REGISTERED AT THE G.P.O. AS A NEWSPAPER

# A VISIT TO MOORSIDE EDGE (See Page 93)

# Popular Wireless

Every Thursday PRICE 3d.

No. 461. Vol. XIX. INCORPORATING "WIRELESS" April 4th, 1931.

## Full Details of THE "COMET" FOUR Inside

*Further Special Articles This Week*

**THE "COMET" ON LONG WAVES**

**THOSE CONVERTED SETS**

BROADCASTING AND CONTROVERSY—By Sir Oswald Mosley

**HOW "P.W." FLEXI-COUPLING WORKS**

# Popular Wireless

LARGEST NET SALES

Scientific Adviser:
Sir OLIVER LODGE, F.R.S.
Chief Radio Consultant:
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Technical Editor: G. V. DOWDING, Associate I.E.E.
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K. D. ROGERS, P. R. BIRD.
A. JOHNSON RANDALL.


THE "EXTENSER" TWO
RADIO ROBBERS
COIL CONSTRUCTION
BE CAREFUL!

CRITICAL CONFESSION
OUR AGONY
BUSINESS AS (UN)USUAL
LWOW! WOW!

## RADIO NOTES & NEWS

### The Yearly Competition.

ONCE again, I am happy to know, the annual fight between the joys of radio and those of the open air has begun. Primulus versus primaries! Digging versus D X!

Although radio is an all-round-the-year hobby, I confess that so soon as the sun remembers its duty and the air becomes warmer I feel a desire to renew my acquaintanceship with all the jolly plants and corners of my garden, and to work off some of the winter's deposit of blubber by agonising at the lawn-roller. So—roll on summer!

### Our Prince's Speech.

IF you heard the B.B.C's broadcast of the Prince's Buenos Aires speech last month you heard one of the best long-distance shows ever put over—probably *the* best, considering the distance—and the B.B.C. deserves a pat on the back, though the Post Office was the real power behind it all, because they picked up the stuff for the B.B.C. to re-radiate. Did you notice the peculiar rhythmic effect, like waves breaking?

### Cheap Telephony to Buenos Aires.

IN order to help the Exhibition and British business along, the Post Office here and "Transradio Internacional," the wireless company in Buenos Aires, have arranged that during the period of the Exhibition, and between the hours of 18.00 and 22.00 G.M.T., telephone calls between any place in Great Britain and the City of Buenos Aires may be made in either direction at half the normal rate. Hence during those hours the fee will be £1 per minute with a minimum of three minutes.

### This Week's Good Cause.

BUY a copy, or a couple of hundred copies, of the April "Wireless Constructor." 'Cos why? Why, because, to give one reason, it contains an article on a remarkable system called the "Extenser," which can be applied to any existing set; it simplifies construction and operation, increases receiver efficiency, eliminates wave-change switches, and enables one set of dial readings to cover both long and ordinary wavelengths. You must read this, or miss a treat.

### The "Extenser" Two.

THE same issue of the "Wireless Constructor" gives an example of the application of this system to a two-valver, fully illustrated and showing *inter alia* the wiring and the layout of the parts. Yet another article is devoted to full constructional details for making the "Extenser" itself.

Another especially attractive item is the "Stowaway" Three, a set designed to be tucked away in a cupboard, bookcase, or any odd corner; complete with swivelling frame aerial. Altogether a remarkable sixpennyworth!

## HIGH TIME FOR THE AERIAL

This is the American equivalent of our "Outside Broadcast" Van, and it will be seen that the aerial problem can be solved by the use of balloons.

### Radio Robbers.

THE "trade" papers are reporting an ever-increasing number of thefts of radio sets and parts, one of the latest being a case of "smash and grab," the thieves having the nerve to use stones *from a near-by graveyard* for the "smash." Strange, this fascination which radio sets exert over the mind of the underworld—I mean the underworld of crime, not of Chelsea and Chamber Music.

Can there be a Cockney Capone, king of some vast hidden warehouse crammed with radio loot? It's a theme for Edgar Wallace!

### "Windows in Heaven."

MR. E. R. APPLETON, who is the B.B.C.'s West Regional Director and the originator of "The Silent Fellowship," has caused the publishers to send me a copy of his little book "Windows in Heaven," which was published last month at 3s. 6d. It is a book about religious matters written from the point of view of the orthodox believer.

A review of it would be out of place in "P.W.," but I see that it is couched in bright, simple language, and I think that it would make an excellent "bed book." If you want to please some mother or granny here is the very gift!

### Coil Construction.

NOTHING like a little practical evidence, is there? What pleases us particularly is to get a letter from someone who has thoroughly digested one of our constructional articles and then got to work and made a really good job.

For example, take the instructions in our issue of Feb. 28th about coil making. V. D. J. F. (H.M.S. Caledon) has kindly sent us photographs of the "Dual Range" and "Star Turn" coils, made by himself. He says "they are really A 1. These coils are now in use in the 'Plus X' Four."

(*Continued on next page.*)

# RADIO NOTES AND NEWS

*(Continued from previous page.)*

They certainly appear to be beautifully made, and I am sure that they have given our correspondent, whom we thank, a great deal of pleasure.

### Transmitting Note.

MR. J. HUNTER, 63, Hervey Road, Blackheath, S.E.3, having been allotted the call sign G 2 Z Q—gee, what a brute for morse!—asks me to say how much he would appreciate reports on his morse and telephony on 20, 40, and 160 metres. All correct reports will be acknowledged by card.

Mr. Hunter hunts to some purpose, for he reports having received the "Belgenland" working with London and New York on 23 metres, while the ship was in Hong Kong Harbour.

### Be Careful What You Quote.

IT gives one a bit of a shock to learn that one of the French Broadcasting concerns has been ordered to pay twenty-five francs to the heirs of the writer, Victor Hugo, as damages for infringement of copyright. As Hugo died about 45 years ago he deserves a tribute to the efficient manner in which he protected the rights of his posterity.

But the incident makes one nervous about quoting a bit of Shakespeare or Scott, doesn't it?

### My Critical Confession.

PLEASE see par 1, page 1173, "P.W.," March 7th. I seem to be heavily engaged with musical readers nowadays. G. I. (Scarboro') says that he disagrees with me when I mention that composers should write their works as they mean them to be played. Well, I didn't say so, did I!

I said I *wished* that they would—which is different, especially if you consider the humble tone of my paragraph. Surely a composer has a very distinct idea of how he means his work to be played! Surely no composer means to leave all kinds of conductors to please themselves about the time and expression!

If that is so, then I think they might indicate exactly how they wish their own work to be executed. I do not see how we laymen can be expected to understand music if every orchestra plays it differently.

### "For This Relief . . ."

AT last the B.B.C. has decided to regale us with an alternative to the Bach Cantata which has been broadcast on Sunday afternoons—for years, it seems. This alternative, which will date from the 5th, will appear in the programmes of the London and Midland Regional transmitters, which will come into action at 3 p.m.

I am sure that this alteration will please a great many people, provided that the alternative does not land us into the fire, from the frying-pan.

### Our "Agony" Feature.

IF this should meet the eye of J. P. (not Jack Payne, surely!), of "The Black Horse," Biggin Hill, let him rest assured that I have sent a scout after his "Query" and hope that he will receive attention in time to save his reputation as a pa[illegible] Yes, I know! When these boys come home for the holidays they want the earth.

That's a nice-looking little hostelry you've got there. I should like to plank a quart pot down on one of those tables and smoke a friendly pipe with ye. I live less than——miles from you—but what has a sprite to do with pewter?

### Radio in Madras.

PTE. W. F., of the good old 2nd Middlesex Regiment, stationed at Madras, hurls a pretty solid bouquet at "P.W." and the merry men who produce it. (Count me out! I merely slope around trying to discover where the lady typists keep the sugar!). W. F. draws a lovely

## SHORT WAVES.

Mischief-making Caller (to new neighbour): Of course, when a husband says he's kept late at business, you've no proof, you know.

New Neighbour: Oh, really! Well, my husband happens to be a wireless announcer.—"Passing Show."

* * *

"Loud speakers have been installed in the belfry of Totteridge Parish Church," we read in the "Daily Mirror."

We hope there aren't any bats there.

* * *

**AFTER DARK.**

"What is a jazz band?" asks a newspaper correspondent.

Surely every wireless enthusiast knows that a jazz band is a body of men who are paid for making atmospherics.

"Birmingham Daily Mail."

* * *

Adams: Have you heard my new super-het receiver?

Brown: Yes, I heard it last night.

Adams: That's something like a wireless set, isn't it?

Brown: Yes—*something!*

* * *

In these uncertain days we can be quite sure of one thing, anyhow: If George Washington had had a wireless receiver, he would never have enjoyed the reputation he did.

* * *

**AFRICA SPEAKS.**

Prepared to make their wireless bow,
The jungle dwellers stand.
Excitement's running high—and how!
On Afric's sunny strand.
When there before the magic Mike
They've come from near and far,
We'll realise how truly like
To humans beasties are.

The programmes will be much the same
As those we know by heart;
Though from the wild, 'twill be as tame
Right from the very start.
When Leo's loud and throaty roar
Is o'er the ether blown,
You'll say, "How like to Bernard Bore,
The broadcast baritone!"

"Answers."

circuit on page 4, which gets him four Indian stations, Saigon, Bangkok, Melbourne, Nairobi, some Americans and oodles of Morse stations. He abandoned the "Magic" Four for this circuit. We look at "said" circuit and observe that it follows the principle of our "P.W." Four. (See issue of Sept. 21st, 1929.) Cheerio, Middlesex. "Ich dien"—and all that!

### Business as (Un)usual.

REALLY, these Indian fellow-cits are the rummiest coves as ever were. Here they go and naughtily make Na $Cl_2$, dead agin the Raj; wallop the cops; boycott Lancashire cotton goods; eat dates on the floor of the Vice-Regal Lodge—and then one of them has the nerve to write to an English firm as follows: "Sir (or Missusses), Introducing the undersigned, beg to enquire whether you, the more influential firm in our common Empire, caring consider Indian pottential interests by reserving us 25 (twentyfives) persent on sales effected, you quoting undersigned free on boards. I having biggest bazar this city and much American offers trading if yours goodselfs not caring."

### The Best of the "Talks."

IF all the "talks" were like unto those of the Hon. Harold Nicolson and Mr. Vernon Bartlett we should be both better informed and better amused than we are likely to be by the learned lisping of countless professors. Mr. Bartlett's bits are helped considerably by his pleasant delivery and "human touches," but the games of politicians tire one after a little while. Now the Hon. Harold Nicolson is by way of producing good Birrell, and his chats soothe the mind like as a rare unguent. (But what a voice! It's full of something which one longs to scrape off . . .)

### "Comet" Comment.

IF this "Comet" correspondence continues to be bunged on to *my* desk I shall have to apply for an "Ariel's mate" to help me out. It's really "immense," though, the letters seem so nice after I have smarted from the lash of a few highbrow musical people who pretend to be ravished by the unmelodious squeals, shrieks, bangs and toots of "never before performed in this country" stuff.

But let me not be bitter on this happy occasion when I am nose high in "Comet" letters.

### "Comet" Helps Trade.

BECAUSE it is such a wang-dooper, high-spot, gold-from-the-grass-roots, crash-tinkle set the "Comet" is helping the radio trade besides tickling to death (or glory) the home constructor. C. J. G. (Smethwick) says that to describe the circuit as a phenomenal success is to put it very mildly. Handsomely spoke!

C. J. G., proud proprietor of the "G. G. Radio Service," has made up eight Foundation "Comets" and has orders for several more. (*Attafan!*) He swears that Birmingham has run out of "Comet" parts, and as he writes his own "Comet" is delivering W G Y at L.S. punch. I forgive all my enemies!

### Lwow! Wow!

IN pursuance of the scheme to put Poland on the broadcasting map as a hefty and striking blob, the new station at Lwow has now been completed and launched on the ether. Power, 16 k.w., wavelength 381 metres—as before.

This station is a "go-getter," and as a result of its tests it received more than 900 reports from listeners in the British Isles. The next new Polish station will (yes!) be Wilno!

### Further Adventures of an "Uncle."

I DARESAY that Mr. R. E. Jeffrey is still remembered amongst you, though he left the B.B.C. to join British International Pictures, Ltd., at Elstree, as an expert in sound reproduction. He has now moved on, and let us hope, upward, having become the reporter for the Universal Talking Newsreel—which of a truth has a Hollywoodlike sound.

Best o' luck! But the B.B.C. doesn't seem to lead men to peaceful lives, does it?

**ARIEL.**

# AN EARLY VISIT TO MOORSIDE EDGE

**"P.W.'s" special representative gives an exclusive description of the new North Regional Station for the benefit of our readers.**

BY the time this appears in print, the new Northern Regional station will be in official working order, on one wave-length, if not on both the Regional and National waves. But when, by special arrangement, I was enabled to visit the station recently, before the initial tests started, it did not look like the hive of industry which I suppose it is now that it is working.

At the time of my visit no transmissions were possible from the station, although it was well past the official opening date as announced before last Christmas (first tests were supposed to be made during January), and plans were in hand for a visit of the portable 1½-kilowatt transmitter, in order to get general radiation data for the district. The B.B.C. believes in playing for safety, and did not want to turn on the full power until the engineers had some idea of the directions in which the signals would be best received.

When I paid my visit, the station site appeared to be almost deserted. Perhaps the engineers were—like myself—not Northerners by birth, and they found Moorside Edge a trifle chilly, as I did.

### A Good Site.

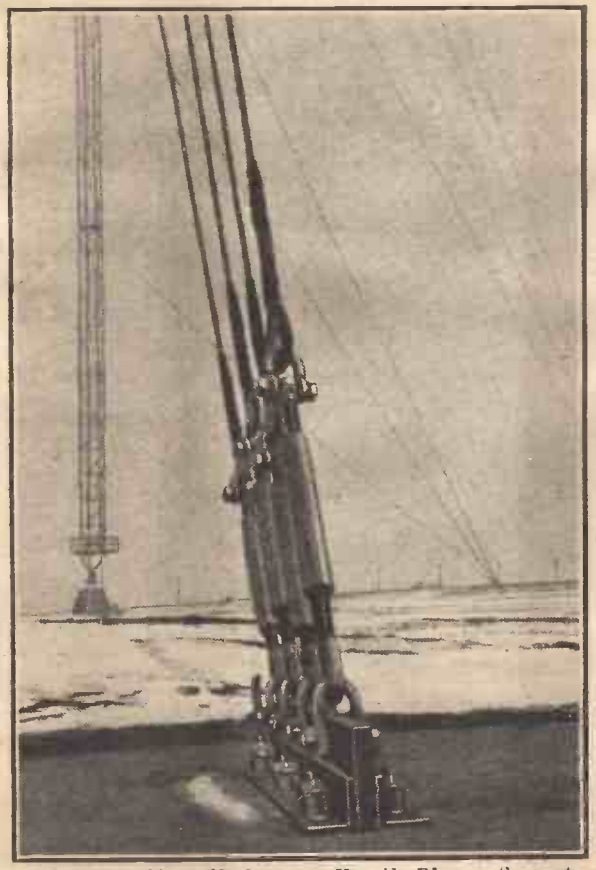
It certainly was chilly when I was at Slaithwaite, and found that I had about another mile and half to go in order to reach the station itself. That mile and a half seemed like five, and I resolved that "Slaithwaite" is a very bad name for a station which is so remote from its home town; they might just as well call it Huddersfield, for it is only five miles away to the east of that town!

My guide (a Huddersfield man) even seemed to be a little apologetic for the weather; he needed to be apologetic, for Moorside Edge is very exposed, and the wind blows over the hill-tops in great gusts. The actual station site is over 1,100 feet above sea-level and the masts can be seen for miles around.

### Insulated Stays.

The masts, of course, are higher than at Brookmans Park—500 feet, or thereabouts, instead of "B.P.'s" 200 feet—and are of the stayed type, resting on slender, insulated bases. The Brookmans Park masts are quite satisfactory, but it was not considered wise to put up Eiffel Tower type masts of this kind at a height of 500 feet; economy also had to be considered, and the engineer told me that the stayed-type masts are, at this height, less expensive.

## WITH A GIANT'S STRENGTH



Gales blow with terrific force over Moorside Edge, so the mast stays have had to be anchored to massive concret blocks let deep into the ground.

I noticed that each stay of these huge masts is broken up, electrically speaking, by insulators, and the ends of these stays are rather impressive. Massive concrete blocks let into the ground take the strain of the gigantic cables, and there are huge insulated rings and hooks at the end of each cable. The mast bases rock on insulated blocks of an amazing height (they took months to put in position, so I am told), and at the lower end of each mast column is a little gallery.

To anyone who has seen Brookmans Park, the station strikes a familiar note. It is planned on very similar lines, as I found immediately on entering, and the colour of the outside work—reddish brick instead of grey Portland stone—is the only striking external difference.

### Ready for Emergencies.

At the entrance are the control-rooms and station offices, all of them very barren when I made my visit, and a door leads straight in to the main transmitter hall—a longish room, perhaps a little smaller than that at Brookmans Park, but perhaps only looking smaller because the interior decoration was not finished at the time, and it makes the appearance deceptive.

At the back of the hall are the rotary generators, and in a building at the end is the Diesel plant. We went through to these first of all, because here some men were at work.

In the power house are six-cylinder Diesel engines of the very latest type; the man in charge of the work here told me that even engineers of the latest oil-driven liners should be made to blush for shame! But, without any exaggeration, I can say that these power units are of the very modern heavy-fuel type. They drive direct-current generators each capable of giving an output of about 200 kilowatts. Arrangements are made for driving these big "juice" producers in the unlikely event of a breakdown.

### A Good Foundation.

I was told that the work of putting down the foundations for the Diesel engines had taken several weeks, and that embodied in the foundations (and the foundations, also, of the rotary converters) are special arrangements to cut down the amount of vibration. It is essential that the trans-

(*Continued on next page.*)

## AN EARLY VISIT TO MOORSIDE EDGE

*(Continued from previous page.)*

mitters should not be subject to any vibration, and, on the strength of the experience gained in the construction of the London Regional, the Slaithwaite Diesels have been mounted in very much the same way.

### Some Fuel Bill!

Running round the top of the engine-room is a traveller-crane which can lift parts of the huge engines bodily on chain-and-pulley lifters, and I believe that this is a permanent installation. Anyway, it was vitally necessary in getting the big engines into place on their concrete beds. I had previously noticed that part of the roadway outside the station had been made up so that the heavy machinery could be delivered while the station was in course of construction. Also this is necessary for the transport of 600 gallons of fuel oil per annum to the station when the engines are working! Some fuel bill!

There are galleries round the tops of these Diesel engines—and while they are running the engineers can climb to the tops of the cylinder heads and attend to the heavy-fuel injection gear.

We went back to the transmitter hall, where all the delicate parts were covered with white cloths to keep out the dust. As I have explained, the arrangement of the panels is very similar to that at the London Regional. The twin transmitters are facing each other, and there is a separate control desk (the control men sitting back to back) for each plant. At the end of the room is the main switchboard.

### Safety First.

In the main, the arrangement of the transmitter panels, and the type of gear enclosed in each is on similar lines to that of Brookmans Park, and is now to be standardised by the B.B.C. In each transmitter there are five units. Starting from the switchboard end, there are some small glass-bulb air-cooled valves in the master-oscillator (no crystal control is used), the separator, the first and second modulator stages and the modulated amplifier.

There is a fairly high anode voltage in the next stage, in the second frame, and so water-cooled valves are used. As a matter of fact, this amplifying stage has two water-cooled valves in "push-pull"—a striking comparison with the push-pull amplifiers which we use in radio-grams!

The third and fifth frames each contain half of the valves used in the final output stage, and these again are connected in push-pull. I believe that this is a fact known to very few technical people, and many experts do not realise that the B.B.C. has taken up this form of transmitter circuit. In the fourth frame are the main H.F. tuning controls, and in it also are the coupling circuits for the aerial feeders which run out at right-angles from this frame to the outside aerial lead-in—or, more correctly "lead-out."

Two things are rather intriguing about these neat grey panels: first, the provision made for a rapid change-over if a valve burns out. A spare valve is provided in each stage, and it is necessary only to touch a switch to bring it into circuit. Second, there are safety doors in all the units with the exception of the fourth. Usually these transmitter safety doors cut off the power if they are opened while the plant is working. Slaithwaite gates work like lift gates, however, and *cannot be opened while the power is on.*

As at Brookmans Park, there are the very minimum of controls and dials on the actual control desks, and relays are provided so that the operator on each of the twin-wave stations can control the input voltages without walking across to the main panel at the end of the room. Incidentally, one of the rooms I visited in the office part of the building, at the entrance, is to be fitted up as a valve stores, and when the station is working there will be several hundreds of pounds' worth of water-cooled valves in stock.

As I was leaving the station I walked with my guide round to the back of the building to see the huge concrete-lined reservoir, which will hold over 200,000 gallons of water. As on many of these high hills in the Pennines there are natural water lakes at the very tops (a rather extraordinary geographical fact)! I enquired the reason for the immense amount of work undertaken in building a natural lake! I was told that in all probability, Slaithwaite will use 10,000 gallons of valve-cooling water a day; there was a severe drought, as you will remember, in the summer of 1929, and this affected the hill-top water supplies. The B.B.C. does not mean to let the summer dry up its transmitters!

### Warming the Aerials.

At the other extreme they have taken elaborate precautions against an aerial electrical breakdown. B.B.C. engineers went into consultation with Continental authorities about aerials in cold districts, and they finally adopted an idea which is also in use at the Reykjavik station in Iceland. In the mornings, when there may be thin ice on the aerial and guy wires, a heavy current can be passed through the whole aerial system to heat it and melt any "short-circuiting" ice. This, of course, is a novelty for the B.B.C. Certainly something of the kind is needed to combat the bleakness of the moor.

I left feeling that Slaithwaite is an even more massive job than Brookmans Park, and the engineers and builders are to be congratulated. The next few months will tell if the policy behind the erection of the station is correct. Complaints of a "wipe-out" in Huddersfield (not to mention Slaithwaite itself, from which town, in the main street, the aerial masts can be seen), are bound to swamp the Manchester and Savoy Hill authorities.

## DAISY DEVOE AND HER RADIO

They seem to have nice radio sets in American prisons, don't they? Miss Daisy Devoe, Clara Bow's former secretary, is spending a few moments of her prison sentence (18 months for theft) tuning-in.

## AT HOME AND ABROAD

**Some interesting items about sets and stations.**

**Japan's short-wave broadcaster J O A K, was delayed owing to the Japanese concentrating on simultaneous broadcasting.**

* * *

**The interval signal of the Vatican short-wave station is the first bar of the Papal March.**

* * *

**When a power valve is found to be very much hotter than usual, it is usually a sign that grid bias is not being properly applied to it.**

* * *

**The fact that a grid bias or H.T. battery is new does not necessarily mean that it is in perfect condition, since dry cells deteriorate even though not used.**

* * *

**It often takes nearly two minutes after an indirectly-heated valve is switched on for the cathode to warm up sufficiently to provide a normal anode current.**

* * *

**Warsaw's new station has the tallest broadcast masts in Europe, these being 600 feet high.**

* * *

**In the latest types of broadcast transmitters, the modulation has a straight-line characteristic over frequencies from 30 to 10,000 cycles.**

* * *

**It has long been the practice to cool the anodes of transmitting valves with running water, and this method is now being applied to the filaments as well.**

# The "COMET" on LONG WAVES

WHEN you saw the "Comet" Three in its "radio-gram" form you must surely have thought that we had gone to somewhere near the ultimate in the addition of refinements. So far as the main body of our readers is concerned, we have probably done enough to enable them to pick out an adequate selection of "extras," but there yet remains a minority which must not be forgotten.

These are the unfortunates who find long-wave reception unusually difficult, either as a result of very bad local conditions, or extremely close proximity to a powerful local station.

**Exceptional Efficiency.**

For them we are going to describe a little modification in the system of aerial coupling on long waves. It involves only a very small alteration in the standard connections, and just one new component (a spaghetti resistance, price about one shilling), yet it removes most thoroughly any troubles due to a very powerful and nearby local station "breaking through" on long waves.

Such troubles, of course, are very much less in evidence with the "Comet" than with most receivers, but they are still possible to a slight extent in particularly difficult localities, so you may like to know of a method which gives definite and complete prevention.

It is at the same time a method of aerial coupling of exceptional efficiency, so you need not fear that you will lose anything by adopting it. On the contrary, you are likely to notice even a slight improvement in volume on the long-wave stations.

It is only slight, as a rule, and so we did not adopt it for the standard "Comet," preferring the somewhat greater simplicity and economy of the normal "P.W." method of long-wave aerial coupling. Still, slight as the gain in general long-wave efficiency usually is, the scheme we are about to describe will no doubt interest those who like to get the last possible ounce out of their sets.

**Easy Conversion.**

Now, the standard "P.W." method of long-wave aerial coupling is the scheme commonly known as "Brookmans" coupling, after the famous "Brookmans" Rejector, in which it was first popnlarised. This system was a great step forward on the earlier methods which it superseded, and it has very nearly banished the old nuisance of local station interference on long waves.

**Details of a further refinement which can be easily applied to all "Comet" receivers.**

However, there are still the unfortunate few, and for their benefit we will explain how they can convert their "Comets" to use "Interwave" coupling for the aerial on long waves. This system is one commonly used in the sets described in our sister journal, "Modern Wireless," and it has some interesting special virtues of its own.

The conversion is a very simple job, and it will only take you a few minutes to make. It is so simple, indeed, that you will not need a special diagram, for we can tell you how to do it in words, quite clearly.

It will be a help if you can refer to the original blue print of the "Comet," but even that is not necessary, for you can follow out the alterations on the wiring of the set itself almost as easily.

Looking either at the blue print or the set, identify the ·002-mfd. compression condenser which gives "Brookmans" aerial coupling on long waves. Next note that a wire runs from one side of this condenser to the moving plates of the tuning condenser.

Remove this lead and instead wire the moving plates to the *other* terminal of the compression condenser. This is the terminal which is also wired to earth, to the wave-change switch, to $S_3$ on the coil, and to $F_2$ on the reaction condenser.

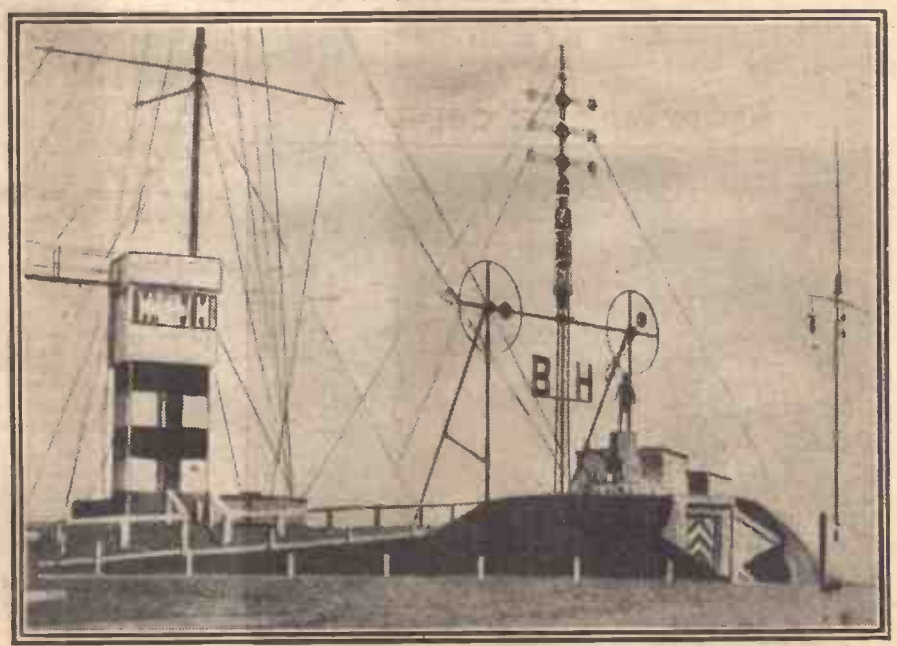
**The Switch Wiring.**

Now remove the wire joining this terminal of the compression condenser to $S_3$ on the coil. Instead, wire $S_3$ to the *other* terminal of the ·002 condenser (i.e. to the one from which you previously removed the lead running to the moving plates of the tuning condenser).

Those are the only alterations you have to make, and it obviously won't take you long to complete the little job. The final step is to connect a 25,000-ohms "spaghetti" resistance across the terminals of the ·002 condenser.

Grip one tag of the resistance under one terminal, then grip the other tag under the second terminal, and that is the end of the conversion.

## THE RADIO MEDICINE MAN



This station, situated at Cuxhaven, has a medical man always in attendance. Symptoms are sent to him by radio, and he treats his patients over the air!

# BROADCASTING AND CONTROVERSY

**A short time ago a debate was suddenly postponed by the B.B.C. on the ground that it was too controversial. In this special article the vexed question of the microphone and politics is discussed**

**By Sir OSWALD MOSLEY, M.P.**

IT has for some time been clear that the development of broadcasting gives us a means to debate matters of national importance before the whole nation. This implies a possible revolution in public affairs. Broadcasting, in fact, allows people to become truly informed on matters where before they had no opportunity to gather anything but scrappy and one-sided opinions based on half facts.

It is, of course, impossible in the present stage of broadcasting to have as many stations as there are would-be talkers! If this be the case, at any rate, for the present, it seems perfectly logical to form a public utility company to be in sole charge of the development and administration of broadcasting.

### Is the B.B.C. too Cautious?

The B.B.C. is naturally anxious to pursue a policy which cannot be criticised as partial to any one point of view on any subject. The danger, however, it seems to me, is that caution may lead them into a position where, in never daring, they may never use broadcasting for its true purpose.

There is a danger that talks may become devitalised by over caution. When broadcasting first began I understand that the B.B.C. was not allowed to deal with "controversial matter." This was a foolish situation, and the B.B.C. must have pressed for a revision of the regulations.

In any case, such a revision took place and their freedom to deal with any matter whatsoever through the broadcasting medium is unchallenged. This very freedom is, of course, likely to lead to over caution.

There is, however, a way out of the difficulty. The broadcasting authorities can avoid the criticism that they give tendencious views by staging a debate rather than one-sided talks on controversial subjects. Indeed, in refusing facilities for debate on any vital subject the B.B.C. may be strongly criticised as seeming to wish to maintain the status quo rather than allow the nation to be informed upon the better arrangement of its affairs.

The present is no time for academic talks; we are facing a crisis, and those of us who are conscious that the nation must rouse itself to do something feel that the B.B.C. should throw open its doors and welcome every would-be talker whose knowledge of a particular subject is of interest to the public.

I am particularly interested in these questions because I was recently asked to debate a matter of fundamental importance; but, a few hours before the debate was due to take place, was asked not to!

It struck me that the reasons given even for postponement revealed a weakness on the part of the B.B.C. policy in their interpreting their duties to the public in so cautious a way. The B.B.C. it appears has promised that no one shall debate political matters unless they are permitted by the Party Whips.

### The Issue.

Many of us believe that the present party machines are useless to cope with our national problems during this time of crisis. It is a tenable point of view, not relevantly debatable here, but certainly one deserving the respect of the broadcasting authorities. Nor was the point of view to be given without the contrast of an opposed opinion.

The issue seems to me to be whether the B.B.C. are not more offending against the spirit of their Charter by taking the point of view that the selection of what political subjects shall or shall not be debated shall be given to the Party Whips.

### Throw Off the Fetters.

If this principle that the B.B.C. hands over its responsibilities to established institutions is admitted, broadcasting becomes merely the instrument to reflect the dull contours of the thing that is, rather than to illuminate the possibilities of what might be.

I say again, as I said at the beginning, that the listener deserves a service of the spoken word which deals in realities. Let us throw off the fetters of tradition and caution and use the most modern of inventions for the dissemination of modern ideas.

Nevertheless, let those of us who have faith, not fear to hear the opposite opinions put as strongly as they can be so that in the end we who listen decide. Broadcasting if properly used overcomes one of the greater difficulties of democratic government because it allows the expert in government immediate contact with those whom he serves.

Nothing in the programmes should be more interesting than discussion of the realities of our position as a nation; nothing is more vital to us all and nothing should surely stand in the way of such discussion.

## SHORTLY CLOSING DOWN

Sheffield—the first relay station in this country—will be closed down when Moorside Edge is in full blast. Here we see the Sheffield control-room.

## WHERE ARE WE GOING?

Watching the operation of a new aircraft direction finder while a test flight over Los Angeles was in progress.

## STATION INFORMATION

**Items about favourite foreigners.**

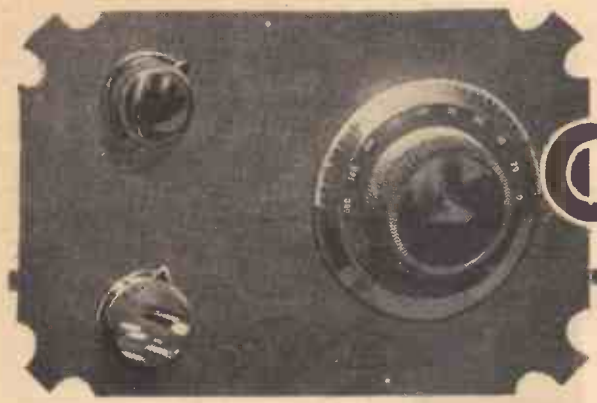
**The interval signal of the Cracow station is an interrupted bugle call which commemorates a heroic sentry who died at his post.**

* * *

**When the British cut the German cables during the Great War, the Konigswusterhausen station was used by Germany to communicate with America, using the call sign L P.**

* * *

**Although listeners know Konigswusterhausen as a broadcasting station, it is chiefly important to the Germans on account of the commercial long-distance radio services centred there.**



# CURIOUS CONDENSER USES

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

**An interesting and practical article in which the use of fixed condensers as "tone adjusters" and in filter circuits is reviewed in a critical and authoritative manner.**

IN earlier crystal circuits a fixed condenser was nearly always connected across the telephone receivers. I think that the main idea was to obtain "mellow" results. Most of the telephone receivers used were high-pitched affairs. They were designed to be high pitched so that they would emphasise average Morse signals.

When it came to music, however hardly any bass at all could be heard, and violins and sopranos had it all their own way. The introduction of a fixed condenser helped to level things up a bit. You see, a fixed condenser will pass low-frequency currents, although the lower the frequency the greater its resistance. On the other hand, as the frequency rises, so the resistance of the fixed condensers decreases.

### The Alternative Path.

I'll give you an example so you will be able clearly to follow what I mean. Supposing we had a fixed condenser of ·2 mfd. capacity connected in such a manner that all the loud-speaker currents in a valve set had to pass through it. The electrical energy representing the note "Middle C" on the piano (frequency 256 cycles) would meet that condenser as a resistance in its path equal to about 3,000 ohms. But the current variation corresponding with a high solo bit on a clarinet, say 4,000 cycles frequency, would consider that ·2 mfd. fixed condenser easy going, for it would then offer only 200 or so ohms of resistance.

Therefore, with a fixed condenser connected across the telephone receivers as in the accompanying diagram, an alternative path is offered to the low-frequency currents. Some part of them will pass through the condenser instead of through the telephone receivers. And the higher the note the more the current that will be diverted from the 'phones.

### Two Megohms.

But it has to be a condenser of fair capacity before it will divert sufficient of the energy to alter the pitch of the reproduction very much. At that Middle C frequency a fixed condenser of ·0003 mfd. will have a resistance of some two million ohms; while even at 4,000 cycles it would divert but one-hundredth or so of the current away from the telephone receivers, and the most critical ear on earth could not detect a difference caused by twenty or thirty times that

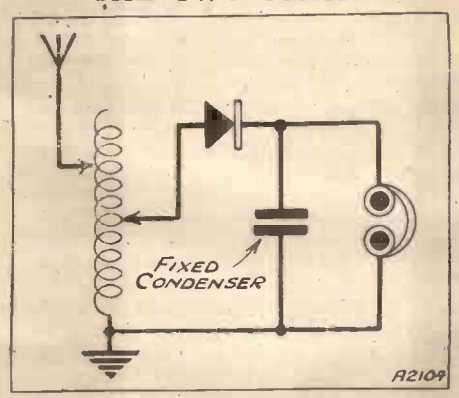
In actual fact, a scientific tone control is absolutely impossible with one fixed condenser connected across loud-speaker or telephone receivers, however carefully you choose its value.

Supposing we were faced with the problem of reducing the "squeakiness" of an old-fashioned horn-type loud-speaker to something approaching modern standards of response.

That loud-speaker might itself alter in resistance (or impedance, as we should more correctly term it when we deal with L.F. currents) with the varying frequencies with which it had to deal, and alter as much as from say, 4,000 ohms at the lower frequencies up to 25,000 at four or five thousand cycles.

To smarten up the results, the first thing to be done is to make the resistance across the loud-speaker terminals as constant as

## THE TWO PATHS




When a fixed condenser is joined across telephone receivers or a loud-speaker, it offers an alternative path to the current that varies in resistance as with its capacity and the frequency of the current.

possible over the whole band of audio-frequencies. Now, as the resistance rises with increases in frequencies, it might be thought that an exactly correct effect would follow the connecting of a device across its terminals whose resistance would fall with the rising frequency.

The trouble is that there is no one device that will do the trick. The only likely one is the fixed condenser, which is, however, a tricky little beast to take at its face value.

Our loud speaker is giving us a resistance ranging from four to twenty-five thousand ohms, going upwards with the frequency; and many might think it would be a simple matter to choose a fixed condenser of such a value that it would contribute an offsetting bypass for the energy ranging from 4,000 ohms at 4,000 cycles down to 25,000 ohms at the low note end of the scale (I have chosen 60 cycles for this).

But what do we find? That a condenser to have a resistance of 25,000 ohms at 60 cycles must be ·1 mfd. in capacity, but that its "resistance" at 4,000 cycles is only 400 ohms, so low that it would absorb practically all the high notes and leave only a soggy, syrupy bass.

I don't suggest that ·1 mfd. gives you the best possible results in the circumstances, I'm just quoting values to prove my point.

### That Ohmic Resistance.

If the loud-speaker were all inductance it would be a different matter. I calculate that a loud-speaker having windings of one-henry inductance would give you a perfect offset to the ·1 mfd. fixed condenser, and would rise in resistance to L.F. currents from about 400 at 60 cycles up to 25,000 ohms at 4,000 cycles, exactly matching the fall from 25,000 ohms at 60 to 400 at 25,000 on the part of the condenser.

The snag is, of course, that the loud-speaker also has ohmic resistance to add to its inductance in the formation of resistance to current variations (impedance).

Of course, you can add resistance to the condenser bypass and even things up a lot; and that is what is done in many tone-control arrangements, although both condenser and resistance should be variable if all the circuit factors are not known and it is impossible to choose specific values.

In the design of many such tone-controls the mistake of having a too limited capacity variation is made, while a widely variable resistance is provided. This is going the wrong way to work. It is the variable condenser that wants to be wider in capacity variation; there is little to be gained in having a very elastic resistance, which, when you think it over, remembering pure resistance doesn't alter with frequency, is obvious, isn't it?

### Complicated Business.

Another mistake often made is to think it is possible to calculate the effective resistances of condensers joined in parallel with resistances, or condensers joined in series with resistances, in the same simple way that you arrive at the results of joining two like resistances in such a manner.

It is not the case, however, and that is another reason why the simple paralleling of fixed condensers across loud-speaker terminals is liable to produce results somewhat different from those anticipated.

*(Continued on next page.)*

## CURIOUS CONDENSER USES

*(Continued from previous page.)*

While the condenser operates as a bypass only, all well and good, but it is liable, in certain conditions, to combine with the electrical characteristics of the speaker windings and have definite reactions on the operating characteristics of the remainder of the circuit in which the loud speaker figures.

### A Simple Calculation.

If, for instance, the loud speaker carried a certain given proportion of the energy in the circuit at a frequency of, say, 500 cycles, it would be because that loud speaker developed a certain opposing resistance. It might be 2,000 ohms.

A condenser of ·15 mfd. has a similar resistance at a similar frequency, but if you joined it across the loud-speaker terminals the result would not be to reduce the resistance across the two points to exactly half, i.e. 1,000 ohms. It is not as easy as that when you work with L.F. currents!

The easiest way I can think of to arrive at the correct results is first of all to take a voltage (any figure will do), divide the separate resistances into it in order, by Ohm's law, to find out what currents they would invariably pass. Then square each of these figures and add together. Take the square root of that and divide this result into your mythical voltage. The answer is the resultant resistance!

### Improve Your Coupled Set.

Before I conclude this article I want to indicate a use for fixed condensers in crystal sets that constructors might like to hear about. A condenser is joined across the telephone receivers, not to alter the tone in any way, but to increase the sensitivity of the circuit. And so a condenser of moderately small value is used.

Suppose we choose one of ·002 mfd. The circuit is as in the diagram on the previous page.

The crystal detector and the telephone receivers constitute a bypass to the high-frequency energy developed in the aerial circuit. The resistance of the crystal detector is very much less for the current that flows in one direction than to that which flows in the other.

It is by virtue of this fact that it rectifies, because to actuate the 'phones you want uni-directional current. Unrectified H.F. current that dashes backwards and forwards developing exactly the same energy in each direction is useless for the purpose.

In its "open" direction, or when it offers the least resistance to H.F., the resistance of the detector will be about 1,500 ohms, or thereabouts. And the resistance offered by the telephone receivers to high-frequency current will be somewhere around about the same figure.

### Fewer Ohms.

But if you join a ·002 mfd. fixed condenser across the 'phones, the resistance here to high-frequency currents of the order met with in broadcasting will drop to less than a mere 100 ohms. Therefore, the total resistance of the detector 'phones bypass is reduced to little above that of the detector itself.

You might think that as the H.F. still flows in both directions (and is much more effective in the one direction) any gain would be off-set by that H.F. which still tends to flow in the "unused" direction. That is not so, because it is not only a matter of Ohm's Law—the crystal has a characteristic curve with a bend in it like the valve—only more so generally!

Now as to L.F. The condenser will not divert the rectified current from the 'phones to any appreciable extent, for its resistance of over 100,000 ohms at "middle" speech frequencies will make the 'phone resistance look quite negligible in comparison.

### Selectivity.

But there is this to be said against the use of a 'phone bypass of this nature, and that is any reduction in H.F. resistance in the detector circuit is likely to decrease the selectivity of the circuit.

Nevertheless, crystal enthusiasts should try the experiment—many will no doubt discover an increase in volume without any appreciable upset in the station-separating qualities of their outfits.

I am referring to possessors of older types of receivers. Many of the more modern circuits achieve an optimum of sensitivity (plus adequate selectivity) through other methods. The "P.W." "Inducto-Crys" is a case in point. In this instance, the increase of volume obtaining when a bypass condenser is used is, for practical purposes, negligible. But I must say that even in this special case there is a showing on a sensitive micro-ammeter.

### Worth Trying.

So if you happen to have a ·002 or a ·001 mfd. fixed condenser on hand, try joining it across the telephone terminals of your crystal set. But don't expect a 50 per cent increase in loudness of music or speech. I wouldn't even advise you to go out of your way to get a condenser, though, on the other hand, I am bound to say a big "kick-up" does result at times, especially when old and simple types of circuits are concerned.

But don't use anything much above ·004 mfd., or you will begin to impose an L.F. drain away from the 'phones, which will weaken the volume and start "tone controlling."

## COFFEE WITH YOUR RADIO MISS?

A scene in an American hotel that is fitted throughout with radio. American broadcasting begins before breakfast.

## SHE GIVES SOLOS ON A SAW

Joan Stonehaven, of Putney, makes music with an ordinary steel saw. Did you hear her broadcast a few weeks ago?

## BROADCAST BREVITIES

**The large 100-kilowatt valves now used for broadcasting stations cost about £500 each.**

* * *

**The Rugby station is the most powerful in the world, employing about 800 k.w.**

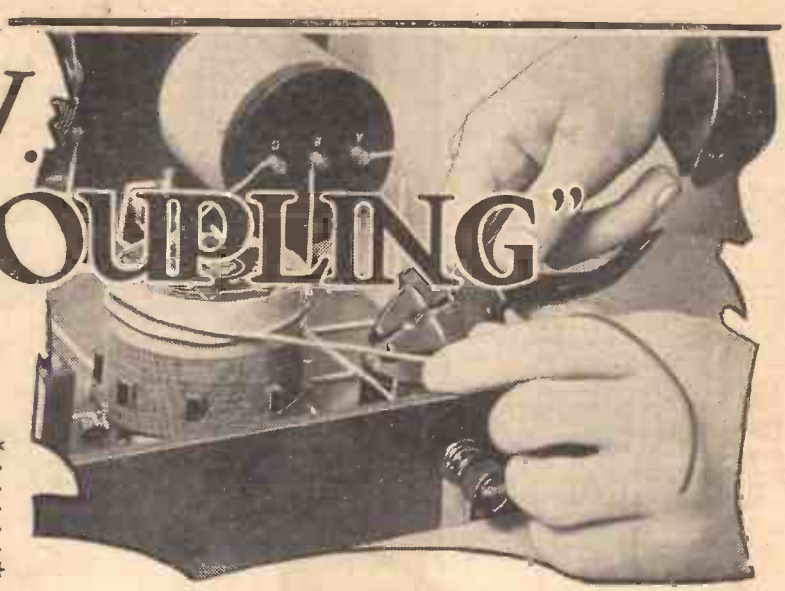
* * *

**Underground cables will be used to connect the North Regional station with Manchester.**

* * *

**Noon in the British Isles is 12 o'clock also in France, Belgium, Algeria, Spain, and Morocco, so time-signals in these countries agree with ours.**

# HOW P.W. "FLEXI-COUPLING" WORKS



**A simple explanation of the fascinating and powerful selectivity, system that has figured in many of "P.W.'s" latest set designs.**

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

FIRST of all, let me tell you why we called it "Flexi-Coupling." It was because the name neatly expresses two of the salient features of the scheme, the first being the fact that a coupling coil made of rubber-covered flex wire is used; and the second that it provides a degree of coupling which is very easily adjusted, and so may be described as flexible, too.

To be sure, there is nothing magical in the use of a bit of flex curled round to form a coupling coil, and any other kind of insulated wire would give just as good results. However, we ourselves found flex wire the best for reasons of convenience, and so we advised it for the job.

Do you understand what that little curled up piece of wire does? Those of you who remember the old inductively-coupled two-circuit tuners will probably guess, but it must look a bit mysterious to everyone else.

This is how it works: The incoming signals from the aerial first pass through that portion of the "Selector" coil which is in use, and then make their way to earth through the "Flexi-Coupling" coil.

### "Different."

In doing so they set up a magnetic field around the latter coil, and thus they generate currents by induction in the main tuned circuit. This last, you will understand, consists of the dual-range coil and the tuning condenser, and when the signals appear here they are detected by the first valve and amplified up by the others in just the usual way.

The fact that the coupling coil which causes the signals to be passed through in this way is so small is significant. It indicates at once that something is going on here which is definitely different from the behaviour of the ordinary aerial coupling schemes.

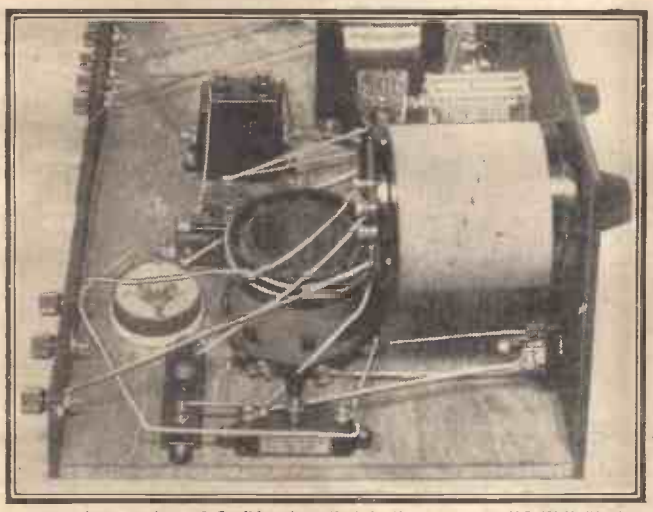
This is pretty obvious, if you imagine what would happen if you coupled the aerial into an ordinary receiver by means of a couple of turns of wire placed loosely round the tuning coil; selectivity would be pretty good, but range and volume would be very poor indeed.

Yet with "Flexi-Coupling" selectivity is still better than it would be with a normal set and similarly weak coupling, and range and volume are actually increased!

### Tuned Aerial Circuit.

Wherein lies the explanation of this seeming impossibility? Simply in the fact that our aerial circuit is now tuned to the wave-length of the station being received. It therefore functions with greatly increased efficiency as compared with the usual untuned or "semi-aperiodic" arrangement.

## A TURN FOR THE BETTER



Just a turn or two of flexible wire—that is the essence of "P.W." Flexi-Coupling—an amazingly simple scheme that really does give wonderful results, as many "Comet" constructors have discovered.

In this way it becomes possible still to get good (and even improved) range and volume in spite of our very weak coupling. The gain in selectivity is evident; not merely is there the fact that we are using very loose coupling, but there is now an additional tuned circuit at work in the set.

At this point the reader who is in such a locality as to be little troubled by the interference problem may begin to wonder whether he could not sacrifice a little selectivity and gain still further in volume by using rather more coupling.

We have suggested from one to three turns of "Flexi-Coupling." Might it not be possible to use five or six and so get even more range and volume in localities where high selectivity is not so necessary? By analogy with the ordinary methods of aerial coupling this should be the case, but are we now dealing with a question of aerial coupling pure and simple?

Unfortunately for the suggestion, we are not. Instead, we are dealing with a question of coupling between two tuned circuits, not between a tuned and a semi-aperiodic circuit.

Now, between two tuned circuits it is not possible to increase the coupling with advantage beyond a certain point. When that point is passed, not merely does selectivity fall off but actual volume and sensitivity suffer as well.

### Independent of Size.

This is quite a well-known property of coupled tuned circuits, but the reasons are rather involved and I'm afraid I cannot go into them in the limits of a short article. Anyway, you can take it for granted that a substantial increase in the degree of "Flexi-Coupling" is not possible without upsetting the general functioning of the circuit, regardless of selectivity.

Another interesting point is that the amount of coupling required for best results has very little to do with the size of your aerial. It is almost entirely a question of the amount of selectivity you need, i.e. how far away you are from your local station.

Naturally, aerial size has something to do with the matter, because with a large one you can afford to cut the coupling right down and sacrifice a little of the possible volume in the interests of absolutely super-selectivity if you wish. The effect is now an indirect one, however, and it is definitely different from the state of affairs existing with ordinary "semi-aperiodic" aerial systems.

Lastly, let me give you a little practical hint. It is this: when you have tried out your "Flexi-Coupled" set, just see whether the *direction* in which you curl the flex lead round your dual-range coil has anything to do with your results.

# THE POSTPONED PLAY

**A word in season about the B.B.C.'s recent substitution of "Red Tabs" for "Krassin Saves Italia."**

**BY THE EDITOR.**

FOLLOWING right on the heels, so to speak, of the charge brought against the B.B.C. by a morning newspaper—to the effect that the B.B.C. was biased in favour of Socialism and "Red" propaganda—the sudden indefinite postponement of the play, "Krassin Saves Italia," provided a piquant sequel.

No doubt many listeners wondered what the real reason was for the B.B.C.'s last-minute decision not to broadcast the play; and no doubt many "P.W." readers put two and two together and drew their own conclusions, especially in view of the recent attempt in the House of Lords to sustain the charge of Socialistic bias against the B.B.C.

### Was It "Wind Up"?

There is no doubt that this particular play, if broadcast, would have given some colour to the charge—that is, in the eyes of those who are silly enough to believe the B.B.C. has any sort of political bias: but, nevertheless, we feel it is a pity the B.B.C. postponed the play. It looks as though the chiefs at Savoy Hill "got the wind up," and in withdrawing the play they lay themselves open to the charge of being scared of an attack which their own consciences should have told them was unfounded.

It would have been more in keeping with the dignity of British broadcasting if Sir John Reith had decided to let the play be broadcast on its merit as an artistic production, and not to have allowed the public to jump to the conclusion that the B.B.C. had been in any way intimidated or scared.

It has been said that "Krassin Saves Italia" is an air epic full of Red propaganda—but if that be so the censor's department at Savoy Hill could have excised any offending passages.

The B.B.C. made matters worse by refusing to issue any official explanation for the postponement of the play—thus adding fuel to the fires of controversy concerning the B.B.C.'s political bias.

### Storm in a Teacup.

It is all very stupid—what our grandmothers would call a storm in a teacup.

