

POWER FOR YOUR "COMET"

(See Page 1221)

Popular Wireless

Every Thursday
PRICE
3d.

No. 458. Vol. XVIII.

INCORPORATING "WIRELESS"

March 14th 1931.

FULL DETAILS OF
THE "COMET"
TWO
Inside

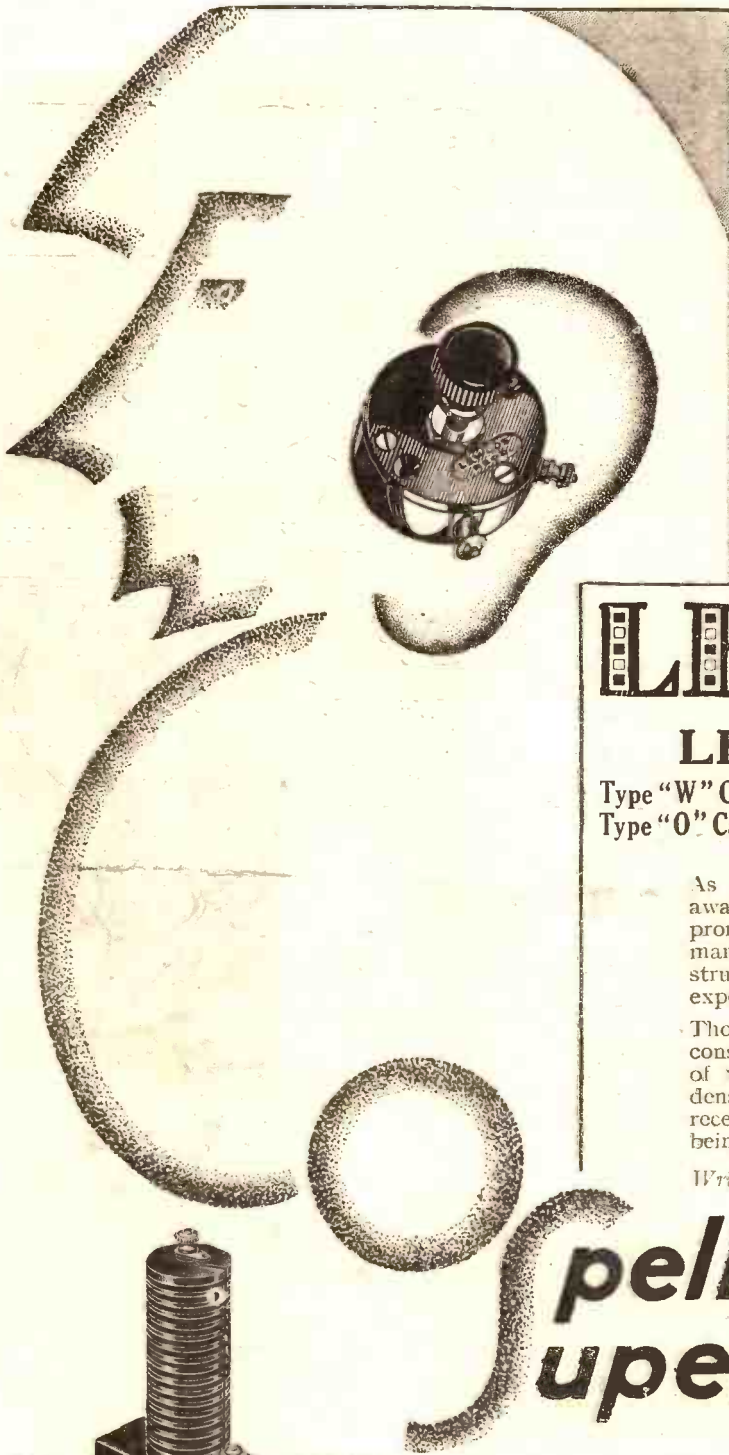


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AT HOME WITH POUISHNOFF.
THE POPE'S BROADCASTER

(Full details by "P.W." representative who paid a special visit to the Vatican.)

THE G.B.C. MOVES IN DO WE WANT THOSE LONG-WAVERS?



The
Ear of
Many
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THE
LEWCOS
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LEWCODENSER

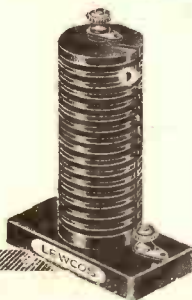
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A Lewcodenser, as illustrated above, is specified for the "Comet" Two Receiver described in this issue.

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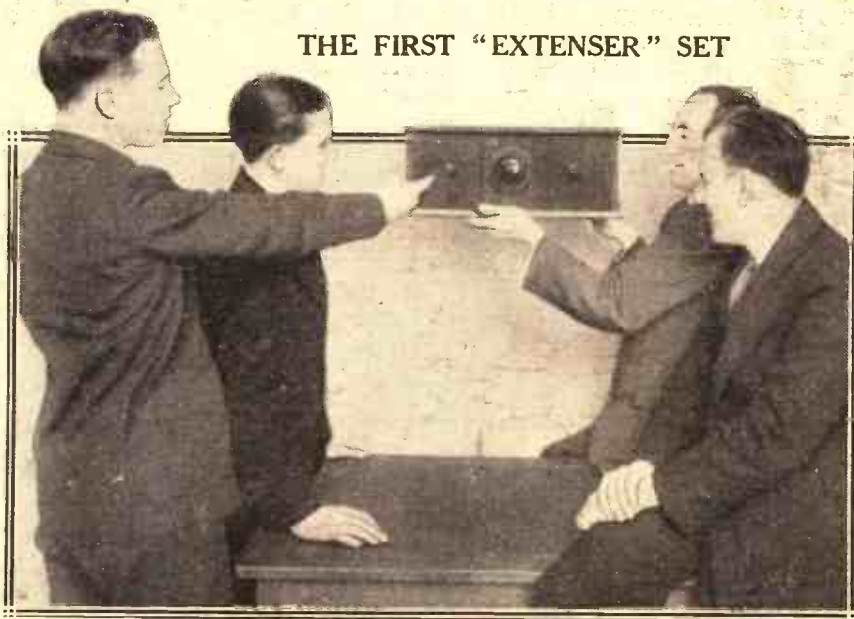
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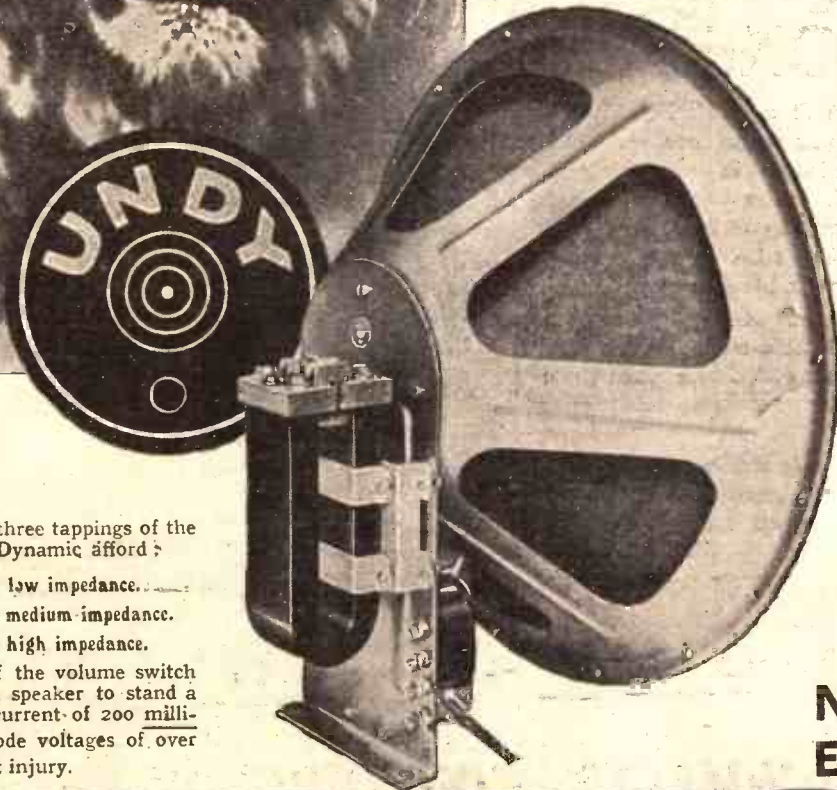
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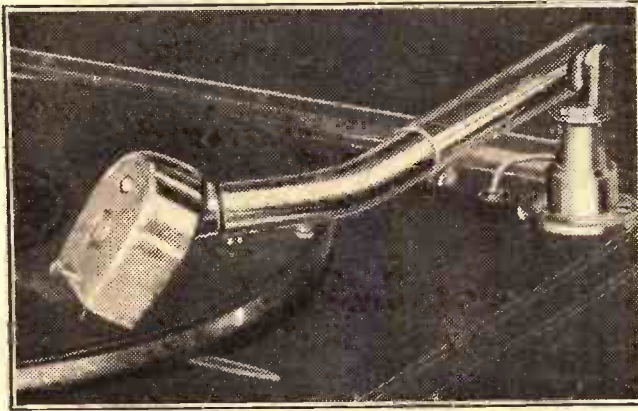
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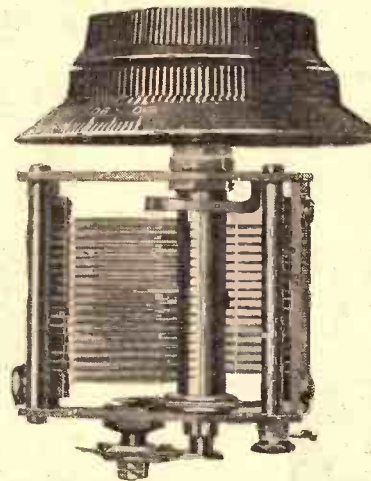
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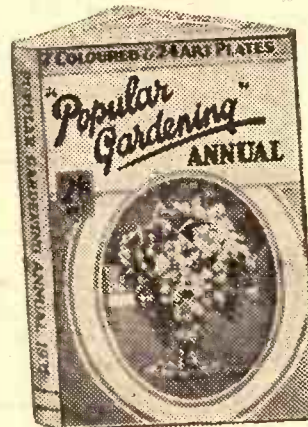
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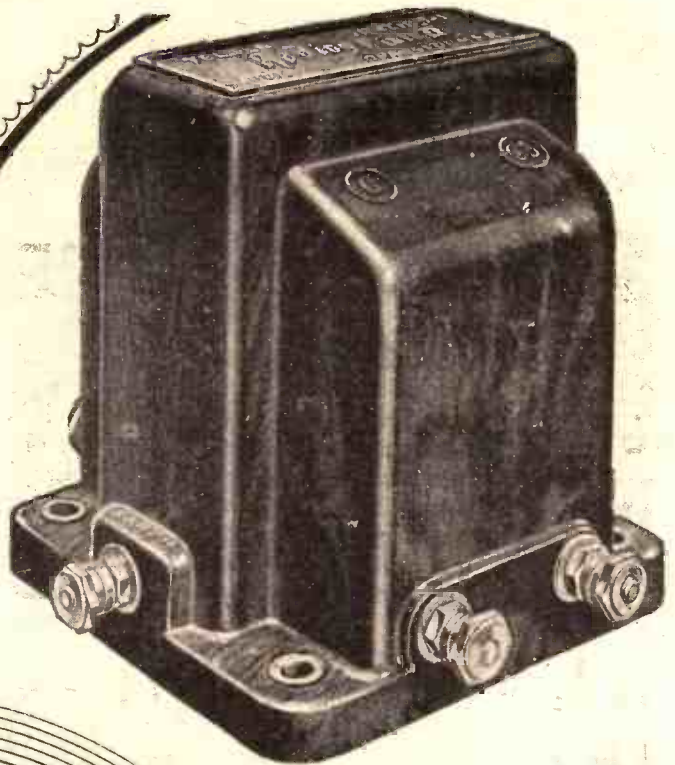


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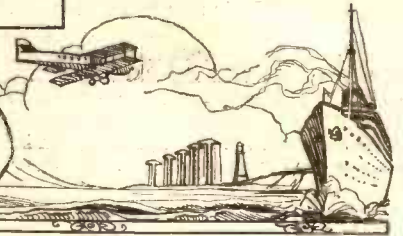
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BONELESS TENORS
 SEVEN FANS
 THE OPTIMISTS
 LICENCES ILLEGAL!

RADIO NOTES & NEWS

WONDERFUL DISTANCE
 POLAND'S NEW STATION
 OURSELVES ABROAD
 DEATHLESS WAVES

Boneless Tenors.

TO my way of thinking there is one particularly irritating trick which is practised by even the best of Dance Bands, and that is the occasional introduction of a spongy, boneless, foolish, tenor voice singing unbecomingly about babies or mummies or "liddle goils." The owners of these filleted voices appear to be trying not to wake a baby! Or to imitate whispering tenors. Why can't they sing out like men, or hold their peace?

What the U.S.A. Thinks.

I HAVE been ploughing through an accumulation of U.S.A. periodicals, and am struck to observe that two points about our broadcasting system seem to have furnished American journalists with much material for comment. The first is our Sunday programmes, and, secondly, Sir John's defiant banner, that the B.B.C. gives us what it considers we ought to have. That has amazed America—and well it might. Nevertheless, I am glad to think that radio here has not been allowed to degenerate to the state of the average cinema shows.

Epoch-Making Invention.

IN response to my sigh for a labour-saving gramophone, A. E. G. (Plymouth) just sits up, adjusts his thinking cap, and invents the very thing as easily as "kiss me 'and," as our Lady Plate Finger-printer says. All I have to do is to rivet one end of a strip of metal to the minute hand of a clock, the other end being fastened to the handle of the gramophone—and there I am. One revolution of the handle every hour! Yeh! And one record a quarter, at that rate! However, I admit that the idea is sound in principle—though not in mechanics. Come again, A. E. G.

A New Scottish Ruse.

I HAVE let the Scots alone lately, feeling that Sir Harry Lauder's last performance was enough to go on with, but I must pass on this one, which I joyfully lift from "The Broadcaster."

Salesman, to gentleman from north of the Border: "No, I can't change your gramophone if you bought it from us a year ago. What's wrong with it, anyhow?"

Highland Gentleman: "Och, the needle's broken!"

Reply to "Seven 'P.W.' Fans."

GENTLEMEN! Lovers of "P.W." and worthy members of its Friendly Following, you say that some of our diagrams are beyond your present knowledge, and that you would like them drawn in some simpler fashion. Actually, they could hardly be made simpler because the usual electrical diagram is composed of a combination of accepted symbols, a sort of shorthand, which, once learnt, is as easy as A B C. A plus sign means "positive," a

and we cannot insult their technical attainments by treating them as beginners.

Nevertheless, we know that the beginner of to-day is to-morrow's expert and so every now and then we give a series of elementary articles dealing with the rudiments of electrical science. Good luck, oh seven!

One Thousand and One Hints.

TALKING of handbooks, what a treasury "P.W." readers have in our sixpenny booklet which was given free with our issue of February 21st! Every aspect of amateur radio reception is covered by that remarkable compilation, and if you know—that is, *understand*—all that it contains, why, you know a skuffful!

In it you will find practical wisdom on dozens of radio topics, from down-leads to pick-ups, from millivolts to megohms. And I hope that you all have your copy safe and sound—and dog's-eared, ere now!

A Re-count Demanded.

A DARTFORD reader, who evidently does not take statistics on trust, writes to say that there are only 1,000 hints, and will we kindly send the missing one to him by registered post. Has our actuarial friend counted up? No! He states that a hint on page one is more or less repeated on page two, and therefore we are one short. Oh, no! I cannot agree with that sort of algebra.

Our Dartford critic ought to make the count—he will find that we claim "1001," but that there are actually a half-dozen or so to spare.

The Optimists.

A FIRM of surveyors have requested us to pass to them any enquiries for factories which we may receive. We certainly will! We are asked many unusual questions, some quite out of our line of business, but I do not recall that any reader has ever written to us with the factory-hunger in his eyes! However, if you want a factory, apply here. Our factories are guaranteed free from rats, fungi and night-watchmen! We are the only radio periodical in the world with a first call on factories. (By gum! I'll get some publicity out of that, or bust!)

(Continued on next page.)

HAS THE P.M.G. BUILT IT?



Apparently the "Comet" Three is already well-known to the Post Office, for this letter, was delivered to us without the slightest delay in transit! Good business on the part of the postal people, and a nice tribute to the "Comet."

minus sign means "negative," spiral lines denote inductance coils, parallel straight lines denote condensers and so on.

The Seven Fans (Continued)

I AM sure that you will realise that we cannot represent every circuit in pictorial form—though we have done quite a lot of that from time to time—because of the waste of space, time and money. Moreover, remember that a vast number of our readers are quite clever electricians.

RADIO NOTES AND NEWS

(Continued from previous page.)

Wireless Licences Illegal.

THE law which was passed last year by the State of South Carolina, imposing a tax on radio sets, has been declared by a Federal Court to be illegal. The basis of the decision is stated to be the fact that as the station W B T (which brought the action) broadcasts beyond the confines of South Carolina it is engaged in Inter-State commerce, and the tax is therefore an interference with such commerce. That might do for lawyers, but to a plain man it sounds like plain rubbish. Anyhow, that's what has happened to the first plan ever evolved in the U.S.A. for "raising the wind" by wireless licences!

Wonderful Long-Distance Telephony.

ON February 13th the Red Star liner "Belgenland" succeeded in establishing direct radio telephone communication with England, when it was in the Formosa Strait, between Hong Kong and Shanghai, nearly 7,000 miles away. Excellent conversations were held with the offices of two London newspapers, via the stations at Rugby and Baldock.

This is surely a record; anyway, it is wonderful work, and if you are listening-in between 13 and 100 metres you may hear this ship. Probably you are most likely to get her somewhere between 20 and 35 metres.

As Others Hear Them.

AT the Schenectady station, W G Y, of the General Electric Company of America, there is installed a film sound recorder which is used in connection with auditions. If there is any doubt about the suitability of a singer's voice, from the standpoint of radio reception and reproduction through loud speakers, a film record of the voice is made and tried out through a loud speaker. By this means not only is the public interest protected but artists are restrained from damaging their reputations through broadcasting. It seems to be a fact that many good platform voices are hopeless for microphone work.

New Polish Station.

WHAT is the most powerful station in Europe and, probably, in the world, has now been completed by Marconi's at Rasin, near Warsaw. This station is a long-waver, and boasts 160 kilowatts of power.

It has taken over the daytime programmes of the Warsaw station and will gradually replace that station altogether. Five smaller stations are to be supplied to Poland. How some of these small nations do wallow in radio, don't they?

For Technical Readers.

AS this station is unique, a few details of its construction will, perhaps, interest you. It has the highest masts (for broadcasting) in Europe, except radio towers; namely, 600 feet. It was begun at the middle of October and was working by the second week in January. It is about five times as powerful as 5 X X, and works on 1411 metres.

The primary energy is 700 kw., of which eight 100 kw. valves deliver 160 kw. to the aerial; 80 per cent modulation, with a straight line characteristic throughout a frequency of from 30 to 10,000 cycles.

The Vatican Station.

NOW let us look at a few points of the Vatican short-wave broadcasting station. Only 8 to 10 kw. of unmodulated carrier-wave energy is delivered to the aerial. Modulation, 80 per cent. The towers are only one-third of the height of those at Rasin.

The aerial is a vertical one, suspended and insulated from a triatic slung between the towers. The efficacy of short waves is amply demonstrated by the fact that this station, with its modest power, has had good telephone communication with Australia, India, South Africa, Argentina, Canada, U.S.A., and a number of European capitals.

Symbolic Towers.

IT is said that the towers of the Vatican station have been designed, as to their tops, to represent mitres, thus adding an ecclesiastical touch to rather unchurch-like structures. So far as I know, this is the first instance of its kind in the architecture

SHORT WAVES.

Professor: Science has made such progress that we can now send pictures by wireless.
Old Lady Listener: Really, ready framed?—
"Answers."

SIMPLE!

Resistance in "ohms" can very easily be avoided by going into lodgings.

Say it fast: "Is this a zither?"—three times. Now you'll appreciate the trouble a Columbia announcer had the other afternoon. He tried three times without success.—
"Radio Digest."

THIS WEEK'S CAREFUL BODY.—The man who asked the P.M.G. whether, if he plugged one ear with cotton wool, he could have a licence for five shillings.

Lady of the House: This pie is absolutely poisonous!

Cook: I made it from a wireless recipe, but there was a chemistry talk coming through from another station at the same time.

WHAT ARE THE WILD WINES SAYING?
(A French wine expert says that you should be able to listen to a wine's "electric conductivity!")

Tune-in to the wireless
And listen with glee,
While someone gives running comments
on a sport;
Yes, listen to Oslo,
Or Berlin-on-Spree,
But don't listen-in to a bottle of port!
"Pictorial Weekly."

of radio stations, though I have seen a wireless mast decorated with those ghastly trappings which in those days were known as "a pair of stays"—and I do not refer to the wire-rope variety.

Ourselves Abroad.

A BRIGHTON reader has sent me a couple of copies of the Danish "Politikens Radio," which is, roughly, the equivalent of our "World Radio." Some of the B.B.C. items, as reported therein, look peculiar. The Arsenal-Birmingham match is "Fodboldkamp mellem Arsenal og Birmingham." Then there is "Jack Payne Radiodansorkester," the "Gershom-Parkington-Kvintetten" and "Vaudevilleprogram," besides Reg Foorts' "Orgelsoli." One notes, in the advertisement columns, that a four-valve "all-mains" set sells at 15 guineas, and m.c. speakers are offered at an average of £3 15s.

An Impression Corrected.

IT seems that I have been labouring under a mistaken notion of the state of affairs in the U.S.A. I, and probably many of you also, thought that on account of the large number of broadcasting stations there, one of the prime necessities of a radio set for use in the States was high selectivity. But Mr. Batson of the U.S. Department of Commerce says that Europe is the place where selectivity is needed, and not America. His explanation of this is that the "chain broadcasting" in vogue there renders selectivity of secondary importance.

The March "M.W."

ANOTHER wonderful shilling's worth which the would-be-well-informed "fan" ought not to miss. On the constructional side this issue contains articles about the "Filterphone," the "Super-Plus" Four, the "M.W." "Pentogram" Three, the "M.W." "Hi-Tone" Control and the "Record-Radio" Three. There is an exclusive article about one of the men who have been "back of" radio ever since Marconi first came to England, and a fine assortment of miscellaneous articles. The photograph of the Zulu choir, on page 301, is alone almost worth the price of the magazine.

Imagination Run Riot.

A LITTLE speculative thought now and then is a welcome relief from the humdrum of one's usual mental exertions, but in the public interest this should not be allowed to whizz off into flights of fancy—if it is to be printed and published. An Irish newspaper says that the capture of scenes which existed centuries ago "is just around the corner." "These spectacles," it asserts, mentioning the burning of Rome and the sack of Troy, "are all bobbing about in space, for light waves never die." Confusion of thought! Light waves, in mathematical theory, perhaps never die, but age-old—or even yesterday's—spectacles are not bobbing about in space.

Those Deathless Waves.

