, but I receive two of the foreign stations fairly regularly each evening, using a good outside aerial 100ft. in length. The Chinese Government station at Nanking, XGOA, can be received during daylight, though this station is only putting out one-seventh of its rated power of 75 kW.

I notice now in Shanghai that PRACTICAL AND AMATEUR WIRELESS is selling much better, and it is the only English paper on wireless on the bookstands. Competition is very severe; I have counted seven American radio monthlies side by side with your paper, which in my mind is the "gem of the collection!"

So here's to a long life for PRACTICAL AND AMATEUR WIRELESS, and more power to your pen.—Yours sincerely, J. R. HARLING (Shantung, China).

Baseboards: GBTT

SIR,—With reference to the letter from L. Spalton, and headed "Baseboards: A DX Log," in your issue of November 21st, an argument for baseboards which I have not seen in print is the scope provided by this method of construction for moving components about to different positions in the event of any additions or improvements to the circuit. A metal chassis would somewhat resemble a colander after two or three experiments.

Regarding call signs, is not Mr. Spalton mistaken about GBTT? This should be Queen Mary, not Normandie.—L. Walton (Upton).

[GBTT is, of course, the "Queen Mary's" call sign.—Ed.]

CUT THIS OUT EACH WEEK.

Do you know

—THAT it is possible to work out mathematically whether an S.G. stage will be stable with certain types of coupling.

—THAT automatic grid bias may be employed with ordinary battery valves.

—THAT the absorption of moisture by the covering of the wire on a tuning coil can affect its tuning range.

—THAT certain high-power output valves must be mounted in a special position in order to assist in heat dissipation and to protect the filament.

—THAT an H.T. battery recuperates slightly when the set is switched off and thus its life curve is of an "undulating" nature.

—THAT nickel and aluminium are employed in the latest types of loudspeaker magnets.

The Editor will be pleased to consider articles of a practical nature suitable for publication in PRACTICAL AND AMATEUR WIRELESS. Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2.

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



IMPRESSIONS ON THE WAX

By
T. Onearm

Serious Music

IT is well known that record manufacturers keep many of their brightest offerings for their Christmas list to tempt people who are looking for records not only as gifts for their friends, but as special treats for themselves.

First let us consider the records of serious music for the permanent collection. Pride of place must be claimed for the recording of Beethoven's Symphony No. 7 in E minor, played by the Philharmonic Symphony Orchestra of New York, conducted by Toscanini. There are five records—*H.M.V. DB 2986/90*—sold complete in an album.

Berlioz is now an established favourite in the concert hall, and although most people know the Hungarian March from the "Damnation of Faust," the equally attractive music of the Sprites and Demons is not played so often. It demands a large orchestra, and Koussevitsky, conducting the Boston Symphony Orchestra, gives a fine performance of the March, the Minuet of the Will o' the Wisp and the Presto and Waltz (three sides) with the Larghetto from Handel's Concerto Grosso No. 12 in B minor on the fourth side. The numbers are *H.M.V. DB 3009/10*.

An Important Issue

A VERY important issue concerns the sets of Suites (or Overtures) of Bach played by Adolf Busch Chamber Players, who recently performed them in London. The first two of the suites are now issued in an album, *H.M.V. DB 3012/7*, and I understand that the remaining two will follow shortly.

Four Tenors

THE vocal records afford some interesting comparisons, for there are four tenors of international fame. Gigli gives a brief lesson in "bel canto," singing "Norte e Venezia" (Night in Venice) and "Tu sei la Vita Mia," the title song from his new film, "You Are My Life," on *H.M.V. DA 1535*. This can be contrasted with the latest re-created record of Caruso. By this interesting process, a new and full orchestral accompaniment is grafted on to Caruso's original record of "The Flower Song," from "Carmen," and "Turiddu's Farewell to his Mother," from "Cavalleria Rusticana," in such a way as to give the older recording the advantages of modern electrical methods. The number of the record is *H.M.V. DB 3023*. Richard Crooks as a singer of ballads has an enormous following in America, and has chosen two favourites in "Bird Songs at Eventide" and "The Green Hills of Ireland"—*H.M.V. DA 1536*; and John McCormack has taken two tuneful songs and invests them with his particular charm on *H.M.V. DA 1533*.

