

# ALL ABOUT THE "P.W." COIL (See Page 7)

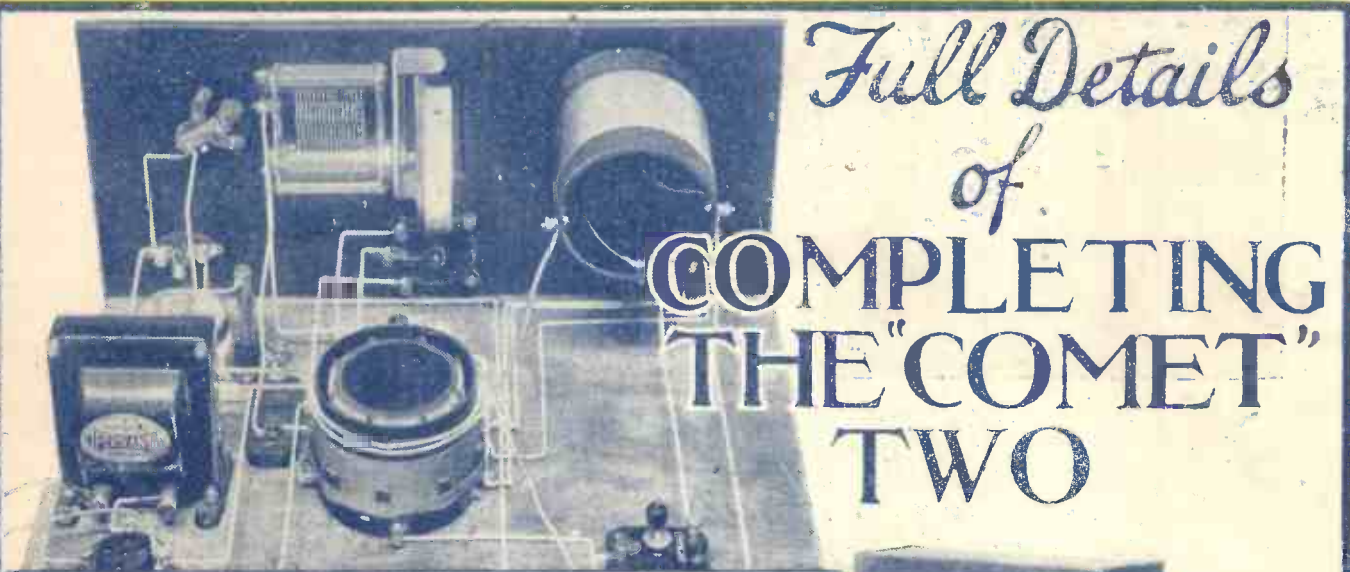
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No. 459. Vol. XIX.

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March 21st, 1931.



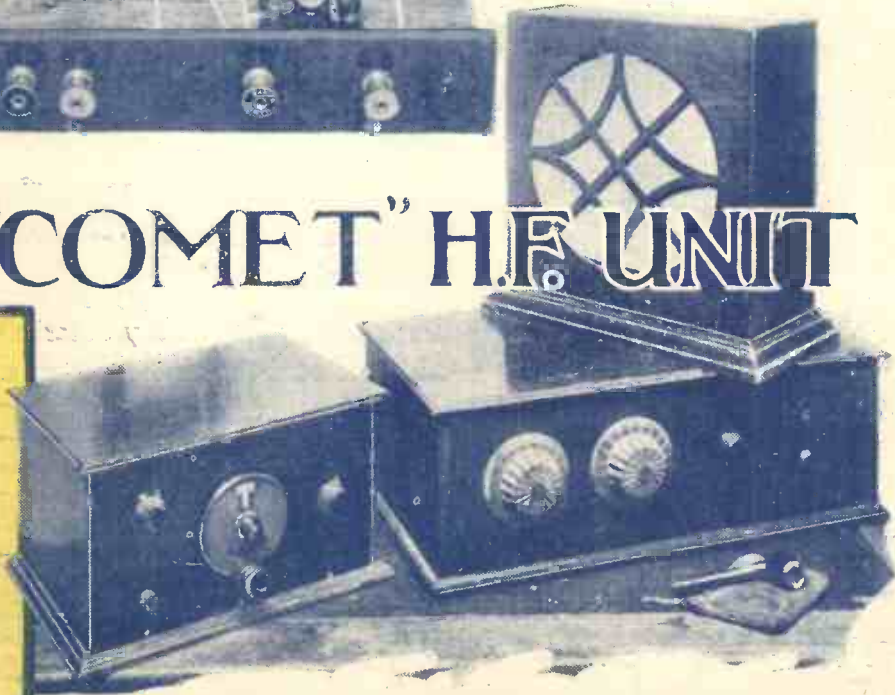
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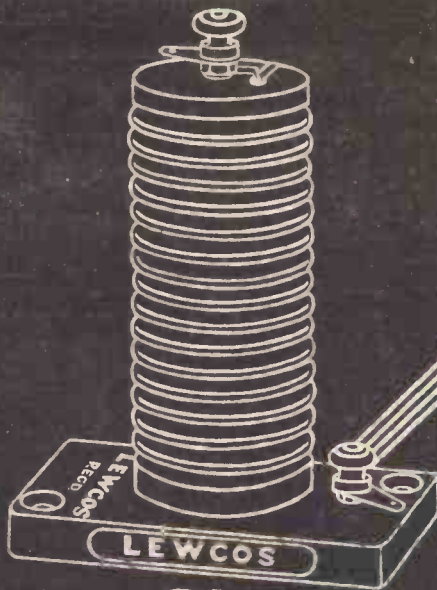
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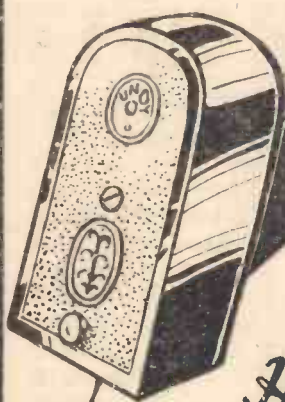
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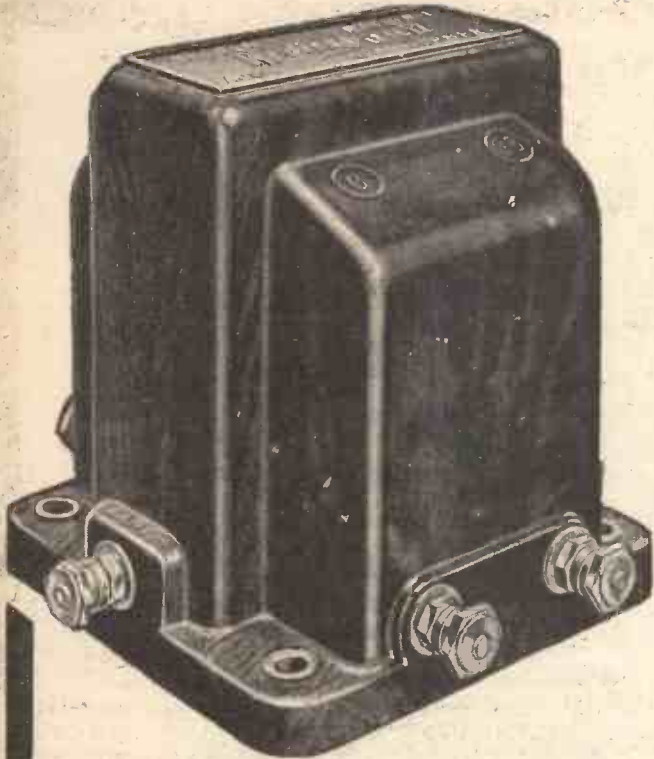
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**WITHOUT HUM  
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TYPE	Fil. Volts	Fil. Amps.	Max H.T. Volts	Amp. Factor	Anode Resistance (ohms.)	Mutual cond. m $\mu$ V	PRICE
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AC/P	4	1.0 "	200	10	2650	3.75	17/6
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AC/Pen	4	1.0 "	250	—	—	2.2	27/6



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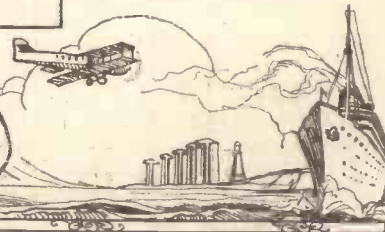
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**THE COMET  
 INDIAN MAGIC  
 HALIFAX OPERA  
 AT QUEEN'S HALL**

**THE B.B.C. ORCHESTRA  
 OUR ALF.  
 A NEW VALVE  
 HOLLOW KNOCKERY**

## RADIO NOTES & NEWS

### The U.I.R. Gets Busy.

**I**N view of some of the projects, notably those of Germany and Russia, for the building of numerous high-power stations, it is a saccharine drop in the general cup of bitterness to learn that the Union Internationale de Radiodiffusion has arranged to carry out tests in which its members in fifteen European countries will measure the field strength at which about thirty of the principal European broadcasting stations are received in those countries. What is aimed at eventually is the solution of the problems of interference due to the increasing power and number of stations.

### About Television.

**R.** H. B. (W. Norwood) is only one of a number of readers who have asked us for a statement of our position in regard to the publication by "P.W." of constructional details of television sets. Our position is simply this. "P.W." is essentially a practical man's journal. Television, in our opinion, is not yet sufficiently advanced for it to have the service potentiality which radio-telephonic broadcasting had ten years ago; but when it has, then you will not look to "P.W." in vain for details and explanations of the apparatus required.

### Radio Advertising.

**W**HERE there's a will there's a station! I learn that the Gramophone Company is considering arranging a series of weekly broadcasts of H.M.V. gramophone records on Sunday evenings, the transmission to be effected by a Continental station. This item, if it emanates from a station which is easily intercepted in England, will be a godsend to Sunday listeners and will help to throw up in stronger relief the awful programmes foisted on us by the over-guid B.B.C.

### Ship Telephony.

**I**N view of the interest which many readers are evincing in ship telephony, Mr. A. Mann kindly passes on the following notes from his log. "Olympic."

G L S Q, 18.3 m., 24 m., 35 m., "Leviathan," W S B N, 45.21 m., 33.98 m., 87.51 m.; "Majestic," G F W V, 17.10 m., 22.58 m., 35.2 m., 65 m., 72.72 m.; "Homer," G D L J, 24.23 m., 63.12 m. "P.W." does not vouch for the accuracy of these figures, but hopes that our correspondent feels pretty confident of it. Oh, Mr. Mann asks whether anyone has heard "Winchester Castle," R M M V, on 36.5 m. or 17.8 m.; or Z L W, Wellington, N.Z., on 27.3 metres?

are almost lyrical in their commendation of the "Comet."

### A Return to "Magic."

**I** SHOULD like to say that makers of the "Magic" Four are still writing in praise of that set. The letter of H.E.M.L. (Midlothian) is typical. He has picked up Georgetown (Br. Guiana), V R Y, on 43.86 metres; H V J, the Vatican station; C T I A A, Lisbon, on 42.90 metres; 2 X A F, 2 X A D, K D K A, Rome, Zeesen, and heaps of amateurs on 41-42 and 150-175 metres. Verily, the day of the sceptic has passed!

### Indian "Magic."

**S**O much for a home report; now for one from Calcutta. G. O. L. D.—what a ripping set of initials!—declares that with his "Magic" Three he can get European broadcast, and mentions London Regional, Stuttgart, Bucharest, Vienna and Heilsberg. As he has to sit up till 3 a.m. for this work, I should think that the results must, indeed, be satisfactory. On the short waves he finds this set a fine station-getter.

### Opera from Halifax.

**T**HOSE broadcasts of opera from Halifax, by the Covent Garden Opera Company—what did you think of them? They were the first that have ever taken place from there. I thought that the lucid intervals, when the orchestra had its say, were well worth the long-drawn agony of the arias, etc. No reflection on the singers is intended; it's the composers' fault. There were five microphones at work, three in the footlights and one on each side of the proscenium opening.

### Queen's Hall Items.

**O**N March 21st, at the Queen's Hall, the Glasgow Orpheus Choir will give an afternoon performance, Sir Hugh S. Robertson conducting and London Regional radiating. In the evening they will carry on, same conductor, but National  
 (Continued on next page.)

### "WHAT DID HE SAY, BILL?"



The villager in the foreground is hearing radio for the first time, and being a little deaf he wants to be uninterrupted. His friends, however, are trying to take a rise out of him!

### Commending the "Comet."

**O**NE thing I will say about you fellows, and that is that when you get on to something good you don't hesitate to hand out the "Thank you's."

I am still opening your letters about the "Comet," and they make me feel all of a glow! It is amazing that after all these years of enthusiastic radio the real old hard-case, shell-back constructors can be tempted to take up pen and ink and write these straight-from-the-heart appreciations.

We can only publish a small selection from those received, but you will see they

## RADIO NOTES AND NEWS

(Continued from previous page.)

transmitters emitting or diffusing. On March 25th a whale of a work called "Morning Heroes" will be broadcast from Queen's Hall; Arthur Bliss, the composer, conducting. Others present will be an orator (Basil Maine), the National Chorus and the big B.B.C. Symphony Orchestra.

### The B.B.C. Orchestra.

I'M frightfully musical this week, am I not? All along of a new record which I bought, entitled, "My Cutie's cuter than Cuticura." Now, about this B.C.C. orchestra! Even if you can't settle down to symphonies you must have noticed the power and slickness—I say slickness because as you are British you will understand that American word—slickness of that orchestra! By the way, what is the difference between an orchestra and a "band"? The B.B.C. O. costs, I believe, about £20,000 per annum to maintain, and has already made the Hallé fellows sit up and cogitate. I—me—Ariel—will not be happy till the Philadelphia Symphony Orchestra gives it "best," and I can buy grammy records of the B.B.C. O. performances.

### A West Country Exhibition.

A RADIO Exhibition is being organised by Messrs. Partridge & Love, of Broadmead, Bristol, and The Metal Agencies Co., Ltd., of Queen Square, Bristol. Aforesaid show will be held in the Colston Hall, Bristol, from September 21st to 30th (inclusive), the first large one of its kind to be promoted in the dear old West Countree. Don't say that I did not give you enough warning! (Bless me, my summer bathing bliss will be over by then, and I shall be anxious about my dahlias!) The B.B.C. support is being sought, and altogether this show bids fair to be IT.

### The "Crystachoke."

I HOPE that the kindly readers who are resident in Reading will feel special interest in this paragraph, because it concerns a blind radio "fan," W. C. I., of that town. W. C. I. had a copy of "P.W." given to him, and after hearing the description of our "Crystachoke," he not only made the set but afterwards improved upon it by replacing our coil for a coil holder in which he uses a No. 200 for Nat., a No. 60 for Mid., and a No. 30 for London Regional. W. C. I. considers the "Crystachoke" is a boon to blind persons. And if ever "P.W." hit the bull's-eye, it did when it gave that set to the world. The very best wishes to W. C. I., and may the tables and chairs of Reading break by the score—for he repairs 'em!

### The "Globe-Trotter."

A CHEERY, though Scottish; horse-doctor writes from Edinburgh in praise of the "P.W." "Globe-Trotter" set, with which, on an indoor aerial, he has logged 34 stations. In fact, I may say that our trotter has diverted his mind from horses' trotters! My friend, the foot-and-mouth expert, writes, I think, with a needle, through a microscope. He could inscribe the diseases of the common goat on a three-penny bit—provided that the coin were thereafter legal tender! As to the Wop station which he gets only on

Sundays and can't identify—I'm still inquiring. (In my younger days I tried bacteriological work in the anti-toxin line, but the horror of getting near to the graveyard of a horse's mouth drove me into another job. But that's anticipating my further memoirs.)

### Our Alf.

HAVE you ever heard Mabs Constanduros say "Alfice"? Our Mister Mann, of Middlesbro', takes a penful and says that he recommends all S.W fans to join the International Short-Wave Radio League. Also, that Mr Bob Conningsby, of Van Ness Avenue, Martilyuong (W.3), Melbourne, Victoria, Australia, wishes to correspond with any short-wave enthusiast

## SHORT WAVES.

### OSCILLATION.

"More wireless sets for teaching," I read. Now we shall get some genuine howlers. "Sunday Pictorial."

THIS WEEK'S GRANDMA: The dear old lady who, on being subjected to a bad demonstration of the Croyland Abbey bells by her grandson's 10-valve distorter said she could distinctly hear the bats in the belfry.

### BRIGHTENING THE B.B.C.

10.50 p.m.—Songs of Old England. "We Won't Go Home Till Morning."  
10.55 p.m.—Last Orders.  
10.57 p.m.—Drink Up, Gentlemen.  
11.0 p.m.—Time, Gentlemen, please!  
11.0 p.m.—Television for Housewives.  
"Where is My Wandering Boy To-night?"  
12.0 p.m.—The Ceremony of the Keys from Wormwood Scrubbs.  
"Theatre World."

"Most food stores sell 'canned' chicken, which is put up in glass jars a little larger than the ordinary custard cup. W S A E uses the jars for lead-in insulators," we read in "Amateur Radio."  
So that explains what is meant by "canned music."

### SUNDAY PROGRAMMES.

"What would I get with a five-valve portable set?" asks a wireless fan.  
Fed up, quite easily. "Sunday Pictorial."

### TO THE B.B.C.

I wish you'd broadcast every day  
Some witty saying—grave or gay;  
A word so wise and neat and pat,  
We'd shout with "Quex"—"Who told you that?"

who is resident in the Sheffield district. He wishes to know whether V K—6 A G works a subscriber telephone circuit on 41.7 metres.

### The Reply Courteous.

MR. MANN proffers a mild protest against the "something-for-nothing brigade" who write to him, and others, asking for magazines, circuits, photographs, etc., and send neither stamps nor, afterwards, thanks. Whom the cap fits, etc. Here is the present time schedule of W 2 X A F—2 X A D. 2 X A D, 1 p.m. to 3 p.m. (E.S.T.), except Saturdays and Sundays, when 1 p.m. to 4 p.m. As to 2 X A F, daily from 5.30 p.m. to 11 p.m. (E.S.T.). Waves, 19.56 and 31.48 metres respectively. Alf is always full of information, more power to him.

### A Request from Cleveland, Ohio.

E. T. (Gloucester), who is an ether-comber of distinction, thanks to the "P.W." "Magic," sends a copy of a "confirmation reception" letter from W T A M.

Cleveland, Ohio, U.S.A. The special point of interest in this lies in the fact that W T A M is anxious to know what audience they have here; so wash your ears, pull in the signals, and, if you feel so disposed, write to Mr. J. D. Disbrow, Engineering Dept., National Broadcasting Company, 1,367 East Sixth Street, Cleveland, and tell him all about it. You will find the U.S.A. a ready and cordial correspondent.

### Indian Broadcasting.

THIS is in a condition which gives rise to gloomy foreboding, and I understand that the Government of India are seriously considering its future. The running of broadcasting in India must be one of the very greatest problems of its kind, but it cannot be an insoluble one; but somehow I have not much hope that it will do more than linger on whilst Ghandi is in full career.

If only Indian broadcasting, plentifully tintured with propaganda, had been pushed forward a couple of years ago, as I suggested in my Notes, there would not now be so much foolery going on now.

### New British Monster Valve.

A new "Osram" valve for transmitting purposes has been brought to my notice and I thought that a comparison of its dimensions with that of an "Osram L.210" receiving valve might interest you. I put the corresponding figures for the L.210 in brackets. Filament volts, 31.5 (2.0); fil. current, 226 amps. (0.1 amp.); anode voltage, 18,000 (150); length, 3½ ft. (3¼ in.); diameter of anode, 4 in. (¼ in.); approx. weight, 18–20 lb. (2 oz.). This monster can handle an output of 100 kilowatts.

### Hunt That Noise.

AN American firm has produced what they call a "radio noise meter," an instrument which measures electrical interference and locates its source. It consists of a receiver unit for the detection of the "noise" and a calibrating unit for measuring the intensity of the interference in microvolts per metre; it is a "six-toober," and weighs 30 lb. I should think that something of this kind would be useful in this country.

### Further Note on Noise.

INTERFERENCE hunting is not, however, a perfectly simple process. First, you should be sure that the trouble does not lie in your receiver or its accessories, not forgetting the mains. Next, investigate any other electrical apparatus which may be working in your house, and then do the same for your neighbours! A process of elimination is the best method to apply. Don't forget that a lamp slightly loose in its socket or some wee bad contact in the electric-iron, or vacuum-cleaner or fan, may be the cause of your trouble.

### Latest News of the "Hollow Knockery."

SOMEONE has loosed the rumour that the B.B.C.'s inspired "interval" signal is produced by the Pronunciation Expert rapping on Chamber Music Charlie's skull with an auctioneer's gavel. The rumour is no doubt exaggerated. The latest descriptions of the signal are: "Chopping wood on a trap-door," and "a tap dripping on to an empty wooden box."

ARIEL.





# All About the "P.W." Coil

WHAT I have seen of late of some of the correspondence handled by the "P.W." Queries Department has given me a shrewd suspicion that some of our readers are not quite so clear as they would like to be about the actual working of the "P.W." high-efficiency dual-range coil.

This is really only natural, because in the original article in which we disclosed the new coil we were necessarily compelled to stick very much to its construction, and in subsequent articles describing receivers incorporating it, it has been necessary to devote most of our space to explanations of its application to the particular circuits in question. Perhaps, therefore, a general explanation of how the coil functions may be of interest.

### Two Main Parts.

You will remember, no doubt, that the coil consists of two main parts. There is an outer tubular former, carrying the low-wave secondary winding and a small aerial or primary winding supported above this on ebonite spacing pieces. The inner former is of the slotted variety and carries the long-wave secondary winding and the reaction winding, which last operates on both wave-bands.

Now, the first thing you must realise about this arrangement of windings is that the small primary (or aerial) coil is intended to function *only* on the medium

Our dual-range coil is a fascinating component in operation, as you will see if you read this informative article.

By G. P. KENDALL, B.Sc.,

wave-band. It is far too small to be of any use on long waves. For aerial coupling on long waves an entirely different method is used, the usual scheme in "P.W." sets being that known as "Brookmans" aerial coupling, which employs a condenser instead of a coupling winding.

Then there is the reaction winding, which is one of the most important details in the unit. A single winding is made to serve for both wave ranges, by careful choice of the number of turns and equally careful positioning of the winding itself in relation to the others.

It is usually considered rather difficult to make one winding serve for reaction purposes on both the medium and long-wave ranges, but we found that it could be done with our special arrangement of windings provided that proper disposition was made.

### Extremely High Efficiency.

It cost us a great deal of laborious experimental work, but in the end we found a scheme which worked well, and has actually a good deal to do with the extremely high efficiency of the final product.

This was how we did it. We used a winding which would normally be a little too big for pleasant reaction effects on the medium wave-band, and correspondingly a little too small for the long waves. Then we arranged the other windings so that our reaction coil coupled only rather weakly with the low-wave secondary winding, and unusually tightly to the long-wave secondary coil.