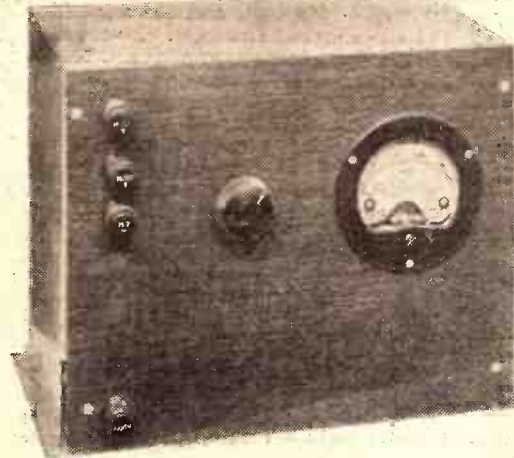
THE "Belfast Telegraph" reports Mr. O. B. Hanson, an American engineer, as saying: "It is quite within the bounds of scientific possibility that a valve will be perfected to control those age-old light beams." That, from an engineer, is sufficiently rash. Mr. Raymond Hood, an architect is made to say that he has talked and dreamed radio ever since he got the job of designing the Rockefeller radio building for New York. Ses he, "I am told these waves are deathless and have been since time began. That being true, all of the history of the past is ours to capture." My dear fellow, hadn't you better concentrate on making a good job of the drains?

Radio the Rationaliser.

WITH what degree of accuracy I know not, it is reported that the Mosque of St. Sophia at Constantinople has been converted into a broadcasting station and that its minarets now support the aerial. I have gathered that Enver, the maker of modern Turkey, is fairly progressive, but I can hardly believe that he has permitted that treasure of Byzantine art, built by the great Constantine, to be so utilised. The report adds that the station is to be devoted to propaganda, so perhaps Enver thinks the end justifies the means.

ARIEL.

MAINS POWER FOR YOUR "COMET"



Adding still further to the advantages possessed by the wonderful "Comet" Three, we here describe how a suitable radio-gram cabinet can be chosen, and how, by means of a simple "Safe-power" D.C. mains unit, the H.T. for the set can be obtained from the mains.

Thus is added to this most flexible, progressive receiver another important and valuable feature—mains power.

Read about it in the following article.

By the
"P.W." RESEARCH DEPT.



HOW are you getting on with your "Comet"? Have you finished the radio-gram alteration? If so, you will be particularly interested in the photograph of the radio-gram cabinet shown on this page. And whether or not you have followed the various modifications and additions we have described,

ALL YOU REQUIRE

- 1 0-250-v. voltmeter (Ferranti, etc.).
- 1 10,000-ohm resistance, with power potentiometer holder (Varley).
- 2 2-mfd. condensers, "working" voltage rating 250 or over. (Lissen and Forno in unit. Any good makes may be used, a few examples being: Igranic, Dubilier, T.C.C., Hydra, Mullard, etc.).
- 1 4-mfd. condenser, same rating (T.C.C., or other good make, as above).
- 1 Panel, 10 in. x 8 in. special Safe-power base 10 in. x 8 1/2 in. and cover. (Ready Radio or Keystone, Parex, etc.)
- 1 Smoothing choke, about 20 to 40 henries (R.I. "Hypercore," or other compact equivalent type).
- 1 Heavy-duty H.F. choke (Wearite).
- 1 Potential divider, 20,000 ohms (Bulgin or Climax, Wearite, etc.).
- 4 Insulated terminals (Belling and Lee).

week by week, you will find the special Safe-power D.C. mains unit for the "Comet," most interesting.

You may not all have mains, and D.C. mains at that, but that is no reason why you should shut up your "P.W." and say "That's no good to me!" It may not be of immediate practical appeal, but it is hoped that the article, in itself, will make tolerably interesting reading, besides being not without its instructive value.

For All Comet Users.

But let us take the radio-gram part of the set first. Last week we left our story of the progress of the "Comet" at the stage where a pick-up and its associated volume control and radio-gram switch had been fitted.

A plug and jack system of attaching the pick-up was provided for use by those who were possessors of some sort of gramophone turn-table and motor, and who did not necessarily want to convert their "Comet" into a full-blown radio-gram receiver, with motor, speaker, etc., all aboard.

But there are others who would like to do so—if not at once, then at a later date—and for their benefit the first part of this article is written. The latter part, concerning the mains unit, concerns all "Comet" users with mains, whether or not they are using the set as a radio-gram receiver.

Concerning the Cabinet.

The cabinet we have chosen for the complete radio-gram "house" is made by Peto-Scott, Ltd., and is illustrated in the photograph above.

Of course, it is not necessary to keep to the one particular type of cabinet we have mentioned; any convenient type of make would do, provided it has plenty of room in it for the motor and pick-up, set, and speaker, with batteries or mains unit.

In a combined radio-gram outfit such as this is, there is obviously no need for the

pick-up jack; this was used as explained before, for those who were going to use the outfit in two sections, as it were. Instead, we suggest that the pick-up leads be taken down through the motor board and connected direct to the two terminals on the jack, or to the two outside terminals of the pick-up volume control, whichever scheme is the more convenient.

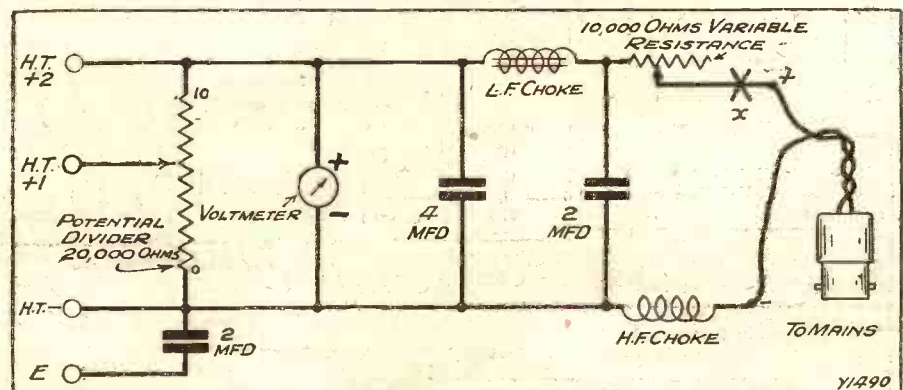
Looking Ahead.

Finally, before we go on to the mains unit, let us place the cart before the horse somewhat, and draw your attention to the fact that, in addition to the mains unit, we recommend the use of the trickle charger described in a recent number of "P.W." (See 7th February, 1931). This could be placed either screwed to the bottom of the cabinet, or on the back, or more convenient place, so that the mains unit or charger could be switched on at will.

We draw your attention to this little unit at this stage because you want to bear in mind the possible addition when deciding on a cabinet, and you, therefore may want a certain amount of convenient space for the mounting of the charger.

(Continued on next page.)

THE ACME OF SIMPLICITY



Without sacrificing efficiency, the circuit of the "Comet" Safe-power D.C. Unit has been "boiled down" until it is almost too simple to be true. When tried it proves to be a fact all right, and it hands out the "goods" in a most surprising manner.

**MAINS POWER FOR
YOUR "COMET"**
(Continued from previous page.)

And now for the mains unit which we have designed specially for use with the "Comet" Three. It is *not* suitable for use with other sets unless very special de-coupling arrangements are provided. These were included in the "Comet" Three in the initial Foundation model, and owners of this or subsequent models will find the

unit perfectly satisfactory if they follow the few modifications set out below.

The Safe-Power System.

The unit is designed on our well-known "P.W." Safe-power System, a scheme by which perfect safety in operation is assured. The whole unit is enclosed in an earthed metal case and the special safety plug at the back has to be removed before any access can be had to the inside of the unit.

The safety device consists of ordinary electric lamp adaptor plug situated under the metal base of the unit. The plug is attached by flex to the H.F. choke and variable resistance (see wiring diagram).

Connection to the mains is effected by means of a flex lead bearing upon its end an ordinary lamp holder. This fits on to the adaptor plug in the base, access thereto being obtained through a hole in the cover and another in the base opposite to it

Let us look at the theoretical circuit.

From this it will be seen that there are two H.T.+ tapping, and the smoothing is of the simplest character. De-coupling is not included because, as remarked before, this is included in the set.

Different voltage tapings are obtainable for H.T.+1, which is to go to the detector H.T. terminal on the set, by means of the 20,000-ohm potential divider.

A voltmeter across this shows the maximum available on the H.T.+2 tapping.

Note also the 2-mfd. condenser between the H.T.—terminal and "E." This is a safety precaution, which, among others, must be taken when operating sets off D.C.mains. But more of that later.

Smoothing.

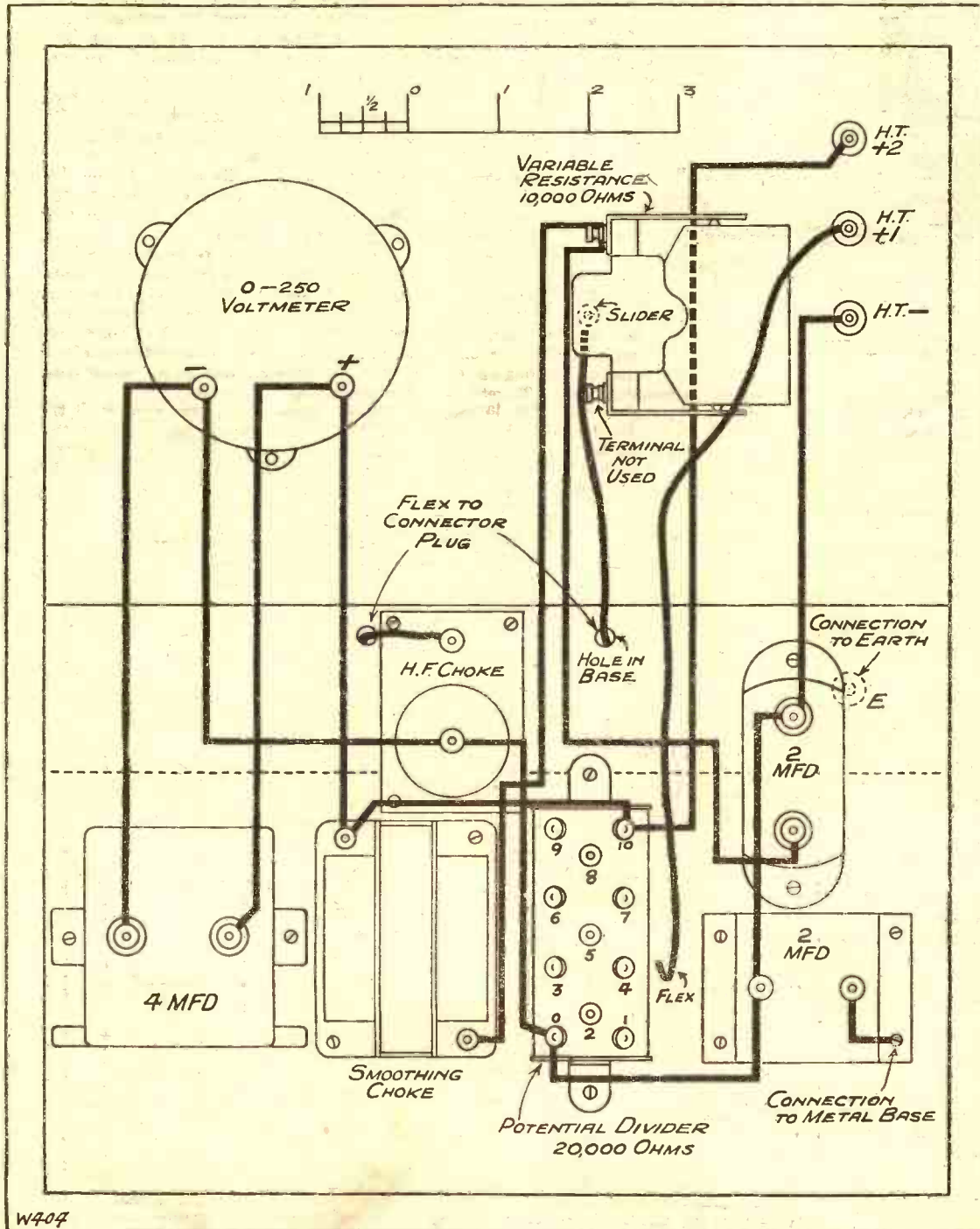
The L.F. smoothing is carried out by the L.F. choke and the two smoothing condensers. Further, as a precaution against "dirty" mains, which have H.F. impulses in them, the H.F. choke is situated in the negative lead. If this does not seem efficacious it should be removed and placed at the point "X" in the positive lead.

The last feature is the 10,000-ohm resistance, which enables perfect control of the maximum voltage to be obtained. Thus, if your mains are 240 volts and the maximum H.T. required for the L.F. valves (which both work off H.T.+2) is only 150, the resistance is varied until that figure is obtained.

Easy to Make.

But let us go on to the practical side of the unit. The wiring diagram on this page shows how the various components are situated and wired up. The plug and socket at the back preclude the lid being lifted while the mains are plugged in, thus preventing any alterations inside the unit while mains are on.

AS SIMPLE AS IT IS SAFE



W404

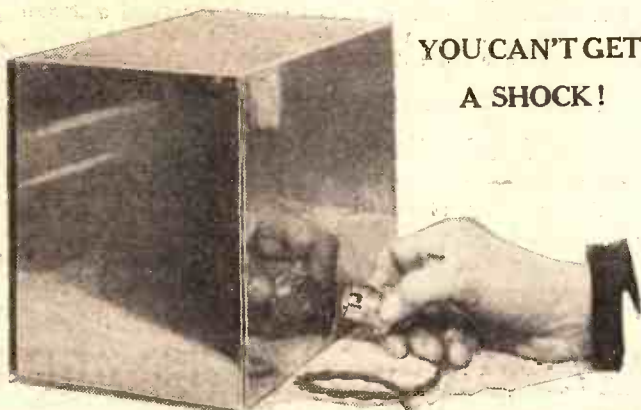
A couple of chokes, three condensers, a potential divider, a variable resistance, a voltmeter and a few terminals—that's about all!

(Continued on next page)

MAINS POWER FOR YOUR "COMET"

(Continued from previous page.)

The connections to the components are very easy to carry out, but care must be taken in the event of your using a Safe-power box in which the earth terminal does not make direct contact with the metal case, that a lead be joined from that terminal to the metal, so that adequate earthing is obtained.



The "Comet" Safe-power is powerful, but you can't get a shock from it because of the unique safety-device shown above. The metal cover cannot be removed while the mains connector is in.

The building is so simple that there is very little to be said about it. The voltmeter should be of good make, reading to 250 volts and having a resistance of not less than 200 ohms per volt.

In the event of your changing over the H.F. choke, as described previously, the best way to do this is as follows.

There are two flex leads coming from the mains plug, and going underneath the base-board, coming up through a couple of holes, one to the choke (negative lead), and the other to the slider of the resistance on the panel.

The H.F. Choke.

The change-over is carried out in this way. The lead to the resistance is disconnected and is taken to the bottom of the choke, the lead now going there being removed and taken direct to some point in the negative wiring such as the negative terminal of the meter.

This leaves us with the top of the choke still going to the negative wiring. This must be disconnected from this wiring and the top of the choke taken instead to the slider of the variable resistance. Quite simple, really, isn't it? But there is no need to change over like this if the mains are not giving trouble in any way.

The use of the Safe-power unit is simplicity itself.

But before we connect it up there are one or two safety points which we must mention.

About Your Filter.

You have already seen that the Safe-power box cannot be opened if the mains plug is still in, but other things have to be attended to besides this.

First of all you must have a two-condenser filter-choke output system in your set. Those who have added a filter output to

their "Comet" have little extra to do, but those who have not, should add this unit as described in "P.W." No. 456 and then make the following simple alteration.

Flexi-coupled Comets.

Break the lead from the L.S. to H.T. — terminal, and insert in it a 2-mfd condenser of similar type to the other one in the output system. Your connections now read: Anode of valve to choke and one condenser; other side of this condenser to one L.S. terminal, other L.S. terminal to one side of a second 2-mfd. condenser, and remaining side of this to H.T. —.

This condenser renders you quite safe should you have your positive main earthed and should you touch the loud-speaker leads at some bare point.

The extra condenser can easily be placed next to the anti-motor-boating condenser in the "Comet." But it is essential, for safety that you use an output-filter unit of this description.

Another little alteration is necessary for those "Comet" users who have Flexi-coupled their sets. In the ordinary "Comet" the series aerial condenser is standard, but in the flexi-coupled model this is only in use on the long waves.

So to prevent possibility of H.T. getting into the aerial a .002-mfd. (or larger) condenser should be placed in series between the aerial terminal and the "A" terminal in the "Selector" Coil. This condenser is as essential as the output filter and the

series-earth condenser in the Safe-power unit.

Finally, while discussing precautions, don't forget that all parts of the set connected to L.T. — as well as those to H.T. + may be alive—dependent on whether the mains have the positive or negative pole earthed.

Before plugging into the mains, the flex lead from H.T. +1 should be joined on about the middle (No. 5 or No. 6) terminal of the potential divider.

Then the box should be closed, and the unit connected up to the set as follows. H.T. + 2 to H.T. + 2 on set, H.T. + 1 to H.T. + 1 on set, E on unit to actual earth lead, H.T. — to H.T. — on set and the E terminal of set is left disconnected.

Voltage Adjustment.

The unit can then be switched on, care having been taken that the voltage control resistance knob is over to the minimum voltage (maximum resistance) position. This should be hard over to the left.

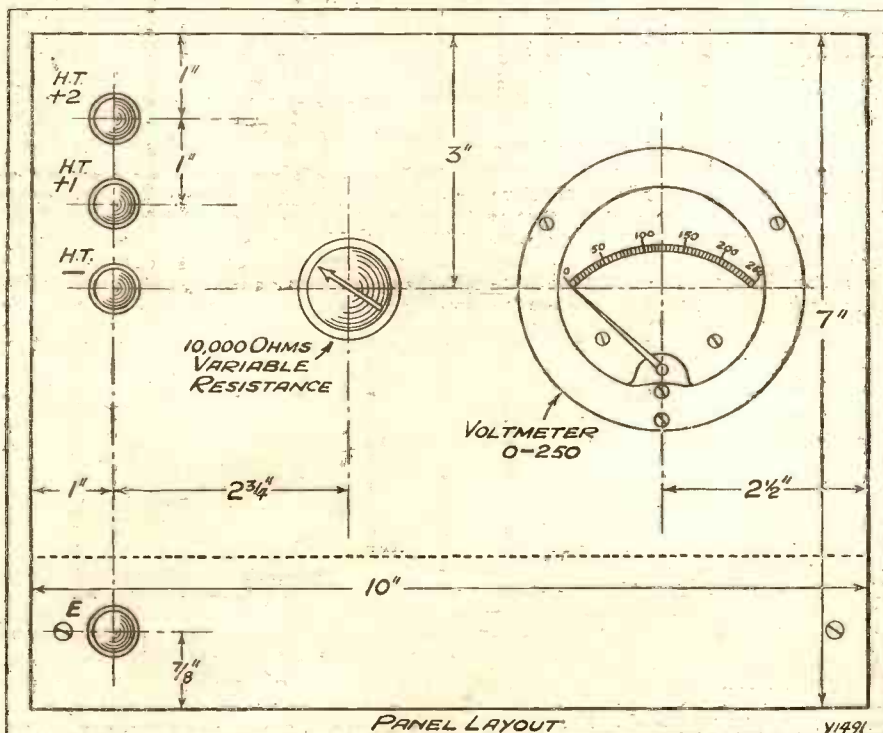
Now, assuming the L.F. valves of your set are adjusted as regards bias for 150 volts, turn the voltage regulator to the right until the voltmeter reads 150.

(If the meter needle reads nothing, but tends to go in the wrong direction, reverse the plug in the mains; you have got it in the wrong way round.)

The detector should be tried for smooth reaction, and if this is not obtained, switch off the unit, open it and change the position of the flex on the potential divider until the reaction control is O.K. After that there is no more need to touch the unit, and it can be treated just as we would treat an everlasting H.T. battery.

Finally, those of you who have built the "Comet" Two will probably wonder if this mains unit can be used with it. Certainly it can, and so can the Safe-power Junior described in "P.W." No. 406.

PERFECT VOLTAGE ADJUSTMENT PROVIDED



By means of the variable resistance and the voltmeter you can obtain perfect voltage control, ensuring the absolute best results from your "Comet."

LATEST BROADCASTING NEWS.

**SCOTLAND'S ARTISTIC
REVOLT**

**THE B.B.C. AND POLITICS—
THE ATTACK ON SIR JOHN
REITH — DUBLIN SUPPORTS
BELFAST — IN MEMORY OF
PAVLOVA, etc., etc.**

SCOTLAND wants none of the umpteen thousand singers and instrumentalists whose names are carefully filed away at Savoy Hill as people to whom auditions have been granted and whose services are available for broadcasting whenever they may be required.

The Scottish Regional headquarters prefer to find their own talent, and since only the Scottish blend is desirable (which incidentally is none too prolific), a tour of the country is to be made by broadcasting experts to search it out in the Highlands and the remote isles, in the industrial areas, along the Borders, and in Dumfriesshire.

Singers, and reciters, are in great demand. Programmes must be strengthened in preparation for the opening of the new Regional transmitter at Falkirk.

The B.B.C. and Politics.

There is nothing novel in the B.B.C. being found guilty of partiality by the two extremes of politics. "The Morning Post" and "The Daily Herald" have exhausted

**"POPULAR WIRELESS" HAS
AN UNRIVALLED BROADCAST-
ING NEWS SERVICE AND IS
ABLE TO PRESENT TO ITS
READERS ALL WORTH-WHILE
NEWS AND VIEWS REGARDING
B.B.C. ACTIVITIES.**

their superlatives in pointing out what a public danger is the B.B.C.

As long as there is this balance of active criticism, the presumption is that there is really not much wrong either with B.B.C. policy or with those who conduct it.

Far better that Savoy Hill should occasionally come under the hammer of the extremists Right and Left than that it should be content with programmes of colourless unenterprise. The real test is whether Youth and the point of view of Youth are to find expression through a medium which to live must be vibrant and youthful. And Youth has as little time for the extreme Left as the extreme Right.

The Attack on Sir John Reith.

The most unpleasant feature of the violent criticism of the B.B.C. which has recently found expression in a London newspaper is the personal attack on Sir John Reith.

Popular Wireless has frequently criticised Sir John Reith's policy and his administration, but has always maintained that, on balance, both the listening public and the nation at large are permanently in his debt for magnificent and disinterested public service.

Dublin Supports Belfast.

Recently we published details of the special St. Patrick's Day programme which the Belfast station is arranging for relay by all transmitters on the National chain next Tuesday, March 17th.

To these, it should be added that Mr. Seamus Clandillon, Director of the Dublin Broadcasting Station, will give a message of greeting before the programme ends with a relay of the carillon from St. Patrick's Cathedral, Armagh, by Mr. Thomas W. Holdén.

In Memory of Pavlova.

A concert of the music to which Pavlova danced, performed by the B.B.C. Orchestra, conducted by Walford Hyden, will be broadcast as part of the National programme

on Monday, March 30th. It will be a tribute to the memory of the great artiste.

"Krassin Saves Italia."

Mr. Cecil Lewis is to produce a play he has adapted from the German, and of which he is making a talking film version at Elstree, for London Regional and National listeners on Thursday and Friday, March 19th and 20th respectively.

The play is called "Krassin Saves Italia," and deals with the rescue by a Russian ice-breaker of the crew of the Italian airship which met with disaster while exploring the Arctic Circle.

It has already been broadcast on several occasions from German stations and also from Radio-Paris. No doubt a certain newspaper will see in this programme item yet another proof of the Bolshevik attitude of the B.B.C.!

Morning Heroes.

"Morning Heroes," the great choral work by Arthur Bliss which, it will be remembered, was recently postponed on account of insufficient time for rehearsals, will be given its first performance in London at the Queen's Hall, with the composer as conductor, on Wednesday evening, March 25th. The full B.B.C. Symphony Orchestra and the National Chorus will take part, and Mr. Basil Main will fulfil the functions of orator.

NEXT WEEK

**COMPLETING THE "COMET"
TWO**

How to make this week's set into a real de-luxe two-valver.