We understand that the decision to abandon the broadcast was made only two days before the date of production. The actors were notified that the performance would not be taking place, and were asked to return their scripts.

The play is the work of Friedrich Wolf, and has been translated by Susan Behn and Mr. Cecil Lewis, the producer. It tells the story of Nobile's ill-fated expedition to the Arctic in the airship Italia, from which the crew were rescued by the Russian ice-breaker Krassin. It has been described as "a new kind of radio play, a drama of actual and recent events."

The scene which has apparently given rise to the suggestion that the play contains pro-Russian propaganda occurs when a number of Russian workers are heard arguing whether it is right to spend money on sending out a rescue party when their fellow countrymen are starving.

The dialogue at this point is as follows:

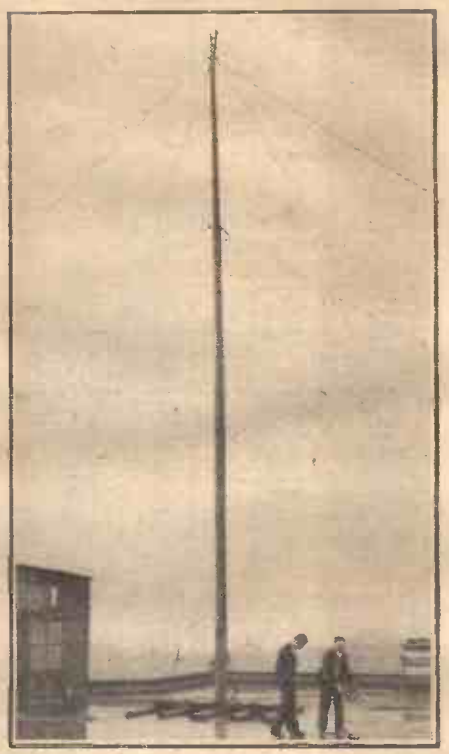
MESKIN: Comrades, it is more important that our fish exports should increase, that we should be able to transport corn to the harbours of the Murman coast. It is more important to build up new towns, new cities for our people to live in, to expand the great foundations of our system.

VOICES: Bravo, Meskin! He's right! Meskin is right!

It is then objected that while peasants are starving, it is wrong to send out a relief expedition.

PETROV: True, we need bread; but even more we need our flag.

## THE AIR-FORCE AERIAL



Officials of the Air Force are here shown examining the damage done by a storm to the Air Ministry mast in Kingsway, London. Note the split at the top of the mast.

VOICES: Bravo, Petrov! Up with the flag of the Soviets. U.S.S.R. for ever.

PETROV: And what is our flag, comrades? Just a bit of red cotton? Just a political program? No. I tell you the Malygin is our flag at this moment. It is flying in the eyes of the world for the working classes of the world to see! We must keep it up. Blown wide on the great wind of United opinion. (Cheers.) I propose the following resolution: The workmen of the Putilov Iron works approve of the sending of the Malygin to rescue the crew of the Italia. They salute the crew of the Italia in the name of the solidarity of the working classes the world over.

It is stated that the play ends with the singing of "The Red Flag" and the Italian National Anthem.

If the above was considered Red propaganda it could very easily have been toned down, without injury to the basic theme of the play. However, Mr. Lewis has thought fit to explain matters in a letter to the "Times." The gist of his explanation may be given in the following extracts.

According to Mr. Lewis the facts are these:

### Everything is Controversial.

"A German radio play, performed with success from many European stations, submitted to the B.B.C., passed by them some months ago, is stopped, when in full rehearsal, two days before production. The play deals with the rescue of the lost crew of the airship Italia, wrecked in the Polar Seas in 1928. The facts of that rescue form the subject of an article in this week's 'Radio Times,' and I need not outline them here. The significant point is that Fascist Italy was saved by Soviet Russia. And the play dramatises this incident with scrupulous fairness and impartiality. Applied science is the hero, and the unity of all peoples, under the stress of emergency, the moral.

"I am an author and producer, frankly uninterested in politics generally, and only concerned with art as an instrument to enrich and ennoble life. Yet, if art is alive, if it is to stimulate people to thought and self-criticism, it must necessarily impinge upon current opinion and consequently upon current politics. And that is why, since the aims of the B.B.C. are mainly educative and artistic, it is necessary to examine this political veto on artistic effort.

"Now, everything is controversial. Birth control is heresy to the Catholic and Communism to the Conservative, the Wagnerites cannot abide Bach, nor the pre-Raphaelites Cezanne, and so on throughout the whole range of subjects, large or small, in which any community takes an interest. If your job is holding a balance, you can keep the pointer steady by putting nothing in either scale (and many would assert that this is what the B.B.C. is engaged in doing), but you can also keep it steady by putting a ton in either scale.

### A Question of Trust.

"This is what the B.B.C. must do, if it is to discharge its function as a public service. But it cannot do this unless its independence is assured and its integrity respected. I would ask any who may take part in these discussions to bear this in mind in the interests of the nation."

Mr. Lewis' last paragraph is pregnant with importance. The whole point of the controversy about the conduct of the B.B.C. turns on whether the public can trust the integrity of the B.B.C., and whether, in consequence its independence can be guaranteed.

And we venture to think that public opinion is definitely of the view that the B.B.C.'s integrity is above suspicion and that its full independence should be guaranteed.

We can only hope that these hysterical charges will not be made again.

# CAPT. ECKERSLEY'S QUERY CORNER

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

CUTTING OUT MORSE INTERFERENCE—VOLTAGE OUTPUT FROM RECTIFIER—WHO WHISTLED?

**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.**

### Cutting Out Morse Interference.

M. S. T. (Eastbourne).—"I am having a lot of trouble with Morse interference on my Det. and 2 L.F. receiver, and although I have tried wave-traps and rejectors, so far I have been unable to eliminate this trouble. Can you tell me whether there is any method of cutting out this interference from ships?"

I doubt whether, living in Eastbourne, you will ever completely eliminate Morse interference when receiving the medium-wave stations from 300–500 metres. I think you should be perfectly able, however, to cut out all but very little interference when listening to the longer-wave stations.

It may be that the fitting of a coupled circuit would considerably improve matters, on the other hand you may have a local spark station which is the cause of considerable interference which cannot be cut out. If I were you I should write to the B.B.C., who have a full knowledge of the spark stations round the coast, and might be able to help you more categorically than I can.

I do think, however, that unless you have a very powerful local spark station, you should be able to receive the long waves, Daventry, Radio Paris, etc., etc., provided you use a coupled circuit.

* * *

### Voltage Output from Rectifier.

B. G. (Highgate).—"I have a transformer intended for an H.T. eliminator. The secondary side has an H.T. secondary centre tapped and an L.T. secondary centre tapped.

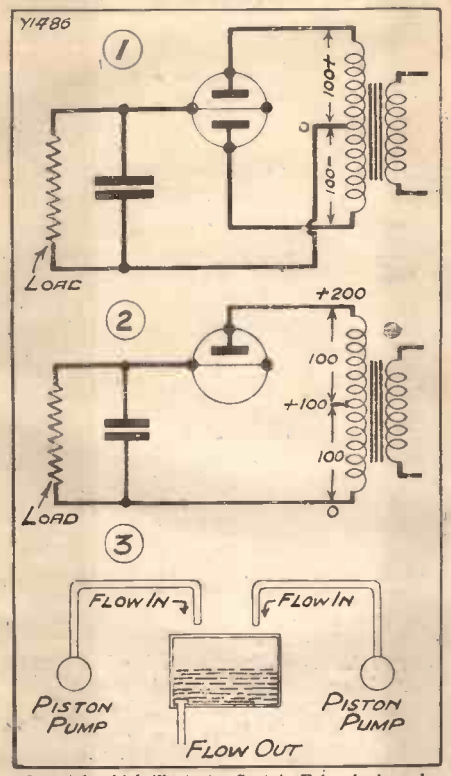
"Which of the two following schemes will give me the greatest output? A full-wave rectifying valve connected in the conventional manner to this transformer, or a full-wave valve with the plates connected together, and the whole of the H.T. secondary used for half-wave output.

"When referring to output I really mean the highest *voltage* output."

Obviously the high tension will be greater with the single-wave than with the double-wave rectifier.

I have drawn two diagrams assuming that the transformer has voltages as shown. Obviously twice the voltage is given with the single-wave rectifier than with the double-wave rectifier, as you propose to connect them.

If you are connecting a given load, then the single-wave rectifier will require more emission from the valve than the double-wave rectifier, simply because current taken by the load will be doubled if the




A sketch which illustrates Captain Eckersley's reply to B. G., Highgate, on the subject of rectifier output.

volts are doubled. (This, of course, is not quite right owing to other considerations, but I am talking of the simple theory.)

A very simple way to look at rectification is to consider a pump gulching water into a tank. Thus, the "flow in" on my diagram comes in gulches from the pump, which is a piston pump and not a rotary pump.

You want to maintain even flow from the "flow out," and have, therefore, got to make the "flow out" so restricted that the water keeps up to a steady level. Thus, never ask the rectifier to feed out more than is fed in.

If you do the level in the tank will be always surging up and down, giving surging "flow out" (or in electrical practise, a hum). You could either make two flow-ins as shown, squirting alternately smaller gulches, or one single flow-in squirting much larger gulches.

That is the difference between single-wave and double-wave rectification. There is no difference between the two provided there is sufficient flow-in in each case and, of course, a sufficiently large tank which is the condenser.

The pressure is always constant provided the flow-in is sufficient to cope with the flow-out.

I hope this answer is clear.

* * *

### Who Whistled?

C. M. (Bournemouth).—"I was a Naval wireless operator during the war, and I remember that at that time operators were keenly interested in mysterious 'whistling' noises which were often observed while 'listening-in' on the comparatively simple apparatus then in use. I have long since ceased to take more than a 'broadcasting' interest in wireless, but it occurred to me recently that broadcast reception is now never accompanied by these mysterious 'whistles.'

"Can I take it from this circumstance that the 'whistles' were, after all, due to human agency and that their cessation was concurrent with the cessation of hostilities? I think more readers of 'P.W.' than myself will be interested in this matter."

No, the ether still whistles, and no gay belligerent was responsible for these sounds. Commercial wireless sets are used and were a decade ago more widely used, both on longer waves and at greater sensitivity.

The "whistle" is a form of atmospheric, and can still be picked up when the receiving set is tuned to a very long wave and is made sufficiently sensitive. The conditions of the atmospheric maybe have to be right—that I do not know—but I can assure you, and the readers of "P.W.," that it is not a matter of human agency, malign or benign!

## FROM THE TECHNICAL EDITOR'S NOTE BOOK.

# Tested and Found—?

### AN APPROVED "P.W." COIL.

ARTHUR PREEN and Co., Ltd., might be rather late in the season with their version of the "P.W." and "M.W" Dual-Range Coil, but they have made a most satisfactory job of it.

Indeed, I cannot help expressing a sincere regret that this "Formo" wasn't


A fine moulding comprises the foundation of this coil.

available as an alternative to the all-too-few other really dependable makes in existence four or five months ago.

The Formo is built on a fine moulding, which is so designed as to cope with any slight alterations that might in future be made.

We have, of course, tested several samples and have no hesitation whatever in giving them our complete approval.

### THE LAMPLUGH LOUD SPEAKER.

Round about the end of January there was a report on this page concerning the Lamplugh Inductor loud speaker, but since the particular model I reviewed was manufactured, Lamplughs have made several improvements in their very excellent accessory.

It is now even more sensitive, while its winding has been given a greater impedance range. Its response is of the highest order, and I advise all "P.W." readers who are thinking of buying a loud speaker to make a point of hearing it, even if they have to go a little out of their way to do so.

### AN INTERESTING SHORT-WAVE KIT.

I would like to devote more space than I shall be able to on this page to the Hammarlund two-valve kit short-waver sent me by the Rothermel Corporation, Ltd. It is a distinctly interesting design and short-wave enthusiasts should write for descriptive details of it.

It is being sold by the Rothermel Corporation, Ltd., in complete kits, all ready for assembly. The component parts are of good quality and they make up into a good-looking, easily handled, and efficient outfit.

The circuit is a simple, straightforward one and comprises a detector and a transformer-coupled L.F. stage. There is a variable grid condenser, throttle reaction control and loose-coupled aerial. The variable condenser provides drum-dial calibration through an artistic illuminated escutcheon.

We made the sample kit up and gave it a thorough testing, the result being first class. There was no trace of threshold howl, and with the smooth reaction control and silky tuning, it was easy properly to bring in the weakest of the receivable stations.

### PERTRIX SUPER-LIFE ACCUMULATOR.

There are some particularly attractive features about the latest type of Pertrix accumulator, the P.A.C.2. I like particularly its attractive carrier, a simple, but completely effective handle that is permanently fixed to the solid glass case. This handle clips down out of the way when not required.

And there is no mistaking the polarity of the terminals, for not only are they brightly coloured with the appropriate tints, but large + and — signs are moulded on them. The screws also are of different threads, so that the terminals cannot be changed over in error.

Another eminently practical feature in regard to terminals is the provision of a grease trap to eliminate corrosion.

There are no separators in this Pertrix accumulator, the plates being rigidly kept in position by special mouldings in the glass case itself, but there is a little red ball which provides immediate visual indication when the battery requires recharging.

The plates are thick and substantial and, indeed, the whole cell is constructed on robust lines. The P.A.C.2 has a 32 ampere capacity at a 100 hour rate (that is with about a third of an amp. discharge). The price is 8s. 6d., and it certainly does seem to be a very worth-while proposition.

### THE R.I. G.P. TRANSFORMER.

Radio Instruments, Ltd., are now manufacturing a general-purpose transformer for sale at 10s. 6d. It is an excellent transformer, as you will be able to judge from the following characteristics. It has a ratio of 1 to 3½, and a primary winding inductance of 35 to 40 henries. It can handle up to 5 milliamps without saturation.

It is built into a cleanly moulded bakelite case, and it is undoubtedly an L.F. transformer that will be very widely used. Coming as it does from a firm with the repute of R.I., constructors will know it is reliable, while its openly published technical characteristics indicate that it quite reaches a standard to do full justice to any average hook-up.

It is debatable whether any real advantage would be obtained by using anything superior in any ordinary set, although I must add that there are not such a great number of L.F. transformers at any price that are better.

**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.**

### THE CLAROSTAT BOOK.

One of the most interesting radio catalogues that has joined my incoming mail is the ClarOstat book published by Claude Lyons, Ltd., of Liverpool. It comprises 48 pages of interesting descriptive matter concerning distinctive American radio apparatus of the highest possible class, and very attractively priced.

### ANOTHER FREE BLUE PRINT.

A booklet and blue print describing the Ridley "Fireside" Three receiver are being distributed gratis by Cecil Ridley, of Radio House, Middlesbrough.

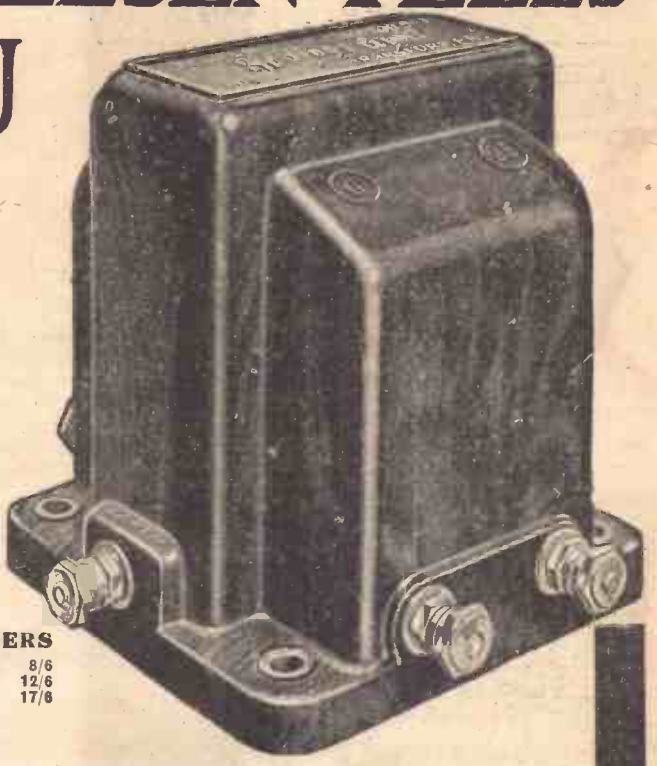
This is the R.I. G.P. Transformer.

# WHAT THE MIKE TELLS TO TELSEN-TELSEN TELLS TO YOU


**Telsen Four-Pin Valve Holders**
Price 1/- each.


**Telsen Five-Pin Valve Holders.** Price 1/3 each.

**Telsen Valve Holders.** Pro. Pat. No. 20286/30. An entirely new design in Valve Holders, embodying patent metal spring contacts, which are designed to provide the most efficient contact with the valve legs, whether split or non-split. Low capacity, self locating, supplied with patent soldering tags and hexagon terminal nuts.



**TELSEN L.F. TRANSFORMERS**

| | | |
|---|---|---|
| **"ACE"** - - - | Ratios 3-1 & 5-1 | 8/6 |
| **"RADIOGRAND"** - - | 3-1 & 5-1 | 12/6 |
| **"RADIOGRAND"** - | Super Ratio 7-1 | 17/6 |


**Telsen H.F. Chokes.** Designed to cover the whole waveband range from 18 to 4,000 metres, extremely low self-capacity, shrouded in genuine bakelite. Inductance, 150,000 microhenries; resistance, 400 ohms. Price 2/6 each.


**Telsen Grid Leaks.** Absolutely silent and non-microphonic, practically unbreakable, cannot be burnt out, and are unaffected by atmospheric changes. Not being wire wound, there are no capacity effects. Made in capacities: ¼, ½, 1, 2, 3, 4, and 5 megohms. Price 1/- each.


**Telsen Fixed (Mica) Condensers.** Shrouded in genuine bakelite, made in capacities up to ·002 mfd. Pro. Pat. No. 20287/30. ·0003 supplied complete with patent grid-leak clips, to facilitate series or parallel connection. Can be mounted upright or flat. Tested on 500 volts.
Price 1/- each.

**TELSEN Components pass on to you the full perfection of the original—no need to test them—you can rely on the guarantee which is in the name TELSEN... As you construct your set you know of at least six points of possible weakness which are safeguarded by TELSEN... As you switch on the receiver for the first thrilling test of the completed instrument there is no need to strain forward and 'listen'—you lean back and 'hear'... Fit TELSEN Components and safeguard the Key positions of your new set...**

**TELSEN COMPONENTS**

Popular Wireless, April 4th, 1931.

# THE "COMET" FOUR

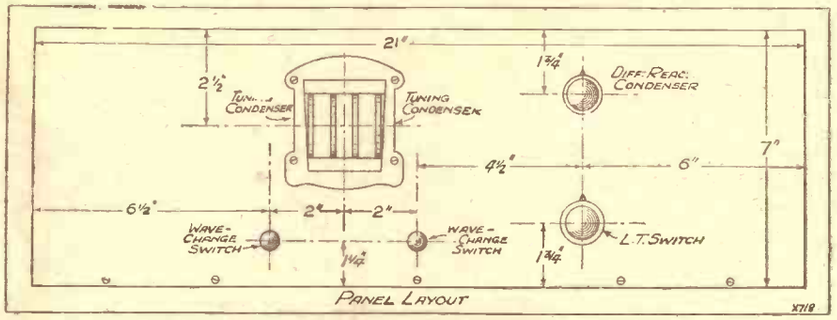
Here is the "Comet" blazing even brighter than ever. This week we are presenting the Four-valve version of this famous set; a receiver that will surprise you with its wonderful reaching powers.

"P. W.'s" Famous "Comet" is getting still brighter. The "Comet" Four has arrived, more brilliant even than the Three—if this be possible.

The "Three" is an ideal household receiver, and with the numerous refinements that could be added to it, made a de luxe set of which any radio enthusiast might well be proud. But, there is always a certain percentage of our readers who do not find a "Three"—however magnificent its results—really up to their requirements.

They need an H.F. stage, either in order to enable them to overcome some unfortunate inferiority in local condition (such as a dud aerial, poor earth system, or bad local screening), or else they feel they must have the last word in "DX" receivers, and, after all, you expect more long-distance punch from a Four than a Three, don't you?

## A REAL DISTANCE SMASHER



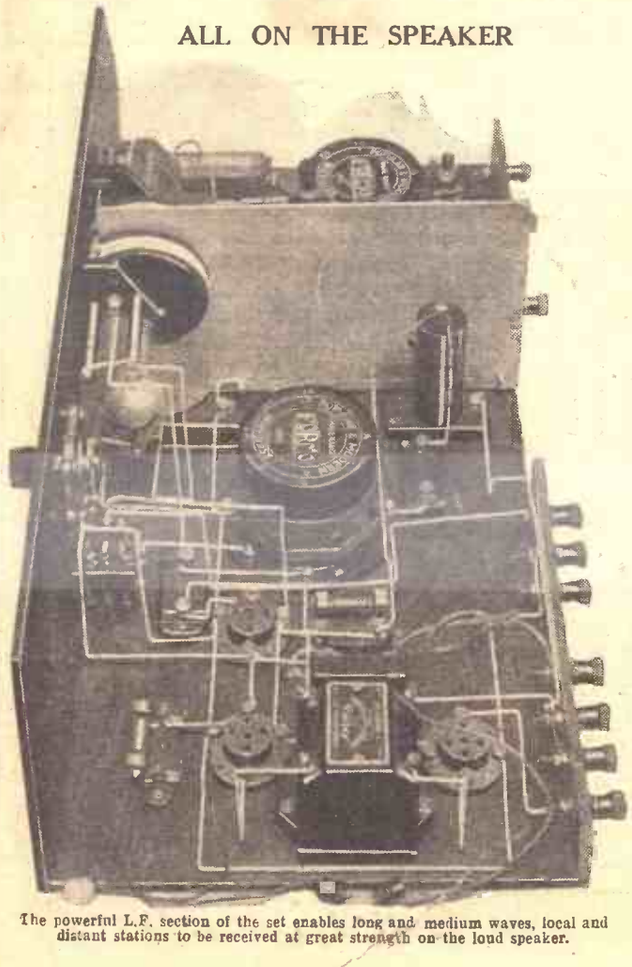

Easy drum-driven tuning makes the foreigners flock in to your loud speaker.

### For the Connoisseur.

And so the "Comet" Four was designed specially to suit what we may call the long-distance connoisseur. And in accordance with our recent practice, we have kept some little refinements up our sleeve. These will be described next week, and can be added to the receiver as described here without any trouble.

On the other hand, should any of our readers wish to build the "Foundation" model only the refinements can be omitted in the sure knowledge that nothing *essential* for really high-class results has been omitted, and that the refinements can be added at any later date if desired.

## ALL ON THE SPEAKER



The powerful L.F. section of the set enables long and medium waves, local and distant stations to be received at great strength on the loud speaker.

The circuit is based, naturally enough, on the "P.W." dual-range coil, and two of these are employed in the construction of the set. One S.G. H.F. stage is used and the detector is followed by one resistance-capacity, and one transformer-coupled L.F. stage.

"Brookmans" coupling is employed for each tuned circuit on the long waves, and in the case of the first circuit is variable by means of the compression-type ·002-mfd. condenser.

Selectivity is also controllable by means of the ·001-mfd. series condenser in the aerial circuit. Wave-changing is carried out in the usual manner, by means of three-contact wave-change switches. When the medium band is required these two switches are pulled "out" thus enabling the plunger portion to short the three contacts. This, as you can see, joins $S_2$ and $S_3$ on the coils together (paralleling the grid windings), and takes $S_1$ direct to earth, short circuiting the Brookmans coupling condenser in each case.

### Very Simple Switching.

When the switches are placed "in" (long-wave position) the three contacts are separated. In each tuned circuit $S_1$ now goes to the junction between the tuning condenser and the ·002 condenser, while $S_2$ is no longer in parallel with $S_3$, but is out of circuit.

We thus see that each of the three contacts of the switch does its job, and we have stressed the point because so many constructors do not seem to realise the necessity of getting the correct type of switch. Very often we have it brought to our notice that a three-contact switch of the "change-over" type is being used and results are not satisfactory.

Of course they are not; in a "change-over" switch of the push-pull type you have three contacts right enough, but they are so arranged that two of the three are in contact *all the time*. The "centre" or "common" contact makes connection either with one or the other of the "outside" ones, and in no position of the switch do the three completely separate or come together.

For the "P.W." dual-coil system of wave-changing you must have a "wave-change" switch—one that has three contacts

## WHAT IS IN THE "COMET" FOUR?

1 Panel, 21 in. × 7 in. (Goltone, or Lissen, Peto-Scott, etc.).
1 Cabinet with baseboard, 10 ins. deep, to fit (Pickett, or Camco, Gilbert, Lock, Osborn, etc.).
2 ·0005-mfd. drum condensers with double escutcheon, or similar double-drum control assembly (Polar, Ideal, or J.B., Cyldon, Lotus, etc.).
1 ·0001-mfd. (or larger up to ·0002) differential reaction condenser (Ready Radio, or J.B., Lotus, Igranic, Ormond, Lissen, Dubilier, Formo, Parex, etc.).
2 3-point wave-change switches (Bulgin, or W.B., Ready Radio, Wearite, Keystone, Magnum, Red Diamond, Ormond, etc.).
1 3-pole change-over switch (see text) (Wearite).
2 P.W. dual-range coils (Formo, or Ready Radio, Wearite, R.I., Keystone, Goltone, Magnum, Tunewell, Parex, etc.).
4 Valve-holders (Telsen, or Lotus, Clix, W.B., Igranic, Benjamin, Dario, Lissen, Formo, Magnum, Wearite, Bulgin, etc.).
1 H.F. choke (Lewcos, Keystone, Telsen, R.I., Ready Radio, Varley, Dubilier, Lissen, Lotus, Wearite, Parex, Magnum, Watmel, etc.).
1 ·001-mfd. max. compression-type condenser (R.I., or Lewcos, Polar, Formo, Lissen, etc.).
1 ·002-mfd. max. compression-type condenser (Formo, etc.).
1 ·0003-mfd. fixed condenser (Dubilier, [illegible] Telsen, Ready Radio, Ediswan, Lissen, Ferranti, Graham-Farish, T.C.C., Mullard, Watmel, Formo, etc.).
1 ·002-mfd. fixed cond. (Lissen, etc.).
2 ·01-mfd. fixed condensers (Lissen, and T.C.C., etc.).
1 ·001-mfd. fixed cond. (Lissen, etc.).
1 1-mfd. fixed condenser (Dubilier, or Lissen, T.C.C., Mullard, Formo, Hydra, etc.).
1 1-meg. grid leak and holder (Lissen, etc.).
1 600- or 500-ohm. resistance and holder (Ready Radio, or Parex, Bulgin, Wearite, Keystone, Magnum, etc.).
1 2-meg. grid leak and holder (Lissen, or Graham-Farish, Ferranti, Dubilier, Ediswan, Igranic, Telsen, Mullard, etc.).
1 L.F. transformer (Varley, or Ferranti, Telsen, R.I., Lissen, Lewcos, Igranic, Lotus, Mullard, etc.).
1 10,000-ohm spaghetti resistance (Ready Radio, or Lewcos, Bulgin, Keystone, Sovereign, Graham-Farish, etc.).
1 50,000-ohm spaghetti resistance (Ready Radio, etc.).
1 Screen, 10 in. × 6 in. (Keystone, or Parex, Ready Radio, Magnum, Wearite, etc.).
1 Terminal strip, 9 in. × 2 in.
1 Terminal strip, 7 in. × 2 in.
10 Terminals (Igranic, or Belling & Lee, Eelex, Clix, etc.).
Flex, Glazite, screws, etc.

that can *all* be separated, or all *made* at the same time.

You will probably have noticed by now that the anode-resistance in the detector circuit is of an unusually low value. This is for a definite reason. Although a very much higher resistance (say 250,000 ohms) might give slightly more amplification to the stage, it would definitely reduce the effectiveness of the reaction. And a little more magnification with unsatisfactory reaction is not a combination of events we require.

### Drilling the Panel.

Magnification is no good without reaction in a circuit of this type, so we made sure of our reaction by using a 50,000-ohm resistance. This does not cut the magnification down a noticeable amount simply because of this increased reaction efficiency, and the net result is really first-class distance-getting powers.

Now for the actual construction of the set. The "Comet" Four is no more difficult to build than its predecessors, the "Three" and the "Two." There are more components and more connections to make, of course, but everything is quite straightforward if you go about it the right way. Get all the components together first, before commencing the mounting on panel or baseboard.

The panel drilling is carried out in accordance with the layout given in the panel diagram. This, by the way, shows the *front* of panel, and as it is best to work a drill from the back, you must not forget to "reverse" the dimensions given. Thus the differential reaction condenser will be six inches in from the *left* and not the right as it is when you look at the front of the panel.

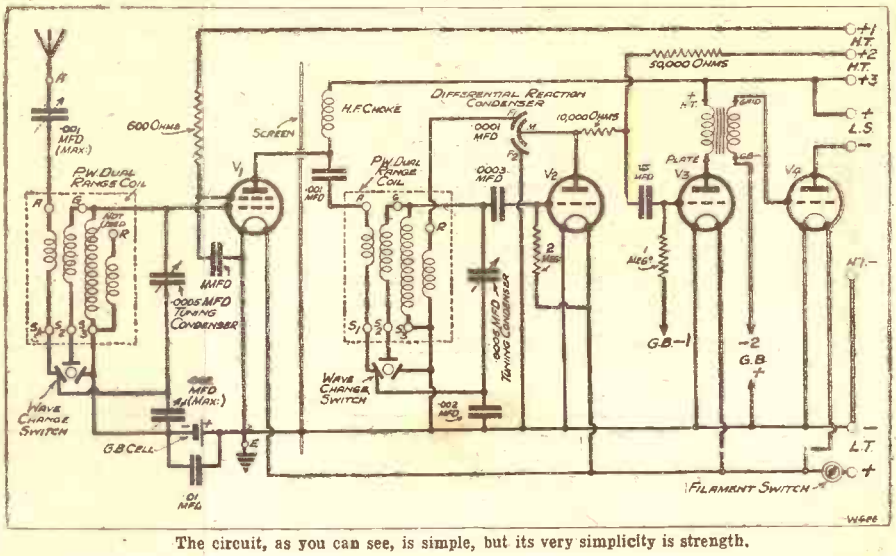
### Layout of the Baseboard.

The drum condenser is the most tricky component to mount. The hole in the panel for the escutcheon plate and the projecting drums is best made by using the escutcheon as a template and cutting out the required area by means of a fret-saw. It *can* be drilled out, by means of drilling a series of holes round and then filing the edge into shape, but the fret-saw process is by far the better of the two. But this condenser should be placed in position right at the last, for the reason we shall give later.

After the panel comes the baseboard layout, the screen being left till last, to

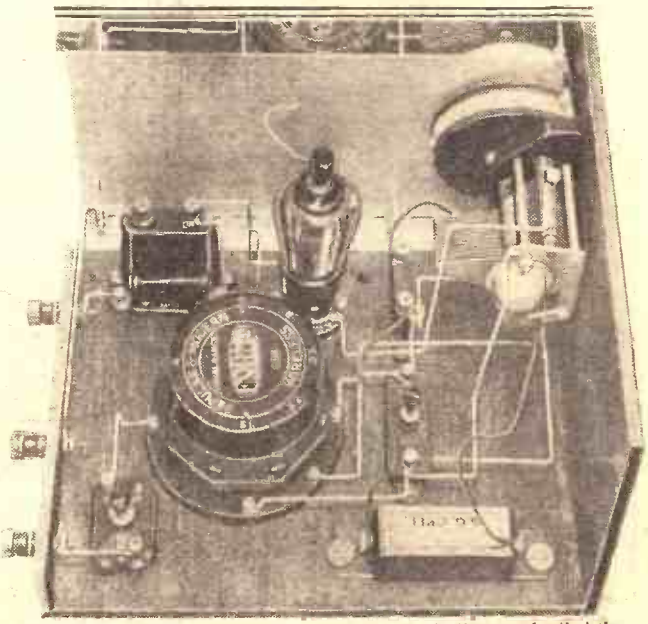
(*Continued on next page.*)

## PLENTY OF POWERFUL PROGRAMMES




The circuit, as you can see, is simple, but its very simplicity is strength.

## PICKING OUT THE PROGRAMMES



The H.F. stage sorts out the programmes and boosts them up so that they come clear and strong to the detector valve.

## ENGTH

## THE "COMET" FOUR

(*Continued from previous page.*)

facilitate the placing of the screws in such components as the H.F. valve holder, fixed condensers near the screen, and the H.F. choke. And in the mounting of all the components don't forget that you may want to add the refinements to be described next week, so keep strictly to the layout given, or you may not be able to get the extras in when the time comes.

**The On-Off Switch.**

We said just now that the tuning condenser should be mounted last. This is because unless you leave this until you have all else mounted except the screen, and the three leads to each of the wave-change switches in position, you will find it difficult to connect up these switches. So do these first of all, after you have finished the baseboard layout.

Then mount the variable condenser, and finally fit the screen in position, its edge nearest the panel going between the two drums of the dual condenser. If this latter has a metal panel plate, this should be earthed only if it is *not* connected anywhere to the moving vanes. If it does make contact with the moving vanes then leave it alone. It must not make contact with *both* sets of vanes. (With certain condensers it will be necessary to cut the screen a little. This is easily done with a fretsaw or hacksaw.)

Follow the wiring as carefully as possible and try to get it exactly like that in the original set shown in the photographs and wiring diagram. The special connectors on the switch (of which more in the next paragraph) can be obtained with the switch, and obviate the need for soldering. The whole of the set, of course, can be built without recourse to the soldering iron.

Now about the switch. It looks a complicated affair for a mere on-off control doesn't it? And if it were intended, merely as that it would *be* a complicated affair; but we must not forget the future. Next week many are going to add the refinements we have referred to previously. All those contacts will be needed then.

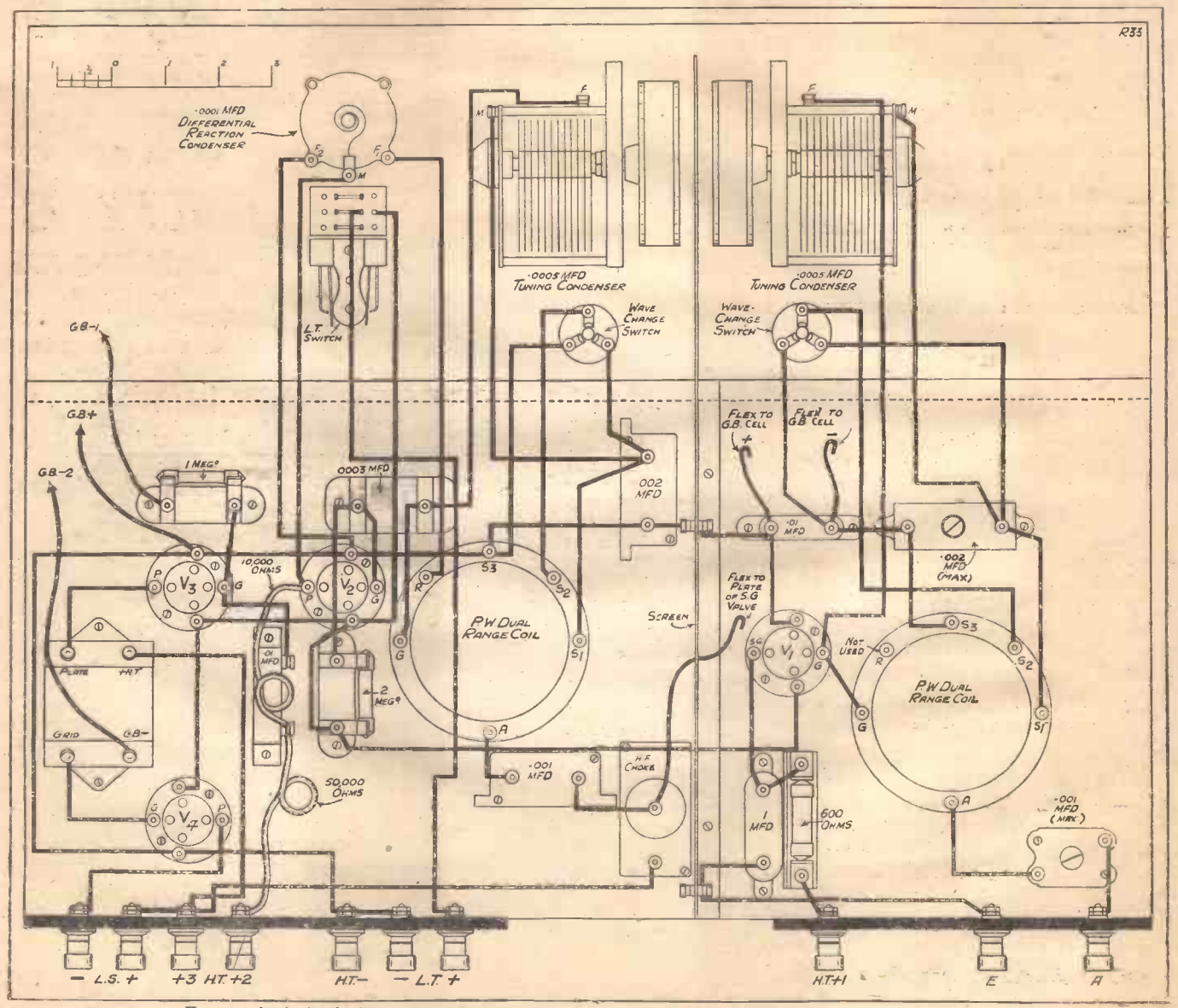
But *you* may not be going to add anything to the set. If this is the case and you are confident you *never* will want to use the set as a radiogram receiver (now we have let one cat out of the bag, haven't we?) then you could use any kind of convenient on-off switch. But if you are not quite sure, then don't risk possible future disappointment by getting the wrong sort of switch.

**Valves to Use.**

The operation of the set is simple. Valves required are the usual types: 2-, 4-, or 6-volters, an S.G. for the first stage, ordinary H.F. or special detector for the second, a "small L.F." valve for the third, and a power or super-power for the output. The super-power valve will need a "super" H.T. battery, of course, unless you are going to use a good mains unit, but such a valve will be necessary if you want to handle very loud results from the local stations. In this event the L.F. valves should be of the Mazda L.210, P.M.1 L.F., Cossor 210 L.F.,

(*Continued on page* 120.)

## EASY TO BUILD—EASY TO OPERATE




Keep as closely to the layout as shown here, as you possibly can, and you will be sure of superb results.

# TERMS TO SUIT ALL

## Build your COMET with the CHOSEN COMPONENTS

**THE "COMET" THREE (Foundation Circuit)**

**KIT A** . . . . . £4 5 0
Or 12 monthly payments of 7/9.
(Complete Kit of Components, as specified.)

**KIT B** . . . . . £5 12 6
Or 12 monthly payments of 10/4.
(As Kit A, with set of Mullard valves.)

**KIT C** . . . . . £7 2 6
Or 12 monthly payments of 13/-.
(As Kit B, with attractive oak cabinet.)

**Additional Components for L.F. CONTROL.**

£1.10.10. (If ordered with any of the Kits, add 2/9 per month to the monthly payments.)

**FLEXI-COUPLED "COMET" THREE**

**KIT A** . . . . . £5 3 3
Or 12 monthly payments of 9/5.
(Complete Kit of Components, as specified.)

**KIT B** . . . . . £6 10 9
Or 12 monthly payments of 12/-.
(As Kit A, with set of Mullard valves.)

**KIT C** . . . . . £8 0 9
Or 12 monthly payments of 14/8.
(As Kit B, with attractive oak cabinet.)

**Completely Assembled FLEXI-COUPLED "COMET" THREE**

Ready for use, aerial tested, valves, cabinet and royalties included. £9.5.9, or 12 monthly payments of 17/-.

**Additional Components for "COMET" RADIO-GRAMOPHONE**

13/6. If ordered with any of the Kits, add 1/3 per month to the monthly payments.

**"MAGIC" THREE CONVERSION KIT**
**£1 8 9**

**"COMET" TWO**

**KIT A** . . . . . £3 2 6
Or 12 monthly payments of 5/8.
(Complete Kit of Components, as specified.)

**KIT B** . . . . . £4 1 6
Or 12 monthly payments of 7/6.
(As Kit A, with set of Mullard valves.)

**KIT C** . . . . . £5 1 6
Or 12 monthly payments of 9/3.
(As Kit B, with attractive oak cabinet.)

**Components for completing the "COMET" TWO**

16/-. If ordered with the "Comet" Two Kit, add 1/6 per month to the monthly payments.

**"COMET" H.F. UNIT.**

**KIT A** . . . . . £3 8 6
Or 12 monthly payments of 6/3.
(Complete Kit of Components, as specified.)

**KIT B** . . . . . £4 8 6
Or 12 monthly payments of 8/-.
(As Kit A, with specified valve.)

**KIT C** . . . . . £5 3 6
Or 12 monthly payments of 9/6.
(As Kit B, with attractive oak cabinet.)

**THE "COMET" A.C. SAFE-POWER UNIT**

**Complete Kit of Components £5 3 0**
Or 12 monthly payments of 9/6.

**Any part may be purchased separately.**

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

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

**IMMEDIATE DISPATCH**

Order your Kit of Components now. If it is not convenient to send cash with order you can pay on delivery—it costs you no more. Or, if you wish, send a small payment with your order and pay the balance by easy monthly instalments. Ready Radio Terms suit all pockets.

**CASH** with order —or— **E.P.** (Easy monthly payments) —or— **C.O.D.** (Pay on delivery)

## THE "COMET" FOUR

| | £ | s. | d. |
|---|---|---|---|
| 1 Ebonite panel, drilled to specification, 21 x 7 x ⅛ in. | | 7 | 0 |
| 1 Hand-polished oak cabinet, with 10-in. baseboard | 1 | 12 | 6 |
| 1 Lotus double drum, ·0005 condenser | 1 | 9 | 6 |
| 1 ReadiRad ·00015-mfd. differential reaction condenser | | 5 | 0 |
| 2 ReadiRad 3-pt. wave-change switches | | 3 | 0 |
| 1 Wearite 3-pole change-over switch, with terminals | | 4 | 6 |
| 2 ReadiRad "P.W." dual-range coils | 1 | 5 | 0 |
| 4 Telsen valve holders | | 4 | 0 |
| 1 ReadiRad "Hilo" H.F. choke | | 4 | 6 |
| 1 Lewcodenser, ·001-mfd. maximum capacity | | 2 | 6 |
| 1 Formodenser, ·002-mfd. maximum capacity | | 2 | 3 |
| 1 ReadiRad ·0003-mfd. fixed condenser | | | 10 |
| 1 Telsen ·002-mfd. fixed condenser | | 1 | 0 |
| 2 T.C.C. ·01-mfd. fixed condenser (flat type) | | 5 | 0 |
| 1 Telsen ·001-mfd. fixed condenser | | 1 | 0 |
| 1 T.C.C. 1-mfd. fixed condenser | | 2 | 10 |
| 1 ReadiRad 1-megohm grid leak and holder | | 1 | 4 |
| 1 ReadiRad 600-ohm resistance and holder | | 2 | 6 |
| 1 ReadiRad 2-megohm grid leak and holder | | 1 | 4 |
| 1 Telsen "Radiogrand" L.F. transformer (ratio 5–1) | | 12 | 6 |
| 1 ReadiRad 10,000-ohm link resistance | | 1 | 0 |
| 1 ReadiRad 50,000-ohm link resistance | | 1 | 9 |
| 1 ReadiRad standard 10 x 6-in. screen | | 2 | 0 |
| 1 Terminal strip, 21 x 2 x ⅛ in., drilled to specification | | 2 | 3 |
| 10 Belling Lee "R" type terminals | | 2 | 6 |
| 1 Siemens' "S.G." cell | | 1 | 0 |
| 1 Packet "Jiffilinx," for wiring | | 2 | 6 |
| 4 Valves to specification: S.G., Det., L.F. and power | 2 | 7 | 6 |
| Wire, screws, flex, etc. | | 1 | 5 |
| Total, including valves and cabinet | £10 | 10 | 0 |

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LATEST BROADCASTING NEWS.

# AFTER THE BATTLE.

## SLAITHWAITE: EARLY RESULTS EASTER MONDAY FEATURES—"DER ROSENKAVALIER"—MR. ASHBRIDGE AT THE "MIKE"—RELAY FROM BIRKENHEAD.

THE battle between the B.B.C. and the "Morning Post" lasted nearly two months, culminating with a full-dress debate in the House of Lords. Outside opinion gives the verdict to the B.B.C. with a big margin in hand.

There was really a great deal of fuss about trivialities, and Lord Astor's summing-up in the House of Lords was a fair indication of the independent view. So Lord Radnor had to admit that the House did not share his view and the hostile motion was withdrawn.

Meanwhile, although the B.B.C. has emerged triumphant, there are signs that forces within the B.B.C. are at work to curtail a good deal of the freedom formerly exercised by those responsible for the arrangements of talks and adult education.

If there is to be any change that will please listeners, it should be less talk and not less interesting or controversial talk.

### Slaithwaite: Early Results.

The first analysis of the first public tests of the new North Regional transmitter reveals some very interesting results. Signal strength in Manchester is hardly less than from the old Manchester transmitter.

Nearly the whole of Lancashire and Yorkshire are served as never before.

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

Stoke-on-Trent and Newcastle-on-Tyne have not come out very well, and it remains to be seen whether listeners in these areas can record the signal of Slaithwaite readily enough to avoid alternative methods.

Probably not in the case of Newcastle.

### Easter Monday Features.

Alexander and Mose, those imitation Negro coons the mystery of whose identity so intrigued theatrical managers as well as listeners until they were recently revealed to be Billy Bennett, the well-known comedian, and James Carew, who was married to the late Dame Ellen Terry, are appearing in a vaudeville programme for National listeners on Easter Monday, April 6th, together with Ann Penn and Anona Winn and Mr. Flotsam and Mr. Jetsam.

Listeners are now aware that the anonymity of Alexander and Mose was necessary on account of certain theatrical contracts still then running in their own names, but it will strike many listeners as odd, for Mr. Bennett to say what was reported in some newspapers—that he was not broadcasting for the sake of the fee but because it was good fun.

### "Der Rosenkavalier."

Part of the performance of "Der Rosenkavalier," with which the Grand Opera Season is to open at Covent Garden on Monday, April 27th, will be relayed for broadcast in the National programme. Further details of this and their relays during the season will be given in our columns in due course.

**NEXT WEEK**

**COMPLETING THE "COMET" FOUR**

Also a strikingly selective crystal set

**THE "FLEXICRYS"**

**COMING SOON:**

**Dave Burnaby on**

**"THE FUN OF BEING FUNNY"**

### Mr. Ashbridge at the "Mike."

Mr. Noel Ashbridge, Chief Engineer of the B.B.C., has decided to give a series of broadcast talks on similar lines to those of his predecessor, Captain P. P. Eckersley, concerning various phases of broadcasting.

It is quite time that listeners were told of the many changes shortly to be introduced as a result of the progress of the Regional Scheme, and no better way could be devised than telling them over the microphone. Mr. Ashbridge will give his first talk on Easter Monday, April 6th, for all stations taking the National programme.

### Relay from Birkenhead.

It is interesting to learn that the North Regional headquarters of the B.B.C. has arranged to take a relay from the Argyle Theatre, Birkenhead—a district which has suffered considerably from the lack of outside broadcasts.

It would be well, if only from the point of view of licence revenue, for the B.B.C. to extend rather than to curtail its outside broadcast services; and the broadcast relay of part of a revue called "Oddments" on Tuesday, April 14th, is bound to bring some satisfaction to northern holiday-makers as well as being an enjoyable programme item.

# 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.**

AN Outside Broadcast always gives me the feeling that I am getting something extra for my money. It is a kind of bonus. I feel that I pay to hear the concert in the studio, but I listen to the concert in the Albert Hall free of charge.

### The Gate-Crashers.

I feel that it is of right that I hear Professor Heath talking from the studio in Cardiff, but it is of grace that I am allowed to hear Professor Einstein making an after-dinner speech at a banquet. Something has been thrown in. I surprisingly get a packet of cigarettes with my pound of tea.

I attend the Boat Race without the expense of the railway fare to Putney, and without the wear and tear of getting there—and being there! I attend the Grand National at Aintree without having to travel North in a "topper" and a morning coat. I am as pleased about it all as a schoolboy who has unexpectedly received a tip.

In earlier days of enthusiasm and hero-worship, I have on several occasions attempted to enter places without a card of invitation or a ticket. Not always without success. The gate-crasher is held to be not a very honest, perhaps not even a quite respectable, person.

But we are all gate-crashers now. We crash even into the House of Lords when the King addresses a Round Table Conference. The microphone has abolished gates; and your licence admits you by the favour of the B.B.C. and the engineers to almost any place and any company.

### Argentina's Triumph.

It admitted you the other day to the Exhibition at Buenos Aires, without the trouble of getting there or paying for admission. Though it was 7,000 miles away, you heard every word. The Prince spoke into your private ear.

This is probably the most successful, and most romantic, Outside Broadcast yet made. It was fitting that the Prince should be the

(*Continued on page* 118.)

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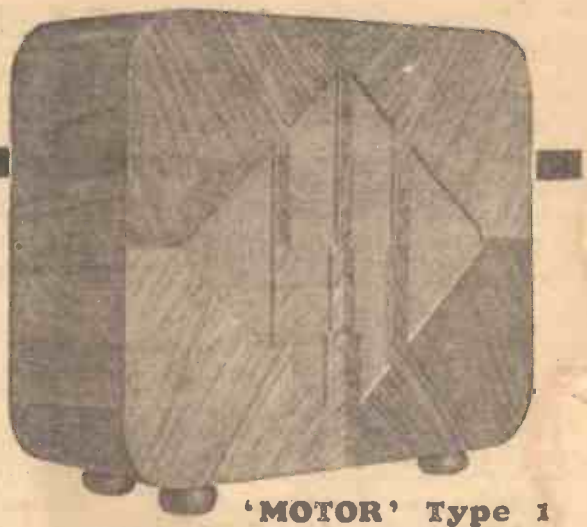

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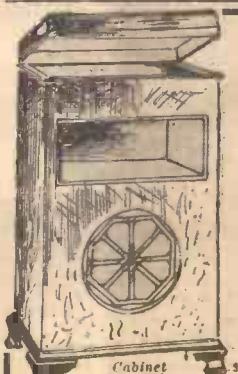

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**Some practical distant-programme notes compiled by a special contributor who nightly searches the ether in order to obtain really up-to-the-minute information for "P.W." readers.**

**By R. W. H.**

*"And thick and fast they come at last*
*And more and more and more."*

THOSE lines seem to describe exactly the eruption of high-power stations which is taking place on the broadcast band. Recent newcomers of the super-power order that have been officially notified are Moorside Edge, Sottens and Lwow. But there are others as well.

### Still More Power.

Though, for example, Berlin Witzleben is still shown as working at 1·7 kilowatts, the huge increase in his strength shows that he has put up his power. He is not yet, though, working with anything like his full ration, which will be in the neighbourhood of 75 kilowatts or more before many months are past.

Turin again has gone from strength to strength. When this station first loosed his transmissions in the ether his power was about 8 kilowatts, and that enabled him to provide very big strength in this country. Recently, though, he has been suffering from interference troubles and he seems to have adopted the fashionable remedy of endeavouring to shout the other fellow down.

At any rate he is now quite as strong with me as is the Midland Regional at 45 miles.

Gothenburg seems to have settled in his stride with 15 full kilowatts, and you will find his a really big transmission on most nights. Two other stations of the super-power order are Brussels No. 1 and No. 2, either of which you will find easy to tune in—and as the Americans would say—easy to listen to.

### Greater Selectivity Needed.

With so many high-power transmitters in operation the great need of the moment is for selectivity. Almost any set can tune them in; the trouble is to tune them out when you don't want them.

In the great cities the need for selectivity is going to become more and more acutely felt as the months pass, and it is a fortunate thing for readers of POPULAR WIRELESS that the Research Department is fully alive to the fact and studies the requirements of the future instead of merely those of the moment.

### Moorside Edge.

The long-distance enthusiast will do well not to jump to conclusions about his set whilst the B.B.C.'s fading-in scheme for Moorside Edge is in progress. By some curious oversight the test transmissions are being made only on 479 metres to start with, and we therefore know nothing of the effects that 5 G B is going to produce on 398·9 metres or Moorside Edge No. 2 on 301 metres.