Light Music

THERE is a big choice of light music in the December list of new *H.M.V.* records, which are heavily sprinkled with melody and fun. Jeanette MacDonald and Nelson Eddy are heard together in

songs from two of their most famous films, "Indian Love Call," from the film "Rose Marie," coupled with "Ah! Sweet Mystery of Life," from "Naughty Marietta," on *H.M.V. DA 1537*. Essie Ackland has made a potpourri of serenades called "At Mother's Knee" on *H.M.V. C 2873*, and Peter Dawson is as robust as ever in "Song of the Grateful Heart" (a Coronation song) and "There's a Bride Hanging on the Wall," on *H.M.V. B 8508*. Connie Russell, a newcomer to *H.M.V.*, puts plenty of "pep" into "Organ Grinder's Swing" and "Sing me a Swing Song"—*H.M.V.*

BD 383, and Denny Dennis makes his debut with "Until the Real Thing Comes Along" and "I'll Sing You a Thousand Love Songs"—*H.M.V. BD 390*.

There are plenty of humorous records by favourite stars. Cicely Courtneidge and Jack Hulbert make a medley of their "Greatest Successes" on *H.M.V. C 2868*, as well as a clever piece of foolery in "The Cure,"—*H.M.V. B 8506*.

Leslie Henson and Fred Emney are very funny in scenes from two of their recent shows. The "Riddle Scene" from "Swing Along," and the "German Commissionaire Scene" from "Seeing Stars" is recorded on *H.M.V. C 2888*.

Max Miller will appeal to nimble wits with "The Woman Improver" and "Mary from the Dairy," both very characteristic of his style on *H.M.V. BD 385*, and Nellie Wallace thoroughly enjoys "Bang! Bang! Bang!"—*H.M.V. B 8502*.

OPEN LETTER TO MR. SOMEBODY AND HIS SON

DEAR SIR,—The natural desire of most parents is to give their children a fair chance in life in the form of a good College Training, also there are many young men who would like to go to College but for some reason are not able to do so. Let us tell you here and now you can get a Complete College Training without having to go anywhere, and at a reasonable monthly fee for tuition. For well over 30 years we have been training students for all the Key positions, by post, in all parts of the world. Distance is nothing when you are studying by your own fireside.

The nature of our business makes us keep in touch with employment requirements, therefore we specialise in preparing students for the good positions which we know exist, and for all the worth-while examinations.

Write to us for FREE particulars of any subject which interests you, or if your career is not decided write and tell us of your likes and dislikes, and we will give you practical advice as to the possibilities of a vocation and how to succeed in it.