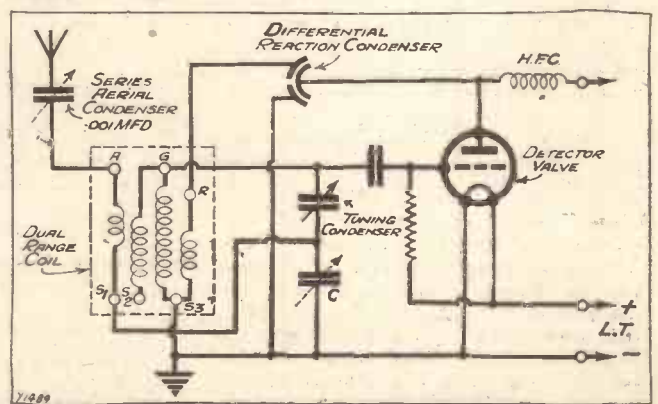
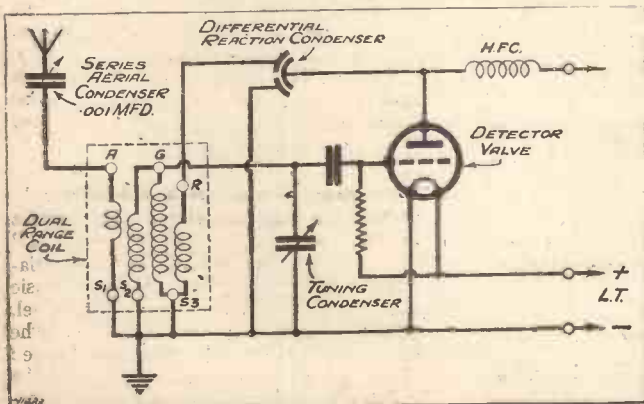
### Arranging the Couplings.

The necessary degrees of coupling were arranged as follows. The reaction coil is placed upon the inner slotted former, and since there is a space all round between this and the outer tube a suitable degree of weakened coupling is obtained between the reaction winding and the low-wave secondary. Similarly, the necessary very tight coupling between the reaction coil and the long-wave secondary is obtained by placing the reaction in one of the slots of the inner former, with portions of the long-wave secondary close against it on either side.

The method of arranging the wave-change switching is, of course, the real secret of the "P.W." dual-range coil and does more than anything else to confer upon it the remarkably high efficiency which it is now generally admitted to possess. As usually represented in the circuit diagrams of complete receivers, these arrangements

(Continued on next page.)

## HOW THE "P.W." COIL CHANGES THE CIRCUIT



These two diagrams have been specially drawn to show as simply as possible just how the "P.W." coil functions. On the right you see the equivalent circuit on long waves, while on the left is the circuit which results when the switch is closed for medium waves.

## ALL ABOUT THE "P.W." COIL.

(Continued from previous page.)

are not, perhaps, quite so simple to follow as they might be, so I have drawn two special diagrams to make the whole thing perfectly clear.

In the first diagram you see a typical detector and reaction arrangement employing the coil, simplified right down to show how the circuit is actually arranged. The wave-change switch is not shown, but the connections which it makes are inserted instead.

### Selectivity Control.

You will see that the impulses coming down from your aerial are first of all passed through the customary series aerial condenser of the compression type which gives

The result of placing two coils in parallel in this way, provided they are both in the same direction, is to give you an inductance slightly lower than the smallest of them. The medium wave secondary is, of course, suitably proportioned to allow for this effect. A very efficient inductance results in this way, and all dead-end losses are cut out.

### On Long Waves.

Now, on going over to long waves, quite a number of things are altered in this circuit, and I have redrawn it in the second diagram to show just what happens. The signals after coming down from the aerial and passing through the small primary winding no longer go straight to earth but only get there through the "Brookmans" coupling condenser marked C on the diagram.

This is usually of the adjustable type and gives a control of aerial coupling in the normal manner.

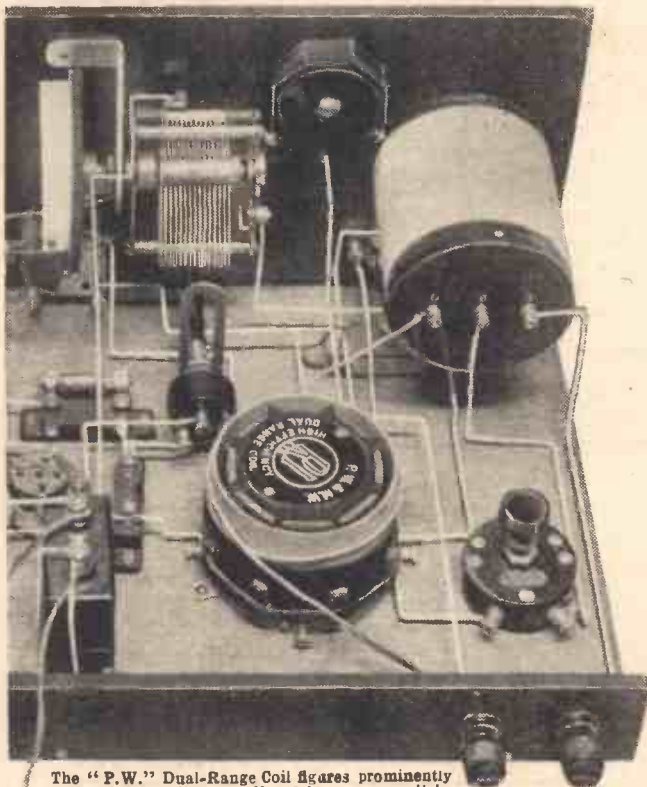
Incidentally, it gives a particularly efficient method of aerial coupling, with a marked reduction in the old trouble of the local station "breaking through" on the long-wave range. A usual capacity for this condenser, by the way, is .002 mfd. maximum, the ones commonly employed for the purpose being variable down to .001 mfd.

The inductance forming the secondary circuit is now the long-wave secondary coil alone, the action of the switch having separated the point  $S_2$  from earth and so disconnected the lower end of the medium-wave secondary coil.

It is true that this coil is left hanging on the end of the long-wave secondary, but its effect is negligible, since it is so small in comparison with the one which is active.

The main purpose of the paralleling scheme is, as I have said, to dispose of the long-wave winding when you are working on medium waves.

## THE CORE OF THE "COMET"



The "P.W." Dual-Range Coil figures prominently in the famous "Comets," and here you see it in that fine set—the "Comet" Three.

you your control of selectivity, and then through a small primary winding between terminals A and  $S_1$  to earth. The long-wave coupling arrangements are, naturally, now shorted out by the switch, and so are not shown.

### Losses: Eliminated.

The tuning coil constituting the secondary circuit is formed by the medium wave secondary and the long wave secondary joined in parallel. These are the two windings that are permanently joined together at their upper ends and terminate at their lower ends in terminals  $S_2$  and  $S_3$ , which you will see are earthed.

## A FINE OUTFIT.

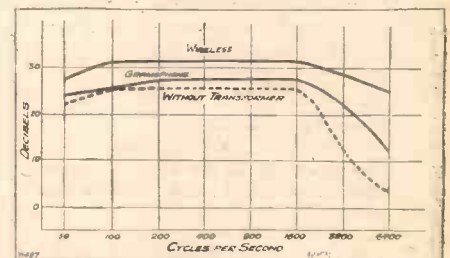
The first man in the country to receive wireless messages from Australia discovers the wonderful capabilities of the "P.W." "Magic" Four.

Sir,—You have probably heard so much concerning the "Magics" that you are now tired of the name; but I think you might be interested in the accompanying graph showing the remarkable accuracy and evenness of the sounds delivered by my "Magic" Four.

It will be observed that the drop in the lowest octave is particularly slight, both with the wireless and the gramophone, whilst with the very highest notes the drop is not serious. For four octaves the response is perfectly even. Note also the line showing the effect when the transformer was not used. The measurements were taken on a constant-frequency record, and a power-level indicator used.

I should not like to take credit for these measurements, because a young friend brought his instruments to my place for

### MODERN "MAGIC"



The output curves of the "P.W." "Magic" Four referred to by our Oxford correspondent.

testing the receiver. By the way, he was the first person in this country to receive wireless messages from Australia. This was done in November, 1924.

Yours truly,  
R. McINTOSH.

Oxford.

## RADIO WRINKLES

Usually the chief snag in the portable set is the H.T. consumption, so if you are purchasing such a receiver make sure what this figure is likely to be, or you may find battery renewals far more expensive than you expected.

Theoretically the best place for a volume control is as early in the set as possible, i.e. at the H.F. end.

The directly-heated type of S.G. valve usually requires rather less grid bias than the indirectly-heated type.

When a grid-bias battery has to be included in an oscillatory circuit (such as biasing for an S.G. valve) it should be shunted by a large condenser of good quality.

One disadvantage of the leaky grid detector is that it causes damping and loss of selectivity in the circuit to which it is coupled.

## DO YOU TRAVEL?

If you are interested in "wandering around" the foreign stations, you should make a point of studying

### THE WORLD'S PROGRAMMES

A special section that appears every month in

## MODERN WIRELESS

# THE "COMET" H.F. UNIT



Every evening scores of interesting items in programmes from the Continent are waiting for you to pick them up. This amazing little wave-change unit will enable you to tour Europe's ether with the greatest of ease.

Designed and described by The "P.W." RESEARCH DEPARTMENT.

## WHAT YOU REQUIRE.

- 1 Panel, 12 in. × 7 in. (Peto-Scott, or Lissen, Goltone, Parex, etc.).
- 1 Cabinet, with baseboard 9 in. deep, to fit (Pickett, or Camco, Keystone, Osborn, Kay, Lock, Gilbert, etc.).
- 1 .0005-mfd. variable condenser (Lissen, or Lotus, Cyldon, J.B., Ready Radio, Dubilier, Polar, Ormond, Igranic, Formo, Burton, etc.).
- 1 Slow-motion dial if condenser not slow-motion type (Igranic, or Ready Radio, Formo, J.B., Ormond, Brownie, etc.).
- 1 "Star-Turn" selector coil (Ready Radio, or R.I., Keystone, Goltone, Wearite, Parex, Magnum, etc.).
- 1 3-point push-pull wavechange switch (Bulgin, or Ready Radio, Wearite, Ormond, Keystone, Magnum, W.B., Red Diamond, etc.).
- 1 Fil. rheostat, 10 ohms. (For 4- or 6-volt valve 30 ohms) (Wearite, or Gecophone, Lissen, Igranic, etc.).
- 1 .001-mfd. max. compression condenser (Formo, or Lewcos, R.I., Polar, Lissen, Sovereign, etc.).
- 1 .001-mfd. fixed condenser (Lissen, or Telsen, T.C.C., Ferranti, Dubilier, Ediswan, Ready Radio, Sovereign, Watmel, etc.).
- 1 .01-mfd. fixed condenser (T.C.C., etc.).
- 1 1-mfd. fixed condenser (T.C.C., etc.).
- 1 .002-mfd. fixed condenser (Dubilier, etc.).
- 1 600- or 500-ohms fixed resistance with holder (Ready Radio, or Bulgin, Parex, Magnum, Wearite, etc.).
- 1 Sprung valve holder (Telsen, or Igranic, Lotus, Benjamin, W.B., Clix, Dario, Lissen, Igranic, Bulgin, Formo, etc.).
- 1 "P.W." dual-range coil (Keystone, or Formo, R.I., Ready Radio, Goltone, Wearite, Magnum, Parex, Tunewell, etc.).
- 1 H.F. choke (Lewcos, or Keystone, Varley, Ready Radio, R.I., Lotus, Parex, Dubilier, Lissen, Watmel, etc.).
- Standard "P.W." screen, 9 in. × 6 in. (Keystone, or Ready Radio, Parex, Magnum, Wearite, Sovereign, etc.).
- 6 Terminals (Belling & Lee, or Igranic, Eelex, Clix, etc.).
- 1 Terminal strip, 12 in. × 2 in. Flex, Glazite, screws, etc.

IN spite of the much-talked-of etheric chaos there is nevertheless a whole host of programmes really worth hearing waiting to be pulled in. Foreigners by the score are available to the man who has a good DX receiver.

You may doubt the statement, but you will be convinced if you try the wonderful little unit described here.

But before we go on to the description of the "Comet" H.F. unit, let us see exactly what is required in order that really satisfactory long-distance reception shall be obtained.

Obviously, a very high degree of selectivity is required in order that not only the local station but other powerful transmissions can be cut out in favour of a weaker programme.

Such a case as that of Bratislava is a good example of what we mean. We have the London National, and just above it there are Heilsberg and Bratislava. If you want the latter it is obvious that you must be able not only to cut out the National, but separate Heilsberg from the required transmission. And this takes a bit of doing, for they are very close together in wavelength.

## For Distance.

But a high degree of selectivity is useless unless the receiver is sensitive enough to pull in the station you want. And many sets are not really sensitive enough to give you what you want in the way of foreign reception. Sets like the "Comet" Three and the "Comet" Two are adequate in them-

selves to provide large numbers of Continental broadcasts, but there are hundreds of sets, detectors and one or two L.F., that, owing either to their design or the conditions under which they are operated, can supply very few programmes beside those of the local station.

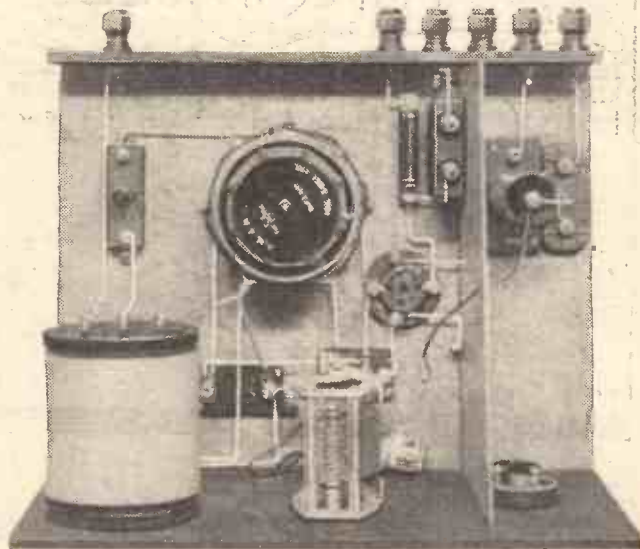
## Add It To Your Set.

We have said that in order to obtain satisfactory long-distance reception, it is essential that a set be selective and sensitive. But further qualities are necessary, one of these being ease of control. A receiver bristling with knobs, and having all sorts of tricky adjustments, is certainly not suitable for picking up weak transmissions.

It is easy enough to design a receiver that has endless gadgets that have to be worked before it is in its most sensitive and selective condition. But that sort of design

*(Continued on next page.)*

## EVER SO SIMPLE—ISN'T IT ?



Yes, it IS simple, but, nevertheless, it is amazingly effective, and will be a revelation to the man who builds it.

# THE "COMET" H.F. UNIT

(Continued from previous page.)

is never successful in the hands of any but the most expert.

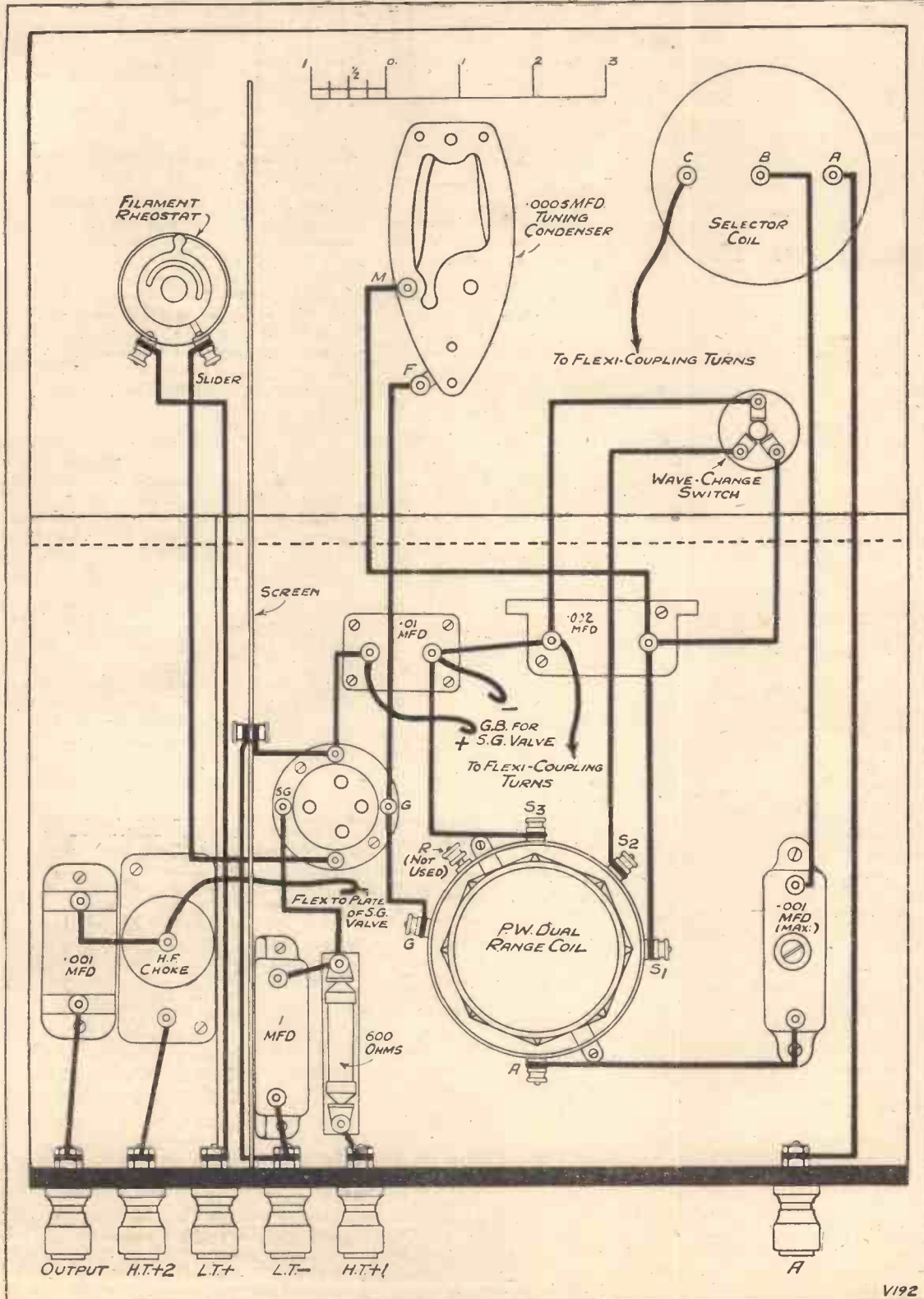
Ease of control, then, must be added to our list of essentials if we are to tour the ether with success. And so we must design a set that has this quality if we want a good receiver for foreign programmes.

"But," you will say, "this won't help the owners of existing sets that have not got these qualities you mention. They will have to scrap their sets and build new ones. A pretty expense that will be!"

Not at all! There is no need for them to touch their sets in the majority of cases. All a person in that position has to do is to make up the simple little unit described hereunder, connect it in front of his present receiver, and he will have a really top-notch DX receiver.

The unit, as you will have guessed by its name, is based on the famous "Comet" circuit. It is not intended for use with "Comet" sets—they hardly need such an addition; though it could be used if desired. It is really designed to give owners of ordinary receivers a chance to reap the benefits that the "Comet" circuit provides. And, moreover, the unit incorporates "Flexi-Coupling."

## SPEED THROUGH THE ETHER WITH THE "COMET"



### Wave-Changing.

But let us take the various features one by one. First of all, we have the "P.W." dual-range high efficiency coil as the basis of the circuit. This enables wave-changing to be carried out in a simple and highly efficient manner. Brookmans coupling is used on the long waves, the compression-type condenser (.002 mfd) providing a potentiometer effect with the tuning condenser that gives an adequate degree of coupling on the long waves without impairing the selectivity.

### Flexi-Coupling.

You might say that plenty of coupling could have been obtained by taking the input to the dual-range coil through a larger primary. But that would have spoiled the short-wave coupling, and the condenser scheme is much more satisfactory, as we have found by innumerable experiments.

But excellent as the dual-range coil is, there is a way of getting still better results—by means of "Flexi-Coupling."

This, as you will see, consists of an easily adjustable method of varying the coupling between the aerial and the dual-range coil, and at the same time of tuning the

(Continued on next page.)

## THE "COMET" H.F. UNIT

(Continued from previous page.)

aerial-earth circuit so that added selectivity and increased sensitivity are obtained.

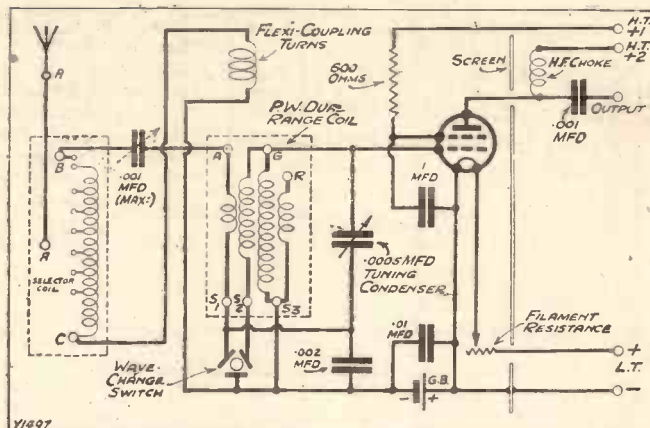
This is accomplished by the use of the special tapped selector coil, and a choice of coupling between this and the dual-range coil is provided.

The slider of the selector coil varies the tuning of the aerial (not of the whole unit, which, is tuned in the usual way by the condenser), but the aerial can be switched on to the dual-coil direct through a series condenser (.001 mfd.) by turning the selector knob hard over to the right, when the slider makes contact with stud "B," thus leaving the coil windings and taking

ponents. It is best to do the panel components first before the screen is placed in position, because otherwise it may be difficult to secure the leads in the variable condenser and on the filament rheostat. If you follow the wiring diagram carefully you cannot possibly go wrong.

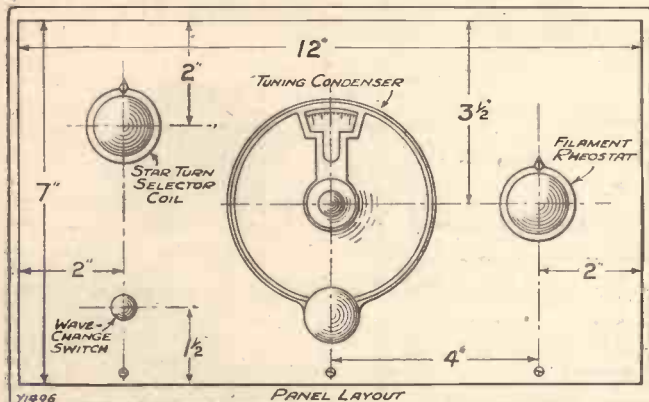
The use of the unit, which, of course, goes between the aerial and your present set, needs some explanation. The procedure is as follows.

Remove the aerial from your set and connect it to the unit. Take leads from each of the



Selector and Dual-Range Coils, Flexi-Coupling and an S.G. valve are features of the circuit.

## HOW THE CONTROLS ARE ARRANGED



The handling of the "Comet" H.F. unit is extremely easy.

the aerial straight to the condenser mentioned above.

Flexi-Coupling consists of connecting one end of the selector coil to earth via a long flex lead which can be coiled round the top of the dual-wave coil unit. This means that a loose coupling can be obtained between the aerial circuit and the dual-range coil, by virtue of these few turns. Moreover, the coupling can easily be varied by reducing or increasing the number of turns. Usually two or three are ample for all ordinary purposes; but it is easy to vary the coupling and you will find it a most fascinating business finding how even one turn will make quite a big difference.