Don't forget that all sets are more selective towards the upper end of the wave-band covered by their tuned circuits owing to the fact that a comparatively large amount of capacity is in parallel with the coils. Thus, even if the wipe-out of Moorside Edge No. 1 or 5 G B is comparatively small round about a wavelength of 479 metres there is no guarantee that it will be equally satisfactory when a 301 metre transmission comes along.

### National v. Regional.

Nor is it only the set that may be responsible for bigger wipe-outs on shorter waves. The actual field strength of a transmission with a lowish wave may be enormous at short and medium ranges. In my locality, for instance, that of the London National rated at 68 kilowatts is very much greater than the regional rated at 70 kilowatts.

What a pity it is that the B.B.C. did not arrange from the very first for full dual transmissions outside programme hours on 479 metres, 398·9 metres and 301 metres. Then we should have known the worse right away.

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# SHORT-WAVE NOTES

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

THE recent "W 2 X A D incident" leaves me still deluged with letters from indignant readers who tell me (*a*) that my receiver is no good; (*b*) that their own receiver is wonderful; or (*c*) that conditions where I live must be very peculiar.

To all these remarks I am impervious. The one point that emerges is that if I want to get people to write to me I have only to make one small remark, and I receive all the letters I want for the next few weeks.

### "In Great Form."

Seriously, however, it is very interesting. Classifying the letters, it appears that W 2 X A D suddenly came to life at a time varying from mid-February to early March, according to the location of the receiver. As I have already said, no sooner had I written the paragraph stating that he was poor in this neighbourhood than he improved greatly.

By the time it appeared in print he was in great form, and has been ever since. Undeniably, the conditions on 20 metres and below are wonderful at present. I have never known them better.

### Data Required.

Now I have one request to make. I think some very valuable data might be collected if all those readers who have so kindly written and taken the trouble to tell me *when* W 2 X A D commenced to improve, would conclude matters by sending me a postcard as soon as he commences to fade out again. This may not be for a matter of months (I hope it won't, myself), but please remember, and give (1) the approximate date on which the fading-out starts, and (2) the day on which he may be said to have disappeared completely.

Taking the two sets of data together, we should be able to form some useful conclusions.

In view of the favourable conditions for the really short waves, I am listing here a few stations in the "below 20" class that should be available to everyone with an efficient receiver.

### Important Short-wavers.

The most important are H V J, Vatican City, on 19·84; W 8 X K, E. Pittsburgh, on 19·7; W 2 X A D, Schenectady, on 19·557; P C L, Kootwijk, Holland, on 18·4; H S P, Bangkok, on 16·9; P L E, Bandoeng, Java, on 15·93; P P U, Rio de Janeiro, on 15·57 (1500 to 2200—can anyone claim this?), and P M B, Malabar, on 14·63.

Short-wave items of interest include the following. Sir Hubert Wilkins' Submarine expedition will be taking a short-wave transmitter. This should be a good opportunity for the DX-snatchers to log a real North Pole signal.

### A New Station.

V Q 7 L O (Nairobi) is going through severe experimental changes, but the regular programmes are maintained as far as possible.

A new station has appeared in the middle of the 49·5 metre group in the form of Brussels, O N V A.

The identification signal from H R B, Honduras, is described as "three cuckoos." (Had I heard this and not known I should have imagined it to be three short-wave acquaintances of mine broadcasting.)

J B, Johannesburg, is now on 43 metres approximately.

### Transatlantic 'Phone.

Two or three readers want to know whether there is any harm in my giving them the exact wave-lengths of the Transatlantic 'phone. Those described as "near W 2 X A D" are W N C, Ocean Township, N.J., on 20·73 metres, and G B W, Rugby, on 20·77 metres. Just above them you will find the 20-metre amateur wave-band, above which is W N D, the other Ocean Township station.

Lastly, my new short-waver is finally completed, and I am quite satisfied with it. An article describing it is now being written and will appear when (and if) the Editor decrees.

# THOSE CONVERTED SETS

By K. D. ROGERS.

**A short article for those who want to adopt their battery receivers for use on A.C. mains.**

A SHORT time ago I wrote an article entitled "Going Over to A.C." in which I described how I would set about converting a battery three-valver so that it would work on the A.C. mains. Since then a considerable amount of correspondence has reached me in regard to conversion of certain sets belonging to readers, and several rather interesting points have cropped up.

In the first place, the question of overloading in the output valve seems to be a very difficult one. Many readers do not seem to realise that if they convert a detector and two L.F. to A.C. they *must* use a large output valve if they intend to tune-in their set fully to their local station. That is, if they expect to get out of it very much more volume on their local than they did on their battery set.

### The Two Alternatives.

A.C. valves give tremendous magnification, and we find that in the detector and two L.F. stage set we can quite easily get the local station up to sufficient volume to fully load an output valve of the calibre of the L.S.6A. or the new Mazda P.P.5/400.

Now very few readers can use L.S.6A.'s, for the simple reason that they need specially-made all-mains apparatus in order to give the required 400 volts and plenty of milliamps.

But readers have two alternatives. One is to insert a volume control so that they need not overload their set on the local station, but can get really good, pure volume, and use an indirectly-heated A.C. valve of the A.C.P.1 type or a directly-heated valve of the P.X.4 variety. On distant stations they can then put their volume control over to "loud" and get full advantage of the tremendous magnification given by A.C. valves.

### About Overloading.

On the other hand, if they only want to work their sets from A.C. merely from the point of view of convenience, and do not want the volume of the set to be any different from that obtained when a battery was used, they can quite safely scrap their intermediate stage and take the detector, transformer-coupled, straight to the output valve, using for this something of the order of the A.C.P. or the Mullard 104V., Marconi M.L.4, and so on.

But there is one thing they must *not* expect if they stick to the three valves, and that is to be able to get their local station *fully* tuned-in without a volume control with A.C. valves and an output type of quite ordinary calibre without any trace of overloading.

As a matter of fact, in these circumstances the overloading is liable to be very bad indeed, and consequently many readers have been rather disappointed at the results of their conversion to A.C.

### A Point to Remember.

Now let us take another point about conversion—the fact that because A.C. valves have a very much greater magnification they are liable to cause instability. If your D.C. set was only just "held down" working on moderate H.T. voltages such as 120, you cannot expect to put in A.C. valves and work with voltages up to 200 without getting instability such as motor-boating and L.F. howling.

So when you convert your set, make absolutely sure that the detector is perfectly decoupled, and that the output valve has a good choke output system in its anode circuit, otherwise you are liable to get very bad motor-boating indeed. In this connection I would like to emphasise the fact that the resistance and condenser decoupling is not the only method. It is certainly the cheapest, but there is a method which I think is slightly more efficient, and it certainly does conserve H.T. energy.

### The Output Filter.

It is to use a good L.F. choke instead of the usual 25,000-ohm resistance, with a 4-mfd. condenser between the choke and the earth.

There is another point which I should like to bring forward, and which seems to be not too clear to many readers—the output filter of the set. When automatic bias is used the return from the output filter condenser through the loud speaker to earth should *not* be made (as in the battery set) to H.T. —, or to earth, but taken *direct to the cathode* of the last valve. Otherwise the L.F. impulses in your anode circuit are going to go through the biasing resistance, and will tend to cause fluctuations in the grid circuit of the valve, with a possibility of giving rise to trouble.

And now as regards hum. Many people have asked me what is the best earthing system for an A.C. set. Unfortunately this depends on a certain amount of experiment.

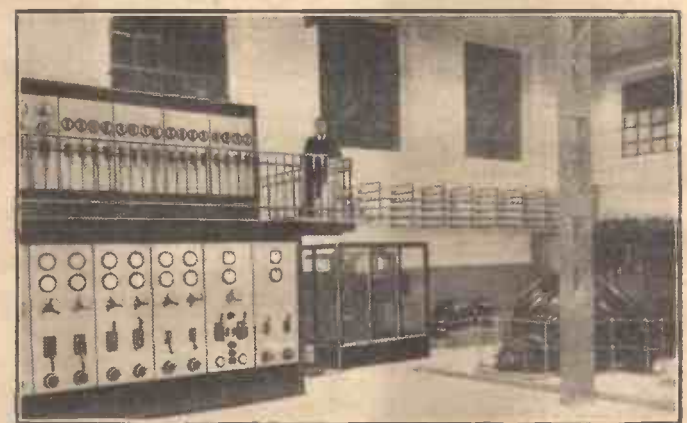
### Grid Return Connections.

Provided you have got the filament wiring as well done as possible, carrying it out with twisted flex (possibly with metal covering, such as is now obtainable), and provided you have kept it away from grid and plate leads and L.F. transformers, the best thing to do with indirectly-heated valves is to try earthing first one side of the heater and then the other, and then, if you have got a centre-tapped winding on the L.F. transformer secondary, to this. Usually you will find that the best place is to one or other side of the heater winding.

If you have got indirectly-heated valves throughout, you are quite safe with this method, but if you are using a directly-heated valve in the last stage you are rather up against it, unless your transformer has a separate winding for that valve.

In a directly-heated output circuit it is best to use a transformer which has a separate winding for this valve, and here the centre tap should be taken to grid return, or else a potentiometer connected across the filament wiring and the return taken to the slider of that potentiometer.

## VOLTS FOR THE VATICAN



The new electrical power station built in Vatican City to supply the recently-opened radio station.

### A Necessary Compromise.

If a common winding is employed, you will probably find it best not to connect any other heaters to earth, merely taking the centre point to H.T. — and earth. It is rather a compromise, but more trouble is usually encountered in small sets (without S.G. valves) by earthing the filament of the directly-heated output than in centre-tapped earthing of the indirectly-heated valves.

Where an S.G. valve is used the heater usually *has* to be earthed close to the valve, and then it is practically essential to employ a separate winding for a directly-heated output valve. Many mains power transformers make provision for this, and it is best, when considering the purchase of a transformer for the building of your mains unit, to bear this in mind and use one of the makes having this separate winding.

# TECHNICAL NOTES

**Some diverse and informative jottings about interesting aspects of radio reception.**

**By Dr. J. H. T. ROBERTS, F.Inst.P.**

### Instability.

ONE of the most frequent of all troubles when making up a new circuit is the danger of instability in the finished receiver. It is really very difficult to answer satisfactorily the question, so often asked—What is the cause of instability and how can I avoid it?

As it may arise from any of a variety of causes, perhaps the best thing to do is to run over the most likely sources of trouble.

### Spacing Coils.

In spacing out the components for a set, have particular regard to the coils, because it is here that the constructor most often goes wrong. Remember that every coil, when in operation, is surrounded by a field of force (even the so-called "fieldless" coils) and that, consequently, interaction between one coil and another is taking place.

The extent of this interaction (or "coupling") depends upon the distance apart of the coils and also upon their directions in relation to one another—whether their axes are in line, or parallel, or at right-angles.

Naturally, the further apart the coils, the less the coupling, and if their axes are at right angles the coupling, for given positions of the coils, will be a minimum, whilst if the axes are in line the coupling will probably be a maximum.

### Fieldless Coils.

So-called "fieldless" coils should be used when specified by the designer of the set, because he will have arranged the spacing of the coils and other components on the assumption that it is not necessary to provide specifically for the external fields of the coils. If you substitute "ordinary" coils, you will certainly be "asking for trouble."

A high-frequency choke, although not classed as a "coil" in the ordinary sense, is very much a coil in the sense we are now considering and should accordingly be treated as just indicated.

### Importance of Bypass.

Condensers also may interact with one another and with other components, and tuning condensers should be kept well apart. I should also mention that bypass condensers are generally very important; as often as not the very purpose of a bypass condenser is to prevent instability.

Consequently, it is a great mistake to think that you will improve on the designer's arrangement by omitting a bypass condenser here and there, or for the sake of saving cost of components. It is practically certain that the result will be to make the set unworkable.

As regards the wiring, the leads which most want watching are, of course, grid-leads. Leads to grids and anodes should be kept as short as is conveniently possible and care should be taken to prevent interaction between them.

Furthermore, they should not be allowed to run parallel to one another (unless a good distance apart, which they are unlikely to be), and should not come too near to H.F. chokes or coils.

### H.F. Screening.

When any considerable amount of H.F. amplification is used, especially with modern valves, the question of shielding becomes very important and the size and position of the shields requires careful consideration.

Usually it is best to earth the shields. Remember that the shields, although preventing unwanted coupling, also absorb energy and reduce sensitivity, so the position and size of the shields depends upon a compromise between these two opposing effects.

Low-frequency transformers and chokes, just as H.F. chokes, are liable to coupling and must be watched in a corresponding way. If the foregoing points are kept in mind, and a little care is exercised in applying the principles underlying the above to any special or exceptional conditions which may be met with, there is no reason why the bugbear of instability should not be successfully disposed of.

Several readers have written to me this week sending various little hints about extracting screws which have long been in the wood or ebonite. You will remember that I passed on one or two hints about this two or three weeks ago, and perhaps the following (selected from the various letters) may be useful to other readers.

### A Useful Dodge.

One dodge is the following: Mix powdered plumbago thoroughly in melted paraffin wax (melted in a tin vessel or an old saucepan over a gas-jet), stir thoroughly, and then turn out into a tin of suitable size and allow to cool, stirring before finally cooling so as to keep the plumbago mixed throughout the mass. Whilst the mixture is still liquid, dip in the steel screws and see that the thread is well covered. This has no bad effects, especially if the wood is seasoned.

### Examine the Screwdriver.

A further point to remember is that often the failure to extract a screw is due to the blade of the screwdriver being too tapered or rounded, and consequently, in narrow slots, the blade does not bottom in the slot. It is a good plan, therefore, to file down or grind the blade of the screwdriver for about ⅛ in., leaving a blunt-ended but thinner blade which will fit accurately into screw slot.

### Care Necessary.

Another hint which I have picked out is from a London reader, and is as follows: "The most obstinate screw will behave quite well if handled in the following manner. Take a hot soldering iron or other suitable piece of heated metal and press the end hard down on the head of the screw. This causes the screw to expand, and when the screw finally cools off you will find that it has been loosened in the wood and will come out easily with the aid of a screwdriver."

This dodge for getting out a fast screw is new to me, and I have not tried it out. I should imagine that it would only apply in any case to a screw in which the head was well above the surface of the wood, as otherwise the heat of the iron would surely burn or scorch the surrounding wood.

### Readers' Experiences.

I was describing the other day some annoying experiences which I had with an all-mains receiver in which the fuse kept

(*Continued on page* 119.)

## LISTENERS ON AN AIR LINER

The tedium of long journeys by air will no longer trouble the hardened air traveller, when radio has stepped into the breach and provided programmes for passengers and crew. This picture was taken during broadcast reception tests, soon after leaving Croydon.

### "P.W." PANELS.

### No. 13.—FITTING A MAINS UNIT

The maker's instructions for installing the unit should be followed with care and intelligence, or damage and possibly a shock may result.

* * *

Where flexible leads are provided for connection these should never be kept taut, or placed so that they are liable to a direct strain or tug.

* * *

As a general rule the switch on the wall, as well as the switch on the unit, should be "off" when the unit is not in use.


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

*The Editor will be pleased to consider articles and photographs dealing with all subjects appertaining to wireless work. The Editor cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication, if stamped and addressed envelope must be sent with every article. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents, Messrs. John H. Lite, Ltd., 4, Ludgate Circus, London, E.C.4.*

*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

### ALTERING AN AMPLIFIER.

G. F. (Kilmarnock).—"I have a two-valve low-frequency amplifier with two disadvantages. It needs a volume control, and it needs a choke condenser filter for the loud-speaker circuit.

"So far as I understand it the volume control must be across the first low-frequency transformer to give maximum control, and the low-frequency choke should work in conjunction with two condensers if the loud speaker is to be quite isolated from mains H.T.

"I think I know how this is done, but I should like to have your description (in words) of the alterations, as a double check."

You are right in assuming that the best place for the volume control will be in front of the first valve in the amplifier, so that the following are the alterations you must make.

Disconnect the first low-frequency transformer secondary from the grid of the first valve and wire this latter point to the slider of the potentiometer, and join the potentiometer across the two secondary terminals of this transformer. Then mount your two 2-mfd. condensers close to the loud-speaker terminals, in proximity to the L.F. choke, which must not, however, touch or stand too close to the low-frequency transformer.

The plate of the last valve, which now goes to one of the loud-speaker terminals should instead be taken to one end of the low-frequency choke, and this point must also be joined to one of the condensers. The other side of the low-frequency choke carries the wiring that previously went to the other loud-speaker terminal, i.e. the H.T. positive lead and that to the primary of the other transformer.

The remaining side of the first condenser is now wired to one loud-speaker terminal, and the other loud-speaker terminal goes to the second large condenser. Finally the remaining side of this is taken to the L.T. negative lead or to any point connected with it, such as earth, H.T. negative, etc.

### CONDENSERS IN SERIES.

F. H. M. (London, W.13.).—"I understand that if two condensers are connected in parallel the total capacity equals the sum of the two

(*Continued on page* 116.)

# RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 114.)

capacities. What happens if they are connected in series?

"Is it the difference between the two, and if so, do two of equal capacity cancel out? I think this question would be of general interest, as, though I have asked a number of people, no one has been able to supply the answer."

We are afraid you have not been reading your "P.W." as long or as carefully as we should hope! For we have often given the answer to this question. However, it is so handy to know that it is worth repeating.

As you say, when condensers are added in *parallel*, you should add the capacities together. Examples: ·001+·001=·002; ·00075+·00025=·001, etc.

When adding condensers in *series* complications arise, and you have to do a little arithmetic. But it is really quite easy if you remember to do it step by step.

The rule says "when condensers are connected in series the resultant capacity is such that its reciprocal equals the sum of the reciprocals of the separate capacities." (And after reading that rule you may be tempted to say, with Alexander and Mose, "Says which?")

However, it is not as bad as it sounds. The reciprocal of a number is simply that number divided into one, so to find the reciprocal of say 1, 7, and ½, simply divide these into one and as a result you get 1/1, 1/7, and 2. These latter figures are the reciprocals of the former.

Having looked the reciprocals squarely in the face, and finding they are not so bad as they sound, let us try it out on three condensers. Imagine that you have three condensers with the capacities 1 mfd., 2 mfd. and 4 mfd. respectively.

You are going to join them in series. What will be the resultant capacity?

Well you know the three capacities, and the first thing to do is to find the separate reciprocals. Write down the figures 1, 2 and 4, divide them each into 1, and you get your three reciprocals as follows, 1, ½ and ¼.

The next thing to do is to find the sum of these three reciprocals and to add them together. You must, of course, find a common denominator, which in this case gives you an answer of 7/4ths. That is the sum of the separate reciprocals.

Looking again at the rule mentioned above, you will find that the sum of the separate reciprocals is the reciprocal of the number you want. In other words, what you have found up to the present is not the capacity itself, but the reciprocal of the capacity.

So we simply have to divide this into unity. See how many times it goes into 1. The answer to this works out at 0·571 mfd.

You can find the resultant capacity of any number of condensers connected in series in this way, and you will notice that the resultant capacity is always *less* than the *smallest* of the separate capacities. It is, for example, in the above instance, where the smallest capacity was 1 mfd. and your answer shows the capacity of the three condensers all joined together to be only just over half a mfd.

The rule is very easy to apply when the capacities are all equal, and if you work it out you will find that two condensers of the same capacity will give a resultant capacity of half that of either of them, three equal will give one-third, four one-fourth, etc.

## RADIO SYMBOLS

No. 13.

**THE S.G. VALVE**

In addition to the ordinary filament, plate and grid it contains an extra "grid" or screen.

* * *

This has about 80 volts H.T. applied to it, and enables stable H.F. amplification to be obtained.

* * *

Correct anode and screening-grid voltages are essential for best results.

* *

The screening grid should generally be "in line" with the external screen.

## TROUBLE WITH A "SHARP TUNE" TWO.

R. E. J. K. (Somerset).—"Being a regular reader of POPULAR WIRELESS, I got the four blue prints enclosed in October 11th, 1930, issue and decided to make the 'Sharp Tune' Two. I made it with great success. The past week it has crackled awfully.

"Trying to remedy it, I put on a shorter aerial. On testing it I found the tuning just the same. I disconnected the aerial terminal from the set, the tuning being unaltered, though not so loud.

"All the coils being O.K., can you give me any explanation?"

We are not quite clear from what you say whether the explanation you need is of the unaltered tuning, or whether you are still suffering from the crackle and want *that* explained.

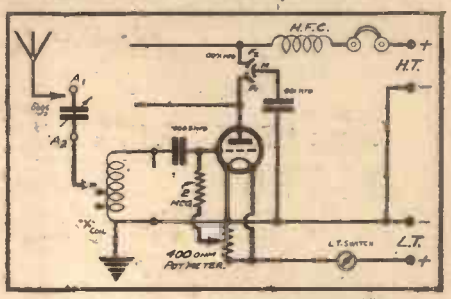
If the crackle is still troubling you remember that the probability is that it is due to an imperfect contact somewhere. It may be a loose wire or bad joint in the set, or a broken flex lead. Or it may be something far more difficult to stop, such as a dud contact inside an H.T. battery.

Other common causes of crackling are badly fitting plugs and sockets, a broken aerial, or earth, or lead-in wire (which can be very puzzling if one or two strands instead of several are broken, leaving the others intact), and interference from nearby electrical machinery.

If on the other hand it is the fact that tuning is not altered that has been puzzling you, this is easily explained. The reason is that whereas in old-fashioned sets the aerial circuit itself was tuned, the improved selectivity now available in a set has resulted in a rather different type of circuit, in which the aerial is used more as an *aperiodic* collector.

(*Continued on page* 118.)

## MISSING LINKS, No. 5.




Here is another one-valve set, using differential reaction and potentiometer control of grid potential. Two of the components are missing. Can you fill them in and thus complete the circuit?

**(LOOK OUT FOR THE ANSWERING DIAGRAM NEXT WEEK.)**

# MAKE YOURS A MAINS SET FOR LESS THAN £3

If your house is supplied with alternating current, as little as £2 15 0 will enable you to run your radio set from the mains—less than you would spend on dry batteries alone during the course o. a year.

As you know, a rectifier is necessary when employing alternating current to run a wireless set.

Of the many types of rectifier obtainable, none can claim so many virtues as the "Westinghouse." It is all-metal—substantial—compact—never needs attention—and its life is so prolonged we haven't yet been able to determine its limit.

The H.T.5, priced at 15/-, is a particularly popular style.

If you think of converting an existing battery-driven receiver to mains-driven, or building a new one, send for the Booklet, "The All-Metal Way, 1931," which tells you all about the Westinghouse Metal Rectifiers, and also contains chapters on high-tension trickle-charging, low-tension trickle-charging, moving-coil loud speakers, general principles and methods of rectification, smoothing, transformers for eliminators, the voltage doubler circuit, voltage dropping, etc. (Please enclose 3d. for your copy.)

Telephone : North 2415.

**WESTINGHOUSE**

## METAL RECTIFIERS

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

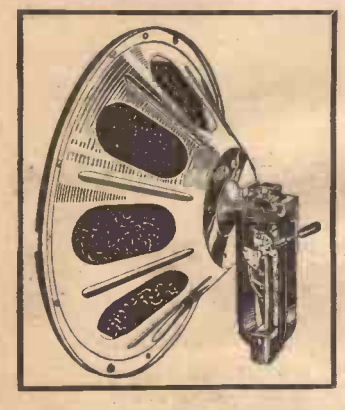
COUPON

Please send me your forty-page booklet, "The All-Metal Way, 1931," for which I enclose 3d. in stamps.

Please write in block letters.

NAME.....

ADDRESS.....P.W. 4/4/31



# "...but I prefer a WUFA.."

*"A great speaker at a small price . . . The quality and tone of the 'Wufa' have every resemblance of a moving-coil speaker, but I prefer the 'Wufa.'"*
*B.W. (Chatham).*

Letters from "Wufa" enthusiasts are continually pouring in—all giving evidence of the singular qualities of this loud-speaker.

These are just a few extracts.

Ask your dealer to demonstrate. The marvellous reproduction and volume will astound you.

*"The 'Wufa' is the purest unit I have heard for 4 years."*

*"The 'Wufa' unit has exceeded my expectations."*

*"The 'Wufa' Speaker is great, considering I use only a 2 Valve Set."*

*"I have tried many speakers of various kinds, but I have not yet had an equal for the 'Wufa'."*

*"I consider it a fine piece of mechanism at a very reasonable price."*

*THE "WUFA"*
*Prices*
*Complete with Chassis* 40/-
*Unit Only* 25/-

# WUFA

60 POLE SUPER POWER UNIT.

*If dealer is unable to demonstrate send us his name and address. Write Dept. P.*

**M. LICHTENBERG**
**4, Great Queen St., London, W.C.2.**


ETA Valves have arrived! Quality valves in every respect, they are manufactured with the greatest care and tested again and again before they leave our works.

ETA Valves are sold at a price that will place them high in the esteem of radio-lovers. For purity of tone, dependable efficiency and low current consumption fit ETA Valves. They more than justify their claim of being "the best between aerial and earth." Prices from 7/-.

Ask your Radio dealer for particulars of the ETA Valve to suit your set.

# ETA VALVES

THE ELECTRICAL TRADING ASSOCIATION LIMITED,
ALDWYCH HOUSE, ALDWYCH, W.C.2.
Telegrams: Eltradax, Estrand, London. Telephone: Holborn 8139.

# RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 116.)

The tuning condenser is across the grid coil, thus forming a tuned *grid* circuit, and although the removal of the aerial connection has some slight effect upon this, it is not very large, and, as you say, the alteration in tuning is often hardly noticeable. A certain amount of local station broadcasting gets through even without an aerial, and it will be found that the tuning for this is virtually if not quite the same as when the aerial is used.

### A "MAXI-POWER" PUZZLE.

"PUZZLED" (Hendon, N.W.).—"I built the 'Maxi-power' Four thinking it would be much better than the three-valve set I already possessed, and I must say it has got me worried and likewise very disappointed

"In the first place I could only get reasonable volume by having S1 out and S2 in, with not a sign of reaction on a foreign station. Since December my bag of stations are the London Regional and the National, as against a dozen on the last set. I have persevered in trying to find the fault before troubling you.

"Last Saturday I was at it again, and I happened to put my hand in the set and one finger rested on that terminal of C6 that is connected to the 100,000-ohms resistance, and another finger of the same hand rested on the top terminal of the said resistance. To my astonishment there was a terrific burst of undistorted music which was indeed 'Maxi-power.'

"On turning the dials I found that I could now get reaction whilst I kept my fingers on these terminals, and succeeded in pulling in a couple of foreign stations. Can you tell me the cause and cure of this, as now if we want to hear good robust and undistorted music or speech either myself or wife has to hold the said terminals!"

Everything points to the fact that you have got a dud anode resistance or a dud connection at this point. Can you borrow another 100,000-ohms resistance to try in place of yours?

First make sure that your contact, etc., is quite O.K., and that there is no faulty connection either in the wires going to the resistance or inside the resistance holder. If the resistance itself is dud, or one of its ends is not connected to the rest of the circuit, you would get results exactly as you describe.

We think there is no doubt that this is your trouble.

## TECHNICAL TWISTERS

### No. 55. Changing to A.C. Valves.

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

As the . . . . . of A.C. valves are better than those of battery valves, a set when "converted" to A.C. has much higher magnification.

* * *

This often creates a tendency to . . . . . owing to the . . . . - . . . . between the different circuits.

* * *

. . . . - . . . . may be prevented by better screening, but it is sometimes necessary to alter coupling values as well.

* * *

The efficient A.C. valves often cause motor-boating in a set formerly quite stable, but this can usually be overcome by better . . - . . . . . arrangements.

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

**Last week's missing words (in order) were: De-tune. De-tune, Higher, Lower. Resistance. Potentiometer, Slider. Smooth.**

# FOR THE LISTENER

(*Continued from page* 108.)

centre of it—for in a way he is the most romantic figure of this generation. Our best commerical traveller; in whom "commerce becomes kingly."

Some Outside Broadcasts give me less than I want. This from the Argentine was one of them. I wanted the colour of the scene, the atmosphere of the occasion, full of light and charged with emotion.

It came across the ocean and the continent in a sort of vacuum. It was like a rose without its setting of leaves; or like a dish without its garnishings.

**Too Little or Too Much!**

A description of the Boat Race by Mr. Holt Marvell would be equally dry and without atmosphere to anyone who did not know the scene, and was not able to recreate the emotional atmosphere of the occasion out of his memories. But if you know your stretch of the river, or the view from the bridge, then the "commentary" moves amid the remembered scene, and gives you all you want.

If the Outside Broadcast is of something happening in the Tube, then most people are satisfied, for they can visualise and remember, and so create the proper circumstance; but when, in the days of the old "Diversions," the broadcast was of something happening under the river, I was lost. I heard meaningless voices in the dark. The thing failed.

But, oddly enough, an Outside Broadcast may also fail not because it gives you too little but because it gives you too much. Music-hall broadcasts often affect me like this. There is so much I cannot see. I am missing such a great deal.

I haven't time to catch the words before they are drowned in a roar of laughter. And all that laughter which fills the loud speaker between the words! It irritates me. All that I hear is like a little ribbon of light in a darkness which is shaking with laughter and yelling for joy.

I am having the soda-water, but they, the rascals, are having all the whiskey! For a moment I laugh because they laugh; but that isn't good enough for long; and, in a gust of jealousy, I switch off! I determine that I will go to the Palladium in person before that particular turn is taken off.

**Artful Mr. Allinson!**

Atmosphere counts for so much. Clever Mr. Allinson tries to create it before he begins, by telling us what sort of weather it is at Highbury, and what the crowd looks like, and what colours the players are wearing. He also has the most enviable gift of being able to communicate atmosphere by the tones of his voice and the manner of his speaking, and is thus our best commentator.

It is really all very wonderful when you come to think about it. The Prince of Wales said at Buenos Aires that he supposed he could have done from London all that he was doing there on the spot. I suppose he could.

He might have touched a switch in London and set all those little models working, just as easily, and without any loss of time, as he did it on the platform. The world has marvellously shrunk. Neither space nor time divide us now as once they did. No wonder we are beginning to think that it is about time we made home together, and lived as a happy family!

# TECHNICAL NOTES

(*Continued from page* 112.)

blowing without any apparent cause. A number of readers have sent me their experiences on this point also. I have not the space to deal with these, and I only mention one which I think is fairly representative and which agrees also pretty well with the experiences which I had myself.

The set described by my correspondent worked perfectly for a week; then, after being in use for about two and a half hours, the fuse, which was a flash-lamp in the high-tension negative lead, blew without apparent cause.

Next day another fuse was put in and the set worked perfectly for a week, when, after the set had been put on for about two hours, the same trouble occurred again. A further fuse put in at once was immediately blown.

He then took out the receiving valves, and put in another fuse, and this also went up immediately, the same thing again happening after trying a different rectifying valve. The set was tested throughout for any "shorts," but nothing wrong could be found. Next night he tried the set again, but with a different mains transformer and a slightly reduced H.T. voltage on the last valve (a Mazda A.C.P.1), from 200 volts to 180 volts, and since that time he has had no further trouble with the fuse.

### Faulty Mains Transformers.

It would appear in this case that the trouble was caused by a faulty mains transformer which became more faulty as it got warmed up. You will notice that the trouble never occurred when the transformer was cold, but only after it had been in use for about a couple of hours.

The writer of the letter stated that he went to a good deal of trouble in testing out transformers for H.T. supply, but found that several of them became overheated very soon and to such an extent that he was obliged to discontinue using them.

It would be interesting to know how many readers have had similar experiences with the overheating of small transformers for H.T. supply.

### Loud-Speaker Hints.

Amongst my other correspondence this week are several letters from readers of these Notes with regard to loud-speaker sensitivity and the operation of loud speakers generally. Some of them describe some rather curious peculiarities of their particular speakers, but I do not think these are of sufficiently general interest to take up the limited space available here.

One little dodge which may perhaps be useful to many for finding the right connections for the speaker is very well summed up in a letter from a Gloucestershire reader as follows:

"Starting with the magnet poles adjusted well away from the diaphragm, the set is switched on and then the speaker adjusted until the most sensitive spot is found. On reversing the connections it may be found that the diaphragm is touching the poles, indicating that with the latter connections the anode current and the magnets are helping each other. The speaker is then adjusted again so that the diaphragm comes just clear of the poles."

## THE "COMET" FOUR

*(Continued from page 106.)*

Osram and Marconi L.210, Six-Sixty 210L.F., etc., or the same type of valve in the other voltages. The output valve should be a super-power valve if you can give it enough H.T. current—at about 150 volts. Otherwise the ordinary "P" type will do for average working.

**The Wave-change Switching.**

The H.T. you require is as follows: H.T. + 1 75–80 volts, H.T.+ 2 60–100 volts. (This should be varied till best reaction results are obtained.) H.T.+3 120/150 volts.

We have seen how the wave-change switches work ("in" for long waves and "out" medium) but we must just say a few words about the aerial-series condenser near the aerial terminal, and also the Brookmans condenser (·002 mfd.) behind the first wave-change coil.

The aerial-series condenser is for selectivity control, while the other controls the coupling on the long waves, and we do not think we can do better than repeat the instructions we gave with the "Comet" Three regarding these adjustments.

Adjust selectivity control thus: First screw down fully, then gradually unscrew until just sufficient selectivity is obtained.



Reaction is increased by turning to the right; use it to keep the set nearly, but *not quite*, oscillating when searching.

Aerial coupling on long waves: Set ·002-mfd. compression-type condenser to a midway adjustment, then try varying either way a little and re-tune. A little experimenting will soon find the setting which best suits your aerial.

By the way, on some aerials you will occasionally find you can get better volume on long waves by screwing the selectivity control knob fully down.

**Some Final Details.**

As regards the grid-bias adjustment, it is a little difficult to deal helpfully, because valves vary so much in their requirements. You should really be guided by the data slip you will receive with the valves.

The S.G. valve bias should be connected to the leads shown and should be ·9 volts for a 2-volt S.G. valve (though 1·5 volts will do) and 1·5 volts for a 4- or 6-volter. The ·9-volt battery is obtainable like the 1·5, in single-cell form.

The first L.F. valve will probably want about 3 or 4·5 volts, and the last valve up to 15 according to the make and type employed.

Tuning is carried out by moving the dual condenser drums together, keeping them in step as nearly as possible, but varying them for final adjustment of strength, while the reaction control is of the normal type.

The on-off switch is "off" in the middle position, and "on" when turned to the right.

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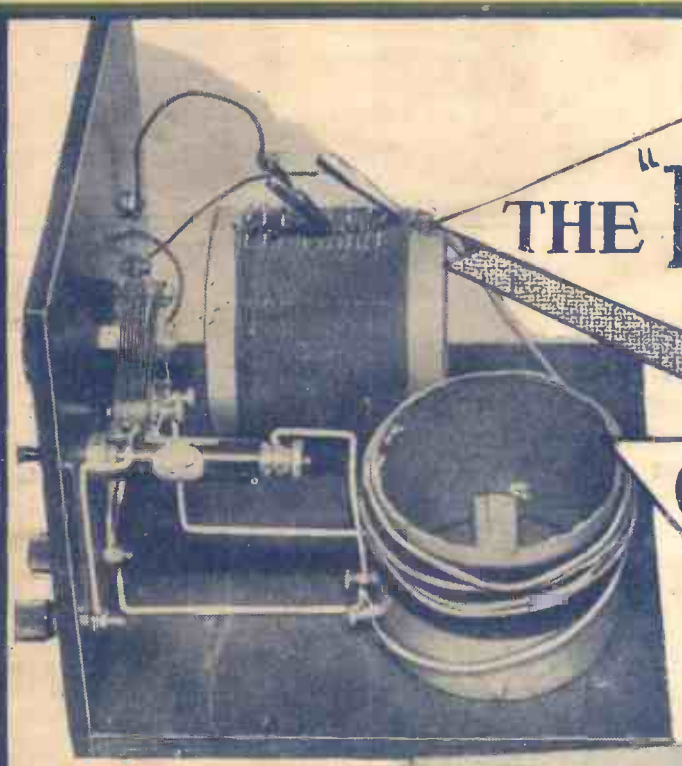
POPULAR WIRELESS April 11th, 1931. REGISTERED AT THE G.P.O. AS A NEWSPAPER.

# TELEVISION TO-DAY: A NEW SERIES (See Page 125)

# Popular Wireless

Every Thursday PRICE 3d.

No. 462. Vol. XIX. INCORPORATING "WIRELESS" April 11th, 1931.



## IN THIS ISSUE

## THE "FLEXI-CRYS" AND COMPLETING THE "COMET" FOUR

*ALSO THIS WEEK*

BROADCASTING AT EASE

QUESTIONS I AM ASKED—By W. L. S.

A FAIR FIELD AND NO FAVOUR

# For large volume

## WITHOUT HUM or DISTORTION

In A.C. mains Sets where the output valve —whether triode or pentode—is directly heated by A.C. mains, hum is difficult to eliminate. A valve using an indirectly heated cathode should therefore be employed.

The Mazda AC/PEN is a high power Pentode capable of an enormous output with only 250 volts H.T. Its characteristics ensure excellent bass response and brilliant high notes and a detector can fully load it without an intermediate stage and complete freedom from hum is assured.

### CHARACTERISTICS

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

THE AMAZING

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*Incorporating the Wiring Supplies, Lighting Engineering and Radio Business of the British Thomson-Houston Co., Ltd.*
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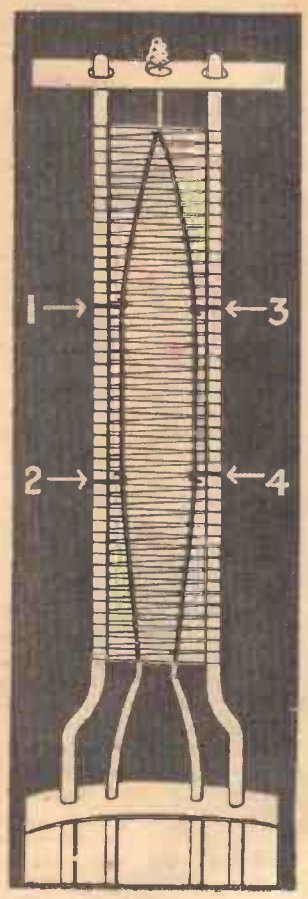
**EDISWAN**

V.105

Simple facts for Valve Users No. 1.




# Why Cossor Valves are non-microphonic

MICROPHONIC (or ringing) noises in a valve are usually due to filament vibrations. It is normal practice to suspend the filament in an inverted V formation with a spring hook at its upper extremity to counteract expansion due to heat. Naturally—because it is taut—such a filament is very prone to vibrate.

Cossor engineers have definitely solved the problem of microphonic noises by evolving the 7-point filament suspension system shown here. You will notice the four insulated hooks which secure the filament in position and instantly damp out any tendency to vibration. Incidentally, the Cossor Insulated Bridge Construction ensures a much higher standard of accuracy in assembly—thereby permitting greater uniformity of characteristics and a finer all-round performance.

**Over 50 types of Cossor Valves are available from any Wireless Shop to suit all 2, 4, and 6 volt Battery operated and A.C. Mains Receivers**

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**N.Y.'s RADIO CITY**
**VALUE OF WORDS**
**SHORT-WAVE NOTE**
**THIS 'ERE SUN**

## RADIO NOTES & NEWS

**STRAVINSKY**
**TRUTH AT LAST**
**ARIEL'S APPEAL**
**ALEX. & MOSE**

### A Good "Howler."

A SCHOOLMISTRESS has just told me a genuine "howler," which, as it arose out of matters referred to in radio "talks," may not be out-of-place. One boy, who had been learning about the "South Sea Bubble" (with modern instances), wrote that Nelson's last words were, "Kiss me, Hatry!"

### New York's Radio City.

THIS mighty enterprise, which is projected at a cost of fifty millions sterling and is being financed by a group headed by the younger Rockefeller, is now completely planned.

It will cover no less than three whole blocks, fronting Fifth Avenue, and will accommodate the offices of the Radio Corporation of America, Radio-Keith-Orphean, R.C.A. Victor and R.C.A. Photophone Co.; also a "talkie" theatre seating 6,000 and a combined cinema and variety theatre seating 4,000. Looks as if New York intends to amuse itself pretty well.

### Wireless Exchange a Menace?

OPPOSITION to the growth of the "wireless exchange" business is growing—on paper—in the ranks of the radio traders, who quite accurately see in it a menace to their business. It is also suggested that if the system were to become very widespread other menaces would appear and that the question is important enough for the House of Commons to consider. As to trade, one's loss is another's gain.

If there were no professional photographers the camera-makers would sell more goods. Less charabancs, more cheap cars, and so on. I don't blame the manufacturers and dealers for trying to protect themselves—that's what we all do! But I think the exchanges fill a gap and give radio to many who would otherwise have to miss it.

### Is this an Advance?

NEW YORK reports the invention by Dr. S. N. Baruch of a device for radio transmission which may revolutionise broadcasting, it being claimed that it creates no side-bands and will, therefore, permit more stations to occupy the ether without interference.

Dr. Baruch has applied to the Federal Radio Commission for authority to test his invention on a working scale. He claims also, I may say, that his system will give a practical shove to television. Well Robinson on the reception side with his "Stenode," and Baruch without side-bands, ought to make the ether safe for listeners.

## THE PREMIER LISTENS IN

Mr. Ramsay MacDonald is keenly interested in radio, and is here shown listening-in at "Chequers." Regular readers of "P.W." will remember that the set installed in the Premier's London home at Hampstead was a "P.W." receiver.

### Sir A. Fleming Honoured.

ON March 20th Professor Eddington presented the Duddell Medal of the Physical Society to Sir Ambrose Fleming, who everywhere but in the U.S.A. is known as the inventor of the valve. I am glad to have an occasional opportunity to draw attention to Fleming's work for radio because the general public hear only the drums and bugles of American "publicity," and need to be reminded now and then what's what and who's who!

I believe that Dr. Fleming, as he was then, assisted Marconi to design and build the world's first long-distance radio station, at Poldhu, Cornwall.

### The Value of Words.

IN the States they don't seem to bother much about murder (vide the newly published biography of Capone), but they are apt to be mighty sensitive about a naughty word or a book which frolics in parts. I see that a man of Portland (Oregon) has been fined 500 dollars for using "profane language" on the ether.

In order to let the wickedness of his crime soak well in they also sent him to prison for six months. Capone was still at large—but then, you can't convict a million dollars!

### Short-Wave Note.

MR. A. E. BEAR, 10, St. Mary's Place, Rotherhithe, S.E.16, London, England, invites the attention of short-wave enthusiasts to the following momentous matter. The International Short-Wave Club, whose headquarters are at Klondyke, Ohio, U.S.A., is, he says, the original of its kind, and has at least four imitators. (*The more the merrier, surely!*—ED. "P.W.")

This club has members in 52 countries, and is said to enjoy the support of Mr. G. Marcuse, the well-known amateur radio engineer.

### The I.S.W.C.

THE club has official stations as follows: Honduras, H R B; Winnipeg, V E 9 C L; Chicago, W 9 X A A; England, G 2 N M (Mr. Marcuse's station); and Winnipeg again, C J R X. Membership costs one dollar (4s. 2d.) per annum, and includes free copies of the club's monthly

(*Continued on next page.*)

# RADIO NOTES AND NEWS

(Continued from previous page.)

magazine, which I have seen and like the look of.

If any of you feel like joining, would you mind mentioning "P.W." when you apply? Address the club at P.O. Box 713, Klondyke, Ohio, U.S.A.

### Important Future Items.

ON April 23rd there will be broadcast the speeches of John Drinkwater, Sir Nigel Playfair, Miss Lilian Braithewaite and the Mayor of Stratford-on-Avon which are to be made during the Shakespeare Birthday Celebrations at the Town Hall of the poet's birthplace.

Don't forget that on April 25th there will be a running commentary on the F.A. Cup Final. And again, on April 25th there will be an exchange of Gallipoli memories between Gen. Sir Ian Hamilton and Compton Mackenzie.

### This 'Ere Sun.

AS I write, old Sol is making a red blob, like a fried egg, in the sky. He is sinking, in a dignified manner, over the Old Bailey, a'gilding the blindfolded lady and her scales, brightening up the dome of St. Paul's and the heels of the flappers tripping up or down Ludgate Hill. Old Sol has been tempting me all day to retire and keep fowls and to devote my life to home-construction. To-morrow—maybe—there will be an A.1 frost and I shall desire to glide in my electric car (Southern Railway!) to a really warm office and read "Comet" letters. Let's wait and see.

### Stravinsky.

OBLIGE me, friends, by turning to page 1,174 of "P.W." for March 7th, middle column. Of the two Stravinsky paragraphs R. G. S. (Wallington) has written, describing my remarks as "foolish and biassed." It is evident that they got him between wind and water, as the old sea-fighters used to say. However, if you will do what R. G. S. has not done, what that kind of critic never does, and read the paragraphs carefully, you will observe that I refer not so much to Stravinsky as to those who write or rave about him. I merely quoted the comments of the critics of the established organs of the musical world. And look at them! As for R. G. S., I think he didn't like the bit out of the "Spectator" at the end of my second paragraph. Well, judge thou between us!

### "Ariel" is Not a Musical Critic.

EVVING forbid! How should I set up as a critic of music, that know not a semibreve from an oboe? There is a musical tradition in our family, and I have a deevil of an ear for a false note. My grandfather was musical librarian for something or other of the University of London and was, with Curwen, one of the pioneers of the tonic-sol-fa system; he played at the Handel Festival on occasion, and so forth. But I have inherited only The Ear! Grandpa made me play the drum, when I was aged six, at a performance of Haydn's "Toy Symphony," which I successfully accomplished by banging the brute every time grandpa put his baton and a furious facial expression in my direction. The fact that I was reading Spohr's "Last Judgment" did not detract from the *verve* of my performance. But I am not a critic of music.

### The Truth at Last.

AND, doubtless, R. G. S. (of Wallington) will rejoice to hear it! When I refer to beer or literature or music—gramophone or radio—I am expressing only my very own low, plebeian taste. I am an ordinary domesticated man, without complexes or poses, and I write for plain, ordinary men, the salt of the British Empire. I have lived long, widely, and deeply enough to twig little conceits and poses of my fellow men and to pin my faith on the blunt yeoman, the matter-of-fact Scot and the transparent Cockney—in a pinch. And when I hear a man waxing (what he thinks is) ecstatic over a pain of piano, flute and harp, I touch wood and turn to Elgar. "P.W." doesn't possess or desire a Musical Critic. Even "Philemon" is a man and a brother!

## SHORT WAVES.

Wife: I got something good on your wireless set at last, Bill.

Bill: What was it?

Wife: Thirty bob at the pawnbroker's.—"Passing Show."

* * *

**RADIO SETS IN POLICE HELMETS.**

Wireless on the brain.—"Sunday Pictorial."

* * *

A critic recently remarked that a certain wireless programme was so good that his cigar went out three times while he was listening-in.

Evidently it wasn't quite so enthusiastic.

* * *

A "ham" catalogue, recently distributed, lists some Weston Plush type meters. To be used with transmitters installed in the living-room, no doubt!—"Q. S. T."

* * *

**LISTENING-IN TO VARIETY.**

"Whee-eee-eee! Whoop-whoop-whoop! Whee-eee-eee!"

"There doesn't seem much variety in that, old man. It's exactly what you did before."

"Never mind; I'll get it in a minute."

"You certainly will, if the neighbours find out who it is!"—"Pictorial Weekly."

* * *

Some people never seem to be able to appreciate the thrill of "twiddling" for an hour to get Algiers, only to find that it is giving news in eight African languages.—"Kettering Leader."

* * *

**AT THE CROSSBEAMS.**

(Experiments are being made in Abbeville of setting up "signposts" in space to guide aeroplanes under difficult conditions by means of two intersecting wireless "beams.")

Here at the signposts
Of planets and stars
(How far to Uranus?
Which way to Mars?),
Pilots through space,
As they slacken their pace,
Sigh for a Pull-up
For Aerial Cars . . .

Here is the nightfall
(We started at noon).
Wouldn't a resting-place
Now be a boon?
But the Crossbeams are bare,
And the Signposts of air
Say it's twelve thousand miles or so
Still to the Moon.

—"Manchester Guardian."

### What Can be Done.

MR. LESLIE W. ORTON, President of the Anglo-American Radio Society, headquarters at "Kingsthorpe," Willowbank, Uxbridge, England, and branches in U.S.A., Ireland and Birmingham, favours me with a few notes of some superfine reception which he has done. For examples, how about logging W G B B, a 100-watt station at Freeport, New York, and W J A C, another 100-watter of Johnstown, Pa.? But the gem of the collection is C R C (China) *on medium waves!*

I see Alf. Mann (of Middlesbro') jumping two feet into the ether and having bad dreams after reading this! All right, Alf! I guess it was C.W. telegraphy, not telephony!

### Ariel's Appeal.

WILL friend Snigsberry, or—the handwriting is hieroglyphical—perhaps it is Fragsworthy—cease writing about his or her correspondence with the Post Office and the B.B.C. about the reception conditions at Spudton or Spilton or Spelter or Shulfer, Yorks? We do not desire to act as arbitrators, nor do we understand about the iron bedstead which crops up about every third letter.

Do we seem like people who know about iron bedsteads? The whole office is disorganised when this Slagbittle's letters come! We tried to pay one of 'em into the bank the other day, and on another occasion we submitted one to the Handwriting Expert of "Chicks' Own," and she has claimed damages in respect of an incurable squint! Go away to Lwow!

### "Night Flight" News.

AN excellent tribute to the performance of our "Night Flight" Three comes from H. N. W. (Malacca). This set "passed up the bacon" from the moment it was hitched to an aerial. At the time he wrote, H. N. W. was listening to back-chat between Bandoeng and Sydney, "as clear as a bell." In order to get L.S. strength he built the "A.P." amplifier, and there he sits on his rubber plantation and is in touch with Bangkok, Batavia, Khabarosk, Manila, Perth, Saigon, Singapore, Sourabaya, Rome and Chelmsford. The set is "a gem," he says. Other marooned Britons, please note.

### The Strange Case of H. P. (Sutton).

HE made up a Det. and 2 L.F. (transformer-coupled) set, with good results.

Then he replaced the hook-up wiring with neat and proper connections, and got a high-pitched whistle. Ha! What was the source of his H.T.? If an eliminator, he ought to put an anti-mobq device in the anode of the Det., or a resistance in each grid lead to his second and third valves. Again, he might try an H.F. choke, with a small condenser to "earth," or a 0·0005 condenser across the transformer primary or secondary. Failing these remedies, all I can suggest is that he replaces the present wiring by his original spider hook-up!

### Alex 'N 'Mose.

WASN'T it a surprise to learn that these two excellent foolers are Billy Bennett and James Carew, husband of the late Ellen Terry? One could have sworn that they are a couple of Americans.

I see that their "opposite numbers" in the U.S.A., Messrs. Amos 'n' Andy, are losing their popularity. How is that? I don't think that we shall tire of Alex 'n' Mose for a very long time, provided the dosage is scientifically fixed and is always administered at the proper strength.

ARIEL.

# WHAT I THINK of TELEVISION

BY John Scott-Taggart, M.C., A.M.I.E.E., F.Inst.P.

"A SWINDLE, a rank swindle and a persistent swindle!" Such was the startling reply I received a few days ago when I asked the chief engineer of one of the greatest electrical concerns in the world what he thought of television.

He spoke with more disgust than discretion. But that such a man—an extremely able and experienced electrical and radio engineer—could give vent to such an outburst is a portent. I have had my own ideas for years, and each year I have hoped to make a radical change in them.

**"A Growing Child."**

This is the first occasion on which I have ever written on the subject of television—chiefly, perhaps, because of a deep sympathy with its objects, and an abiding faith in its ultimate success.

One is inclined to encourage the growing child and to hope that its bad manners, petty delinquencies, boastfulness and general noisiness will become toned down with the years.

If, however, it reaches an age of discretion without modifying its habits, what *were* forgivable peccadillos become serious offences. Boastful statements are apt to be regarded as lies; if money is obtained by them or speculation encouraged, then those lies are swindling lies.

Noisiness becomes intolerable in the grown man, however much it is tolerated in a child. The child in this analogy is, of course, television.

**Unique Exception?**

It should be made very clear from the start that when I speak of television I am referring to the art and science of transmitting images to produce the illusion of sight—and that I am speaking of the art in the world-wide sense. I am not referring to this country in particular and certainly to no individual system. There may be unique exception to my criticisms.

This explanation is necessary because modern commercial publicity methods have a knack of identifying an art with an individual. If you asked the average man in the street who invented wireless, he would say "Marconi." If you asked the average wireless listener who invented the valve he would say "Fleming."