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J. Bennett



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Summit Three (HF Pen, D, Pen) ..	8.8.34	PW37
All Pentode Three (HF Pen, D (Pen), Pen) ..	22.9.34	PW39
Hall-Mark Three (SG, D, Pow) ..	—	PW41
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F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-Wave Three) ..	13.4.35	PW49
Genet Midget (D, 2 LF (Trans)) ..	June '35	PM2
Cameo Midget Three (D, 2 LF (Trans)) ..	8.6.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen) ..	17.8.35	PW53
Battery All-Wave Three (D, 2 LF (RC)) ..	—	PW55
The Monitor (HF Pen, D, Pen) ..	—	PW61
The Tutor Three (HF Pen, D, Pen) ..	21.3.36	PW62
The Contour Three (SG, D, P) ..	—	PW64
The Gladiator All-Wave Three ..	29.8.36	PW66
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen) ..	31.10.36	PW69
Four-valve : Blueprints, 1s. each.		
Fury Four (2 SG, D, Pen) ..	—	PW11
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Nucleon Class B Four (SG, D (SG), LF, Cl B) ..	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen) ..	—	PW34C
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Three-valve : Blueprints, 1s. each.		
Double-Diode-Triode Three (HF Pen, DDT, Pen) ..	10.6.33	PW23
D.C. Ace (SG, D, Pen) ..	—	PW25
A.C. Three (SG, D, Pen) ..	—	PW29
A.C. Leader (HF Pen, D, Pow) ..	7.4.34	PW35C
D.C. Premier (HF Pen, D, Pen) ..	31.3.34	PW35B
Ubique (HF Pen, D (Pen), Pen) ..	28.7.34	PW36A
Armada Mains Three (HF Pen, D, Pen) ..	18.8.34	PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen) ..	11.5.35	PW50
"All-Wave" A.C. Three (D, 2 LF (RC)) ..	17.8.35	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen) ..	—	PW56
Four-valve : Blueprints, 1s. each.		
A.C. Fury Four (SG, SG, D, Pen) ..	—	PW20
A.C. Fury Four Super (SG, SG, D, Pen) ..	—	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull) ..	—	PW45
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Battery Sets : Blueprints, 1s. each.		
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F. J. Camm's 2-valve Superhet (Two-valve) ..	13.7.35	PW52
F. J. Camm's £4 Superhet ..	—	PW58
Mains Sets : Blueprints, 1s. each.		
A.C. £5 Superhet (Three-valve) ..	—	PW43
D.C. £5 Superhet (Three-valve) ..	1.12.34	PW42
Universal £5 Superhet (Three-valve) ..	—	PW44
F. J. Camm's A.C. £4 Superhet 4 ..	—	PW59
F. J. Camm's Universal £4 Superhet 4 ..	—	PW60
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Two-valve : Blueprint, 1s.		
Midget Short-Wave Two (D, Pen) ..	15.9.34	PW38A
Three-valve : Blueprints, 1s. each.		
Experimenter's Short-Wave Three (SG, D, Pow) ..	—	PW30A
The Prefect 3 (D, 2 LF (RC and Trans)) ..	—	PW63
The Bandspread S.W. Three (HF Pen, D (Pen), Pen) ..	29.8.35	PW68

PORTABLES.

Three-valve : Blueprint, 1s.		
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen) ..	16.5.36	PW65
Four-valve : Blueprint, 1s.		
Featherweight Portable Four (SG, D, LF, Cl B) ..	—	PW12

MISCELLANEOUS.

S.W. Converter-Adapter (1 valve) ..	—	PW48A
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AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.

Blueprints, 6d. each.		
Four-station Crystal Set ..	12.12.36	AW427
1934 Crystal Set ..	—	AW444
150-mile Crystal Set ..	—	AW450

STRAIGHT SETS. Battery Operated.

One-valve : Blueprints, 1s. each.		
B.B.C. Special One-valver ..	—	AW387
Twenty-station Loudspeaker One-valver (Class B) ..	—	AW449

Two-valve : Blueprints, 1s. each.		
Melody Ranger Two (D, Trans) ..	—	AW388
Full-volume Two (SG det, Pen) ..	—	AW392
B.B.C. National Two with Lucerne Coil (D, Trans) ..	—	AW377A
Big-power Melody Two with Lucerne Coil (SG, Trans) ..	—	AW388A
Lucerne Minor (D, Pen) ..	—	AW426
A Modern Two-valver ..	July '36	WM409