### On the Long Waves.

For long-wave reception the selector coil and Flexi-Coupling are cut out, by turning the selector knob to the right, so that the slider makes contact with "B." The wave-change switch also is pushed in, thereby switching over the coil to the long-wave condition.

Volume control of the unit is carried out by the variable rheostat in the filament lead, and, of course, the grid bias of the H.F. valve is obtained from a separate 1.5 or .9 volt bias cell placed in the unit, and not from the grid-bias battery of the main receiver.

There are no snags in the construction of the "Comet" H.F. Unit. Everything is perfectly straightforward, so we need not go into that except for one thing.

This concerns the actual wiring of com-

ponents. No H.T. connection to the unit is required, as this is completed by the H.T. — to L.T. — wiring in the set.

We are left with one terminal to consider — the "output" terminal.

In the case of a set using ordinary coils or a wave-change scheme other than the "P.W." dual-wave coil, this should be taken either to the aerial terminal (for preference) or to the end of the coil that goes to the grid of the valve in your set.

If the "P.W." dual-range coil is in use, take the terminal "output" to "A" on the coil, and if Flexi-Coupling also is employed this should be ignored.

Now, making sure both sets are in the "short-wave" condition, switch in the set and the "Comet" H.F. Unit (which by the way is not really advised for use in front of a set already containing an H.F. stage) and try the outfit on the local.

You will have to turn both the condenser

tuning dials, that in the new unit and that in the set, and for the first go off the selector on the unit should be out of action — right over to the right.

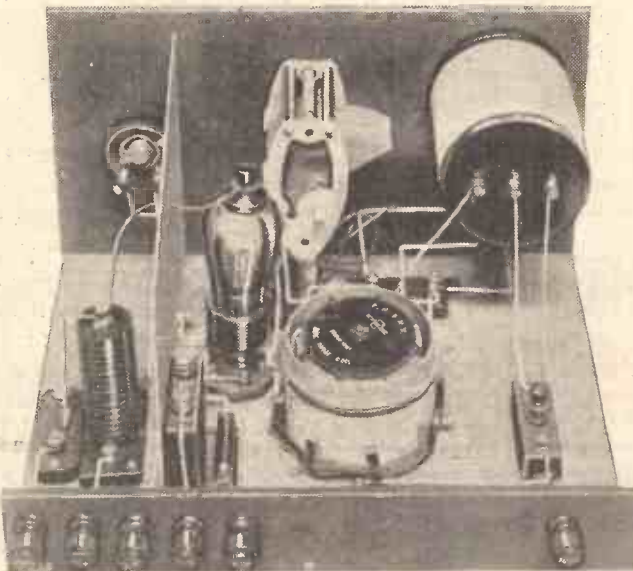
Note the dial readings for the local, and then turning the two dials, vary them together a few degrees at a time, keeping them in step till you have covered the whole range. You will find many stations, and the tuning will not be critical. But you should note how the dials keep in step.

### The Final Touches.

Switch over to long waves on both the unit and the set and repeat the process till you get the hang of things. For maximum strength on long waves place the .001-mfd. compression condenser at maximum (screwed down). Increase of selectivity is obtained by decreasing the capacity, i.e., by turning in an anti-clockwise direction.

Now, when you have the idea of tuning, go back to the short waves and find a moderate-strength station. The selector knob is now brought into action and varied until maximum signal strength is obtained. You will soon find that this final selector adjustment makes all the difference in both selectivity and sensitivity.

## READY TO REACH OUT



This little unit will give your ordinary set many of the advantages of the famous "Comet" receivers. Note the Flexi-Coupling!

## LATEST BROADCASTING NEWS.

**THE B.B.C. AND POLITICS**  
**NORTHERN WIRELESS**  
**ORCHESTRA FAREWELL—**  
**"FOLLY TO BE WISE"—**  
**AMERICA RELAYS B.B.C.—**  
**EASTER PROGRAMME**  
**ARRANGEMENTS—BELFAST**  
**NEWS.**

**B.** B.C. talks of all kinds are being followed more closely now than ever before.

Equal vigilance is being exercised by those who either believe they detect or wish to detect a bias towards the "left" and by those who are watchdogs against "reaction." The result is a considerable increase of irrationally abusive letters from all sorts of cranks and "specialists." This is not likely to disturb Savoy Hill out of the even tenor of its way, but, of course, some self-examination there is inevitable. It is only natural that special measures should be taken to prevent mistakes and to make censorship watertight.

It is to be hoped, however, that talks are not pushed back into their old dull, colourless routine. If there is any change, let it be by introducing more contentious discussion at the expense of less enjoyable dissertation.

Efforts are being made to induce Parliament to take a hand, but Westminster is proverbially hard to move in broadcasting matters. There will be a splutter of questions and then *finis* there.

## Northern Wireless Orchestra Farewell.

The Northern Wireless Orchestra, which, as already announced in our columns, is about to be disbanded, gives its final concerts for North Regional listeners on the evenings of Monday and Tuesday, March 30th and 31st, respectively. Their programmes on both nights will be devoted to request numbers asked for by listeners, to finally select which a special meeting of the Manchester Programme staff will take place a day or two previously.

Regret at the disappearance of the Northern Wireless Orchestra is not confined to the North Region. This orchestra was by common consent of listeners nationally the best musical combination outside London.

The new Northern Studio Orchestra, of nine players, comes into the programmes during the afternoon transmissions on Friday, April 3rd, when they are giving a concert selected from the works of Mozart, including his No. 11 "Divertimenti" and a movement from his "Clarinet Quintet in A." There will also be pianoforte items by Mollie Haigh and songs by Frank Brecknell (tenor).

## "Folly to be Wise."

An excerpt from "Folly to be Wise," in which Cicely Courtneidge, Nelson Keyes and Mary Eaton are appearing, will be relayed from the Piccadilly Theatre as part of the National programme on Saturday, April 18th.

## America Relays B.B.C.

The very noteworthy interest now being taken by the United States in British

broadcasting receives semi-official recognition by the plans of American stations to relay the B.B.C.'s running commentaries on several forthcoming sporting events.

The first will be the Boat Race broadcast this Saturday, March 21st, which will be followed by the commentary on the Grand National on Friday, March 27th. The transatlantic telephone service will probably be used to ensure good reception for American listeners.

## Easter Programme Arrangements.

While most of the provincial stations will be taking the National or London Regional programmes on Good Friday, it is worthy of mention that the Western and Scottish Regions are putting on several items of considerable local importance.

West Regional listeners will hear a service between 11 a.m. and noon, relayed from St. Nicholas' Church, Bristol, with an address by the Bishop of Bristol, while at 7.30 p.m. a concert by the Cardiff Musical Society will be relayed from the Park Hall,

Cardiff. The programme will be given by the National Orchestra of Wales, with Thea Phillips (soprano), Dorothy Clarke (contralto), Ben Williams (tenor) and Kenneth Ellis (baritone).

Scottish Stations are broadcasting programmes of readings and suitable music during the afternoon and early evening.

## Belfast News.

The Belfast Station of the B.B.C., whose excellent relations with the local civic authorities are perhaps more marked than at all the other centre of broadcasting, has just concluded negotiations with the Belfast City Corporation, arranging a new series of concerts in the Ulster Hall.

The first of these is fixed to take place on Saturday, April 4th, when the Belfast Symphony Orchestra and several distinguished solo artists will perform under the conductorship of Mr. E. Godfrey Brown. The programme will, of course, be broadcast to Ulster listeners, and the public will be admitted to the Hall on payment of a small charge.

## NEXT WEEK:

THE  
 "COMET" A.C. SAFE-POWER  
 ALSO

THE "DUAL-STAGER"  
 A FINE LONG-DISTANCE TWO-VALVER.

And an exclusive article by Capt. ECKERSLEY,

## THOSE TRANSMISSIONS

COMING SHORTLY:

THE  
 "COMET"  
 FOUR



## 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.

## Quality is Everything.

I ADMIRE a young friend of mine who, well in advance of his birthday, sent round to all his friends and relations who were likely to give him presents and said that, if they didn't mind, he would rather have it in cash this time.

They didn't mind. It made it easier for them. And with the money, plus a few scrapings of his own, he bought a new wireless set.

The odd pound or two, which represented what might have been a muffler, a pair of gloves, a box of cigars, and a fancy pull-over—none of which he particularly wanted—enabled him to get a better set.

I call him a wise fellow. The value of the programmes ultimately depends upon the quality of reception.

## Questionnaire.

Apparently there is an idea of sending round to us a list of questions to be answered so that the B.B.C. may know at what hour we take our meals, get home from work, go to bed; or at what time of the day we feel most gay or most depressed, as the case may be. They will then try to fit the programmes to suit our convenience and our emotional condition.

At the hour of greatest national depression they will probably turn on Leonard Henry or Gillie Potter, and at our cheeriest moment, when we can stand anything, they will broadcast "Nurse Henrietta," or "The Flowers Are Not for You to Pick." It shows, at any rate, that their intentions are good.

(Continued on page 44.)

# AT HOME WITH RADIO STARS



An interesting and exclusive picture of one of the B.B.C.'s first and most regular pianists.

12. MAURICE COLE.

**I**N a small, modest top-floor flat, not far from Notting Hill Gate, there live a couple whose names are household words with every wireless listener. They are a couple who can recall the earliest days of the British Broadcasting Company at Marconi House; the days of a single studio; of Stanton Jefferies playing the multiple rôles of receptionist, accompanist, announcer, and general factotum; days of the primitive microphone suspended by a length of flex from the ceiling.

You think they must be a very, very old couple, these strange people who can thus delve down into ancient history? You picture, perhaps, a gingham gown, cherry-wood pipes, old-fashioned carpet slippers, and wax fruit on the mantelpiece? If so, you must amend your ideas.

## Still Quite Young.

The couple are quite young, although they somehow manage to preserve much of the delightful nineteenth-century atmosphere of a home, of courtesy and hospitality. They are Mr. and Mrs. Maurice Cole, known to wireless listeners as Maurice Cole, pianist, and Winifred Small, violinist.

To be at home with the Coles is to be at home with oneself. One can sit and smoke and talk about everyday things in an everyday manner. It is difficult to believe that one is speaking with people whose names are known throughout Great Britain.

I have an idea that if Mr. Cole were asked if he were a musician, he would reply: "Well, I play the piano a little, you know." Mrs. Cole prefers to sit and listen. One must ask her point-blank questions to discover something of her musical activities.

There are no outstanding features in the Cole household. It is just a home; modest, snug, and comfortable. There are no footmen or servants to attend to one. Mr. and Mrs. Cole do that themselves.

## A Radio Romance.

In fact, it is just like one's own home, except, perhaps, that the sitting-room is considerably larger, for it has to accommodate a grand piano and still give an air of openness. On the wall above the piano there is a picture of Beethoven, a print of Mozart, and some half-dozen photographs of modern musical celebrities, including Arthur de Greef.

There is a music stand for a violin player, and nothing else in the room can give you a hint that you are in the home of people who have established themselves in the front rank of English musicians.

Wireless seems to have played a large part in Maurice Cole's life ever since 1922. He was one of the first pianists to work for the old British Broadcasting Company, and he has been broadcasting ever since.

At the present time, when popularity proves so fickle, and has ousted so many of the "old-timers"; and when there is so much competition from newcomers, this fact is indeed a fine testimony to his skill. He has also broadcast in Germany, and those who know of the high standard of music set in that country, and of the strong prejudice against all foreign performers, will agree that this is no ordinary triumph.

But quite apart from the fact that wireless had introduced Maurice Cole to an increasingly large public, it has played a big part in his private life as well. In 1925 he was touring the provincial stations of the B.B.C. in company with Miss Daisy Kennedy, the well-known violinist.

At Cardiff Miss Kennedy was taken ill, and Mr. Cole was at his wits' end to know how the tour could be satisfactorily completed. It happened that Miss Small, whom he had previously met at a public concert at St. Leonard's, appeared at Cardiff in the same week.

Mr. Cole asked her if she would take Miss Kennedy's place. She agreed, and the B.B.C. gave their consent to the new arrangement. On the following day they left for a northern station. The tour was

completed, but apparently it was not long enough. Some time later they decided to marry. Which, to me, is far more romantic than the most extravagant wireless play ever broadcast.

I might say that Mr. Cole is one of the very few wireless artists I have met—in fact, I think the only one—who takes an interest in the technical side of radio. The set which he now uses is his own construction, made up from a blue-print.

As in everything, he is overwhelmingly modest about it.

"Oh, yes, I am quite fond of tinkering with wireless parts," he told me. "But, then, anyone can make up a set from a print."

## A Charming Personality.

I agreed that it was not a very formidable task, but discovered the truth by putting to him the old, old question which marks the dividing line between the "dabbler" and the expert.

"Can you use a soldering iron, Mr. Cole?"

"Well, yes, I can," he answered. "Although my present set hasn't a single speck of solder in it."

The answer was good enough for me.

I should, I suppose, include a few facts concerning Maurice Cole's career, but I find it difficult to describe adequately the charm of his personality, and yet find space for pure hard facts. To look at, he is tall, slim, dark.

## A VERY MUSICAL MARRIAGE



Maurice Cole met his wife, Miss Winifred Small, the well-known violinist, on a broadcasting tour.

There is an obscure air of dreamy artistry about him, quite indefinable. He is quietly dressed, and favours the old type of butterfly collar. His long, lean fingers could only belong to a surgeon or a musician. I am convinced that had he chosen medicine for a career, he would have done equally big things.

He was born at Streatham early in the present century, and acquired his first few lessons from a professional teacher, but was forced to give them up for eighteen months on account of health.

He subsequently studied under the immortal De Greef, both in Brussels and London.

# A UNIQUE BROADCAST

Some advance details of a thrilling future broadcast from the heart of an East African Jungle.

By THE EDITOR.

MANY of our readers no doubt saw in the newspapers the other day references to a special broadcast which will be made by the Nairobi station on April 20th. And no doubt readers wondered about the origin of this programme, which in several ways promises to be unique in the history of broadcasting.

The fact of the matter is that this transmission has been specially arranged by our contemporary, the "Wireless Constructor"—a fact, by the way, which the London newspapers, with two exceptions ("The News Chronicle" and "The Daily Mirror"), were discourteous enough to refrain from mentioning when we supplied them with the advance news of the arrangements.

## Listen to the Lions.

However, that is a minor point; the main thing is that, thanks to the courtesy and interest of the director of the Nairobi short-wave broadcasting station, our contemporary has been successful in arranging for a special transmission at 7 p.m. G.M.T. on April 20th, which we feel sure will be of great interest to every owner of a short-wave set in this and other countries.

And, furthermore, there is a good chance that this broadcast will interest ordinary listeners, for the B.B.C. has expressed great interest in the transmission and it may be that arrangements will be made for the B.B.C. to pick up Nairobi direct and relay the broadcast to listeners in this country.

The transmission will last approximately for an hour, and the programme will contain at least two items of outstanding novelty.

In a letter to the Editor of the "Wireless Constructor," the Director of the Nairobi station says that he is arranging for microphones to be placed near a pool in the jungle on the outskirts of Nairobi, where lions are in the habit of slaking their thirst before starting out on their nocturnal hunt for food.

And as these kings of the jungle usually roar a good deal before and after drinking, listeners who pick up Nairobi that evening should hear something rather thrilling—providing, that is, that the lions don't disappoint and drink in silence!

## Personal Messages.

Another item in the programme should have a very special appeal for listeners who have friends or relations in Kenya Colony, for the Director of the station is inviting British residents to step before the microphone and broadcast a few words of greetings to their folks in the home country.

As far as we know, this has never been done before by a British station. You can imagine the thrill this arrangement may provide for those in this country who have friends and relations in Kenya—and we hope that readers of "P.W." who know of people who have relations in the colony will let them know about this feature of the

Nairobi broadcast, and will, where possible, assist in every way to pick up the broadcast on the 20th.

Preliminary details concerning Nairobi's transmission, etc., will be found in the issue of the "Wireless Constructor" now on sale, and a full schedule of times, together with the programme, will be provided in the following issue, on sale Wednesday, April 15th.

Meanwhile, brush up your short-wave technique and overhaul your set. Nairobi is, admittedly, a deuce of a long way away, but nevertheless the short-wave transmissions from that station are usually heard with no great difficulty in this country.

One member of our staff often picks up the transmissions on a two-valve short-

## "THE GIRL WITH APRIL IN HER VOICE"



"Mr. Ramsbottom" (Philip Ridgeway) and his vocal "And," Miss Babs Farren, who has joined the well-known "Parades."

waver, so we anticipate that thousands of our readers who have good short-wave sets will have little difficulty in hearing this unique broadcast on April 20th.

It is stated in the current issue of the "Marconi Review," which we have before us as we write, that a scheme is being developed on the Continent whereby local receiving stations pick up the programmes from the high-power transmitters and re-broadcast them. The redistribution is done either on low-power transmitters working on common waves or on very short waves below 10 metres, or the received signals are distributed through systems of house-to-house wiring.

Broadcasting on common wave-lengths is not new, but local re-broadcasting on short waves has not yet been tried out in this country, and it is possible that this

scheme offers a practical solution to the problem of other traffic congestion. It is stated that short waves below 10 metres are quite useful for local transmission, because the range of these waves is small, and therefore no interference is likely to be set up with distant stations; subject to the precaution of erecting the aerials on high buildings, clear of obstacles, good results are assured. By this method it is possible for first-quality broadcasting to be received in districts not normally served by high-power stations.

Such a scheme was first described in "Popular Wireless," in the December 27th, 1930, issue, under the title of "The New Ardenne Radio."

## Local Exchange.

The local exchange method of house-to-house distribution of radio programmes has been exploited in England, but it is used on a much larger scale in several Continental countries, particularly in Russia.

Nevertheless, we believe that this distributing method will shortly be developed on a much more ambitious scale.

In fact, there are many signs that this method of broadcast reception is becoming increasingly popular among non-technical

listeners who are also content with a limited choice of programmes.

The scheme is that a central receiving exchange relays broadcast programmes to "subscribers" in the district. All the subscriber needs is a loud speaker and a switch. He presses the switch and gets his programme just as he gets his electric light, water, and gas—on tap, so to speak.

The central exchanges do all the necessary tuning-in, adjusting volume, etc., etc.

## Two Programmes.

As a rule an exchange of this type, catering for several hundred subscribers, offers its clients the choice of two programmes—you switch on to "A" or "B" programme—and that's all you can get that particular evening. If you don't like either programme, you switch off and go without!

It sounds a little limited, but no doubt for those who are content to get what's given them the scheme has its appeal.

But we can't see readers of "P.W." enjoying such a service as long as there are "Magics" and "Comets" to be built which will fetch in dozens of alternatives!

Read all about  
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IN THE APRIL

"WIRELESS CONSTRUCTOR"

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# THAT INTERVAL SIGNAL

by CAPT. P.P. ECKERSLEY, M.L.E.E.



**I** NOTICE that the B.B.C. has fallen for the Interval Signal. But very carefully and very discreetly. So discreetly that quite often I wonder if it's the interval signal or a clock ticking. Is someone hitting something with a mallet?

I hold decided views about the principle of the interval signal. These views have been aired a good deal at the meetings of the International Union, where the interval signal principle finds its champions.

Dr. Schwaiger, who is the technical inspiration of Austrian broadcasting, has long held the view that a robust interval signal is essential. We have had some delightful arguments about it.

Dr. Schwaiger is a splendid person with whom to argue because he sticks to the point and his temper, and we finish up with the proper laughter. Because you can have great fun about it all, I always try to make the interval signal look silly.

One can conjure up all sorts of situations of anticlimax where something beautiful is followed by the mechanical reminder of the technique of broadcasting. Broadcasting, so I argue, should never insist upon its machinery, it should carry always some hint of its magic, it should be a worthwhile sound stealing into one's senses, not a blatant, clicking mechanical toy insisting upon its mechanism.

The interval signal is a method to relieve people of anxiety in regard to their sets; if, during intervals, they hear something, they are sure that their sets are working. If the sets were reliable they would be sure, anyway.

### Inevitable Compromise.

The B.B.C. is conscious of all these arguments. Thus it arranges for an interval between the end of an item and the beginning of its emasculated signal to prevent anyone relating the two. That is the inevitable compromise when two or three points of view are each given weight without taking a real policy decision.

Let us pursue the matter further. If there is to be so long a pause between the item and the signal is there not time to arrange and get on with the next item? This is where we turn to the "Radio Times," the official organ of the B.B.C., to find that a new policy is promulgated.

There shall be long intervals between items. Thus Mr. Filson Young encourages us to believe in the artistic stimulus afforded by broadcasting, and decries the steam organ policy which never pauses, which grinds it all out in a long string, news and Tristan, psychology and vaudeville, weather and whither mankind; no pause, no co-relation, no time to think. Awful!

Some call it a "death tick in goloshes," others "wind-up heart beats," while our Chief Radio Consultant—but read below his own words on the subject.

Mr. Filson Young pictures to us the last dying note of a beautiful symphony (but so very often reproduced on a portable with the adjusting screw loose) and then the luxury of silence.

Our thoughts stray here and there, touched, lulled, stimulated, so that we can, in silence, chew the cud of sweet and bitter fancy as we will. But there seems to be a curious lack of co-relation when someone else whose views are not represented in the official organ insists that our thoughts shall be quickly brought back to earth by this mallet-banging noise.

### No Unity of Purpose.

Why a long interval for thought should be partly backgrounded by ticks and tocks, I do not understand. It's all really rather silly, and shows no unity of purpose behind the B.B.C.; of course, I cannot help welcoming even this funny noise when I am experimenting. Better still, the steady roar of the vision signal and television transmission.

A long pause just as one has taken a reading or changed a circuit is muddling.

### IT'S NOT THE SET!



The interval signal indicates that the set hasn't broken down—not that the "Comet." Two (above) is likely to do that if you keep the batteries up to scratch.

Has one lost the station? What time is it? When do they start? Ah, there it is, tick, tock. We've got the carrier, anyway. All very comforting. But is the B.B.C. service devoted to the interests of the experimenter?

Then, again, think what a boon it is to listeners on the Continent. What station was that? Tick, tock—London, of course. They can then switch off that one and see what they can pick up next. The logging goes on.

### What is the Policy?

Do not misunderstand me. I think logging stations the greatest fun in the world, and when the local programmes fail to interest what better than to kill boredom by oscillating round the ether?

But is it interesting to the majority, and should the B.B.C. cater for those who log but never listen?

What is the policy? What does it all mean? Departments decide here, departments act there. Now we are to have long pauses, but someone points out that this will make people mistrust their sets, oscillate and create chaos. So they decide to have a long pause and an interval signal. But the interval signal must be discreet. So it is made very quiet and fails to carry to the Continent. What more logical?

### Silence is Better.

But the point at issue seems to be this: Is it better either to have a long interval and encourage people to trust their sets, to take listening seriously, to switch on at the time for a given chosen programme, and have their silence after it, or is it better to decide that reception technique is not at present advanced enough to put up with long intervals and that oscillation will upset the policy of silence!