Both statements, strictly speaking, are incorrect, although everyone knows the vast debt the art of radio owes to these geniuses. We have similar claims made in different countries in respect of television.

**The well-known author of this new series of articles needs no introduction to our readers. As author of "Thermionic Tubes in Radio Telegraphy and Telephony," "Elementary Textbook on Wireless Vacuum Tubes," etc., as inventor and research worker of international repute, his qualifications as an expert investigator and critic of Radio Television are obvious. Mr. Scott-Taggart's series of seven articles on Television, which we have secured, will appear exclusively in "Popular Wireless."**

## MR. SCOTT-TAGGART

The author of this article in his barrister's wig and robes.

I introduce this matter to make it quite clear that I am now writing of television throughout the world as developed by many different investigators.

Broadly speaking, television throughout the world has developed on similar general lines. It has been closely associated with its half-sister—the transmission of pictures by wireless or line telegraphy.

The two arts are different, but they have in more than one case been bred in the same stable, hatched by the same hen, or however one cares to put it.

**A Radio "Cinderella."**

But whereas picture transmission has been treated seriously almost from the first because it had newspaper and other applications of great importance, television has been the Cinderella who, however, is ultimately destined—when the slipper is properly adjusted to the foot—to marry the prince and live happily ever after.

The blunt fact is that television has never been wholly respectable. It has always been sneered at. To-day it is coming into its own. Why? Simply because the heads of the entertainment world realise that there is a vast amount of money to be made out of it if it can be made successful.

And since there is a vast amount of money to be made out of it, the problem will be solved, although I doubt whether the pioneers will reap the harvest they have sown, or which they claim they have sown, for it may be that they have sown the wrong kind of seed.

**Value as a Show.**

Even to-day, as I write, television—at, say, an exhibition—is treated as something a little better than a Punch and Judy show and very considerably worse than Mickey Mouse. But it arouses a vast amount of interest which, however, has not yet taken its form of any extensive buying.

The average man—if you give him an hour to forget the account in his morning's newspaper of how he is on the point of seeing test-matches being played in South Africa or boat races on the Thames—is slightly sick of television.

He has been promised a feast and he has been served with a sardine served on a very thin and narrow piece of toast. But

(*Continued on next page.*)

# WHAT I THINK OF TELEVISION.

*(Continued from previous page.)*

this fact. in my own opinion, is certain: you will see Mickey Mouse—or more probably his great-great-grandchild—on a screen in your own home. And advertisers will tell us that with their brand of receivers he looks as life-like as at the cinema. But not yet.

Initial prejudice against television has been very strong. Why, I wonder? Vested interests (sinister expression!) have been against it. Why? It is no good pretending it is not so.

Every radio engineer in the world has had a good. hearty sneer at television at some time in his career. It has been almost a part of his creed: "I do not believe in television."

### Classed as Cranks.

If he were at all enthusiastic he was classed with uncooked-food cranks, nude sects, people who thought the end of the world was coming next month, and other harmless but mildly abnormal persons. On the other hand, the harder a man sneered at television, the better radio engineer he was considered.

The amusing thing is that the sneerers have now been told to buckle to and get on with the job themselves and make a success of it! And without a doubt they will make a success of it. This comedy has been staged in America principally. Colossal concerns have watched with mild contempt the "antics" of the television "cranks."

Then one day the heads of the entertainment world realised: "There's money in this." And they peremptorily ordered their technical research staffs to do the impossible It hasn't been done yet.

At first they made themselves rather ridiculous by somewhat shamefacedly re-hashing the work of Baird, Jenkins, and others, and giving an exhibition.

What else could they do at such short notice, poor things? But the ominous silence of the big corporations indicates that the problem is now being tackled in earnest. And I shall be very much surprised if concerns which spend a million pounds a year on research alone fail to solve the problem of television.

### Sneered At.

But why has television been sneered at? My proffered reasons are these: Firstly, the radio engineers of the world have been almost wholly occupied with broadcasting and the vast industrial developments which have sprung from it.

This meant immediate monetary return. Then came the "talkies"—again financial success. Television has always loomed up as a problem, and as a problem that was extraordinarily difficult.

To bury it—as a dog buries a bone with the idea of exhuming it later—was a great temptation. And since one was busy with other more pressing—and more easy—problems, what more natural than to scoff at the television pioneers, especially if they were not very successful?

If I were a dog, I should certainly be annoyed if I saw another dog scratching up the bone I had carefully buried!

Television five years ago would have been before its time. A complete solution to-day would be before its time. The moment for television is when radio is beginning to pall—or, if that doesn't happen, when sets are more or less standardised and everyone has a good set.

### Ready Now.

Five years ago technical and business men alike were coping with ordinary broadcast receivers and valve requirements. To-day we are ready to *prepare* ourselves for television.

A second reason for the widespread contempt for television in its early days was due to the highly spectacular nature of the art. The professional engineer and scientist looked askance at something so frankly sensational.

And he looked still more askance at the whole art when it was so shamelessly exploited by the workers in it. There was no restraint—the wildest and most optimistic assertions were made—and the general Press of the countries in which television was being developed was used as an ally.

In addition—and this perhaps is the most serious aspect—money was sometimes obtained from the public on the strength of exaggerated promises, and speculation became rife. To the professional scientist and engineer, anything savouring at all of quackery is anathema.

And television has always dragged in its train all the appurtenances of quackery. Instead of being looked at as a scientific development in its childhood it has been treated as a circus side-show by most of its various proponents.

### Matter for Speculation.

The fact that some of the inventors have been rather of the unconventional type has—probably unfairly—resulted in their being regarded much as doctors regard unregistered practitioners, namely, as quacks.

Sir Herbert Barker—the famous bone-setter—was undoubtedly regarded as a quack by many doctors, and Edison himself has been recognised as everything but a professional engineer!

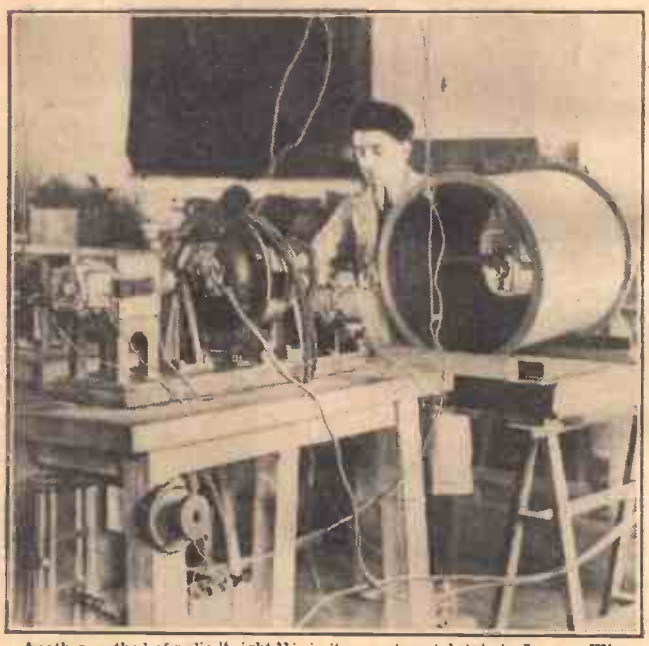
Whether the pioneers of television will achieve technical recognition or whether the producers of successful television will simply sweep them and their ideas aside in their tidal wave of triumph is a matter for speculation; mental speculation, I mean.

But whatever molten gold may lie at the bottom of their crucibles, the slag and dross has been most sadly conspicuous. Television has made an unsavoury start. May it soon recover its tarnished prestige!

## TELEVISION IN AMERICA

The inventor of the Jenkins system of television examining one of the scanning discs. We heard a great deal of this system some time ago.

## ALL OVER THE WORLD



Another method of radio "sight" is in its experimental state in Japan. Who will win the world-wide television race remains to be seen.

*LOOK OUT—*

**For the next article in this interesting series—**

**EXCLUSIVE TO "P.W."**

# The "FLEXI-CRYS"

**Here is a remarkably good crystal set, using home-made coils, and INCORPORATING THE FLEXI-COUPLING system for obtaining striking selectivity.**

ALTHOUGH it is often remarked that "crystal sets are played out," and there seems to be an idea in some quarters that to enjoy real wireless you must have a valve set, many "P.W." readers know better. They know the crystal is still very much alive, and that you can still get quite a kick out of it.

As a matter of fact, when the B.B.C. introduced in the London area their Regional scheme by which two different programmes are sent from one station, there was a big revival of interest in the crystal set. For extra power at the B.B.C. end means stronger reception for listeners, and many a crystal jumped into new life as a result of the Regional scheme!

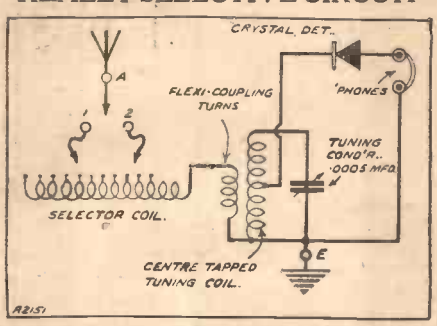
### Just Right for "Regionals."

Now this scheme is just being extended to the northern area, and at Moorside Edge, near Huddersfield, the B.B.C. has prepared to launch out two more strong programmes. And northern listeners are wondering what sort of hope they will have with a crystal set of separating those two programmes and receiving one or the other as required.

To be perfectly frank, we must admit that the old-fashioned crystal set will have its work cut out to do this! Most of the old circuits will give a hopeless hash of the two programmes in the 'phones, or else the listener will hear one of the programmes with a constant and very annoying background of the other.

A *selective* crystal receiver—and one which is capable of giving good strength as well as sharp tuning—is not at all an easy thing to design. But "P.W.'s" experience with the now very popular system of "Flexi-Coupling" has shown how it *can* be done. And so this week we present to your notice the "Flexi-Crys."

### REALLY SELECTIVE CIRCUIT




The Selector coil is linked to the tuned circuit by about half-a-dozen turns of flex.

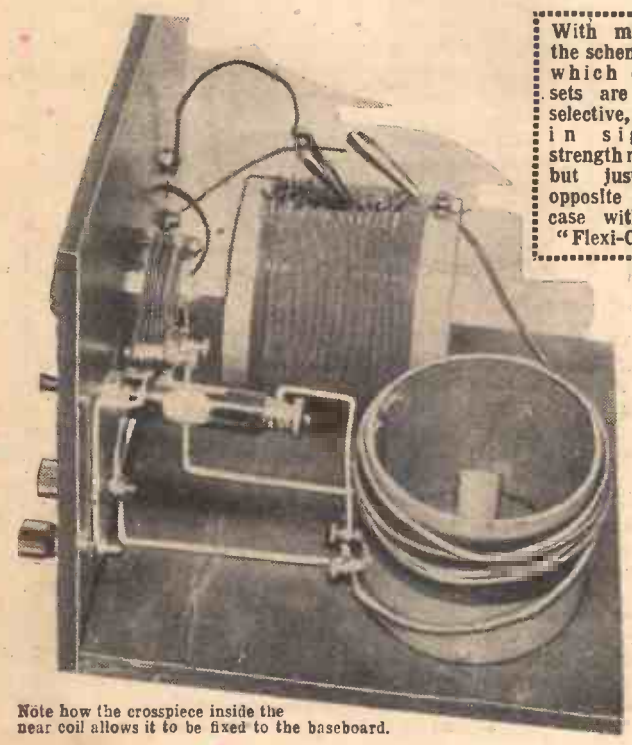
To appreciate its advantages you should have a look at the small theoretical diagram on this page. You will see that the aerial terminal (A) is capable of being connected either to (1) or to (2), these being two flexible connections that clip on to a selector coil.

### Coil-Coupling Scheme.

One end of this Selector coil goes via a small Flexi-Coupled coil to the main coil on the set, at the point where this is connected to earth (E). So all the currents that flow between aerial and earth have to pass round this little Flexi-Coupling coil.

Now this Flexi-Coupling coil is just what its name suggests—a piece of flex wire, and nothing else. But, by winding it round the top of the main coil of the set, as shown in the photographs, you can get

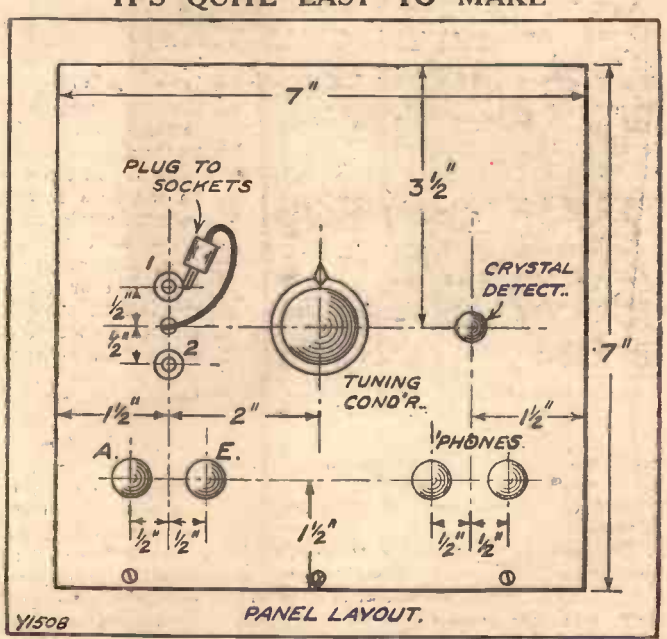
*(Continued on next page.)*



Note how the crosspiece inside the near coil allows it to be fixed to the baseboard.

**With most of the schemes by which crystal sets are made selective, a loss in signal strength results, but just the opposite is the case with the "Flexi-Crys."**

### IT'S QUITE EASY TO MAKE




The necessary measurements for drilling the holes in the panel are given on this diagram of the front of the receiver.

## THE "FLEXI-CRYS"

(*Continued from previous page.*)

sharp tuning, and an easy separation of the two different programmes.

It will be seen from the diagram that the tuning condenser is joined right across the main coil on the set, and at its centre a lead goes off to the crystal detector.

**"FOR THE FLEXI-CRYS."**

- 1 Panel, 7 ins. × 7 ins. (Peto-Scott, or Parex, Goltone, Lissen, etc.).
- 1 Cabinet with baseboard about 7 ins. deep.
- 1 ·0005-mfd. solid-dielectric condenser (Ready Radio, "Brookmans" Type, or Burton, etc.).
- 1 Crystal detector (R.I., or Red Diamond, Brownie, etc.).
- 2 Formers, 3-in. diameter, one 2½ ins. and the other 3 ins. long (Pirtoid, or Paxolin, etc.).
- ¼ lb. No. 24 D.S.C. wire.
- 4 Terminals (Belling & Lee, or Eelex, Clix, Igranic, etc.).
- Plug and sockets (Eelex, Belling & Lee, Clix, Igranic, etc.).
- 2 Crocodile clips (Glazite, etc.).

This arrangement is quite different from the old-fashioned crystal-set's connections, and you have only got to give it a trial to be convinced of its superiority.

Moreover, it will be easy to try it out, for the coils are easily made at home, and the rest of the components are very inexpensive. A list of all the parts you need for construction is given separately on this page.

When you have collected these, the first thing to do is to make the coils. The main coil (the one standing on end) consists of 50 turns of the wire wound near one end of the smaller former. To begin it, you simply pierce two or three small holes in the former, thread one end of the wire through these to hold it steady, and then wind on the fifty turns. But

## CONCERNING THE COILS

Note how the clips are fixed and the method of securing the tapped coil to the base.

half-way down—namely, at the 25th turn—you halt a moment and make a tapping.

Probably you know how this tapping business is done. Simply pull a loop of the wire through another small hole made in the former and secure, so that later on you can make connection with this point.

(The end-on photograph shows how the inside of the coil looks when this has been done.)

So the finished 50-turn coil has two ends and a centre tapping. These are taken to three little terminals mounted on the lower end of the coil-former, as shown in the wiring diagram.

So much for the main tuning coil. Now for the Selector coil.

This is a bit more complicated, for here, instead of making one centre-tapping, you need a tapping at every 4 turns, after the first 15 turns. These, however, are very easily made by just twisting small loops in the wire at every fourth turn as you wind the coil.

Then, later, you scrape the covering from the loop, give it a twist with the pliers to make it firm, and it serves as a clipping point. (For ease in attaching the clips, adjacent loops are bent in different directions, as the photograph shows.)

**Fixing Coils.**

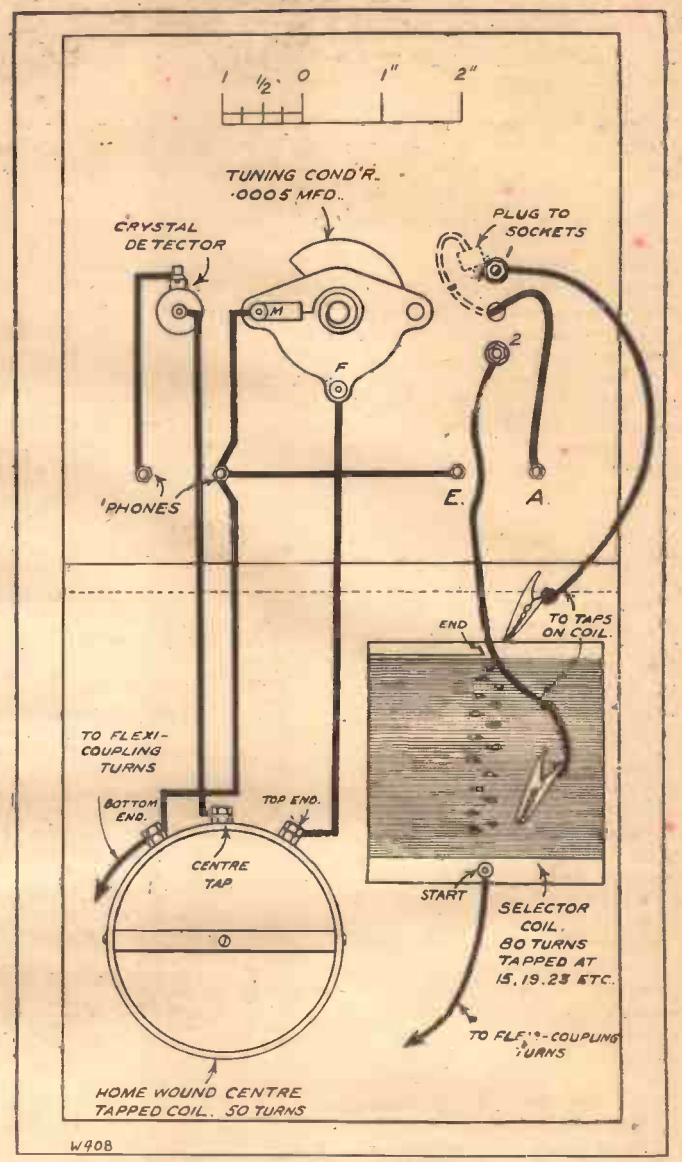
One end of the Selector coil goes to a terminal mounted on the former, the other end being finished off by anchoring it firmly to the former through a couple of holes. It is then left like that, connections to the coil being made by the clips, as shown.

To mount the coils on the base is easy enough, small screws being used for the lying-down coil, while the main or tuning coil is first provided with a wooden internal cross-piece.

This in turn is fastened to the baseboard by a single small screw. Note that the 15-turn end of Selector coil, without tappings, is placed towards the back of the set.

At first, wind the Flexi-Coupling wire round the main tuning coil half-a-dozen times, as shown by the photographs. Join up aerial, earth and 'phones, and clip the two clips on to the Selector coil, one about one-third and the other two-thirds of the way along it. Put the plug that is on the wire from the aerial terminal into either of the sockets, and listen-in for your "local."

## HOW TO WIRE UP




The heavy black lines show how the various parts are joined together.

At first it may not be very loud, so adjust your detector, and then try moving the clips along the Selector coil to different tappings. You will discover that one clip needs to go on to one particular tap to get fullest results, and that reception is then very loud.

**A Quick Change Over.**

If you put the plug into the other socket on the panel, re-tune the condenser and adjust the *other* clip on the Selector coil, you can get the second programme just as easily as the first. And once this has been done, you can go over from one programme to the other at will merely by changing over the plug on the panel and re-tuning on the condenser.

Finally, you will discover that the actual number of turns used for Flexi-Coupling makes a big difference. If very near to the local station, you may need only two or even one turn to get the right selectivity. Experiment a little with the flex lead till you get the best number of turns to suit your own needs.

# CAPT. ECKERSLEY'S QUERY CORNER

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

AIR-GAPS IN L.F. TRANSFORMER —THE BEST WAVES FOR BROADCASTING.

**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.**

### Air-Gaps in L.F. Transformer.

T. W. (Kensington).—"At a recent Technical Exhibition, I was interested to note that one exhibitor was showing an inter-valve L.F. transformer which achieved a measure of constancy in primary inductance with large variations of D.C. current.

"The principle involved was the use of an air-gap in the core of the component; and it was further stated that this device gave better treatment of "transients" owing to the fact that the inductance of the primary did not vary with changes of A.C.

"In my own receiver I employ resistance-coupling in order to ensure good "transient" response, but there is, of course, an iron-cored choke associated with the output valve. In view of the fact that chokes with air-gaps in their cores are readily available, would it be advantageous to use such a choke for better treatment of "transients"?

I answer your question in terms of the adjectives good, better and best. Taking it all in all, and realising that both microphone land lines and loud speaker all give transient distortion, it may be unnecessary to worry unduly about other parts of the circuit.

The transformer has a great commercial value (although it does not represent perfection mostly because it gives transient distortion). This transformer connection may be considered as good, and in very many cases in commercial design perfectly satisfactory for the purposes of hearing broadcasting.

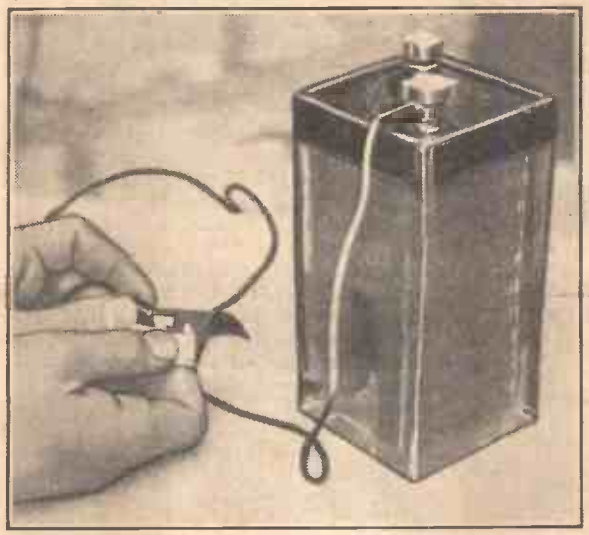
It is a question of reactances that are introduced into a circuit by the use of a transformer with given transient distortion; and a transformer with an air-gap, provided its other qualities are unimpaired and provided it gives less reactance, is therefore better. The same applies to a choke.

### Avoid Reactance.

This is the better solution, provided it *is* a better solution—i.e. provided it does not bring in other disadvantages.

The best solution is to avoid reactance altogether, and therefore the pure resistance coupling is the best solution if perfection is aimed at. I do not know if you have a mains set, but if you have I should have thought it would be possible to use your last stage with a resistance instead of choke coupling. Choke output is a practical means of using high-tension economically, but if you have mains the question of economics does not enter, and by raising the voltage sufficiently for the last stage you can get all the advantages of resistance magnification plus straight-line amplification plus correct optimum impedance plus as large output with the resistance-coupling as with the choke coupling.

## THE BATTERY CONNECTIONS



Good sound contact at the accumulator terminals is one secret of freedom from crackle. Strong, well-made connectors can be obtained for a few pence. They should be cleaned at intervals, and kept coated with a smear of petroleum jelly.

### The Best Waves for Broadcasting.

L. K. (Bristol).—"My brother, who is a marine wireless operator tells me that it is possible to read the telegraph signals of the Rugby wireless station quite easily even off the coast of Australia. This, I understand, is due partly to the very high power employed and partly to the fact that the station works on a very long wave-length.

"If increase in wave-length is so effective in giving additional range, why is it that no broadcasting station is operated on the long wave-lengths?"

This question hits me very hard. I claim to be a pioneer of long-wave broadcasting, and from the first I have realised that the use of long waves does give a very much greater range of direct ray service.

I have long argued at international conferences that broadcasting should be given as many long waves as possible. There are, however, various difficulties in the way.

Firstly, broadcasting has not the only claim upon the limited number of wave-lengths available for all wireless. There are many important services which could not work on waves other than those they possess, and while broadcasting is extremely important it has come last into the field and its claims are therefore to that extent invalidated.

I believe, however, that it could be arranged without dislocation to other services to allocate nearly all the waves between 400 and 2,000 metres to broadcasting. The ships, I believe, could use shorter wave-lengths for their general communication, and it is hoped one day that the administrations will come to see the logicality of the claims of broadcasting for long waves.

It is, however, uneconomic to pursue this policy too far, and a wave-length of say 5,000 or 6,000 metres would be of little value to broadcasting, in fact waves above 2,000 metres have very little value.

### Not Much Room.

I cannot go into the full theory, but I can tell you and I hope you will believe me, that you can only fit in something like three or four broadcasting stations between 2,000 and 3,000 metres and perhaps only one between 10,000 and 20,000 metres. (I speak casually and not altogether quantitatively accurately).

Furthermore, the design of aerial becomes difficult and efficiency on these long waves is hard to obtain. It is easier with telegraphy than with telephony: high-power telegraphy stations on very long waves have a certain value, a value very much less for point to point communication than very short-waves, but nevertheless a value.

The arrangement outlined above would prove of benefit for broadcasting and should not dislocate other services if the changes are introduced gradually and consistent with the priority claims of other services.

## FROM THE TECHNICAL EDITOR'S NOTE BOOK.

# Tested and Found—?

### A FASCINATING RECEIVER.

I have just completed my tests on one of those all-mains three-stage multi-valve Loewe receivers. It has a built-in loud speaker, and you will see from the accompanying photograph that it resembles a set built into a loud speaker rather than a set with a built-in loud speaker!

Apart from the rectifier there is only the one valve, and this is of the Loewe triple type. Perhaps there are many of you who have the idea that when this one valve

The Loewe E.B.100 All-Mains Set.

burns out a very heavy replacement expenditure is incurred, but this is not so, for the Loewe people operate a system whereby it is possible to exchange damaged valves for new ones through dealers at reasonable charges.

I must say that I anticipated a fair amount of hum in view of the fact that all the vital coupling components are built into the valve itself, but, as a matter of fact, the hum is so slight as to be almost negligible.

There is ample volume from medium-wave stations, while long-wavers come in with commendable punch. And on the point of selectivity this Loewe EB100 set is one of the best I have tried, particularly on the medium waves.

### SUPROLYTE.

This is a liquid sold by Othon Bastadin, of 90, West Side, Clapham Common, S.W.4. It is designed to replace the acid in an accumulator, and it is claimed that it will enable an accumulator to be charged in forty-five minutes as against twenty-four hours by the ordinary method and prevents sulphation, overheating and paste shedding.

I have been carrying out some tests with this fluid, and it does seem to be effective. I do not think the rapid charging interests radio amateurs so much as the prevention and cure of sulphation, and I am sure Suprolyte would more vitally interest the average radio amateur if the sulphation claims were underlined.

In one of my tests I took a very badly sulphated accumulator, exchanged the acid for Suprolyte and had the thing charged and discharged several times. Most of the sulphation has now disappeared and the accumulator is holding a charge, a thing it had not done for months. Suprolyte cannot do this accumulator any harm, as it was only fit for throwing away before.

### BURNE-JONES PUBLICATIONS.

Burne-Jones & Co., Ltd., have issued new lists dealing with Magnum A.C. mains and battery receivers and Magnum components.

### WIRE-WOUND POWER RESISTANCES.

With the ever-increasing popularity of mains sets a greater and greater demand is being made for resistances capable of handling fairly heavy currents, and the diminishing demand for anode resistances owing to a falling off in popularity of resistance-capacity coupling is off-set by the wider use of decoupling arrangements.

The Watmel Wireless Co., Ltd., are now producing an entirely new range of wire-wound resistances designed on a non-inductive basis. I number them among the neatest little components that I have seen. They are compacted into tiny bakelite cases and—a very good point this—their values are clearly inset on the tops of the formers.

The range includes a large number of values from 100 to 100,000 ohms, and the current-carrying capacities are from 50 milliamps down to 6 milliamps. The prices rise as with the increase of resistance from 1s. 6d. up to 7s. 6d. I checked up the resistances of the samples sent for test and found them perfectly O.K. in this regard.

### FOR SET TESTING.

For those who have to do a fair amount of set testing or battery voltage testing, the Eelex Test Prods, made by Messrs. J. J. Eastick & Sons, Ltd., should prove of valuable assistance. They are very brightly coloured red and black (glossily, I suppose, would be the more correct adjective in the latter case!) and each prod is about the size of a propelling pencil.

The metal contact point comes up only when you press the spring top, but the point can be locked in position merely by twisting this top. The very ingenious design is undoubtedly one which will commend itself to the practical engineer. It means that you can drop the prod without fear that there will be a serious short circuit caused.

### PANADYNE LOUD SPEAKER.

I recently received a Panadyne loud speaker and loud-speaker unit for test.

**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.**

The unit is a robustly constructed affair, and incorporates a wedge-shaped reed operating between the poles of a large and strong magnet. A large milled screw is fitted for adjusting purposes.

The unit is more sensitive than the average, and its response is bright and clean. The bass is good, too, for this type of movement.

The Panadyne loud speaker provides a clear-cut response and is an accessory of good class. As you will see by examining the photo below, its "lines" are distinctive and I can add that the craftsmanship displayed is of a high order.

A complete Panadyne and a Panadyne Loud-Speaker Unit.

# QUESTIONS I AM ASKED

## BY OUR SHORT WAVE EXPERT

**"W. L. S.," who is a popular and regular contributor to our pages, discusses some of the queries he is asked concerning short waves.**

I AM frequently asked questions on short-wave subjects, both by acquaintances in person, and readers of "P.W." by post. It is interesting to review them occasionally, and particularly to note that those that appear most obvious are usually those that are most difficult to answer satisfactorily.

Probably the answers to many of them will prove of interest to short-wave enthusiasts who must often have asked themselves similar questions. Even if they have only reached the stage of "I wonder why ——" and left it at that, they probably are still interested.

### The Question of Distance.

The following are selected as fairly good examples of the "obvious" variety:

"*Why are the short waves so much associated with distant reception, and why is local reception so poor?*"

This is a question that it is almost impossible to answer with any certainty. The favoured theory at the moment is that of the "Heaviside" layer, a region of ionised particles believed to exist at a distance above the earth's surface varying between 60 and 200 miles.

Signals radiated from an aerial travel upwards until they encounter this layer, when they are partly reflected and partly absorbed, according to their wave-length. (This is all in theory, of course.)

The shorter the wave-length, the greater is the degree of reflection, and consequently the greater the distance across the earth's surface between their source and the point where they "come down."

This layer is supposed to vary in height according to the position of the sun, and this ingenious theory, of course, accounts for the different distances covered by a given signal during different degrees of daylight.

It is a well-known fact that the wave-lengths up to about 30 metres generally travel further during daylight, whereas those above will, in certain conditions, make better "night waves."

### Those Erratic Conditions.

"*What can account for the erratic changes in receiving conditions from week to week on the short waves?*"

This is another poser; if we accept the "Heaviside" theory it partly supplies us with an answer. Changes in the condition of the sun's surface, due to sun-spot areas, would mean corresponding changes in the ionising effect of the sun on the hypothetical "layer."

Therefore, the "skip-distance," as it is called, of a given signal, would vary in an erratic manner. Thus it might happen that in January a signal from America would be strong in this country and inaudible in, say, Poland. A change in "skip" might take place that would lead to the same signal being much weaker or even inaudible here in February, while in Poland it would quite possibly be strong.

To compensate for this, the change would probably shift things round so that another signal, not heard here in January, would suddenly start arriving in February.

It seems probable that what we call "bad conditions," when we can hear no distant stations at all, are simply periods that should be good for the reception of parts where no transmitting stations exist. After all, the Pacific Ocean alone accounts for a large part of the globe and is not very thickly populated by short-wave transmitters!

"*Why can there be several transmitters, working in a space of a few metres (say, between 30 and 32) when, on the broadcast waves, stations five metres apart interfere with each other?*"

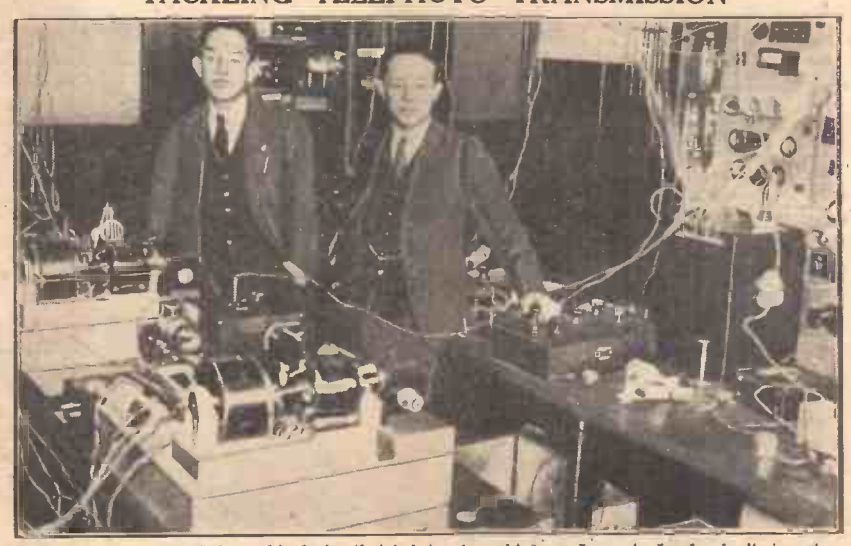
This is simply because it is ridiculous to keep to "wave-lengths," when "frequencies" are more scientific and less misleading. Frequencies are inversely proportional to wave-lengths, and a station always occupies the same frequency-band, except when something is technically wrong and it "spreads." Frequencies are obtained by dividing wave-lengths (in metres) into 300,000, the answer then being in thousands of cycles, or *kilocycles*. 300 metres is equivalent to 1,000 kilocycles per second, and 3,000 metres to 100 kilocycles per second.

### Simple Arithmetic.

Thus a little simple arithmetic will show that between 30 and 33 metres we have nearly 1,000 kc., whereas between 300 and 333 metres we have only just under 100 kc. And this with 3 metres in the one case and 33 metres in the other! The frequency-band contained between 20 metres and 30 metres is about five times as wide as the whole range between 300 metres and the "top edge"—i.e. about 30,000 metres!

Thus we are liable to be confused by thinking in metres, whereas by thinking in kilocycles we can tell at a glance what chance there is of interference between two stations.

## TACKLING TELEPHOTO TRANSMISSION



A newly-invented telephotographic device that is being brought from Japan to London by its inventor. It enables rapid transmission of photographs to be carried out by radio.

# "A FAIR FIELD AND NO FAVOUR"

**Not a bad motto for the B.B.C. where controversial matter is concerned.**

**BY THE EDITOR.**

SIR JOHN REITH is definitely of the opinion that people are not getting tired of wireless. And he is incontestably right.

There are 2,500 new licences taken out every day. In February alone 70,000 new licences were taken out; and to-day it would not be an exaggeration to say that the average number of people who listened-in daily must be in the neighbourhood of 17,000,000.

Yes, Sir John Reith is right.

### The B.B.C. Best.

People are not getting tired of wireless—but this may be due, in a large measure, to the fact that foreign programmes are now very easy to receive.

But, a good many people still think the B.B.C.'s programmes are the best "on the air." And if you don't agree, you must remember another dictum of Sir John Reith's—that the programmes are not intended to suit all folks all the time, but in them will be found something suitable for all folks at some time.

Sir John also maintains—according to Sir John Foster Fraser, who interviewed the Director-General a few days ago—that "the ethical and intellectual standards must not be lowered," and that "broadcasting has a consolidating effect on the community in considering problems of the world."

And few will disagree with him.

But when Sir John says (if correctly reported) that "there are different views on science and religion, but there should be no mental unsettling which may cause a sense of hopelessness in the mind of the listener," we feel he is assuming that the average intelligence and general good sense of listeners is rather low.

### "Unsettling."

If *both* sides of a question are discussed, it should be safe to broadcast any controversial matter. Sir John obviously feels that it would be "unsettling" for the listener if a talk were broadcast on atheism—even if it were immediately followed by a talk, say, on Faith.

Sir John's viewpoint, in short, seems to us a dangerous one to express in practice. The recent row at Daytona, between the Fundamentalists and those who upheld Darwinism is a case in point which illustrates the dangers of not allowing the ventilation of all opinions.

"A Fair Field and No Favour" would not be a bad motto for the B.B.C., especially where controversial matter was concerned.

### The Summer Programme.

The B.B.C. announces that the programme of talks for the period April to July, 1931, has now been arranged.

Listeners will be interested to know that among the talks to be given in the late evening (generally at 9.20 p.m.), Dr. George Dyson continues his series on "The Progress of Music" on Tuesdays, while Mr. Vernon Bartlett, from the beginning of May onwards, will give his weekly talk on "The Way of the World" on Fridays instead of Thursdays.

At the end of April Mr. Harold Nicolson will end his "People and Things" talks. Instead there will be broadcast on Thursday evenings a series of light talks called "Idle Thoughts." Various speakers will contribute, including Lord Ponsonby, Mr. Compton Mackenzie, Mr. Denis Mackail, and Captain Robert Hartman, as well as Mr. Harold Nicolson.

### "The Ideal Holiday."

On Saturdays there will be a series called "The Ideal Holiday," consisting of six discussions between well-known people on the respective merits as holiday centres of different parts of the British Isles. Major J. W. Hills, M.P., and Mr. Clough Williams-Ellis will dispute the respective merits of the Cornish coast and the Welsh coast; Mr. Compton Mackenzie and Mr. Stephen Gwynn, the Highlands and Ireland; and Mr. Hugh Walpole and Mr. H. J. Massingham, the Lake Country and Shakespeare's Country.

After these discussions there will be a series of talks called "Escape," in which various people who have made exciting escapes from enemy hands will tell the stories of their adventures. The series will be introduced by Mr. J. R. Ackerley, author of "Prisoners of War," and other probable speakers include Major F. Yeats-Brown; Mr. A. J. Evans, author of "The Escaping Club"; and Mr. E. H. Jones, author of "The Road to Endor."

"HULLO MIKE!"

Everybody who is famous has to make acquaintance with "Mike"—the microphone—at some time or other. Here is Sophie Tucker with—whom do you think?—Hanneu Swaffer, of course.

On Monday and Wednesday evenings there will be topical talks, including a symposium on "Russia," and probably a series of political talks.

The seven o'clock talks will as usual be devoted to the wireless critics, Mr. Desmond MacCarthy and Miss Sackville West, on "New Books." Mr. Agate on "Plays and the Theatre," Mr. Francis Birrell on "The Cinema," Mr. Michael Sadleir and another speaker on "New Novels," Mr. Ernest Newman on "Music Criticism," and M. Adrian Boult on "Music in the Coming Programmes." In addition, the fortnightly talks on Farming, by Sir Daniel Hall; on Business, by Mr. A. P. L. Gordon; and on "This Surprising World," by Mr. Gerald Heard, will be continued. On Saturdays there will be a new departure in the shape of a weekly talk called "The Week in the Garden."

### Interesting Indian Talks.

There will be, as usual, a series of educational talks at 7.25 p.m. on the National programme. Perhaps the most important of these is that to be broadcast on Friday evenings about India. The object of this series is to provide material upon which listeners can obtain some knowledge of the conditions in India and the problems to be faced. This series will consist of eight or twelve talks. Further details will be given in a comprehensive pamphlet (price threepence, or by post fourpence) which will be published as a background to the series.

On Thursday evenings there will be a second series of discussions on "The World and Ourselves," which have been arranged in response to the demands from many listeners who enjoyed the first series. Mr. Evelyn Wrench, who was chairman of the discussions in the first series, will now act as a representative of Great Britain in each of the discussions.

### Another Series.

On Wednesdays there will be a series by Major F. Yeats-Brown, well-known as the author of "Bengal Lancer," called "Gods, Saints and Heroes of Hindustan." This series will, it is hoped, prove a useful complement to the series on India. Major Yeats-Brown will be concerned with the psychic background of India and will take the listener from the mythical gods and heroes of the Aryan race through the ages to the Maharajahs and fighting clans of to-day, as well as the modern poets, painters and philosophers. This series of six talks will be followed by another called "Chemistry in Industry." The contributors will include Sir William Pope, Professor F. G. Donnan and Dr. Herbert Levinstein.

### Science at Sea.

Two different series of six talks will be broadcast on Tuesday evenings. First, "Our Food from the Sea," by Professor A. C. Hardy, will tell the story of the development of our great fishing industry and show what science has done for it and what it still can do. This series will be

(*Continued on page* 152.)

# BROADCASTING AT EASE

**Artistes must feel entirely "at home" in the studio before they can broadcast at their best. In this article some of the experiments carried out by the B.B.C. to make their artistes "comfy" are described. By OUR SPECIAL CORRESPONDENT.**

THERE are now nine studios at Savoy Hill, and three at the new Midland Regional B.B.C. offices at Manchester. Each one is a great improvement on the studios in the early days of broadcasting, but it is only within the last few months that the B.B.C. engineers have copied a few American ideas and are hoping for better broadcasts by making artistes "comfy."

### Faked Footlights.

The artistes themselves have been agitating for this, particularly for vaudeville turns. Tommy Handley is happy in front of the microphone without any "props," but one of the first broadcast vaudeville turns which Leonard Henry *compêred* was done in a darkened studio with limelights playing on the performers (most of them well-known music-hall people) to create a normal stage atmosphere. In a similar turn a fortnight later the impression of being on a stage was heightened by the erection of a platform in one of the studios —No. 4. I think—on which the artistes performed, while the B.B.C. dance band was playing a few feet below on the floor level.

This kind of thing isn't done now; first because the "limes" necessitated high-voltage cables straying about the floor and it was difficult to prevent the microphone leads picking up mains hum; second, because most of the wireless vaudeville stars who are so well known—Mabel Constanduros, Clapham and Dwyer, "Stainless," Tommy Handley, Ronald Frankau and so on—are, after long radio experience, as happy with the microphone as under any circumstances.

Jack Payne, Gershom Parkington, and J. H. Squire and their merry men could probably play placidly even in a studio on fire!

### The Clapping Claque.

But newcomers are different; there are so many things in a studio which "put them off their stroke," and when the B.B.C. can avoid this entirely we shall have better broadcasts, particularly from well-known stars who have had life-long experience of the stage, and feel lost without the footlights.

Two new things which the B.B.C. producers and engineers are doing are increasing the "claque," and the use of directional microphones.

The "claque," of course, is just a rude term for the studio audience, in which there is nothing new; *but have you noticed that all the recent vaudeville turns from the North have been done in Manchester's new giant studio, which has a gallery for a large audience: and the large audience is there.*

The best that can be done in this way at Savoy Hill, at present, is in the No. 7 studio, which is the largest and is a double-decker formed by knocking two rooms, one above the other, into one.

### Focussing the Sound.

In the new Broadcasting House in Portland Place there will be a much larger public-hall studio than at Manchester, and it is understood officially that the general public will be admitted. At present the studio "claque" is often formed of artistes' friends; hence the loud clapping!

Directional "mikes" are another step in the direction of making artistes more at home. Beginners are sometimes unnerved by having to keep their heads always turned towards the microphone (even when reading lines from a vaudeville or play MS.) and by having to act quite differently from the way they would on a stage—stepping forward to address important lines to the microphone, for instance, instead of normally addressing a "partner."

The failure to do this properly results in artificial fading away of some perhaps vital lines, and that is why a few quite famous stage stars have "made a flop" as radio vaudeville turns.

### A DIRECTIONAL "MIKE."

One of the ideas mentioned for making radio artistes feel at home is a directional microphone. The one shown complete with operator is in action in a National Broadcasting Studio in America.

### Kicking Out an Artiste.

Briefly, a condenser microphone is fitted with a broad and short copper horn like a loud speaker trumpet, and this is simply pointed at any artiste whom it is desired to accentuate. Actors in a radio play can thus address one another in the normal way, instead of facing the "mike"; the horn is pointed at each artistein turn.

The troubles are that the normal B.B.C. microphones, of the carbon variety, make an appalling crackling din if touched or moved; also, the fitting of a horn sometimes produces resonances which are as bad as those from old-type horn loud speakers.

The first trouble has been partly overcome by using condenser microphones in place of the carbons; condenser "mikes" are made like a large fixed condenser with air-

(*Continued on page* 152.)

LATEST BROADCASTING NEWS.

# POLITICIANS ON THE AIR.

**B.B.C. LIVESTOCK — NORTHERN ODDMENTS — NEW BELFAST PRODUCER, Etc.**

SPEECHES by Mr. J. H. Thomas and Mr. Stanley Baldwin, following the annual banquet of the Royal Empire Society, will be relayed from the Connaught Rooms, London, for National listeners on Thursday evening, May 21st.

On Saturday, April 11th, London Regional listeners will hear the speeches at a dinner to be given at the Savoy Hotel to Mr. Lloyd George in recognition of his services to the Jewish people. Dr. Chaim Weizmann, President of the Jewish Agency for Palestine, which is arranging the dinner, will propose the health of Mr. Lloyd George, the proposition being seconded by Sir Herbert Samuel (a former First High Commissioner for Palestine).

Mr. Lloyd George's reply will, of course, also be broadcast.

### Criticism in Canada.

Efforts behind the scenes have not succeeded in preventing an outbreak of hostilities between the B.B.C. and the Canadian Pacific Railway Company, one of whose officials contributed an article to a Canadian magazine seriously criticising the B.B.C. The railway company declined to accept responsibility for what they regarded as an independent expression of opinion, but they also declined to make any public statement.

Savoy Hill regards the affair as serious and is acting accordingly.

### B.B.C. "Live Stock."

A week or so ago a railway delivery van brought to the Birmingham offices of the B.B.C. a mysteriously wrapped package, labelled "Live Stock." Naturally the staff was agog with the wildest excitement, and when the covers were removed their equilibrium was still further upset by the sight of a beautiful pink and grey parrot, complete with cage, on the top of which was tied a small packet of seed, in case the shop happened to be closed when the bird arrived at its destination.

There was no clue to the sender, nor any indication of Polly's name—nothing, in fact, beyond the briefly addressed label that he or she was intended to become the pet of the Midland Regional Children's Hour. Mr. Percy Edgar, the Regional director, decided that for a while he would keep the creature under observation, as it were, and so it is living in his office in order that he can hear it say whatever it knows, if anything.

So far, however, "Ermyntrude"—the first name which occurred to Mr. Edgar—has said nothing, probably for the good reason that, being fairly young, it knows nothing. But Mr. Edgar and his staff are hopeful. If and when "Ermyntrude" can say, "Hallo, Children!" he or she will be allowed to appear before the microphone in what is now one of the best and most popular Children's Hour programmes of the whole country.

### Uncle Peter's Parrot.

Let us hope that Mr. Edgar will have better luck with "Ermyntrude" than Mr. C. E. Hodges (Uncle Peter) had with his parrot at Savoy Hill some few years ago. If we remember rightly, that bird was purchased and put on the staff, a great honour for any bird, but one which it utterly failed to appreciate, because the only effect was to cause the parrot to die.

### Northern Oddments.

The days of several transmitters in the Northern Region are numbered, and the sooner the new station at Moorside Edge takes over the regular radiation of programmes the sooner will the old gear at Manchester, Liverpool, Sheffield, Leeds, Bradford and Hull be scrapped. But this does not spell the end of the existing studios which mean so much to the civic pride of those cities whose importance has been accentuated by the coming of broadcasting.

Just to show that they intend to continue to draw on the artistic resources of the whole region, the B.B.C. has arranged a revue called "Oddments," made up of contributions from Manchester, Leeds and Newcastle. It will be heard on Saturday, April 25th, and is the work of writers whose names have figured in many Northern revues of the past—E. A. Bryan, Edwin Lewis, and Henry Toplis—whose efforts will reflect the life and humour of Lancashire, Northumberland and Yorkshire respectively.

The whole programme will be made continuous and carried through in the same way as if only one, and not three studios were being used.

### New Belfast Producer.

Mr. Sam Bulloch, who has just been appointed permanent producer to the Belfast station, is well known for his extensive knowledge of Irish drama which the Ulster station is very keen on developing at the present time. He has also a considerable reputation as a producer of Shakespeare, as well as an actor, and now that Belfast has regained its temporarily lost status as a main station, plenty of scope will be found for him.



# 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.**

### The Smoothing Iron

THE B.B.C. is not a government department, but it is a public service. This fact must have weight in determining its policy.

It gives us a glimpse into the difficulties with which Savoy Hill is constantly contending. One of its ablest officials employs a good deal of his time in "coaxing and cajoling" persons who are angry about something.

He is a sort of smoothing-iron. He smooths out the creases. There are always objectors.

Years ago, a very innocent little talk of mine brought (as it seemed) the whole of the Roman Catholic Church buzzing like a swarm of hornets round the head of the Director-General. They had to be appeased. The smoothing-iron got busy. Westminster Cathedral still stands!

### You Can't Please Everybody.

The B.B.C. cannot please everybody, but it must please as many as it can. It must particularly try to please persons in authority, who have influence over large groups of listeners. Or, if it cannot please them, it must keep them quiet.

It is well-established by this time that the editor of even a well-established paper must be careful of his clientele. Causes of offence must be reduced to a minimum.

(*Continued on page* 151.)

# R.I. SCORE AGAIN with a new, improved model of the P.W and M.W. SELECTOR COIL

**Here is the latest and best production of the "P.W.," "M.W." and "Constructor" coil made and perfected by R.I. to a degree of amazing efficiency and finished excellence.**

**The thousands of satisfied users of the R.I. Dual Range Coil will find that it has paid them to wait for the R.I. Selector Coil, which is certainly a wonderful job, built of bakelite and fitted with an engraved scale—a new and essential feature showing the exact position of the tappings. This is indispensable for easy operation of your set.**

***The obvious thoroughness in design and manufacture, and the exactitude of this latest R.I. component, clearly pre-determine that the results, claimed by the designers of the coil, will be positively attained by using the R.I. model with the engraved dial.***

*The R.I. Selector Coil, made to the exact specification of the designers and laboratory tested to ensure highest efficiency. Bakelite moulded former wound with finest double silk wire. One hole fixing.* **12/6**

## and for Specified Highest Efficiency these R.I. Components excel


**The Famous R.I. DUAL RANGE COIL**

The amazing perfection of the R.I. Dual Range Coil and its immense success is due to the most highly critical laboratory tests, including the wavemeter and inductance bridge, and a special apparatus answering to all "P.W." and "M.W." published circuits in which the coil is specified. **12/6**

**The "HYPERMITE" Nikalloy Transformer**

The use of the "Hypermite" ensures getting the best bass notes and the highest treble of which any speaker is capable. It is a marvel for its weight and size, and absolutely indispensable in compact set assembly. Primary inductance over 50 henries. Ratio 3½ to 1. **12/6**

**The Improved G.P. L.F. TRANSFORMER**

This improved model of the famous G.P. Transformer when employed in conjunction with the "Hypermite" definitely gives higher amplification and purer reproduction than any other combination of transformers at the price. Ratio 3½ to 1. Primary inductance 35/40 henries. **10/6**

**PURCHASE R.I. THEY'RE BEST AND COST NO MORE**

*Radio Instruments Ltd., Madrigal Works, Purley Way, Croydon.* *'Phone: Thornton Heath 3211.*

# A MIXED BAG.

**Some more representative letters from our readers, dealing with all sorts of interesting radio subjects.**

### THE "P.W." "COMET."

The Editor, POPULAR WIRELESS.

Dear Sirs,—I have much pleasure in writing to inform you of the excellent results I have obtained from the "Comet."

Last Sunday night I received 40 stations on L.S., 33 L.W., 7 H.W., with only slight jamming on two of the L.W. at mid. dial owing to the congestion at that point on the tuning scale.

The dial readings for L.W. are practically on the dot, as I have proved for Turin, Rome, Barcelona, Mid. Reg., etc.

The results I have obtained reflect much more credit to the circuit, owing to the fact that I am in a sort of "bird cage." Ten pairs of 'phone wires within 22 yards of where set is, four electric feed wires for village, 250 volts, practically running parallel with roof of the garden bungalow where set is, and last but not least, within 30 yards, two pairs of electric feed wires for Ayr, from Kilmarnock, 11,000 volts. When wind is coming from east—direction of wires—reception is affected to a certain extent, as regards hum, which is not to be wondered at. I may inform you that before your "Comet" Two was mooted to the public, I had one made, and with a Pentode valve received 27 stations on L.S. It is similar to the Three as above described.