Three-valve : Blueprints, 1s. each.		
Class-B Three (D, Trans, Class B) ..	22.4.33	AW386
New Britain's Favourite Three (D, Trans, Class B) ..	15.7.33	AW394
Home-built Coil Three (SG, D, Trans) ..	—	AW404
Fan and Family Three (D, Trans, Class B) ..	25.11.33	AW410
£5 5s. S.G.3 (SG, D, Trans) ..	2.12.33	AW412
1934 Ether Searcher : Baseboard Model (SG, D, Pen) ..	—	AW417
1934 Ether Searcher : Chassis Model (SG, D, Pen) ..	—	AW419
Lucerne Ranger (SG, D, Trans) ..	—	AW422
Coscor Melody Maker with Lucerne Coils ..	—	AW423
Mullard Master Three with Lucerne Coils ..	—	AW424
£5 5s. Three : De Luxe Version (SG, D, Trans) ..	19.5.34	AW435
Lucerne Straight Three (D, RC, Trans) ..	—	AW437
All-Britain Three (HF Pen, D, Pen) "Wireless League" Three (HF Pen, D, Pen) ..	3.11.34	AW451
Transportable Three (SG, D, Pen) ..	—	WM271
£6 6s. Radiogram (D, RC, Trans) ..	—	WM318
Simple-tune Three (SG, D, Pen) ..	June '33	WM327
Economy-pentode Three (SG, D, Pen) ..	Oct '33	WM337
"W.M." 1934 Standard Three (SG, D, Pen) ..	—	WM351
£3 3s. Three (SG, D, Trans) ..	Mar. '34	WM354
Iron-Core Band-pass Three (SG, D, QP 21) ..	June '34	WM362
1935 £6 6s. Battery Three (SG, D, Pen) ..	—	WM371
PTP Three (Pen, D, Pen) ..	June '35	WM389
Certainty Three (SG, D, Pen) ..	Sept. '35	WM393
Minutiae Three (SG, D, Trans) ..	Oct. '35	WM396
All-wave Winning Three (SG, D, Pen) ..	Dec. '35	WM400

Four-valve : Blueprints, 1s. 6d. each.		
65s. Four (SG, D, RC, Trans) ..	—	AW370
"A.W." Ideal Four (2 SG, D, Pen) ..	16.9.33	AW402
2 H.F. Four (2 SG, D, Pen) ..	—	AW421
Crusaders' A.V.C. 4 (2 HF, D, QP 21) ..	18.8.34	AW445
(Pentode and Class-B Outputs for above : Blueprints, 6d. each) ..	25.8.34	AW445A
Self-contained Four (SG, D, LF, Class B) ..	Aug. '33	WM331
Lucerne Straight Four (SG, D, LF, Trans) ..	—	WM350
£5 5s. Battery Four (HF, D, 2 LF) ..	Feb. '35	WM381
The H.K. Four (HF Pen, HF Pen, D, Pen) ..	Mar. '35	WM384
The Auto Straight Four (HF Pen, HF Pen, DDT, Pen) ..	April '36	WM404
Five-valve : Blueprints, 1s. 6d. each.		
Super-quality Five (2 HF, D, RC, Trans) ..	May '33	WM329
Class-B Quadradine (2 SG, D, LF, Class B) ..	Dec. '33	WM344

Mains Operated.

Two-valve : Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C. ..	—	AW403
Economy A.C. Two (D, Trans) A.C. ..	—	WM236
Unicorn A.C./D.C. Two (D, Pen) ..	Sept. '35	WM394
Three-valve : Blueprints, 1s. each.		
Home-Lover's New All-electric Three (SG, D, Trans) A.C. ..	—	AW383

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" " Practical Mechanics ..	7d.	" "
" " Wireless Magazine ..	1/3	" "

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A.C. Triodyne (SG, D, Pen) A.C. ..	19.8.33	AW399
A. C. Pentaquester (HF Pen, D, Pen) A.C. ..	23.6.34	AW439
Mantovani A.C. Three (HF, Pen, D, Pen) A.C. ..	—	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen) ..	Jan. '36	WM401
Four-valve : Blueprints, 1s. 6d. each.		
All Metal Four (2 SG, D, Pen) ..	July '33	WM326
Harris Jubilee Radiogram (HF Pen, D, LF, P) ..	May '35	WM386
SUPERHETS.		
Battery Sets : Blueprints, 1s. 6d. each.		
Modern Super Senior ..	—	WM375
Varsity Four ..	Oct. '35	WM395
The Request All-Wave ..	June '36	WM407
1935 Super Five Battery (Superhet) ..	—	WM379
Mains Sets : Blueprints, 1s. 6d. each.		
1934 A.C. Century Super A.C. ..	—	AW425
Heptode Super Three A.C. ..	May '34	WM359
"W.M." Radiogram Super A.C. ..	—	WM366
1935 A.C. Stenode ..	Apr. '34	WM385

PORTABLES.