ALSO:
**The "COMET"
H.F. UNIT**

**COMING SOON:
HOW "P.W." FLEXI
COUPLING WORKS**

and more of our famous series,
AT HOME WITH RADIO STARS.



FOR THE LISTENER

By "PHILEMON."

Other people's views are not always very interesting, but our popular contributor certainly knocks the nail on the head more often than most critics of the broadcast programmes.

"Science in the Making."

THE blackbirds are in for an uneasy time this spring. All over the country their nests are being watched for the laying of the first egg.

A family in my village are doing the thing thoroughly. The nest is in the garden hedge. One of the boys, a budding electrician, has wired the nest so that when the hen-bird sits she completes the circuit, and a little lamp glows on the mantelpiece.

When the lamp goes out, somebody rushes to see whether it was a False Alarm or the Real Thing! I'm sorry for the blackbirds. There will be a lot of forsaken nests this year. If I were a blackbird, I should call the local federation together and decide to build nests in the tops of elms or the bottom of old rabbit burrows!

"The Prison."

I think Dame Ethel Smyth is a gifted, if not a great, musician. There were some lovely moments in her choral and orchestral work, entitled "The Prison"; but, on the whole, I found it interesting rather than

impressive; as if Dame Ethel were not sufficiently strong as a creative artist to give effective body to her thoughts.

She was well served by the London Symphony Orchestra and the vocalists, Miss Suddaby and Mr. Stewart Robertson.

Once again I felt that my enjoyment of this unfamiliar music would have been increased if I had had the words of it by me. The words of the choruses especially, for I could not hear them.

Requiem Mass.

The first performance of this work by Frederic d'Erlanger was the real stuff. It was a great work, greatly delivered. It was full, now of a profound beauty, now of an ecstatic loveliness.

I found it extremely moving. In the absence of Dr. Boulton, stricken with influenza, Mr. Stanford Robinson took the baton and rose to the occasion. Miriam Licette sang divinely.

The work of the chorus could not have been better. A lovely, haunting thing.

(Continued on page 1254.)

THE POPE'S BROADCASTER



SPECIAL permission is needed to get an entry to the Vatican City and the new broadcasting station, and fortunately I was able to get this about two days after the opening ceremony.

One is not allowed to take any liberties in the Vatican City, and a special guide attached to the Vatican conducted me round the station and the world-famous Vatican gardens in which it is situated.

The position of the station is rather misleading, for a great Roman wall about fifty feet high borders off the part of the garden where the transmitter building actually is, and the tall aerial masts are outside this.

Two Hundred Feet High.

The masts tower above the glaring white buildings of the Pope's palace, and are far higher than the few surrounding towers and steeples connected with the Vatican and with a big local church. The height, I was told, was 200 feet.

Visitors are not encouraged to see this private part of the garden near the station, and I suppose I should consider myself honoured. It was hot (it always is) on the day I went to the station, and it was very pleasant to walk under the shade of the many quaint trees in the Vatican gardens.

My guide took me across very rough ground in an unmade-up part of the garden to the base of the Roman wall. He explained that for reasons of space the aerial had to be outside the gardens, and in order that nothing unsightly should be created, the aerial lead-in has been taken *under* the wall, and a big brick tunnel some 150 feet long has been built.

Concentric leads.

The lead-in consists of two copper tubes, one inside the other; that is the same arrangement I saw at the Radio Roma short-wave station, and is used at the new "beam" stations.

Two leads-in are needed because of the special short-wave aerial used. There are actually two aerials on the same support. One is used for the 19.84-metre wave-length, and the other is for the 50.26-metre transmissions.

"P.W.'s" representative was able to obtain the necessary special permission to enter Vatican City and examine the Pope's radio installation, and in the following article he describes this visit for the exclusive benefit of "P.W." readers.

Between the two slender lattice masts is a cable 296 feet long, and the two aerials hang down from this. A third aerial, much smaller, is also suspended from the aerial masts, and when I enquired about this, I was surprised to learn that it is for a receiver in the Vatican.

Tappings are taken from it at carefully measured-off points, and, as I saw later, its electrical length (and hence its natural wave-length) can be varied by means of a switch in the control-room of the station.

Striking Contrast.

As this wire is only a few yards from the transmitting aerial it would be impossible to transmit and receive at the same time.

I noticed that the aerial masts have a sort of bishop's mitre ornamentation on the tops, but even this does not prevent the

modern radio gear making striking contrast with the age-old buildings of the palace.

I was surprised to see that the aerial transmitter building was quite small. It is a plain piece of architecture standing in one corner of the Vatican gardens near a railway terminus.

I was told that the plans for the building were passed by the Pope and by Marchese Marconi, the latter taking the greatest care that the Pope should not complain that the radio gear is not in keeping with the graceful surroundings of Vatican City.

A rather quaint appearance is given by shuttered ventilators which keep out the glaring midday sun, and yet which let in any breezes which, by good fortune, may be blowing. Would that all private houses in this part of the country were so equipped!

The biggest room in the building is given up, of course, to the transmitter, and there are four panels exactly like those at 5 S W, Rome, and other short-wavers built by Marconi.

Despite the fact that the lower of the two wave-lengths—19.84 metres—is very short, crystal control is not used, the special Marconi-Franklin valve master drive being used instead.

This extremely complicated piece of apparatus is housed behind the second panel, while a separate valve drive behind the third panel is used for the 50-metre side.

Telegraphy as Well.

One of the other panels contains an H.F. amplifier for both wave-lengths, while the other carries the modulator equipment and also a special keying device: the transmitter can be used for Morse when necessary.

These four panels stand in a row against one wall of the room, and the control engineer stands at a metal table in front on which are the main regulators. On each transmitter cage are long vertical ebonite panels carrying the subsidiary controls, and a few indicator meters.

POWER FOR THE VATICAN



Pope Pius XI opens the electric power station which now supplies the Vatican City with current for lighting and heating and for the radio installation.

(Continued on next page.)

THE POPE'S BROADCASTER.

(Continued from previous page.)

We passed into the next room, where are the modulation controls and the switches, strength controls and tone-shifters connected with the landlines to the station. I had thought that the Vatican station was for the exclusive use of the Pope, but apparently landlines are being run out to several big centres so that "O.B.'s" will be possible.

My guide told me that already the station has been in touch with London, Paris, Berlin, the United States, Australia, India and Africa, so it looks as though the Pope's wish to be able to speak to the whole world has been granted.

Where The Pope Listens.

There is a special room for the receiver, on which, on the short waves, the Pope can also listen to the whole world. The appearance of this set struck me as being rather familiar, and I was told that it is made up with a well-known Marconi commercial set as a basis.

In connection with the station there are also a machine-room, accumulator-room, valve store and an office, but owing to pressure of time I had to hurry through these. The machine-room is quite small, of course, for the power of the station (on speech) is in the nature of 10 kilowatts.

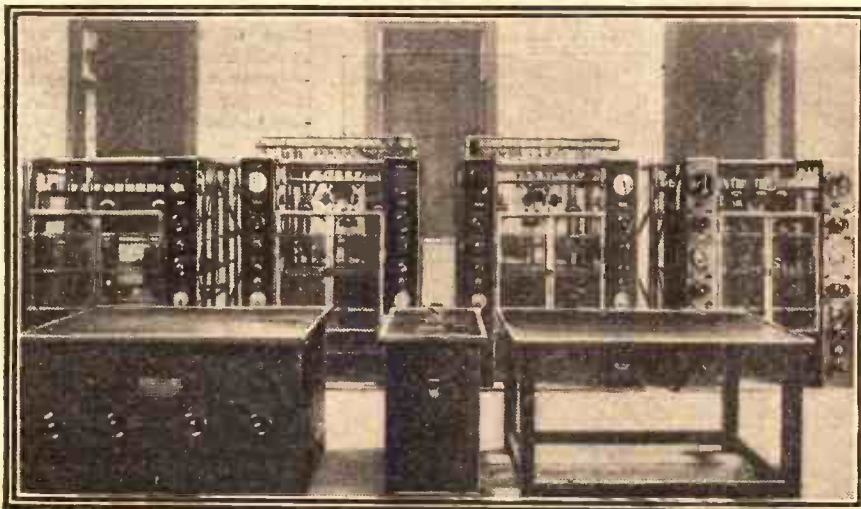
PERTINENT PARS

A.C. Heaters—Broadcast Brevities—Receiver Instability, etc.

A small resistance in series with the heater leads to a two-valve A.C. set often prolongs the life of the valves, although it appears to have no detrimental effect on reception.

With a given make of good quality low-frequency transformer the ratio is generally inversely proportional to the primary impedance. The higher the ratio the lower the impedance.

IT SPANS ALL CONTINENTS



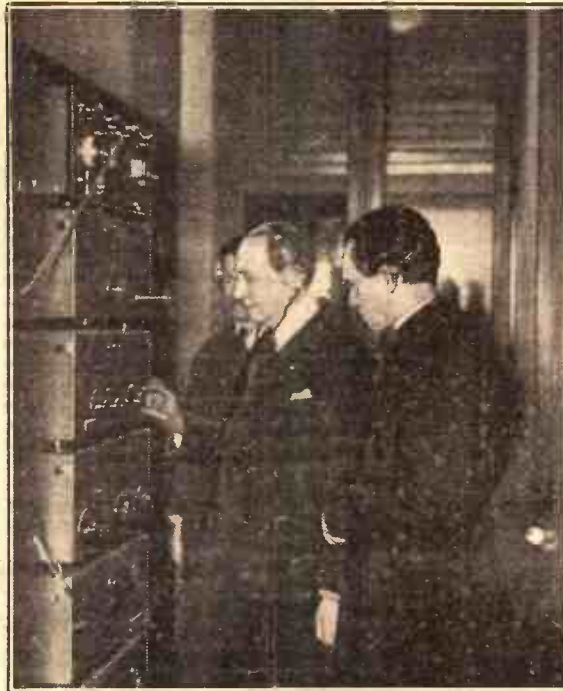
The transmitters work on the short wave-lengths of 19.84 and 50.26 metres, and, using up to about 10 kws. of power, reception has already been reported in all quarters of the world. You can recognise H V J by the musical signal of the first bar of the Papal March.

Virtually all the ships in the Navy are adapted for short-wave wireless, and the Admiralty now works a short-wave service to Hong Kong and Singapore.

The German stations which use quartz crystal control of wave-length hold to their allotted frequencies no more steadily than the B.B.C. stations in which the tuning-fork system is employed.

If acid from an accumulator gets into a cut on your hand you may have serious trouble with it, as it is very poisonous.

GETTING IT READY



Marchese Marconi engaged in some of the preliminary tests on the Vatican radio station.

A common cause of instability, especially on long wave-lengths, is the presence of stray H.F. on the L.F. side of a receiver.

It is nearly always inadvisable to attempt the switching of high-frequency amplifying stages.

WHAT OUR READERS SAY.

A selection of letters from "P.W.'s" vast post bag.

PRaise FOR "P.W." SETS.

The Editor, POPULAR WIRELESS.
Dear Sir,—It may be of interest to you to know that using the "Super-Coil" Three with an S.W. adaptor, during the last three days I have logged the following transmissions:

W 3 X A L, W 2 X A F (x), Zeesen (x), P C J (fast fading), Rome 3 R O, W 2 X A D (x); Red Star liner Belgenland in Hong Kong Harbour (about 6,000 miles, 2 p.m., G.M.T., February 14th), on about 25 m. (x); Radio Maroc (x); also several amateur transmissions.

All those marked x were audible on loud speaker, especially Radio Maroc, Zeesen, and Belgenland; W 2 X A D, 5.30 to 6.30 p.m., very consistent.

I find that taking the L.S. neg. lead from the plate of the second valve, and substituting the power valve in the second socket, I can get ample volume for most occasions, using only two valves. With a pentode in the second stage and a super-power valve in the last socket, the volume is terrific with surprisingly good reproduction.

I have constructed about nine of your circuits and have never had any trouble, all giving fine results, and I must thank you for the efficient series of sets that you continue to put on. One point about all your circuits is that the standard parts used can be utilised in practically every new set with only small additions.

Well—now for the "Comet" series.

Thanking you,

Yours faithfully,

T. A. CLARKE.

Trowbridge, Wiltshire.

EARTHING MAINS SETS.

The Editor, POPULAR WIRELESS.

Dear Sir,—The following may be of some interest to owners of mains sets, regarding the earthing system. I myself being the owner of a three-valve mains set, experienced for a considerable time a considerable interference, which consisted of a running noise. This I put up with for some time, but it somewhat spoilt the programmes, so I thought I would try and discover the cause of it. My earthing system was on the mains water supply. I thought I would try a buried earth in the ground, which consisted of a tube with water supply, and behold, this cut out the noise entirely.

An old reader,

H. J. HORNE.

Southampton.

THE "ECONOMY" THREE.

The Editor, POPULAR WIRELESS.

Dear Sir,—I am writing to let you know that I built the "Economy Three" from your issue of POPULAR WIRELESS, October 18th, and am entirely satisfied with the results obtained. Besides being able to get the British stations, I am able to tune in eleven foreign stations at good loud-speaker strength. Thanking you for publishing the circuit, and wishing your paper every success.

Yours faithfully,

A CHARE,

Sheffield.

Late R.E. Signals.

100% "P.W."—100% EFFICIENT.

The Editor, POPULAR WIRELESS.

Dear Sir,—Having spent a whole winter making many different types of cone speakers, I am glad to be able to tell you that the "Clear-Cut" Cone ("P.W." No. 447) is without doubt the best. Its fine volume, tone, and complete range of frequencies makes a wonderful contrast with many speakers I have tried. The high notes are clean, while the bass is full, without trace of "boom." My set is the 1930 "Magic" Three. May I thank you for such a fine set and speaker? Your new "P.W." Dual-range coil is also included in my set, and has improved my tuning considerably. So my apparatus is 100 per cent "P.W." and, thanks to your invaluable publication, 100 per cent efficient. Readers may be interested to know that my unit is a "Blue Spot," while my transformers are R.I. Hypermite, and in the second stage, Ferranti A.F.3, with the secondary reversed.

Yours faithfully,

SIDNEY E. WORROW.

Holmwood, Surrey.

AT HOME WITH RADIO STARS



11.—POUSHNOFF.
All about a popular broadcaster who made a mystery radio debut.

FRANKLY, I did not expect to find that Pouishnoff would have any interest in wireless. Musicians are generally supposed to be temperamental folk, and they have a suspicion that radio reproduction, being not the real thing, it is not quite good enough for them.

Not so, though, with Pouishnoff. I can't say that a wireless set was the first thing that caught my eye when I entered his studio, for the set is hidden behind a screen; but I had not been talking for long to the famous pianist before he confessed to having a very keen radio technical interest.

Pouishnoff's studio is a spacious and lofty room, one end of which has a glass roof so that the whole place is as light as daylight. At the other end, some thirty feet away, is a large old-world red-brick fireplace with dark oak beams.

That Mystery Performance.

We sat down before the cosy red-brick hearth and chatted about the B.B.C. I ventured to ask Pouishnoff about what I hoped he wouldn't think a touchy subject. I asked him the truth about the "Mystery Pianist."

He laughed.

"It was like this," he explained. "In the summer of 1923—I think it was—I went to Savoy Hill (which had then only just been opened) to see for myself what it feels like to play in the padded studios.

"I found them awfully depressing. There was too much damping, and too little echo. Then I was taken up to the control room and I listened in to a loud speaker on a set tuned-in to 2 L O, radiated then from the top of Selfridges. I was somewhat reassured to find that what sounded terrible in the studio was tolerable in the loud speaker. But still I wasn't satisfied.

"Then up came the announcer, who was very worried because there was a programme gap to fill. He suggested my stepping into the gap, and I thought it would give me a good opportunity to try the studio acoustics for myself.

"So I gave a fifteen-minute recital, but as I didn't want my name associated with experiments, the broadcast was given without a full announcement.

He Likes Radio.

"The daily papers took it up, and so the 'Mystery Pianist' came into being. Hundreds of letters were sent to Savoy Hill with vague guesses as to my identity. Many names were suggested.

"But," he laughed, "I don't remember

anyone saying Pouishnoff."

It was just twelve noon. I suggested that the Regional Station would be on. Pouishnoff flicked a switch and the studio was flooded with music from the loud speaker behind the screen.

"When I did take up broadcasting," explained Pouishnoff, "I naturally took an interest in the technicalities of it. I have rather an extraordinary five-valver here. I had it arranged to suit my needs."

Fifteen on the Speaker.

On the pedestal was a well-known five-valve portable. Only three of the valves were in use and below it was a moving-coil loud speaker with a two-valve power amplifier. An H.T. battery supplied the portable set, but an eliminator fed the power amplifier.

The mains also charged the accumulator and the six-volt battery supplying the speaker field winding. There was a switch so that either the set's frame aerial or an indoor aerial could be used. The indoor

I am free," said Pouishnoff. "I listen to the Queen's Hall concerts on rare occasions when I have a free evening; and sometimes I listen to the news, the plays and to dance music.

I expressed surprise.

"Why not?" said Pouishnoff. "There is beauty in many kinds of music, and the only trouble with much of your modern syncopated compositions is that it is too 'mass-produced.' But sometimes there is beauty in it."

"But you do not play jazz music, do you?" I inquired.

Pouishnoff laughed again, evidently enjoying my surprise.

Motoring and Flying!

"That's the interesting thing about music. There is beauty in every angle of it, and you find music everywhere. Why, there is even music in a well-tuned engine when it is running smoothly."

"Then you are a motorist?" I hazarded.

"Why, yes," he said. "I was very keen,

A KEEN LISTENER



Pouishnoff, whom you see here playing in the London studio, takes a keen interest in the technical aspects of radio and possesses a specially designed five-valve set of his own.

aerial was slung up beneath the glass-roofed end of the studio.

The results were as good as any I have heard. The moving-coil reproduction gave plenty of bass without sounding boomy.

"I have no use for a set which gets fifty stations but none of them perfect," declared Pouishnoff. "Non-musical listeners like to receive the very distant stations even if the quality is worse than that of a bad gramophone. I can receive about fifteen stations here, all with good musical quality."

"Might I ask," I said, "to what kind of items you most frequently listen?"

"I listen to practically everything when

too, once upon a time."

"Once upon a time?"

"The roads are so crowded now, aren't they? I don't find much pleasure in motoring nowadays. I am seriously thinking of buying a 'Moth' or some such machine and taking up flying."

I suggested that flying is strenuous and might not be good for a pianist's hands.

"That is a difficulty," he said.

But there is something very attractive about this famous artist who sometimes can put his art aside and deal with five-valve sets, fast cars and aeroplanes in a very knowledgeable way.

MORE CASH FOR THE B.B.C.?

By THE EDITOR.

Negotiations are in progress concerning the question of the percentage of listeners' money allowed to the B.B.C.

WHAT will be the outcome of the negotiations now going on between the Post Office, the Treasury, and the B.B.C. on the question of a greater share of the licence revenue for the B.B.C.? Extraordinary secrecy is being maintained, but it is strongly rumoured that in the end the B.B.C. will get more money—how much it is impossible to say at the moment. £200,000 has been mentioned as a possible figure, but in all probability it will be considerably less.

The adjustment in the B.B.C.'s share of licence revenue may be fixed so as to enable Mr. Snowden to name the extra sum allowed the B.B.C. as the Treasury contribution to the Opera scheme he announced some months ago. If this is the case, then the B.B.C. is not likely to be satisfied.

The cost of the Regional stations has proved heavier than was perhaps realised when the Regional scheme was adopted, and there is no doubt about the fact that the B.B.C. is hard up and that, as a consequence, further delays in completing the Regional scheme may be inevitable unless more cash is forthcoming.

That "Rake-Off"

We have always maintained that it was a very unfair arrangement which allowed the Treasury and the Post Office to take such a large "rake off" from the gross licence revenue—unfair to the B.B.C. and, above all, unfair to the listener.

And although it may be too much to expect the Treasury to return its licence hoard in full, let us hope it will be made—the sooner the better—to return a large proportion to the B.B.C. so that the progress of broadcasting may not be hindered because of the rapacity of the Post Office and the Treasury.

Attacking the B.B.C. was once a favourite pastime of the newspapers. The practice fell into disuse a year or so ago—we suppose newspapers and their readers got tired of it as a game—but just recently the idea has been revived again.

The "Morning Post" has had a delightfully entertaining campaign against the B.B.C. all on its own. It has accused the B.B.C. of propagating "Socialist dope," of making "mistake after mistake," and there have been dark hints in its columns of "growing public uneasiness" and of an "Outcry Aroused by Communists' Russian broadcast."

More Criticism.

References have also been made to the effect that "widespread indignation has been aroused as the result of the action of the B.B.C. in broadcasting a talk on Russia by Mr. Maurice Dobb, a well-known Communist."

This is really funny! Most intelligent people to-day are complaining that the B.B.C. keeps us in apron-strings; that we must only listen to what is good for us; that political controversial matter, such as

Mr. Churchill's proposed talk on India, and the Percy-Mosley debate, must not be broadcast because it might prove—er—dangerous!

And now it is seriously suggested that the B.B.C. has caused "widespread indignation" because it allowed Mr. Dobb to broadcast a talk on Russia. As a matter of fact we heard Mr. Dobb's talk, and we found it most amusing. We don't care a row of buttons what political shades of opinion are expressed by B.B.C. talks; like most people in this country, we like to hear all sorts of opinions and all sorts of arguments—if, and only if, they are interesting.

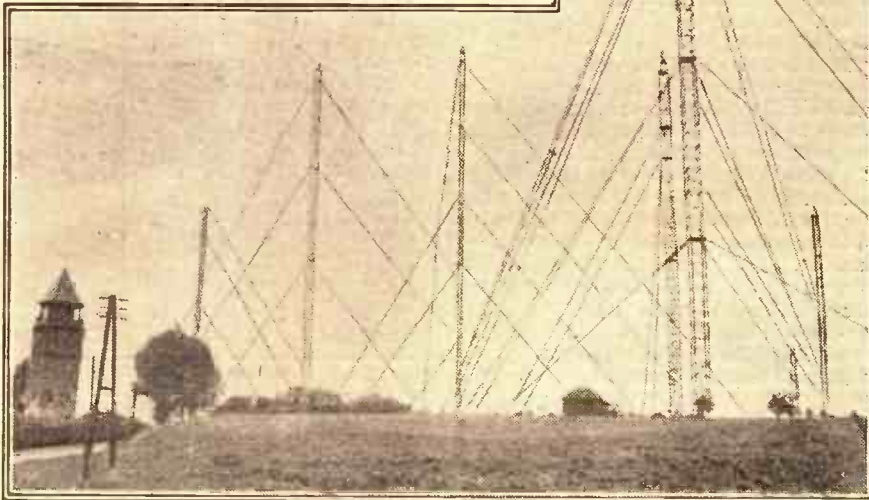
Ether Shocks.

Mr. Dobb was interesting and even, to us, amusing. No doubt the Percy-Mosley debate would have been interesting; certainly Mr. Churchill would. But even as it is we fail to notice any "widespread indignation."

There is certainly no cause for adverse criticism because the B.B.C. has given support to a newspaper broadcasting ballot. Other newspapers have, in the past, welcomed the B.B.C.'s co-operation in a scheme of this kind. We ourselves, readers may remember, enjoyed the help of the B.B.C. when we organised the "P.W." Radio Sounds Competition some years ago.

No, the fact is these "campaigns" against the B.B.C. are played out. They

GERMANY'S BIGGEST BROADCASTER



Some of the aerials at the giant commercial and broadcast station at Koenigswusterhausen, near Berlin. It regularly broadcasts on a wavelength of 1635 metres.

don't convince. The integrity of Sir John Reith and his loyal staff is too well known. The B.B.C. may make mistakes now and then, but they are generally pretty trivial—more irritating than frightening. The "Daily Herald" summed the matter up very well in the following:

"By a supreme feat of comedy the most

reactionary and carefully conservative of contemporary British institutions has been singled out for shrill attack as a corporation markedly biased in favour of the Socialist Government and Party."