The "Comet" I consider is a receiver that fills the gap that is required at present. Selective enough to obtain at L.S. volume a good number of stations; quite enough to satisfy more than the average listener, and that without interference from others. The average screened three, is more sensitive, but its sensitivity is its fault, owing to the limited number of stations that can be heard without interference.

Yours faithfully,
PERCY SCOTT MCHUTCHENS.

Robertloan House
Loans
Troon,
Ayrshire.

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### ALL ON A TWO-VALVER!

To the Editor, POPULAR WIRELESS.

Dear Sir,—A year ago my friend and I each built a "Magic" Two, and have succeeded on bagging the following stations:

**LONG WAVES.**

Radio-Paris (LS); Huizen (LS); Königswusterhausen (LS); Daventry 5 X X (LS); Eiffel Tower; Oslo (LS); Croydon.

**SHORT WAVES.**

Budapest (LS); Munich; Vienna (LS); Brussels 1 (LS); Milan (LS); Moscow; Prague; Midland Regional (LS); Langenberg (LS); Lyons; Paris, P H (LS); Rome (LS); Belgrade (LS); Berlin; Dublin; Katowice (LS); Glasgow; Bucharest; Frankfurt; Toulouse (LS); Lwów; Genoa; Manchester; Hamburg (LS); Algiers (LS); Stuttgart (LS); Mühlacker (LS); London Regional (LS); Graz; Barcelona (LS); Strasbourg-Brumath (LS); Brno; Brussels (2) (LS); Naples; Breslau; Göteborg (LS); Wilno; Bordeau-Lafayette; Aberdeen; Hilversum; Lyons; Montpellier; Bratislava; Königsberg; Heilbourg (LS); Turin (LS); Barcelona; Morovska-Ostrava; London National (LS); Gleiwitz; Horby (LS); Toulouse (LS); Leipzig (LS); Cracow; Belfast; Cork; Cologne; Leeds.

**AMERICAN SHORT WAVES.**

| | | Metres. |
|---|---|---|
| Miami Beach, Florida .. | W 1 O D | 556 |
| New York .. .. .. | W E A F | 453·1 |
| Chicago, Ill. .. .. | W E M R | 345 |
| Bound Brook, N.J. (LS) .. | W J Z | 295 |
| Schenectady, N.Y., (LS) .. | W G Y | 380 |
| Denver, Col. .. .. | K O A | 361 |
| New York City .. .. | W A B C | 349 |
| Pittsburg East, P.A. .. | K D K A | 306 |
| Harkford, Con. (LS) .. | W T U | 283 |
| Cleveland, Ohio .. .. | W T A M | 280 |
| St. Louis, Mo. .. .. | K M O X | 275·2 |
| Kearny, N.J. .. .. | W O R | 422 |
| Atlantic City, N.J. (LS) .. | W P G | 272·6 |
| Council Bluffs, Iowa .. | K O I L | 238 |

**ULTRA SHORT WAVES.**

Rome (LS); Prague (LS); Bergedorf (LS); Barcelona (Radio club); Chicago, W G X F (LS); New York, W 2 X A L; Cincinnati, W 8 X A L; Philadelphia W 3 X A U; Vienna; Chicago W 9 X A A; Bound Brook W 3 X A L (LS); Richmond Hill W 2 X E; Saigon; Pittsburg East W 8 X K (LS); Bogota H K C; Tegucigalpa, H R B; Georgetown V R Y; Long Island W 2 X V; Lyngby (LS); Schnectady W 2 X A F (LS); Zeesen (LS); Springfield W 1 X A L; Eindhoven (LS); Philadelphia W 3 X A V; Sydney V K 2 M E; Nairobi 7 L O; Posen; Buenos Aires L S X (LS); Chelmsford G 5 S W (LS); Schenectady W 2 X A D (LS); Bandoeng P L E; Bandoeng P L F, P L R; Bridgewater; Doberitz A F K; Drummondville; Madrid; Ss. Majestic G F W V (LS); Ss. Olympic G L S G (LS); N.Y. Telephone Stations; St. Assise P S A; Rugby; Slough; Nancy.

**AMATEURS, ENGLISH.**

2 A K, 2 A L, 2 A O, 2 A X, 2 C J, 2 C K, 2 D N, 2 D Q, 2 F Q, 2 G F, 2 I J, 2 K O, 2 K T, 2 K Z, 2 L D, 2 L V, 2 L Z, 2 M I, 2 M J, 2 N V, 2 P O, 2 P S, 2 Q C, 2 Q N, 2 R V, 2 S O, 2 S R, 2 X V 5 A J, 5 A P, 5 A R, 5 B R, 5 B Y, 5 C Y, 5 G M, 5 S Y, 5 H K, 5 J F, 5 J O, 5 K R, 5 M J, 5 M L, 5 M R, 5 O A, 5 O K, 5 P M, 5 Q V, 5 R N, 5 S N, 5 T I, 5 T Z, 5 W L, 5 W N, 5 Z N, 6 A A, 6 C L, 6 C R, 6 D Q, 6 D U, 6 F O, 6 G A, 6 I A, 6 L K, 6 L L, 6 L Y, 6 L F, 6 N J, 6 N U, 6 N W, 6 P A, 6 P B, 6 P J, 6 Q A, 6 Q O, 6 Q V, 6 R G, 6 S B, 6 T A, 6 U V, 6 V J, 6 W T, 6 W D, 6 X Q, 6 Z R, 2 B H M, 2 A C K.

**FOREIGN.**

O N 4 B V, O N 4 H Q, G 1 S D, P 10 1 M, P A 0 2 W, P C O G A, P C E R R, O Z 1 V, K C E R R, L Z Y T, L W G U M, Indianna, U.S.A.). Total 223, and still they come.

Yours faithfully,
ERIC TAYLOR.
JAMES WATSON.

Westcliff.

P.S.—No Morse stations included.

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### STRAIGHT FROM THE STRAITS.

The Editor, POPULAR WIRELESS.

Dear Sir,—Perhaps my experience with your "Magic" Four may be of interest. In this country, only short-waves are possible, and except for a few nights yearly (say a dozen) in November-December, anything over 50 miles is impossible, atmospherics being quite deafening. I have for four years been building S.W. sets and have tried almost every circuit that came out, but till the "Magic" Four came have had to depend on a six-valve Super Het., which is always good. I tried your "Four" and, with a few alterations, has everything else beaten easily.

I made it with a metal panel, and a sheet of aluminium under the baseboard. With a pentode in the last stage, it gives wonderful results. Reaction is perfect on all wave-lengths, I don't use the potentiometer at all. No hand capacity, thanks to the aluminium panel. Results: I have had every continent on the loud speaker. New York I get daily, at 6 a.m., 12 hours difference., K D K A, K G O, K E Z, 7 L O, 2 L O, 3 F C, Winnipeg, 5 S W, Berlin, Rome, Calcutta, Saigon, Manila, and Buenos Aires, and New Zealand. All these on short waves. But my best effort, and one to make your DX hounds envious, I twice last week had Midland Regional, Daventry, about 475 metres on the loud speaker, spoilt by X's, but both music and speech were quite clear. This is about 7,000 miles, and I think must be a record for this station. Brookmans Park I can't get, not even the carrier.

Morse: I can get amateurs in every continent daily, and even though W. L. S. says it is impossible. I work with a '0005 Polar condenser, and tuning is quite easy.

Many thanks for your excellent paper, and for a really perfect short-waver.

I use a Pilot American and a G.E.C. transformer and there is absolutely no threshold howl.

Yours truly,
C. W. W. KING.

Straits Settlements.

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### A BRICK—AND A BOUQUET.

The Editor POPULAR WIRELESS.

Dear Sir,—My heavens! Great snakes! Suffering cats! At last your draughtsman has slipped up. I have learnt a lot from your valuable paper, but it is the first time that I knew that a rectangle described around a circle has two different measurements. What a wonderful cone the Clear Cut Cone must be if it were wangled on the frame measurements given by the aforesaid draughtsman—12 in. × 11¼ in. outside dimensions. Jolly good! Never mind, if some of us chaps couldn't chuck a brick now and again what a rotten old life this would be. Now for a bouquet. Having tested your "Magic" Three for the last nine months I find, like a lot of other wireless fans, that it is a stunner. I cannot append a list of stations as I have come to the conclusion that it is a waste of good time to count them. Sufficient to say that no other set that I have possessed has given me the number of hours programmes as my "Magic."

Wishing you and all the staff the very best,
I am yours truly,
ARTHUR J. FOX.

Forest Hill, S.E.

[ED. NOTE.—The draughtsman responsible for that error has been sent to London, S.E.]

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## MOUNTING A CLEAR-CUT CONE

**To get full benefit from the excellent quality obtainable a baffle-board is needed. This shows how the original "Clear-Cut" Cone was mounted behind an ornamental fret.**

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### HE GETS THE U.S.A.

The Editor, POPULAR WIRELESS.

Dear Sir,—I have not read many reports on the "Neu-Type" Four. This may interest you.

Stations come in all round the dial too numerous to mention, free from B.P. which, in this district, is very troublesome.

The best result I had was on Old Year's Eve or, I should say, New Year's Morn, at about one o'clock. I turned the dials and was surprised to hear an English voice—or, as it turned out to be, American—W J B. ? National Broadcasting Station, New York. I listened for quite a time, and at times had to detune.

Since then I have picked them up any time I chose to tune-in after B. P. closes down, on wave-length just above Toulouse.

This, I think, is a very good performance.

I also made the "Presto" Two and tried the S.W., and also picked up Shenectady at first attempt.

Yours sincerely,
H. W. GODDARD.

Manor Park, E.12.

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### ANOTHER "COMET" APPRECIATION.

To the Editor, POPULAR WIRELESS.

Dear Sir,—I have no doubt that you will be snowed under with letters about the "Comet" Three, yet I feel that I must write and say what I think about this, the latest triumph of "P.W." I have been a regular reader of "P.W." ever since No. 1, but I have not yet seen anything to compare with The "Comet" Three. I must say thank you for giving us such a top-hole circuit.

I know that every radio fan has the very best set ever, but the "Comet" Three just has to be heard to be believed, and believe me it will be heard!

I have made up my set with all Ready Radio components, and I am more than satisfied.

Keep up the good work, and jolly good luck to "P.W."

Yours sincerely,
J. PARKER.

Birmingham.

# No need to wait! You can get your Drydex to-day!


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

| RED TRIANGLE | GREEN TRIANGLE | ORANGE TRIANGLE | BLUE TRIANGLE |
|---|---|---|---|
| 60 volts 7/- • 66 volts 7/6 | 60 volts 9/6 • 66 volts 10/6 | Triple Capacity • 60 volts 14/- | For portable sets • 63 volts 9/- |
| 99 volts 11/6 • 120 volts 14/- | 99 volts 15/6 • 120 volts 18/6 | 105 volts 24/6 • 120 volts 27/- | 99 volts - 14/- • 108 volts 15/6 |

For Grid Bias: *Red Triangle.* 9 volts—1/4. 16·5 volts—2/3. *Green Triangle.* 9 volts—1/9. 16·5 volts—2/9.

Unit Cells for Torches: *Green Triangle.* 1·5 volts—4d. Batteries for Pocket Lamps: *Blue Triangle* 4·5 volts – 6d.

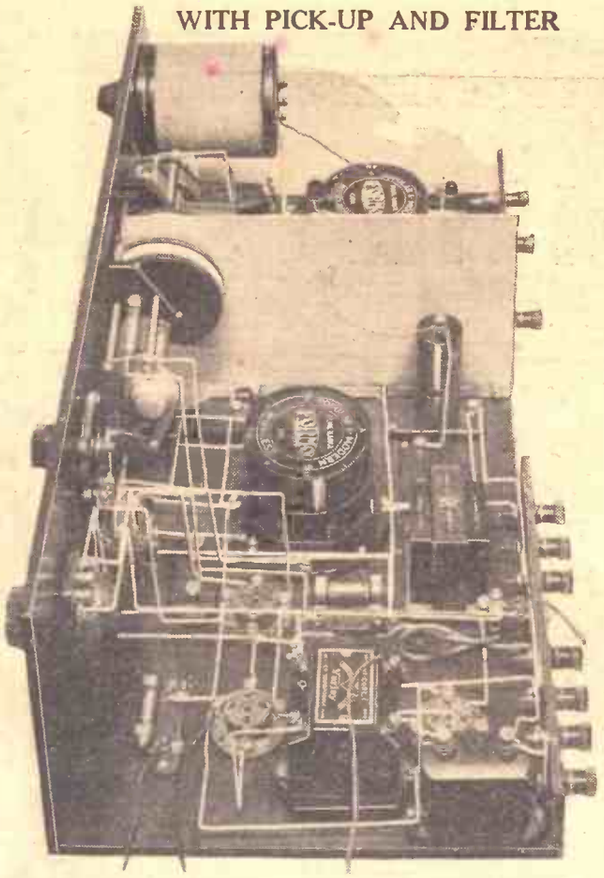
**Obtainable everywhere from all good dealers.**

Exide Batteries, Clifton Junction, near Manchester. Branches at London, Manchester, Birmingham, Bristol and Glasgow.

Dx 16

Popular Wireless, April 11th, 1931.

## WITH PICK-UP AND FILTER



The L.F. end of the "Comet" Four after the pick-up, volume control and output-filter schemes have been adopted.

# COMPLETING THE "COMET" FOUR

**Here are some finishing touches you can apply to your "Comet" Four that will make it the very prince of receivers. The refinements are easy to add and can be carried out independently of each other whenever you feel so disposed.**

LAST week we showed how to build the latest and greatest of the "Comet" sets—the "Comet" Four, and we mentioned that, superb as was that receiver, it could be made even more remarkable by the addition of one or two refinements. These we propose to discuss this week.

But for the benefit of those who have built, or are building, the "Comet" Four let us say that the refinements we are considering are not essential to the satisfactory operation of the receiver, but they *are* of great advantage and enable you to get the utmost out of the set.

### Choose Your Own.

For instance, a four-valve receiver of the "Comet" type is capable of pulling in programmes from all over Europe, so while broadcasting is on somewhere in our Continent there is no need to be without some sort of music. But how much better to be able to "tune-in" exactly the *item* you want. And all by the touch of a switch.

That is what is offered by the "radiogramising" of the "Comet" Four. A simple alteration, but one which enables you to have complete control over your musical programme. If the radio items are not to your liking you can switch to your gramophone and have exactly what you require in the way of entertainment—and with the same volume and purity, too.

Then there is an ouput-filter scheme which we can add to the "Comet" Four. Simple, but having many advantages, not the least of which is the fact that it acts as a very efficient decoupler so that instability due to the use of the set with "wonky" H.T. batteries is not so likely to occur, while the use of a "Comet" with a mains unit is made possible, the danger accruing from the presence of H.T in the loud-speaker leads being obviated.

Another refinement is the pre-detector volume control, carried out by means of a rheostat (value 10 ohms for 2-volt valves, and 30 ohms for 4- or 6-volters) in series with the filament of the S.G. valve. This enables you to cut down the input so that you do not get too much volume. And we may assure you it is very easy to get too much with this set.

**By the "P.W." Research Department**

### Luxurious Efficiency.

And, finally, we must incorporate Flexi-coupling if the "Comet" Four is to be the last word in luxurious efficiency.

For the benefit of those of our readers who are not familiar with Flexi-coupling, we will briefly explain what it is.

The ordinary coupling of the aerial to the "P.W." Dual-Range Coil consists of a series condenser through which the aerial is taken to "A" on the coil.

Flexi-coupling consists in fairly closely tuning the aerial-earth circuit on the medium waves and coupling this tuned circuit by means of a few turns of flex wound round the top of the dual-range coil. By this means the extra sensitivity obtained by tuning the aerial circuit is coupled with extra selectivity—and simply controllable selectivity at that—engendered by the method of coupling the tuned aerial to the main tuning coil, through the two or three turns of flex. Control of selectivity is carried out by varying the number of these turns and their position on the coil former.

### Select Your Selectivity.

If they are low down—over the main winding—the coupling will be tight and selectivity will be decreased. If they are at the top of the coil the coupling is loose and selectivity is increased. Similarly we get tight coupling by employing several turns, and loose coupling by using only one or two. By this means you are enabled to vary minutely the selectivity of the set within very wide limits, and thus suit it exactly for the conditions under which it is to be operated.

### On Long Waves.

On the long waves the tuned aerial and Flexi-coupling are not required, and so by turning the knob of the selector coil hard over to the right the Flexi-coupling scheme is cut out and the set becomes a normally coupled set again, except for the fact that Brookmans condenser long-wave coupling is employed.

And here lies another possible modification, of benefit to those who have particularly short aerials and therefore do not get the long waves too well, or to those who find the medium-wave local creeping in in the bottom of the long-wave band. To carry this out two extra components are needed—two spaghetti resistances of 25,000 ohms, and as we are on the subject, let us see how to do this before we discuss the refinements we previously mentioned.

Firstly, however, don't forget that these refinements are all "solo," they are not interconnected in any way, and any one can be used without the others, if so desired. You need not go the whole hog. Each is complete in itself. The new method of long-wave coupling is arranged as follows. In both tuned circuits you will find $S_1$ on the coil going to a wave-change switch and a fixed or compression-type condenser, and to a variable condenser's moving vanes.

### For Interwave Coupling.

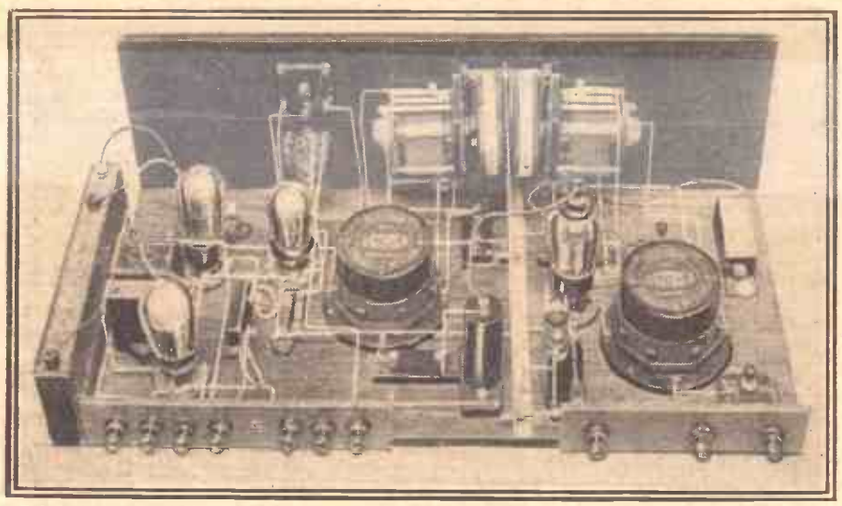
The other side of the fixed or compression-type condenser (·002 mfd.) goes (among other places) to grid bias for H.F. valve or to an earth point (dependent on the stage you

### THE EXTRA PARTS.

- 1 Selector coil (Ready Radio, or R.I., Wearite, Goltone, Keystone, Magnum, Parex, etc.).
- 1 filament rheostat (see text) (Wearite, or Gecophone, Lissen, Igranic, etc.).
- 1 Potentiometer-type volume control, (Sovereign, or Igranic, Gambrell, Wearite, Magnum, Varley, Lissen, etc.).
- 1 2-mfd. fixed condenser (Lissen, or T.C.C., Formo, Dubilier, Igranic, Mullard, Hydra, etc.).
- 1 Output choke (R.I., or Igranic, Varley, Ferranti, Atlas, Wearite, Magnum, Bulgin, etc.).
- 1 Pick-up jack and plug (Bulgin, or Lotus, Igranic, Ormond, etc.).
- 1 Grid-bias plug (Belling & Lee, or Eelex, Clix, Igranic, etc.).

Flex, Glazite, screws, etc.

## WHAT IT LOOKED LIKE LAST WEEK



This is how your "Comet" Four should appear when you have built it according to the instructions given last week—

# A REALLY HIGH-CLASS RECEIVER

are considering). What you have to do is this: In both cases disconnect the lead running from $S_3$ to the ·002 and join $S_3$ instead to $S_1$.

In the case of the *second* coil only (the one on the L.F. side of the screen) the wire to $S_3$ from the $V_2$ filament and also the wire to $S_3$ from the second wave-change switch must be removed from $S_3$, and both be joined instead to the adjacent terminal on the screen. (For the wire from $V_2$ filament a longer lead will be necessary).

The lead going from the moving vanes of each tuning condenser to the ·002 is removed from this latter, and connected to the *other* terminal of the ·002 instead.

### The Spaghetti

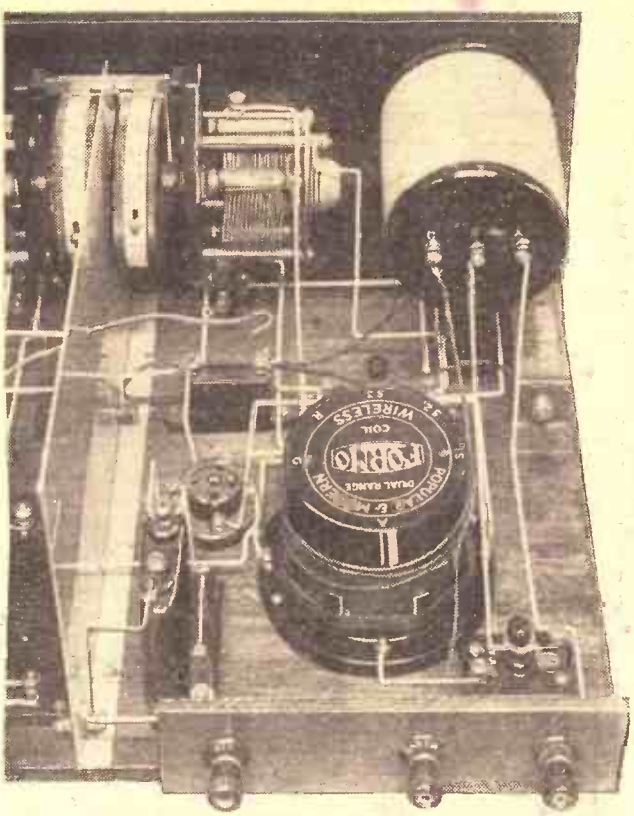
Now connect a 25,000-ohm "Spaghetti" across each ·002 condenser.

That's all. The alteration makes no difference to the handling of the set but will help if your aerial is not a good "long-wave" one.

Now for the other alterations. Most of them are so simple as to require hardly any description. But we will take each in turn.

We have seen how Flexi-coupling is carried out, now for the actual fitting of the Selector coil. The coil is placed 2 in. in and $1\frac{3}{4}$ in. down on the right of the panel, looking at it from the *back*. Below it, also 2 in. in and $1\frac{3}{4}$ in. up is the rheostat for controlling volume on radio.

## ADDING FLEXI-COUPLING




Note the Flexi-coupling turns round the Dual-range coil, and the wiring to and from the Selector coil.

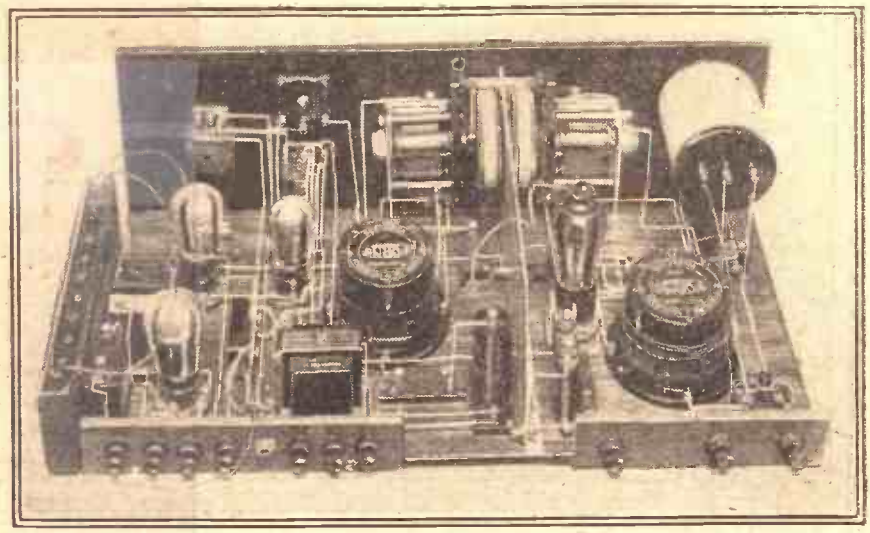
The Selector coil connections are carried out as follow:

### Flexicoupling Alterations.

Remove the aerial to ·001 compression condenser lead. Now wire up as hereunder. Aerial terminal to A or Selector coil, B on this coil to terminal on ·001 compression condenser that is now vacant. C on Selector by flex (to be wound two or three times round the dual-range coil, as emphasised previously) to earth terminal. This completes the alterations here. (Further details

(*Continued on next page.*)

## HOW THE "COMET" FOUR APPEARS NOW



—And here we have the same set after the refinements described in this article have been added.

## COMPLETING THE "COMET" FOUR

*(Continued from previous page.)*

of Flexi-coupling can be found in "P.W." No. 455, and may interest those who want to know more about this interesting scheme.)

Now for the rheostat volume control.

### The Switch Connections.

Remove the lead from L.T.+ terminal of $V_2$ to the 2-meg. grid leak. Instead, join this grid leak terminal to the inside (nearest panel) right contact of switch. (This, and the further alterations, explain why such an apparently unnecessarily complicated "on off" switch was used in the original "Comet" Four.)

Join middle centre terminals of switch to inside centre terminal. Disconnect lead from 2-meg. grid leak to filament of $V_1$ and take instead a lead from the leak to the rheostat just mounted on the panel. The other side of this comes back to $V_1$ filament terminal just vacated.

Now the switch controls $V_1$ filament independently of $V_2$ and $V_3$ and $V_4$, and $V_1$ is "off" when switch knob is turned to the left (pick-up position).

### Adding a Pick-Up.

If you don't want to use a pick-up you could add the volume-control rheostat to the ordinary Four and ordinary on-off switch by just removing the $V_1$ filament lead and taking it via the rheostat back to the grid leak. That is, you would have grid leak to rheostat, and rheostat to filament of $V_1$ instead of direct grid leak to $V_1$ connection.

Let us now add the pick-up. This is done by mounting an ordinary pick-up jack between H.T.+2 and H.T.— in the terminal strip (note space left last week) and connecting this jack to the two outside terminals of a 500,000 ohm or 1-meg. volume control potentiometer to be mounted in the panel near the switch. The position for the volume control is 3 in. in and 3½ in. down. Be sure that the jack connection that goes to the left-hand terminal of volume control is the one that goes to G.B.— pick-up (see diagram), and that volume control is mounted with terminals at top.

The centre (slider) of the volume control goes to left (furthest from panel) contact of switch, and we now join the right and left middle contacts together.

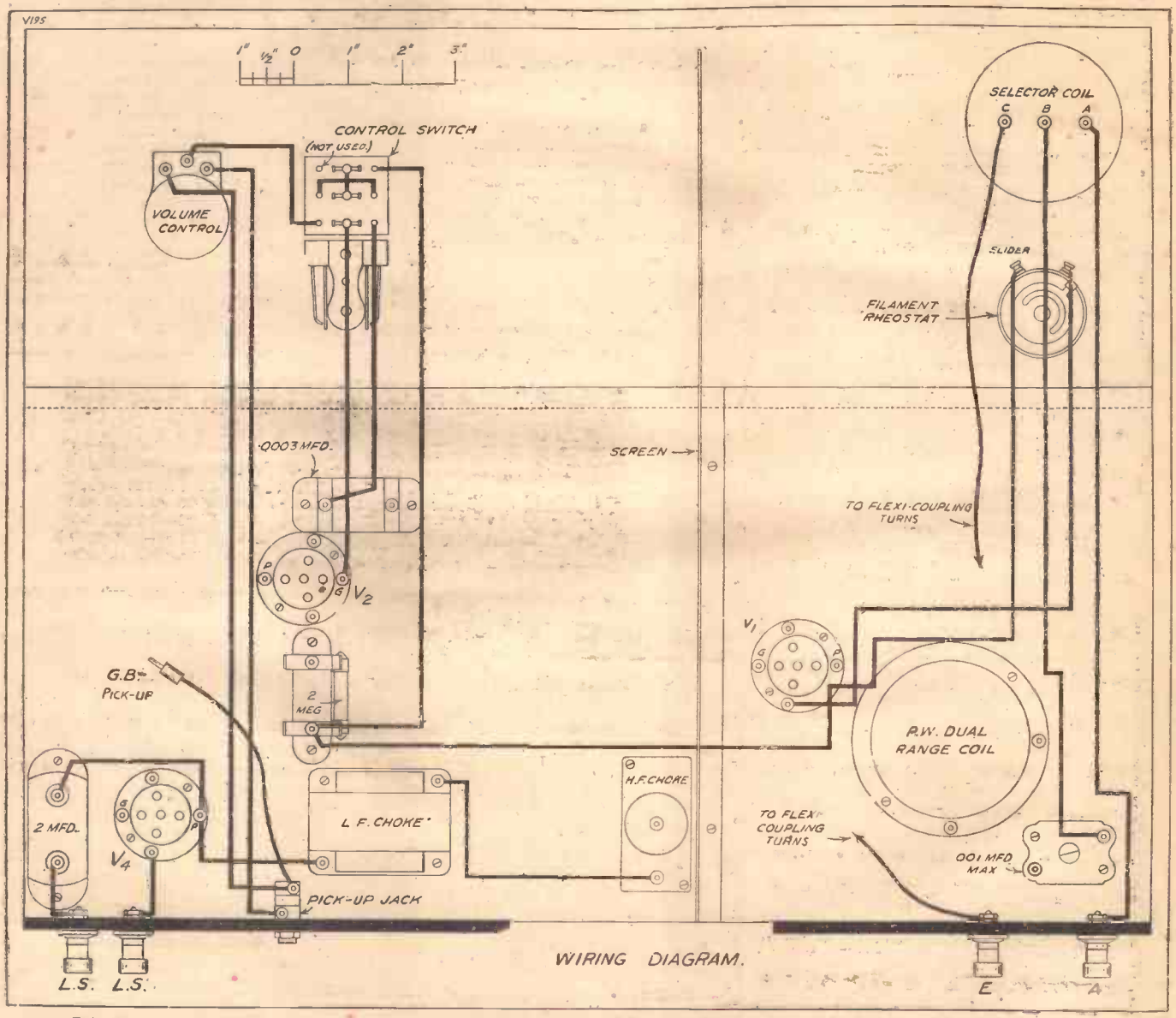
Now for the *alterations* in wiring, as opposed to mere additions.

Remove the grid of $V_2$ to ·0003 grid-condenser lead. Instead, take grid of $V_2$ to middle (furthest from panel) contacts of switch. Right-hand contact of switch goes to ·0003 grid-condenser terminal which previously went to G on $V_2$. (It still goes to grid leak, of course.)

### Volume Control.

This completes the pick-up wiring. To work the pick-up, place switch over to the left and insert pick-up plug into jack. Volume control is carried out by turning volume-control knob to right to increase volume. (Pick-up grid bias should be about 1½ to 3 volts.) As we have no more space here the operating details and those for the output filter will be given next week.

## THESE FEW ADDITIONS MAKE ALL THE DIFFERENCE




This diagram shows the few extra wires that have to be added and the positions of the new components, including those for the output filter

# TERMS TO SUIT ALL

## Build your COMET with the CHOSEN COMPONENTS

**THE "COMET" THREE (Foundation Circuit)**

**KIT A** . . . . . **£4 5 0**
Or 12 monthly payments of 7/9.
(Complete Kit of Components, as specified.)

**KIT B** . . . . . **£5 12 6**
Or 12 monthly payments of 10/4.
(As Kit A, with set of Mullard valves.)

**KIT C** . . . . . **£7 2 6**
Or 12 monthly payments of 13/-.
(As Kit B, with attractive oak cabinet.)

**Additional Components for L.F. CONTROL.**

£1.10.10. (If ordered with any of the Kits, add 2/9 per month to the monthly payments.)

**FLEXI-COUPLED "COMET" THREE**

**KIT A** . . . . . **£5 3 3**
Or 12 monthly payments of 9/5.
(Complete Kit of Components, as specified.)

**KIT B** . . . . . **£6 10 9**
Or 12 monthly payments of 12/-.
(As Kit A, with set of Mullard valves.)

**KIT C** . . . . . **£8 0 9**
Or 12 monthly payments of 14/8.
(As Kit B, with attractive oak cabinet.)

**Completely Assembled FLEXI-COUPLED "COMET" THREE**

Ready for use, aerial tested, valves, cabinet and royalties included. £9.5.9, or 12 monthly payments of 17/-.

**Additional Components for "COMET" RADIO-GRAMOPHONE**

13/6. If ordered with any of the Kits, add 1/3 per month to the monthly payments.

**"MAGIC" THREE CONVERSION KIT £1 8 9**

**"COMET" TWO**

**KIT A** . . . . . **£3 2 6**
Or 12 monthly payments of 5/8.
(Complete Kit of Components, as specified.)

**KIT B** . . . . . **£4 1 6**
Or 12 monthly payments of 7/6.
(As Kit A, with set of Mullard valves.)

**KIT C** . . . . . **£5 1 6**
Or 12 monthly payments of 9/3.
(As Kit B, with attractive oak cabinet.)

**Components for completing the "COMET" TWO**

16/-. If ordered with the "Comet" Two Kit, add 1/6 per month to the monthly payments.

**"COMET" H.F. UNIT.**

**KIT A** . . . . . **£3 8 6**
Or 12 monthly payments of 6/3.
(Complete Kit of Components, as specified.)

**KIT B** . . . . . **£4 8 6**
Or 12 monthly payments of 8/-.
(As Kit A, with specified valve.)

**KIT C** . . . . . **£5 3 6**
Or 12 monthly payments of 9/6.
(As Kit B, with attractive oak cabinet.)

**THE "COMET" A.C. SAFE-POWER UNIT**

**Complete Kit of Components £5 3 0**
Or 12 monthly payments of 9/6.

**Any part may be purchased separately.**

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

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

**IMMEDIATE DISPATCH**

Order your Kit of Components now. If it is not convenient to send cash with order you can pay on delivery—it costs you no more. Or, if you wish, send a small payment with your order and pay the balance by easy monthly instalments. Ready Radio Terms suit all pockets.

**CASH** with order —or— **E.P.** (Easy monthly payments) —or— **C.O.D.** (Pay on delivery)

## THE "COMET" FOUR

**KIT A** Complete Kit of Components as specified less valves and cabinet. Cash or C.O.D. **£6 . 10 . 0** or 12 monthly payments of **12 . 0**

**KIT B** Complete Kit of Components as specified with valves, less cabinet. Cash or C.O.D. **£8 17 . 6** or 12 monthly payments of **16 . 3**

**KIT C** Complete Kit of Components as specified with valves and cabinet. Cash or C.O.D. **£10 . 10 . 0** or 12 monthly payments of **19 . 3**

### COMPLETING THE "COMET" 4 RECEIVER

| | £ | s. | d. |
|---|---|---|---|
| 1 ReadiRad Star Turn Selector coil .. | | 12 | 6 |
| 1 Weariterheostat to suit valves .. .. | | 1 | 6 |
| 1 Sovereign ½-meg. volume control .. | | 4 | 6 |
| 1 T.C.C. 2-mfd. fixed condenser .. .. | | 3 | 10 |
| 1 Atlas 20 h. L.F. Choke .. .. .. | 1 | 1 | 0 |
| 1 Bulgin Jack and Plug for Pick-up .. | | 2 | 9 |
| Flex, G.B. Plug wire, screws, etc. .. | | | 11 |

**£2.7.0**

***If ordered with any of the Kits, add 4/3 per month to the monthly payments.***

## THE "FLEXI-CRYS" RECEIVER

| | s. | d. |
|---|---|---|
| 1 Panel 7 in. × 7 in. × 3/16 in. drilled to specification - | 2 | 3 |
| 1 Cabinet with 7 in. deep baseboard - | 10 | 0 |
| 1 ReadiRad ·0005mfd. Brookmans condenser - - | 3 | 6 |
| 1 Red Diamond crystal detector - | 2 | 0 |
| 2 Coils wound to specification - | 12 | 6 |
| 4 Belling-Lee terminals type "R" - | 1 | 0 |
| 2 Clips, plug, 2 sockets, wire, flex, etc. - - - - | 1 | 3 |

**£1.12.6**

Completely assembled, tested and ready for use **£1.15.0**

**Ready Radio**
159, BOROUGH HIGH STREET, LONDON BRIDGE, S.E.1.
*Telephone: Hop 5555 (Private Exchange)* *Telegrams: READIRAD, SEDIST.*

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

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

**C.O.D. ORDER FORM**
Please dispatch to me at once the goods specified 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 specified for which I enclose first deposit of
£.....

*Name* .....

*Address* .....

.....

*Kit Required*.....

# A MAGNIFICENT SHILLINGSWORTH

## WHAT YOU WILL FIND IN THE APRIL NUMBER OF MODERN WIRELESS

### FREE THE B.B.C.

**Lt. Com. Kenworthy, R.N., M.P., hits out at B.B.C. Censorship.**

THE B.B.C. is the property of the nation, and the people as a whole have a right to hear anyone over the wireless who interests them, on any subject of importance that they want to hear about.

It is not an annexe of the offices of the three recognised party headquarters, and it is not a means of fortifying the prestige of the party bosses . . .

Read this trenchant article on the B.B.C. stranglehold in MODERN WIRELESS.

### SEARCHING FOR SNAGS.

**How "M.W.'s" Valve Expert Conducts His Tests.**

*THE carrying out of all sorts of tests on valves is part of my work in connection with MODERN WIRELESS, and it may interest some of you to have a slight glimpse into the inside workings of the test department which deals, among other things, with new valves and, occasionally, our own old, faulty ones . . .*

*An article of interest to all valve set owners is to be found on page 385.*

### BEHIND THE SCENES.

THERE is a discussion going on at present about the B.B.C. control room. People who like to "slate" the B.B.C. whenever they can say that the control-rooms at Savoy Hill and Manchester are out of date, and that that is why we get so much interfereuce, poor regulation of volume, crackling and annoying clicks due to changes over from one studio or line to another.

To settle this pretty problem, I went up to Savoy Hill recently and craved audience with one of the control-room engineers. He was most apologetic in his attitude.

This is the beginning of an authoritative, intriguing article entitled "Down in the Control-Room."

### "SOMETHING DIFFERENT."

**A Refreshing Change.**

*"LET'S have something quite different," said the Chief of the Research Department, when he was asked to design a small but powerful household two-valver. What did he do? It is not an easy task to produce a small receiver that is really different from anything else ever brought out. But this goal was reached, and you will agree that the "Pentodion" is a really notable achievement.*

### WE'RE NEVER SATISFIED!

ONCE upon a time (as the story-books used to say) the more stations that we could hear upon our wireless sets, the better we liked them. But nowadays, when Europe hears over two hundred programmes nightly, including many of high power, the cry is often not for *more stations*, but for more selectivity . . .

Fortunately, the writer can point to a simple, inexpensive method of eliminating two powerful stations, adding general selectivity and increasing the power of any set to tune in distant programmes without necessitating the addition of valves, etc.

### COUPLING IN THE SCREENS

*This is an article by G. P. Kendall, B.Sc., on a particularly interesting aspect of set construction. In it he reveals some startling facts concerning phenomena encountered in certain kinds of radio receivers.*

### THE WORLD'S PROGRAMMES

**This is the title of a fascinating special supplement included in this month's "MODERN WIRELESS." It is a feature you cannot afford to miss, for it covers all phases of broadcast reception, from the programmes of your local to those hailing from the corners of the earth.**

**Look at the titles of some of the articles in this wonderful selection, whose lavishly illustrated pages are packed with information of the most intense interest.**

**Extending Your Tuning Range. Fifty Favourite Foreigners.**
**Switzerland's New Stations. Short Wave Shorts.**

### THE CONCERTS OF EUROPE

**Radio in Other Lands. Stations and Wave-lengths of Norway.**
**News from the Stations. Below 300 Metres.**

### HOW THE WORLD'S STATIONS PASS THE TIME

**Notes on Long Waves. "Goodnight Everybody, Goodnight."**
**Wavelengths and Frequencies. Keeping Their Ends Up.**

### THE "M.W." STATION FINDER

**Below 100 Metres. At The Bottom of The Dial.**

### SIXTEEN STAR STATIONS

**Where They Lie. How Many Miles.**

### HEARING THE U.S.A.

**Nowhere else can you get such full information about the doings of broadcasters all over the world. Artistically and lavishly illustrated, the World's Programmes is undoubtedly of inestimable value to every set owner. It brings the whole world to your ears, putting you in close touch with every tongue and clime.**

### TRIED AN S.G. YET?

IF you have—and it worked properly—you were no doubt staggered by the powerful amplification of the most distant stations that resulted. The "M.W." "Supervox" uses two S.G.'s, and it is a four-valver that needs to be heard to be believed. Yet it is not difficult either to build or to operate. You can read all about it in the April issue of "M.W."

### LOUD SPEAKER CONNECTIONS

*. . . But when you come to the use of two or more loud speakers simultaneously, either in order to achieve a distribution of volume or to supply several rooms with speech and music, it is immediately evident that there are two ways in which the connections can be made.*

*And G. V. Dowding, Associate I.E.E., tells you which is the better, and why.*

### TROUBLED BY HETERODYNING?

YOU can frequently lose a heterodyne by skilfully juggling with volume and tuning controls, and it is easier to achieve success if . . .

There is an article, entitled "Reducing Heterodyning," that should usefully appeal to many of those who are troubled by those steady, high-pitched whistles that interfere with radio reception

### INTERESTED IN RADIOGRAMS?

*There are several articles of Radiogram interest in the April* MODERN WIRELESS, *including Mains Motors, Some Needle Notes, Round the Turntable, and Recent Record Releases. These are all of an eminently practical nature, designed to be of direct assistance to all who build or use record/radio instruments.*

## AND THERE ARE DOZENS OF OTHER ARTICLES

ON SALE EVERYWHERE **MODERN WIRELESS** PRICE ONE SHILLING

# 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.**

LONG-DISTANCE men are having a pretty good time of it just now, despite the fact that what is normally the best season of the year for wireless reception is nearly past.

### The Sunspot Cycle.

The reason is that the general improvement in conditions due to our progress away from a maximum period of the sunspot cycle has so far more than counteracted the deterioration in signal strength and range that ordinarily accompanies increasing hours of daylight and shorter periods of darkness.

That we are quite rapidly approaching a period free from the baleful influence of sunspots is shown by the comparative rarity of serious atmospheric interference Things have not yet quite settled down after the minor sunspot outburst which occurred in February and we still do get occasional surprises.

There was, for example, the night towards the end of March when London was amazed by a visit from a thunderstorm which consisted of one lightning flash and one thunder-clap. That was a night of considerable electro-magnetic disturbance in the ether, and atmospherics were so bad that there was no pleasure in long-distance listening.

This, however, was an isolated instance, and on the whole atmospherics have provided far less trouble than is usual at the time when winter gives way to spring.

Some of my correspondents from the more northerly parts of England are horrified at the field strength and the wipe-out of Moorside Edge in their localities, now that they have had a forotaste of what he can do. Others, again, who write from the Midlands, are very much worried over the probable effects upon their long-distance reception when 5 G B comes down to 398·9 metres and Moorside Edge No. 2 gets busy on 301 metres.

### Increasing Your Selectivity.

The only immediate solution of their problem is to be found in increasing the selectivity of their sets by adapting them to Flexi-coupling, or by making use of the "P.W." Brookmans Rejector system. In the near future, though, I feel that we may all of us find it necessary to increase the number of our valves on account of the strength of our local station.

This is a real comic opera situation, since the essence of the Regional Scheme was to provide fine reception with the simplest of sets.

Stations worth your attention just now are very numerous. Before giving a list I want to mention three which you should certainly try to add to your log if they are not already there.

These are Belgrade (432·3 m., 694 kcs.), Bucharest (394 m., 761 kcs.), and Naples 332 m., 905 kcs.). All of these are coming through with splendid strength at the moment.

### First-rate Transmissions.

Another which will give you a surprise if you are not already familiar with it is Moscow, on 1,304 metres, which must now be using more power than any other station in Europe.

Here is a list of first-rate transmissions at present. Sottens, Lyons Doua, Nuremberg, Turin, Hilversum, Breslau, Hamburg, Toulouse, Berlin Witzleben, Katowice, Rome, Stockholm, Langenberg, Vienna, Brussels No. 1 and No. 2, Oslo, Kalundborg, Motala, Warsaw, Radio-Paris and Huizen.

You cannot, of course, expect to get every one of these on any night that you try for it, since interference is always possible either from Russian or French stations engaged in wave-length wandering, or from spark stations whose operators seem to use the tightest of couplings on any wave-length that takes their fancy.

---

## SHORT-WAVE NOTES

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

YOUR much-harassed writer of short-wave brevities is now just visible over the top of the pile of letters accumulated through the recent "W 2 X A D" controversy! In fact, he has just logged another change in W 2 X A D, but is far too scared to mention it for fear of another similar outburst.

### "W L S's Good Turn."

I was interested and amused to see a recent description of a scheme inaugurated by station W L S, Chicago, whereby some of the funds amassed by the station are diverted to provide soup-kitchens for the poorer classes. An excellent scheme, no doubt, but rather spoilt by the shrieking publicity following it in the particular description that I saw. At any rate, you will now be clear that *your* W L S is running no risk of being "bumped off" but still residing securely in his native land.

### Fresh from Australia.

By a freak in the mails, three separate sets of notes from our friend, "R. H. C." of Melbourne, have arrived during one week. I will do my best to summarise them herewith.

First, G 5 S W and Zeesen are "booming in"; they also hear the Honduras station H R B without difficulty. Radio Saigon also is easy prey. Bangkok, the Java stations and Suva, Fiji, are likewise well received and regarded as "locals." How many people over here would give their boots to log Suva?

V K 3 M E at Melbourne is in regular operation again on 31·55 metres, but from 10 a.m. to 11.30 a.m. G.M.T. Much work was done by the old station V K 2 M E, now V J L, in conjunction with Z L W, Wellington, N.Z., after the recent catastrophe in New Zealand. Incidentally, some of the N.Z. "hams" distinguished themselves through that trying time.

"R. H. C.," to whom I am very much indebted for his regular letters, would like to "meet," via the mail, any short-wave enthusiasts in this country that would care to write to him. I will gladly forward any letters of this kind sent c/o myself.

"A. S. W." has logged the American station W 3 F S on telephony, working in the 20-metre amateur band, His full address is: C. G. Benzig, 6,446, Garman Street, Philadelphia, Pa., U.S.A. Other outstandingly good amateur 'phones logged recently are W 8 D L D and W 3 G S, the latter on 80 metres.

### My Colleague.

My colleague, "R. W. H.," recently mentioned that I had paid him a visit. I am hoping that he will return the compliment and come and make some humorous remarks about my own humble gear. Incidentally, do not imagine that I despise the reception of mere broadcast! I am very proud of my broadcast receiver and gramophone reproduction, but business comes first.

"R. W. H." likewise confesses to a sneaking liking for short-wave work. Perhaps we will change over for a week now and then!

It is queer how most readers who never interest themselves in anything but medium- and long-wave broadcast, sometimes refuse to believe that there is anything but Morse to be found on the short waves. They write and ask me whether it is a fact that music can be heard down below!

### Hundreds of Stations.

Apparently they think this weekly chat is a rival to Aesop's Fables, or something of the sort. But it is wonderful how the fascination of the shorter waves holds them, once they have made a good try at getting down there.

I should say, myself, that over the whole range, from 5 to 200 metres, there are as many broadcast transmissions to be found as there are between 200 and 2,000 metres.

**If you are interested in the reception of distant stations you will find the special "World's Programmes" section in "MODERN WIRELESS" of immense practical value.**


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

*The Editor will be pleased to consider articles and photographs dealing with all subjects appertaining to wireless work. The Editor cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped and addressed envelope must be sent with every article. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents, Messrs. John H. Lile, Ltd., 4, Ludgate Circus, London, E.C.4.*

*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

### UNSATISFACTORY SELECTIVITY.

R. H. T. (Finsbury Park, London, N.).—"My father is a sea captain. When he was home last January he put up a 40-ft. pole, the distance from this to the end that is fixed to the chimney being just over 50 ft.

"The wire runs almost straight from the end where the house supports it down to the window, in the glass of which a hole is drilled for it to pass through. The set is placed permanently on the window sill, and the earth lead goes straight out (there is also an earthing switch).

"The set, which is a detector and two low-frequencies, is in a cabinet without much room to spare, but I have been trying to make it more selective. The latest idea is by adding a coupled circuit between the aerial and the set.

"A ·0001 condenser in series with the aerial did not have much effect on sharpening selectivity, but eventually I was recommended to use a ·0005 tuning condenser and a 40-turn coil across it, built up as a separate unit, and standing behind the set (not coupled).

"One end of this coil and condenser arrangement went to the earth terminal on the set (which was still joined to earth) and the other end of it went to aerial. On the set's aerial terminal was a lead joined to the new aerial terminal via the ·0001 condenser.

"Although the arrangement seems to have possibilities, I think something must be wrong, because both the condensers (the one on the unit and the one on the set) will tune in a programme at two different settings on the dial, and the aerial tuning, although it makes a difference, does not seem as sharp as I should have expected it to be. I am told this is the arrangement recommended by the B.B.C.,

(*Continued on page* 146.)

### "CAN'T GET THE SET 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.

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

# READY WITH RADIO IN 1920

## "COMET 3" Parts for Foundation Circuit

| | £ s. d. |
|---|---|
| 1 Red Triangle ebonite panel, 18" × 7", drilled and slotted to specification | 6 0 |
| 1 Baseboard, 10" deep | 1 6 |
| 1 Cyldon ·0005-mfd. variable condenser | 11 6 |
| 1 ·00013-mfd. differential reaction condenser, J.B. | 4 6 |
| 1 Keystone 3-point wave-change switch | 1 6 |
| 1 Keystone L.T. switch | 1 3 |
| 1 Keystone P.W. dual-range coil | 12 6 |
| 3 Telsen valve holders | 3 0 |
| 1 Sovereign ·0003-mfd. fixed condenser | 10 |
| 1 Franklin 2-mfd. fixed condenser | 3 0 |
| 1 Lissen 2-meg. grid leak and holder | 1 6 |
| 2 L.F. transformers (Telsen "Radiogrand" and Igranic "Midget") | 1 3 0 |
| 2 Keystone spaghetti resistances, 10,000 and 25,000 ohms | 3 0 |
| 1 Formo or Sovereign ·001-mfd. (max. compression type condenser | 1 6 |
| 1 Formo or Sovereign ·002-mfd. (max. compression type condenser | 2 3 |
| 1 Terminal strip, 18" × 2" | 2 0 |
| 1 Sheet of aluminium foil, 18" × 10" | 1 0 |
| 9 Belling-Lee Terminals | 2 3 |
| 1 Konceterkit, comprising Keystone angle brackets, wire for connecting, wood screws, G.B. plugs, etc. | GRATIS |

**Kit "A" as above £4-0-0**

C.O.D. or CASH with ORDER or 12 *monthly payments of* 7/4

KIT "B" (with valves). C.O.D. or cash, £5.7.6, or 12 monthly payments of 9/10.

KIT "C" (with valves and cabinet). C.O.D. or cash, £6.7.6, or 12 monthly payments of 11.8.

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

| | |
|---|---|
| 3 Valves as specified "Comet 3" | £1 7 6 |
| Handsome French Polished Cabinet | £1 0 0 |

## FLEXI-COUPLED "COMET 3"

Extra Components required:

| | |
|---|---|
| 1 Keystone Star-Turn selector coil | 12 6 |
| 1 400-ohm B.M. Potentiometer | 1 6 |
| 1 Bulgin Panel-Light (without bulb) | 2 6 |

**Complete Kit "A" £4-16-6**

or 12 *monthly payments of* 8/10

KIT "B" (with valves). C.O.D. or cash, £6.4.0, or 12 monthly payments of 11/5.

KIT "C" (with valves and cabinet). C.O.D. or cash, £7.4.0, or 12 monthly payments of 13/3.