To my mind a bold and continued policy which includes the long interval and will finally encourage people to trust their  
(Continued on page 40)

## USING YOUR "COMET" D.C. UNIT

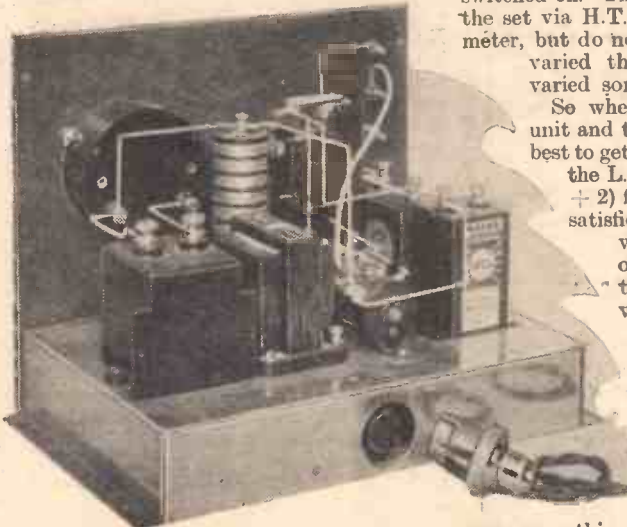
Last week we described the finishing off of the "Comet" radio-gram and the construction of a special Safe-power D.C. unit. Below are some further practical details.

By THE "P.W." RESEARCH DEPARTMENT.

LAST week we gave a brief description of a special Safe-power D.C. unit for the "Comet" Three. In this page we want to give a few more details concerning this unit and the charger which was mentioned last week.

As regards the Safe-power D.C. unit, we should like to emphasise the importance of keeping strictly to the operating details we

### IT SAVES YOU MONEY—



The "Comet" Safe-power unit is not expensive to build, and it provides smooth power for almost nothing.

gave and the hints that you will find below if perfect safety is to be obtained.

That sounds terrible, perhaps. Almost as if the unit is a dangerous one. This is not really the case, any more than one can say that ordinary electric light mains are dangerous.

No one in their senses would take an electric lamp out of its socket, and with the mains "on" place his fingers across the contacts in the lamp holder.

Very well, then, why should radio set constructors take risks with their mains units? And yet so many do. They go fiddling about inside these units, making voltage adjustments and so on with the set and mains on. The result is almost invariably a "packet."

#### Adjusting the Voltages

So we, in our chief mains unit designs, follow our Safe-power scheme, covering the whole unit with a metal case, and having a special plug and socket contact with the mains supply, as you can see in the photos on this page. Sensible constructors will not attempt to use the unit with the lid off.

But talking about shocks, we would like to warn readers that in the event of the mains having the positive pole earthed, the metal parts of the filament switch, escutcheon plate screws in the variable condenser and wave-change switch spindle may be

alive. Therefore, to avoid a little "tingle" in the event of your touching them when the set is on, and a mains unit is being employed, it is just as well to enamel them with some ordinary enamel, or with shellac.

Owing to lack of space we were unable to go into the matter of voltage adjustment, and perhaps some more detailed description, will be of use.

The output voltage control is carried out by the variable resistance, with the set switched on. The actual voltage applied to the set via H.T. + 2 is shown on the voltmeter, but do not forget that when this is varied the detector voltage also is varied somewhat.

So when you have fitted up the unit and tried it out on the set, it is best to get the correct adjustment for the L.F. and output valves (H.T. + 2) first. Then, after you are satisfied that you have the right voltage here, switch the unit off and, removing the plug at the back, alter the detector voltage tapping on the potential divider.

#### The Switching

With 150 volts showing on the meter when the unit is in operation, tapping No. 5 on the divider will give about 75 volts for the detector. But in

some cases this may be too much for smooth reaction and you may find it advisable to try No. 4 or even No. 3.

On the other hand, certain instances may require a little more H.T. for best operation and in this case you should tap further up the potential divider—say at No. 6 or No. 7. It is more likely, however, that No. 4 or No. 5 will give best results. But, having ten taps in the potential divider you have adjustment in steps of 15 volts or so for the detector.

As regards switching the set on and off, don't forget that the mains unit must also be switched on and off. The on-off switch on the set has no control over the unit; this has to be controlled at the electric light switch or by removing the adaptor plug you will have fitted to the mains flex, from its socket.

You will remember that last week we suggested that in conjunction with the mains unit there should be used a little trickle charger (described in "P.W." dated Feb.

7th), and if this is employed it greatly simplifies the maintenance of the set.

For the L.T. battery is always kept at full strength and so virtually the "Comet" Three becomes a mains driven set. Simple, isn't it?

#### Real Protection

All you have to do is to construct the simple little charger and then, placing it in some convenient place, forget about your power supply.

The double switch on that unit enables complete control of the L.T. side to be obtained. The charger is so connected that when the switch is in one position the L.T. battery is switched over to the set.

In the other position the charger switch automatically switches off the set and puts the L.T. battery "on charge." With the charger in use, of course, the L.T. switch on the set is left permanently in the "on" position.

(The H.T. unit is switched "on" and "off" as before, of course.)

The charger is built on the Safe-power principle, being metal-covered and is quite safe in use. It should be placed in some position where the heat from the lamps can be dissipated, but at the same time easy access to the switch is provided.

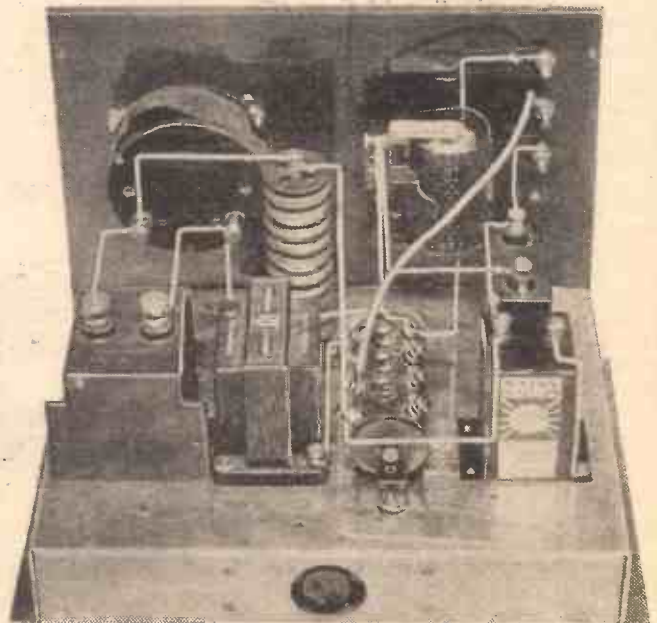
#### Very Long Life

This concludes all we want to say about the "Comet" Safe-power unit and its use, and provided both the unit and the charger are reasonably handled there is no reason why they should not work indefinitely with every satisfaction.

For those of our "Comet" builders who have a C. electric light supply and wish to take advantage of this for the provision of H.T., we are giving full constructional details of an A.C. Safe-power "Comet" unit next week.

This unit will be simple to build and in every way as satisfactory to use as the D.C. unit just described.

### —IT SAVES YOU TROUBLE

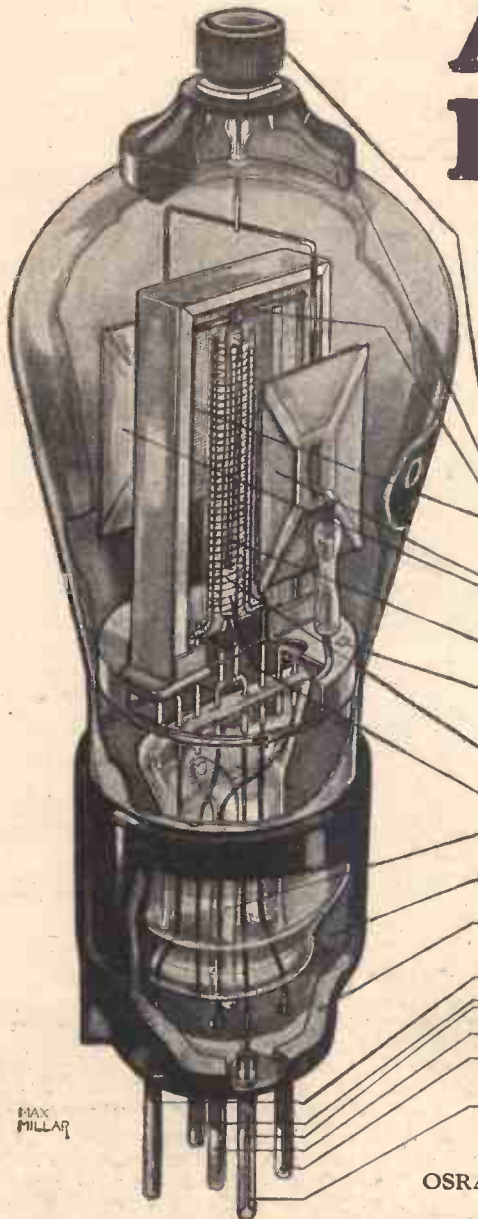


Completely trouble free H.T. is provided by this unit. No H.T. batteries to run down; constant service and voltage are obtained instead. Note the special Safe-power safety plug at the back of the base.

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## OSRAM A.C. MAINS VALVES



- ANODE TERMINAL leading to Anode Plates.
- BAKELITE CAP
- CATHODE SUPPORT BAR
- SCREEN GRID of box construction surrounding Cathode, Control Grid, and Heater.
- ANODE PLATES connected to Anode Terminal and insulated from Screen Grid.
- INSULATED FILAMENT working direct from A.C. Mains.
- MAGNESIUM GETTER for absorbing residue gas after final exhaustion of bulb.
- CATHODE TUBE heated by filament for high electron emission.
- CONTROL GRID wire wound and welded at each turn for rigidity.
- SEALING-OFF TUBE for air exhaustion of bulb during manufacture.
- STRONG CEMENT holding bulb to base.
- BAKELITE BASE giving maximum insulation and minimum losses.
- SCREEN GRID PIN
- HEATER PINS
- CATHODE PIN
- CONTROL GRID PIN
- SECTION OF PIN showing countersunk end for perfect soldering of wire.

### The points that count:

1. No hum.
2. Entire absence of interfering background noises.
3. Consistent electron emission.
4. Rigid and reliable.
5. Built to withstand mains fluctuation.

In fact, everything that goes to make a trouble-free A.C. mains set.

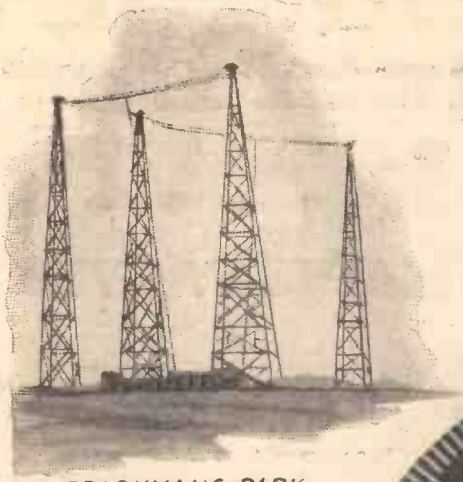
OSRAM M.S.4.

# Osram Valves

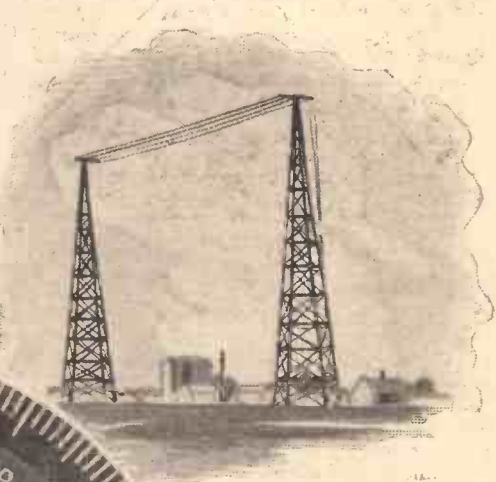
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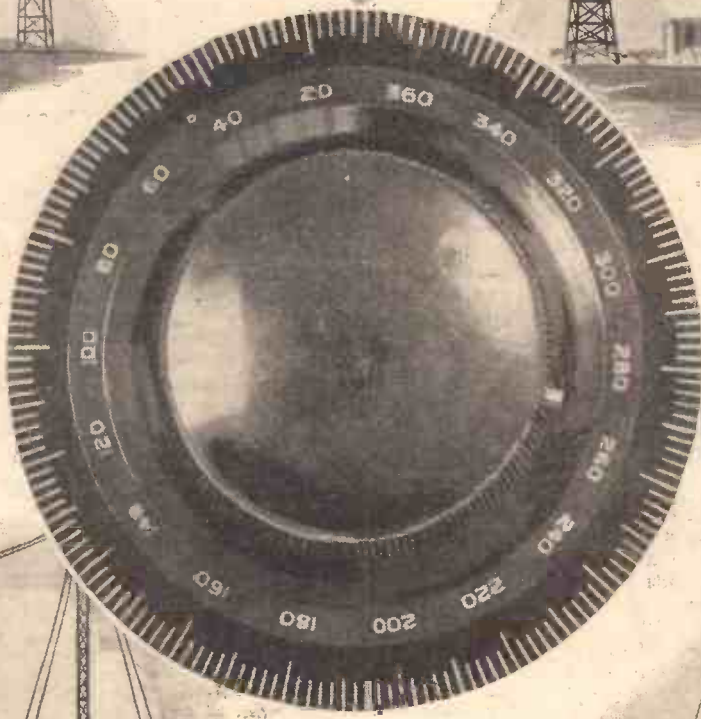
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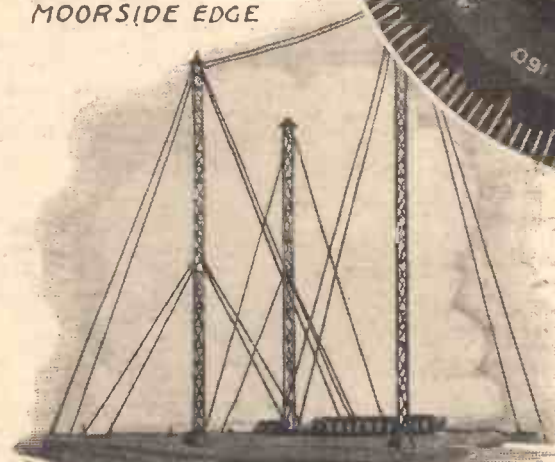
RADIO PARIS



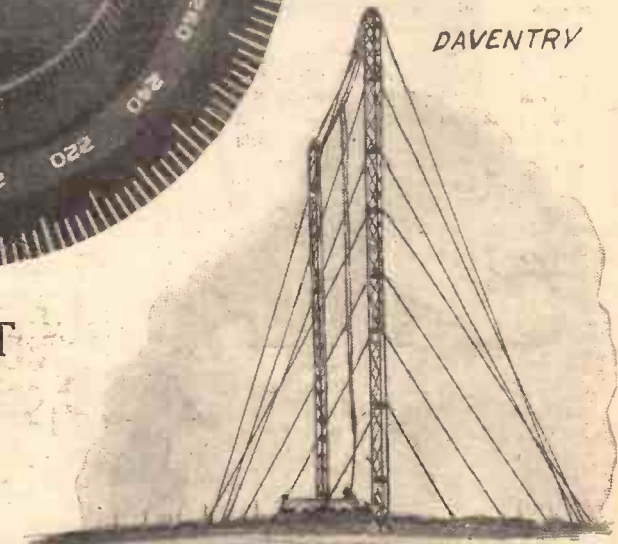
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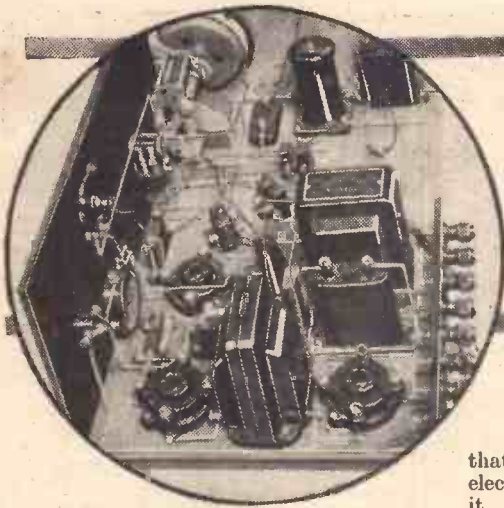
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# RESISTANCES IN YOUR SET

Some startling facts about the energy in radio receivers that may be quite new to many "P.W." readers.

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

IT is just as hard to grasp the real significance of small things as it is of objects of colossal dimensions. Indeed, there are points where measurements become quite meaningless to most of us, both in very large and extremely tiny things, which yet have vitally important physical characteristics.

We know, for instance, that our national wealth runs into thousands of millions of pounds, but only the leading economists can visualise the reality of piles of money like that. And I expect they are much more moved by their own comparatively trifling bank balance fluctuations than by the discrepancy of an odd ten million or so in the nation's purse!

## Diminutive Power.

In regard to diminutive quantities, we meet something staggeringly diminutive in the electrical power the average radio aerial is able to collect even from a powerful local broadcasting station.

I'll give you a comparison. You know that the ordinary modern valve is reckoned to consume but a small amount of electrical power in its filament. The most widely used 2-volt valves take only one-tenth of an ampere at two volts. And that equals .2 watts of power (current multiplied by voltage). Sixty watts is a common rating for one single electric light bulb such as is employed for illuminating an ordinary living-room, and that represents enough power to heat the filaments of three hundred dull-emitter 2-volt radio valves!

But the power generated in an aerial by a broadcaster fifteen or twenty miles away will be somewhere around about one millionth of that extracted from an L.T. battery by no more than one valve!

Obviously, where broadcasters hundreds of miles away are concerned, the electrical energy you can collect from the ether, even with a first-class aerial, will be of incredibly tiny dimensions. I'm not going to attempt any illustrations at all for this, for we have now gone beyond, miles beyond, that point I mentioned at the beginning of this article.

## All Round the World.

The most surprising fact is that it is possible to guide such microscopic pulsations of power on to the grid of the first valve of a radio set. You'd expect it to get absorbed on the way, wouldn't you?

But electricity isn't like water. Give it a path and no matter how long or how hard

that path may be, the smallest pressure of electricity will push electrical energy through it. If you took a giant reel of the thinnest metal wire ever made and joined up one terminal of a small flash-lamp battery, ran the wire right round the world, and then joined the other end of the wire to the remaining terminal of the battery, a current of electricity would flow round that twenty-four thousand mile circuit. (And it would accomplish that journey in a fraction of a second.)

For that matter you could send a current to the sun or the moon and back from one cell of your L.T. battery through the finest wire. But it would be an infinitesimally small current, and no measuring instrument, however sensitive, would be able to measure it.

It is not necessary that a circuit should be physically long for it to be a difficult one for electricity to pass through.

The hardest path that can be offered to an electrical current is one composed of an insulating material such as ebonite or mica. Mighty small current flows through such materials, however strong the electrical pressure applied across them, unless they "break down" and cease to become "insulators."

A piece of rubber of paper thickness will reduce the current flow to the same extent

that indicates that it doesn't do to take things electric too much at their face value!

Let us turn practical for a moment. A grid leak as ordinarily used in the grid circuit of a detector valve, has a very high resistance. A usual value is two million ohms (2 megohms). To equal that resistance in wire, of quite a stout gauge, you would want a length of well over a thousand miles!

## Fixed Condensers.

So you can say that the grid leak is a very bad conductor of current, though not so bad that it enters into the "insulator" class. But a fixed condenser is supposed to be a well-insulated device. Connect a battery across its two terminals and completely negligible current should pass.

But one often meets grid condensers of shoddy construction made of poor material whose resistances actually test out at figures below that of the average grid leak. Such a condenser ceases to be purely a condenser, and sets itself to do work similar to that of the grid leak (which does not want help). The results may be a distinct upset in the operation of the receiver.

And because a substance looks black and has the general appearances of ebonite, it does not follow that it necessarily has the insulating properties of a proper rubber-sulphur combination. Of course, there are many "synthetic" insulators composed from tar extracts and so on that are quite good, except that they frequently tend to be over brittle.

## Not a Success.

I once had a valve holder on the test bench that readily passed current between its various terminals through the black composition comprising its main moulding. I won't say it conducted as readily as a solid lump of metal, but if I mention that it would have made a passable anode resistance, the more knowledgeable of you will gather that as a valve holder it couldn't be regarded as a particularly bright success!

On the other side of the picture, I have recently encountered fixed condensers embodying almost miraculously good insulation, insulation so closely approaching perfection that one cannot fail to pay tribute to the British manufacturers concerned—and I'd do so in the appropriate report. The electrical resistance constituted between the terminals of these condensers is so terrific that they will hold charges of electricity for days at a stretch. Connect one across the mains for a second and you could post an electric shock to a friend in it!

## MINUTE MEASUREMENTS



A sensitive micro-ammeter being used to measure the minute currents that flow through an ordinary crystal detector.

as thousands of miles of metal wire of the gauge of a human hair.

From all this you will gather that there is no such thing as a perfect electrical insulator, and that all substances are conductors of electricity, though some are such bad conductors that for all practical purposes they can be regarded as non-conductors.

On the other hand, some so-called insulators are so bad at their job that they tend to step into the category of conductors.

## FROM THE TECHNICAL EDITOR'S NOTE BOOK.

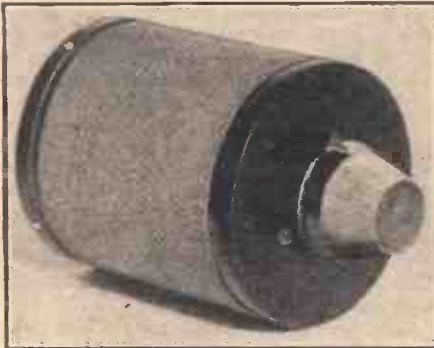
## Tested and Found—?

**READY RADIO SELECTOR COIL.**

THOSE enthusiastic suppliers of guaranteed kits of parts, Messrs. Ready Radio, are now manufacturing, in quantity, the "P.W." selector coil for Flexi-coupling and other circuits.

And very well made it is, too, with its efficient, concealed switching and well moulded former.

We have tested several samples and find them to be first class in every respect.



The Ready-Radio selector coil for "P.W." Flexi-coupling, etc.

**A VERY CHEAP LATHE.**

An item which should prove of some considerable interest to the home constructor is the Adept Lathe, which is manufactured by Fel-Ectric Radio, Sheffield. It is a 1½-in. centre lathe and, with a compound slide rest, it costs only £1. A treadle arrangement, complete with driving belt, is available at £1 4s. 0d. Here are its technical details:

"The mandril bearings are adjustable for wear, the mandril nose is threaded to take catch plate, etc., and is bored taper to accommodate the centre, which is removable and renewable. The lathe is fitted with fully compounded slide rest, the slides of which are of the orthodox Vee type, having gibs and adjusting screws. The tailstock has a sliding barrel which is clamped in position by a set screw. The principal dimensions are: Height of centres over bed 1½ in. Height of centres over gap, 2½ in. Length of work taken between centres, 6 in. Length of lathe overall, 11½ in. Weight, 6 lb."

I must confess that I, personally, am no expert on lathes. They are devices which I can handle only amateurishly, but we have members of the staff who know all there is to know about such things. And they tell me that the "Adept," while falling far short of ten and twenty guinea models in certain respects, is yet excellent value for money at the price mentioned.