Four-valve : Blueprints, 1s. 6d. each.		
Midget Class B Portable (SG, D, LF, Class B) ..	20.5.33	AW389
Holiday Portable (SG, D, LF, Class B) ..	1.7.33	AW393
Family Portable (HF, D, RC, Trans) ..	22.9.34	AW447
TWO H.F. Portable (2 SG, D, QP21) ..	June '34	WM363
Tyers Portable (SG, D, 2 Trans) ..	—	WM367
Five-valve : Blueprint, 1s. 6d.		
New Class-B Five (2 SG, D, LF, Class B) ..	Nov. '33	WM340
SHORT-WAVE SETS. Battery Operated.		
One-valve : Blueprints, 1s. each.		
S.W. One-valve converter (Price 6d.) ..	—	AW329
S.W. One-valve for America ..	—	AW429
Rome Short-Waver ..	—	AW452
Two-valve : Blueprints, 1s. each.		
Ultra-short Battery Two (SG det., Pen) ..	Feb. '36	WM402
Home-made Coil Two (D, Pen) ..	—	AW440
Three-valve : Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans) ..	—	AW355
Experimenter's 5-metre Set (D, Trans, Super-regen) ..	30.6.34	AW438
Experimenter's Short-waver (SG, D, Pen) ..	Jan. 19, '35	AW463
The Carrier Short-waver (SG, D, P.) ..	July '35	WM390
Four-valve : Blueprints, 1s. 6d. each.		
A. W. Short-wave World Beater (HF, Pen, D, RC, Trans) ..	—	AW436
Empire Short-waver (SG, D, RC, Trans) ..	—	WM313
Standard Four-valve Short-Waver (SG, D, LF, P.) ..	Mar. '35	WM388
Superhet : Blueprint, 1s. 6d.		
Simplified Short-wave Super ..	Nov. '35	WM397

Mains Operated.

Two-valve : Blueprints, 1s. each.		
Two-valve Mains short-waver (D, Pen) A.C. ..	—	AW453
"W.M." Band-spread Short-waver (D, Pen) A.C./D.C. ..	—	WM368
"W.M." Long-wave Converter ..	—	WM380
Three-valve : Blueprint, 1s.		
Emigrator (SG, D, Pen) A.C. ..	—	WM352
Four-valve : Blueprint, 1s. 6d.		
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans) ..	Aug. '35	WM391
MISCELLANEOUS.		
Enthusiast's Power Amplifier (1/6) ..	June '35	WM387
Listener's 5-watt A.C. Amplifier (1/6) ..	Sept. '35	WM392
Radio Unit (2v.) for WM392 (1/-) ..	Nov. '35	WM398
Harris Electrogram (battery amplifier) (1/-) ..	Dec. '35	WM399
De-Luxe Concert A.C. Electrogram ..	Mar. '36	WM403
New Style Short-waver Adapter (1/-) ..	June '35	WM388
Trickle Charger (6d.) ..	Jan. 5, '35	AW462
Short-wave Adapter (1/-) ..	Dec. 1, '34	AW456
Superhet Converter (1/-) ..	Dec. 1, '34	AW457
B.L.D.L.C. Short-Wave Converter (1/-) ..	May '36	WM405
Wilson Tone Master (1/-) ..	June '36	WM406
The W.M. A.C. Short-Wave Converter (1/-) ..	July '36	WM403



QUERIES and ENQUIRIES

Making a Start

"I know nothing of wireless, but having obtained a copy of your book out of interest, I feel I should like to know enough about the subject to build a set. There are various training schools, but this involves tuition over at least six months, and I feel I could not afford the fee. There is 'Everyman's Wireless Book,' edited by you, and I should like to know whether this would meet my requirements, or is it too advanced?"—G. H. W. (Brighton, 7).

THE best book would obviously be the "Constructor's Encyclopaedia," as this explains the various terms met with in our pages, as well as providing diagrams to explain different points and all theoretical symbols, etc. This, in conjunction with the various simple constructional and instructional features in these pages, should soon enable you to obtain the necessary knowledge, although you can build a simple set without knowing anything about the subject. Our articles on construction are so worded that even a newcomer can carry out the building of a receiver and operate it to obtain maximum results.