The exact opposite is the truth. So timid, so orthodox, is the B.B.C. that it declines to allow any original thinker to broadcast his views.

"No man or woman with a message of any kind that is likely to startle the conventional listener is allowed to 'shock' the ether."

That, alas! is only too true. We only wish the ether could be "shocked"—and often at that. Broadcasting would be more interesting, alive, and stimulating. And we can hardly believe there would be any "widespread indignation"!

SOME RANDOM REMINDERS.

A.C. Valves—Wavetraps, etc.

As a general rule the extra magnification obtainable from A.C. valves is such that it is not possible to place them indiscriminately in a circuit designed for battery valves, without alterations to screening and possibly to coupling valves.

The efficiency of a wave-trap can often be improved by reducing its coil value and increasing its condenser setting.

The resistance of one thousand yards of No. 22 S.W.G. copper wire is 39 ohms.

If the quality of your receiver tends to fall off when the H.T. battery has been in use for only a few weeks you would probably benefit from additional decoupling devices.

No. 30 S.W.G. copper wire has a resistance of 1 ohm in a length of five yards and about nine-tenths of an inch.

CAPT. ECKERSLEY'S QUERY CORNER



Some questions and answers of general radio interest that will help you in your radio reception.

DO BIG SETS INTERFERE MOST?
—OUTPUT FROM AN H.T. UNIT—
TOO TRUE!

Under the above title, week by week, our Chief Radio Consultant comments upon radio queries submitted by "P.W." readers. Don't address your questions to Captain Eckersley, however, a selection of those received by the Query Department in the ordinary way will be answered by him.

Do Big Sets Interfere Most?

C. M. (Croydon).—"Has the 'size' of one's receiver any bearing on the amount of interference to neighbouring listeners which one can cause by oscillating? That is to say, if, for instance, the offending set happens to be a very elaborate multi-valve receiver, capable of reproduction at volume 'equal to the original' does it cause interference over a larger area when in an oscillating condition than a simple two-valver?"

I cannot answer this question categorically. Certainly the re-radiation qualities of a receiver have nothing to do with its powers of low-frequency amplification.

Thus, consider a plain detector with note magnifier. If this detector has a certain number of volts on its anode, a certain feedback into the aerial, and one note magnifier, and if it is made to oscillate, a given interference will be created. If this same detector is followed by more note magnifiers and is made to oscillate, the interference will be no greater and no less than when it only had one note magnifier.

Again consider the conventional three-valve set with a screen-grid high-frequency magnification. If it is made to oscillate it will give far less feed-back than a plain detector.

If you had three or four screen grids in cascade they might give more interference, but very little more, and certainly less than a plain detector. The screen-grid valve ensures to some extent against re-radiation.

Thus, in sum, it is the design of the high-frequency circuits which counts in assessing the interfering qualities of a circuit, not the low frequency, and not very much the power of the set.

Output from an H.T. Unit.

F. H. (Dulwich).—"My H.T. unit is giving a reasonable output, but I find that both H.T. transformer and the smoothing circuits are capable of delivering a much greater output. Would it be in order to join a further rectifying valve in parallel with the existing rectifying valve and the eliminator?"

"In such a case, is it necessary to increase the size of the condenser across the output from the rectifier; at present it is a 2 mfd."

The design of a high-tension eliminator cannot be specified so simply that I can answer your question directly. I can

certainly say that if you put in another valve in parallel with the first, and provided the transformer which lights the filament of the rectifying valves is capable of taking the extra load, then you can certainly get more power out of the eliminator, inasmuch as you state that the transformer is capable of greater output than it is at present asked to supply.

If your smoothing is quite satisfactory at present, and if you are not going to take a

mention will be satisfactory or not; if the effective resistance of your set decreases, it is a question of quantities. Do you not use a choke as well as a condenser, and might not this choke become saturated with the greater current?

I can only give you very general ideas without knowing full particulars of the set, the smoothing circuit and so on.

Too True!

J. K. (Aberdeen).—"A new 'solution' to the perpetual motion problem has recently been introduced to my notice by a fellow radio enthusiast. The imaginary conditions are that a receiver is accurately tuned to a transmitter and the loud speaker placed in front of the microphone.

"If, then, a gong, for instance, was struck within range of the microphone, the sound thereof would be radiated by the transmitter, picked up by the receiver, given to the microphone again by the loud speaker, re-radiated by the transmitter, and so on. Where is the snag?"

What is the definition of perpetual motion? Something that will go on forever, I suppose, and "for ever" is a relative term.

The universe might be considered as an example of perpetual motion, but that is losing energy and is (slowly) slowing down. Anything that is in motion requires energy to keep it in motion, and that energy is slowly frittered away and must, in the end, cease.

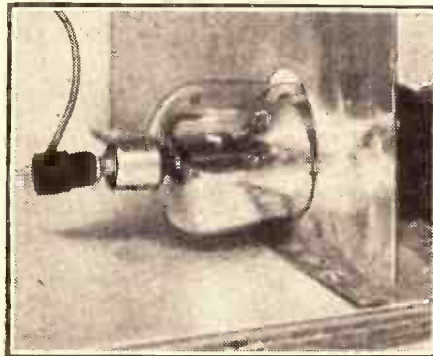
After all, your friend's invention of perpetual motion, while ingenious, requires energy to keep it going. The transmitter, thus (if it is one of the new Regional transmitters), is absorbing about 300 horse power. I could do much better than that with a watch!

I do not see that setting up a process like the starting of a motor-car engine, electric motor, or anything else that moves, can be described as perpetual motion. It is perpetual all right until it stops, and other things being equal it will go on so long as energy is supplied to it.

That is true of everything that requires energy to keep it going, and just as much to your friend's scheme as to a watch or the universe, or answering this question!

READ "MODERN WIRELESS."

SAFETY FIRST WITH S.G. VALVES



Owing to the large earthed metal screen usually surrounding an S.G. valve special care should be taken with its leads that carry H.T., or the battery may be shorted. Whether ordinary terminals or special connectors are used, be sure to see the leads are firmly fixed.

great deal more out of the set, then it should remain satisfactory; but you have to look at it in this way:

If you connected a milliammeter in series with your set, and you connected a voltmeter across the output terminals of the eliminator you would find that you had a certain voltage, and a certain current. This would represent a certain resistance (found by dividing the voltage by the current).

If the set is made to take more power at the given voltage, the effective resistance of the set drops. This can be dealt with by the eliminator if the rectifying valves will pass the extra power, but the smoothing circuit cannot be so effective if the resistance of the set is lowered.

I cannot say if the 2-mfd condenser you

STATIONS WORTH HEARING

Some practical distant-programme notes compiled by a special contributor who nightly searches the Ether in order to obtain really up-to-the-minute information for "P.W." readers.

By R. W. H.

JUST to show that they still have a kick 'or two left in them the sun spots have been at it again. I wrote recently that we seemed definitely to be rid of them, but hardly had these remarks appeared in print than a procession of no less than eighteen large spots proceeded to move across the face of the sun.

"Perfect" Weather.

The result was what foreigners would regard as a perfect sample of English weather; in a single week we had broiling sun, blinding snow, pelting hail, a little fog, warm muggy spells, thunder, and frosts.

As is usually the case when this kind of thing happens, atmospherics were troublesome and long-distance reception was none too good. We shall probably have further slight setbacks from time to

time, but we should have at least four and probably six years of better and better conditions before us.

There is a great deal doing in Europe just now, for a number of new big stations are coming into regular operation whilst others are engaged in testing. From March 2nd onwards, for example, Warsaw on 1411 metres (212.5 kilocycles) has been using his full 135 kilowatts.

Some of you may have heard him during February and have been surprised at his power. Actually he has been employing only half his full "juice," but even so he was received in most parts of this country every bit as strongly as Radio-Paris. Now that he is up to full output he is quite the strongest of European stations.

Poland is going great guns in the matter of super stations. Lemberg (or Lwow if

you so prefer it) has also increased his strength, and you can be pretty sure of finding him at work on a Sunday night after our own stations have closed down. Another interesting test being made concerns Italy. Genoa has suffered (and caused) so much interference that he is at present trying wave-lengths up above that of Budapest. If you try round you are pretty sure to find him.

An enormous transmission on the medium wave-band is Bratislava, but this station's wave-length is unfortunately next door to that of the giant Heilsberg. It takes a rather selective set to separate the two—here is a good opportunity for the Flexi-coupler.

German Giants.

Heilsberg himself is so powerful that daylight reception is frequently possible. Other stations on the medium band receivable before dark are Hilversum and Stuttgart. You need not be surprised if you tune in the latter, even on a portable set, on Sunday morning when the London Regional is silent.

Have you tried Göteborg lately? This Swedish station is coming in extraordinarily well and there is no difficulty about finding him, for he is immediately below Breslau. Another good Swede is Hörby, though he is so close to the London National that selectivity is essential.

SHORT-WAVE NOTES

Here are some useful remarks on happenings down on the short waves by W. L. S., a very well-known amateur transmitter and a leading expert on the subject.

THE past week has not shown any startling changes in short-wave conditions, except a general improvement of the wave-lengths round about 40 metres, including the amateur band. At the beginning of the week, on that band, I heard more distant stations in a few hours (and so did friends who were also listening) than I have done since the "good old days" of 1928-9. This, incidentally, coincided with the sudden arrival from nowhere of eighteen large sunspots!

I am asked to announce that the European headquarters of the International Short-Wave Radio League are now at 106, Lord Street, Southport, Lancs. Any inquiries about the League or applications for membership should be made at that address.

Best In The States.

I have also to acknowledge the February magazine of the International Short-Wave Club, of Klondyke, Ohio (not connected in any way with the other firm!). This was kindly forwarded to me by our old friend, G. L. P., of New York, who makes the following observations:

The best stations heard in New York at present include Vatican City, on both 19.84 and 50.24; Chi-Hoa, Indo-China, 49.00; H R B, Honduras, 48.62; and Rabat, Morocco, on 23.36 and 32.26.

G 5 S W, apparently, is good over there until about 5 p.m. (their time), and by 6 p.m. they cannot even hear the carrier-wave. Let us hope that G 5 S W, also,

will revise his policy of not sending "verifications" to foreign listeners. He is, at present, one of the few important short-wave stations in the world that will not condescend to do that.

Incidentally, you may remember my recent remarks on the short-waver of the future and the set I should like to see. Well, G. L. P. shall speak for himself:

All Mains Sets.

The rage here is all-mains S.W. receivers, using S.G. high-frequency stage, S.G. detector and indirect-heater L.F. stage, followed by indirect-heater push-pull stage. Phones are plugged in after the first L.F. stage.

"Reaction control is resistance, varying the voltage applied to the S.G. of the detector valve. Very smooth one-dial control, humless. With a good location this receiver is a 'go-getter.'"

My reputation as a prophet has run on ahead of itself!

Vatican Schedule.

G. T., from Oñskirk, writes a most enthusiastic letter running to eight pages, and commencing: "I've suddenly become the most enthusiastic short-wave fan in Great Britain." Yes, G. T., it takes you that way! Details of my gear will be published as soon as I've finished experimenting with screened-grid detectors.

C. A. B., of Burton-on-Trent, is the latest member of the H.A.C. Club with an excellent list of stations, including the much sought-after H R B, Honduras. (2.30-4 a.m.)

A Wrexham reader kindly forwards the information that the Vatican City station will be transmitting on both wave-lengths at regular times in future. He will be on 19.84 metres from 14.30 to 15.00 G.M.T., and on 50.26 from 15.30 to 16.00. Doubtless, as daylight hours change the schedule will be moved round a little.

No one seems to be able to find W 2 X A D nowadays, on his 19.56-metre wave. This

is a confirmation of the apparently bad conditions across the Atlantic on the shorter waves. The wave-length, as a whole, cannot be "dead," vide the loud signals from the Vatican on 19.84. Transatlantic work is almost exclusively above 40 metres just now.

THE "COMET" THREE

A Reader's Appreciation.

The Editor, POPULAR WIRELESS.

Dear Sir,—I would like to take this opportunity and thank you for such a wonderful set as the "Comet." It certainly is a "star" set. I started to build it on Sunday afternoon, and finished it the same evening. Then came the moment to switch on, and I thought to myself, "Will it work?" And did it work? Well, I tuned in to London, and the volume was tremendous. I might say that I am using an ordinary power valve, a Cossor which I bought in 1928. As for foreigners, the dial is simply alive with them, and at such a volume that a volume control is needed on some of them. I built the "Magic" Three, and thought that was very good, but the "Comet" knocks it into a cocked hat.

The man who built this receiver certainly has something to be proud of; it certainly is the star set of 1931.

I advise all "P.W." readers to scrap their "Magic" Threes, or any other set they may have, and build the "Comet"; they'll never be sorry for it. I am eagerly waiting for further instalments of this set.

Wishing every success to "P.W." and its designers.

I remain, yours faithfully,

G. HUGHES.

Bethnal Green, E.2.

[Other readers' experiences from our ever-growing post bag are given on page 1252.]

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AMAZING**

**MAZDA
RADIO
VALVES**

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TYPE	Fil. Volts	Fil. Amps.	Max H.T. Volts	Amp. Factor	Anode Resistance (ohms.)	Mutual cond. m A/V	PRICE
AC/SG	4	1.0 approx.	200	1200	—	—	25/6
AC/HL	4	1.0 "	200	35	11700	3.0	15/6
AC/P	4	1.0 "	200	10	2650	3.75	17/6
AC/P 1	4	1.0 "	200	5	2000	2.5	17/6
AC/Pen	4	1.0 "	250	—	—	2.2	27/6

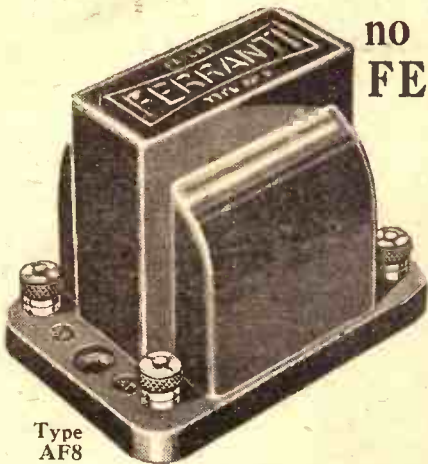


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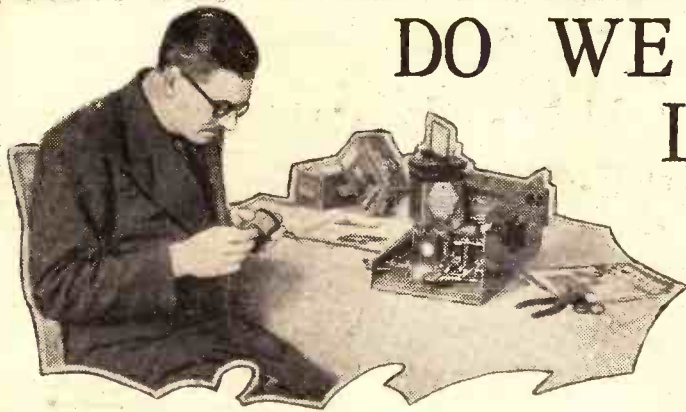
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DO WE WANT THOSE LONG-WAVERS?

By G. V. DOWDING, Associate I.E.E.

Now what about those more distant transmitters? Our Totton friend is practically on the South coast-line, and is in

several others of the long-wavers quite well. I receive Königswusterhausen, Kalundborg and Oslo at fine strength on a simple Det., 2 L.F. outfit. And when I say "fine strength," I mean comfortable loud-speaker volume, without pressing the reaction so far as to upset the quality. Of course, I realise that local conditions differ and that there are listeners who are unable to do as well as that.

However, long-distance daylight radio is almost entirely confined to the long waves in many instances.

Maybe Mr. Capliss has never fitted a really efficient wave-change or, rather, tried a modern set having a convenient panel wave-change embodied in it.

That Odd Half-Hour.

Facile wave-changing, in my experience, is like many other things—you never realise how really useful it is until you have it! When, to go over to long waves, it is necessary to mess about with plug-in coils (lifting the lid of the set and poking about among the "innards") well, many just don't wave-change at all, unless some very special occasion urges them to make the effort.

But when wave-changing is accomplishable without hardly any effort at all, it is an entirely different matter. In a moment of idleness you walk over to the set. It's the week-end, and the B.B.C. aren't lavish with their transmissions. There is silence on the "local" dial settings. You svish the dials around carelessly, but hear nothing except a little "chirrup" here and there.

Then in goes the wave-change switch and you investigate the possibilities of French, German or Dutch long-waving. And often you hit on some quite sffring music to while away an odd half-an-hour.

It might cost eight or nine shillings more in the building of the set, but I deny that there is "complication." I do not think the few extra wires merit that term. In any case, I personally would still consider wave-changing worth while, even if the initial trouble and expense involved were greater.

I fancy that those who will say "No" to the question heading this article are hard-boiled local station listeners who have no time at all for "DX," and who look askance at the admitted infrequent efforts of 5 X X to be "different."

THIS question, the question that forms the title of this article, is prompted by a letter that I have before me as I write. It is from a "P.W." reader, a Mr. Capliss, who lives at Totton, a nice little village near Southampton and on the Winchester-Bournemouth road.

The Case of 5 X X.

Mr. Capliss asserts that wave-changing is not worth while, because there are no easily-receivable long-wave stations worth listening to. He says: "In spite of what your various correspondents and contributors have said on the subject of loud-speaker reception from Hilversum, Motala and Zeesen, I myself have only had reasonable signals from three stations on this wave-band, i.e. Eiffel Tower, Daventry 5 X X and Radio Paris. The Daventry Station is practically useless to the big majority of us because we can get precisely the same programme from various other transmitters. This leaves Eiffel Tower and Radio Paris, and are these two stations worth the cost and complication of a wave-change system?"

Personally, I am of opinion that every "household," as distinct from a special experimenter's set, should have easily operated wave-changing. And I know that there will be a vast number of "P.W." readers holding the same view.

On the other hand it is improbable that Mr. Capliss is a "lone voice in the wilderness." Therefore I feel it is worth while stating a case for the long-wavers.

If the only receivable stations were Britishers, the problem would resolve itself into "Is Daventry 5 X X worth while in the case of valve-set users able to tune-in the medium-wave stations?"

Very Little Fading.

I for one would say yes, right away, for on occasions Daventry 5 X X transmits what I consider are items worth listening to, and which are obtainable from none of the other stations. At the time of writing, for instance, the "long-wave National" has a series of eight o'clock talks all to itself that I find most interesting hearing.

There is this point, too: The lower-wave station taking the long-wave National programme has been known to break down, although such mishaps are rare with British radio. Nevertheless, such break-downs do occur, but with panel wave-changing there is little or no interruption in one's listening; a click of a switch and a touch on the dial, and you are over.

a very happy position for the reception of many of the Continentals. Perhaps he does not experience the fading that mars reception from even the more powerful Continental medium wavers for most of us.

You get very little fading with the long-wavers. Tune in Radio-Paris and he "stays put" for hours; he doesn't alternate between inaudibility and terrific volume as do a large number of the 280 to 550 fellows. And I have the idea, shared no doubt by not a few others, that the programme value of a station falls rapidly with its tendency to fade.

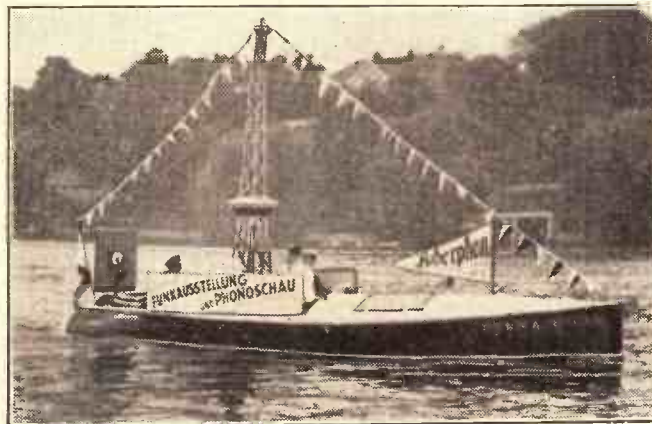
When I've tuned-in a spot of good music or an interesting talk in a language I can nearly follow, I want to sit back from the dials on my set and temporarily forget them. I don't want to have to juggle the controls about in order to "hang on."

Sunday Alternatives.

Then, again, we have a great deal more mush and heterodyning on the medium waves. For pretty clear, uninterrupted reception my experience commends me to transmitters like Radio Paris and Motala.

Not that I consider Radio Paris has a particularly wonderful programme value

SEEN AT BERLIN



A novel method of advertising a local radio exhibition seen on the Wannsee at Berlin.

so far as its actual programme material goes. Nevertheless, I don't suppose I am alone in enjoying some of its Sunday stuff as an alternative to the silence and austerity of our own transmissions.

As a matter of fact many of us get

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found-?



FORMO FIXED CONDENSERS.

THERE are several foreign makes of fixed condensers which are presumed to be above suspicion, better in fact than any which are made in this country. This is almost a fallacy. I have had several instances brought to my notice quite recently where constructors have been let down very badly indeed by such components.

Fixed condensers are, in my opinion, the weaker brothers of radio gear. There are



The new Formo mains condensers, which are extremely efficient, are already available in 2-mfd. and 4-mfd. capacities.

three or four British makes that stand out, and all these are not necessarily those with the widest-known names.

But Messrs. Formo deserve a place in the sun for their two and four mfd. mains condensers, samples of which I recently received. They are marked, sensibly, "working voltage 400," and are paper condensers built into metal cases having substantial terminals which will take a couple of leads at a time quite comfortably.

A special feature of these Formo Mains Condensers is their extremely high insulation resistance. In this regard they reach figures that seem almost fantastical. They are, in short, condensers which can take their places across mains and arouse no trepidation whatever.

NEW R.I. CATALOGUE.

The new catalogue issued by Radio Instruments, Ltd., still further illustrates the wideness and excellence of the range of components produced by this firm, more particularly in regard to the L.F. ends of sets and mains apparatus. But the "P.W." and "M.W." Dual-Range Coil Unit has a whole page to itself.

NEW HEYBERD TRANSFORMER.

Messrs. Heyberd recently sent me one of their No. 400 Auto Transformers. The purpose of this device is the conversion of 200-250 volt mains to 100-110 volts or vice versa. It is for use with 50 cycle supplies, and it will stand anything in the

way of a load up to 100 watts. The price is 22s. 6d.

Many amateurs should find it a very useful transformer, more particularly those who have low voltage mains. Many mains sets and units are not obtainable in 100 to 110 volt models, but this Heyberd transformer can be put between the mains and

the set or unit to raise the voltage to one or other of the more popular 200 to 250 ratings. As with other Heyberd mains gear, this transformer is well made and technically first-class from every point of view.

MY MISTAKE.

I recently gave the retail prices of those ingenious W.B. switches as 1s. 3d. for the two-point and 1s. 6d. for the three-point model, whereas they should have been 1s. and 1s. 3d. respectively. So you see those switches are even still better value for money.

EXPLOSION No. 1.

This is the first number of "Lightning," a staff magazine dealing with the social activities of Ferranti employees.

Although many of the people referred to in the journal are unknown to me, I find the magazine most enjoyable reading, and I wish it every success in the future. I hope Ferranti's will send me a copy of each number.

FOR RADIOGRAM ENTHUSIASTS.

Those readers who desire to transform their radio sets into radio-grams would be well advised to keep the A.E.D. pick-up and tone arm well in mind. It is made by Auto Electric Devices, Ltd.—the firm who are responsible for that very ingenious clockwork-cum-electric gramophone motor.