## L.F. CONTROLLED "COMET 3"

Extra Components required:

| | |
|---|---|
| ½-1 Megohm volume control (Igranic) | 6 0 |
| Output Filter Choke (Pye or Bulgin) | 12 6 |
| 2-mfd. Condenser (Dubilier or Franklin) | 3 6 |

**Complete Kit "A" £5-2-0**

or 12 *monthly payments of* 9/4

KIT "B" (with valves). C.O.D. or cash, £6.9.6, or 12 monthly payments of 11/11.

KIT "C" (with valves and cabinet). C.O.D. or cash, £7.9.6, or 12 monthly payments of 13/8.

## RADIO-GRAM "COMET 3"

Extra Components required:

| | |
|---|---|
| ½-1 Megohm volume control (Igranic) | 6 0 |
| 1 Single Circuit open Jack and Plug (Bulgin) | 2 6 |
| 1 Single Pole Change-over Switch (B.M.) | 4 0 |
| Flex and G.B. Plug | 3 |

**Complete Kit "A" £4-12-9**

or 12 *monthly payments of* 8/6

KIT "B" (with valves). C.O.D. or cash, £6.0.3, or 12 monthly payments of 11/-.

KIT "C" (with valves and cabinet). C.O.D. or cash, £7.0.3, or 12 monthly payments of 12/10.

**Combined Flexi-Coupled L.F. Controlled and Radio-Gram "COMET 3"**

**Complete Kit "A" £6-11-3**

or 12 *monthly payments* 12/1

KIT "B" (with valves). C.O.D. or cash, £7.18.9, or 12 monthly payments of 14/7.

KIT "C" (with valves and cabinet). C.O.D. or cash, £8.18.9, or 12 monthly payments of 16/5.

# GUARANTEED SATISFACTION ONLY BY THE NEW 3-WAY PLAN

# C.O.D. CASH H.P.

*PAY THE POSTMAN—IT COSTS NO MORE—WE PAY ALL CHARGES*

*WITH ORDER. CARRIAGE PAID.*

*Strict Privacy to all Easy Payment Orders.*

## "COMET 4"

**Complete List of Specified Parts**

| | £ s. d. |
|---|---|
| 1 Baseboard, 21" × 10" | 1 9 |
| 1 Panel, 21" × 7" drilled and slotted to specification (Peto-Scott) | 9 0 |
| 2 ·0005-mfd. drum condensers (Cyldon) | 1 10 0 |
| 1 ·0001-mfd. differential reaction condenser (Keystone) | 3 6 |
| 2 3-point wave-change switches (Wearite) | 3 0 |
| 1 3-pole change-over switch (Wearite) | 3 9 |
| 2 "P.W." dual-range coils (Keystone) | 1 5 0 |
| 4 Valve holders (Telsen) | 4 0 |
| 1 H.F. choke (Keystone) | 3 6 |
| 1 ·001-mfd. max. compression type condenser (Sovereign) | 1 6 |
| 1 ·002-mfd. max. compression type condenser (Sovereign) | 2 3 |
| 1 ·0003-mfd. fixed condenser (Telsen) | 1 0 |
| 1 ·002-mfd. fixed condenser (Telsen) | 1 6 |
| 2 ·01-mfd. fixed condensers (Telsen) | 4 0 |
| 1 ·001-mfd. fixed condenser (Telsen) | 1 0 |
| 1 1-mfd. fixed condenser (Dubilier) | 2 6 |
| 1 1-meg. grid leak and holder (Telsen) | 1 6 |
| 1 600-ohm resistance and holder (Ready Radio) | 2 6 |
| 1 2-meg. grid leak and holder (Telsen) | 1 6 |
| 1 L.F. transformer (Telsen) | 12 6 |
| 1 10,000-ohm Spaghetti resistance (Keystone) | 1 6 |
| 1 50,000-ohm Spaghetti resistance (Keystone) | 1 6 |
| 1 Aluminium screen, 10" × 6" (Keystone) | 2 6 |
| 1 Terminal strip, 9" × 2", and 1 Terminal strip, 7" × 2" | 1 6 |
| 10 Terminals, specified markings (Belling and Lee) | 2 6 |
| Flex, glazed connecting wire, screws, etc. | Gratis |

Valves S.G., H.F., L.F., Power £2.7.6. Mahogany cabinet, £1.2.6. **£6 4 9**

KIT "A" (less valves and cabinet). C.O.D. or cash. Price £6.4.9, or 12 monthly payments of 11/6.

KIT "B" with valves less cabinet). C.O.D. or cash. Price £8.12.3, or 12 monthly payments of 15/10.

KIT "C" (with valves and cabinet). C.O.D. or cash. Price £9.14.9, or 12 monthly payments of 17/10.

### Completing the "Comet 4"

Extra Components required:

| | |
|---|---|
| 1 Star-Turn selector coil (Keystone) | 10 6 |
| 1 Filament rheostat (Wearite) | 2 6 |
| 1 Potentiometer-type volume control, ½-meg (Sovereign) | 6 0 |
| 1 2-mfd. fixed condenser (Dubilier) | 3 6 |
| 1 Output choke (Pye or Bulgin) | 12 6 |
| 1 Pick-up jack and plug (Lotus) | 4 3 |
| 1 Grid bias plug (Belling and Lee) | 3 |
| Flex, glazed connecting wire, screws, etc. | Gratis |

Cash or C.O.D. *Pay the Postman* **£1 19 6**

**Complete "Comet 4"**

With refinements as above.

KIT "A" (less valves and cabinet). C.O.D. or cash. Price £8.4.3, or 12 monthly payments of 15/2.

KIT "B" (with valves less cabinet). C.O.D. or cash. Price £10.10.9, or 12 monthly payments of 17/7.

KIT "C" (with valves and cabinet). C.O.D. or cash. Price £11.3.3, or 12 monthly payments of 18/7.

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

## "COMET 2"

*Full list of specified parts in P.W. 21/3/31*

**KIT "A" Pay the Postman £2-18-0**

*Or 12 monthly payments of* 5/4

2 Mullard Valves as specified .. 19/-

Byldurone Cabinet as specified .. 7/-

**KIT "B"** (*With valves but less cabinet*) **Pay the Postman £3-17-0**

*Or 12 monthly payments of* 7/1

**KIT "C"** (*With valves and cabinet*) **Pay the Postman £4-4-0**

*or 12 monthly payments of* 7/9

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**ATLAS A.C. ELIMINATOR.** Type A.C. 244, 3 tappings, S.G. Detector, power output 120 volts at 20 M/A. Pay the Postman — 59/6

**ULTRA MAJOR MOVING-COIL SPEAKER.** For D.C. Mains, 200–250 volts. Chassis, complete with tapped input, transformer for Pentode or Power valve. Pay the Postman — 59/6

**ULTRA MAJOR MOVING-COIL SPEAKER.** for A.C. Mains, 200–250 volts. Chassis, complete with input transformer for Pentode or Power Valve, Mains Transformer, metal rectifier and electrolytic smoothing condenser. Pay the Postman — 92/6

**KEYSTONE "P.W." DUAL RANGE COIL.** Officially approved by "P.W." for Comet Receivers. Pay the Postman — 12/6

**KEYSTONE STAR TURN SELECTOR COIL.** For use in the "Comet" Three, etc., etc. Pay the Postman — 12/6

**A.E.D. PICK-UP.** Complete with tone arm. Pay the Postman — 42/-

**BLUE SPOT SPEAKER UNIT.** Type 66R. 4-pole balanced armature. Pay the Postman — 35/-

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***Cash with order for the above Popular Accessories if preferred.***

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*Name*.....

*Address*.....

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P.W. 11/4/31

# PILOT KITS LEAD ALL THE WAY THROUGH

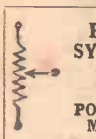
# RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 144.)

and if this is the case I should like to know what I can do to make it more efficient."

In general you have the correct arrangement for providing selectivity by means of an additional coupled circuit: but you are failing to get the required degree of sharpness because your coupling is too tight.

To obtain the necessary separation the coupling condenser joined between the new aerial terminal and the old one should be quite small, and at its maximum setting the capacity should be much less than ·0001. You require a very small capacity indeed, and some neutralising condensers do not go down low enough in their minimum position. But if you replace your present coupling condenser by one of the neutralising type, with a low minimum capacity, you should get the required sharpness and separation.



**RADIO SYMBOLS.**

**No. 14.**

**THE POTENTIOMETER.**

**It has many uses, particularly for easy volume control, and as a grid potential adjuster.**

* * *

**The principle is that of a fixed resistance, with a variable tapping.**

* * *

**Usually the tapping takes the form of a slider, the position of which is continuously variable.**

## BOTHER WITH BATTERIES.

S. L. S. (Sheffield).—"Like another of your correspondents I had a suspicion that something was eating my battery current, but I did not have as much luck as he got. Instead I unearthed what seems to me to be the most inexplicable fault that could be imagined!

"Perhaps I had better describe what happened. The set is a four-valver, S.G. Det. and two L.F.s, and I put my milliammeter lead in series with the negative lead to the H.T. battery.

"With the set full on I got 16 milliamps, so I switched off to see if there was any leakage. Down dropped the needle to zero. Here comes the funny part!

"I was looking at the needle of the milliammeter, and I got my hand on the panel of the set, when I distinctly saw the needle jump and then flick back again. I was not touching the switches, nor anything like that, simply holding the panel.

"It seemed so surprising that I gave the panel another little push, and sure enough the milliammeter flicked once again. So I had a good look all over the set to see what could possibly be doing it. And I am certain that everything on the panel was as it should be!

"What I cannot understand is that when I had finished inspecting everything, I gave the panel another little push, but now the needle remained at zero, and nothing I can do will make it move again. Why do you think it flicked like that, as I did not find anything wrong on the panel?"

It looks to us as though you have got an insulated wire going from the panel through a screen, and at the screen the wire's insulation is cut at one point; so that when everything is exactly favourable a slight push on the panel brings the little bare place on the wire into contact with the screen.

In other words, you have got bad insulation at just one point, and pressure on the panel may cause an H.T. wire to make contact with earth, provided the wire is bent exactly where the two can come into contact. We think this must be the cause of the trouble.

Anyway, it is pretty obvious that when you get milliammeter kicks in this way you are getting imperfect insulation somewhere, and the only imperfect insulation that would be likely to be affected by pressure on the panel of the type you have suggested is a supposed-to-be wire passing through a screen and being touched by it.

Anything less obvious than this your inspection of the panel, etc., would have brought to light; but the fault we have in mind is one it is almost impossible to see—unless, indeed, one is looking for it in the dark, when a tiny spark will occur at the point where the insulation is defective.

Bearing these possibilities in mind, go over your receiver carefully again, and we do not doubt that somewhere you will find one of the H.T.-carrying wires is touching near something that is connected to H.T.+, and the insulation at that point is not all that it should be.

## THE NORTH REGIONAL.

"Getsme" (Manchester).—"It gets me what they are up to with this new North Regional station. Is there to be a 300-metre programme? If so, when? Why not now?

"And all these erratic tests on 479. I'm fed up! Some nights they are on, other times you can tune and tune and get nothing.

"And are they on full power or is there more to come?"

We don't think you are quite justified in being annoyed about it, "Getsme." The Press and microphone announcements are frequent and clear, and the B.B.C. is doing all it can to give you a better service, with a minimum of dislocation while the change-over is effected.

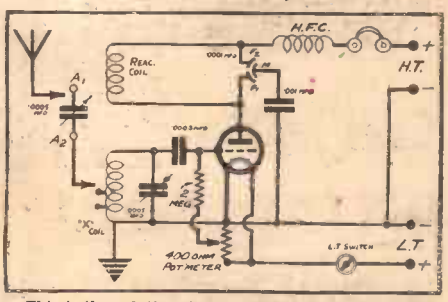
The present tests on 479·2 metres are intended to familiarise listeners with the new station's programmes. They are now on full power, and at the time of writing test at the following times:

Mornings (Sundays excepted): 11.5 a.m. to 11.45 a.m.

Nights (Sundays excepted): Mondays, Wednesdays and Fridays, 11.15 p.m. to 12 midnight; Tuesdays, Thursdays and Saturdays, 12.15 to 1 a.m.

(*Continued on page* 148.)

## MISSING LINKS, No. 5.




**This is the solution to the Missing Link given last week. You will see that the parts omitted were the reaction coil and the tuning condenser.**

# RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 146.)

This schedule will be continued until listeners seem to be ready for an extension of it. When this happens further announcements will be made and the North Regional transmitter will radiate a portion of the daily programmes.

The whole aim and object of this *gradual* introduction of the new transmitter is to enable the public to accustom themselves to its reception before the full programme service is transferred to it.

The second transmitter at the North Regional station, which ultimately will relay the National programme on 301·5 metres, will not be introduced until the North Regional transmitter has taken over the full service of daily programmes, and until any temporary difficulties in receiving it have been overcome.

After the North Regional transmitter is in full twin-wave operation it will be possible to withdraw at least some of the existing transmitters in the North Region, such as those now situated in Manchester, Leeds and Bradford, but ample notice will be given before this happens.

A point to bear in mind is that when the second wave-length (301·5 metres) is brought into operation at a date to be arranged later, the Regional wave-length will develop distinctively and in contrast to the transmission on the National Programme, so that there will be a choice of programmes available.

As you will be getting two different programmes, easily receivable at good strength, and as millions of other listeners will be getting better reception, we don't see much to grumble about! Of course, there will be a bit of difficulty during the transition period; but the B.B.C. is doing its best to give its listeners better value for money, and after all that is something to be thankful for in these hard times, isn't it?

### AERIAL POSITION TO AVOID INTERFERENCE.

F. H. (Bradford.)—"Which is the best position for my aerial, in view of the wires, etc., round the house?"

You are in a very bad situation, F.H.; in fact, your sketch shows that there is only one way in which the aerial can run without the likelihood of strong interference.

Try running a wire from the house to a point near the telephone wires, but to that end of them which is farthest from the tram wires which they cross. You do not give distances on your sketch, but if this wire is about 40 ft. or more in length (straight line) you may get quite decent results.

If, however, the distance is much less than this, we should try an indoor aerial. (Suitable arrangements of these, along a hall or passage, under the roof or round a room, have often been described in "P.W.")

## TECHNICAL TWISTERS

### No. 56. TUNING ADJUSTMENTS

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

Simple one- and two-valve sets usually have only one tuning control. It is almost invariably a . . . . . .

* * *

Most variable . . . . . use an . . . dielectric, but sometimes . . . . is used instead of, or in addition to, . . . spacing.

* * *

Multi-valve sets with several tuned circuits may have separate tuning controls, or else a . . . . . tuning condenser.

* * *

In virtually all cases a clockwise motion of the dial . . . . . the capacity (and wave-length) and an anti-clockwise motion . . . . . it.

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

**Last week's missing words (in order) were: Characteristics. Instability. Feed-back. Feed-back. Decoupling.**

### TWO SETS ON ONE AERIAL.

V. C. (East Ham).—"In my bedroom I have a crystal set which is on an outdoor aerial which my father uses for his crystal set downstairs. For my earth I have a gas-pipe.

"When I tune-in I get one station all right, but when I push the slider over to the other side of the coil I get two stations together, which is not very pleasant. Can you please tell me how I can get over this difficulty?"

We are afraid you will have to give up the idea of working from the same aerial as the set downstairs. When two sets are using the same aerial there is bound to be considerable if not inseparable interaction between them.

This is particularly true if they both impose a fairly heavy load on the aerial, which is always the case with crystal sets. Even a very selective crystal set (like the one . . described . . . week) can hardly be expected to sort out such a mix-up.

In the circumstances we should be inclined to try using a good indoor aerial with another earth. We do not like the sound of that gas-pipe much, but if it is the best you can do, perhaps even with this and a good indoor aerial you might get satisfactory reception.

It is certainly worth trying, as we are afraid it is the only way out of your difficulty. You would need about a quarter of a pound of No. 36 D.C.C. wire (or D.S.C.), and a little patience in finding the best shape and arrangement of the indoor aerial.

Even then, this might not give such good results as regards loudness as the outdoor aerial, but it seems to be the only way out of your difficulty, as you cannot possibly expect selective working with two crystal sets fixed to one aerial.

### ARRANGING AN INDOOR AERIAL.

L. N. P. (Middlesex).—"I am told that indoor aerials are quite satisfactory and I should like to use one because in my opinion one of the outdoor type would spoil the appearance of the house.

"It is a new house, and as there are no trees suitable I should have to put up a pole. The difficulty, however, is that I am rather keen on getting foreign stations on Sunday evening, etc., so if I use an indoor one I

(*Continued on page* 150.)

# RADIOTORIAL QUESTIONS AND ANSWERS

*(Continued from page 148.)*

should like it to be as good as possible, so as not to confine me too much to local reception only.

"Is the loft the best place for an indoor aerial, and, if so, how should it be arranged to get the best results with this kind of aerial?"

The loft is usually an excellent place for an indoor aerial, but you must place the set where the lead from the loft will be fairly short. You should bear in mind the fact that none of the wires must be placed too close to walls, ceilings, etc., if the arrangement is to be efficient. In most modern houses the following arrangement gives good results when properly installed.

Three or four copper or silicon-bronze wires (preferably 7/22, but insulated bell wiring is good), stretched parallel and about 18 inches or more apart, right across the loft. At one end, or in the middle if necessary, all the wires come down to a V and are soldered to the lead-in wire that goes to the set's aerial terminal.

All the separate aerial wires must be insulated, and none of them should run within a yard of the roof or other conductive surface. (A roof is quite a good conductor when it is wet.)

## CONNECTING BATTERIES.

"NOVICE" (Isle-of-Wight).—"I wish you would kindly explain the following. How batteries in parallel can be used with a three-valve receiver having a separate tapping to the H.T. battery for each valve?

"The principal difficulty I have is in connection with the negative lead. Should the negative tapping in one battery be connected to the negative tapping in the other?

"How can batteries be connected in series? Here again the difficulty is with the negative lead. As to the positive leads, I suppose some go into one battery and the remainder into the other?"

We do not wonder that you are a little bit puzzled for, as a matter of fact, the term "batteries in parallel" is not quite correct when used in this fashion. When batteries are truly in parallel, all the negatives are joined together, and all the maximum positives are joined together, so that you have one negative and one positive lead. That's that.

This is *not* what you mean. Batteries are seldom used thus, and you are referring to the use of batteries *in parallel across the set*, but not in parallel with each other.

In practice this is very easy to arrange, and all that you have to do is to join the H.T. negative on the set to all the H.T. negative terminals of the batteries, that is to say, you have a common H.T. negative lead connecting all the batteries to the set.

Now, with regard to your H.T. positive leads. What you need is a separate lead on every H.T. positive terminal on the set, terminating in a suitable plug, and one of these plugs goes into one battery, the other into the other, etc. It does not matter in the least into which battery you place any particular H.T. positive plug, for you will find they are all now connected up correctly.

But in order to distribute the load equally, you should naturally make each battery do the work to which it is most suited. Remember in this connection that the power valve generally takes more current from your battery than all the rest of the valves put together.

Regarding the second part of your question, how batteries can be used in series, this is simplicity itself. If you already have one H.T. battery working your set, which we will call battery No. 1, and you wish to place another one in series with it, which we will call battery No. 2, simply remove H.T. +, join a short length of flex from the negative terminal of battery No. 2 to the positive terminal of battery No. 1, and re-insert H.T. + at any desired point, then the two batteries are in series.

The voltages also are in series, so that if your first battery is 120 and the second battery is 60, the total voltage you can get out of the two batteries will be 180. You can tap off intermittently, at intermediate voltages, by means of plugs in the ordinary way at any point in the double battery.

Finally, may we remind you that it is remarkably easy to burn out a valve if you are unaccustomed to handling H.T. battery leads, so do not forget to be careful all the time alterations, etc., are being carried out.

The only safe rule in such circumstances is first of all to disconnect the H.T. — of the set before altering any plugs, etc. In this way you will remove the danger from the valves until the H.T. — connection is restored after the alteration in the battery has been carried out.

## A QUESTION OF FREQUENCY.

G. S. E. (Newmarket).—"What is the frequency of a beam station?"

You are not very explicit, G. S. E. And different beam stations have different frequencies.

However, beam stations are working at present on 26·269 metres, 21·912 metres, and 15·707 metres; and these wave-lengths form frequencies of 11,420 kc., 13,660 kc., and 19,100 kc. per second respectively.

## THE "CONTRADYNE" THREE.

D. D. (Glasgow).—"Would be much obliged if you can tell me where to obtain a blue print for the 'Contradyne' Three, as my newsagent cannot get one. Can I obtain the same from you?"

We regret that we have no blue print for this set, but full constructional details, with wiring diagram, were given in "P.W." No. 439 (November 1st, 1930). (Back numbers of "P.W." which are still in print can be obtained from the Amalgamated Press, Back Number Department, Bear Alley, Farringdon Street, London, E.C.4. Price 4d. per copy, post free.)

### *"P.W." PANELS.—No. 14.—COUPLING.*

**When electrical energy is passed from one circuit to another the circuits are said to be coupled.**

* * *

**Such action between two coils, for instance, is due to the electro-magnetic fields surrounding the coils. It is called electro-magnetic (or popularly "magnetic,") coupling.**

* * *

**When energy is passed across a condenser from one circuit to another, the coupling is called electro-static or "condenser-coupling."**

* * *

**Even the simplest form of "condenser"—such as adjacent wires separated by air or other insulator—will serve to couple circuits together to some degree.**

## FOR THE LISTENER

*(Continued from page 134.)*

The average reader, or listener, must be satisfied. The opinions of minorities must be considered.

If you give a plum with the right hand to-day, you must offer another with the left hand to-morrow. Many things are good, but not all good things are suitable to the time; many things are lawful, but not all things are expedient.

Since the recent postponement of "Krassin Saves Italia," I had an interview with the translator and producer. He did not seem to be worrying. He was disappointed, of course, because a lot of hard work seemed to be thrown away.

As an artiste, he seemed surprised that the protests of politicians, officials, scaremongers, and the rest, should have so much weight in the world; but he could afford to stand aside and wait. Artistes are the only people in the world who can afford to stand aside and wait.

They cannot force the world to accept their work; but they know that, if it is good work and sincere, the world will come round to them sooner or later.

### Religion and Politics.

Meanwhile I feel a good deal of sympathy for the harassed officials at Savoy Hill. Personally, I hate compromise and expediency. I am built that way. I should make a very bad official.

But I admire the way in which the B.B.C. holds the balance. It must be extremely difficult in a Corporation which consists so largely of men who are young in years and in spirit, and in a world which is so full of new ideas.

The problem is, how to broadcast new ideas without offending too many; how to march ahead without treading on too many corns. Religion and Politics are the two great snags.

You may broadcast new music, and new science, and even new poetry, and the listening world still gets to bed in peace; but if you give utterance to a new religious or political idea, some avalanche is bound to break and fall from somewhere. These are "hot" subjects.

The policy of a public body with respect to them must be either silence or some sort of agreement between rival camps so as to give fair play to everybody. On the whole, I think that the B.B.C. does give fair play. Indeed, you may be sure that, if it didn't do so, there would have been a dickens of a row long before this.

### The Danger of Boredom.

The danger which I find in the programmes is not that I should be annoyed or irritated, but that I should be bored. I would sooner be irritated than bored any day. It would also be better for me.

The broadcasting of material which has been censored and pruned of all offence is rather inclined to be tepid and tasteless. I prefer to be stimulated and stung and shocked. It inflames the weak blood, and, galvanises the sleepy grey matter.

For this reason I would, if I had my way, give the B.B.C. the greatest possible independence and let it broadcast whatever it has a mind to; for I am persuaded that it has a good and a sincere mind.

## BROADCASTING AT EASE.

(*Continued from page* 133.)

dielectric, and the sound variations on one plate cause the capacity to vary. These microphones can be handled fairly well without crackling.

The second trouble, namely, resonance, is not yet cured; the idea is being tried of having balanced air chambers resembling cocoa tins joined to the horn at the apex near the microphone end.

The Elstree talkie engineers are now using directional microphones for "close-ups" of outdoor events, but, because of the resonance mentioned they are not yet generally in use in the studios; that is why the B.B.C. has not yet used them, but they will undoubtedly do so before the year is out.

Frankly, even when the idea is in use, the credit cannot go to the B.B.C. The scheme has been "cribbed" more or less from the dramatic microphones used by the National Broadcasting Company of America.

Varied and "glare" lighting is another American idea which might be tried, crude as it sounds; it is in use in several studios of R.C.A. stations, and is a by-product of Hollywood.

### The Colour Question.

Just before an artiste broadcasts, dazzling "suns" (limelights) are switched on which bathe the brodcaster in strong light, and have the mental effect of making him gather his wits and forget the microphone.

These dazzling limelights are slowly turned down as the microphone is switched on, and suns of a soothing green or violet colour take their place; the colour may even be changed during an item to indicate, for instance, that the artiste must change from "patter" to song, or must bring his turn to a close.

The nearest that the B.B.C. has been to this idea yet is with the previously-mentioned Leonard Henry limelights, and it may sound too violent for the august Corporation. But it is only what is done in "film-shooting," both at Elstree and Wembley in this country, and in the States.

Film artistes have developed a habit ("complex," they call it, to be polite) of not being able to act without the atmosphere of the limelights.

The question is: Will Clapham and Dwyer, f'rinstance, be even funnier if acting under a battery of searchlights? Let the B.B.C. engineers investigate these personal questions, and tell us!

## "A FAIR FIELD AND NO FAVOUR."

(*Continued from page* 132.)

followed by six talks on Unemployment by Sir William Beveridge.

Monday nights will be devoted to literature. A series by Sir Henry Newbolt on "The Progress of English Prose" will be preceded by a series by Mr. D. R. Hardman on "Galsworthy's Forsytes." In addition to these talks at 7.25 p.m. there will be the usual language talks on the London and Midland Regional programme by Monsieur E. M. Stéphan (French), on Mondays at 8 p.m. and by Mr. Otto Siepmann (German) on Wednesdays also at 8 p.m.

There are also two series on the Daventry National programme at eight o'clock on Tuesdays, the first by Professor William McDougall, the distinguished psychologist called "Love and Hate: A Study of the Energies of Men and Nations," and the second by Dr. Sydney Cave on "Living Religions of the East." This series should also form a useful complement to Major Yeats-Brown's, and to the series on India. Both these series will have pamphlets published in connection with them, price twopence, or threepence post free.

### During the Summer.

Finally, there will be two series on Sunday evenings on the London and Midland Regional programme from 5 to 5.30 p.m. In the first Mr. T. S. Eliot will give three talks about John Dryden, whose tercentenary it is this year; followed by three talks on Daniel Defoe by Mr. Bonamy Dobré. In the second series the Rev. C. H. Dodd, of Manchester University, will give six talks on "The History of the Bible."

During the summer months there will be fewer talks at six o'clock, although the period will often be filled by eye-witness accounts of sporting events. There will be the usual Bible Readings at six o'clock on Sundays until June 21st. The Readings will, during this period, be taken from the Non-Pauline Epistles. It is hoped that these will be followed by a second series of English Eloquence readings. On Tuesdays Mr. Frank Prewett will continue his weekly commentary on "Country Life," and on Fridays there will be fortnightly specialist gardening talks by various distinguished gardeners.

The usual talks especially designed for women will continue at 10.45 a.m. These talks will be introduced by Miss Ishbel MacDonald, on May 4th.

## TECHNICAL NOTES

**By Dr. J. H. T. ROBERTS, F.Inst.P.**

### Balanced Armature Speakers.

I HAVE had a number of queries with regard to balanced-armature loud-speaker movements as compared with the ordinary reed type. Some readers do not seem to be quite clear about the balanced-armature type.

In this type the armature is shifted to and fro from its mean position by reason of the speech currents. In an ordinary reed type there is a very definite restoring force tending to bring the armature back to its mean position when it is displaced.

As a matter of fact, although a loud-speaker armature is sometimes described as being aperiodic, it is never quite so. Any vibratory system in which a restoring force is called into play by a displacement in the system is bound to have a natural period of oscillation, and, other things being equal, this period will be larger the smaller the restoring force. In an ordinary reed-type movement the system has very definite natural frequencies of vibration, which constitute resonance-points and so accentuate particular frequencies in the received speech or music.

### Polarisation.

There is a little point in regard to the use of a permanent magnet, in the case of an

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## TECHNICAL NOTES

*(Continued from previous page.)*

ordinary reed-type movement, where the speech currents traverse the magnet windings. Some people think that better results would be obtained if the "magnet" were not magnetised at all except under the influence of the speech currents.

In that case, when using an output transformer or filter, the frequency of vibration of the armature would be twice that of alternating current fed into the magnet windings, because each half of the wave would attract the armature indiscriminately—that is, without regard to polarity.

By fitting a permanent magnet, however, and an armature which is under a definite restoring force, we have an arrangement whereby increases in the strength of the magnetic force pull the armature in one direction, whilst decreases allow it to move in the opposite direction.

In this way the armature moves in synchronism with alternating current fed into the magnet windings so that the frequency of vibration of the armature is correct.

**A Curious Resonance Point.**

While on this question of resonance points, I want to mention another thing which often crops up and sometimes seems rather mysterious. When using A.C. mains you may, of course, use a so-called "half-wave" rectifier or a "full-wave" rectifier.

The half-wave rectifier allows one half of each wave to pass and cuts out the other half. The full-wave rectifier in effect allows one half of the wave to pass through it and takes the other or reverse half, turns it round to the right direction, and then allows it to pass, so that in the result it allows both halves to pass in the same direction.

You might expect that the amount of smoothing required with the full-wave rectifier would be much less than with the half-wave rectifier, and in general this is true. But cases sometimes occur where apparently the full-wave rectified current is more difficult to smooth than the half-wave.

**Anomalies.**

When this happens it is generally due to accidental resonance in some other part of the circuit. For instance, if you happen to have a loud-speaker which has a resonance point in the region of 100 cycles (assuming the A.C. frequency is the usual 50 cycles) then clearly with full-wave rectification, giving 100 cycles per second you are getting an input frequency which is in the region of the natural frequency of the loud-speaker, and you may get a pronounced hum (at 100 vibrations per second, of course).

With the single-wave rectified current however, you are feeding only 50 cycle frequency into the loud-speaker, and, although, with the same smoothing arrangements, this may be less "smoothed," it may nevertheless produce a smaller response in the loud-speaker owing to the fact that its frequency is fairly well removed from the natural frequency of the speaker.

This is a curious anomaly which quite often occurs, and, as I have several times found readers rather puzzled by it, I

*(Continued on next page.)*

# TECHNICAL NOTES

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thought it might be worth while to give you this brief explanation.

**L.F. Connections.**

When using a couple of stages of low-frequency amplification these may, of course, both be transformer stages or, as is common practice, a resistance stage followed by a transformer stage.

Readers are often inclined to wonder how results would compare if the transformer stage were put first, and the choke or resistance stage last.

As a matter of fact, this latter arrangement would generally be all wrong, and for several reasons.

Where an all-mains receiver is concerned it is sufficient to mention one of the reasons, and that is that the A.C. hum is likely to be much more pronounced with the transformer first. It is much better, therefore, for this and other reasons to stick to the conventional arrangement.

**Some H.F. Pointers.**

I was talking recently about the question of transformer ratios, and I pointed out that there are usually other factors which may be equally important as, if not more important than, mere ratio. As I have had several letters on this point, I should like to say something of a similar kind with regard to the H.F. end of the circuit.

What I have in mind more particularly is the use of a screened-grid valve as an H.F. amplifier, when some people try to get voltage step-up from, say, a four-to-one transformer.

Generally you will find it more satisfactory to use a one-to-one transformer, or to go in for a tuned anode circuit. By accurate tuning and the use of a low-loss coil the impedance of this latter circuit may be made as high as the actual impedance of the valve.

As regards the one-to-one transformer, this as a matter of fact can in the same way be made equivalent to the tuned anode arrangement, especially if the secondary is tuned.

**Matching Impedance.**

With a modern screen-grid valve, it becomes difficult, if not impossible in many cases, to match the impedance of the valve if you are seeking at the same time to gain the step-up advantage of, say, a four-to-one transformer, because the effective impedance is only a fraction of that of the secondary.

Of course, when using older types of valves, it is often possible to take advantage of the transformer step-up, owing to the much lower internal impedance of the older type of valves.

Because an arrangement works satisfactorily with the ordinary or neutrodyned valve, it does not follow that it will be satisfactory with, say, a screened-grid valve of high impedance.

**Simple Tuning.**

When using three tuned high-frequency circuits the operation of the receiver often becomes complicated owing to the different readings of the first dial and the second and third. The second and third may often be

*(Continued on next page.)*

## TECHNICAL NOTES

*(Continued from previous page.)*

ganged, although even that sometimes has an appreciable effect upon efficiency. The setting of the first dial, however, depends to some extent upon the aerial capacity.

A simple arrangement, however, which often facilitates tuning, is to compensate for aerial capacity by means of a semi-variable condenser introduced in series with the aerial, that is, between the aerial lead-in and the aerial terminal of the receiver.

When a station is tuned in, you can easily arrange the readings of the second and third dials to be the same, and then you can shift the dial of the first condenser (independently of the shaft) until it reads below the others. Now you can adjust the semi-variable condenser in series with the aerial until the reading of the first dial comes into line with that of the others.

**Try Different Stations.**

Of course, it will require a certain amount of juggling about, and you will need to try it on a number of stations of fairly different wave-lengths. If you have made your adjustments on medium wave-lengths, you will probably find that when you go over to long wave-lengths the divergence is too great, and the adjustment fails to hold even approximately.

Another semi-variable, however (with a different adjustment, of course) will probably be easily found which will give you a fair approximation to equality in the readings of the dials over the whole wave-length range. If you desire to retain the two semi-variable condensers, these may be arranged with a change-over switch, so that one or the other is thrown in series with the aerial, according to whether you wish to receive long waves or medium waves.

**An Experimenter's Ideas.**

A Manchester reader sends me a long and interesting letter describing his experiments and experiences with trickle-chargers. Before getting a regular transformer, designed for the purpose, he used a doorbell transformer (8 volts output) and a Leclanché container with sulphuric acid and tantalum.

He says that on one occasion there was a mild explosion with this cell, owing to the "topping up" having been neglected; what happened was that eventually the electrolyte got down to the bottom of the lead electrode, after which sparking took place between the lead and the electrolyte, and the mixture of hydrogen and oxygen in the upper part of the container was "fired."

You will notice that the hydrogen-oxygen mixture is produced by the electrolytic dissociation of water, and is therefore in the precise proportion for maximum explosiveness.

**Increasing Output.**

The writer of the above letter also gives a little tip which may be useful to those of you who still use tantalum rectifiers. You know that it is a common practice to dissolve a small proportion of ferrous sulphate in the dilute acid; this appears to act as a depolariser and it has the effect of increasing the rectified current output very considerably (50 per cent to 100 per cent),

*(Continued on next page.)*

## TECHNICAL NOTES

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and of making the rectifier work much more smoothly and uniformly. In addition to all this, the ferrous sulphate prevents the minute sparks which otherwise occur at the surface of the tantalum, and so it renders the tantalum practically everlasting.

**An Important Precaution.**

Well, the ferrous sulphate apparently becomes used up in course of time, being no doubt converted into other compounds by the action of the cell. To counteract this, my correspondent always puts into the cell a few iron filings, or even one or two iron nails.

These react slowly with the acid and provide a fresh sourse of ferrous sulphate. I should mention that the amount of ferrous sulphate required is very small—about a teaspoonful of the powder to a quart of the dilute acid is quite sufficient, in my experience.

Perhaps I should also mention, in passing, that the ferrous sulphate should on no account be allowed to get into your accumulators, as iron compounds are a great enemy of lead cells. Therefore, you should be careful, if using the same vessels for preparing the rectifier solution and the acid for the accumulators, to avoid any possibility of contaminating the latter.

**Short-Wave Effects.**

I am often asked, particularly by beginners in radio, why it is that the "hand capacity" effect with a condenser should be greater on short or medium wave-lengths than on long wave-lengths; in fact, why the general behaviour of a circuit on short waves should be decidedly different from that on long waves. Well, the effect is, of course, a difference of *degree*, not of *kind*. I mean that the effects which are so noticeable with short waves are still present with long waves, but are so inappreciable as to be of no serious account.

Perhaps I can best indicate the general difference between the behaviour of a circuit on long and on short waves by confining the explanation to the behaviour of a condenser. Hand-capacity, as already mentioned, is more pronounced with the short waves.

**Condenser Characteristics.**

Short wave-length is another way of saying "high-frequency"; and, in fact, the wave-length and frequency (since the velocity of the waves is constant and independent of frequency) are inversely proportional to one another; or, in simpler language, the shorter the wave-length, the higher the frequency, in the same ratio.

Now the effect of a condenser depends very definitely upon the frequency of the alternating voltages applied to it. You know, for instance, that if the alternations are very slow, the condenser is practically an insulator, whilst if they are very rapid the condenser behaves as though it were a conductor.

You will see, then that stray capacities (such as that produced by the proximity of your hands—"hand capacity") are likely to be much more pronounced when short waves (high frequencies) are in question than with long waves.

The way to overcome disturbances of this kind is by screening in various ways.

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Every Thursday PRICE 3d.

No. 463. Vol. XIX. INCORPORATING "WIRELESS" April 18th, 1931.

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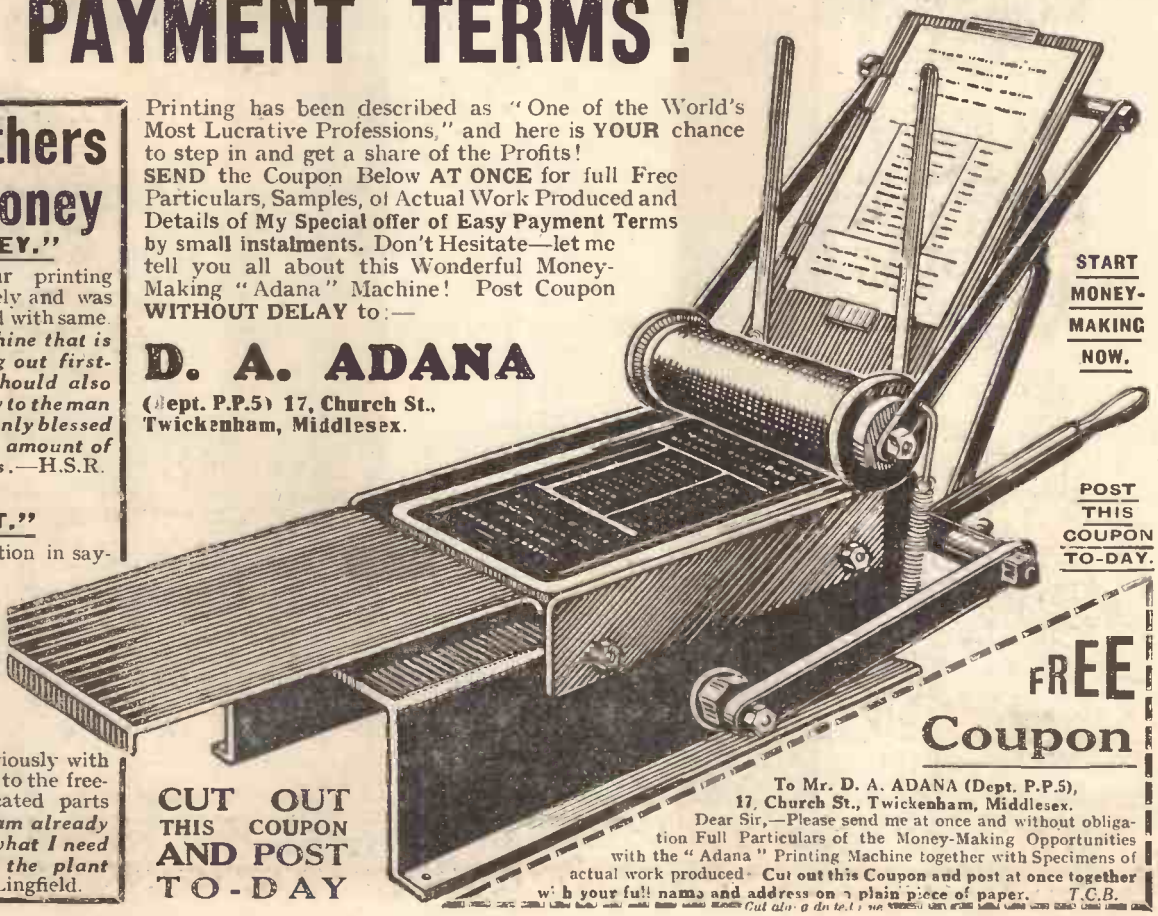

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HIGHLY COMMENDED TELEVISION WHERE THEY ARE A RADIO GRAMMY

## RADIO NOTES & NEWS

THE NEW TALKS "GRANDMA" IN MEMORIAM SOTTENS

### Highly Commended.

"WE lived in a placid and graceful age, and would never have understood the strained and tormented world which has brought forth its Stravinskys and Hindemiths and Honeggers. '*Melody is the essence of music*,' he said; and again, 'music must never offend the ear.'" That is from the "Radio Times," and is not a reference to "Ariel" or similar ignoramuses: no, Mozart was the inconsiderable musician who has laid it down that *the essence of music is melody*. So whatever the musical *poseurs* say at me, I am in jolly good company.

### Television.

ANOTHER quotation—from the 1930 Report of the Radio Corporation of America. "While television during the past two years has been repeatedly demonstrated by wire and by wireless on a laboratory basis, it has remained the conviction of your own Corporation that further research and development must precede the manufacture and sale of television sets on a commercial basis." That puts the leading American view plainly and in a nutshell.

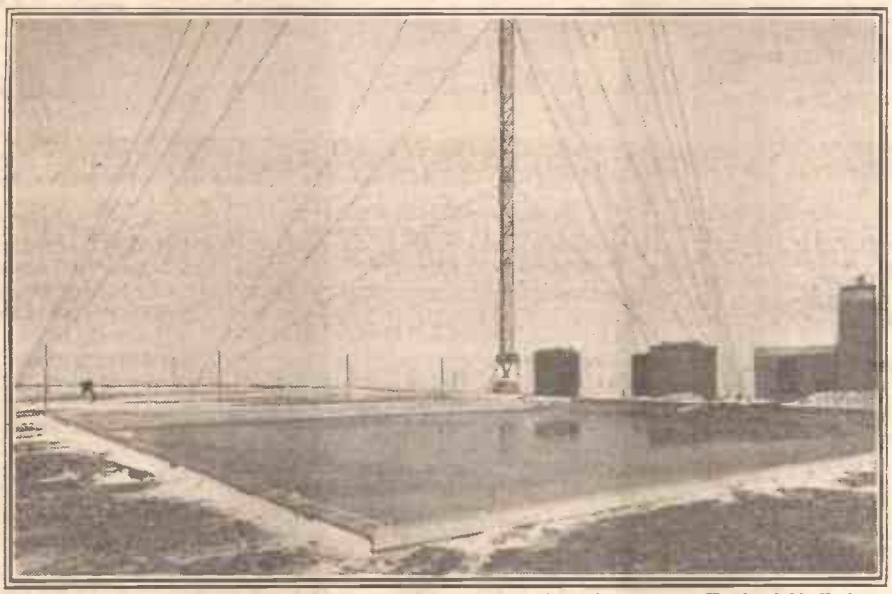
### What America Aims At.

THE Report continues, "It is felt that in the practical sense of the term, television must develop to the stage where broadcasting stations will be able to broadcast regularly visual objects in the studio, or scenes occurring at other places through remote control; where reception devices . . . . will make these objects and scenes clearly discernible in millions of homes; where such devices can be built upon a principle that will eliminate rotary scanning discs, delicate hand controls and other movable parts; and where research has made possible the utilisation of wavelengths for sight transmission that would not interfere with the use of the already overcrowded channels in space."

### Where They Are.

THE "Wireless and Gramophone Trader" publishes the official Post Office returns of licences issued in the Head Post Office areas of the U.K. as at December 31st, 1930. A few examples may interest you. In London the S.E. district has most, the E. coming second. In "England and Wales," Birmingham is an easy winner with 99,221, with Manchester second, 94,817, and Liverpool third with 82,672. In Scotland Glasgow romps home with 60,994, with Edinburgh second, 33,987, and Aberdeen third, 17,039—a tribute to Aberdeen! Northern Ireland, of course, has Belfast top, with 22,329, Lisburn with 1,153, beating Londonderry with 989.

### THE GIANT OF THE MOORS



A view of the new North Regional twin-wave B.B.C. station at Slaithwaite, near Huddersfield, Yorks. It shows the insulated base of a 500-ft. mast, with the water storage, and fuel tanks in the background.

### "Daily Mail" and Albert Hall.

WHAT a stunning concert the "Daily Mail" staged at the Albert Hall on Sunday, March 29th! Froward circumstances prevented me from attending in person, and my delight, when I learned that it was to be broadcast, was overwhelming. Nothing like it has been at the disposal of listeners on a Sunday since Marconi was a lad. It just shows what a touch of commercial genius can do for the public. Golly, what a Sunday it was! The B.B.C. fully deserves praise for its excellent technical work; it seemed to me that there wasn't a single flaw in the transmission!

### A Radio-Grammy.

FERRANTI'S have sent me a lovely brochure describing their radio-gramophone, a courtesy which, unfortunately, coincides with the understanding at which I have just arrived with my favourite assessor in respect of income tax for the period 1930–31 (April). So that Ferranti's cannot, I regret, see the colour of my 'oof. Nevertheless, were I wealthy sufficiently I should look 'em up, don't-ye-know, because a radio-grammy is the subject of my dreams. Definitely, my 1931 complex demands an all-mains, perpetual record-changing-minus-Mühlacker-anti-Stravinsky-radio gramophone.

### The Same—Only Different.

A HEYWOOD (Lancs.) reader is good enough to describe how he detached the aerial lead from his set, tied a piece of insulated wire *along* the last six inches of it, with a few inches projecting beyond the end of it, and then connected the free end of the insulated wire to the aerial terminal of the set. This arrangement, he says, he found more selective than a condenser in series with the aerial. But this actually constitutes a series condenser, only one not so conveniently variable as the ordinary "shop" sort.

# RADIO NOTES AND NEWS

*(Continued from previous page.)*

Probably our friend chanced to hit upon a more suitable capacity in this way than that of the condenser he used before, but there is no difference in principle.

### H.M.V. Broadcasts.

THE Gramophone Company had planned to give an all-star, all-record broadcast from Rome (441 metres) on each of the following Sundays, April 12th, 19th, and 26th, from 7.30 p.m. to 8.30 p.m. Owing to special broadcasts of opera by the Italian authorities it has been rendered necessary to alter these arrangements and readers are requested to note that these broadcasts are now to be given on Sundays, April 19th, 26th and May 3rd from 7.15 p.m. to 8.15 p.m.

### The B.B.C. "Talks."

THE "talks" programme for the period April to July is now ready and I make so free as to offer the B B.C. my congratulations—the first time that I have felt able to do that in regard to "talks."

The selection is really brilliant and some extraordinary interesting fish have been caught this time, including Mr. A. J. Evans, author of "The Escaping Club," and Mr. E. H. Jones, author of "The Road to Endor," both books about attempts to escape from enemy wartime prisons, and the last-mentioned as good as any novel. Do get it!

### In Memoriam.

THOSE thousands of listeners who have enjoyed the "Roosters'" performances and who remember the tragically sudden death of one of their number, Albert E. Howe, will be pleased to think of the concert which the troupe are organising for April 24th, at the Northern Polytechnic, Holloway Road, to inaugurate a fund for their late colleague's widow. Tickets, 1s. to 5s., can be got from Percy Merriman, 43, St. Andrews Road, N.W.11, and C. S. Riley, Gillespie Road School, Highbury, N.5.

Leonard Henry, De Groot, Elsie and Doris Waters are going to take part in the concert, besides the Roosters.

### "Grandma."

I WAS very pleased when the B.B.C. told me that of all Mabel Constanduros' characters the majority of appreciations received at Savoy Hill name "Grandma" as being the favourite. She always was mine; her voice and downright manner of speaking are perfect.

"Father" is best when he does not speak, as in the boating episode. Vocal, he is a vulgar clown not worth Mrs. Buggins's old shoe. But how I should love to hear "Grandma" telling the dustman "where he gets off."

### Band or Orchestra?

MY aside, asking what is the difference between a band and an orchestra, brings a letter from C. S. P., who suggests that the band is mainly wind and the orchestra mostly strings. Well, I suppose it works out like that in general, though a good orchestra generally boasts brass, drums, flutes, and other wood-wind, besides triangles and bells.

But why is one gang a *band* and the other an *orchestra?* They often play the same music. Besides, I have seen plenty of strings in so-called bands at seaside resorts.

Apropos, I have just heard for the first time a symphony containing an oration—Arthur Bliss' "Morning Heroes."

If this sort of thing is encouraged Stravinsky will be emboldened to include a "talk" on "Zinc and its alloys!"

### Trials of a "Comet" Builder.

W. B. (Manchester) has won through to a full appreciation of the "Comet" Three after numerous vicissitudes. Scrapping his existing set, a "trade" layout, good but not in the same avenue or mews as the "Comet," he pulled his pa's wallet to the tune of a "Comet" Kit, and got busy.

The set was finished in 6 hours but delivered only hoarse whispers. Then W. B. found that a tin panel was not the ideal, and he remedied that. Improved, but not true "Comet" results. Finally he got a "Blue-Spot 66R" Unit and chassis, and then the "Comet" surpassed all hopes and expectations.

Our 16-years-old correspondent has now a radio reputation second only to that of Marconi himself.

### The "Globe Trotter" Again.

ON the short waves this set, as we have ample evidence, is an easy winner, and "fans" interested in DX work should not miss trying it out. Negligently leaning over my immense pile of correspondence, and picking at random one letter, I learn from C. H. (Trowbridge) that he is overwhelmed with short wavers and can put W 2 X A F on his L.S. any night.

Extracts from his log show that he has received America, Argentine, Italy, Germany, Kenya, Morocco, Portugal, Australia, Russia, Spain, French Indo-China, and others. Not bad! Eh?

## SHORT WAVES.

**WIRELESS IN A COAL-MINE.**

Not too deep for words.—"Sunday Pictorial."

* * *

Curate (outside wireless shop on Grand National day): Well, Mrs. Shadbolt! Listening to the running commentator?

Dear Old Soul: Yes, sir, an' I was just thinking what a splendid runner 'e must be to keep up with all them horses!—"Passing Show."

* * *

**HAIRS AND AIRS.**

A correspondent says he has discovered a use for his wireless set.

Some time ago he was dismayed by the premature whitening of considerable areas of his hair, a phenomenon with which the various remedies he tried were unable to cope. Necessity sharpened invention; he bought a steel comb, connected it with his wireless batteries, and to the accompaniment of the B.B.C. programmes, put this hair through a daily drill. In a few days the normal hue was restored, and several pints of hair lotion went down the sink!—"Northern Evening Despatch."

* * *

"Plea for Brighter Sunday Programmes" runs a headline in a daily newspaper.

Less Bach and a little more bite!

* * *

This Week's Most Tragic Man—the burglar who, after trying for several hours to find the combination of a safe, finally got the Midland Regional.

* * *

"So Bob was the life of the party?"

"Yes, he was the only one who could talk louder than the wireless."—"Answers."

* * *

I understand there is no truth in the rumour that the B.B.C. is making arrangements to broadcast the first croak of the croci at Hampton Court.—"Daily Mirror."

### Sottens

REFERRING to the remarks by R. W. H. in our issue of March 21st (p. 22) about the Sottens station, I am indebted to the Hon. Sec.—or rather *one* of the Hon. Secs.—of the Woodford, Wanstead and District Radio Society, Mr. H. O. Crisp, for some interesting details of this new performer in the concert of Europe.

Sottens is by no means an experimental station, but was built in this country I think by Standard Telephones and Cables, Ltd., for the Swiss Administration.

### 2,500 Feet Up.

L S (Sottens), or Station Romande, is in a village 2,500 feet above sea-level in the Canton de Vaud, 17 miles north of Lausanne, and is intended to serve French Switzerland. It is proposed to broadcast programmes from the studios of Lausanne and Geneva, to which Sottens will be connected by cable.

The aerial is 410 feet high, the power 25 kw., and the wave-length 403·8 metres. Probably a great many of you will have tuned in this station before these Notes appear.

### "Spirit of the Storm."

THAT is what S. K. W. says that "Ariel" is. Well, that's not inapt, for I am generally to be found in the thick of some controversy, notwithstanding the fact that I am not Hibernian but Kentish.

S. K. W.—no. Harold! *not* the call-sign of SasKatcheWan!—is a Yorkshireman, and as Yorkshire is the second finest county in the finest country in the world, I salute him as one peer does another. He pays a compliment to the man who draws the diagrams for "P.W." often from the roughest of sketches.