The Transmitting Licence

"In your issue containing No. 1 of the series on Amateur Transmitting, I read that it is compulsory to pass a morse test in order to qualify for a transmitting licence. I intend building a 5-metre instrument in the near future which is intended for use exclusively for telephony (speech). Will it therefore be necessary to learn morse?"—D. S. (Finchley).

THE morse test is one of the conditions of the standard transmitting licence, and no exception is made because you intend to use speech only. You should therefore immediately start learning the code and obtaining the necessary speed if you intend eventually to obtain a transmitting licence.

Unmatched Speakers

"I am using two Rola loudspeakers, and find that one gives much more volume on the same set (Universal Ferguson) than the other. What can be wrong? Is there any adjustment that can be made on the earlier type of speaker?"—J. A. M. (Fort William).

WE presume that you refer to the self-contained speaker and to the extension speaker, and the difference in volume may be due to the fact that the impedances of the two models are different. Furthermore, the speaker in the receiver is of the energised type, and is therefore more sensitive than your external model, which is no doubt of the permanent magnet type. If, however, you refer to two separate P.M. speakers used as extension models, the difference may be due to the fact that the input transformers on them are different and one matches the output circuit whilst the other does not. There are no adjustments for sensitivity on a modern moving-coil loudspeaker.

Multi-purpose Switches

"I am desirous of combining my radiogram, filament, and wave-change switching into one control, but do not wish to obtain modern coils incorporating such switching. Can you tell me where I can get a rotary switch that will accomplish this, if such a thing is made? If it is available, what price is it?"—W. R. F. H. (Bedford).

IT should be quite simple to carry out your idea, and there are several types of switch which may be used. Unfortunately, you do not give any details of the receivers, and thus we cannot make a definite recommendation. A multi-switch unit is obtainable from Messrs. Burne-Jones, having various numbers and combinations of contacts, and if you could supply them with a diagram of the present coil and radiogram switching, they would be able to recommend a suitable type from their range.

RULES

We wish to draw the reader's attention to the fact that the Queries Service is intended only for the solution of problems or difficulties arising from the construction of receivers described in our pages, from articles appearing in our pages, or on general wireless matters. We regret that we cannot, for obvious reasons—

- (1) Supply circuit diagrams of complete multi-valve receivers.
- (2) Suggest alterations or modifications of receivers described in our contemporaries.
- (3) Suggest alterations or modifications to commercial receivers.
- (4) Answer queries over the telephone.
- (5) Grant interviews to querists.

Please note also, that queries must be limited to two per reader, and all sketches and drawings which are sent to us should bear the name and address of the sender.

Requests for Blueprints must not be enclosed with queries as they are dealt with by a different department.

If a postal reply is desired, a stamped addressed envelope must be enclosed. Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

The Coupon must be enclosed with every query.

Position of Reaction Condenser

"I have noted in some of your circuits that the reaction condenser is sometimes connected direct to the anode and at other times it is joined between the earth and one side of the reaction coil winding. Is there any advantage in one method, and why is it that sometimes one scheme is adopted and at another you do another

thing? Perhaps you could explain this point, as I am building a short-wave set and should like to incorporate the best scheme."—E. T. S. (Canterbury).

IN effect the two methods of connection are the same, as it amounts to the fact that the reaction condenser is connected between the anode and earth. The resistance of the reaction coil winding is usually so low that it may be ignored and the condenser may thus be considered as joined direct to earth. From this point of view, therefore, there is no difference in the two methods of connection. Some commercial coils, however, have the reaction winding already joined internally to the earth side of the grid winding, and thus the condenser has to be joined between the anode and the reaction winding, but in general it may be considered preferable to join the condenser between the reaction winding and earth, as this enables the condenser framework to be directly earthed, and this often simplifies wiring.

Short-wave Components

"I attach a list of the parts I intend to use in the enclosed circuit, designed for use from 5 to 50 metres. Will you criticise this for me and let me have your suggestions?"—F. A. (Barnet).