The A.E.D. pick-up and tone arm is designed as one corporate whole, and does not comprise two distinct items, each universally adaptable to other makes of the oppo-

site part. This is a commendable point, for the arm is offset and sprung so as to give exactly the correct tracking and needle pressure for best results with minimum record wear.

The arm swings easily, and has a restricted movement so that it cannot slip right across the record and cause severe scratching, as sometimes happens where definite stops are not provided. An earthing terminal is fitted.

Another good feature is that the pick-up swivels over, and this greatly facilitates the insertion and removal of needles.

A new and effective principle is employed in the pick-up itself. Instead of vibrating between the pole pieces of the magnet, the

Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department, with the strictest of impartiality, under the personal supervision of the Technical Editor.

We should like to point out that we prefer to receive production samples picked from stock, and that we cannot guarantee their safe return undamaged, as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are, therefore, framed up in a readily readable manner free from technicalities unnecessary for that immediate purpose.

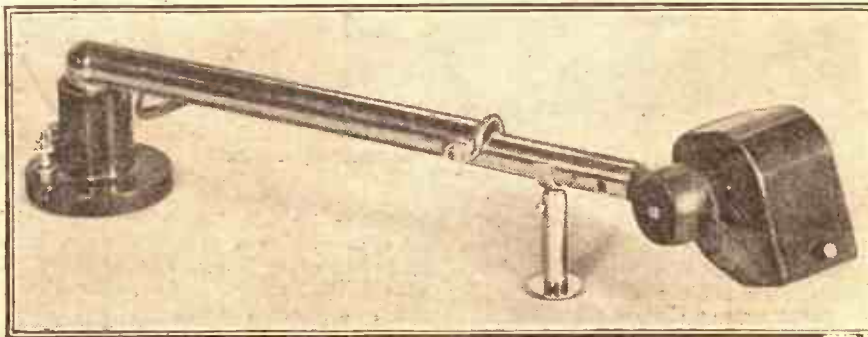
armature moves across the faces of them and an excellently even response with a quite impressive bass lift results.

The instrument is exceptionally sensitive. As a matter of fact, you get a greater output from it than even a small 2-valve amplifier generally needs for comfortable room strength, but, providing you use efficient volume controlling, you have a wonderful flexibility.

The price of the A.E.D. Pick-up and Tone-arm complete and already to fit to a gramophone or turntable, is two guineas, and I must not forget to add that its construction and finish are absolutely first class.

COMETISING THE "MAGIC" THREE.

A slip occurred in the Peto-Scott advertisement which appeared on page 1201 of our March 7th issue. The price of the parts for Cometising The "Magic" Three is £1 8s. 9d., and not £1 9s. 9d. as stated.



Here is the A. E. D. Gramophone Pick-up and Tone Arm complete with the rest that is supplied.

COMETISE YOUR "MAGIC" THREE

with the

CHOSEN COMPONENTS

Every "P.W." reader who built the famous "Magic" Three can now convert it quite easily and quickly into the wonderful Flexi-coupled Comet with the few inexpensive components detailed below.

Needless to say the designer made sure of best possible results by using ReadRad Coils for the conversion.

"POPULAR WIRELESS" says:—

"We used the very convenient special Kit of the necessary new parts which is being supplied for the purpose by Messrs. Ready Radio."

"MAGIC" THREE CONVERSION KIT

1 ReadRad 1931 "Star Turn" Coil	12 6
1 ReadRad "P.W." Dual-Range Coil*	12 6
1 Formo .002 mfd. compression type condenser	2 3
1 ReadRad 3-point wavechange switch	1 6
	<u>£1 8 9</u>

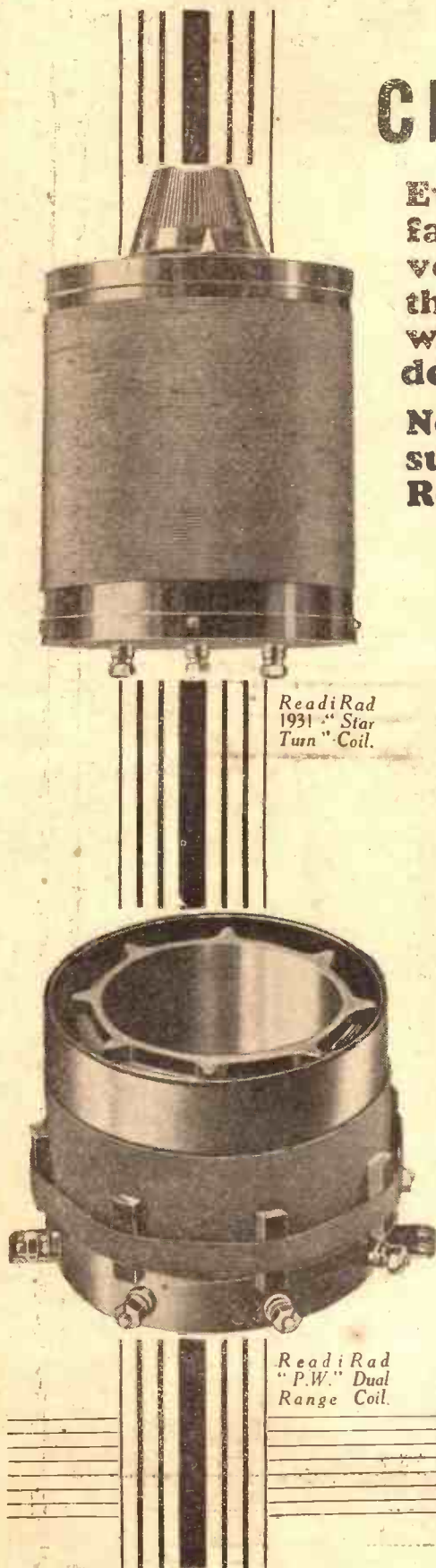
USE ORDER FORM ON PAGE 1243
SEE ALSO PAGES 1240 AND 1243

No ReadRad Coil leaves our Test Room until it satisfies the conditions laid down by "Popular Wireless" and has received an actual broadcast test.

Ready Radio

159, BOROUGH HIGH STREET,
LONDON BRIDGE, S.E.1.

Telephone: Hop 5555 (Private Exchange) Telegrams: READIRAD, SEDIST.



ReadRad
1931 "Star
Turn" Coil.

ReadRad
"P.W." Dual
Range Coil.



HAIRBREADTH ADJUSTMENT

that links two Continents

Wonderful selectivity and fractional movement -

The wonderfully smooth action and fractional accuracy of the Formo Vernier Dial used in conjunction with Formo variable condensers makes tuning of close stations a simple operation with the certainty of clear-cut reception. The scientific thoroughness of Formo condenser construction is your assurance of the best possible results from any set. High performance is further assisted by the enclosed and protected pigtail within the shaft and minimum eddy current losses.



MID LOG VARIABLE CONDENSER.

In 4 capacities. Price 4/6. Weight 4 1/2 oz. Size 3 1/2 x 2 1/2". Small mass of metal, approx. air suspension. Low loss. The finest condenser made.



From all good dealers. Ask us to send you folder P.W.
ARTHUR PREEN & CO., LTD.,
Golden Square, Piccadilly Circus, W.1
Factory: Crown Works, Southampton



DIFFERENTIAL CONDENSER.
.00015 Cap. Price 3/9.
Compact, perfect, integral pointer.

CONDENSERS

BUY YOUR RADIO WHERE YOU



SEE THESE FORMO Displays



The Sign of the Best Dealers Everywhere

ORDER YOUR "COMET" TWO KIT FROM READY RADIO

	£	s.	d.
1 Polished black ebonite panel 14 in. x 7 in. x 3-16 in.	4	6	
1 Cylidon .0005-mfd. single drum condenser	11	6	
1 ReadRad .00015-mfd. differential reaction condenser	5	0	
1 ReadRad 3-point wave-change switch	1	0	
1 ReadRad 10,000-ohm link resistance	1	0	
1 ReadRad On and Off switch	10		
1 Lewcos compression condenser .001-mfd.	2	6	
1 ReadRad P.W. Dual Range Coil	12	6	
1 Formodenser type "H." .002-mfd.	2	0	
2 Teisen sprung valve holders	2	0	
1 ReadRad .0003-mfd. fixed condenser	10		
1 ReadRad 2-megohm grid leak with holder	1	4	
1 Traznic 400-ohm baseboard mounting potentiometer	1	8	
1 Teisen "Ace" L.F. Transformer, ratio 3-1	8	6	
1 Ebonite terminal strip 14 in. x 2 in. x 3-16 in.	1	3	
1 Packet "Jiflinx" for wiring	2	3	
Wanderplugs, screws, etc.	2	6	
	£3	2	6

1 Hand-polished oak cabinet with 10 in. baseboard	1	0	0
2 Valves to specification Det. and Power	19	0	0

KIT A Complete Kit of Components as specified above .. **£3.2.6**
or 12 monthly payments of .. **5/8**

KIT B As KIT A but with two valves as specified .. **£4.1.6**
or 12 monthly payments of .. **7/6**

KIT C As KIT B but with cabinet and baseboard .. **£5.1.6**
or 12 monthly payments of .. **9/3**

THE "COMET" D.C. SAFE POWER UNIT

	£	s.	d.
1 Chassis and Cover with drilled panel 10 in. x 8 in. x 3-16 in.	1	6	0
1 Ferranti Flush Mounting Voltmeter 0-250	2	4	0
1 Varley Power Potentiometer 10,000-ohms	10	0	0
2 Dubilier 2-mfd. fixed condensers type B.G.	7	4	
1 Dubilier 4-mfd. fixed condensers type B.C.	6	0	
1 R.I. Hypercore Smoothing Choke	17	6	
1 Wearite Heavy Duty H.F. Choke (No. HF8)	10	6	
1 Bulgin Potential Divider 20,000-ohms	7	6	
4 Belling Lee Insulated Terminals	2	0	
1 Packet "Jiflinx" for wiring	2	6	
Flex. Screws, Adaptor Plug, etc.	1	8	
	£6	15	0

or 12 monthly payments of 12/3.

For particulars of the "Comet" Three see page 1243.

See also pages 1239 and 1243.

Ready Radio

ORDER FORM To READY RADIO (R.R. Ltd.), 159, Borough High Street, London Bridge, S.E.1

CASH ORDER. Please dispatch to me at once the goods specified below for which I enclose payment in full of £.....

C.O.D. ORDER. Please dispatch to me at once the goods specified below for which I will pay in full on delivery the sum of £.....

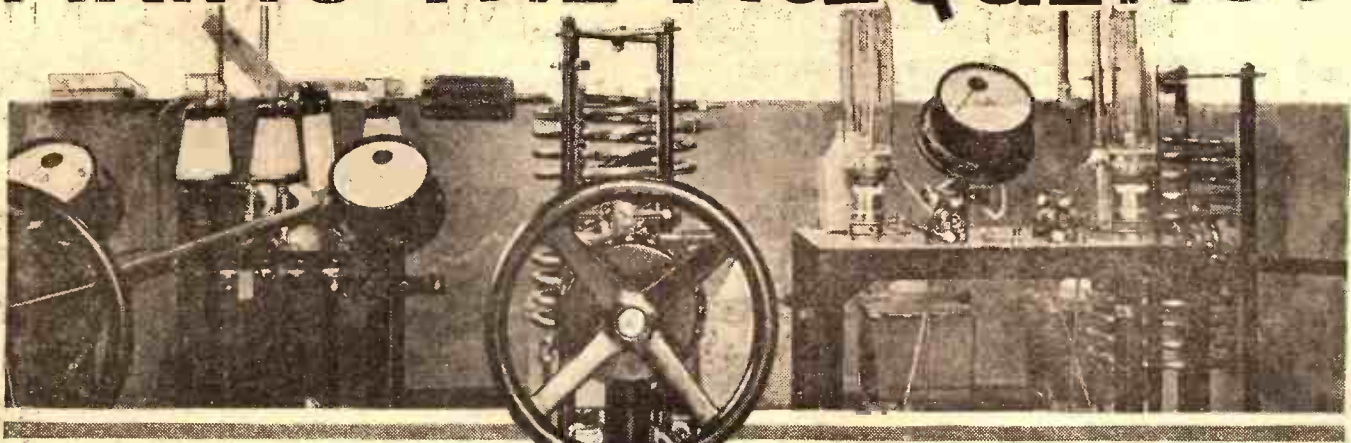
HIRE PURCHASE ORDER. Please dispatch my Hire Purchase Order for the goods specified below for which I enclose first deposit of £.....

Name

Address

KIT REQUIRED

FIXING THE FREQUENCY



IT is the fashion to grumble at the B.B.C.; but although we all do it, we seldom grumble about the quality. Generally it is good, and if occasionally a piano note sounds harsh or the quality of a relay is indifferent, listeners put it down to a momentary lapse or to a landline fault.

But when, as sometimes happens, a whole evening's programme is "edgy," when the definition of music is blurred and there is an odd echo behind speech, we hardly need the next day's newspaper to tell us what happened. We know that there was been a wobble in wave-length, and some other European station has encroached upon our local station's frequency.

It might be thought that such a lapse was due to unpardonable carelessness and that somebody had been shifting the condenser in the transmitter, or altering an aerial or coil. Not a bit of it!

It is one of the radio engineer's most pressing problems, and one which he is ceaselessly striving to overcome. Such a common occurrence as a sharp frost would play havoc with wave-lengths unless proper precautions were taken against it, and for the same reason constant watch is kept against slight changes in filament voltage and anode voltage supplied at the transmitting station.

Crystal Control.

So much has been heard of the quartz crystal as a means of stabilising wave-length or frequency that it is sometimes forgotten that the crystal is only one of three methods in common use at transmitting stations. The B.B.C. at the moment incline to favour the tuning fork method of frequency control, and also the valve master oscillator, both of which methods can be used alternatively to the quartz crystal as a stabiliser of frequency.

When the ordinary tuning fork method is employed, it has usually been found essential to employ some form of temperature control apparatus. This must be capable of keeping the fork at a constant temperature, to within approximately 1 degree Fahr.

Such control is preferably automatic, such as the thermostat. And how good the temperature controlled tuning fork method can be is shown by the fact that it is employed at Hull, Liverpool, Newcastle,

By **P. R. BIRD.**

We hear a lot about this wicked wave-length wobbling. Here is the other side of the picture, with some details of the way in which engineers are tackling the problem.

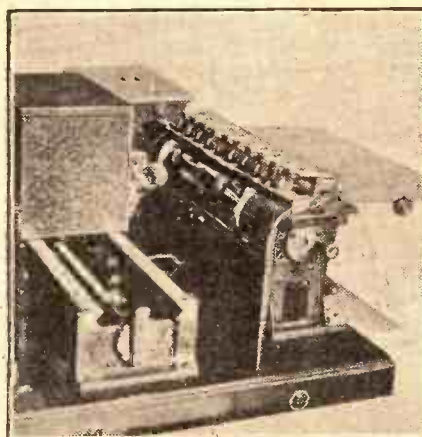
Plymouth, Sheffield, Stoke-on-Trent and Swansea.

All these stations share the wave-length of 288.5 metres, which corresponds with a frequency of 1,040,000 cycles per second. After many months in service the constancy can be defined as being about plus or minus 1½ in 100,000. These figures speak for themselves!

German Broadcasters.

The Germans, on the other hand, are inclined to pin their faith to the quartz crystal method of frequency stabilisation. Their problem does not seem so severe as that of the B.B.C., for in place of ten or eleven stations the Germans decided to hold three only on one wave-length, viz., Cologne, Aachen and Münster. It is only fair to say that in the case of these three

TRANSATLANTIC RADIO PICTURES



One of the machines used in high-speed radio-picture transmission between London and New York. By this means documents, etc., can be "photographed" across the Atlantic in a few minutes.

stations the frequency was certainly higher than for that of the B.B.C. stations named.

The German wave-length was 227 metres, which correspond with a frequency of 1,319 kilocycles. And in practice it has proved that the three German stations are more liable to "wobble" than the British relays.

When a valve master oscillator is used, no change must occur in the supply voltage to the filament, anode or grid, and another difficulty arises in keeping the inductance and capacity values of the associated circuits absolutely constant over long periods. Even when they are maintained at an absolutely even temperature this is a problem of considerable difficulty!

This part of the problem becomes specially acute when the apparatus is started up to begin the day's transmission. At such times the comparatively sudden temperature variations, etc., may combine to send the wave-length "all to pot"!

Even where every precaution can be taken, such as in the beam stations, a wobble of ten kilocycles per second in starting up is not unknown!

In one of the latest constant frequency devices two oscillator valves are used, in combination with the principle of differential expansion. The insulating material on which the tuning coil is wound is placed near a brass rod carrying a vernier condenser so situated that any mis-tuning of the coil caused by heat is automatically compensated for by the condenser, and vice versa.

A Double Check.

This ingenious method, fundamentally simple in theory, but confoundingly difficult in practice to work out, renders temperature control almost unnecessary, and it gives a degree of accuracy which hitherto had seemed out of reach and impossible.

It should not be forgotten that sometimes different methods of frequency stabilising are used in conjunction or alternatively. A good example of this is the new Warsaw station, now testing on about 1,200 metres, which employs both valve and crystal control.

When it is remembered that some of the European stations experience almost arctic conditions, while others have semi-tropical volcanic and cyclonic disturbances to contend with, it will be seen that to fix a broadcast frequency is not easy.



THE G.B.C. MOVES IN

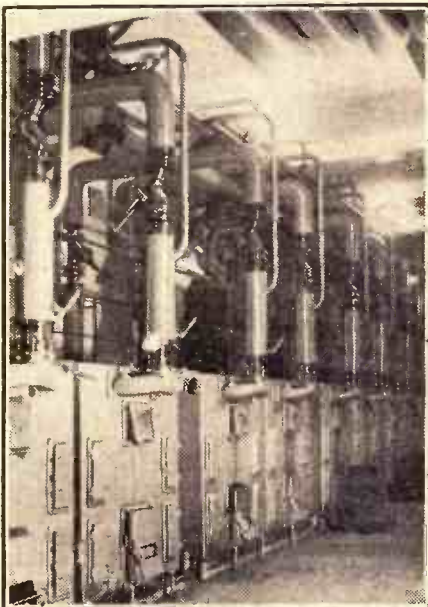
THE article could also have been entitled "From Potsdamerplatz to Reichskanzlerplatz," but this would not indicate much to those of my readers who do not know Berlin. Potsdamerplatz, close to which the former studios and offices of the Berlin broadcasting company were situated, is the centre of the old business Berlin; Reichskanzlerplatz, away out west is the centre of Berlin's future business centre, at least so the architects say.

The district railway, the underground, and the buses and trams take you to within a stone's-throw of Berlin's new broadcasting centre. The new "Funkhaus" is situated under the German Eiffel Tower, the "Berliner Funkturm."

A Berlin Rumour.

I hear rumours of a new much higher-powered broadcasting station that will be erected some distance from the present Witzleben station, but I am sure that the Funkturm will remain even though it does not carry the aerial of the broadcasting station as it does at present.

KEEPS THEM WARM



This magnificent central-heating plant generates heat for warming the building.

* * * * *

If you glance at the above heading photograph you will gather that Berlin's new Broadcasting House is a truly tremendous edifice and one that completely dwarfs the B.B.C.'s Portland Place affair. And "P.W.'s" Special European Correspondent gives you some details of the Haus des Rundfunks that emphasises both its majesty and its magnitude.

* * * * *

Professor Poelzig of Cologne designed the house. The outer surface of the walls is brownly black. If you are a normal kind of visitor and not a radio broadcaster you enter by means of the three glass doors above which you see the legend HAUS DES RUNDFUNKS; if on the other hand you belong to that perspiry band of people who work in front of microphones, then you enter the building at the back, through the stage door, so to speak, and are confronted by a large bank of clocks.

Not one clock but whole rows of them. They all give the same exact time and all seem to be driven by one huge master clock in the centre. First of all, I thought that all and sundry would have to put their card in a slot and let the clock stamp the time of entrance on it, but seemingly this is not required of poor over-worked radio artistes.

Rest-rooms, staff-rooms, etc., are all situated here and the artistes can enter one of the three main studios or take one of the funny non-stop lifts up to the second floor to the studios belonging to the all-Prussian educative broadcasting company, the Deutsche Welle.

A Good Colour Scheme.

As I wandered along the corridors, I found that at one place the walls were green, at another yellow, at another blue. One of the many office boys told me the reason why. The All-German Broadcasting Company's part of the building, that belonging to the holding company, the Reichs-Rundfunk-Gesellschaft, was in yellow; the part allotted to the Berlin broadcasting company was in blue; the part used by the Deutsche Welle is green. Thus one can always see in what part of the building one is.

The main entrance hall goes right up to the top of the building, a glass roof lighting

the whole. The balustrades are not in wood, or stone, or common steel or metal; they are in a kind of burnt porcelain stone and give a very novel effect.

Immediately opposite the entrance, the whole length of the hall, are cloak rooms where you can leave your outdoor clothing under the safe watch of a white-capped "maiden" of from 40 to 60 years of age.

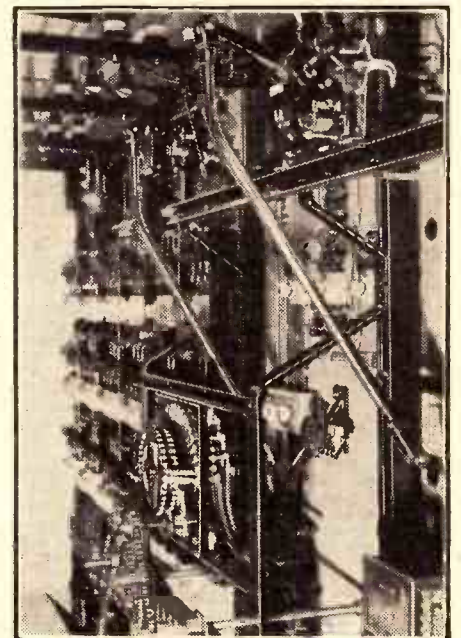
And from here you can enter one of the three main studios. You first go through one door with a glass window, then through a tiny corridor and then through another glass-panelled door into the studio. These glass panels are something new in broadcast house design.

Heinrich Hertz Helps.

The Heinrich Hertz Institute even unbent to a certain amount of research and the result is windows and glass-partitioned doors which are absolutely sound-proof. To prevent breaking of the glass panels wire netting is embedded in the glass,

(Continued on page 1244.)

SOME SWITCHES



The main switchboard is a rather fearsome-looking affair, as you can see. Note the two huge switches that project obliquely upwards.

ORDER YOUR "COMET" FROM

Ready Radio

Terms to suit all pockets

CASH or **E.P.** or **C.O.D.**
 with order (easy monthly payments) (pay on delivery)

ORDER FORM To READY RADIO (RR) Ltd.,

159, Borough High Street, London Bridge, S.E.1.

Please send me:

THE COMET THREE (Foundation Circuit)

KIT A	Complete Kit of components as specified	£4. 5. 0	or 12 monthly payments of	7/9
KIT B	Complete Kit of components as specified with set of three Mullard valves.	£5. 12. 6	or 12 monthly payments of	10/4
KIT C	Complete Kit of components as specified with set of three Mullard valves and attractive Oak Cabinet	£7. 2. 6	or 12 monthly payments of	13/-

Additional Components for Flexi-Coupled Comet 18/3

THE FLEXI-COUPLED COMET

KIT A	As Kit A above but with additional components as specified for Flexi-Coupling	£5. 3. 3	or 12 monthly payments of	9/5
KIT B	As Kit B above but with additional components as specified for Flexi-Coupling	£6. 10. 9	or 12 monthly payments of	12/-
KIT C	As Kit C above but with additional components as specified for Flexi-Coupling	£8. 0. 9	or 12 monthly payments of	14/8

Completely Assembled Flexi-Coupled Comet.