**EUREKA PUSH-PULL SWITCH.**

Ingenious mechanical devices always appeal to me (as no doubt they do to most

"P.W." readers, too). That is why I have a friendly feeling for the Eureka Push-Pull Switch, a product of L. Person & Son, of London, N.1.

Its action is most novel. You pull the little knob, and a small steel ball pops out of a hole and forces two spring contacts together.

The contacts are quite self-cleaning, and the pressure is firmly and efficiently applied. The action of this one-hole-panel-mounting switch also embodies that nice little "click," both on making and breaking contact, which I find almost essential in any switch if I am going to use it on my set.

The movement is also easy, and there is no No-Man's-Land between the "on" and the "off." The price of the Eureka Push-Pull switch is one shilling, and I consider it a very reasonable price. But I am of the opinion that many constructors would willingly pay two or three pennies more if they could get little terminals as well as the soldering tags that are fitted.

**A PRICE REDUCTION.**

The General Electric Co., Ltd., announce that the Gecophone Portable Screened-Grid Four Receiver has been reduced in price from twenty-one guineas to fifteen guineas.

**LISSEN "TOREX" TRANSFORMER.**

A new component invariably means a new carton or box into which to pack it. And sales managers are frequently even more concerned as to the design of the carton than that of the actual article itself. The colour scheme is very carefully arranged so that it will stand out in window displays, etc., and very close attention is given to the wording.

For instance, on the carton and covering of the Lissen "Torex" L.F. transformer you see "A Mighty Good Transformer With An Excellent Curve." But nowhere do you find the words "radio" or "wireless"! I noticed this quite by chance, and, going over to a pile of other components of various makes, I haphazardly picked out a brightly coloured box containing an anode resistor. No, there was no "radio" or "wireless" on it. I wonder if that is considered policy—a tribute to the ubiquitousness of radio these days—or unhappy forgetfulness. Personally, if I were designing the carton of a component I would be sure to use "radio" "wireless" or, at least, "broadcasting" in the descriptive wording. "Your radio set needs the X Y Z" or, impersonally, "X Y Z

means better and brighter broadcasting," is the sort of thing I should feel like saying.

However, I am straying away from the subject of the Lissen "Torex" L.F. transformer. This little component has a ratio of 1 to 3, is built into a hermetically sealed bakelite case, and costs only 5s. 6d. Externally, it has the appearance of quite an expensive article, and it gives fine results for its sixty-six pence.

Where anode current is heavy it is advisable to use it in some shunt-fed system; but it will, of course, stand up to the small currents found in modest detector plate circuits.

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.

**INEXPENSIVE MOVING-COIL SPEAKER.**

Four Pounds Ten Shillings seems to me to be a very agreeable price for a high-grade permanent-magnet type of moving-coil loud speaker.

And that is all that is being asked for the new W.B. unit, which, is moreover, guaranteed for 5 years.

It is identical with the Model P.M.1, which caused such interest at the last Radio Show, but the magnet is less massive, although, in my opinion, it is just as sensitive and perhaps, even better in regard to bass which hall-marks the efficient M.C.

You can drive this new W.B. moving-coil—which, by the way, is styled the P.M.2—with a small set and get wonderful results.

**A DUBILIER LEAFLET.**

The Dubilier people have published a two-coloured folder in connection with their all-electric radio-gramophones and radio receivers.



Two of the Lissen "Torex" L.F. transformers.

# Clear tone, free from "background"

Reception with the Exide High Tension Battery is always crystal clear. No other source of power is so completely free from causing a background of buzzes and crackles. It is an essential part of the

principle of this battery that it gives current without the slightest fluctuation or fall right to the end of its charge. This means also that it causes **no howl, harshness or "motor boating."** Distant stations come in clear. It helps selectivity, too. **And economy.** The Exide High Tension Battery

can be recharged. With a trickle charger it gives all the freedom from attention of a mains unit yet retains all its inherent advantages of clearer tone. That is why this battery is **used in the big speech amplifiers,** talking film apparatus and everywhere that clarity of tone is of the utmost importance.



Prices : WJ, 60 volts, 2,500 milliamp hrs., £1 17s. 6d. WH, 60 volts, 5,000 milliamp hrs., £2 6s. 6d. WT, 30 volts, 10,000 milliamp hrs., £2 4s. 0d. From Exide Service Stations or any reputable dealer. Exide Service Stations give service on every make of battery Exide Batteries. Clifton Junction, near Manchester. Branches at London, Manchester, Birmingham, Bristol and Glasgow. M12

# 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.

THE slight set-back of which I wrote recently was, as I predicted, but a temporary affair. Conditions are excellent again except for the fact that atmospherics cause a little trouble every now and then. Atmospherics, though, are always to be expected at times of seasonal change, and conditions were peculiarly favourable for their production this year when Dame Nature gave us most of our winter in the early part of March.

## Excellent Long Wavers.

On the long waves stations are coming in particularly well; in fact, I find that even with a portable I have generally at least half a dozen programmes available at any time of the day or evening. The pick of the bunch are Huizen, Zeesen, Radio-Paris, Warsaw, Motala, the Eiffel Tower, Kalundborg and Oslo. So far as signal strength is concerned I might add Moscow Trades Union and Leningrad, but I cannot recommend their programmes as being particularly attractive.

Warsaw on 1,411 metres has now gone up to 150 kilowatts and you will find it easy to believe this if you tune him in, supposing that you have not done so lately. Unless

your set is pretty selective you will not be able to get the Eiffel Tower when the Polish station is working owing to his wipe-out.

And talking of Poland, don't forget Lemberg, or Lwow, who is now coming through with tremendous strength—so strongly, in fact, that unless there is useful selectivity in the receiving set you may find that he drowns Toulouse, and that you will admit takes some doing. He made an announcement the other night in English about going up to 135 kilowatts, and, to judge from his signal strength, I should say that he is well on the way towards that figure.

An interesting newcomer is the Swiss station of Sottens. This, I understand, is a more or less experimental transmitter operated by a commercial company. The present output rating is 25 kilowatts, and the signal strength in this country is excellent. Reception reports have come in from here, there, and everywhere.

## Enormously Strong.

Toulouse is now an enormously strong station, but I find it very difficult to get really good quality from him, and I expect that readers have the same problem. It

may be a consolation to them to know that it is the transmitter and not the receiving set that is to blame.

I have recently been observing this transmission with good measuring instruments, and there is no question that a great deal of frequency modulation is taking place. The more selective your set the more likely it is for this reason to make a poor showing on Toulouse. Strasbourg is one of the finest European stations for reception in this country except during those periods when he fades right out.

The fading which affects him is of a curious ultra-slow type. Often you will have him at the fullest strength for ten minutes or more; then he will decline rapidly to zero and come back again in about thirty seconds.

## A Fine Selection.

The number of stations which are worth attention now is very large indeed. Budapest has quite come back to form and you will find him most reliable. Munich is generally good and Vienna has few "off" nights. Others that I can recommend are both the Brussels stations, Milan, Langenberg, Rome, Stockholm, Katowice, Frankfurt, Bordeaux, Turin, Heilsberg and Gothenburg.

Other stations which are not quite so consistent but occasionally give first-rate reception are Lyons Doua, Nuremberg, Berlin, Witzleben, Hilversum (sometimes heterodyned), Breslau and Hoerby.

Taking things all round, the long-distance man has now a very large selection of stations. Naturally he cannot expect to find each one of them going on every night, but if his set is up to the mark he should always have a round dozen or more genuine alternative programmes from stations which come in so well that first-rate reproduction is obtainable.

THE most disturbing fact to report this week is that, eleven-year cycle or no eleven-year cycle, conditions on 20 metres appear to be as good as I have ever heard them! During the first days of the A.R.R.L. tests, which are still going on, I must have logged more North American stations than I have done in a similar space of time since 1927! The fact remains that the higher waves continue to be good, but this sudden return to favour of the short bands upsets all our calculations completely.

## An Interesting Theory.

There used to be a theory (to uphold which meant that one was a crank) to the effect that as more transmissions were sent out on any particular wave-length it became more reliable for communication. The perpetrator of this put forth the ingenious idea that the ether between any two stations (a transmitting station and a receiver listening to it) must be a kind of resonating tuned circuit to act as a medium for the transmission.

Following this up, the more transmissions there were on any particular wave-length, the better did the ether like it, and the better could it resonate! Personally, I have never had any interest in this theory except a kind of sneaking admiration for the author's cheek in putting it forward, but this last week almost makes it appear as if he might be right.

## SHORT-WAVE NOTES

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

Ten days ago, on twenty metres, there was not a sound to be heard. Probably people with transmitters listened for a minute, observed this, and went out for a walk, or shifted to another wave. This week-end, the A.R.R.L. having decreed that the North American stations shall be on in large numbers, they are pouring it on this side of the Atlantic in such a way that one cannot find a quiet space in between them.

## Quite Obvious.

One thing is obvious—even if the "eleven-year cycle" is going to mean anything to us, there are "sub-cycles" at a higher frequency which will cause a rapid variation in conditions rather than in general slow falling-off.

One more point worthy of mention is this: the North Americans, knowing that conditions are, or should be, gradually deteriorating, are probably using far more power for Transatlantic work now than

they were in the winter of 1927/8. Thus, if conditions now were comparable to those obtaining in that year, we should probably hear no more than one large mass of signal in the form of a continuous roar from our neighbours on the other side!

It is interesting to note, by the way, that W & X K has been coming across quite well on 19.72 metres, though he is not as strong here as on 48 metres.

## On One Valve.

D. F. T., of Kettering, has been logging CT.1 A A, Lisbon, on one valve; he mentions that a panacea for short-wave troubles—particularly non-oscillation—is the use of a neutralising condenser in series with the aerial. Yes, D. F. T., when the aerial is directly coupled, certainly, but why not loose-couple it through a small coil? Certainly no one need hope to make a short-waver work with a directly-coupled aerial right on the live end of the grid coil.

W. F. M., of Uxbridge, mentions some interesting points. (1) V R Y, Georgetown, comes over well when the "big noises" are completely faded out. (2) One lone C Q call on a "blank" night turned out to be an Australian (this one 40 metres). (3) The average short-wave enthusiast misses more than half the fun by not troubling to learn the code. (4) Fivemetre people may be interested to hear that he finds the best detector valve is a super-power valve of the P.M. 252 class, with a grid-leak of 5 megohm.



# COMPLETING the "COMET" TWO

By THE  
"P.W." RESEARCH  
DEPARTMENT.



IN our description of the "Comet" Two last week we gave the details necessary for making it. And we explained that, as it stood then, it was a complete two-valve set of quite unusual merit.

No doubt by the time these words appear in print many readers will have constructed that set for themselves, and will have shared our pleasure in its performance. For it is a powerful little receiver, with a marked liking for Continental programmes, as an alternative to the fare provided by the B.B.C.

It will be remembered that we announced it was a real true-to-type "Comet," capable—like its famous big brother, the "Comet" Three—of being extended into a super set. This week we propose to deal in full with those extensions.

Before giving details, however, we should like to emphasise that although this second article is called "Completing the 'Comet' Two," there will be no need for every "Comet" Two builder to "complete" it. Some of you may already be more than satisfied with the set as it stands at present!

### Optional Additions.

The additions which we are describing this week are quite optional ones. They are intended for the man who wants a super "Comet" Two, with every worth-while refinement incorporated.

In short last week's version was the "Foundation" "Comet" Two, and this week we see how to turn it into the "De Luxe" model. The same set, really, but "pushed up."

Now let us see what the differences are, so that you can judge whether

If you want to "go all the way" with the "Comet" Two, here are the particulars for applying "Flexi-coupling" to it, and details for fixing a panel light. These optional additions make it a really super two-valver, of exceptional merit.

you would like to go all out for the extra refinements, or whether you will leave the set as it stands now.

There are two additional features to be described, namely, "Flexi-Coupling" and a panel light. Let us see exactly what improvements they would make.

"Flexi-Coupling" is an important alteration, for it makes the "Comet" Two strikingly selective. So let us deal with that first.

As you probably know, two-valve sets of the detector and low-frequency type are not usually as "sharp" in tuning as larger sets employing a high-frequency amplifying valve. It is not to be expected of them.

Nevertheless, even a Det.-L.F. two-valver can be sharpened up to a truly remarkable degree. And there is one way of doing this that not only gives knife-edge tuning but actually gives a little extra strength.

### Superior to All Others.

It is a method which our readers are finding superior to all other selectivity methods. It is called "Flexi-Coupling."

Now, it was only a few weeks ago that we unfolded to readers all about this latest "P.W." development. And in the ordinary way we should just refer you back to that number of "P.W." to refresh your memories on the subject.

But in these last few weeks we have numbered so many new readers among our friends that we shall just briefly have to describe "Flexi-Coupling" once again. (If you follows will roll up on Thursdays in your hundreds of thousands and demand "P.W.," it's sure to go out of print sometimes, you know!)

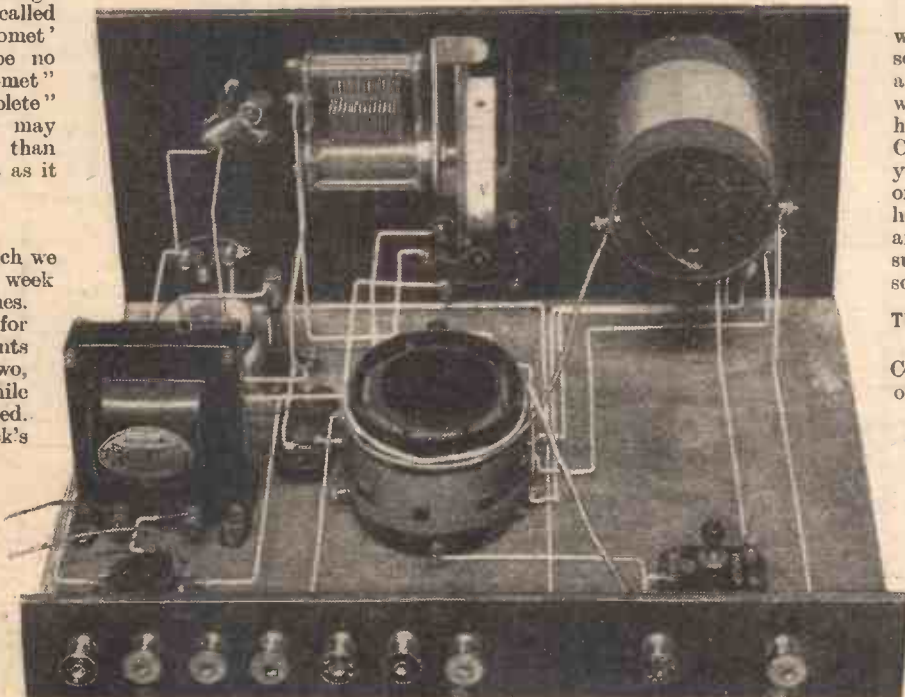
### The New Scheme.

Well, this "Flexi-Coupling" is a new method of linking the aerial circuit to the first tuning circuit. As you know, the "Comet" Two uses one of the famous "P.W." Dual-Range Coil Units, and, normally, the aerial is connected to terminal A on this, through a semi-variable condenser.

But the "Flexi-Coupling" method is quite different.

(Cont'd on next page.)

## ALL FIXED FOR FLEXI-COUPLING



Here is the whole simple scheme shown in full detail. Note that the new hex lead is wound round the top of the coil.

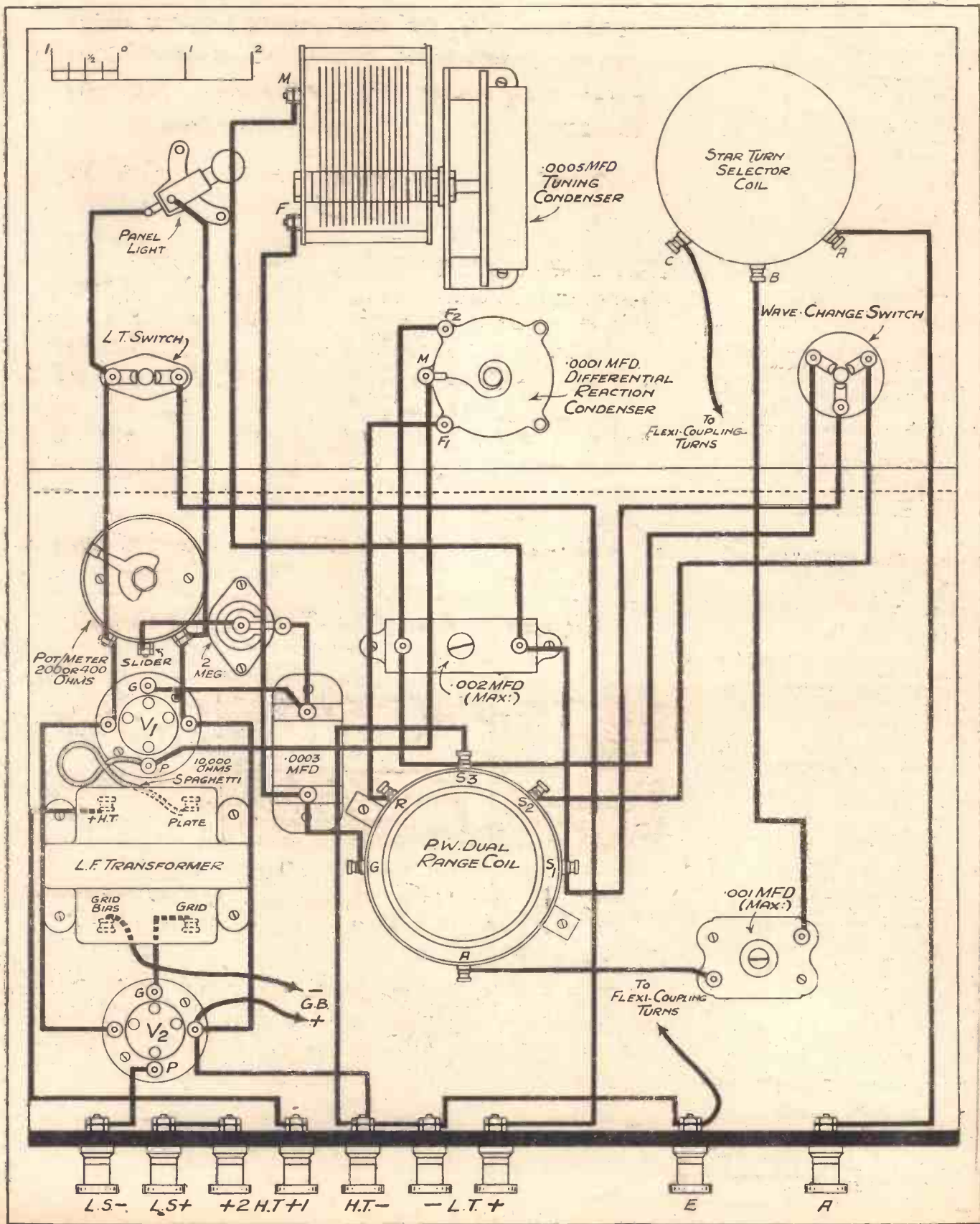
# COMPLETING THE "COMET" TWO

(Continued from previous page.)

For "Flexi-Coupling" you must use a Selector Coil, which is employed to tune the aerial circuit, and is quite apart from the main tuning. And your medium-wave coupling is done, not by the normal method to terminal A on the Dual-Range Coil, but

by a couple of turns of flex wire wound round it! Hence the name "Flexi-Coupling."

What is the effect of that simple alteration? Ask any reader who has tried it  
(Continued on page 27.)



# CHOSEN COMPONENTS

## APPROVED COMPONENTS FOR THE "COMET" THREE.

1	Ebonite panel, 18" x 7" (drilled to specification)	6 0
1	J.B. or Cydon 0005-mfd. "humb-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 0005-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 "Radio-grand" and Igranic "Midget"	12 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" x 2"	1 9
1	ReadiRad sheet of copper foil, 18" x 10"	1 6
9	Belling-Lee terminals, type "R"	2 3
3	Belling-Lee G.B. plugs	2 6
1	Packet of Jiffilux, for "wiring up"	5 0
		<b>£4 5 0</b>

## ADDITIONAL COMPONENTS FOR "COMET" L.F. CONTROL.

1	Varley 1-meg. volume control	6 0
1	Atlas L.F. choke	1 10
1	T.C.C. 2-mfd. fixed condenser	3 10
		<b>£1 10 10</b>

When required with any of the Kits add £1.10.10 to the cash price, or 2/9 per month to the monthly payments.

## ADDITIONAL COMPONENTS FOR FLEXI-COUPLING "COMET."

1	ReadiRad 1931 "Star-Turn" coil	12 6
1	ReadiRad 400-ohm potentiometer	2 6
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
		<b>18 3</b>

## ADDITIONAL COMPONENTS FOR "COMET" RADIO-GRAM.

1	Igranic megostat, .5 megohm	6 0
1	Bulgin J.3 single circuit open jack	1 3
1	Bulgin P.15 jack plug	1 6
1	Bulgin radio-gram switch, S.86	2 0
1	Bulgin ext. rod	0 6
1	Bulgin baseboard bracket	3 6
1	Flex, wire, screws, etc.	6
		<b>13 6</b>

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

## "MAGIC" THREE CONVERSION KIT.

1	ReadiRad 1931 "Star-Turn" coil	12 6
1	ReadiRad "P.W." dual-range coil	12 6
1	Formo 002-mfd. maximum compression type condenser	2 3
1	ReadiRad 3-point wave-change switch	1 6
		<b>£1 8 9</b>

## CHOSEN COMPONENTS FOR THE "COMET" TWO.

1	Polished black ebonite panel, 14" x 7" x 3/16"	4 6
1	Cydon 0005-mfd. single drum condenser	11 6
1	ReadiRad 00015-mfd. differential reaction condenser	5 0
1	ReadiRad 3-point wave-change switch	1 6
1	ReadiRad 10,000-ohm link resistance	1 0
1	ReadiRad on-and-off switch	10
1	Lewcos compression condenser, 001-mfd.	2 6
1	ReadiRad "P.W." dual range coil	12 6
1	Formo 002-mfd. maximum compression type condenser	2 3
2	Telsen sprung valve holders	2 0
1	ReadiRad 0003-mfd. fixed condenser	10
1	ReadiRad 2-megohm grid leak with holder	1 4
1	Igranic 400-ohm baseboard mounting potentiometer	1 8
1	Telsen "Ace" L.F. transformer, ratio 3-1	8 6
1	Ebonite terminal strip, 14" x 2" x 3/16"	1 3
9	Belling-Lee terminals, type "R"	2 3
1	Packet "Jiffilux" for wiring	2 6
1	Wanderplugs, screws, etc.	7
		<b>£3 2 6</b>

When required with the "Comet" Two Kit add 16/- to the cash price, or 1/6 per month to the monthly payments.

## ANY PART MAY BE PURCHASED SEPARATELY.

1	Hand-polished oak cabinet with 10" baseboard	1 0 0
2	Valves to specification, Det. and Forev	19 0
		<b>16 0</b>

When required with the "Comet" Two Kit add 16/- to the cash price, or 1/6 per month to the monthly payments.