Truly that is well-deserved. You may scribble idly on a bit of scrap-paper and our artist will turn it into a three-valver of high degree or a wave-trap fit to snare elephants.

### Higher and Higher.

I HAVE referred before to the remarkable career of David Sarnoff, who has risen in twenty-five years from a messenger boy to President of the Radio Corporation of America, and as an indication of what he has done for himself culturally, I am pleased to report that the New York University has conferred on him the honorary degree of Doctor of Science and elected him to its Council.

The speech made on the occasion referred to him as "tireless in research, skilful in literary expression, recognised as a guiding force in business affairs, a man of high ideals, practical methods and untiring energy."

### Watches and Perpetual Motion.

NO connection whatever, of course. These are two of the subjects in a very interesting letter from W. T. C. (Whitehaven), who probably does not trouble to read my weekly ramblings. He wants us to stick entirely to radio; he requests Capt. Eckersley not to waste space over magnetised watches or perpetual motion—but he actually uses up some of his time in deriding the idea of heating a watch to de-magnetise it.

Well, if our readers did not write to us on all kinds of subjects allied to radio we should not "waste" space in answering strictly non-radio letters.

**ARIEL.**

# WHAT I THINK of TELEVISION

BY John Scott-Taggart, M.C., A.M.I.E.E., F.Inst.P.

WHAT is television? What do the words mean? What is a good definition? Television, a disgruntled inventor told me, is a scientific means whereby one can see money disappearing in the distance.

Perhaps the simplest and best is simply "Seeing at a distance by some system of communication other than direct vision." This more or less implies electrical communication.

The word comes from the Greek "tele," meaning "at a distance," and the Latin "visus," seen. I propose, in the simple explanations which will follow, to assume that you know nothing whatever about television.

It will seem ridiculous to the readers of this paper, but many people imagine that television will enable one to see what someone else is doing without their knowing it—a sort of electrical Peeping Tom, in fact.

Such people throw up their hands in mock horror. "Will people see me having a bath?" they ask; or suggest other sights likely to be equally startling or disillusioning.

They need not worry. No one will be televised unless he wants to be. He will have to go before a television apparatus just as now he has to go to a telephone—that is, unless in some public place he chances to pass before the television "camera."

**Before Long . . .**

A few years ago it was necessary for us all to set aside a certain amount of time each week to correcting friends who said: "Before long we'll all be talking to each other by wireless." The idea, apparently, was that we should all have pocket wireless telephone apparatus and be liable to be called up at any minute, like Scotland Yard's flying squads.

**2. ARE THEY TELEVISIONARIES?**

**The famous inventor, research worker and author, continues his survey of television in an exclusive series of "P.W." articles.**

May such a day never come! It is not likely to. The telegraph and telephone have been defined as electrical inventions for hearing more quickly something you don't want to hear at all. A wide extension of rapid communication would rob us of our last vestiges of privacy.

**Not Worth Seeing!**

As an adjunct to the telephone there would be a vast but remote future for television, provided people really wanted it, which I doubt. "Speech was given us to disguise our thoughts," said Rochefoucauld. "The telephone to conceal our faces," we might almost add.

In my own opinion, the real huge potential market for television is in "home talkies." The Baird company seems to be firmly of opinion that people want to see things as they happen, *e.g.*, people in the studio, the Derby, the boat-race, etc.

**"Deadly Dull."**

The German and American television people, on the other hand, look to the home cinema and concentrate on that, and I think they are right.

Except in rare cases, we do not really want to see what goes on in the studio. It is deadly dull. It is certainly not worth the hundreds of thousands, perhaps millions, of pounds which will be poured out to provide television. In some cases we would be very much disillusioned. In others, merely casually interested.

The Bible tells us that "where there is no vision the people perish." Perhaps where there is no television the people will also perish. But up to the present there has been too much vision and not enough television.

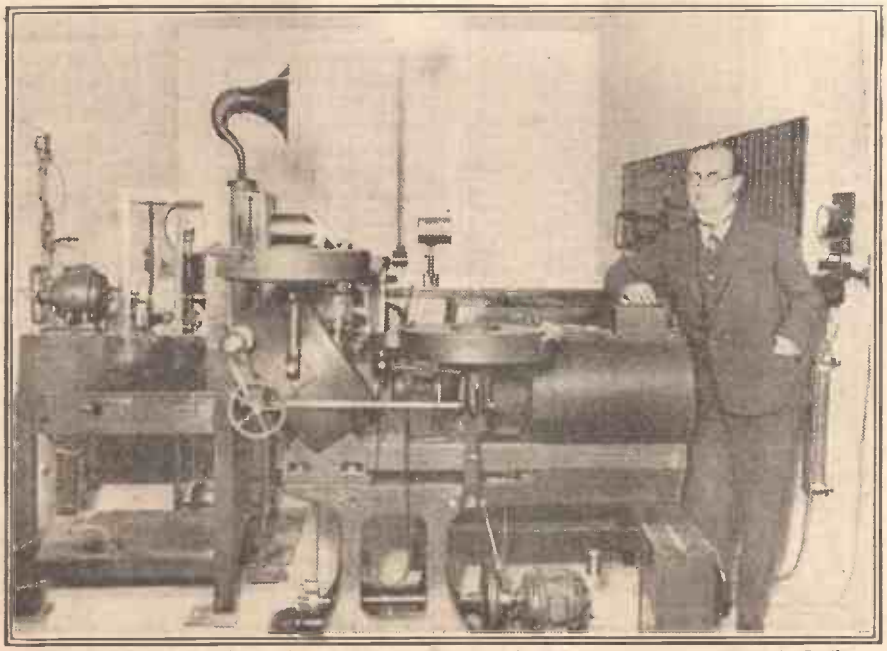
**Not Enough Experts.**

We have too many "televisionaries," if I may coin the term, and not enough experts. We need to stop dreaming and talking and demonstrating, and get on with the job.

The first real demand, I think, will be for the home talkie. Perhaps we do not know that that is what we want, but I think it is what we are going to get. By home talkie I include up-to-the-minute cinema news.

(*Cont. on next page.*)

## A FAMOUS GERMAN TELEVISION INVENTOR



Professor Karolus, of Leipzig, and the television apparatus he has frequently demonstrated in Berlin.

## WHAT I THINK OF TELEVISION.

*(Continued from previous page.)*

It may take time to see the Grand National while it is actually taking place, but the reproduction of a film or talkie by television presents far fewer technical difficulties at present, and may easily be made really practicable in only a few years time. From a scientific standpoint it is possible now, but the entertainment value at present is small.

What will happen to the cinemas? No one can tell. In America they suffered huge damage by the miniature golf craze. No one can predict the effect of really successful home talkies which require no more operation than the pressing of a button.

### Are You One of Them?

My own opinion inclines to a survival of an improved cinema. Many people go to the cinema to get away from home. The whole modern trend is towards movement—getting away from things rather than going to things.

That is why so many of us in cars pathetically crawl along the Portsmouth road on a Sunday afternoon sniffing in the lead-laden exhaust gases of the car in front. Or go up in aeroplanes. We're getting away from things. Perhaps we are merely trying to get away from ourselves.

Moreover, a scientist, observing the average cinema audience, would note with interest that the sexes were equally represented and that they were mostly arranged like the cells in a high-tension accumulator, positive and negative, positive and negative. This is another factor.

The gregarious instinct is a third—the desire to be in a crowd. So home talkies are not likely to oust the cinema. But this, I think, may be taken as certain that the future of television will lie with the cinematograph magnates. Or rather, I should say, with the super-magnates who are beginning to control the entertainment world.

### The Valve at the Core.

Look what has happened in America! The Radio Corporation has extended its tentacles to embrace gramophone, broadcast radio sets, variety theatres, cinematograph studios and television. The whole entertainment world is centring round such a corporation.

In this country, we have the Gramophone Company, Ltd., acquiring the Marconiphone Company, and interesting itself in talkies and television.

It is all extremely logical, and to me, at any rate, it is intensely interesting to find that the hub, technically, of all these industries, their greatest common factor, is the thermionic valve which now plays its gallant and indispensable part in every branch of reproduced entertainment.

There are those who go further and say that direct entertainment such as the theatre is doomed. But I am not a professional prophet. Only this will I say: that perfected television is within reasonable reach of finding two sorts of application.

### Looking-In.

One is the equipment of cinemas with "seeing" apparatus which will enable moving pictures of events to be telegraphed from central headquarters along electric wires and projected on the screen.

The other is the provision of telephone booths in large cities to which people can repair when they desire to see or be seen. For example, a young man in London might wish to speak to and see his fiancée in Glasgow.

He would hie himself to the television telephone centre at Piccadilly, say, and she would do the same at Glasgow. One can visualise social centres being built round these television headquarters.

Beauty parlours would probably do very well. Shops selling wearing apparel would cluster round. The young man might go to the extent of having a face massage before appearing before the television apparatus, although this presupposes a high degree of technical excellence in the reproduction.

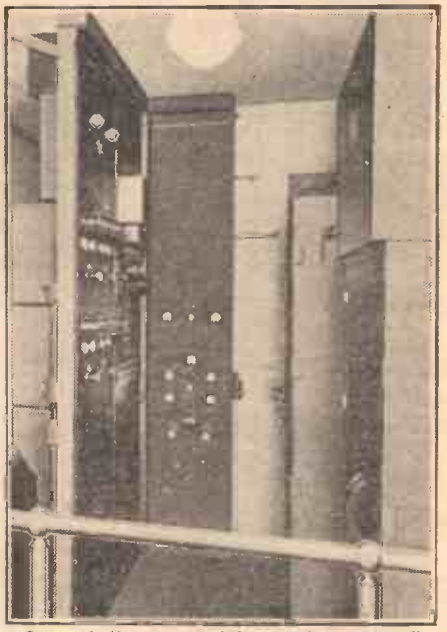
As television stands at present, he would not even need to shave. In fact, the chances are that, as likely as not, the apparatus would, after he had gone to the expense of a shave and face massage, gratuitously provide him with side-whiskers!

But this is the point, which I shall enlarge upon later: television's greatest problem is not so much that of effecting good reproduction as of finding room in the ether for the waves it requires to produce that good reproduction.

## OVER TWO THOUSAND WIRES!

The Jenkins' television receiver includes over two thousand thin wires joined to an equal number of photo-electric cells. It is said to be a masterpiece of mechanical ingenuity.

## TWO-WAY TELEVISION



Some of the gear used by the American Bell Telephone laboratories in an elaborate two-way television experiment.

## RADIO BREVITIES

**Time Factors—Ships and Short Waves.**

**Central European time, which is one hour ahead of Greenwich, is kept in Denmark, Italy, Norway, Poland, Lithuania, Sweden, Austria, Czechoslovakia, Yugoslavia, and Hungary.**

* * *

**Dutch time is twenty minutes in advance of Greenwich, so that when it is 12 o'clock in England it is 12.20 in Amsterdam.**

* * *

**The Eastern European countries keep their clocks two hours ahead of Greenwich, so in Finland, Esthonia, Latvia, Roumania, Russia, and Turkey it is 2 p.m. when it is noon in England.**

* * *

**About 50 per cent of the world's ships are fitted with wireless apparatus. In accordance with the agreement arrived at in Washington, spark transmitters of high power are not now being fitted on board ship.**

* * *

**About 500 ships are now fitted with short-wave receivers, and about 150 for transmission.**

# THE "EXTENSER"

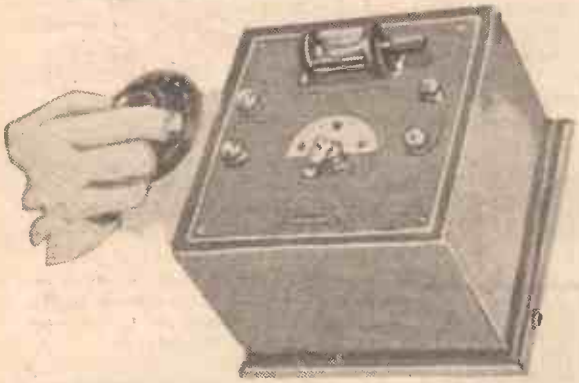
**All about the entirely new tuning method that is creating such wide interest.**

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

THE "Extenser system," the automatic control of wave-changing by the tuning condenser itself, is now on the threshold of universal acceptance. In principle it is far from being a new thing. Indeed, it has quite a long history.

And it may surprise even "P.W." readers to learn that it dates back to the year 1916,

## A VERY EARLY MODEL



In April, 1926, Mr. Dowding described in "Popular Wireless" a crystal set using an early form of his notable invention.

which was while I was in the Royal Flying Corps which preceded the R.A.F.

I was carrying out a series of experiments with a very compact radio receiver I was developing. The instrument incorporated a very simple tuning circuit comprising a tubular condenser and a solenoid coil.

But I wanted to make the set capable of tuning-in both the short-wave aeroplane transmitters and the longer waves used by certain government stations. Simplicity of operation was essential, and I scrutinised my circuits very closely in an attempt to reduce the controls.

### An Inspiration.

It seemed inevitable that I would have to have the variable tubular condenser for tuning, and the inductance switch for tapping up and down the coil; but—an inspiration! The tubular condenser consisted of two tubes, and to obtain a variation of capacity you had to push the one tube into the other. The tube right out—minimum capacity; the tube rammed right home into the other—maximum capacity.

Thus the whole capacity range, and the whole of the tuning for one fixed inductance value, was covered by the one inward journey of the tube. Why not, I thought, make the tube operate the inductance switch so that the condenser operated with another value of inductance and covered a second wave-band on its outward journey.

It appeared to me to be a magnificent idea, so I went ahead. I wound a largish coil and tapped off a little of it for my short-waves, and arranged a trip-switch that brought into service the whole of the coil for a long-wave band.

The result was that as you pushed the tubular condenser in you ran up the short waves, and as you pulled it out you ran down the long waves. In one stroke the first dual-range coil—and the original "Extenser"—was born.

I was extremely pleased with the invention, and I suppose I can be forgiven for that! The full plans of the set were communicated to the Board of Invention and Research; but apart from acknowledgements (which I still possess) they did not say much.

I admit that the arrangement had a very serious drawback in that it permitted tuning only over two wave-bands of a restricted character, whereas in those early days the wireless stations our sets had to pick up were to be found all over the gamut of wave-lengths from about 180 metres up to 3,000 or so.

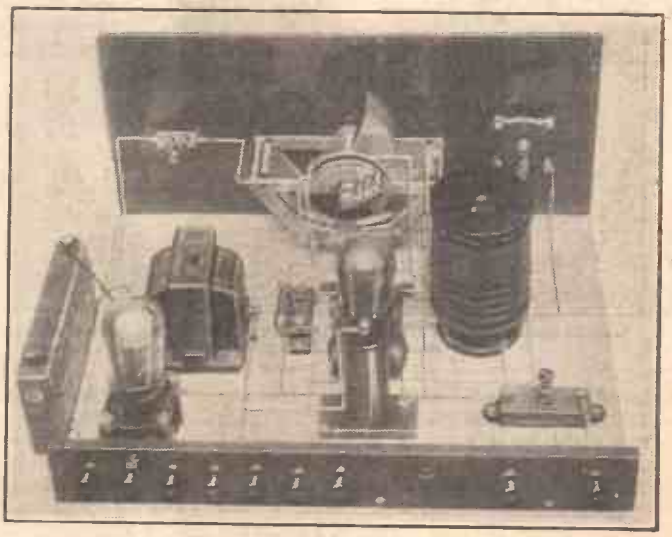
However, when broadcasting came along the situation changed. The broadcasting stations of Europe tended to group themselves into two distant bunches, medium and long wave. It was soon possible to rope the majority of these in with one coil having one tap, providing a simple wave-change switch was used.

### In Use By The Million.

In the meantime I had joined the staff of POPULAR WIRELESS. It was then too early to introduce the combined tuning condenser-wave-change scheme, for plug-in coils were quite universal and broadcasting had not settled down. But "P.W." readers will remember that I was able to introduce the very first tapped plug-in coil, and millions of these have since been employed all over the world.

(*Continued on next page.*)

## THE FIRST EXTENSER SET



A photo of the "Extenser" Two—a "Wireless Constructor" receiver. It was the first set in the world to employ the Extenser.

## THE "EXTENSER"

*(Continued from previous page.)*

When 5 X X and a few other really acceptable long-wave concert broadcasters came along I began again to think of my "automatic" tuning—and, in fact, presented it in "P.W." for April 3rd, 1926.

It was embodied in a ship's crystal set. A straight-line capacity variable condenser rotating through 360 degrees figured in this receiver, a photo of which accompanies this article.

### We Wanted Complications!

As you will see, there is a semicircular metal plate fixed to the panel underneath the condenser dial. A metal tongue was attached to the condenser spindle, and when this tongue traversed the metal plate it shorted a portion of the coil out of circuit and enabled the medium-wave stations to be tuned in. Over the remaining 180 degrees the whole of the coil was in action and the circuit was automatically wave-changed for the reception of 5 X X.

All very simple, and any ordinary variable could easily be adapted to the task by the constructor himself. A week or two later the scheme was embodied in a valve set—the "P.W." "Simplicimus" Three.

But the idea was just a little too early, the public were not ready for it. The radio set of those days did not largely interest any but the mechanically minded, and these were not lured by simplicity in operation; I really do believe that the more complicated the set the better they liked it!

Rather disappointed with the lukewarm reception accorded to my scheme, I shelved it for the time being. But as the years passed it became evident that there was a growing demand for simplicity and yet more simplicity. Wave-changing by panel switches instead of by coil exchanging assumed a real demand as the radio receiver grew away from the "fan" and began to occupy its place in the homes of the country alongside the piano and the gramophone.

### Simplicity Wins.

So in 1929 I again had a shot at introducing the Extenser. Simple single-point switching was not adequate for the prevailing technique, but it was by no means difficult to devise methods of carrying out any kind of circuit change by resorting to different switch methods.

In the November 2nd, 1929, issue of POPULAR WIRELESS I illustrated that by brushes and commutators, or by cams and spring contacts or other devices fitted to the spindle, it was possible to make the condenser itself perform anything in the way of wave-change switchings from that found in the simplest of crystal sets to those figuring in complicated multi-valvers.

Although the scheme did seem to be full of advantages there was one snag, and I expect you have already spotted it. So far, all my practical experiments had been carried out with straight-line-capacity variable condensers, and obviously these are useless for modern sets.

I may have expressed the hope that while compensated tuning was easily obtainable over 180 degrees (S.L.F., S.L.W., etc.) it should be possible to achieve a similar effect over the newly-opened and remaining 180 degrees: but, in my heart, I must confess that I had doubts.

However, I plugged away at it, and, with the help of my "P.W." colleagues, in due course evolved a number of vane shapes that would do the trick. Subsequently, it was discovered that 360 degree compensations developed for other jobs existed! However, I am glad to say that our patents have been cast over any conceivable combination of compensated tuning for any two wave-bands in conjunction with any conceivable kind of condenser-operated switching.

Now a few words about the Extenser, which, as you will have gathered, is my original 1916 idea completely revised for modern conditions. It is my duty, my obvious duty, to give the home-constructor the first advantages of anything that I am able to evolve.

### Now in Full Production.

Therefore, when it was decided that the time was ripe for full details of the perfected Extenser to be published, the question arose as to which of our three journals should contain the preliminary articles. The "Wireless Constructor" was chosen because it caters largely for that type of constructor who is a bit more useful with tools than most others. And an Extenser is not as easily made by the amateur as a coil—it calls for a little metal working.

Anyway, Victor King gave the Extenser as an admirable introduction in the "Wireless Constructor," and in the comparatively short period that has elapsed since then there has been ample proof that this modern version of one of my earliest inventions is "well on its way," and already firms are in production with inexpensive Extensers.

I know I have used the first-person pronoun a tremendous lot in this article, but, after all, it has been rather a one-man idea, hasn't it?

### WHAT THE EXTENSER DOES.

(1) Simplifies set construction.
(2) Simplifies set operation.
(3) Increases receiver efficiency.
(4) Eliminates wave-change switches.
(5) Enables one set of dial readings to cover both long and ordinary waves.
(6) Makes dial readings logical and definite instead of purely arbitrary.

### A CONSTRUCTOR'S MODEL

Full details of the construction of this Extenser appeared in the issue of the "Wireless Constructor" published March 14th, 1931.

### THE OLD AND THE NEW

With an Extenser in your set, as on the left, you have none of those confusions of dial reading or wave-changing troubles such as are met with in the usual way.

## STATION INFORMATION

**Hilversum, Huizen, Posen etc.**

**The Hilversum and Huizen stations have an arrangement by which they exchange wavelengths every three months.**

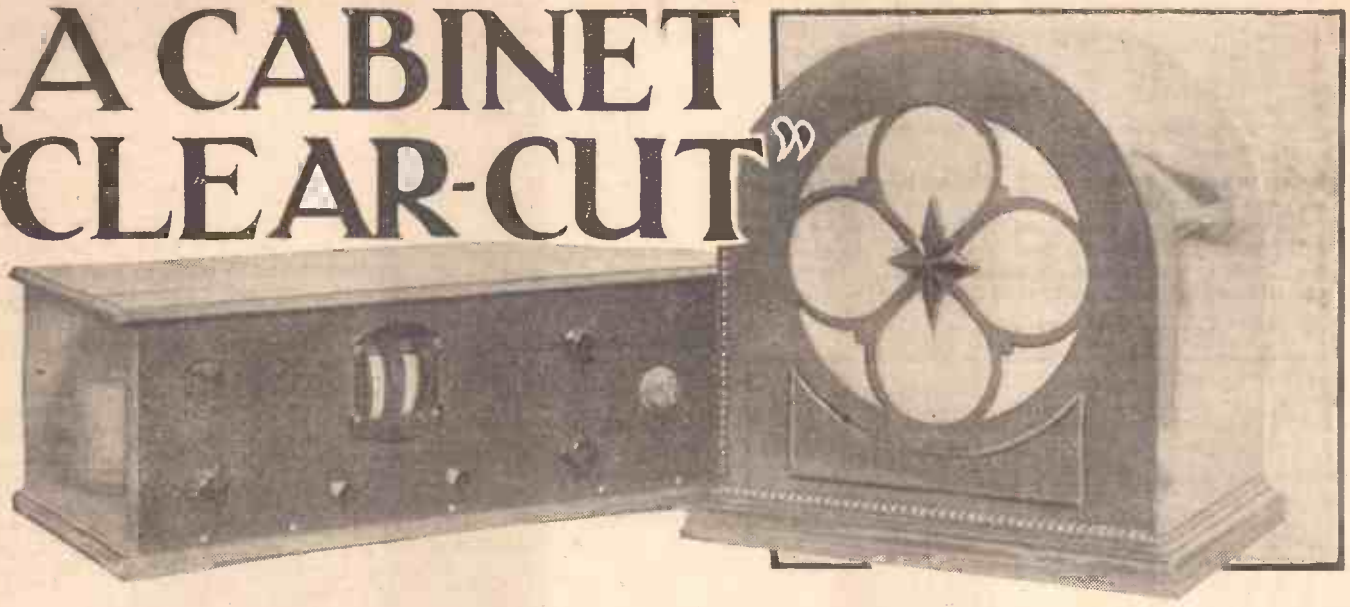
* * *

**The station at Posen, Poland, is probably the first to be on the air in Europe in the mornings, its first transmission generally starting about 4.15 a.m.**

* * *

**In Bulgaria the telegraphs and telephones are monopolies of the government, by whom broadcasting is discouraged, and there are probably fewer sets in Bulgaria than in any country in Europe.**

# A CABINET "CLEAR-CUT"



SOME little time ago, we described how to make the "P.W." "Clear-Cut" Cone, a loud-speaker which was entirely novel in its suspension, and which was notable for the very high-class reproduction which it gave, together with extreme simplicity and economy of construction.

**The original "P.W." "Clear-cut" Cone loud speaker aroused a tremendous amount of interest. Here is another model based on the same simple method of free edge suspension.**

### A "Clear-Cut" Demand.

The numbers of POPULAR WIRELESS describing the original "Clear-Cut" Cone are out of print, and as there is still a considerable demand for this type of loud-speaker, we are this week describing the construction of another model, this time designed for use in a cabinet.

The photograph and diagrams will show that the construction is not a difficult matter, and that there is really little need for us to go deeply into the matter, but there are one or two points which must be brought forward.

If you examine the photographs and the drawings you will see that the "Clear-Cut" Cone is a double cone arrangement, in which a main diaphragm is fixed to what we may call a truncated cone, with the apex facing the other direction. By this means we have a double diaphragm speaker which is extremely rigid from a mechanical point of view, and yet suspended freely enough to enable all the advantages of the free edged cone speaker to be obtained in full.

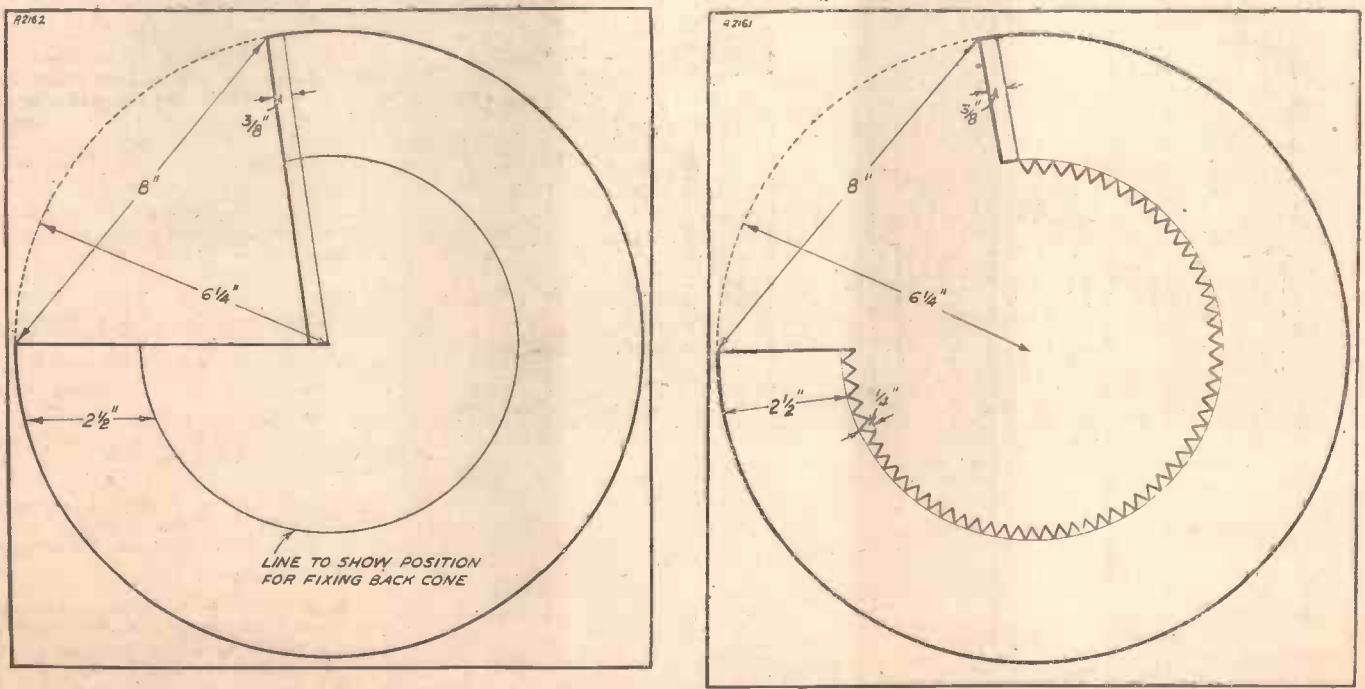
You will notice that the suspension of the cone is carried out by means of paper strips fastened to the smaller or truncated cone, these strips being taken to a cardboard ring which is mounted on the wooden chassis of the assembly.

### Simple Chassis Construction.

The chassis itself, as you will see, is a simple business. It consists merely of a couple of uprights, $7\frac{3}{4}$" long, with 12" cross-pieces at the bottom and the top, the whole

(*Continued on next page.*)

## HOW THE TWO CONES ARE CUT FROM SQUARE SHEETS OF PAPER




**The left-hand diagram shows the dimensions of the main cone, while that on the right tells you how the smaller, truncated cone has to be cut and prepared for fixing over the other one.**

## A CABINET "CLEAR-CUT"

*(Continued from previous page.)*

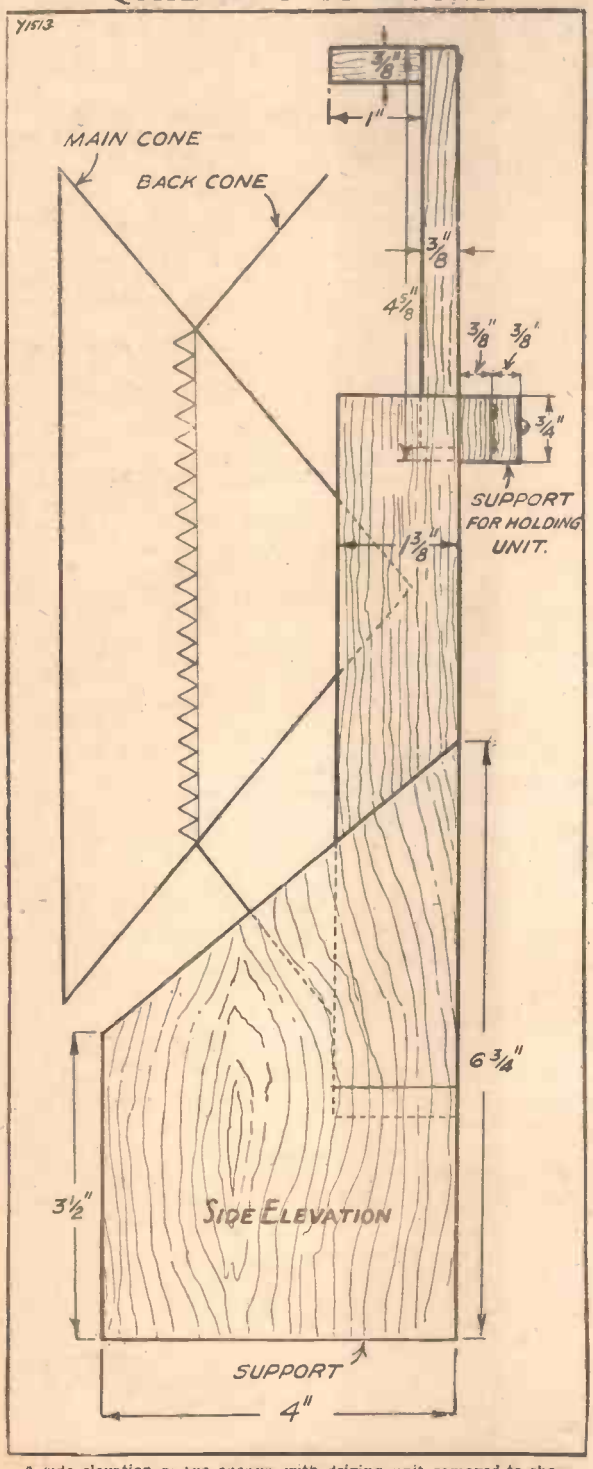
being mounted on two fairly substantial supports at the bottom.

To the top cross piece is fixed the speaker drive unit, which in this case is a "Blue Spot," though any other unit can be employed provided that the cross piece mounting be modified to suit it. In order to bring the unit back a suitable distance, so that the cone comes in the right position, it is mounted on a block of wood fixed on the back of the main cross piece, and this point is made quite clear in the diagrams and photograph.

Fixed at right angles to the cross piece and at the centre is another piece of wood, $4\frac{5}{8}$ inches long, at the top of which and at right angles to it is a 1-in. piece of wood facing towards the front of the speaker.

It is on the side of this piece of wood, and on the two main uprights and the bottom cross piece, that the cardboard ring which supports the suspension of the loud-speaker, is mounted.

### QUITE EASY TO MOUNT




A side elevation of the chassis, with driving unit removed to show how the wooden supports are cut.

**Cone Making.**

Having made the framework and the cardboard ring, which is $\frac{1}{2}$ in. wide and $5\frac{1}{2}$ in. inside radius, and mounted the ring on the framework, the next best thing to do is to make the cones. The main cone is cut from a piece of Kraft paper, and should be $12\frac{1}{2}$ in. diameter in the form of a disc.

This is cut away, as shown in the diagram, so that the chord joining the ends of the two edges of the paper is 8 in. long. This will be perfectly clear from the diagram. The cone is then bent round and stuck with seccotine, the two edges overlapping by $\frac{3}{8}$ in.

While this cone is drying you can be making the back cone, which also is made out of a $12\frac{1}{2}$-in. diameter disc of paper, but in addition to the triangular piece cut out of the same size as the other cone, it has also the centre cut out so that a ring of $2\frac{3}{4}$ in. width is left. The inside edge is now serrated.

**Joining Up.**

The serrations should be as even as possible, $\frac{1}{4}$ in. apart and $\frac{1}{4}$ in. deep being the best dimensions, while getting them as closely alike as possible will help a great deal in the sticking of this cone on top of the other one.

When you have cut the serrations stick the two ends of the cone together, having the same $\frac{3}{8}$-in. overlap as you did in the previous cone, and you will find that when this is set it will slide over the main cone from the apex until it reaches about half-way down the cone.

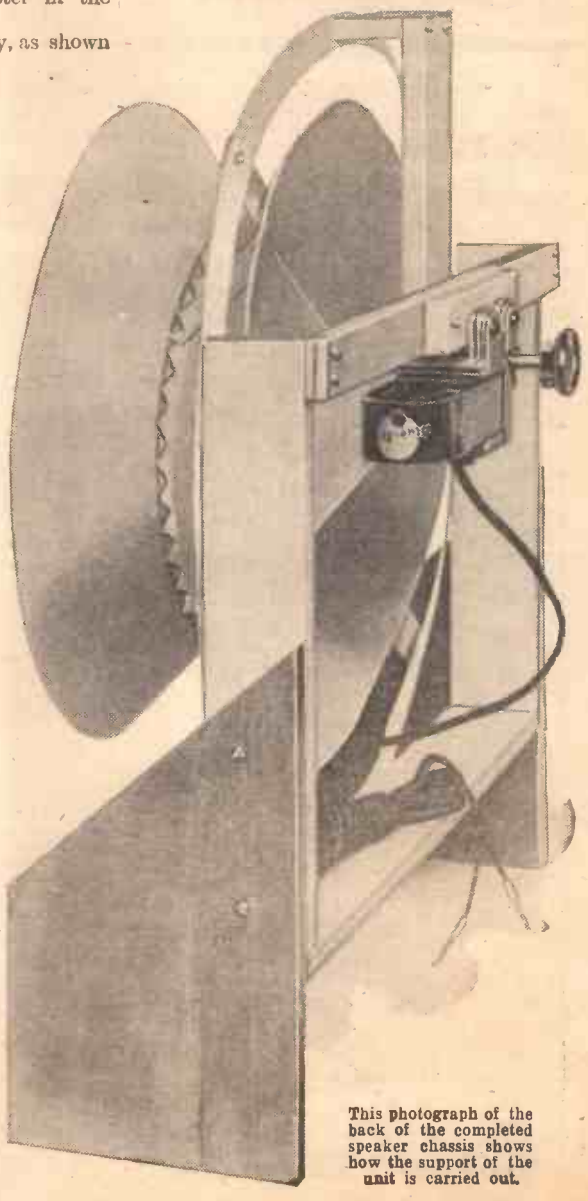
**Let Them Dry Well.**

At this point you should stick the two cones together with seccotine, turning the serrations on the outside cone carefully against the main cone, so that everything is perfectly stuck. And here we will put the cones aside to dry. In fact, let's leave them till next week, and continue the construction then.

By the way, when you are ordering the paper for your cones be careful that you do get kraft paper. Other material may not be suitable, but the odds are strongly on the *not*.

Kraft is sold in various thicknesses and to be sure of getting exactly the same class of paper as we used in the original speaker, you should ask for "120 pound ream" the sheets measuring 29" × 45".

### BEHIND THE SCENES



This photograph of the back of the completed speaker chassis shows how the support of the unit is carried out.

# CAPT. ECKERSLEY'S QUERY CORNER

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

ANODE BENDING WITHOUT BIAS—THREE CONDENSERS IN STEP—INTERFERENCE FROM SHIPS—CUTTING DOWN S.G. VOLTS.

**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.**

### Anode Bending Without Bias.

L. J. (Cardiff).—"The detector valve in my receiver is of the anode-bend type and, of course, is biased negatively. A separate grid battery is used for this purpose and, by accident, this was recently short-circuited, so that the grid of the valve was connected directly to L.T. negative.

"To my surprise signals could still be received from the 'local,' although not so strong as usually. I cannot understand this, as it would appear that the valve was not adjusted for rectification and, therefore, the set should have been silent. How can a valve with zero bias act as a detector?"

I think the best way to understand the answer to this question is to look at the really rather inaccurate diagram, which will, nevertheless, give you the idea.

I drew this grid volts anode current characteristic because it is, perhaps, easier to understand than the more accurate anode volts anode current characteristic.

Imagine that with proper conditions you are biased negatively so that without the signal the condition is accurately represented by the point A, and that you are V volts negative between grid and filament. Now imagine the steady C.W. signal comes along and goes up to the steady condition to B.

Then, obviously the maximum current can be represented by BC. But now suppose that the negative comes off the grid and your condition is accurately represented by the point A'. A little current OA.' is flowing and we are ready for the signal.

The signal comes along, and has the maximum voltage value of OB.'. Then the current is BC.', but quite obviously you achieve rectification because the signal creates more current through the valve in one direction than in the other, although it does cancel out by an amount OA. when the signal is only equal to OA.

You do not, in fact, get rectification of weak signals, but you get it on strong signals.

Of course, the condition without the negative is not a good condition, but nevertheless there is rectification. Of course, if the high tension is so great that you are really sitting on the point A'' before the signal begins; there is practically no rectification since OB.' is equal to OB.''.

* * *

### Three Condensers In Step.

B. W. (Manchester).—"My receiver, consisting of 2 H.F. and detector, has three tuned circuits.

"Either by accident or design on the part of the manufacturers, all three dial readings are exactly the same over the tuning range, which I am interested in. In view of the above, would it be quite in order to gang the three condensers together, and operate same by means of one knob?"

It would appear so, would it not?

You are very lucky!

Lots of people try for this condition like anything, and then finally funk ganging. But be sure that the mechanical rearrangement does not add or subtract stray capacity to any of the variable condensers.

* * *

### Interference from Ships.

N. R. M. (Gravesend).—"Although I have tried every type of selectivity device, I am unable to cut out Morse interference. Do you know of any scheme which might help in reducing this trouble?"

I see your address! Quite frankly, I do not think you will overcome all Morse interference where you are.

I think the fact is that you get the interference due to radiations from the ships as effectively on the same wave-length as that on which broadcasting takes place. I do not mean that the ship radiates on a wrong wave-length, I mean it radiates on several at once.

The apparatus used by shipping is rather out of date, and it is to be changed in some years time. Until then interference must take place in certain areas.

I think it's worth while your writing to the B.B.C. to find out if they can give you any help in representing your case to the authorities.

* * *

### Cutting Down S.G. Volts.

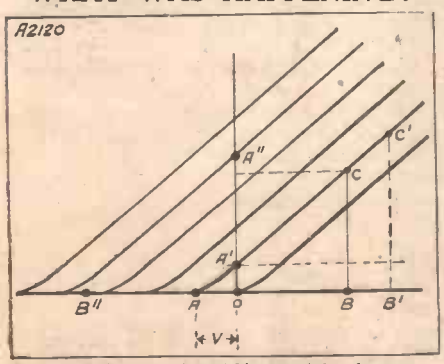
M. D. (Cheltenham).—"I have a home-made eliminator designed to give one output voltage of 120. I have recently added an S.G. valve to my receiver, and wish to cut down the voltage to 80 at the screening-grid terminal. Can you tell me what value resistance will be needed to do this?"

Perhaps the best way, as I have shown in my sketch, is to connect a potentiometer between the positive and negative terminals of your eliminator. You can then obviously choose a voltage of 80 or a voltage round 80, at which the valve acts in the best way.

A screened-grid valve is rather sensitive to screen grid voltage, and it is as well to have an adjustment, and the way to get an adjustment is according to the connection I have shown in the diagram. The potentiometer should be of value about 50 thousand ohms, and will then have to carry about 2½ milliamps.

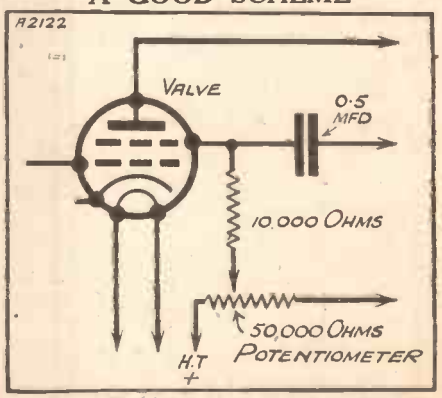
The unlabelled arrows in the case of the potentiometer and the 0·5 condenser both go to H.T. —.

## WHAT WAS HAPPENING?




How rectification without bias can take place, as described above, is shown by this sketch.

## A GOOD SCHEME




This is the method of regulating screen volts recommended by Capt. Eckersley to "M.D."

# THE "EXTENSER'S" WARM WELCOME

**By THE EDITOR.**

**Already Mr. Dowding's latest invention has reached the production stage and is receiving widespread commendation.**

SO many thousands of readers of POPULAR WIRELESS are also regular readers of our associate publications, "The Wireless Constructor" and "Modern Wireless," that they will no doubt already be thoroughly familiar with the Extenser system, details of which we give in an introductory article in this issue.

### In Commercial Form.

But quite apart from the fact that this article will serve as an introduction of the Extenser system to those "P.W." readers who have not read about it in "The Wireless Constructor," the article also marks the start of a series which will, in time, completely familiarise our readers not only with the Extenser system of reception, but with the constructional details of the Extenser condenser and its application to *all kinds* of modern radio receivers.

At the time of going to press with this issue of POPULAR WIRELESS, we are also able definitely to state that Extenser condensers will shortly be available in commercial form—one manufacturer, indeed, having announced that he will be in production with Extensers by May 1st.

The rapidity with which the Extenser system has become famous is one of the most striking tributes to its very obvious merits—not only in the eyes of the professional radio engineer and the amateur, but in the eyes of manufacturers.

In fact, it would be no exaggeration to say that the Extenser system marks the opening of a new era in simpler and more satisfactory radio reception; certainly we feel confident that before another year has passed no really up-to-date set will be without its Extenser condenser.

### Universal Application.

The merits of this component, as you will readily realise when you have read Mr. Dowding's article about it in this issue, speak for themselves. Universal application of the Extenser system to methods of modern radio reception may be regarded as a foregone conclusion.

Mr. G. V. Dowding, Technical Editor of POPULAR WIRELESS, originator of the Extenser system and inventor of the Extenser condenser, has for some years past conducted experiments with a view to the ultimate achievement of materially simplifying the technique of sets for broadcast reception.

Readers with files of the back numbers of POPULAR WIRELESS have only to refer to our issue for April 3rd, 1926, and they will see an article which, even in those far-off days, contained the essential germs of the idea which, fully developed and perfected, and now provisionally patented, was exclusively announced as the Extenser system in our associated journal, "The Wireless Constructor" for April—copies of which, readers may care to note, were on sale to the public March 15th of this year.

The historical development of the Extenser may also be traced, by those interested in the conception and birth of such an important contribution to radio, in POPULAR WIRELESS dated November 2nd, 1929.

It is not my intention to enter into a technical exposition of the theory and practice of the Extenser in this article, but rather it is my privilege and pleasure, as Editor-in-Chief of POPULAR WIRELESS and its associated journals, to tell you—as I have often had the privilege and pleasure in the past—that yet again our Technical Editor has been responsible for a radio development of outstanding merit and importance.


**The wonderful simplicity and complete effectiveness of the Extenser system is at once evident, and even the non-technical listener should quickly be able to appreciate that it has many other advantages beyond that of doing away with wave-change switches.**

### Contemporary Commendation.

Perhaps the truth of these remarks will be all the more appreciated, and the suggestion of hyperbole completely eliminated if I point out to readers that the system originated by Mr. Dowding has received—even at this early stage of its public debut—the warmest commendations from our esteemed contemporary (and no less rival and competitor), "Amateur Wireless."

The alertness and technical perspicacity shown by the editor of that journal is admirably illustrated by the fact that, just three weeks after the exclusive publication of the details of the Extenser system, it was reviewed in his journal (see page 557, issue for week ending April 4th) in terms which may not only be described as laudatory, but which also may—without exaggeration—be described as highly creditable to the ability of the editor at once to appreciate the outstanding merit and importance of Mr. Dowding's contribution to radio science.

### "Entirely Novel."

True it is that Mr. Dowding's name is not printed, but that, I feel sure, is an oversight which will be remedied at an early date.

But it is with extraordinary pleasure that I find myself, at this juncture, able to refer to our contemporary for one of the first—if not the first—impartially published reviews of the Extenser system. In this review which, by the way, was sub-headed "An Entirely Novel Method," thus substantiating, if that were necessary, Mr. Dowding's claim as originator and inventor, the writer says (*inter alia*):

"We now announce the introduction of a new type of condenser, which has reached production stage and is here illustrated by photographs and diagrams. Essentially it is a combination of condenser and switching arrangement by means of which the mere turning of the condenser dial will automatically switch over from the medium wave-band to the long wave-band; in other words, it will obviate the necessity of fitting a separate wave-change switch, thus simplifying construction and rendering the operation of the set still easier. Just how this is accomplished is explained later in this article."

### Moderate Cost.

An admirably concise and accurate explanation then follows; and in the following week's issue further enthusiastic references are made to Mr. Dowding's "entirely novel method," of which we may quote the following:

"In theory, there is no limit to the number of switch cams that could be mounted on the end of the spindle, but probably the maximum switching needed to cope with even a complicated set would be a 3-pole change-over arrangement.

"Sooner or later the question of the cost of the new type of condenser will have to be considered. It has been ascertained that although the device would be slightly more expensive than the normal variable condenser, there is certainly nothing in the construction to make the cost prohibitive.

"Actually, the condenser should not cost more than the combined costs of a normal variable condenser and a panel switch."

I feel that our readers will join with me in my admiration for the prompt and disinterested way in which our contemporary has paid its tribute to Mr. Dowding's magnificent achievement.

# C. B. Cochran says:—

# THE B.B.C. CANNOT BEAT THE BAND

**C. B. Cochran, the world's most famous theatrical producer, in an interview with Harold A. Albert, has something to say about the world's greatest show—the broadcasting programmes.**

IT is rather curious about C. B. Cochran and the B.B.C. Both institutions—for Mr. Cochran is an institution if ever a man was—have much in common. They both believe in youth. The British Broadcasting Corporation employs as many young men and women as it possibly can.

Go along and see the B.B.C. Orchestra at the Queen's Hall and notice for yourself! And Mr. Cochran? His productions are chock-a-block with handsome young men and pretty girls, and you should see some of the people behind the scenes who are responsible for so much of the preparatory work. Youthful, every one of them. Even those who are over thirty lend a lie to their age!

**Pleasing the Public.**

Again, they both know how to please their public. The B.B.C. admittedly, despite its critics. Cochran, deliberately catering for his, wins through. Can you recall a Cochran failure? A real failure? I wonder.

C. B. C. is such an astute showman and so clever that if a piece does happen to fail, the man-in-the-street rarely hears about it. The whole business is hushed up—rather like the B.B.C.

Strange, therefore, that with the two so similar, Cochran should have the reputation of being a radio enemy. Or is it because of that similarity? In any case, it's only a "reputation." "There's no truth in it," said the great one of the theatre, when I went along one teatime to beard the lion in his den, that is, to talk about wireless matters in his Bond Street office—which, incidentally, is as large as any normal flat—"No truth at all. The actual fact is that I am such a busy man—I really am, you know—that I have no time to bother about the B.B.C. I am not antagonistic in any way.

**The B.B.C.'s Letter-Bag.**

"I admire the broadcasting people. I believe that they cater for their public in a truly wonderful manner. I am not inclined to place too much weight on the criticisms they receive. Consider the magnitude of their public, and consider the small percentage of virulent correspondence! Consider the avalanche that would result if the B.B.C. really did displease its public or cease to cater for it altogether!"

"Do you ever listen-in yourself?" said I.

"In town, hardly ever. But when I am in the country, most certainly. If there is anything to my taste on the programme, and if that 'something' comes to my attention, I always endeavour to hear it. If I see the announcement of a talk dealing with any of my peculiar interests—the theatre, old masters, and so on—I almost invariably switch on."

"You are not interested in the broadcast plays?"

## A GREAT SHOWMAN

"C.B."—one of the world's great showmen.

"I have heard one or two, but I confess they baffle me. Mind you, I am not damning them. They may be the beginning of a very fine art, but I, personally, am unable to understand them. I cannot participate in the scene, for the sound effects to me are meaningless, and I cannot distinguish between the voices of the actors. But I am quite sure that they must mean a lot to some people."

It was a fitting moment to ask about musical comedy and radio revue.

"The effect on me is very much the same. I like the music, of course—what person does not?—and I relish some of the jokes, but only for a time. The prospect of an entire evening spent in this manner appals me.

"Still, it strikes me as clever. Millions of people are listening and enjoying themselves. Think of the appeal a production must have to have this effect.

**A Great Future.**

"I confess that if I were asked to produce a two-hour broadcast show immediately, I do not know what I should do. Look back at the programmes of a year ago and imitate them, probably!

"Then I should possibly be charged with being 'out-of-date,' for the B.B.C. seems to make amazing progress. Witness how far it has gone in a brief ten years. And I believe we are nowhere near the end, scarcely at the beginning, in fact. No, there can be no doubt about it. Broadcasting has a great future, and the British Broadcasting Corporation is working on the right lines in bringing about it."

The conversation turned to the effect of broadcasting on the theatre and the concert hall. Mr. Cochran took the stand that the early prophecies relating to the B.B.C. as an adverse force had never been justified. On the contrary, he believes that broadcasting has brought about a considerable improvement.

**A New Audience.**

"If only from the publicity point of view, broadcasting to the artist is doubly justified. It may open up to him a new audience to whom he has previously been unfamiliar. I believe that if Chaliapine had never broadcast, his gramophone record sales would not be at the high figure they are to-day. The same thing may apply to the theatrical manager who permits the transmission of a chosen excerpt from his show.

"The listener, having heard, wants to see the original. So the box office receipts mount up. The listener acquires the spirit of the collector who cannot be content with an imitation but must have the real thing. He becomes as keen to see the actuality as a book collector does to see a first edition.

(*Continued on page* 186.)

LATEST BROADCASTING NEWS.

# ANOTHER FOOTBALL "WAR."

## NORTH REGIONAL STARTS SERVICE—FORTHCOMING FEATURES—THE CUP FINAL, Etc.

HOSTILITIES have broken out again on the B.B.C. football front. Having converted the Football Association, and, in particular, Sir Frederick Wall, to the acceptance of the broadcasting of running commentaries on professional Soccer matches, the B.B.C. might have been excused for believing that its troubles in this direction were at an end.

Not so, however. There was still the League Management to reckon with, and they control most of the ordinary League matches. There are not lacking signs that the League Management will endeavour to stop the broadcasting of all matches under their jurisdiction.

Already it is understood that severe pressure has been applied to individual clubs known to be more friendly than others to the B.B.C. Meanwhile the B.B.C. is not idle. Forewarned, as usual, the energetic Gerald Cock, "O.B. Director" at Savoy Hill, was first in the field, and has obtained all the advantages of a surprise offensive.

Of course, to suspend the running commentaries on Soccer games would be a most unpopular move, and Savoy Hill has no difficulty in assembling public opinion on its side.

It remains to be seen whether the League Management Committee will be able to stand up to the powerful public protest that will be made in answer to its threat. The issue will be determined at a meeting in May.

### North Regional Starts Service.

The new North Regional transmitter at Slaithwaite will come into service first during regular programme broadcasting hours on Sunday, April 19th. It is not intended at first that the whole of the northern programmes shall be sent out in this way, but the new transmitter will be heard every evening until 9 p.m. until further tests have proved that the existing stations at Manchester, Liverpool, Sheffield, Leeds, Hull, and Bradford can be dispensed with.

Already the programme builders at the Northern Region headquarters at Manchester are making their plans to arrange Regional group concerts and entertainments, which during the winter has been possible only one night each week. The second transmitter will probably begin testing during the next few weeks.