Ready for use—aerial tested—valves, cabinet and royalties included.
 £9. 5. 9 or 12 monthly payments of 17/-.

Additional Components for L.F. Control.

Price £1. 10. 10. When required with any of the above Kits add £1. 10. 10 to the cash price or 2/9 per month to the monthly payments.

Additional Components for Radio-Gramophone.

Price 13/6. When required with any of the above Kits add 13/6 to the cash price or 1/3 per month to the monthly payments.

Magic 3 Conversion Kit - - - £1. 8. 9

(Put a X in this column against the items required.)

CASH ORDER FORM Please dispatch to me at once the goods marked above for which I enclose payment in full of £	C.O.D. ORDER FORM Please dispatch to me at once the goods marked above for which I will pay in full on delivery the sum of £	EASY PAYMENT ORDER FORM Please dispatch my Hire Purchase Order for the goods marked above for which I enclose first deposit of £
--	---	---

Name

Address

Nearest Railway Station

APPROVED COMPONENTS FOR THE COMET THREE

1 Ebonite panel, 18 in. x 7 in. s. d. (drilled to specification)	6 0
1 J.B. or Cylcon '0005' mfd. "thumb-control" variable condenser	11 6
1 ReadiRad '00015' differential reaction condenser	5 0
1 ReadiRad L.T. Switch	10
1 ReadiRad 3-point on-and-off wave-change switch	1 6
1 ReadiRad "P.W." dual-range coil	12 6
5 Telsen valve holders	3 0
1 ReadiRad '0003' mfd. fixed condenser	10
1 T.C.C. 2 mfd. condenser	3 10
1 ReadiRad 2 meg. grid leak and holder	1 4
2 L.F. Transformers: Telsen "Radiogrand"	12 6
and Igranite "Midget"	10 6
1 ReadiRad 10,000-ohms spaghetti resistance	1 0
1 ReadiRad 25,000-ohms spaghetti resistance	1 6
1 Lewcos .001 mfd. maximum compression type adjustable condenser	2 6
1 Formo .002 mfd. maximum compression type adjustable condenser	2 3
1 ReadiRad drilled terminal strip, 18 in. x 2 in.	1 9
1 ReadiRad sheet of copper foil, 18 in. x 10 in.	1 6
9 Belling-Lee terminals Type 'R'	2 3
3 Belling-Lee G.B. plugs	6
1 Packet of Jiffilins, for wiring-up	2 6
	£4 5 0

Additional Components for "Comet" L.F. Control

1 Varley 1/2 meg. Volume Control	s. d. 6 0
1 Atlas L.F. Choke	1 1 0
1 T.C.C. 2 mfd. Fixed Condenser	3 10
	110 10

Additional Components for Flexi-Coupling "Comet."

1 ReadiRad 1931 "Star-Turn" Coil	s. d. 12 6
1 ReadiRad 100-ohm Potentiometer	2 9
1 Bulgin Signal Lamp (D.9)	2 6
1 Low Consumption Bulb 2, 4 or 6 volts (when ordering please state which voltage is required)	6
	18 3

Additional Components for "Comet" Radio-Gram.

1 Igranite Megostat 25 megohm.	s. d. 6 0
1 Bulgin I.3. Single Circuit open Jack	1 3
1 Bulgin P.15. Jack Plug	1 3
1 Bulgin Radio-Gram Switch S.36	2 0
1 Bulgin Ext. Rod	0 0
1 Bulgin Baseboard Bracket	3
1 Flex. Wire, Screws, etc.	0
	13 6

ANY PART MAY BE PURCHASED SEPARATELY

TO INLAND CUSTOMERS
 Your goods are dispatched *post free* or carriage paid

TO OVERSEAS CUSTOMERS
 All your goods are very carefully packed for export and insured, all charges forward.

See also pages 1239 & 1240

THE G.B.C. MOVES IN

(Continued from page 1242.)

Anybody can see if something is on in the studio or not, or can watch for a sign from inside or outside before opening the door.

I got somewhat lost after passing through the one studio and suddenly found myself on the gallery of the great studio, which has not quite been completed yet. It is the world's largest, measuring 130 ft. in length, 70 ft. in width in the centre (one end is wider, the other narrower), and 40 ft. in height. The gallery adds a further 3 metres to the length and, in all, 8 metres to the breadth of the hall at the height of the gallery.

Making Them Welcome.

No light from outside penetrates into this huge studio, all the lighting is artificial. Passing out of the cold air of the unfinished studio, I climbed up many stairs to the top of the building.

Walking along the corridors, one noticed the thick rubber covering the floors and completely deadening the sound of footsteps, and along the top of each corridor you could see the small projecting ledges along which the different microphone and other wiring of the house is carried.

Great care has been given to this wiring, as no telephone or electric wires are allowed near the microphone leads. The wiring has been laid on ledges so that one can easily get at the leads for changes, etc.

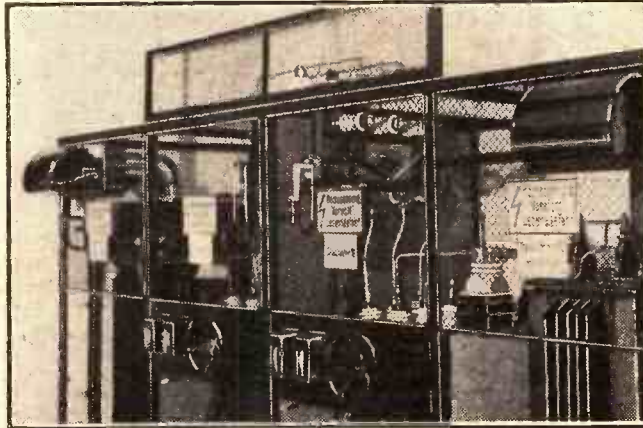
Up on the fourth floor are four hotel bedrooms, and two huge kitchens. I think the idea of having four bedrooms for broadcasters coming from other parts of Germany and only staying a night, or for those who have to broadcast very late and cannot get home, is very good indeed.

A Radio Roof Garden.

The kitchens are all electric, each one being fitted with a special indicator which shows the cook which stove or oven is switched on at the moment. One small dining-room is for the directors and any

visitors they wish to entertain to lunch, and large dining-rooms are for members of the staff and artistes.

COLOSSAL POWER HANDLED



The Converter Station where the 6,000-volt alternating-current supply transmitted from the big Berlin-West power house is stepped down to 220 volts before being distributed through the building for lighting, power amplifiers, and so on.

In summer time there will be access to the roof garden situated on the roof of the

FINISHING TOUCHES



Decorators busily at work around the artistes' entrance to studio No. 3.

large studio, from where there is a lovely view on to the Funkturm and the Grunewald on one side, and on to Berlin on the other side.

WORLD'S LARGEST STUDIO



They claim that Studio No. 3 in Berlin's new broadcasting headquarters is the largest in the world. It is 130 ft. long, 70 ft. in width in the centre, and 40 ft. high. You will appreciate its truly enormous dimensions when we point out that it could envelope a pretty big house complete with garage and garden!

set is not working at all! However, I made a new wave-trap—the Regional Brookmans Rejector, three .001-mfd. condensers and a 50 plug-in coil; it worked! It struck the set dumb! And I have now to tune in the local like a shy foreigner.

Though the wave-trap is generally effective the coil will at times drag in that local. I don't know how to screen the coils, so there is nothing for it but to grin and bear it till the new Scottish station is erected near Falkirk, 22 miles away.

During the intervals I have added the DX unit. I lost a few nights' sleep reading how to make the "P.W." dual-range coil. After careful and close attention to the making of that coil, I must have missed fire, as the unit proved a dud; I gave the screen-grid valve 120 volts (separate battery), and the only thing I got was the local with a severe dose of asthma, hoarse and weak; it came in panting.

When I looked at the unit with its eight plugs and its trailing leads I concluded that amplifiers are nullifiers. Your dual-range advance is too quick for my step with its change-over switches and long waves stations, so,

I am going to construct the "Magic" Four with its good old Lewcos coils. This may be a step backwards, but a step forward for me.

My knowledge of radio is limited to what I picked up since reading POPULAR WIRELESS, now a little over eighteen months, though I scratched a crystal with a cat's whisker before that time. I enjoy reading your journal. I laugh when I read "Ariel," and think when I read Capt. Eekersley (of course there are other wits and pundits peeping through your pages). However, my natural greenness faded.

The Best Waves.

My ideas of radio, though fresh, had no roots in foundation, they came direct from your paper, and there may be a slight difference between what the journal meant and what reached my brain-box.

After reading the three articles by Capt. P. P. Eekersley on the "Best Wave for Broadcasting," my views are now considerably altered. It was a revelation to me to know that there were two kinds of rays, ground and space rays, with the ground ray hugging the earth with a devotion dear to the engineer, and the space ray bounding about the ether like a tennis ball in action, and only the Heaviside layer keeping them from interfering with the Martian programmes.

Now, a good ground ray on a 75-kw. basis can do over a three-hundred-mile flat race in daylight, but when darkness falls his space ray companion, if in an angry mood, will clip off two-thirds of his record, leaving the engineer's fancy with a cool hundred for home defence. Now, this is what is puzzling me: as the Regional scheme advances with a network of high-power stations all over the country, will not the multiple ground rays render existing sets earth-bound or non-selective?

Reaching out for space rays (and this is what gets my goat against the local station) is not only an interesting hobby, but wide selectivity of the sky is much preferable to ground ray congestion.

A Jab at Mr. Jevons.

Should the B.B.C. adopt J. C. Jevons' rapacious ground ray component of 1,000—2,000 metres, they will succeed in nailing us down to our native hills. Jevons intends putting us on our beam ends; he is a dangerous man, his beam aerial directional principle is simply an attempt to slip the triple half-nelson across us, vertically, laterally, horizontally.

The 250-550 wave-band is the link that unites the bottom dog three-valver of all Europe. I see nothing wrong with those wave-bands if the continent would only heap on a few more kilowatts to ginger them up; it would give the ether searcher a sporting chance. The so-called fading is nothing else than a friendly ta-ta! back-in-a-minute attitude of international brotherhood.

The solution of congestion, both ground and space, lies along the lines of the wave-trap. Why not invent a multiple twin trapper?—one section bagging the ground rays and the other section collecting the spacial components? Surely the multiple twin trapper is within the limit of practical radio? As one disturbing factor cancels another disturbing element of equal intensity, the wave-trap would require to be constructed in harmony with the law of negative cancellation.

P. FITZPATRICK.

P.S. Dear Sir,—Should you contemplate destroying, cutting or mutilating this letter, remember I wrote it without an anaesthetic.—P. F. Possilpark, Glasgow

WITHOUT ANAESTHETIC!

A Glasgow Reader recounts some interesting experiences.

The Editor,
POPULAR WIRELESS.

Dear Sir,—Some time ago I wrote a long sick report about my set as a result of its strong liaison with the local station. Two of the several diagnosis which you suggested proved correct, viz., pick-up on the coil and proper adjustment of the wave-trap. I live a quarter of a mile from the local station and can hear the programme distinctly without earth or aerial at fairly loud strength, but I haven't tried it without the speaker.

Believe me, though strange, I imagine I hear the local even when the

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The supreme new dry battery by the makers of the world famous Exide

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60 volts 7/- • 66 volts 7/6
99 volts 11/6 • 120 volts 14/-

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Obtainable everywhere from all good dealers.

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All Editorial communications should be addressed to the Editor, POPULAR WIRELESS, Tallis House, Tallis Street, London, E.C.4.

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The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the subject of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

QUESTIONS AND ANSWERS

"YOU CAN'T BEAT THE NEUT."

C. C. S. (Lincolnshire).—"I suppose you will class me as an old country chaw-bacon when I tell you that I do not use an S.G. valve, would not think of using an S.G., and hate the sight of an S.G. valve. I use a neut.

"Moreover, I contend you cannot beat a neut. Perhaps the S.G. is all right if you have a power station hitched on to your house to

supply H.T., etc., but where batteries are concerned I find it is a hopeless proposition to keep pace with the S.G. Give me the old-fashioned H.F. valve with a neutralising arrangement every time.

"I am interested in foreign stations and I sure can get them good and plenty. What I do find is a bit of a nuisance is that, however carefully I "compromise" the neutralising adjustment, I cannot get the same adjustment for the N.C. on the lower wave-band as for the upper.

"I make my own coils and I have experimented with windings, etc., trying for this, but so far without success. Is there any

method of keeping the setting satisfactory for both waves?"

In spite of its greater H.T. consumption, the S.G. valve scores heavily on this point, for it is possible to switch over from ordinary to long waves without any instability appearing, or any apparent loss of sensitivity. With a neutralised valve there is nearly always some difficulty on this point if the set is worked at anywhere near its full amplification, and we are afraid there is no way out of it, except by experiment along the lines you have tried, or else by using two neutralising condensers with a switch, one being set for the long-wave coil and the other for the ordinary wave-band.

Unless your set is very packed in, this might be quite satisfactory, the two condensers being mounted side by side with a common connection on one side and a plug connector to the other. This will make contact in turn with either the long waves N.C., or the other, adjusted for stability on the ordinary waves, as required.

(Continued on page 1248.)

HOW IS THE SET GOING NOW?

Perhaps some mysterious noise has appeared, and is spoiling your radio reception?—Or one of the batteries seems to run down much faster than formerly?—Or you want a Blue Print?

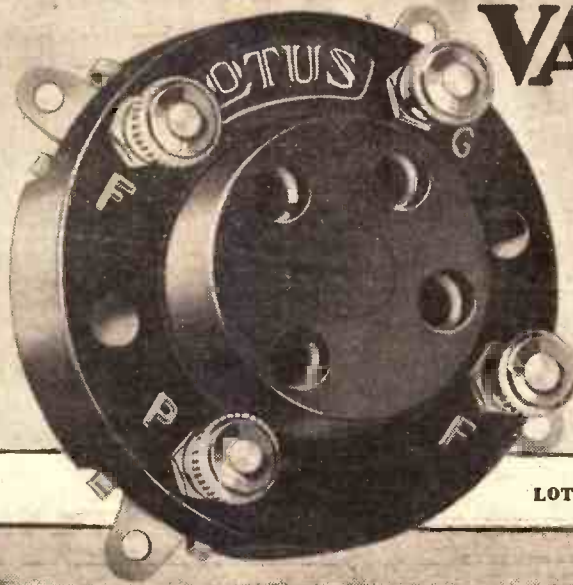
Whatever your radio problem may be, remember that the Technical Query Department is thoroughly equipped to assist our readers, and offers an unrivalled service.

Full details, including scale of charges, can be obtained direct from the Technical Query Dept., POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

A postcard will do. On receipt of this an Application Form will be sent to you free and post free immediately. This application will place you under no obligation whatever, but, having the form, you will know exactly what information we require to have before us in order to solve your problems.

LONDON READERS PLEASE NOTE: Inquiries should NOT be made by phone or in person at Fleetway House or Tallis House.

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SPECIFIED IN THE "COMET TWO"

the Lotus Miniature Type Anti-Microphonic Valve Holder is only 1½ in. in diameter, and has all surplus metal removed from between the valve legs; the phosphor bronze springs and leg sockets being all in one piece. Made from finest bakelite mouldings, this valve holder is almost indestructible.

Price (with or without terminals), 1/6.

Also Anti-Microphonic Model (with terminals), 1/9; (without terminals), 1/6; and Rigid Type Valve Holder (for A.C. Valves) (with terminals), 1/-; (without terminals), 9d.

From every Wireless Dealer.

LOTUS RADIO, LTD., LOTUS WORKS, MILL LANE, LIVERPOOL.

"All the latest Wireless Hits Every Published Refinement in latest "COMET 3"

... included in Pilot Radio Kits, of course

C.O.D. CASH or H.P. ORDERS OVER 10/- **YOU PAY THE POSTMAN WE PAY THE CHARGES**
STRICT PRIVACY GUARANTEED

The official list of specified parts FOR KIT "A" approved by "Popular Wireless."

	£	s.	d.
1 Red Triangle ebonite panel, 18" x 7", ready drilled and slotted to specification	6	0	0
1 Baseboard, 10" deep	1	6	0
1 Cydon 0005-mfd. "thumb control" variable condenser	11	6	0
1 00015-mfd. differential reaction condenser, 3.B.	4	6	0
1 Keystone 3-point wave-change switch	1	6	0
1 Keystone L.T. switch	1	3	0
1 Keystone P.W. dual-range coil	12	6	0
3 Telsco valve holders	3	0	0
1 Sovereign 0003-mfd. fixed condenser	3	0	10
1 Franklin 2-mfd. fixed condenser	3	0	0
1 Lissen 2-meg. grid leak and holder	1	6	0
2 L.F. transformers (Telsco "Radiogram" and Igranite "Midge")	1	3	0
2 Keystone spaghetti resistances, 10,000 and 25,000 ohms	3	0	0
1 Formo or Sovereign 001-mfd. (max.) compression type condenser	1	6	0
1 Formo or Sovereign 002-mfd. (max.) compression type condenser	2	3	0
1 Terminal strip, 18" x 2"	2	0	0
1 Sheet of aluminium foil, 18" x 10", for covering underside of baseboard	1	0	0
9 Belling-Lee Terminals	2	3	0
1 Konec-kit, comprising Keystone angle brackets, wire for connecting, wood screws, G.B. plugs, etc.			

GRATIS

C.O.D. or CASH with ORDER **£4 0 0**

Any parts supplied separately. If value over 10/-, sent C.O.D.

KIT A - £4

PAY THE POSTMAN or 12 monthly payments of **7/4**

Cabinet £1-0-0
Valves as Specified £1-7-6
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FLEXI-COUPLED & L. F. Controlled "Comet 3"

Add 38/6 to each Cash price or to 3/6 each monthly payment. N.B. When ordering please state your requirements clearly as shown in the special order form printed in this advertisement.

FLEXI-COUPLED

(Described P.W. 21/2/31).

EXTRA COMPONENTS:

- 1 Keystone Star-Turn Selector Coil 12/6
- 1 400 ohm B.M. Potentiometer 1/6
- 1 Bulgin Panel Light (without bulb) 2/6

N.B. Add 18/6 to each C.O.D. or Cash Price or 1/6 to each monthly payment below. When ordering "Comet 3" Kit, please state if the panel is to be drilled for Pilot Light, Selector Coil or both.

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EXTRA COMPONENTS:

- 1-1 Megohm Volume Control (Igranite or Sovereign) 6/0
- 1 Single Circuit open Jack and Plug (Bulgin) 2/6
- 1 Single Pole Change-over Switch (B.M.) 4/0
- 1 Flex and G.B. Plug 3/0

N.B. Add 12/9 to each C.O.D. or Cash Price or 1/2 to each monthly payment.

L.F. CONTROLLED

(Described "P.W." 28/2/31).

EXTRA COMPONENTS:

- 1-1 Megohm Volume Control (Igranite or Sovereign) 6/-
- Output Filter Choke (Pye or Lissen) 12/6
- 2 mfd. Condenser (Dubilier or Lissen) 3/6

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FINISHED INSTRUMENT

Complete for Radio-Gramophone (described March 7th) with Flexi-Coupling and L.F. Control.

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(Ready built, exactly as specified. French polished Oak cabinet. Aerial Tested. Mullard valves. Royalties paid.)

FREE Every "Comet 3" Pilot Radio Kit contains a **FREE KONEC-TERKIT**, comprising Panel Brackets (Keystone Die-cast Aluminium Brackets with patent slots), wire for connecting, wood screws, G.B. plugs, etc., Worth 5/-

FREE Every purchaser of the Pilot "Comet 3" will receive Free a full-sized blue print and a copy of "Popular Wireless" containing full constructional details.

FREE The owner of a Pilot "Comet 3" becomes automatically entitled to Free Technical Advice and Assistance.

POST THIS EXPRESS ORDER FORM

Please send me C.O.D., CASH WITH ORDER, H.P. (strike out particulars and items which do not apply).

- Kit "A" "Comet 3."
- Kit "A" Flexi-Coupled "Comet 3."
- Kit "A" L.F. Controlled "Comet 3."
- Kit "A" Flexi-Coupled and L.F. Controlled.
- Kit "A" "Comet 3" Radio-Gramophone Model, including Flexi-Coupling and L.F. Control (Cross out any refinements not required).
- "Comet 3," finished instrument.
- Pilot Kit for Cometsing my "Magic Three" for which I enclose H.P./DEPOSIT/CASH.

Name.....
Address.....

..... "P.W." 14/3/1931

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Better built with Pilot Kits

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1246.)

Do not forget that the wiring should be kept short, or you may get instability troubles arising.

FITTING A DECOUPLER.

R. T. L. (Plymouth).—"At present the set is very good, but it seems to want to motor-boat or 'pop-pop-pop-pop' after I have had an H.T. battery on for about a month. I have heard of a similar case which was cured by fitting decoupling, whatever that is.

"Could I do this to my set, and, if so, what parts would be needed and how should I wire them? I should be very glad if I could, for it is very unpleasant at the present time, and far too expensive for the comfort of my pocket."

It is quite easy to insert a decoupling device. The extra parts required are a fixed resistance of from 20,000 to 40,000 ohms, one of the new spaghetti type being quite suitable, and a large fixed condenser, preferably 4 but not less than 2 mfd.

The procedure is as follows: The lead which goes from the H.T. plus terminal that supplies the detector valve to the primary of the low-frequency transformer should be broken. The resistance should be inserted between this H.T. terminal and the low-frequency transformer primary.

From the side of the resistance which is now joined to the primary terminal a lead is taken to one side of the large fixed condenser. The other side of this condenser is connected to H.T.— or to the earth, or some point connected to earth.

If preferred, the scheme can be employed externally to the set if the latter has a separate H.T. terminal for the detector, and in this case the resistance would be inserted between the H.T. positive lead of the H.T. supply and the H.T. positive on the terminal strip. One side of the condenser must then be connected to the H.T. positive terminal on the set and the other side to the H.T. negative.

TROUBLE WITH A ONE-VALVER.

REX (Wrexham).—"I have recently constructed the 'Titan' one-valve set. Results

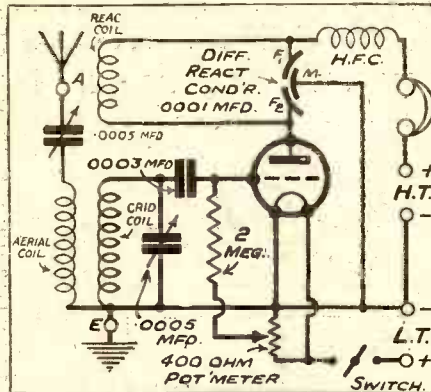
are really excellent on low waves, both home and foreign stations coming in with a rare punch.

"Long waves, however, are not so good. The reaction condenser has little or no effect on long waves. As unit and choke are home-made from description given in 'P.W.' what do you suggest is wrong and what is the cure?"

"I have a fancy for the one-valve dual-coil set, 'P.W.' 440, but wonder if expense and trouble would be worth while, money being rather scarce."

We would advise you to go in for the set employing the new coil if you can possibly manage it. It would certainly be worth while, for the "Dual-Coil".

MISSING LINKS No. 3.



Here is the completed diagram, part of which was given last week. It will be seen that a potentiometer has been added, the leak being taken to its slider, thus allowing smooth reaction to be obtained.

One is extremely efficient and being altogether modern is certainly in advance of your present receiver.

Anyhow, there are several things which might account for poor long-wave results, and we are a little suspicious of the choke, although you say it was made from the description given in "P.W." You might try another choke if you have one on hand wired in series with it, as this is quite likely to cure the trouble straight away.