## COMPLETING THE "COMET" TWO RECEIVER.

1	ReadiRad "Star-Turn" selector coil	12 6
1	Bulgin panel light with bulb	3 0
1	Flex, wire, screws, etc.	6
		<b>16 0</b>

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

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

### THE COMET THREE (Foundation Circuit)

<b>KIT A</b>	<b>£4. 5.0</b>
or 12 monthly payments of	<b>7/9</b>
<b>KIT B</b>	<b>£5. 12.6</b>
or 12 monthly payments of	<b>10/4</b>
<b>KIT C</b>	<b>£7. 2.6</b>
or 12 monthly payments of	<b>13/-</b>

**KIT A** Complete kit of components as specified.

**KIT B** As Kit A with set of Mullard Valves.

**KIT C** As Kit B with attractive oak cabinet.

### THE FLEXI-COUPLED COMET

<b>KIT A</b>	<b>£5. 3.3</b>
or 12 monthly payments of	<b>9/5</b>
<b>KIT B</b>	<b>£6. 10.9</b>
or 12 monthly payments of	<b>12/-</b>
<b>KIT C</b>	<b>£8. 0.9</b>
or 12 monthly payments of	<b>14/8</b>

### COMET TWO

<b>KIT A</b>	<b>£3-2-6</b>	<b>KIT B</b>	<b>£4-1-6</b>	<b>KIT C</b>	<b>£5-1-6</b>
or 12 monthly payments of	<b>5/8</b>	or 12 monthly payments of	<b>7/6</b>	or 12 monthly payments of	<b>9/3</b>

### Completely Assembled Flexi-Coupled Comet.

Ready for use—airial tested—valves, cabinet and royalties included.

**£9.5.9** or 12 monthly payments of **17/-**.

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

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

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

Please send me:

**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 .....

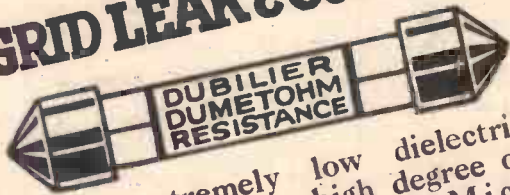
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Kit Required .....

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Ducon Works, Victoria Road, N. Acton, W.3.

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COMET  
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CHOSEN BY  
"POPULAR WIRELESS"**



Follow the lead of the designer of the Comet Receivers by using Ready Radio Components chosen by him. They cost you no more but they make a world of difference to your reception.

**For the COMET H.F. Unit**

**KIT A £3.8.6**

Complete Kit of Parts as specified, less valve and cabinet, or 12 monthly payments of **6/3**

**KIT B £4.8.6**

Complete Kit of Parts as specified, with valve less cabinet. As above, with Mullard Valve, or 12 monthly payments of **8/-**

**KIT C £5.3.6**

Complete Kit of Parts as specified, with valve and cabinet. As Kit B but with attractive Oak cabinet. Or 12 monthly payments of **9/6**

	£	s.	d.
1 Ebonite panel, 12" x 7" x 3/16", drilled to specification	4	0	
1 Hand-polished oak cabinet with 9" baseboard	15	0	
1 ReadRad .0005-mfd. variable condenser	4	6	
1 ReadRad "Duograph" slow motion dial	6	8	
1 ReadRad "Star-Turn" elector. coil	12	6	
1 ReadRad 3-point wave-change switch	1	6	
1 Weavite filament rheostat to suit valve	1	6	
1 Sovereign compression type condenser, .001 mfd.	1	6	
1 Telsens .001-mfd. fixed condenser	1	0	
1 T.C.C. .01-mfd. fixed condenser (flat type)	2	6	
1 T.C.C. 1-mfd fixed condenser	2	6	
1 ReadRad 600-ohm fixed resistance	2	6	
1 Telsens 4-pin valve holder	1	0	
1 ReadRad "P.W." dual-range coil	12	6	
1 ReadRad "Hilo" H.F. choke	4	6	
1 ReadRad 9" x 6" screen	2	0	
5 Bellini-Lee terminals, type "R"	1	6	
1 Ebonite terminal strip, 12" x 2" x 3/16"	1	0	
1 Packet "Jiflinix" for wiring	2	6	
1 Valve to specification, S.G. type	1	0	0
Fix. screws, grid coil, etc.	1	8	
	<b>£5</b>	<b>3</b>	<b>6</b>

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**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 **£** \_\_\_\_\_

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**KIT REQUIRED**

## COMPLETING THE "COMET" TWO

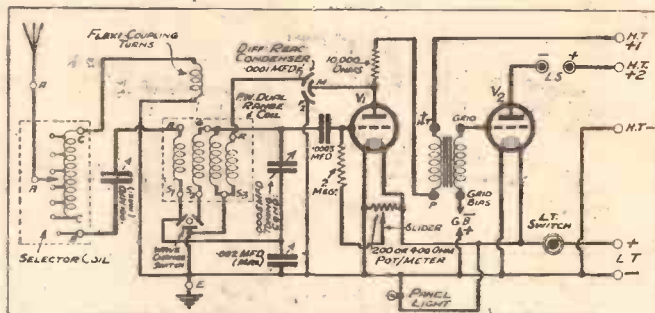
(Continued from page 24.)

as an aid to selectivity, and he will simply roll his eyes and say "Oh, boy!"; or otherwise express his utmost gratification in no uncertain terms!

Loud local programmes that used to "spread" are sharpened almost beyond belief. And, best of all, tuning does not

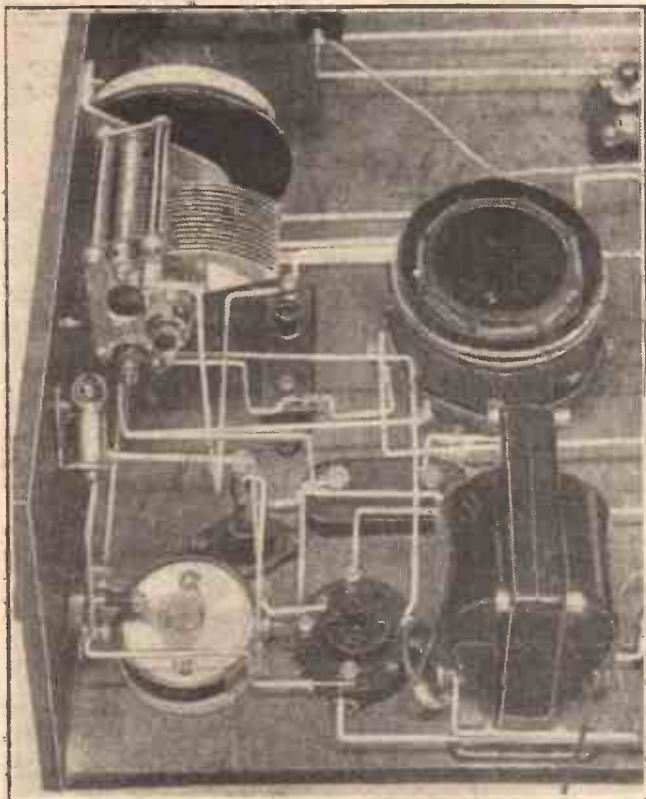
The innermost corner of this marker will indicate the exact spot for the centre of the new hole. Run a small drill through, as a pilot, and then follow it up with the larger one of the required size.

The panel light we used had three small fixing holes as well as the large centre one. The exact positions for



If you compare this with last week's diagram you will see exactly how the alterations affect the circuit.

## REAL FLEXIBILITY



Note how the "Flexi-Coupling" turns are wound round the top of the dual-range coil former.

become tricky, and stations do not lose strength. (In fact, they get stronger!)

So much, for the moment, of the effect of "Flexi-Coupling." Later in the article we will describe exactly how it is applied to the "Comet" Two.

The other improvement which we suggest you may like to make is comparatively quite a small one—it is to install a panel light. This will not affect the working of the set in any way, but it will provide you with a safeguard against leaving the set turned on all night.

### Improves Panel Appearance.

Besides this the panel light "balances" the panel and thus improves the appearance of the set, so it is a refinement well worth your consideration. That little glowing red light won't let you go up to bed on a Sunday night forgetting to switch off your set, as most of us have done in the past!

To fit such a panel light is the easiest thing you can imagine. The main hole for it is 3 in. in from the panel edge, and 2 in. down. So you cut a piece of cardboard 3 in. by 2 in. for a marker, and place it in the corner of the panel.

these are marked from the instrument itself, and the fitting is thus a very easy matter.

The wiring is even easier! As shown on the sketch, one extra wire goes from the on-off switch, and another one goes from the negative side of the potentiometer. And that's that!

### Straightforward.

"Flexi-Coupling" means rather more alterations than fitting a panel light, but it, too, is very straightforward. You first of all fit your Selector coil to the panel, again using the cardboard marker as explained above, but in the other corner of the panel, of course.

As before, it is best to use a small drill through first, and then enlarge the hole to take the Selector coil. Arrange it with the terminals as shown, and then note the few simple alterations.

The original wire from A to the semi-variable is removed, and a wire from the

aerial terminal to the A terminal on the Selector coil is used instead; while the semi-variable condenser is joined to B on the Selector coil, instead of as formerly.

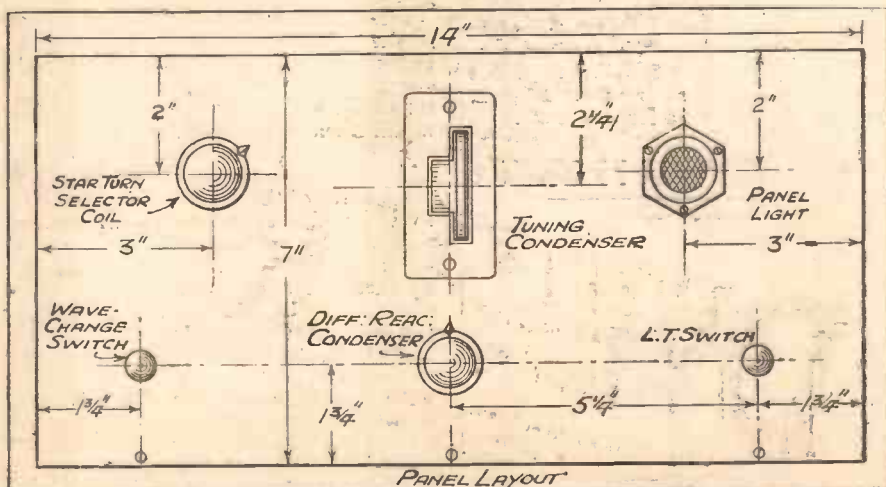
Now take a length of single flex (not double) and fix one end to C on the Selector coil. Run this flex straight across to the upper part of the tube, and then connect its other end to the earth terminal.

### THE FEW "EXTRAS"

- 1 Selector coil (Wearite, or Ready Radio, Goltone, R.I., Keystone, Parex, Magnum, etc.).
- 1 Panel light and bulb (Bulgin). (Large three-hole fixing type was actually used, but the smaller single-hole variety is equally suitable.)
- 1 yard (or thereabouts) of single flex wire.

NOTE.—If you have used a drum-drive tuning condenser for the "Comet" Two it should be of the special type specified for this set. If, on the other hand, you have a drum condenser of different type, you may have to modify the panel layout in accordance with the details given underneath the panel diagram below.

The operation of the set is very simple indeed, but as we have no room left on this page the details for that will be found in our Radiatorial columns.



With the "Comet" Two type drum-drive condenser in use the panel layout will be as above. If you have a different type of drum condenser you may have to move the Selector coil an inch or so to the left of the position marked, and the panel light an equal amount to the right, to match.

# CAPT. ECKERSLEY'S QUERY CORNER

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



THE H.T. ON THE S.G.'S SCREEN—  
ADDING AN H.F. UNIT—A QUESTION  
OF SMOOTHING.

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.

### The H.T. on the S.G.'s Screen.

B. A. M. (Bournemouth).—"I have recently added an S.G. valve to my receiver which is operated from an H.T. eliminator. The question arises as to the most satisfactory method of obtaining a suitable tapping for the screening electrode.

"Which do you advise—a potentiometer connected between the H.T. neg. and one of the positive terminals of the eliminator, or an additional series resistance connected to one of the H.T. tappings?"

I have drawn a diagram to show you the best way of obtaining the necessary positive voltage on the screen of your screened-grid detector.

You will find that a screened-grid valve is sensitive both in its amplification factor (and the distortion produced in the resulting signal) to the potential of the screening grid. It is thus wise to use a potentiometer, as shown.

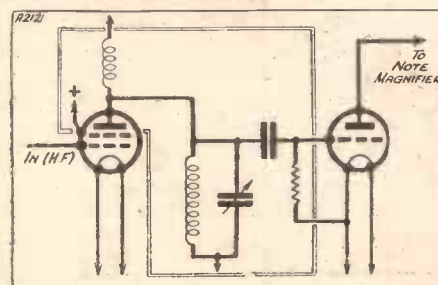
It is furthermore wise to put a resistance in series with this potentiometer to ensure that no high frequency goes back to the positive terminal of the eliminator and to make assurance doubly sure it is better to introduce a condenser as shown, so that one can be certain that the high frequency is passed in the easiest possible way straight to earth; this is called de-coupling.

The scheme I have shown you has the double advantage of de-coupling and giving an adjustment for screening grid volts.

### Adding an H.F. Unit.

M. V. (Felixstowe).—"My receiver, consisting of a Det. and 2 L.F. stages, has been giving excellent results. I wish, however, to construct a four-valve set.

### WHERE AND WHAT TO SCREEN

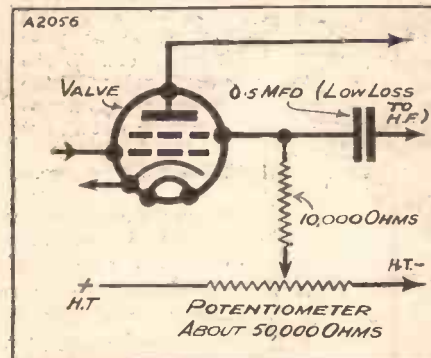


The double line indicates Capt. Eckersley's reply to M.V. (Felixstowe).

"Do you think, and in view of the fact that the present set is giving such good results, that it would be better to add an S.G. H.F. unit, in preference to rebuilding the whole set as a four-valver?"

It is extremely difficult to understand this question because I do not know what type of detector you are using, and I do not know the lay-out of the whole circuit. I take it, however, that you wish to get greater sensitivity and selectivity than you

### S.G. VOLTS



The potentiometer method of adjustment referred to in the first answer on this page.

can get on a detector and two-note magnifiers, and therefore suggest the screened-grid stage.

I think that as you are getting such good results from the set as it stands, it should be perfectly possible to add a screened-grid stage, but the point of your question as I take it is: does a screened-grid stage entail modification of the rest of the circuit?

It does and it does not. The point being you must screen the anode circuit components of the screened-grid stage, and so the problem becomes rather more a mechanical one than anything else. (I think it should be possible to add the screened-grid stage enclosing all the anode components, but risking the grid lead of the detector valve as being exposed.)

I have drawn a little diagram to show my suggested way of doing the screening and believe that given a moderate amount of care, and a certain amount of luck, that the adding of the screened-grid stage need not involve the rebuilding of the whole set. (I have drawn your circuit as a grid-leak detector, and hope I am right.)

### A Question of Smoothing.

B. R. (Dartford).—"I have a D.C. eliminator and I have trouble with mains hum, which I believe is due to bad smoothing. I am already using a smoothing choke and large smoothing condensers.

"Will you please say whether you recommend me to use some more condensers or another smoothing choke.

It is extremely difficult for me to give a categorical answer to your query because I do not know the following particulars:

1. Are you using the "outers" of a three-wire system, or are you working between an earthed positive and a negative, or is the negative earthed?

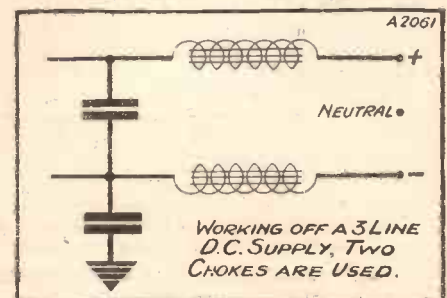
In practice one frequently meets a condition where, for power supply, the mains are brought in on three wires: One a certain number of volts—say 250—above earth or neutral, the other 250 volts below neutral potential. If one requires to work off 500 volts with the quantities given, neither side of the mains is earthed.

If this is the case it is necessary to put smoothing chokes in both leads from the mains, positive and negative.

2. You do not say whether your filaments are lighted from the direct current. This might cause hum if the grid leads from your valves were not brought down to the centre point of an L.T. potentiometer.

3. You do not show the connection that you are adopting, but it is best to connect a smoothing choke behind the smoothing condenser, that is to say on the mains side of the smoothing condenser, and, since the mains have large capacity, it is unnecessary to connect a condenser across the mains side of the chokes.

### HUM FROM D.C. MAINS



The suggested method of condenser connections is shown here.

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## NOTES FROM THE NORTH

Special underground cables have been laid to provide the new North Regional station at Moorside Edge with its programmes.

FROM OUR SPECIAL CORRESPONDENT.

**MOORSIDE EDGE** came into action two months or so later than was originally anticipated. The first transmissions, at the end of February and in the early part of March, consisted merely of a carrier wave "unadorned," but it was sufficient to send a thrill of excitement through the North of England.

It had been hoped by the B.B.C. to have the tests on 479 metres completed and to start the North Regional programme on this wave-length by mid-March, but the delay in the commencement of the test transmissions has made this impossible. The delay was due to the terrible weather conditions with which the B.B.C. has had to contend at Moorside Edge.

### Talk of the North.

The new transmitters, their power, and the quality of their transmissions, are naturally the talk of the North just now. The new Northern broadcasting service does not depend on transmitters alone, however. There are other equally important and interesting developments without which the transmitters would be useless.

The new landlines, for instance. During the past few weeks the final links have been forged of the new underground landlines joining the B.B.C.'s studios and control rooms at Manchester and Leeds to the high-power transmitters high on the Pennine Hills at Moorside Edge.

### Continuous Route.

Hitherto, the only underground cable used by the B.B.C. has been that between London and Leeds. All programmes relayed between Savoy Hill and the North, Scotland, and Ireland, travel via this line, and are distributed over their respective lines from the B.B.C.'s distribution centre at Leeds.

Underground cables are superior to overhead lines for broadcast relaying, and eventually it is hoped that the Post Office will lay underground cables throughout the country so that the B.B.C. will be able to use them generally.

The Leeds-Manchester and Manchester-Moorside Edge cables mark the second stage in this process of "going underground," so that there is now a continuous underground route between London and Manchester, via Leeds.

### Up-to-date Design.

This network of cables will shortly be modified, when certain of the Northern low-power transmitters are closed down in consequence of Moorside Edge taking over the service. When the Bradford transmitter is closed, for instance, the line from Leeds to Bradford will no longer be needed.

The new buried cables are of the most up-to-date design and they provide, after correction, an almost straight frequency response characteristic from 50 to 7,000 cycles per second. The use of such high-quality landlines is obviously a most

important factor in ensuring that the broadcasting from Moorside Edge will be of the finest possible quality.

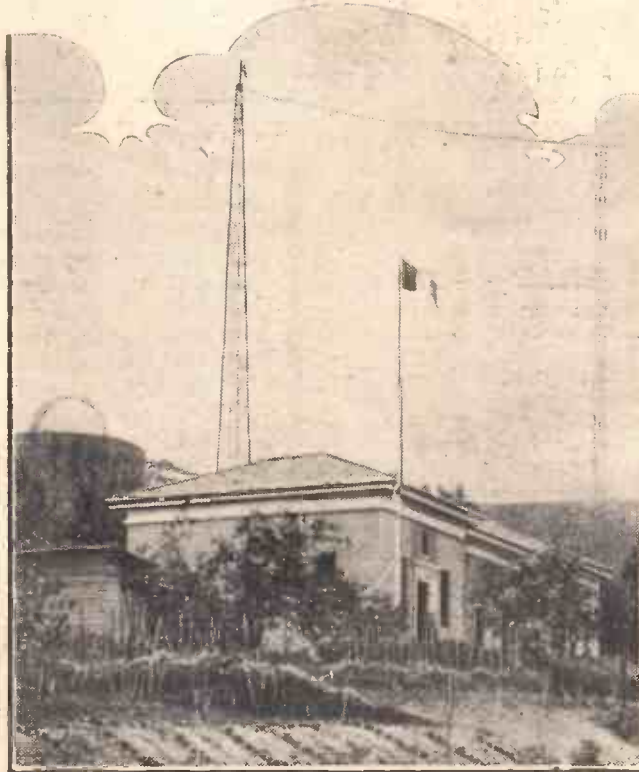
It would be futile to erect high-quality transmitters if the music were distorted during its journey from the London, Manchester, or Leeds studios to Moorside Edge.

### Special Control Rooms.

At Manchester and Leeds the lines pass through B.B.C. control rooms where amplifiers and correction circuits make up for losses on the lines. The National programme will pass from London direct through these control rooms to Moorside Edge, for transmission on the 301 metres wave-length.

The North Regional programme, on 479 metres, will come from various sources, but frequently from the Manchester and Leeds studios. At Manchester there is a fine suite of modern studios, but the single studio at Leeds is out of date and totally

## IN SUNNY ITALY



The broadcast and telegraphy Vatican station recently opened by the Pope. Vertical aerials slung from a wire between the two masts are used.

inadequate for its new duties. The B.B.C. will not confirm the rumour, but from information in my hands I think it is safe to say that the Leeds studio accommodation will be improved before long.

By the time next Northern Notes appear the Northern Wireless Orchestra will have

been disbanded. After March 31st a Studio Orchestra will be constituted, as follows: John Bridge (violin), Don Hyden (violin), Frank Park (viola), Clyde Twelvetrees ('cello), Alfred Stott (bass), Pat Ryan (clarinet), Otto Paersch (horn), S. Holt (trombone), and Eric Fogg (piano).

All these are first-class—they are, in fact, all members of the Hallé Orchestra—so we can count on the same brilliancy of performance from the new "nonet" as from the old orchestra, but no combination of only nine players could ever give the same exhilarating effect to, say, a Gilbert and Sullivan selection, as a full orchestra; and it is to be hoped that the promise that the "nonet" will be augmented will be frequently redeemed.

In the meantime a number of influential newspapers in the North, including the "Yorkshire Post," are still urging the B.B.C. to reconsider its decision.

### Belfast and London.

With the disbandment of this orchestra, the only B.B.C. station outside London to have its own wireless orchestra will be Belfast, a station which in several respects enjoys an unusual degree of autonomy. The National Orchestra, of Wales, at Cardiff, does not come into the category of station orchestras.

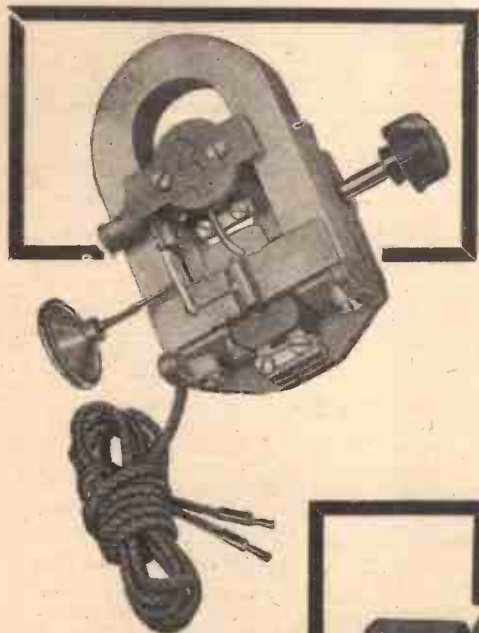
Possibly the long landline over which music has to be relayed between London and Belfast forces the advocates of centralisation to hold their hand as far as the Belfast orchestra is concerned. This orchestra continues to give good account of itself, and the Belfast programmes have lately secured an added interest through an extension of outside broadcasting activities in Ulster.