THE circuit is in order and is quite a standard detector-L.F. scheme, but the components mentioned are in the majority of instances totally unsuitable for use on wavelengths down to 5 metres. At this particular point, the utmost care must be taken to avoid losses, and special ultra-short-wave components are essential. The valve mentioned for the detector is certainly quite in order, and this particular valve is made by Graham Farish, but the top cap is the grid, not the anode. You can find suitable components in the Graham Farish range, and also in the Bulgin, B.T.S., and Eddystone lists. Get a special tuning condenser and ultra-short-wave H.F. choke, and if possible, a low-loss reaction condenser will also be found of assistance.

A Morse Recorder

"I am taking up the television articles, and a friend is working with me. We both wish to learn morse and get speed practice, but often have an argument (as we are both beginners) as to whether the sending or the receiving is wrong. That is, my friend sends a few letters and I write them down, but when we check we sometimes come up against the problem whether my records are right or whether his sending was right. Would a recorder help us, and how could this be used?"—S. A. E. (Weymouth).

YOU will certainly find a recorder of assistance in this case, although there is a difficulty, as you are both beginners, in view of the fact that the sending may be very poor and thus you may get hold of wrong impressions. However, for simply learning the various letters and combinations keep the speed slow until you each have attained a really sound knowledge, and then try to pick up commercial press stations, which send out slow morse signals. Certain weather reports are also given in slow morse. The recorder described in the Readers' Wrinkles page of our issue dated 5th December may be made up quite simply, and attached to the output circuit of your morse practice set. You can then check your signals and all arguments will be avoided.

The coupon on page iii cover must be attached to every query.

NEWNES (Illustrated) TELEVISION and SHORT-WAVE HANDBOOK

by F. J. CAMM
(Editor "Practical Television," "Practical and Amateur Wireless," etc.)

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RADIOMART

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Announce 1937

SHORT-WAVE MANUAL

Packed with short-wave information and circuits of mains and battery receivers, including straight, superhet and 5-metre transmitters, modulators, etc. Information on transmitting licences, aerials, Class B amplification, neutralization, superhet alignment, etc. The most comprehensive manual published, written by practical engineers, price 6d., post free 7½d., including catalogue.

1937 Catalogue only (3 times enlarged) price 1½d. post free.

TELSEN screened dual range coils, 2/6. Pair, 4/6. Milliammeters, 25 ma. upwards, 5/9. Super, 6/9. **A**ERICAN mains transformers 230v., fully shrouded, 350/350. 6.3v., 5v., 6/11. Majestic 250/250. 2.5v., 5v., 4/11. **H**EAVY DUTY mains transformer worth 35/-, 350/350. 150 ma.; 4v. 2.5ACT., 4v. 6ACT., 12/6. **465** KC/S. IF transformers, 2/11. Telsen Ace, 1/11. RG4, Radio grands, 2/9. 2mf. 300v., 9d. **U**ILITY straight line wavelength dials, 3/11. Telsen H.F. chokes, 1/11. **E**UTILITY 2-gang uniknob and dial, 3/11; 1,500-volt tubular condensers, all sizes, 6d. **L**ELECTROLYTICS 500-volt 8mf., 1/6; 4 mf., 1/6; 4 x 4, 1/11; 8 x 8, 3/6; 25 mf. 25v., 1/- etc. **M**OOthing chokes, 20 hv. 120 ma., 3/11; 100 ma., 2/11; 40 ma., 1/11. **U**SHBACK wire, 6 yds., 6d.; heavy, 9d.; 2 gross solder tags, 6d.; resin-cored solder, 9ft., 6d. **E**NTRALAB pots, all sizes, 1/6; switched, 2/-; tubular glass fuses, 2d. **E**NSON PM speakers, 12/6. Varley Iron core coils, 2/6; matched pair, 4/6. **S**PECIAL OFFER Class B valve, driver transformer and valveholder, new, lot 5/-. **L**ISSEN 3-gang bandpass, 3-gang superhet, 2-gang all-wave coils, any set, price 7/6. **R**ADERS' monster bargain parcels, value £4/10/-, for 10/-; also 5/- parcels. **A**MOUS Continental A.C. valves, 4/6; American Duotron, etc., all types, 3/6; battery from 2/3. **U**ILITY 8/6, microdisc dials, 3/11; Radiophone, 0.00016 short-wave condensers, 3/6; series gap, twin, 3/9. **C**ERAMIC all brass microvariables, 15 mmfd., 1/4; 40 mmfd., 1/7; 100 mmfd., 1/10; short-wave H.F.C. 9d. **C**LEARANCE catalogue 1½d. Goods over 5/- post free. All enquirers must send stamp. Branches: 19, John Bright St., 44, Dale End. Mail Orders, 44, Holloway Head, Birmingham. Telephone, MID 3254.