If, however, the trouble is due to rather a "dull" valve we think you could overcome it by increasing the number of reaction turns on the coil unit which, being home made, could readily be altered by you. Half a dozen or so extra turns would probably make all the difference.

TRAMWAY HUM.

"UNTHANK" (Norwich).—"In my time I have battled with back coupling, fought a good fight with neutralisation, done my bit in distortion curing, and generally felt my feet in radio matters. But trams beat me!

"What is the good of a fine set which will give you the high notes, the low notes, and the middle notes, if at the same time it gives you the clinkity-clonkity-clackity-bumpity-bong-bang of a tram coming down the road? I am told there is absolutely no way of getting round this tramway interference. Is it as bad as all that?"

Well, it is hardly "as bad as all that," but we are afraid we must admit that tramway interference, like that from electric trams, etc., is extremely difficult to deal with.

Sometimes it is impossible for the listener to effect a cure, and the only way in which the nuisance can be abated is for the authority concerned to consent to modify their trams or other apparatus in such a way that the sparking or whatever it is that causes the interference is either reduced or eliminated altogether. This may require an expensive alteration of plant.

In fairness to many of the tramway companies it should be said that, on the whole they have been very willing to meet the B.B.C. in this matter.

In really bad cases, the most satisfactory way of dealing with such interference is for the listener or possibly a group of listeners concerned to inform the B.B.C. of the full details, so that suitable steps can be taken to abate it.

(Continued on page 1250.)



NEW MODEL 31 DOUBLE CONE CHASSIS

New Cone Principle. Greatly Improved Results.

ONCE again Wates have triumphed with the greatest advance in Cone Speakers! The New Model 31 employs two cones of special and different texture, the large one of heavier density than the smaller to permit perfect response of the low and high frequencies, respectively. Both cones are scroll cut (an exclusive Wates feature) to avoid a direct line through the sound frequencies and the suspension of the large cone, by a unique method, permits absolute freedom without any self-resonance.

The positively amazing life-like reproduction and full-throated volume excel anything that has yet been produced irrespective of price, size or construction. Hear it at your dealers—you will scrap your present speaker at once and transform flat, unbalanced sound into vivid, soul-stirring realism.

AND THE PRICE IS 8/-, 12 in. Model. 14 in. Model, 9/-; 20 in. Model, 11/-.

NEVER BUY A SPEAKER OR UNIT UNTIL YOU HAVE HEARD THE WATES

All the following Units can be fitted to the Wates Chassis, without alteration, in a few minutes by means of the Wates Universal Bracket, supplied with all Chassis:—Blue Spot 66R, 66P, Ormond, Blue Spot 66K, Watmel, Ediswan, Hepra, G.E.C., Lissen, Trilatron, Brown Vec, Amplion B.A.2, Loewe, W. & B. Silver Chimes, Grawor, Grassman, Togaf, Six-Sixty, Kukoo, and the Wates Star.

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H.P. Strict Privacy Guaranteed to all Easy Payment Orders.



Cometise your Magic 3 for 26/9

With this special PILOT RADIO KIT

Components Specified:

- 1 Keystone Star Turn Selector Coil 10 6
- 1 Formo Compression-Type Condenser 2 3
- 1 Keystone P.W. Dual Range Coil 12 6
- 1 Keystone 3-point Wave-change Switch 1 6

Specially packed and sent C.O.D. for **£1 6 9**

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Special lines through the Post.

KEYSTONE "P.W."

DUAL-RANGE COIL

As specified and approved by "P.W." Guaranteed to specification. Used in the "Comet 3" and 12/6 the "Comet 2."

KELSEY S.W. ADAPTOR

Just plug in to your present set. No extra valves or batteries required. From 16 to 52 metres. Enables you to receive Ultra Short waves without interfering with the range of you set.

Complete Kit ready for assembly 31/-
Ready assembled and Tested 37/6

Officially Approved PILOT RADIO KIT for the "Comet 2"

58/- C.O.D. CASH. KIT "A"

or 12 monthly payments of 5/4

- 1 Panel 14" x 7" x 3/16, Peto-Scott, ready drilled 4 6
- 1 .0005 mfd. Drum Dial Tuning Condenser, Cylind 11 6
- 1 .0001 mfd. or .0002 mfd. Differential Reaction Condenser, Formo 3 9
- 1 5-point wave-change Switch, Peto-Scott 1 3
- 1 On-off Filament Switch, Peto-Scott 1 0
- 1 .001 mfd. (max.) Compression-type Condenser, Sovereign 1 6
- 1 "P.W." Dual Range Coil, Peto-Scott 12 6
- 1 .002 mfd. (max.) Compression-type Condenser, Sovereign 2 3
- 2 Sprung Type Valve Holders, Telsen 2 0
- 1 .0005 mfd. Fixed Condenser, Sovereign 1 0
- 1 2 meg. Grid Leak and Holder, Sovereign 1 6
- 1 200 or 400 ohm Potentiometer, Igranite 2 6
- 1 L.F. Transformer (low or medium ratio), Telsen 8 6
- 1 10,000 ohms Spaghetti Resistance, Keystone 1 0
- 1 Terminal strip 14" x 2", 3/16 or 1/8" 1 6
- 9 Terminals, Belling-Lee 2 3

KONECTERKIT, comprising "Glazed Wire, Screws, Flax, etc. **Gratis**
FREE—Every "Comet 3" Pilot Radio Kit contains a Free Konecterkit, comprising Panel Brackets (Keystone Die-cast Aluminium Brackets with patent slots), wire for connecting, wood screws, G.B. plugs, etc., worth 5/.

C.O.D.—Pay the Postman only **£2 18 0** (We pay all charges)

- 2 Mullard Valves (as specified) 19 0
- 1 Byldurone Cabinet with Baseboard 7 0
- 1 Peto-Scott de-Luxe Cabinet, with baseboard, Hand French Polished, Solid Oak 15 0

Any parts supplied separately. If over 10/-, sent C.O.D.

"P.W." DOUBLE-TRAPPER

Cuts out Moorside Edge. Assembled, Wired and Tested. **READY FOR USE 11/6**

ATLAS A.C. ELIMINATOR

Type A.C.244

3 Tappings—S.G., Detector, Power, Output 120 volts at 20 m.a.

You Pay the Postman **£2. 19. 6**

4 POPULAR ACCESSORIES

- KINGSTON HOME RECORDER.** Send
Cash Price £3 16 6
Balance in 11 monthly payments of 7/ 7/- Only
- CELESTION D.12 LOUD SPEAKER.** Send
An entirely new model in oak. Cash Price £5 0 0
Balance in 11 monthly payments of 9/2 9/2 Only
- EGENTONE W.5 COMBINED H.T. ELIMINATOR AND TRICKLE CHARGER.** One S.G., 1 variable, and 1 fixed tapping for H.T. L.T. charging for 2, 4 and 6 volts. For A.C. mains. Cash Price £5 17 6
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Balance in 11 monthly instalments of 11/- 11/- Only
- ATLAS A.C. ELIMINATOR, TYPE A.C. 244.** 5 Tappings—S.G., Detector, and Power. Output, 120 volts at 20 m.a. Cash Price £2 19 6
Balance in 11 monthly payments of 5/6 5/6 Only
- EXIDE 120-VOLT W.H. TYPE A.C. CUMULATOR.** in crates. Cash Price £4 13 0
Balance in 11 monthly payments of 9/6 8/6 Only
- STANDARD WET H.T. BATTERIES.** fitted with 96 No. 4 Cells, giving 144 volts with chemical for fluid. Trays and lid for top tray. Cash £5 4 6
Balance in 11 monthly instalments of 9/7 9/7 Only
- B.T.H. PICK-UP TONE ARM, and VOLUME CONTROL.** complete. Cash Price £2 9 6
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- LAMPLUGH or FARRAND INDUCTION SPEAKER.** for perfect reproduction. Unit and chassis complete, ready mounted. Cash Price £3 10 0
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- BLUE SPOT MODEL 51R CABINET SPEAKER.** Cash Price £4 4 0
Balance in 11 monthly payments of 7/9 7/9 Only
- EPOCH PERMANENT-MAGNET SPEAKER.** with type B4 unit only. Cash Price £4 4 0
Balance in 11 monthly payments of 7/9 7/9 Only

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Messrs. Peto-Scott Co., Ltd., 77, City Road, London, E.C.1. Please send me

C.O.D./CASH with Order/H.P.

(Strike out particulars not required.)

- 1 Kit "A" "Comet 2" with Cabinet and Valves.
- 2 "Comet" Conversion Kit for my "Magic 3."
- 3 C.O.D. items as detailed.
- 4 Accessories as detailed.

for which I enclose H.P. deposit or Total Cash £ s. d.

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Buy by Post—it's quicker

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1248.)

Such measures, of course, take time, and in the interim the listener can often gain a partial abatement of the nuisance by using a counterpoise earth instead of the usual direct connection. (A counterpoise is as nearly as possible a replica of the aerial, erected at a height of, say, ten or twelve feet above the ground.)

This factor of height can be altered materially without affecting results. Careful insulation, earthing where necessary, etc., should be carried out as with an aerial.

Apart from using a counterpoise, the connection of small fixed condensers in the aerial and earth leads and the use of aperiodic coupling are often helpful; while different earths (i.e. a waterpipe earth instead of the usual buried plate, etc.) should be tried if possible.

TWIN TUNING FOR A CRYSTAL SET.

D. F. G. (Chorley Wood).—"Perhaps you could help me to simplify the tuning of a crystal set. All I want is the two London stations, and it is very satisfactory for this just by turning the condenser from 22 in one position to 57 for the other station.

"The coil is a home-made one of 44 turns on a framework that measures about 3½ inches. My sketch shows how the wiring is arranged with the aerial going to a clip that goes on one of the coil turns about half-way down, and is also connected to the crystal.

"The other side of this crystal is connected to a 'phone terminal and a .0003-mfd. condenser, these two being joined together on the other side and going to one end of the coil and to the earth terminal as well as to the variable condenser. The only other wire is that from the other end of the coil to the other side of the condenser, and as I say, it would be very satisfactory, except that I need it for an invalid.

"He cannot turn the condenser sufficiently accurately to go from one station to the other,

so I had hopes you could tell me how to put in a switch or something which would give either one programme or the other as required and do without any necessity for fine adjustment.

"Simply pull the switch out or push it in. Would it be possible in a simple set of this kind?"

Yes, it would be quite easy to arrange in a simple circuit of this kind where only two stations are required. All you need in the way of extra apparatus is a simple on-off switch of the kind that is easily operated by the invalid and in addition you will need one .0003 mfd. or thereabouts compression-type variable condenser.

Mount the switch in a convenient place on the panel and put the .0003 compression-type variable condenser inside close to the switch and present variable condenser. Connect one side of the new .0003 compression-type variable condenser to the top of the coil and the other side to one connection of the switch. All that now remains is to wire up the other switch contact to earth.

Before it can be operated by the switch, the set must in the first instance be tuned properly and this is very simply carried out as follows:—Push the switch to the out or open position and first of all tune in the London National station on the ordinary variable condenser (you will find that altering the other condenser has no effect when the switch is open).

Having got the National programme in properly, push the switch into its working position and slowly adjust the .0003 compression-type variable condenser until you bring in the Regional programme. When you get it in at good strength, you can leave the condenser alone and you will find that merely by operating the switch the programme will change to

the National so that all the invalid will have to do to change over is to pull or push the switch.

MAGNETISING A WATCH BY A MOVING-COIL SPEAKER.

The case of a "P.W." reader whose watch was magnetised by his moving-coil loud speaker, recently described in "P.W.," appears to have created considerable interest. One amusing letter addressed to our Chief Radio Consultant says:

"M. C. of Dulwich says his watch is magnetised—right. Don't let him go to the expense of your cure, for he can have it done at home by himself for nothing.

"Unless he is a Spartan, he will have a fire; tell him to open his watch and gently heat his watch for a few secs.

"If this doesn't do the trick, let him warm it longer and longer until it is cured. I am surprised at you, really! About the only thing I know about magnetism (beyond its attractive powers) is that it is destroyed by heat.

"This must be true, as (1) I have tried it, (2) my science master says so!

"I wonder if you could let me know if this is effective in his case?"

"H. B. C.

"P.S.—This 'cure' is given quite seriously." Bedford.

Perhaps M.C., of Dulwich would like to try this. We undertake no responsibility in the matter.

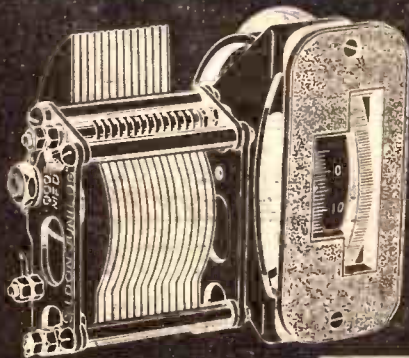
"P.W." PANELS. NO. 10. NEUTRALISING.

Screened-grid valves should not "spill-over" in oscillation as a result of tuning, but this was a common fault of ordinary three-electrode valves when used for H.F. amplification. They could only be stabilised by neutralisation.

There were several methods and circuits, the fundamental requirement being a small controlled feedback from plate to grid.

For this purpose a neutralising condenser, of very small capacity, was used in conjunction with a neutralising coil winding.

The sole object of neutralising was stable H.F. amplification.



CYLDON SINGLE DRUM DRIVE CONDENSER

Complete with escutcheon plate, drum dial control and template. If your dealer cannot supply, send P.O. for delivery direct. C.O.D. if desired.

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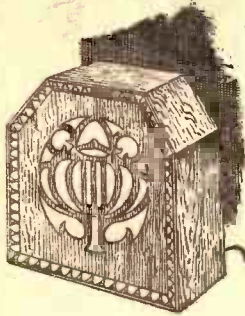
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Extract from "Popular Wireless,"
Jan. 31st. 1931.

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Oak, £8; Mahogany, £7 5s. If you have a 21" x 7" panel, choose the Camco "Senior" Cabinet and have a modern Radio Gramophone.

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Address

PW/1

CORRESPONDENCE.

THE "COMET" THREE

THOSE UNITS AGAIN.

Letters from readers discussing interesting and topical wireless events or recording unusual experiences are always welcomed; but it must be clearly understood that the publication of such does in no way indicate that we associate ourselves with the views expressed by our correspondents, and we cannot accept any responsibility for any information given.—EDITOR.

THE "COMET" THREE.

The Editor, POPULAR WIRELESS.

Dear Sir,—May I be permitted to congratulate the "P.W." Technical Staff on the set of the year. I refer to the "Comet" Three. I have heard stations on this set which I have never heard before. As I write Posen is filling the sitting-room with music, and I have a very poor aerial and earth system. I have bagged the following stations:—

Davenport, Hiltzen, Kalundborg, Motala, Posen, Kosice, Katowice, Lages, Toulouse, Paris, Hamburg, Berlin, Glasgow, London R., London N., Midland R., Frankfurt, Oslo, Madrid, Milan, Rome. This all in three days. So good luck to "P.W." You are at liberty to publish. Wishing you all the best.

Yours, a very satisfied reader and constructor,
A. E. BRADSHAW.
Belfast, Northern Ireland.

The Editor, POPULAR WIRELESS.

Dear Sir,—I feel that I must write and congratulate you and the "P.W." Staff for this very fine circuit, the "Comet" Three. As a very keen wireless enthusiast of about 6 years' standing, I may say that this just beats anything that I have ever heard or tried. I have built numerous sets for people, the "Powerful" Three, "Radiano" Three, and the "Magic" Three, the latter being a real "go getter," both for range and purity of volume. But none can come up to my "Comet." I had built up the set by the Friday, the day after you actually published under the Saturday's date, 14/2/31. So as a matter of fact I can claim to be one of the very first to give it a try out, the results of which I am appending below. The dual-range coil I had made up myself some time ago, thinking that it would probably come

in, it was made up as per your design of your issue of Oct. 11th, 1930. The following is a list of identified stations heard at excellent loud-speaker strength, which is saying something, considering my H.T. is down to about 70 volts (dry).

Long wave: (6) Radio Paris, Konigswusterhausen, Moscow (Trades Union) Davenport, Hiltzen, Oslo. Medium Band: (10)—Ljubljana, Budapest, Brussels No. 1, Prague, Midland Reg., Rome, Langenberg, Berlin W., Dublin, Frankfurt, Toulouse, Manchester, Hamburg, Mühlacker, London Reg., Strasbourg, Heilsberg, London Nat., and lastly Belfast. Thanking you very much indeed for a jolly fine circuit. All success to good old "P.W."

Yours faithfully,
ARTHUR J. LAMBERT.

Blackburn.

THOSE UNITS AGAIN.

The Editor, POPULAR WIRELESS.

Dear Sir,—I would like to reply to a letter signed F. G. Smith in your recent issue. Mr. Smith apparently thinks that because one criticises the H.T. Mains Units of today, one is condemning them, which is not the case.

I think an improvement is necessary before they become universal, as besides more smoothing being needed, more accuracy is wanted as to the voltages passing at the various tapings.

My grouse is that in practically all H.T. Mains Units it is guesswork as to the voltages given to each valve, especially the often very critical S.G. valve.

I am ignoring m/a, because if the valves are not getting the volts, they cannot give the m/a, although Mr. Smith says study m/a, and let the volts look after themselves.

I have recently tried 8 different H.T. Mains Units (in trying to overcome bad mains hum!) and in not one instance have I been able to tell fairly accurately the voltage given to the valves, although I know that the max. m/a output of the units was not nearly approached.

Mr. Smith may have been working well inside his unit's max. m/a output, but does he know the voltage he gives to his valves without a high resistance voltmeter?

I maintain one is necessary with all mains units.
Yours faithfully,
A. H. LEFEVER.

East Sheen, S.W. 14.

Read MODERN WIRELESS
Britain's Leading Radio Magazine

THE "COMET" TWO (Continued from page 1238.)

to suit, and remember that the detector gets its H.T. from +1, whilst the power valve is served by H.T. +2.

The H.T. voltage will be specified by the valve maker, generally from 40 up to 60 volts for the H.T. +1, and 120 volts or as much as you can give to the power valve. The grid bias for the latter will depend on the H.T. you use, and usually a 9-volt battery will be sufficient for this.

Changing the Wave-band.

For ordinary wave-lengths you tune with the wave-change switch pulled out, and for long waves you push it in. No coil changing bother, at all, of course!

The selectivity control on ordinary waves is the .001 condenser that is wired to the aerial terminal. With this screwed down you get full strength, but if your local station "spreads" too far over the dial, slacken off the .001 a little till you get the necessary sharpness. (Don't slacken off too far, or you may weaken reception unnecessarily.)

For long-wave selectivity you use the other baseboard-mounted condenser (.002) and you turn it the other way. That is to say, you get most long-wave selectivity when it is screwed down, and least selectivity when it is screwed "out."

Incidentally the first (.001) condenser will affect long-wave selectivity a little, and generally it is best to have it screwed down for long-wave working, afterwards adjusting the .002 to give you the required sharpness, probably in its "nearly-all-out" position.

NOW MEET THE "POLARGANG"



Those with years of experience in radio always use Polar Condensers because they are produced by specialists who give more attention to detail. Polar means better construction and greater service.

THE "POLARGANG"

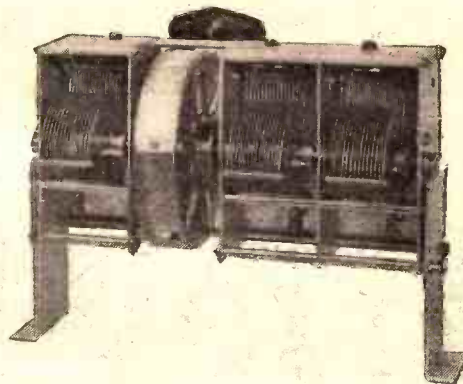
A 2-3-4- or 5-Gang Condenser for the accurate control of a number of tuned circuits by means of the Polar Drum Drive.

Each condenser is fitted with a separate trimmer which is easily accessible from the top of the condenser.

The "Polargang" is rigidly constructed and has adjustable fixing supports.

Very compact. The "Polargang 3" measures only 8½ ins. long by 4 ins. deep.

2-GANG	27/6	<i>Prices.</i>	4-GANG	42/6
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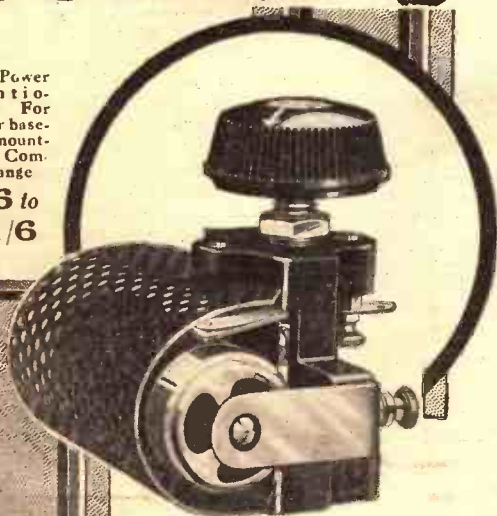
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THE BRITISH MADE POWER POTENTIOMETER USED IN THE COMET 3

Varley Power
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ing. Complete
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9/6 to
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The Varley Power Potentiometer is totally wire-wound, well-ventilated and robustly made in a range of values to pass up to 1.5 amps. It is the ideal voltage control for H.T. Eliminators and mains-operated sets. Used as a potentiometer it makes possible the critical control of voltage for S.G. Valves and anode bend detectors; while in other cases it may be used as a continuously variable resistance. Being totally wire-wound and fitted with a spring-loaded contact arm it is silent in use and gives a continuous reliable connection.

Other uses are as an "Automatic" Grid Bias resistance; for filament control on D.C. Mains sets; for current regulation in battery chargers, etc., etc.

For full particulars of Varley Mains equipment—Power Transformers for Valve and Metal Rectifiers, Chokes, Power Resistances and Potentiometers—write for Section E of Varley Catalogue.

Varley

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THE BOTTOM SECTION. Size 14 in. high by 18 in. wide by 13½ in. deep gives accommodation for Loud speaker and Batteries.

The whole of the back is enclosed by double doors so that all parts are easily accessible. ALL are fitted with hinged top, heavy platform to take a 12-in. turntable for the Gramophone and a substantial baseboard for the Wireless Set.

Extract from one of many testimonials received:—"I am very pleased indeed with the Cabinet; in fact, I cannot emphasize too much the value for money. I would be pleased if you would publish this letter so that other readers of 'Popular Wireless' may buy these Cabinets."—F. Ward (Plymouth)



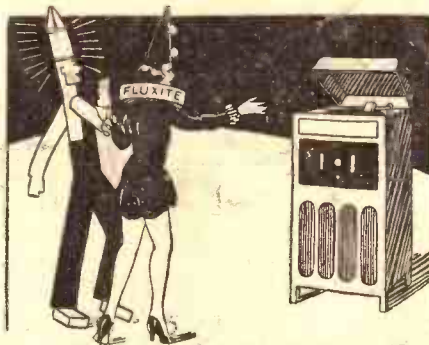
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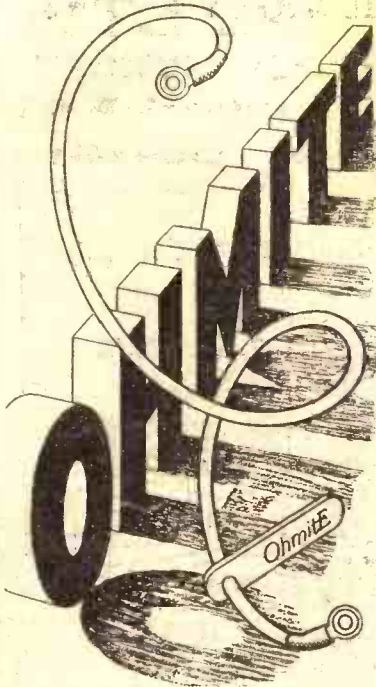
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Ask your dealer to obtain, or write to

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FOR THE LISTENER

(Continued from page 1224.)