### Late News.

I learn from Mr. Noel Ashbridge, the Chief Engineer of the B.B.C., that it is not proposed, at any rate for the present, to fit flashing lights to the aerial masts at Moorside Edge. At one time it was considered that, like the 5 X X masts at Daventry, those at the North Regional station might have to carry some warning device for aircraft, but, of course, there is little or no air traffic at this point.

An interesting point which has not previously been revealed is that each mast weighs 34 tons. Like the 5 X X masts, they rest on a pivotal mounting which permits them to sway slightly, but, unlike 5 X X, they are insulated at the base. A "T" shaped aerial with sausage down lead is being used for the 479 m. transmission.





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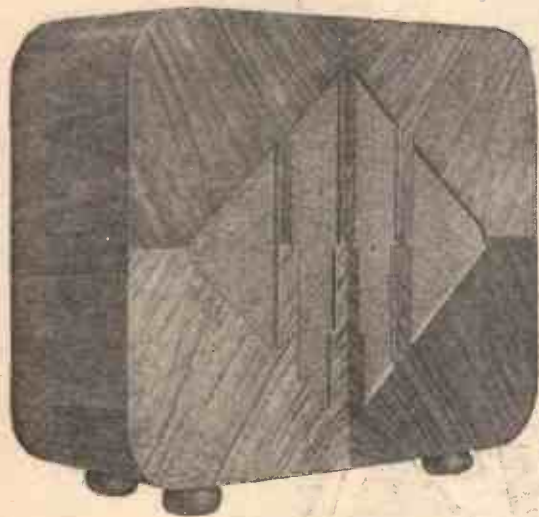
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# RADIOTORIAL

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

### TUNING-IN THE FOREIGNERS.

"DUNNO" (Manchester).—"Your 'Key to the Ether' helped me a rare lot with foreigners, but I still think I am not handling my 'Sharp-Tune' like I should. There is an extra condenser that I don't quite know how to work. "How should you go about getting foreign stations on this set?"

The "Sharp-Tune Two" is not at all a difficult set to handle, but, of course, it wants knowing to get the best out of it.

The tuning condenser (the big one in the middle) alters the wave-length to which the set is tuned. To the left of it are two other condensers, the upper one being the reaction control, and the lower one a selectivity control.

The chief function of this lower one (selectivity) is to prevent your set being "overpowered" by the local station. As you know, a big aerial erected very close to a powerful broadcasting station cannot pick up many foreigners because the strong local signals monopolise it.

By properly adjusting this selectivity condenser will give you the same selectivity-increasing effect as shortening your aerial; so a point can be reached where the local station is not too troublesome, and yet it is still possible to receive the

foreigners, though not quite so strongly as before. If you adjust this control "all in," you get maximum power from the foreigners, but too much maximum power from the "local." Correct adjustment of the selectivity-control condenser reduces foreign stations slightly, but nevertheless you will hear them far better because the new adjustment has "narrowed down" the local station so that it does not interfere with the foreigners.

So you see there is nothing to worry about in the selectivity adjustment. In practice it does not need constant readjustment, but when the set is first installed it has to be adjusted to bring the powerful local station's programme within a reasonable margin on the dial.

If your local station is within a few miles you will need this lower (selectivity) condenser set towards its all-out position, and you should use a small coil in L<sub>1</sub>. At greater distances the larger coil may be used, and the condenser capacity increased, as recommended in the blue print.

(Continued on page 34.)

## "CAN'T GET IT TO WORK?"

Perhaps the switching doesn't work properly? Or some mysterious noise has appeared, and is spoiling your radio reception? —Or one of the batteries seems to run down much faster than formerly?

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 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.

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- 1 Single Circuit open Jack and Plug (Bulbin) 2/6
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1 Panel 12 in. X 7 in. (Peto-Scott)	3	6	0
1 .0005-mfd. variable condenser (Ormond) with slow-motion dial	6	0	0
1 "Star-Turn" Selector coil (Keystone)	10	6	0
1 3 point push-pull wave-change switch (Keystone)	1	6	0
1 Rheostat (Igranite)	2	6	0
1 .001-mfd. compression condenser (Telsen)	1	6	0
1 .001-mfd. fixed condenser (Telsen)	1	0	0
1 .01-mfd. fixed condenser	1	9	0
1 1-mfd. fixed condenser	2	3	0
1 .002-mfd. fixed condenser (Telsen)	1	6	0
1 500- or 500-ohm fixed resistance with holder (Ready Radio)	2	6	0
1 Spring valve-holder (Telsen)	1	0	0
1 "P.W." Dual-Range coil (Keystone)	12	6	0
1 H.F. choke (Keystone)	3	6	0
1 Standard "P.W." screen, 9 in. X 6 in. (Keystone)	1	6	0
6 Terminals (Belling-Lee)	1	6	0
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<b>KIT "A":</b>	<b>£2</b>	<b>17</b>	<b>0</b>

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- 1 Mullard P.M.12 S.G. valve 1 0 0
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1 Baseboard, 10" deep	1	6	0
1 Cylind. .0005-mfd. "thumb control" variable condenser (type C)	11	6	0
1 .00013-mfd. differential reaction condenser, J.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 Telsen valve holders	3	0	0
1 Sovereign .0003-mfd. fixed condenser	1	0	0
1 Franklin 2-mfd. fixed condenser	3	0	0
1 25,000 ohms grid leak and holder	1	6	0
2 L.F. transformers (Telsen "Radiogrand" and Igranite "Midget")	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 Konecterkit, comprising Keystone angle brackets, wire for connecting, wood screws, G.B. plugs, etc.			<b>GRATIS</b>
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## PILOT KITS LEAD ALL THE WAY THROUGH

# RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 32.)

Once the degree of selectivity required has been obtained, this condenser can be considered as finished with, and the handling of the set resolves itself into the correct operation of C<sub>1</sub> and C<sub>2</sub> (tuning and reaction.)

You will find all about how to handle reaction and tuning in "The Key To The Ether."

Read it carefully and then take the trouble to have half an hour's practice in oscillation-control, etc., at some time when the local station is not working, training yourself to keep the set sensitive, but not oscillating as you alter the tuning.

Once you have mastered this you can handle the "Sharp-Tune" Two or any other detector-L.F. set in a way that will seem amazing.

## RADIO SYMBOLS

No. 6.

### THE L.F. CHOKE

It is sometimes used to couple L.F. stages together, but generally for smoothing or for a filtered output.

The chokes are used for smoothing work in conjunction with large fixed condensers, to smooth out ripple from the mains.

Those for filtering the output have an inductance of 20 henries or more. Shorted turns occasionally give rise to distortion, but usually this is a trouble-free component.

insulated by two insulating blocks at the pole end.

"The entry is through a hole bored through the window sash. The wire through the window is covered with the outside rubber taken from a large rubber-covered cable.

"The cover is kept on by a winding of insulating tape. I have a wire from a gas bracket

in the wall (gas pipe built into the wall). The wire is about 3 ft.

"I put it on first for an earth wire, but bought a copper link for earth and took it to the garden. The earth wire is about 20 ft.

"My query is that if I take the small wire from the gas bracket (single burner lamp) the volume of sound is more than twice that of the sound when I have the outside aerial working.

"I don't suppose there is any remedy for it. Just one of those funny things that happen in wireless. But I should like to know your opinion."

It certainly does sound a bit tricky, P. H. Apparently what is happening is that the gas pipes, etc., make a much better "collector" of broadcasting than your aerial, which is supposed to do the collecting.

This kind of thing does happen sometimes, and we have known of metal windows, metal roofing, etc., which gave wonderful results when used as aereals, especially if the comparison is made with a poor aerial.

From what you say of your own aerial we think that this may not be as efficient as it ought to be. That long earth-lead (the earth is always considered as a part of the aerial system) is one thing against it, and we are a little in doubt about that rubber covering at the lead in.

Normally there is no need to cover an aerial at all. Bare wire is quite O.K.

It is only when it must pass through walls or windows, or in places where it needs support that you need insulation. And this does not depend for its

efficiency so much on the rubber, etc., used, as on the spacing of the wire from earthed conductors.

Several inches (at least) of air or other good insulator between the aerial and any metal such as a gutter-pipe, metal window frame, earth-wire, etc., must be allowed where it passes into the house; and the actual main run of the aerial should be yards and yards away from walls, houses, tin roofs, etc.

If, for instance, an aerial runs through the same hole in the window as the earth-wire, it is inefficient. So perhaps something like that is making your outdoor aerial much less effective than it should be. But if you can't find anything wrong with it, we still think you ought not to be content with a gas-pipe aerial.

For one thing the gas company doesn't approve; and for another thing it does seem a pity to mix electricity up with an explosive thing like gas, if it can be avoided.

In your place, if we couldn't better that outdoor aerial we should try an indoor aerial. All you want is a quarter of a pound of No. 22 or 24 D.S.C. wire, and a little patience in finding a good position for it, round the picture rail, or up in the roof.

### WHO IS KOIKE?

A. L. (Dulwich).—"I built the 'Magic' Three when it came out in 1930, since then I can honestly say I have received on loud speaker some 60 stations on medium and long waves, and there are still many stations to be heard on 'phones, including short wavers.

"I am rather keen on building the 'Comet,' but I hate the idea of scrapping the 'Magic,'

(Continued on page 36.)

### "P.W." PANELS.

#### No. 11.—LAYOUT OF THE BASEBOARD.

This is one of the most important features of a set, and can only be done properly by an experienced designer.

Correct layout prevents unwanted interaction between different circuits. It also shortens and simplifies wiring.

Apparently slight alterations to the layout of a set often result in poor quality and reduced strength. Other possible results are howling, whistling and humming.

So important is the baseboard layout that noticeable ill-effects often follow when a component, such as a transformer, standing in its right place, is turned round to face in the wrong direction.

## "DEFINITELY IN THE HIGHEST CLASS"

says "The Wireless World."



# PICK-UP and TONE-ARM

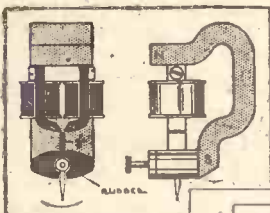
"The damping of the armature is exceptionally light, and from the point of view of freedom from record wear the A.E.D. pick-up is definitely in the highest class. The frequency response curve is of good general form," states the test report published in the March 4th issue of "The Wireless World." Such praise from so high a technical authority *must* guide you in your selection.

The A.E.D. Pick-up gives you more and better volume with less amplification and saves your records. It is your *only* choice.

PRICE **42/-** Complete

**AUTO ELECTRIC DEVICES, LTD.,**  
DIAMOND WORKS, BRIGHTON, SUSSEX.

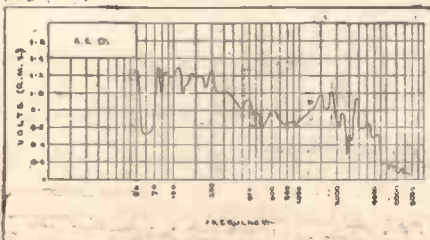
Telephone: Brighton, 2404. Telegrams: "Selfwind, Brighton."



Above. Sectional view of magnet system. Note that the tip of the armature moves across the pole faces and not between them.

Below. Frequency characteristic, showing excellent response at all frequencies.

(Illustrations by courtesy of "The Wireless World.")



# FOR TEN YEARS PILOT RADIO KITS

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PAY THE POSTMAN—it costs no more—we pay all charges.

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Strict Privacy to all Easy Payment Orders.

## POPULAR ACCESSORIES C.O.D. CASH OR H.P.

### Peto-Scott's 3-Pay Way covers everything Radio

- Keystone P.W. Dual Range Coil.** Officially Approved by P.W. Pay the Postman **12/6**
- Keystone Star Turn Selector Coil.** For use in the "Comet" Three. Pay the Postman **12/6**
- Atlas A.C. Eliminator.** Type A.C.244, 3 Tappings—S.G., Detector, Power. Output 120 volts at 20 m.a. Pay the Postman **£2-19-6**
- Ecko D.C. H.T. Eliminator.** Model I.V. 20. Pay the Postman **£1-17-6**
- Ecko A.G. H.T. Eliminator.** Model I.V. 20. Pay the Postman **£3-19-6**
- 3 valves for 1931 Ether Searcher** Mazda A.C./S.G. 25/-; A.C./H.L. 15/-; Mazda A.C./P.I. 17/6. Pay the Postman **£2-17-6**
- Undy Multi-Pole Super Dynamic Speaker.** Fitted with 3 impedance tappings. Pay the Postman **£3-10-0**
- Blue Spot Speaker Unit.** Type 66R. 4 pole balanced armature. Pay the Postman **£1-15-0**
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**Major Chassis and Cone (37 cm) - 15/-**
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- The Kingston Home Recorder** Pay the Postman **£3-16-6**

58/-

or 12 month-ly payments of 5/4

KIT "A"

PAY THE POSTMAN.

COMET 2

FOUNDATION CIRCUIT

1 Panel 14" x 7" x 3/16, Peto-Scott, ready drilled	4 6
1 0005 mfd Drum Dial Tuning Condenser, Cytidon (Type A)	11 6
1 0001 mfd. or 0002 mfd. Differential Reaction Condenser, Formo	3 9
1 3-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 Spring Type Valve Holders, Telsen	2 0
1 0005 mfd. Fixed Condenser, Sovereign	1 0
1 2 mg Grid Leak and Holder, Sovereign	1 6
1 200 or 400 ohm Potentiometer, Igranic	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"	1 6
9 Terminals, Belling-Lee	2 3
<b>KONECTERKIT</b> , comprising Glazed Wire Screws, Filcr, etc.	Gratis

**FREE.**—Every "Comet 2" Pilot Radio Kit contains a Free Konecterkit, comprising Panel Brackets (Keystone Die-cast Aluminum 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.

5/-

Flexi-Coupling  
COMET 2

**EXTRA COMPONENTS:** Keystone Selector Coil 12/6, 1 Bulgin Panel Light 2/6, Flex (free). N.B.—Add 15/- to the Cash or C.O.D. Price (58/-) if you require your "Comet" 2 Kit to be supplied for Flexi-Coupling.

- ATLAS A.C. ELIMINATOR TYPE A.C.244.** 3 tappings—S.G. detector, power. Output 120 volts at 20 m.a. Cash Price £2 19 6  
Balance in 11 monthly payments of 5/6 **Send 5/6 Only**
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Balance in 11 monthly payments of 7/4 **Send 7/4 Only**
- REGENTONE 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  
Balance 11 monthly payments of 10/9 **Send 10/9 Only**
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- LAMPLUGH or FARRAND INDUCTOR SPEAKER,** for perfect reproduction. Unit and chassis complete, ready mounted. Cash Price £3 10 0  
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- CELESTION D.12 LOUD SPEAKER.** An entirely new model in oak. Cash Price £5 0 0  
Balance in 11 monthly payments of 9/2 **Send 9/2 Only**
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ORDER FORM

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

Please send me  
**C.O.D. CASH or H.P.**

1. Kit "A" "Comet 2" (C.O.D. or Cash only).
2. Flexi-Coupling Kit for "Comet 2" (C.O.D. or Cash only.)
3. C.O.D items as detailed.
4. Accessories as detailed.

for which I enclose Cash/H.P. Deposit,  
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Name.....

Address.....

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77, CITY ROAD, LONDON, E.C.1. Clerkenwell 9405. 62, HIGH HOLBORN, LONDON, W.C.1. Chancery 8266. MANCHESTER: 35, Whitelaw Road, Chorlton-cum-Hardy. Phone: Chorlton-cum-Hardy 2028 NEWCASTLE, STAFFS.: 7 Albany Road. Phone: 67190.

# HAVE ECLIPSED ALL OTHERS

## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 34.)

but for experiment I fixed a sheet of copper foil underside of the baseboard, and find this improves the set to such an extent that I advise other 'Magic' users to give it a trial. On short waves the stability of the set is very noticeable.

"Whose call signal is K O I K E, which I picked up on short waves between 30 and 60 metres?"

We cannot trace this definitely, and there are hundreds of stations between 30 and 60 metres, but some of the German stations use K call-signs. So does Manila (Philippine Islands). It is unlikely to be this latter, so we suspect you got a German that time.

### ADDING AN H.F. AMPLIFIER.

"FAIR CITY" (Perth).—"When I saw your new D.X. unit in 'P.W.' I was delighted, as I thought it was just what I was after for my set. But when I read on and saw that it was only intended for sets that did not incorporate a screened-grid valve I was very disappointed.

"My set is a commercial one, and the results on the long waves are very poor indeed, in fact I cannot get any of them except 5 X X, which is too poor to listen to. So I was looking for a unit to attach to my set to make it something worth while.

"Can you help me by publishing a unit suitable for a screened-grid set, such as the D.X. unit? I cannot afford to scrap the set, and as for making alterations to it I do not know the first thing about it.

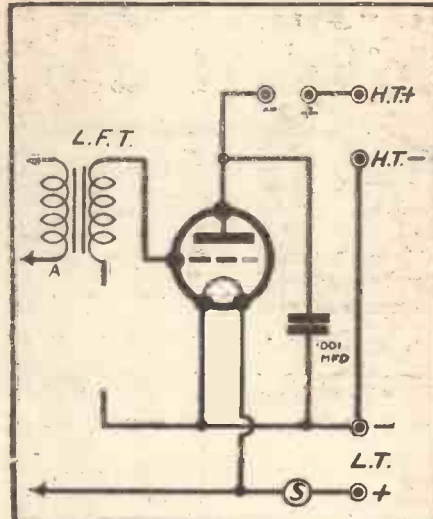
"But I could follow your instructions in regard to adding a unit. There are a lot of long-wave stations that ought to be brought in on my set, but we cannot get anything at all during daylight."

Probably you do not realise that as a matter of fact it is very difficult to add a screened grid stage to a set which already incorporates one. We think there is a far simpler way out of your difficulty.

The firm you mention is one of the many that give real service to their customers, and it is certainly against their wishes that you get such poor results with their set.

There appears to be something seriously wrong with it, or with the way you are working it, and we

### MISSING LINKS, No. 4



This circuit shows the principal connection for a short-wave L.F. amplifier unit, with transformer coupling. On the left is the transformer primary, but one of the secondary connections is incomplete. Can you "wire it up" as it should be, putting in the missing particulars?

LOOK OUT FOR THE ANSWERING DIAGRAM NEXT WEEK.

advise you to write to them, explaining the circumstances. In all probability it is some quite simple fault, which their specialised knowledge of that particular set will enable them to locate without any difficulty or delay.

### CHOOSING SUITABLE VALVES FOR YOUR "COMET."

A. E. R. (Portsmouth).—"In your article of 'P.W.' February 14th, on how to operate The 'Comet,' suitable valves are given as P.M.2.H.F., etc. I have tried several shops in this town, only to meet with the reply that they have never heard of them. Is it a misprint, or are they behind the times?"

No. They are quite right! The particulars should have read P.M.1.H.T., or P.M.2.D.X., the latter being a special detector valve.

### THE "COMET" ON LONG WAVES.

M. W. E. (Buxton).—"I expected a bit of trouble till I got a new detector, as this valve is an old timer. (Been going for over three years.)

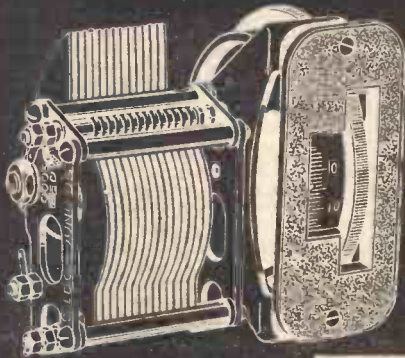
"To my surprise there was no difficulty with long distance on medium waves." In fact, I've had La Doua and Katowice, both new stations to me. But on long waves I only get half-way reaction.

"Would this be anything to do with the old valve? I don't think so, as medium wavelengths are now so good, but shall not be getting new valve till end of next week, and if there is any long-wave fault I can put right in meantime, I should like to do it."

It is a common failure of old valves to refuse to react properly, and with wave-change sets this—like many other faults of a general nature—usually evinces itself first on long waves. So probably your new valve will clear up the trouble right away.

If not, you may have some easily-overlooked fault, such as a wrong condenser-value, which is "holding back the set" on long waves.

By the way, you may be interested to know that another article showing the further progress of the "Comet," particularly on the long waves, will appear very shortly in "P.W."



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.

**11/6**  
COMPLETE

Fitted in the Officially approved kits prepared by H. & B. RADIO CO. PETO-SCOTT CO. LTD. and READY RADIO LTD.

THERE'S NO QUESTION ABOUT CYLDON SUPERIORITY. EXPERTS SPECIFY CYLDON WHEREVER POSSIBLE. THERE'S A CYLDON CONDENSER DESIGNED FOR EVERY RADIO NEED AND PURPOSE.

SYDNEY S. BIRD & SONS LTD. CYLDON WORKS Telephone, SARNESFIELD ROAD, ENFIELD, MIDDLESEX Enfield 2071/2

# AGAIN!

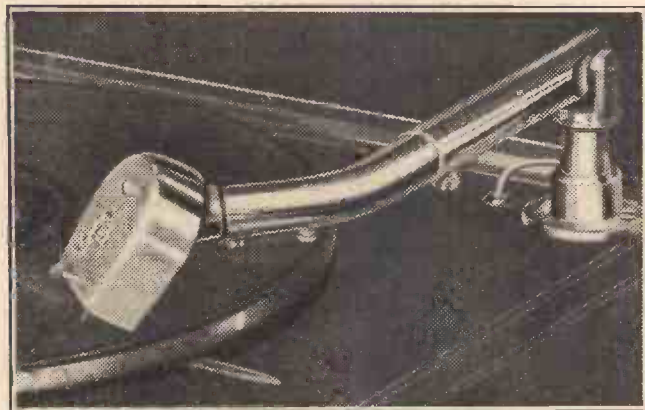
Although specified as an alternative in "The Comet 3" everybody used the CYLDON SINGLE DRUM DRIVE CONDENSER, specially designed for this super-set. And now it is specified as THE condenser to use in "THE COMET 2," another super-star set. Remember, CYLDON CONDENSERS are universally recognised as best both for quality and performance, yet this one costs not a penny more than an ordinary condenser and has all the distinguishing CYLDON features. If you want best results from your "Comet 3" or "Comet 2" build with CYLDON—never known to wear out.

When ordering, please state whether for "Comet 2" or "Comet 3."

# CYLDON

**FIVE YEARS GUARANTEE**

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Only when you fit a B.T.H. Pick-Up and Tone Arm do you realise how much you have been missing in your records. Passages which are a confused medley when reproduced by ordinary means are now heard with a crisp, sparkling vitality that makes record music live.

**PRICE**  
COMPLETE  
**45/-**

Records last longer when played with a B.T.H. Pick-Up. Needle-scratch is eliminated and carefully balanced design gives finest reproduction with an absolute minimum of record wear.

Get a B.T.H. Pick-Up and Tone Arm to-day. It will make your gramophone as good as a factory-built radiogram for a fraction of the cost.