CONVERSION UNITS for operating D.C. Receivers from A.C. Mains, improved type, 120 watts output, at £2/10/0. Send for our comprehensive list of speakers, Resistances and other components. **W**ARD, 46, Farringdon Street, London, E.C.4. Telephone: Holborn 9703.

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SHORT WAVE on a crystal set. Full building instruction and crystal, 1/2 post paid.—Radiomail, Tanworth-in-Arden, Warwickshire.

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AMERICAN VALVES. Genuine American HYTRON and TRIAD first-grade Valves, 3 months' guarantee. All types in stock, 5/6 each. 210 and 250, 8/6 each. New Metal-Glass Valves, all types, 6/6 each. Genuine American DUOTRON Valves, all types, 3/6 each. Valve holders for all above types, 6d. each. Metal bases, 9d. each.

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SUPER CERAMIC CONDENSERS, S.L.F. .00016, .0001, 2/9 each; double-spaced, .00005, .000025, .000015, 3/- each. All brass with integral slow motion, .00015 tuning, 3/9; .00015 reaction, 2/9. British Radiophone 2-gang, .00016, 5/6. **H.F. CHOKES**, S.W. 10-200 metres, 9d.; S.W. screened, 1/6; standard screened 180-2,000 metres, 1/6.

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3-WATT A.C. AMPLIFIER, 2-stage, for mike or pick-up. Complete kit of parts with 3 valves, 40/-.

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10-WATT 3-stage A.C. Amplifier Kit with 5 valves, £5 5s.

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Paper Condensers. W.E., 250 v. working 4 mf., 2/-; 2 mf. 1/-; 1 mf. 6d.; 350 v. working 4 mf., 2/6; 2 mf. 1/6; 1 mf. 1/6. Duobulb 500 v. working 4 mf., 4/-; 800 v. 4 mf., 6/-.

Wego 450 v. working 1 mf., 1/-; 2 mf. 1/9. 4 mf. 3/-; 700 v. working 2 mf. 2/-; 4 mf. 3/6.

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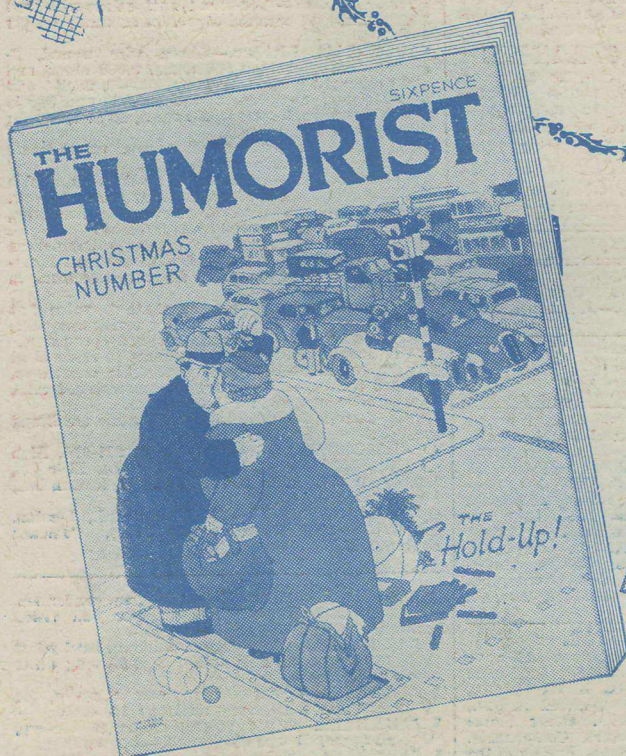
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