The Albert Hall Jubilee.

Places as well as persons have their jubilees. The turn of the Albert Hall comes on March 29th. A massed orchestra, including the B.B.C. Symphony Orchestra, will celebrate the festival.

"Like some of us, who have reached if we have not exactly earned, our jubilee, the Albert Hall is perhaps "not what it was." It has latterly even been a prize-ring. But I have some affection for it as being the place where I first heard Kubelik and Kreisler, Chaliapin, and Melba.

March 29th will doubtless be a great occasion.

"Matinee."

The first part of this amusing fantasy, by P. H. Lennox, made me very grateful that I live alone. The perfect horror of that noisy breakfast-room, with the grumpy father, the quarrelsome kids, and the poor, poor mother! To me, who loves peace and quietness, it was agonising.

However, its very extravagance made it amusing. It was well produced by Peter Cresswell who, I hear, is leaving the B.B.C. for a spell of producing in the "legitimate" theatre.

Good luck to him; and come back soon! I do not know who played the part of Annie, the serving-maid with adenoids, but it was played very well.

The Snags of Diagonalization.

The habit, which is of fairly recent origin, of giving an important item in the programme one night on the National, and another night in the same week on the Regional, needs watching. At times it takes away much of the virtue of "alternative programmes."

I listened to "Matinee" on the Tuesday, not being in the mood for the chamber music which was the alternative. It was repeated on the Thursday, and I found myself compelled either to twiddle my thumbs or listen to a not very good programme provided by the Military Brass Band.

When is an alternative not an alternative? You listened doubtless to the "Ridgeway Parade" on the Monday, choosing it in preference to a concert of light music; so you were caught! For on the Tuesday you had either to listen to the "Ridgeway Parade" again, or the New York Stock Market and a lecture by Dr. Dyson.

Poem of the Week.

"The programmes gaily alternate
Between the high- and low-brow;
But there's no choice, I beg to state,
When you want neither no-how!"

Mr. Dobb on Russia.

Who let in Mr. Maurice L. Dobb? I enjoyed his talk on Russia, because I am too old to be alarmed; and I agree with him that the great thing is to understand even what we heartily disapprove of.

He described Bolshevism as "a new religion, minus the supernatural element."

It was as good, and as interesting, a broadcast talk as I have heard for a long time. I chuckled, imagining what the "Morning Post" would have to say about it next day! But who let him in?

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1 .0005 J.B. Condenser with Drum control Dial	11 6	1 .002 Formo Compression Condenser	2 3
1 .00013-mfd. Lotus Differential Condenser	5 6	1 Terminal Strip	3 6
1 L.T. Switch, Ready Radio	10	1 Sheet of Copper Foil	1 6
1 Three Point On-Off Wave-Change Switch, Ormond	1 3	9 Terminals, Belling Lee	2 3
1 R.I. Dual Range P.W. Coil	12 6		
3 Valve Holders	3 0	Total	£3 17 5
1 .0003-mfd. Condenser	1 0	GIVEN FREE to all purchasers of the above complete kit, Large Blue Print, Glazite, Screws, G.B. Plugs, and full descriptive Booklet with circuit diagram.	
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1 Spaghetti Resistance, 10,000 ohms	1 0		

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Telsen Grid Leaks from 1/2 meg. to 5 meg.	1 0	Descophone guaranteed 4-pole Units	8 6
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Telsen L.F. Choke	7 6	H.F. Binocular Chokes	1 11
Ormond Geared Fast and Slow Dials	2 6	Single Coil Plugs	6
Ormond Log Condensers	4 0	.0003 or .0005 Desco Condensers with adjustable spindles for ganging	4 6
Ormond Log Condensers complete with double dial for fast and slow motion	6 0	Double Cone Chassis, 12 in.	2 11
Ormond Turntable	6 0	Double Cone Chassis, 15 in.	3 11
Latest R.I. General-purpose Transformers	10 6	12 in. x 12 in. x 6 1/2 in. Loud Speaker Cabinets	5 6
Latest R.I. G.P. Output Choke	12 6	Silk gauze for Loud Speaker Frets, 12 in. x 12 in.	9
Latest R.I. P.W. Coils	12 6	18 in. x 18 in. gold tinsel	1 3
Colvern Ether Searcher Coils (Set of 3)	1 8 6	10 ft. Connector Wire, coil	3
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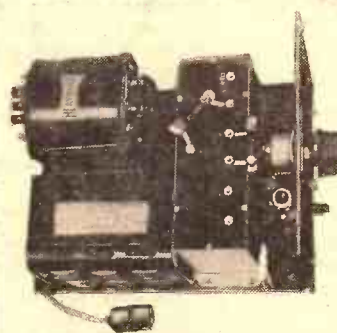
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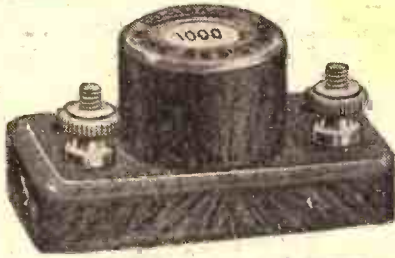
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(M.C.21)

TECHNICAL NOTES

By J. H. T. ROBERTS, D.Sc.

Brilliancy.

THERE is a good deal to be said for having a pick-up which will give a "brilliancy" to the tone of the reproduction; and, as you know, the brilliancy depends very much upon the presence of the higher frequencies.

If you have only the lower frequencies without the upper ones you are apt to lose this peculiar but so easily recognisable quality of brilliancy; whilst, of course, if you go still further into the lower frequencies, your reproduction is apt to become boomy.

Curiously enough, some people prefer the boomy type of reproduction. It all depends really upon what type of instrument you favour. For instance, if you are specially interested in cello reproduction or bass human voice, a boomy type of reproduction suits this very well.

For all round work, however (and, after all, it is impossible to confine yourself to one or two types of record), it is preferable to have a pick-up which will give you at least a fair modicum of the higher frequencies.

Pick-up Weight.

By the way, a point which I am often asked is whether it is better to have a lightweight pick-up or a heavy one, the idea being that a lightweight pick-up is easy on the record, whilst, on the other hand, a heavy pick-up holds the track better. As a matter of fact, this question cannot be answered very precisely.

It is true that if a pick-up is very light it is apt to "float" in the track and so lose a good deal of "definition," whilst also the pick-up as a whole is apt to vibrate instead of remaining stationary.

It goes without saying that any part of the vibration of the needle which is communicated to the body of the pick-up represents so much lost motion, since it is only the relative motion, as between the armature and the body of the pick-up, which contributes to the generation of speech currents.

I certainly do not advise a very heavy pick-up. By this I mean that it is undesirable to have a large dead-weight resting on the record.

I think the happy mean is a pick-up of moderate mass—or weight, if you prefer it—but with the actual dead weight to some extent counterbalanced either by a spring or by means of an adjustable counterweight. In other words, you want a fair mass or inertia in the body of the pick-up, whilst the actual dead weight on the record should be only sufficient to keep the needle in positive engagement.

Valve Efficiency.

The great increase in the efficiency of receiving valves, whilst it has, of course, brought with it enormous improvements in the power and range of even small-receiving sets, has not been entirely without its disadvantages—or should I say its added responsibilities. A highly sensitive

(Continued on next page.)

WHY IS THE CLIX VALVEHOLDER

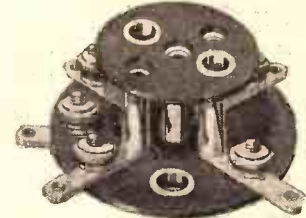
being regularly specified in the Technical Press and its patented features being eagerly adapted by leading Manufacturers to their own Valve Holder requirements?

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2-point Model 1/-



TECHNICAL NOTES

(Continued from previous page.)

receiver naturally requires more careful handling, and, as you know, the extra efficiency often involves a tendency to low-frequency howling or motor-boating.

When a couple of stages of transformer-coupled L.F. amplification were used, even if L.F. instability were set up—which was not very often the case—it could generally be cured by the simple process of reversing the leads to one of the transformers.

Transformer Improvements.

Transformers, however, like valves, have also undergone very great improvements, with the result that the overall amplification now obtainable per stage is enormously greater than it was a few years back.

The result of all this is that, if there should be any accidental coupling in the high-tension circuits, low-frequency oscillation will most probably be set up.

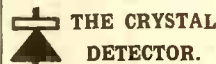
Add to this the much greater anode currents now so often used which produce the possibility of the H.T. supply unit being heavily overloaded. In passing, I should remark that any trouble from this particular cause can obviously be overcome by the simple process of using an H.T. source which is adequate for the purpose in view. If it is a dry battery, then a heavier duty one should be substituted, whilst if it is a question of a mains unit, you should be careful to choose one which is capable of giving the required output without much drop in voltage—for a drop in output voltage when under working conditions is a sign of internal resistance, which is a very fruitful source of unwanted coupling in the H.T. circuits.

Coupling.

I am often asked why a high-resistance H.T. supply unit should cause howling. If you think about it for a moment you will see that, since the anode circuits of all the

RADIO SYMBOLS

No. 5.



Originally a metallic contact on the crystal's surface was used for detection, and the symbol now in use suggests this, though nowadays two crystals are often used.

When the crystal becomes "tired" it can often be rejuvenated by breaking it a little and exposing a new surface.

The degree of pressure at the contact affects sensitivity, so attention to this often improves reception.

Sometimes the instability takes the form of a musical note, sometimes "motor-boating" and sometimes merely distortion. And, by the way, Mr. Baxter discussed this point at some length in "P.W." for February 28th.

L.F. Oscillation.

As he pointed out, the cure for these troubles generally is to isolate the stages from one another (particularly the first

(Continued on next page.)

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TECHNICAL NOTES.

(Continued from previous page.)

and last L.F. stages), by means of anti-motor-boating devices, which, in other words, means by resistances and condensers.

An arrangement of resistance and capacity used in this way is called a decoupling unit, and may often be used to advantage in connection with the detector stage, the resistance being placed in series with the transformer primary winding, so that the anode current has to pass through this resistance after passing through the primary.

One terminal of the condenser is connected to the same terminal of the L.F. transformer to which the resistance is connected, and the other condenser terminal is connected to the negative L.T. The value of the resistance should not be too high, as if it is the valve will not operate at maximum efficiency; a value between 20,000 and 40,000 ohms is generally suitable. For the condenser a value of at least 2 mfd. is necessary.

Isolating Last Stage.

As regards the output end of the receiver, a choke and condenser may be used here for the purpose of isolating the stage. The choke should be introduced into the H.T. supply lead, the condenser being then connected between the valve anode and one terminal of the loudspeaker. The other terminal of the speaker should be connected to negative L.T.

If the instability is not very serious, the output filter only will be required in exceptional cases. I should add that here again a minimum value for the condenser should be 2 mfd., and the choke should have a value of about 20 henries with, of course, as low a direct-current resistance as possible.

Output Filter.

An output filter has certain other important advantages, and these may quite well justify its use, even though it may not be necessary for the purposes indicated above. I have, however, said something about the uses and advantages of output filters in these Notes quite recently, so will not go further into that now, as my space is very limited.

The Optimum Value.

Before leaving the point, however, I should give you one word of warning in regard to the value of the resistance used in the decoupling unit. If you go to extremes and make this resistance too high in value, although you will overcome instability, you will also reduce the efficiency of your valves far below the optimum point.

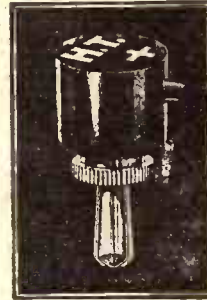
It is easy enough to get rid of instability by getting rid of efficiency, but the art lies in increasing efficiency to the maximum possible amount without running into instability.

Adding Stages.

When wishing to increase the range or power of a receiver, beginners are often rather puzzled to know whether to go in for an H.F. stage or an extra L.F. stage. It is commonly said that the H.F. stage gives you greater sensitivity or range (that

(Continued on next page.)

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TECHNICAL NOTES

(Continued from previous page.)

is, distance-getting qualities), whilst the L.F. gives you greater amplification or loudness of the signals already received.

So far as the L.F. is concerned, this rough-and-ready guide is fairly accurate; but as regards the H.F. it is not always safe to assume that by merely adding a stage of H.F. the range of the set will be satisfactorily increased. In the first place, adding an H.F. stage is not so simple as adding an L.F. one. Apart from the question of extra controls, you have to bear in mind the question of the possibility of overloading the detector.

If you are desiring to receive local or powerful stations, as well as distant ones, you will quite probably find your detector hopelessly overloaded on the strong ones, and consequently the H.F. stage becomes much more of a bugbear than an asset. It is true that much can be done by the aid of a variable grid leak, but at the same time it is a question whether, in such cases, it might not "pay" much better to devote your attention to the L.F. end of the circuit instead.

Question of Ratio.

I should say that if the L.F. side already includes a transformer, the added transformer (assuming the added stage to be a transformer-coupled one, as it almost certainly will be in this case) should be of a fairly low ratio, say 3 to 1.

It is a good plan also to provide yourself with some sort of volume control, which may conveniently take the form of a potentiometer connected across the secondary winding of this last transformer.

When taking steps to increase your L.F. amplification, remember that it is little use working up large power unless you have a valve in the final stage which is capable of handling this power without distortion.

Straight Amplification.

Altogether apart from the question of the actual volume of the output, it is better to gain this volume by what one may call legitimate amplification rather than by excessive reaction. Straight amplification gives you a chance of undistorted reproduction; whereas with reaction, particularly if pushed to excess, there is always the danger of a greater or less degree of distortion.

Pentode Transformer.

For obtaining a large-volume amplification by a single stage the pentode has much to recommend it; but as I have pointed out before, in reply to many readers' queries on the point, the pentode can only be used in appropriate conditions and is by no means to be universally recommended.

(Continued on next page.)

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A PUBLIC ELECTRIC SUPPLY AUTHORITY,

having recently completed a change-over from D.C. to A.C., has for disposal a quantity of wireless apparatus consisting of:—

220-volt D.C. H.T. battery eliminators, H.T. & L.T. battery eliminators and sundry parts.

This Authority will be pleased to receive tenders for the apparatus. Copies of the schedule may be obtained on applying by letter only to: Box B.S., JOHN H. LILE, LTD., 4, LUDGATE CIRCUS, LONDON, E.C.4.

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The first firm to supply Wireless parts on easy payments. Five years advertiser in "Popular Wireless." Thousands of satisfied customers. Send us a list of the parts you require, and the payments that will suit your convenience, and we will send you a definite quotation. Anything wireless H. W. HOLMES, 29, FOLEY STREET, Phone: Museum 1414. Qt. Portland St., W.1

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Let your Cone (or Horn) Speaker give that Moving Coil Quality and ample distortionless volume without extra valves by adding the "Magna" Amplifier (Pro. Pat.) Something new in amplifiers, for it is worked by L.T. supply only. Needs no valves, alterations to set, wiring, or expensive parts, and is very compact. Actually GUARANTEED to amplify reception three times. Special Electrode material, Reed, and Rubber Blocks, 2/6, together with full-size clear constructional blue-prints and diagrams. Simple to construct.—Agent, L. Cook, 182, Cranston Rd., S.E.23.

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TECHNICAL NOTES

(Continued from previous page.)

Moreover, although in its appropriate conditions it is an economical valve—in the sense that it gives a large amplification for a single stage—it is not a complete substitute for a super-power stage, and its power-handling capacity is definitely limited. This is a point which many amateurs are apt to forget.

In using a pentode, it is best to use a special pentode output transformer, the primary being inserted in series with the H.T. supply to the anode of the valve, and the loud speaker being connected to the transformer secondary.

Readers' Experiences.

I mentioned the other week the fact that with an all-mains set the amount of A.C. hum would sometimes vary very considerably at different times of the day, being usually much more pronounced in the mornings than in the evenings.

These remarks have brought me a number of letters from readers giving me all kinds of similar experiences and offering numerous

TECHNICAL TWISTERS

No. 52—L.F. TRANSFORMERS.

CAN YOU FILL IN THE MISSING LETTERS?

Usually when a set employs two different L.F. transformers it is better for the lower-ratio transformer to the other (higher ratio).

The continuity of the windings of an L.F. transformer is easily tested by means of and a dry cell.

Sets employing two L.F. transformer-coupled stages are liable to give rise to motor-boating unless the stages are well

Adjacent L.F. transformers should be mounted with their cores at

Last week's missing words (in order) were: Back. Scriber. Centre punched. Small.

suggestions for overcoming the trouble. It would take too long to go into the various dodges which different readers have found successful in their own particular cases. But their letters make it quite evident that there is no single cause for the trouble mentioned; it may arise from a variety of causes.

An Interesting Cure.

One suggestion for curing the trouble, which is ingenious, is to shield the detector valve, both electrically and acoustically, by means of a metal covering. It is claimed that this completely overcomes the trouble in certain cases, but whether by the electrical shielding or the mechanical, I am unable to say—presumably the electrical.

I know for a fact that there are many cases in which this simple dodge does not work, indicating that in these cases the trouble is not caused in quite the same way.

THE BATTERY SIGNAL

The readings are 0.6 volts, 0.150 volts and 0 to 30 milliamps.

Price 8/6

Are you able to tell when your batteries require renewal or recharging? With a Wates 3 in 1 meter, and the simple instructions for use supplied with each instrument, you need never be let down by batteries running out. There are nearly a million in use, and although the cost is only 8/6 complete, we service them for all time and they are guaranteed in every way. They test H.T., L.T., and grid bias consumption of set in H.T.—an invaluable test this!

WATES TEST METER

(3 in One)

Buy one now from any Radio Dealer. They tell you all you want to know about your batteries—a signal of their condition.

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THE STANDARD BATTERY CO., Dept. P.W., 184-188, Shaftesbury Avenue, London, W.C.2.

M.B.5

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"TONAX" is a new chuck with Patented Split End Taper and a clamping device which gives a relentless grip AT THE BACK of the cone. This means that all traces of "chatter" and "rattle" are utterly eliminated. TONAX is easily fitted to the rear of any unit.

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The Grip is here V

British made Patent applied for.

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ALUMINIUM FOIL (FOR "COMET," ETC.)

18" x 10" and 16" x 16", etc. 10d. each.

COPPER FOIL

In above sizes. 1/- each. (Ample Trade Discounts). Postage 2d. extra.

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IF YOU want a loud-speaker for a room of ordinary size and a set of medium power you need a Blue Spot 66K. If, on the other hand, you want to get the best out of a very powerful set Blue Spot 66R will give you enough volume to fill a hall without loss of purity or tone value.

You can purchase a Blue Spot Unit with the greatest confidence. Its pure and mellow tone is a delight to the ear. Every word and every note is clearly audible. There is no trace of distortion or rattle.

It is important in building a speaker with a Blue Spot Unit to use only a Blue Spot Special or Major Chassis. The proportions of these Chassis have been scientifically calculated to ensure the very best results. It is only fair to

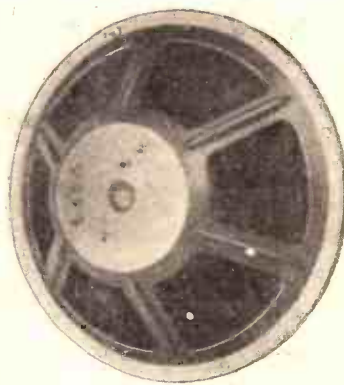
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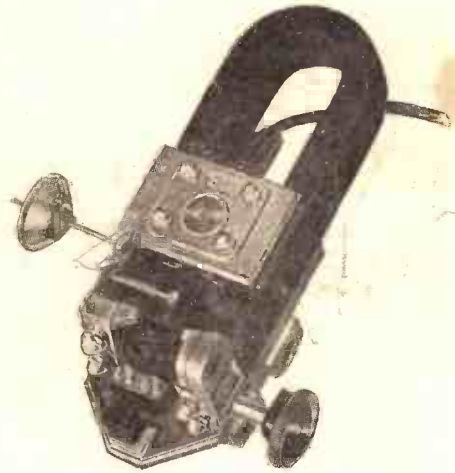
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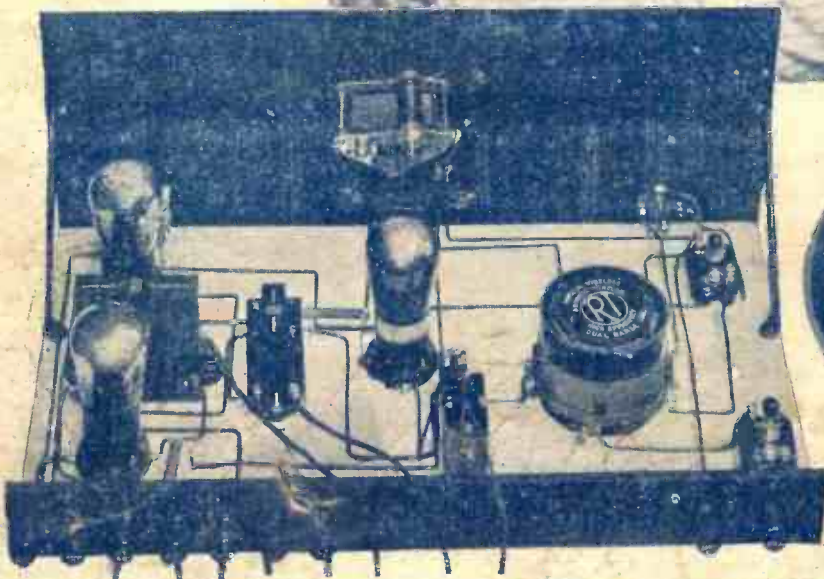


Distributors for Northern England, Scotland and North Wales: H. C. RAWSON (Sheffield and London) LTD., 100 London Road, Sheffield; 22 St Mary's Parsonage, Manchester; 183 George Street, Glasgow.



I made a Good Job of my "COMET 3" with R.I. Components

To prove the claims made for this circuit by the designers, I built the set with R.I. Components as specified and am highly satisfied with the results. It certainly pays to buy the best—particularly as they cost no more.



'P.W.' and 'M.W.' DUAL RANGE COIL

I chose the R.I. Dual Range Coil because it saved me the trouble of winding and assembly, and I knew it would give me perfect results because it is recommended, not only by my wireless friends, but by "Popular Wireless" themselves. It is made in exact accordance with the "P.W." and "M.W." specification and each individual coil is tested on the wave meter and inductance bridge. The maker's name on this coil certainly is the surest guarantee of highest efficiency **12/6**

The 'VARICAP' SEMI-FIXED CONDENSER

I selected the 'Varicap' because it enabled me to get exactly the right adjustment and correct capacity which, once set, remains in adjustment until a change in capacity is required.
Maximum capacity .01 mfd. **2/6**
Maximum capacity .002 mfd. **2/9**

The Improved G.P. L.F. TRANSFORMER
I used this improved model because when employed in conjunction with a Hypermite it definitely gives higher amplification and purer reproduction than any other combination of Transformers at the price.
Ratio 31:1. Primary inductance 35 to 40 Henries **10/6**

The HYPERMITE Nikalloy Core Transformer
I selected the Hypermite to ensure getting the deepest bass notes and the highest treble from my speaker. It is a marvel for its weight and size and absolutely indispensable in compact set assembly. Primary inductance over 50 Henries. Ratio 31:1 **12/6**

I have found the R.I. Catalogue as good as a text book to the amateur. The latest edition just out is better than ever, and IT IS FREE.



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