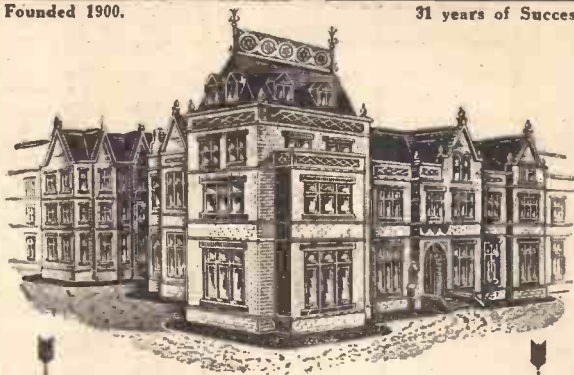
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The Bennett College is not a rented Room in a well-known street—it is a *College*. Over 30 years ago the Founder took as his motto what has now become a household slogan:—

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SHEFFIELD.



(Dept. 106)

**FURTHER NOTES ON THE "COMET" TWO.**

You will have seen from our description that "Flexi-Coupling" not only uses flexible wire, but it really is, in itself, flexible in application.

The beauty of it is that it doesn't make the set harder to handle, and yet it gives all the selectivity you can possibly want. It is going to prove a real blessing up Huddersfield way, when both the new Northern programmes go out at full force!

**Getting Smooth Reaction.**

On long waves, by the way, you turn the Selector coil control right round clockwise, as far as it will go. That cuts out the Selector coils, by means of its lead from terminal B. It is really so simple that no more need be said about "Flexi-Coupling," the diagram and photographs giving all the necessary information. But last week we promised to say a word more about operating the "Comet" Two.

As with all Det.-L.F. receivers, much of the set's long-distance success depends upon the correct handling of reaction. And in order to make the set really sensitive it should be possible to bring reaction up smoothly towards the oscillation point without it actually "going over" into oscillation.

**TECHNICAL TWISTERS**

**No. 53—SHORT WAVES.**

**CAN YOU FILL IN THE MISSING LETTERS?**

The term "short waves" is generally used to mean wave-lengths below . . . metres.

Such waves cover great distances, even when low power is used, because they do not travel along the . . . to the same extent as ordinary waves.

Most of the radiation on short wave-lengths is by the space-waves, which are reflected down to earth again at great distances from the transmitter, by the . . .

Tuning on short wave-lengths is always very . . .

**LOOK OUT FOR THE MISSING WORDS NEXT WEEK.**

Last week's missing words (in order) were: Precede. Phones. De-coupled. Right Angles.

Adjusting the voltage on H.T.+1 helps to give smooth reaction, but for really silky results you must set your potentiometer properly. Do this as follows:

Push the slider round towards that "outside" terminal, which is connected to the on-off switch. Try reaction, and see if the set seems inclined to "plop" into oscillation.

If not, if it glides smoothly and sweetly into the oscillating condition, just leave the slider where it [is, for you will not need to touch it again unless you change your valve, perhaps, or something like that.

**"Some" Set.**

Should you find, however, that there is a tendency to "plop," turn the slider a little way in a clockwise direction, and readjust H.T.+1, if necessary, till the ploppiness vanishes. Don't put the slider too far round, towards the grid-leak holder, because that loses sensitivity, but leave it only just far enough round that way to ensure smooth, sweet reaction control.

That ends our description of completing the "Comet" Two, and if you have made a true copy of our set you should have some very busy evenings in front of you, logging the many stations you will find. Both the strength and selectivity will be something to boast about, and before turning in for the night the little red light will warn you to switch off the set.

"And so to bed!" (as old Sam Pepys would have put it) with the happy thought that the "Comet" Two is some set.

**A NEW BRITISH INVENTION!**  
THE  
**PANADYNE**  
MOVING-IRON SPEAKER




Incorporating an entirely new type of armature, very flexibly suspended between magnet poles, thus obtaining response over an exceptionally wide frequency-range, which extends from the highest to the very lowest bass notes.

**CHASSIS MODEL £2.12.0**  
**CABINET MODEL £4.10.0**  
Walnut or Mahogany.

Ask your dealer to demonstrate, or write to  
**E. V. MACKINTOSH & CO., 32, Ernie Road, WIMBLEDON, S.W.20**

**IMPROVE THE LOOK OF YOUR SET**  
with an **OSBORN RADIO CABINET**



**ALL OSBORN CABINETS WILL TAKE THE "COMET" TWO.**  
4ft. high, 2ft. 2ins. wide, 1ft. 6ins. deep. Size of baffle board behind front is 24ins. by 24ins. Metallic Fabric for the front is included. Opening at top and back. Cabinet takes panel 2ft. by 9ins. (or smaller).  
**RADIO GRAMOPHONE COMBINATION**  
For 5/- extra the cabinet can be made four inches higher and converted into a Radio Gramophone Cabinet, complete with Motor Board.

**PRICES.**  
Machined, Ready to Assemble—Oak, 80/-; Mahogany, 85/-; Walnut, 75/-; Assembled, ready to polish, Oak 80/-; Mahogany, 85/-; Walnut, 95/-; Assembled and Polished Oak, 100/-; Mahogany, 115/-; Walnut 130/-. All Models carriage paid.  
Send 3d. in stamps for 56-page illustrated catalogue.

Model No. 215.

**CHAS. A. OSBORN, Dept. P.W.,** The Regent Works, Arlington Street, London, N.1. Telephone: Clerkenwell 5095. And at 21, ESSEX ROAD, ISLINGTON, N.1 (1 min. from the Agricultural Hall), Telephone: Clerkenwell 5634

**YOU CAN JUST PLUG IN!**



Your mains provide better and more certain reception, with greater economy and considerably less trouble than any battery, however good it may be. Most mains supply alternating current, which for radio purposes has to be converted to direct current; and for this a rectifier is necessary. Of the various types of rectifiers, the Westinghouse is acknowledged to be the most efficient. Unlike valve or chemical rectifiers, it does not burn or wear out. It out-lives your set! Its use—with certain other components—converts "battery-run" into "mains-run" radio; it is most suitable for fitting into amateur-built sets; while anyone who is buying a mains-set will do well to make sure the Westinghouse Rectifier is incorporated—it is found in most good makes. Complete technical details are given in an interesting and lucid manner in our forty-page booklet, "The All-Metal Way, 1931." The coupon will bring you a copy by return of post (please enclose 3d. to cover cost).

**WESTINGHOUSE**  
**METAL RECTIFIERS**  
The Westinghouse Brake & Saxby Signal Co., Ltd., 82, York Road, King's Cross, N.1. Telephone: North 2415.

**COUPON**  
Please send your forty-page booklet, "The All-Metal Way, 1931," for which I enclose 3d. in stamps.  
Please write in block letters.

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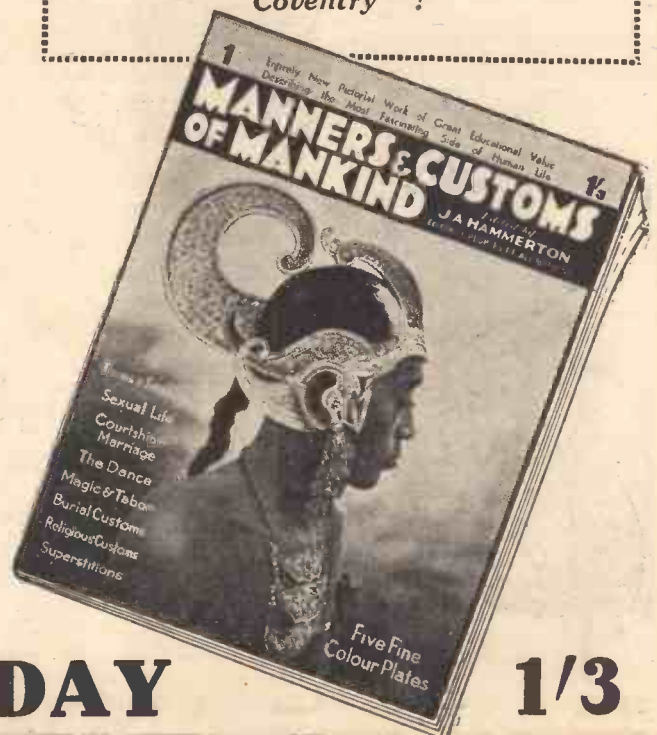
**MANNERS AND CUSTOMS OF MANKIND** is a work of enthralling interest, for it will describe and explain all the strange customs, superstitions and beliefs that survive in every corner of the globe to-day. It will be most generously illustrated with photographs, many thousands of which did not exist a few years ago and have never before appeared in a popular work of this kind. From Ireland to Iceland, from Australia to the Amazon, from the Congo to our own country this amazing work will take us, dealing with such varied subjects as Courtship and Marriage, Magic and Taboo, Religious Rites and Ceremonies, Racial Manners and Etiquette, until we realise that the most fascinating of all studies is that of mankind. Not only does **MANNERS AND CUSTOMS OF MANKIND** deal with the strange mysteries of uncivilised countries, but tells us, too, of strange customs which still survive in Europe, but are dying out. It is a work that once again proves the old adage that "truth is stranger than fiction." Part 1 contains a beautiful

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- Why a person is "Sent to Coventry"?*



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## THAT INTERVAL SIGNAL.

(Continued from page 15.)

receivers is best. The B.B.C., to my mind, must see itself and its service as devoted to the local listener and to programmes as programmes.

### A Question of Policy.

The Continental listener and the experimenter profit, incidentally, and every kind of goodwill is their due, but only so long as the local listener's interests are studied. This is a true *policy*, as I see it.

If, on the other hand, the B.B.C. decides that the interests of the experimenter and the distant listener are paramount let them do everything to implement such a policy.

I would suggest continuous full modulated programmes and, if the organisation fails to keep up a running flow, the immediate switching on of the tuning note to full modulation.

### A Poor Interval Signal.

The present interval signal is a pretty miserable affair, anyway, and only half serves its purpose in that it muddles the serious listener and dissatisfies the logger and experimenter.

Why not a policy, a leadership to correlate all the apparently logical but opposite ideas that each department must hold for its department? Why not decide the ideology and then implement the policy?

Why, in fact, bolster an inefficiency? A phrase, I repeat, I learnt at Savoy Hill!

## TECHNICAL NOTES

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

### Neutralising and Screen-Grid Valves.

THE fact that a screen-grid valve effects somewhat the same purpose as neutralising has often led people to think that there might be an advantage in using neutralising even in addition to the screen grid. I have often had this matter queried.

As a matter of fact, the construction of the screen-grid valve amounts to pretty much the same thing as neutralising the valve, but this would in itself be of little use if steps were not taken to prevent reaction between the grid and anode circuits of the valve at the same time. The combination of the screen-grid valve and the metal shielding or screening between the associated grid and anode circuits amounts to the complete screening of those circuits, both outside and inside the valve. It is obviously little use screening *inside* the valve and not *outside*, and vice-versa.

Screening, externally to the valve, was of course known and practised before the invention of the screen-grid valve, but in those days the coupling or reaction effect of the inter-electrode capacity of the valve had to be got over by the process of neutralising.

### A Pentode Discussion.

In view of the interest taken by readers of these Notes in the pentode valve—as

shown by the frequent queries I receive on this matter, and the references I am consequently obliged to make to it from time to time—it was interesting to note the discussion of this subject which took place in this Journal quite recently. The question centred around the amplification obtainable with a pentode valve, and the way in which this depended upon the impedance of the loud speaker with which the valve was used.

### Speaker Impedance.

It is commonly supposed that the impedance of a loud speaker is comparatively low at very low frequencies (say 100), and that it rises to a high value for frequencies such as the upper "speech frequencies" (say 5,000).

Naturally, the actual impedance depends very much upon the type of speaker in question; whether, for instance, it is an ordinary diaphragm speaker in which the speech currents traverse the magnet windings, or one of the moving-coil type, in which the speech currents travel through a comparatively small coil, the magnet windings (unless a permanent magnet is used, as is now becoming increasingly fashionable) being for the purpose of carrying the energising current for producing the field in which the moving coil operates.

### Impedance and Frequency.

In a particular case in point, the impedance of a loud speaker (as actually measured) was 15 ohms at 100 cycles, whilst at 3,000 cycles the impedance had

(Continued on next page.)

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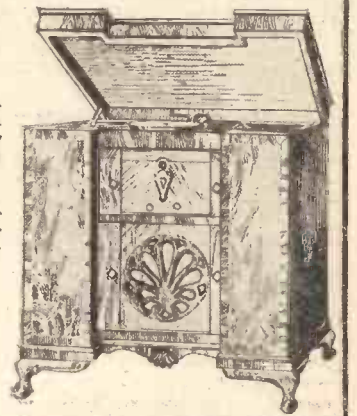
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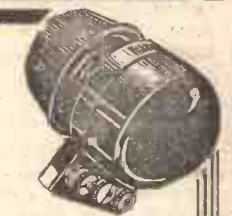
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## TECHNICAL NOTES.

(Continued from previous page.)

only risen to 19 ohms. Thus the rise of impedance with frequency was, in this case at any rate, comparatively insignificant.

### How Much Amplification ?

It is further stated frequently that the pentode valve produces an extremely high magnification—values in the region of 100 times being often given. Now this question of amplification cannot be considered alone, but must be taken with due regard to the *quality* of the reproduction obtainable. It is obviously of little or no value to obtain an enormous magnification of signal strength if this involves the complete sacrifice of everything in the shape of quality.

Looking at the question in this way, we find that the impedance of the loudspeaker must be kept low as compared with that of the valve. If this condition is not observed, then only a very small grid-swing can be allowed, which, in a sense, makes matters worse, for it puts the severest possible limits upon the amplification obtainable with the valve.

The actual value of impedance permissible in the loudspeaker is stated to be not more than about 0.1 to 0.2 of that of the valve, and in these circumstances the magnification given by the valve, so far from being in the region of 100, as so often claimed, comes out to more like 15, that is, about three to four times that which is obtainable by means of an ordinary three-electrode valve when used in proper conditions.

### Bass Frequencies.

A further point of considerable importance which arises out of the pentode discussion is that, if the bass frequencies are to be reproduced in proper proportion, the impedance of the speaker (or rather of the speaker circuit) must bear a certain relationship to the inductance of the transformer, and when this correct relationship is obtained it turns out that the amplification factor which is apparently obtainable with the pentode is still further reduced to about half the value already arrived at.

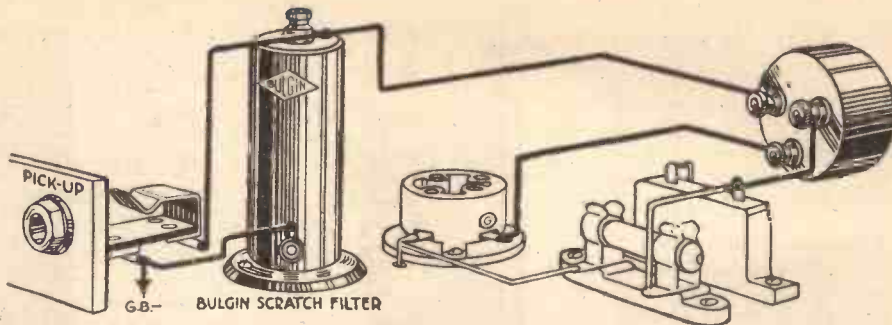
It must be remembered that the impedance of the pentode is enormously greater than that of the ordinary power valve, and consequently, in order to get as near as possible to the proper relationship between the transformer and the speaker and valve circuits, it is necessary to keep the impedance of the speaker circuit to a very low value.

### Importance of Conditions.

I mention all this because, as I say, I so frequently receive questions from my readers on this point, and I have so often in the past had to point out that the pentode is not (as so many people seem to think) all beer and skittles; indeed, I believe I have previously used that very phrase in this connection.

Some readers have written and told me that nothing on earth could be better than the results, both as regards quality and quantity, which they obtain with a pentode output stage. This I do not doubt, and it only confirms still more what I always

(Continued on next page.)



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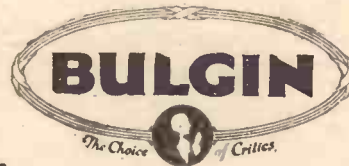
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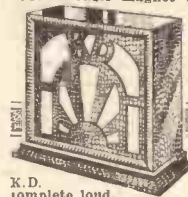
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**TECHNICAL NOTES**

(Continued from previous page.)

say to those who are enamoured of the idea of the pentode, namely, that it is an excellent valve and within its limits will work wonders, provided it is employed in appropriate conditions.

But if the conditions are not to his liking (and it is not always conveniently possible to convert an existing receiver so as to use a pentode), then it may cease to be a good servant and become a very bad master, and you will fare much better with a stage or two of straight L.F. amplification, using power or super-power triodes.

**Measuring Valve Impedance.**

By the way, talking about the impedance of a valve, I have often been asked whether there is any simple way of measuring this—that is, within the scope of the ordinary amateur and without the need for elaborate measuring instruments.

The current which normally flows through a valve is alternating current, or perhaps, to be more accurate, I should say that the characteristics and behaviour of the valve which we require to know are those which are connected with alternating current. The impedance of the valve is that which is offered to alternating current when flowing between filament and anode.

The impedance may be measured by the comparatively simple process of determining the current for a given applied anode voltage, or rather the change in the current produced by a given change in the applied anode voltage.

Of course, it is necessary to use a milliammeter for measuring the actual current, and also it is necessary to know the H.T. and grid bias voltages applied to the valve during the test. If you have no means of measuring the voltages you will be obliged to assume that they correspond to the battery-tappings.

This is not really a satisfactory assumption, and if you really wish to know the impedance of the valve it is worth while (if the test is worth making at all) to find out the values of the applied voltages with reasonable accuracy.

**Making the Test.**

Taking the average conditions under which the valve is intended to work, both as regards grid-bias and H.T. voltage, you must then increase the H.T. to a value a few volts above normal, and measure the current, then decrease it to a value a few volts below normal and again measure the current.

Suppose the normal H.T. (or, at any rate, the value at which you wish to know the working characteristics of the valve) is 120 volts. Then if you apply alternately 130 volts and 110 volts, that is, a difference of 20 volts, you will get a certain difference of current. Divide the voltage change by the change in current (in amps.), and you will have a fair figure for the impedance. Suppose the change in current for 20 volts is 4 milliamps (0.004 amps.), then the impedance works out at 5,000 ohms.

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(Continued on next page.)

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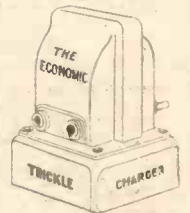
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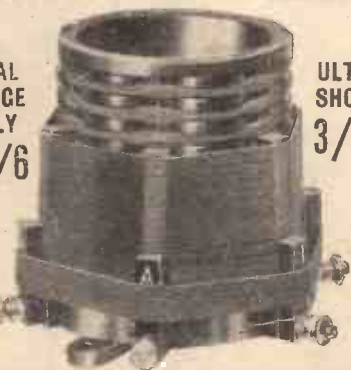
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## TECHNICAL NOTES

(Continued from previous page.)

at the accounts of what can be done with a couple of stages, or even a single stage, of L.F. amplification with these valves. Amongst various sets which I have been using lately is a 2-valver (detector and one L.F. stage), which gives an output volume on stations not too far distant which is simply enormous.

Two stages of L.F. of the same kind, even when receiving weak or distant stations, are generally found sufficient for anybody's requirements.

### Overloading.

Experimenters who change over from battery working to A.C., using indirectly-heated valves, have quite new experiences which are often disconcerting and sometimes disappointing. For one thing, motor-boating is apt to set in, and it is sometimes very pronounced.

This and the A.C. hum, however, should be comparatively easy to get over, and as I have dealt with this particular point in

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- Arthur Preen & Co. (Formo).

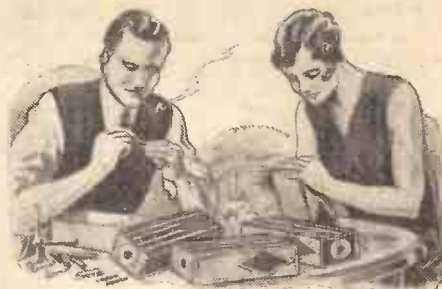
Readers are reminded that it is important they should purchase only approved makes, and manufacturers should note that no fees or restrictions of any kind are attached to the testing of samples for the trade.

these notes recently, I will mention another one which sometimes gives trouble. I refer to the overloading which is often set up and which is, of course, due to the very high magnification produced by the use of these valves.

Where this occurs, it is a clear sign that too much amplification is being obtained and the obvious thing to do is to cut down the amplification to the required amount. If it should happen that two L.F. stages comprise one R.C. and a transformer stage, then a very simple remedy for overloading and a simple way to cut down the overall amplification, is to reduce the value of the anode resistance in the R.C. stage. I cannot say off hand how much you should reduce it, as it depends upon circumstances, but the right value is very easily ascertained by trial.

### Reaction Troubles.

I should also mention that a common trouble, when going over to indirectly-heated A.C. valves, is with the reaction, which may be found difficult to control and not altogether satisfactory in operation. This trouble, however, is also amenable to the same treatment as the overloading, and the simple dodge of reducing the overall amplification will most probably cure both troubles simultaneously.



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THE PICTURE PAPER WITH THE MOST NEWS

**SUNDAY GRAPHIC**

## FOR THE LISTENER

(Continued from page 12.)

### "I Shall Be There."

Personally, when I am keen to hear anything, nothing stands in my way. If Sir James Jeans is timed to speak about stars at the inouent when I am wolfing my macaroni and cheese, I simply put the dish on the floor and place my set before me on the table.

They can put the Symphony Concert at what hour they like, and I shall be there! They can put a political talk at what hour they like, and I shall not be there! It is difficult to accommodate everybody, but easy to accommodate oneself.

I admit that I am lucky because I live alone, and am therefore one of those rather rare birds who is "master in his own house."

### Better and Better.

In my view, programmes continue to progress. There is a distinct improvement in many ways. We can all of us see, or think we can see, ways in which they might be still further improved; and we must have our grouse every now and again; and yet we can give the devil his due!

There is a great deal of enthusiasm, ingenuity, and downright hard work put into this business, and the results are good enough to encourage the hope that they will be still better.

I have paid my licence; and I wish I could be as sure of getting value for my money for every other ten bob I hand across the counter!

### Voices.

I wonder whether it would be possible for the B.B.C., in fixing up its speakers on various subjects, to select those who have pleasant voices? It really makes such a lot of difference.

There is no subject upon which there are not several equally competent speakers; and it would be a mercy if someone could choose the right man (or woman) with the right voice.

I have missed many good talks during the last year simply because I couldn't stand the voice. It has annoyed me.

### "Natural" Speakers are Best.

On the other hand (for I would rather praise than blame), I pleasantly recall two, speakers in the "Edges of the World" series, one I think on Borneo and the other on Mongolia, whose modest and ingratiating and natural voices added immensely to the interest of their subject.

Professional voices are the devil; cocksure masculine voices are "devil," and aggressive feminine voices are the "devilist." Because of them a lot of good stuff goes down the sink!

### Peter Warlock.

The death of Peter Warlock some time ago saddened me. I never knew him; I never even saw him; but I loved his songs, especially his Elizabethan songs.

His biography of Delius was a remarkable work for a young man. The mystery and pressure of life seem to have been too much for him. Life often most swiftly consumes its brightest candles; or a wayward gust of wind blows them out.

We can only be grateful that such wine came from the vinepress.

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