### Forthcoming Features.

Speeches by Lord Barnby and the Lord Mayor of Manchester (Alderman G. F. Ritt), relayed from a banquet to be held in Manchester on Thursday, April 23rd, to celebrate the twenty-first anniversary of the Foundation of the Textile Institute, which is connected with the advancement of science and technology in relation to the textile industries, will be broadcast to North Regional listeners.

During the same week (on Tuesday, April 21st), a debate will be heard between Professor T. H. Pear, of the Manchester University, and Dr. L. du Garde Peach on the interesting subject of the Future of Dialect.

Professor Pear holds the opinion that, while dialects have sentimental and artistic values, they are certain to disappear owing to the influence of wireless and talking-films, and that standard English will take their place. Dr. du Garde Peach has, no doubt, other theories, but his reply will probably be more interesting for its humour and witticism.



Another luncheon of interest to Northern listeners, the speeches from which are to be broadcast on the National wave length, is that on Friday, April 17th, when Lord Leverhulme introduces Mr. William Graham, President of the Board of Trade, on the occasion of the opening of the New Bromborough Dock, Port Sunlight.

### The Cup Final Broadcast.

The arrangements for broadcasting the Association Football Cup Final between Birmingham and West Bromwich Albion, which is to take place at the Empire Stadium, Wembley, on Saturday afternoon, April 25th, are now completed, and will not be affected by the new trouble about broadcasting football.

The programme begins at 2.30 with fifteen minutes' community singing, conducted by Mr. T. P. Ratcliffe and accompanied by the Band of the Welsh Guards, after which Mr. George F. Allison will give a description of the scene before the game actually begins.

Mr. Allison is due to finish at 4.45, and the microphones will then be handed over to Dutch commentators, who will give a fifteen-minutes' eye-witness account of the game, which will be relayed for broadcasting in Holland.

# 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.**

### The Summer Talks.

THE programme of "Summer Talks" has now been issued. Some of the series have already begun, although as yet it is hardly spring—like the daffodils which "come before the swallow dares."

"Talks" are gaining an increasing hold on the listening public. Mr. Roger Eckersley reminded us that they used to be considered the "ugly duckling" in the programmes. Now they are beginning to appeal to the fancy.

They always appealed to me. I was born greedy for information. I like to know everything.

Some of the summer talks are to be serious enough. That is not a bad idea. We enjoy our fun the more for intervals of seriousness.

I often find after a round of golf, when the blood is tingling like champagne in the grey matter, that I am in the mood for a spell of serious thinking. One of the series, for example, is to be on India. India is one of the danger spots at the moment; and summer won't make any difference to the fact.

A citizen with any sort of pride in his country, to say nothing of pride in himself, wants to have an intelligent opinion on a subject of this sort. And first he wants to know the facts. He can get the facts from Blue-Books, but these are not in everybody's pocket; and they are not easy reading.

The "facts" about India are not understandable without some knowledge of the intellectual and religious background.

### Major Yeats-Brown Again.

Major Yeats-Brown has been deputed to put us wise about this. "The gods, saints, and heroes of India." We have heard Major Yeats-Brown before. He knows how to make a subject attractive and popular.

This side of India has always fascinated me. For years I have longed to see Benares. Perhaps, when one can fly there for a week-end, I shall go! And I would like to bathe

(*Continued on page* 184.)

## FROM THE TECHNICAL EDITOR'S NOTE BOOK.

# Tested and Found—?

### WATES STAR PICK-UP.

THE new Wates Star pick-up made by the Standard Battery Company, incorporates a number of improvements, although the price has been reduced to 16s. That seems to be an absurdly low price for a good pick-up, and yet there is no doubt about it, the Wates Star pick-up definitely is good.

It is supplied with a double adaptor, so that it can be fitted to practically any

The New Wates Star Pick-up.

make of tone-arm, and it also has a long connecting lead. In appearance it is quite unlike any other pick-up I have seen, for it is semi-heart-shaped, and is built into an insulating casing of unusual colour—the material is eronoid, I think.

In regard to record wear, a vital point where pick-ups are concerned, the Wates Star is also definitely good. I should certainly advise those "P.W." readers who are thinking of going over to radiogram outfits to make a point of hearing the Wates Star pick-up demonstrated.

### INEXPENSIVE PORTABLES.

Electrical and Radio Products, Ltd., of Empire Works, Horley, Surrey, recently sent me one of their H.T. batteries. This has gone on test and, at the moment of writing, is acquitting itself very well indeed. The same concern also submitted one of their ten-guinea Screened-Grid Four Portables, and one of their eight guinea Suitcase Five sets.

Now eight-guineas for a five-valve set is a very low price, but I, personally, would rather pay the extra two guineas and have the four-valve portable. The Suitcase Five embodies aperiodic coupled H.F. valves, and while it has only one tuning dial and is simple to handle and gives quite good quality of reproduction, we did not find its selectivity sufficient properly to separate the Brookmans Park transmitters at a distance of twelve or so miles.

On the other hand the ten guinea Screen Grid Four definitely is selective, and with an S.G.-H.F. valve obviously efficiently used, its sensitivity, too, is distinctly commendable.

At Tallis House we had no difficulty in tuning-in Radio Paris on the long waves in daylight, and with all the steel, etc., around us that was a good performance. In regard to the local station the volume was all that was necessary adequately to fill a pretty big room and the quality, too, was undoubtedly good.

### GOLTONE "CUB" WAVE-TRAP.

This is one of the cheapest wave-trap devices, if not the very cheapest ever placed on the market. But its cheapness, 2s. 6d., provides no clue as to its effectiveness.

As a matter of fact it is very efficient at any point over the wave-length band it covers, i.e. 200 to 560 metres. It incorporates a very novel tuning scheme, and it is to this that it owes its simplicity and consequent inexpensiveness.

The tuning is accomplished with a two-plate condenser that is built on and in the former carrying the wire.

### WEARITE SELECTOR COIL.

The Wearite "P.W." and "M.W." Selector coil is provided with an engraved panel dial so that the position of the switch can be seen at a glance. This is a very useful feature.

The switch itself has an excellent action and rotates with pleasing smoothness. The winding is protected by a transparent covering and on this are printed plain terminal markings.

The Wearite is, of course, an approved make and I would like to take this opportunity of saying that I consider it is one of the best of the now numerous commercial versions available, and one that constructors can select with every confidence.

### NEW ATLAS UNIT.

The new Clarke's Atlas A.C. 244 unit costs only 59s. 6d., and is thus one of the cheapest A.C. H.T. units on the market; but despite this wonderfully low price, I have no hesitation in saying that I consider it a first-class production.

It is particularly compact and neat in appearance and is, in fact, no larger than a 60-volt H.T. battery. It has three tappings giving 60–80 volts, 90–100 volts, and 120–150 volts.

A current of up to 20 milliamps is obtainable. The unit incorporates a Westinghouse metal rectifier, and it conforms in every way to the I.E.E. recommendations, and is, moreover, fully guaranteed for one year.

Messrs. Clarke's must have used their large manufacturing resources to the utmost, and pared profits down to the bone to produce this A.C.244. And on test I found it, as I have already indicated, completely satisfactory within the limitations of its rated output.

**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.**

The smoothing is high grade, and the separation is taken to very low resistance limits. Clarke's are certainly to be congratulated on an outstanding contribution to mains radio.

### PRICE REDUCTIONS.

I have just heard that Tannoy Products are reducing their mains units type P.2 and C.P.2, from £3 15s. 0d. and £5 10s. 0d. to £3 7s. 6d. and £5 respectively.

### A MAINS TRANSFORMER.

Mains enthusiasts should be interested in the Ellison power transformer which is suitable for supplying ample H.T. and L.T. for five indirectly-heated A.C. valves. You can use it with a fewer number, if necessary of course.

It is a sound job and bears all over it the stamp of knowledgeable and careful craftsmanship. It is the kind of component that gives one pleasure merely in the handling; while, on test, it functioned above criticism.

Clarke's Atlas A.C.244 unit has three fixed H.T. tappings.

# The "COMET"

WHEN we introduced the "Comet" Three, we knew it would prove to be a very popular receiver. We also knew that while a det. and 2 L.F. circuit is the most popular type of set, it is not the ideal arrangement from everybody's point of view.

Sometimes two valves are sufficient to hand out all that is wanted in the way of volume and stations. Sometimes an extra H.F. stage is highly desirable, and then a four-valve set has to be used.

And coming down to less pretentious ideas, sometimes a one-valve set is all that's wanted. Possibly the reason lies in a preference for listening on headphones, or maybe the receiver is for use by deaf people who can quite often hear well with telephones, though a loud speaker may sound miles away to them.

### Carefully Designed.

Then again, unfortunately we are not all possessed of vast amounts of this world's blessings, and to some, expense is an item that calls for urgent consideration. So, as soon as the "Comet" Three had passed all its tests with flying colours, we got down to the design of other "Comets."

The two- and four-valve versions have already been fully described in POPULAR WIRELESS, and are enjoying a measure of success nearly as great as that of the original "Comet" receiver itself. This week we are presenting the "Comet" One, which in all respects upholds what we may term the traditions of this fine series.

Don't run away with the idea that these subsequent designs are merely the original three-valver with one or two valves chopped off, or an extra one stuck on the beginning. Oh, no, sir! There's much more in it than that.

The design of a set, particularly as regards layout, is a matter for consideration as a whole in conjunction with the number of valves to be employed. Only in this way can the most be got out of it, for a thing that may be satisfactory in a three-valver might not apply at all to a two.

Bearing this in mind, and also remembering that one of the outstanding points about a single-valver is its inexpensiveness, we have not adopted quite the same procedure for the "Comet" One as for the other "Comets." All the refinements desirable under modern conditions—but none that are really unnecessary—are incorporated in the set right away.

### "Tuned" Aerial.

The idea which was previously used, namely, giving a foundation design of the bare necessities, and then describing the addition of refinements later, has not been adopted. The set is ideal for present-day conditions, and is not lacking in the necessary selectivity like so many simple receivers.

Selectivity is provided by flexi-coupling, the system that you have probably already read about in POPULAR WIRELESS. Apart from the virtue of real simplicity, this scheme does something that may seem almost impossible—it actually increases the volume of distant stations.

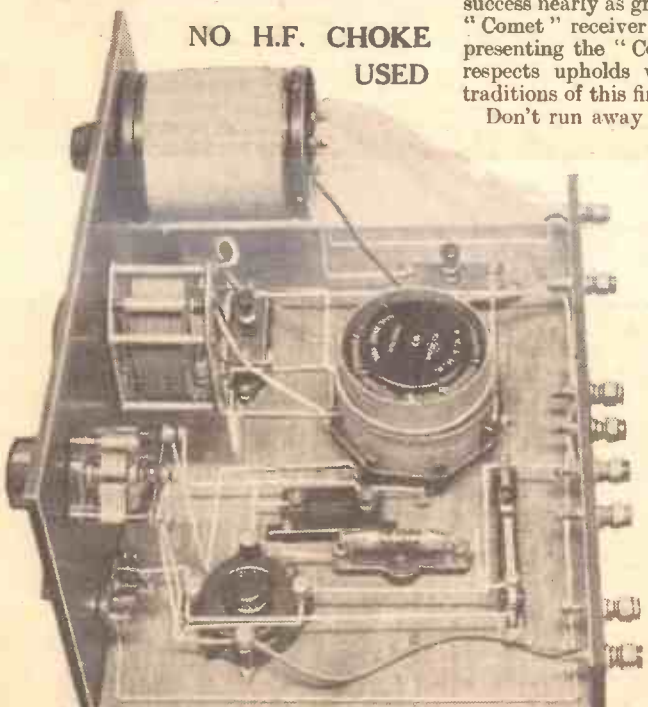
This is because (supposing you are working on medium waves) the aerial is tuned by the

Here you have compacted into one sterling little set all those applicable features that make the famous "Comets" such outstanding successes. The "Comet" One, which is complete in this single article, is the best phone set "P.W." has ever produced—and that, as regular readers will agree, is saying a great deal.

### THE PARTS YOU WILL NEED.

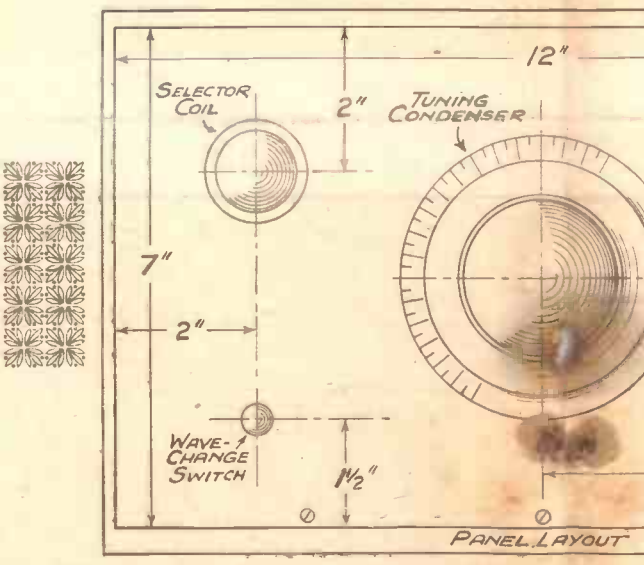
- 1 Panel, 12 in. × 7 in. (Parex, or Peto-Scott, Lissen, Goltone, etc.).
- 1 Cabinet for above with baseboard 9 in. deep (Cameo, or Peto-Scott, Pickett, Kay, Osborn, Lock, etc.).
- 1 ·0005-mfd. tuning condenser and plain dial (Lotus, or J.B., Ormond, Cyldon, Ready Radio, Igranic, Lissen, Polar, Dubilier, Burton, etc.).
- 1 Flexi-coupling Selector coil (Ready Radio, or Formo, Goltone, R.I., Wearite, Keystone, Magnum, Parex, etc.).
- 1 ·0001-mfd. or higher, up to ·0002-mfd., differential reaction condenser (Ormond, or J.B., Ready Radio, Lotus, Igranic, Lissen, Polar.
- 1 L.T. "on-off" switch (Lotus, or Lissen, Bulgin, Ready Radio, Igranic, W.B., Benjamin, Keystone, Goltone, etc.).
- 1 3-point wave-change switch (Red Diamond, or Ready Radio, W.B., Ormond, Wearite, Keystone, Magnum, etc.).
- 1 "P.W." "Dual-Range" coil (Keystone, or Parex, R.I., Goltone, Formo, Wearite, Tunewell, Magnum, etc.).
- 1 Sprung valve holder (Igranic, or Telsen, Clix, Benjamin, Lotus, Lissen, W.B., etc.).
- 1 each ·001-mfd. max. and ·002-mfd. max. compression-type condensers (Formo, or Lewcos, Polar, Lissen, etc.).
- 1 ·0003-mfd. fixed condenser (Lissen, or Telsen, T.C.C., Dubilier, Ediswan, Ready Radio, Ferranti, Mullard, Watmel, Igranic, etc.).
- 1 2-meg. grid leak and holder (Graham Farish, or Igranic, Ferranti, Ediswan, Dubilier, Telsen, Lissen, Mullard, etc.).
- 1 10,000-ohm spaghetti resistance (Lewcos, or Ready Radio, Bulgin, Keystone, Graham-Farish, Sovereign, etc.).
- 1 400-ohm potentiometer (Ready Radio, or Igranic, Lissen, Sovereign, Wearite, etc.).
- 1 Terminal strip 12 in. × 2 in.
- 8 Indicating terminals (Belling-Lee, or Eelex, Igranic, Clix, etc.).
- Wire (Glazite).
- Screws, flex, battery plugs (Belling Lee, Clix, Eelex, etc.).

## NO H.F. CHOKE USED



Efficient reaction is obtained over both wave-bands by the novel use of a resistance instead of an H.F. choke.

## ARTISTICALLY SYMMETRICA




## A REVELATION FOR THOSE WH

# T" ONE

Selector coil, this being controlled by the stud switch. "Tuned" may conjure up in your mind an adjustment that is rather critical, or at least similar to an ordinary condenser circuit.

Actually this is far from being the case. Quite a rough adjustment of the Selector coil is sufficient to enable stations to be located, after which, if you want the last decibel from your speaker, you simply make a final adjustment of the Selector coil.

The coupling between the aerial circuit and the dual-range coil is very simply effected. It is just a piece of ordinary rubber-covered flex twisted two or three times round the dual-range coil.

**No "Breaking Through."**

On the long waves, selectivity is by no means such a vital question as on the medium waves, and the Selector coil is not in use, being cut out of circuit completely by the simple expedient of turning the switch control as far as it will go in a clockwise direction. The most troublesome matter of selectivity on the long waves—and one which most of you have no doubt experienced at some time or the other—is programmes from medium-wave stations breaking through on the long waves.

In the "Comet" One we have taken special precautions to avoid this by means of a combination of capacity and resistance introduced into the aerial-switch system. Differential reaction is used, and as you will see, a fixed resistance instead of the more usual high-frequency choke.

Perhaps you may wonder whether this resistance is every bit as good as the H.F. choke. You may rest assured that it is, for unlike the H.F. choke in an S.G. valve's anode circuit, a choke used for reaction purposes only does not have to be very efficient.

So long as it will stop enough H.F. to give sufficient reaction it will pass muster, and since the resistance will do this just as well, and is very much cheaper—why not use it? The voltage drop across it will not be high enough to worry about.

Just a word specially for Northern readers before we go on to the practical work. Very shortly, if it is not already doing so, your new high-power station will be giving regular programmes.

**Up North.**

These will only be on one wave-length for a start, and quite likely the only difference you will notice between the new giant and your old friend Manchester will be an increased volume. But what about when both the new transmissions are going full blast?

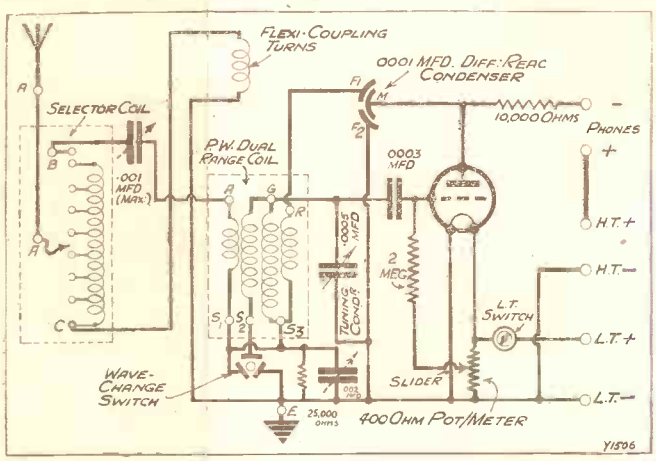
Then, if you are not using a sufficiently selective set, you will have the same bother that your confrères in London did when Brookmans Park started up. You will get a "running commentary" by some lecturer as a background to your dance or high-brow music.

And our advice to you would be to build the "Comet" One if you are a one-valve man. Still, why wait till then? Why not get this efficient little receiver made up in readiness? There is every reason why you should.

Possibly you have a good gramophone pick-up amplifier to hand. If you have, you can add it to the "Comet" One when a superlative loud speaker set will be yours.

All this is not "salesmanship." That is not necessary with POPULAR WIRELESS sets, but most readers like to know what a set will do, so we will add one more point. If you like listening to stations from all sorts of countries on the Continent, then the "Comet" One is the set for you!

## NOVELTY, INGENUITY, AND FLEXIBILITY




The circuit includes "P.W." Flexi-Coupling, the Interwave system for long waves, a special differential reaction arrangement, and potentiometer grid control.

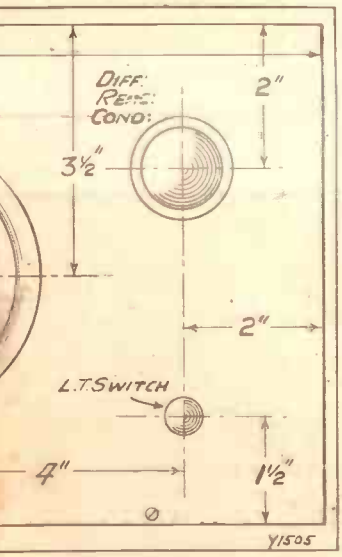
**Easy to Build.**

There is not room here to go fully into all the details of the constructional work. Some of you might feel insulted if we did, for there is hardly anyone interested in set construction who cannot handle the few ordinary tools necessary, such as a drill, screwdriver, pliers, etc. The two practical diagrams tell you all you want to know. Briefly what to do is this:

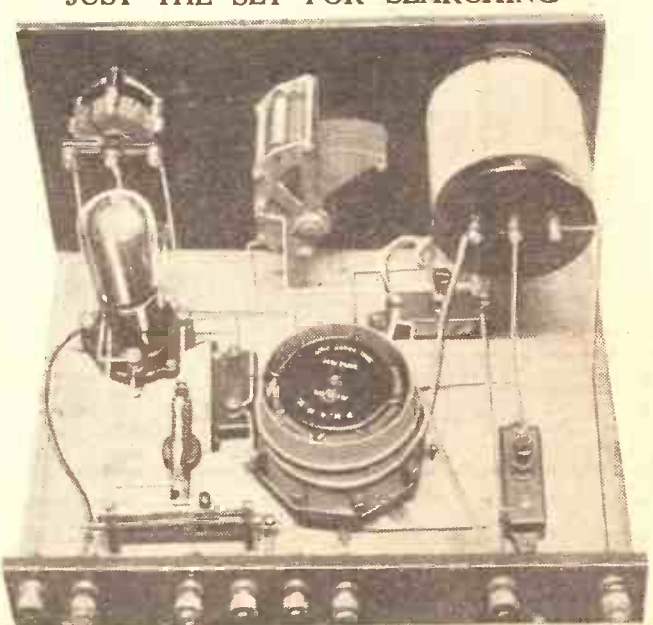
Mark out the positions of the holes on the panel by the aid of the measurements on the panel diagram (remembering that this dia-

(*Continued on next page*)

## AL CONTROLS




## JUST THE SET FOR SEARCHING



With its high selectivity and sensitivity, and simple controls giving maximum reaction strength and smoothness on both bands, the "Comet" One makes a magnificent D.X. set.

## O LISTEN WITH 'PHONES

## THE "COMET" ONE.

*(Continued from previous page.)*

gram is drawn as though looking at the front of the set, and things will need reversing if you mark out on the back of the panel) and then drill the holes.

Next attach the panel and the terminal strip to the baseboard, and fix all the components in place. Follow the layout of the baseboard components from the wiring diagram as closely as possible.

**Testing the Set.**

That done, all there is left to do is to wire up.

The wiring is just a matter of "copy-book" work. And now we will assume you have spent a night or two over the construction and have moved the set from the bench—or whatever you made it on—to the "test department," and have joined up aerial, earth, telephones, and L.T. to their respective terminals.

You will have to join on H.T. battery or mains unit to the H.T. terminals. A 60-volt supply will be ample. The valve, which, by the way, can be a two, four or six-volt one, should be of the H.F. or detector type.

Generally you will find that your valve will take the full 60 volts H.T. and still let you obtain smooth reaction, because the baseboard potentiometer is provided for the purpose of getting the reaction control just right. Start with the slider right over to the end nearer the 'phone terminal.

Move this slider just as far towards the other end that the set goes into oscillation without a flop. Perhaps a slightly lower H.T. voltage will help you a little if you meet any difficulty.

**Tuning.**

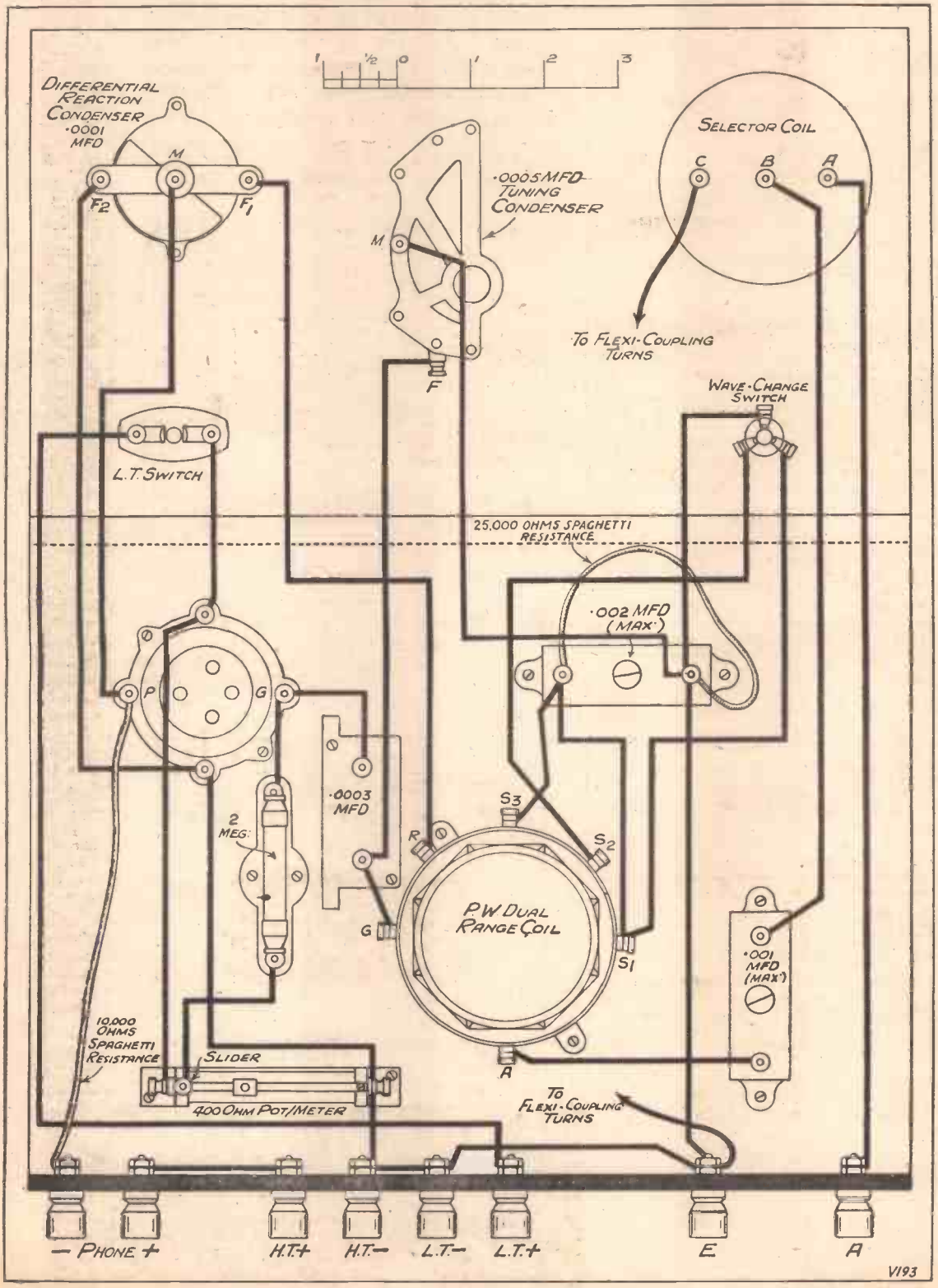
Switch on by pulling out the L.T. switch, and set the set for medium waves by also pulling out the wave-change switch. You will soon find the right settings for the Selector coil switch and the tuning condenser for the local station.

Once having done this you will find it quite a simple matter to keep them in step. As you turn one to the right, so the other also has to go to the right, and *vice versa*.

If you should not need the extra selectivity of the Selector coil at any time and want to cut it out on the medium waves, you simply turn it as far to the right as it will go, just as though you were going over to long waves. On the latter, operation is quite ordinary, the wave-change switch naturally being in its pushed-in positition.

Well, that's all except one point. Try varying the number of Flexi-Coupling turns in use by one turn or so.

## SPAGHETTIS THAT SAVE TIME, TROUBLE, AND SPACE.




Two of these new Spaghetti type resistances figure in this set, and besides being inexpensive they save space and simplify the wiring.

# TERMS TO SUIT ALL

## Build your "COMET" with the CHOSEN COMPONENTS

### THE "COMET" THREE (Foundation Circuit)

KIT A - £4 5 0 Or 12 monthly payments of 7/9
(Complete Kit of Components, as specified.)

KIT B - £5 12 6 Or 12 monthly payments of 10/4
(As Kit A, with set of Mullard valves.)

KIT C - £7 2 6 Or 12 monthly payments of 13/-
(As Kit B with attractive oak cabinet.)

**Additional Components for L.F. CONTROL**

£1.10.10 (If ordered with any of the Kits, add 2/9 per month to the monthly payments.)

### FLEXI-COUPLED "COMET" THREE

KIT A - £5 3 3 Or 12 monthly payments of 9/5
(Complete Kit of Components, as specified.)

KIT B - £6 10 9 Or 12 monthly payments of 12/-
(As Kit A, with set of Mullard valves.)

KIT C - £8 0 9 Or 12 monthly payments of 14/8
(As Kit B, with attractive oak cabinet.)

**Completely Assembled FLEXI-COUPLED "COMET" THREE**

Ready for use aerial tested, valves, cabinet and royalties included. £9.5.9, or 12 monthly payments of 17/-.

**Additional Components for "COMET" RADIO-GRAMOPHONE**

13/6. If ordered with any of the Kits, add 1/3 per month to the monthly payments.

### "MAGIC" THREE CONVERSION KIT £1-8-9

### THE "COMET" TWO

KIT A - £3 2 6 Or 12 monthly payments of 5/8
(Complete Kit of Components, as specified.)

KIT B - £4 1 6 Or 12 monthly payments of 7/6
(As Kit A, with set of Mullard valves.)

KIT C - £5 1 6 Or 12 monthly payments of 9/3
(As Kit B, with attractive oak cabinet.)

**Components for completing the "COMET" TWO**

16/-. If ordered with the "Comet" Two Kit, add 1/6 per month to the monthly payments.

### THE "COMET" FOUR

KIT A - £6 10 0 Or 12 monthly payments of 12/-
(Complete Kit of Components, as specified.)

KIT B - £8 17 6 Or 12 monthly payments of 16/3
(As Kit A, with set of Mullard valves.)

KIT C - £10 10 0 Or 12 monthly payments of 19/3
(As Kit B, with attractive oak cabinet.)

**Components for completing the "COMET" FOUR.**

£2 7 0. If ordered with the "Comet" Four Kit, add 4/3 per month to the monthly payments

### "COMET" H.F. UNIT

KIT A - £3 8 6 Or 12 monthly payments of 6/3
(Complete Kit of Components, as specified.)

KIT B - £4 8 6 Or 12 monthly payments of 8/-
(As Kit A, with specified valve.)

KIT C - £5 3 6 Or 12 monthly payments of 9/6
(As Kit B, with attractive oak cabinet.)

### THE "COMET" A.C. SAFE-POWER UNIT

**Complete Kit of Components £5 3 0**
Or 12 monthly payments of 9/6
**Any part may be purchased separately.**

**Order your Kit of Components now. If it is not convenient to send cash with order you can pay on delivery—it costs you no more. Or, if you wish, send a small payment with your order and pay the balance by easy monthly instalments. Ready Radio Terms suit all pockets.**

## CASH or E.P. or C.O.D.

with order. (Easy monthly payments). (Pay on delivery).

## THE "COMET" ONE

| | | £ | s. | d. |
|---|---|---|---|---|
| 1 | Ebonite panel 12" × 7" × 3/16" (drilled to specification) | | 4 | 0 |
| 1 | Solid hand polished Oak Cabinet with 9" deep baseboard | | 15 | 0 |
| 1 | ReadiRad ·0005-mfd. variable condenser | | 4 | 6 |
| 1 | Plain 4" dial | | 1 | 6 |
| 1 | ReadiRad "Star Turn" Selector coil | | 12 | 6 |
| 1 | ReadiRad ·00015-mfd. differential reaction condenser | | 5 | 0 |
| 1 | ReadiRad on and off switch | | | 10 |
| 1 | ReadiRad wave-change switch | | 1 | 6 |
| 1 | ReadiRad "P.W" Dual Range coil | | 12 | 6 |
| 1 | Telsen 4-pin sprung valve holder | | 1 | 0 |
| 1 | Formodenser type "G" | | 1 | 6 |
| 1 | Formodenser type "H" | | 2 | 3 |
| 1 | ReadiRad ·0003-mfd. fixed condenser | | | 10 |
| 1 | ReadiRad 2 meg. grid leak and holder | | 1 | 4 |
| 1 | ReadiRad 10,000-ohm Link resistance | | 1 | 0 |
| 1 | ReadiRad 400-ohm B/M Potentiometer | | 2 | 9 |
| 1 | Terminal strip 12" × 2" × 3/16" (drilled to specification) | | 1 | 3 |
| 8 | Belling Lee terminals type "R" | | 2 | 0 |
| 1 | packet "Jiffilinx" for wiring | | 2 | 6 |
| 1 | Mullard valve to specification | | 8 | 6 |
| | Screws, flex, battery plugs, etc. | | | 9 |
| | Total (including valve and cabinet) | £4 | 3 | 0 |

KIT "A" (less valve and cabinet) £2 19 6
or twelve equal monthly instalments of 5/6

KIT "B" (with valve less cabinet) £3 8 0
or twelve equal monthly instalments of 6/3

KIT "C" (with valve and cabinet) £4 3 0
or twelve equal monthly instalments of 7/7

## KITS OF PARTS SUPPLIED FOR THE "CABINET CLEAR-CUT."

## CASH or E.P. or C.O.D.

*Write for price lists.*

**Immediate Dispatch**

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

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

## ORDER FORM.

To READY RADIO (RR) Ltd.,
159, Borough High St., London Bridge, S.E.1

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

**C.O.D. ORDER FORM**
Please dispatch to me at once the goods specified 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 specified for which I enclose first deposit of
£.....

*Kit Required*.....
.....
.....

*Name* .....

*Address*.....

# NOTES FROM THE NORTH

**After a few weeks of preliminary tests, careful observations show that the North Regional Station is likely to prove a most efficient broadcaster; indeed, many may find it disconcertingly so, as is described below**

**BY OUR SPECIAL CORRESPONDENT.**

THE B.B.C.'s original Regional Scheme idea of putting more power behind the National programme than the Regional, to make up for the greater attenuation of the former transmission owing to its shorter wave-length, has been revised.

Listeners in the South of England will have noticed that the London Regional transmitter is now using practically the same power as the London National, and Mr. Noel Ashbridge, the Chief Engineer of the B.B.C., tells me that the same will apply at Moorside Edge.

The North Regional transmitter, on 479 metres, is rated at 70 kilowatts (which means 50 kilowatts in the aerial) and the North National transmitter, on 301 metres, will have similar power.

### The Best B.B.C. Station.

With 70 kilowatts on the longest "medium" wave-length used by the B.B.C., with aerials 500 ft. above the ground, and with a site nearly 1,200 ft. above sea level, the North Regional transmitter has already proved to have the widest range of any B.B.C. station with the exception of Daventry 5 X X.

This was to be expected, of course, and Mr. Ashbridge informs me that the performance of the Regional transmitter has proved to be approximately what was predicted for it by its designers.

The station is being picked up at great distances across Europe, and its opening is undoubtedly an added complication to the already serious international wave-lengths situation.

So far as listeners in the north of England are concerned, however, the opening was greeted with immediate enthusiasm throughout the service area of the station.

For ordinary purposes the B.B.C. estimates this at 80 miles radius, but actually I believe the field strength diagrams which have been drawn by the B.B.C. engineers who have carried out reception tests through out the North are lozenge shaped.

That is to say, the transmission comes through better to east and west of Moorside Edge (over Yorkshire and Lancashire) than to north and south. This is due to the Pennine Hills running directly north and south from Moorside Edge.

### Manxmen Delighted.

The Isle of Man, for instance, is 120 miles west of Moorside Edge, but partly owing to this effect and partly owing to the ease with which wireless waves travel across the sea, the transmissions are coming through in Manxland famously. The Manxmen are delighted and Moorside Edge will undoubtedly be their "local" station in future, instead of 5 X X.

From as far afield as Birmingham, which is on the fringe of the 80 miles radius, I have had reports of strong reception with no appreciable fading, but at Newcastle, I understand, reception is not at all satisfactory. This, again, was predicted by the B.B.C., who had decided to keep the Newcastle transmitter in service a long time before Moorside Edge was opened, as was reported at the time in POPULAR WIRELESS.

Tyneside being outside the range of an alternative programme service from Moorside Edge, the problem is how to provide alternative programmes in that district. It is a problem for which, at the time of writing, we are still awaiting the B.C.C.'s solution.

The fading of the North Regional transmission at distances of 100 and 200 miles is, of course, due to natural causes which affect every broadcast transmission, and the London newspaper correspondent who recently criticised the North Regional station because it fades at his home in Sussex was only displaying his own ignorance.

Within the service area the excellent quality of the music transmitted from Moorside Edge has aroused enthusiasm, the contrast with that of our ancient and venerable local low-power stations in the North being so marked that there will be no tears (only, perhaps, a few sentimental sighs) when these hoary veterans meet their impending doom and are strangled for good and all by order of a sternly efficient Chief Engineer.

### Sheffield Satisfied.

At Sheffield there was a silly attempt to organise opposition to the abolition of the local transmitter, but such conservative ideas died a sudden death when the North Regional transmitter started its "reception tests" and people in Sheffield discovered for the first time the quality of a modern transmitter and found that at 25 miles range from Moorside Edge the strength was ideal.

In an enormous number of towns in the North where there has been no local transmitter (the only satisfactory station being 5 X X) and in all the country districts from the smiling Plain of York to the rugged dales and hills Moorside Edge is undoubtedly a blessing.

Within a few miles of Moorside Edge the "swamping" of receiving sets has caused a certain amount of trouble. This will probably be more pronounced when the second transmission on 301 metres starts activities, but at the time of writing this has not happened, and generally speaking there has been less widespread reception trouble than we anticipated.

### Selectivity Problems.

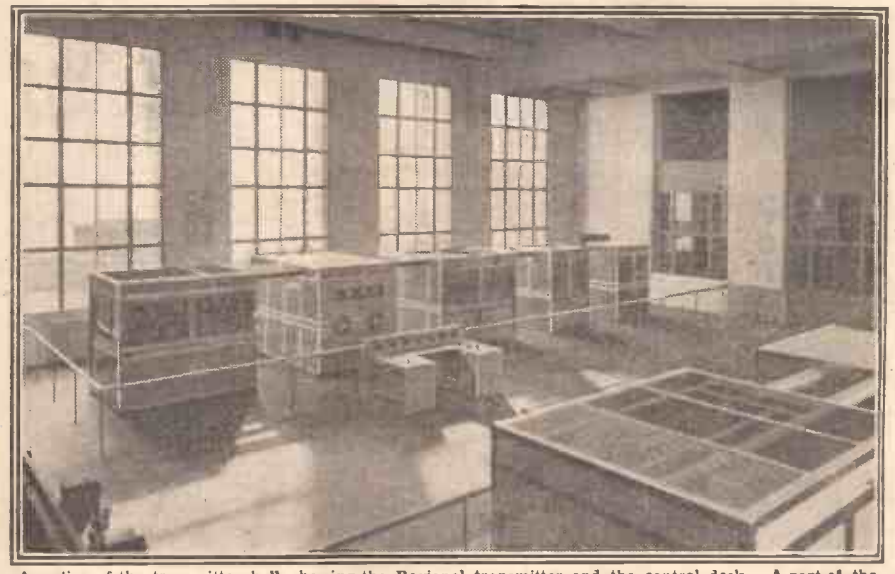
This does not mean that people in such places as Huddersfield are having an easy time. They are not. The well-known methods of improving selectivity are proving effective in most cases, however, though there are instances of receivers of such obsolete design that even at 20 miles from Moorside Edge they receive the new station "all round the dial" on both long and medium waves.

Whether the B.B.C. could have speeded up the erection of the North Regional station I am not going to argue here, but the long delays have undoubtedly been very irksome and have caused, in fact, a certain amount of bad feeling towards the B.B.C., as well as a slump in the wireless trade.

Now that the station is on the air, it is hoped that the B.B.C. will get on with this business of revolutionising Northern broadcasting as rapidly as possible.

And it is now up to the North Regional programme officials at Manchester, Leeds, and Newcastle to justify the faith of those of us who have consistently advocated the importance of Regional activities, and opposed sweeping measures of centralisation on London.

## THE TWIN TRANSMITTERS AT SLAITHWAITE



A section of the transmitter hall, showing the Regional transmitter and the control desk. A part of the National transmitter can be seen in the foreground.


**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.**

THOUGH the days are getting longer and the evenings lighter the number of European stations receivable shows no marked signs of reduction. Many of those on the medium wave-band have now such power behind them that reception can often be obtained from them in broad daylight.

**Good "Daylight" Stations.**

If you have not previously tried it you may be surprised if you run over the band between, say, five o'clock and six o'clock in the evening, by which time the majority of Continental stations are at work. Stations that you may possibly hear if your locality is reasonably good for long-distance work are Brussels No. 1, Langenberg, Rome, Stockholm, Mühlacker, Strasbourg, Brussels No. 2, Hilversum, Turin and Heidelberg.

You may come across others during your searching, but these are on the whole the most likely.

On the long waves there is a station waiting to be added to your log in the shape of the 21-kilowatt Reykjavik. The station is generally to be found at work between 8.30 and 11 p.m.

It has not perhaps yet got properly into its stride, but I have several times had good reception. Reykjavik should eventually be received very well particularly in southern and northern England, for its position on a hill, its 500-foot aerial masts and its wave-length of 1,200 metres all make for good distance-spanning qualities.

**Where to Find Him.**

Reykjavik is easy to find, for he is just above the Danish station Kalundborg, the dial readings for which must be known by every long-distance man.

On the medium wave-band there are no actual new-comers at the moment, though Turin has undoubtedly made a considerable increase in his power, and both Belgrade and Bucharest are now finely received when circumstances are favourable.

If you have not tried for these stations for some time, now is the time to do it. Bucharest you will find between Glasgow and Frankfurt, whilst Belgrade is just below Stockholm.

The lower portion of the medium wave-band between 200 and just under 300 metres is rather disappointing just now for two reasons. First of all, fading is troublesome and secondly the lower wave-lengths seem to be tenanted by a particularly undisciplined crowd.

The latest report of the Brussels Laboratory checking station shows that many French and Swedish stations and not a few others appear to have adopted almost any wave-length that took their fancy on any night. The record is, I think, held by the Swedish Norrkoeping, which only once during the month used the same wave-length on two consecutive nights.

**Another Crowded Spot.**

I find the only worth-while stations towards the bottom of the band are Nuremberg, Gleiwitz, Hoerby, Heilsberg, Bratislava and Hilversum. Higher up things are a good deal better, though there are one or two bad patches.

The worst is perhaps that between Mühlacker and Manchester, for here seven stations are in operation, though there is room for only three if there is not to be mutual interference. It is high time that we had by common agreement some central authority in Europe with real powers to keep stations to their wave-lengths.

Here are ten stations which you may add to your log next week-end if they do not already appear in it. Bordeaux (304 m.), Gothenburg (322 m.), Naples (332 m.), Barcelona (349 m.), Katowitz or Katowice (408 m.), Berlin Witzleben (418 m.), Lyons La Doua (466 m.), Prague (487 m.), Riga (525 m.), and Munich (533 m.).

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# SHORT-WAVE NOTES

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

THE last week or so has seen the arrival of several interesting tit-bits for the short-wave man. Many of them have also met their demolition, having been assigned the title of "rumours," but I will repeat one or two for what they are worth.

Starting with one of the authentic ones, we have the transmission of speech across the English Channel on a wave-length so short that it is measured in centimetres. Waves of this order are useful for relatively short-distance communication and are intensely directional.

Unfortunately, the "scare press" talked about X-rays, infra-red rays, "micro-rays," and every kind of ray except the well-known "Hoo-ray," and concealed effectively from the public the fact that the medium of transmission was our old friend short-wave radio.

**Lower and Lower.**

Incidentally, we have already started referring to waves between 10 and 20 metres as "ultra-short," so what can we do about the latest useful addition? "Hyper-short" might suffice for a while, until someone dives lower still.

Then we have the startling announcement that the U.S. broadcasting companies intend building a chain of short-wave stations "specially to provide programmes for England," and that they likewise intend to flood the English market with short-wave receivers for picking up same. Here I think we should be wise to take a full-sized grain of salt.

The idea of a regular programme service from the States on short waves—that will compare in any way with our own Regional scheme—is intensely humorous. Besides, if I want to hear American songs and speeches I go to the talkies!

How is this B.B.C. Empire Transmitter faring, I wonder? Strangely enough, we always seem to hear "rumours" and "talk" about these things such a *very* long time before they materialise.

As a stimulant for the real "dyed-in-the-wool" short-waver, as our American friends say, I might mention two new countries that I have logged within two days of each other. Both are represented only by low-powered amateurs using C.W.

**A Popular Item.**

They are Guam, an island near the Philippines, and Macao, a smaller island off China. The stations were O M-2 C S and C R-9 C N, both working on 20 metres and both coming over exceptionally well.

I seem to have been thriving on queer experiences and coincidences this year. Just before writing these notes, I was trying to explain the whole of our wonderful short-wave business to a friend of mine, an organist by profession. I had just been demonstrating to him, also, my pet organ record on my radio-gram, and we were idly searching round the receiver. The third station we tuned in was broadcasting the identical record! Not content with this, an hour later we heard Rome giving an organ recital at which the same piece was actually played!

**A Good Time Coming.**

Then I started listening to British amateurs on 40 metres, and I heard myself mentioned twice in five minutes, by two quite different stations! Such publicity is embarrassing me.

I find, on looking up old log-books, that conditions below 30 metres have been very good at this time of year for every year since I started short-wave work *except* last year. 1930 was, of course, uniformly bad for a very long period.

The Easters of 1928 and 1929 were wonderful, and 1931 has not been too bad. But the period round about the 1st of May has always been the bright spot. So grease your dials and adjust the headphones comfortably, and prepare for some good long spells of listening.

Incidentally, I hope the reader who wrote to me complaining that spells of good conditions always corresponded with the times that his accumulator was at the charging station has done something about it! Why not buy a charger or a spare accumulator?

# "IN MY OPINION . . . "

**A selection of interesting letters from "P.W." readers.**

### THE "COMET" CUTS OUT NORTH REGIONAL AT 3½ MILES.

The Editor, POPULAR WIRELESS.

Dear Sir,—It gives me great pleasure to write you and give you the results I have obtained with my flexi-coupled "Comet," as they may be useful to others of your readers. I am situated about 3½ miles as the crow flies from the new transmitter at Slaithwaite, and I can cut it clean out in 6° above his wave-length and 10° below.

I had no difficulty in listening to a transmission at about 420 metres and Toulouse and London Regional roared in whilst Slaithwaite was working his first public test. In fact it is the most selective set I have ever used, and I have been at it since the old Writtle days.

My aerial is 40 ft. long, slung up in a disused box-room in the form of a letter N. The only difference I have made from your circuit is that I have used a Ferranti push-pull last stage with 200 volts on the plates.

Please accept my congratulations for giving home constructors a remarkable set in every form and equal in my opinion to an instrument costing treble. (My last set, a commercial set, 2 H.F., S.G., D. and power, although very good, is not a patch on the "Comet" for selectiveness, although it has a greater range in daylight.)

I will also add for the benefit of any one who is thinking about a "Comet," get a guaranteed "P.W." dual coil, as I made my own first, and although results were very good, they cannot be compared with a coil made by a reputable firm.

Yours truly.

LEWIS BEWERS.

### "RESULTS ARE ABSOLUTELY MARVELLOUS."

The Editor POPULAR WIRELESS.

Dear Sir,—I wish to let you know how much I appreciate your excellent paper. I have been taking it since number one.

Needless to say, I have built many of your receivers, but my favourite is the "Neutype" Four. I have added an output filter choke, and taken separate H.T. leads from each valve. I use Mazda 2-volt valves with a super-power in the last stage, and the results are absolutely marvellous. Stations come tumbling in at almost every degree of the dial, and volume is so great with the reaction condenser at minimum that I shall have to fit a volume control. Apart from the formidable list of European stations received, the American station, W T I C, comes in at full loud speaker strength on favourable nights (some nights it is quite inaudible, owing to atmospherics and Morse).

Last year I had your "Magic" Three, and found it wonderful on the ultra low waves.

I enjoy particularly Dr. Roberts' Technical Notes, and Ariel has in me a great admirer. I always read his chatty article first thing when I receive my paper each week, which reminds me of a friend who told me quite seriously that one of the harmonics was missing from his loud speaker, a fact which one could almost believe on hearing the said speaker. Everything but the noise seemed to be missing.

I hope you will soon have an article on converting the "Neutype" Four to all-electric.

Wishing you, your staff and paper continued success,

I am, sir,
Yours faithfully,
IAN A. LYON-BOWIE.

Co. Cork, Ireland.

## OUR MUTUAL ENEMY

A photomicrograph of "sulphate," the foe of every accumulator in the land.

### WIRELESS AND THE WIND.

The Editor POPULAR WIRELESS.

Dear Sir,—Your article on "Wireless and the Wind," by Mr. G. H. Daly, greatly interested me, and recalled a number of experiments carried out by Mr. H. Case and myself in 1913 by means of kites flown with wire at Barnes and Wimbledon and Nettlebed (near Henley) to determine the different static potentials from winds of different quarters.

The following data may prove of useful interest to Mr. Daly and many of your readers:

With winds from E., N.E. and S.E., greatest potential (negative).

With winds from Southerly and S.W., very slight potential (negative).

With winds from Westerly, variable positive charge.

With winds from N.W., very strong, sometimes positive, sometimes negative charge.

One hour after sunset in all cases provided greatest strength, usually about double the daylight results. A standard length of 36 gauge insulated copper wire 450 feet long was used in all experiments, and with N.E. winds this usually gave a spark of half an inch from end of wire to earthing pin. Cord winder secured with three feet of strong silk ribbon.

With the very inefficient 'phones then at our disposal we tried to see how far we could pick up the signal sent out by spark, and by using 100 feet of insulated wire laid on the grass at Wimbledon Common, and attaching 'phones in series with end of wire and earth pin a click could be heard every time a spark was drawn from kite line at Barnes Common, but could get no results from Wimbledon to Barnes.

We also tried up to heights of 12,000 feet with tempered steel piano wire 24 gauge, but 1-inch spark was about the limit, insulated copper wire always gave best results, but difficult and extravagant to use.

In conclusion, I must add a word of warning to anyone tempted to experiment along these lines, as we found that 100 feet of wire could give a shock that was very painful, and dangerous shocks will be experienced if they neglect to first secure a good earth pin, one foot deep in the ground and three feet high, and always discharge the wire to this before attempting to touch the wire or attach it to instruments.

Yours faithfully,
GEORGE PAGET-USHER.

St. James', S.W.1.

# OPERATING THE "COMET" FOUR

**Some final details.**

BEFORE dealing with the actual operation of the completed "Comet" Four we must find room for details of the output filter.

The choke is mounted just behind the grid leak and the condenser behind the L.F. transformer. If you want to use a D.C. mains unit with the set mount another 2-mfd. condenser alongside the first one, moving $V_4$ to make room, if necessary. This second condenser is essential for D.C. work if safety precautions are to be properly carried out.

For A.C. or battery H.T. the one condenser and choke shown in the diagram are all that are necessary.

The wiring is carried on in this wise.

Remove lead from L.S.— to P. of $V_4$, and lead from L.S.+ to H.T.+ 3.

Take P. of $V_4$ to one side of output choke and to one side of 2-mfd. condenser. Other side of condenser goes to L.S.—. Other side of choke goes to that terminal on the H.F. choke that goes to H.T.+3. L.S.+ goes to L.T.— terminal on $V_4$. *Unless you are going to use a D.C. mains unit.*

### Very Easy to Handle.

In this case, L.S.+ goes to one side of that extra 2-mfd. condenser we mentioned, and other side of this goes to L.T.— on $V_4$. This is to isolate completely the loud-speaker wiring in the event of the D.C. mains having their positive earthed.

These are all the refinements, and we think you will agree when you have added them—and let us repeat you can do this in stages, one at a time if desired—you will agree, we think, that the "Comet" Four is now the last word in luxurious efficiency.

The handling is the same except for the Selector coil. This alters the tuning procedure somewhat, as you will find. We assume you have wound round the flex so that you have a couple of turns round the dual-range coil over the main winding.

The Selector coil, you will find, has a knob controlling a stud switch, and this is your means of adjusting the tuning of the aerial circuit. It is not a critical setting, and adds scarcely at all to the complication of handling the set. Put the Selector roughly right, pick up your station on the tuning dial, then seek for the best stud on the Selector, and that is all.

Now try out the set and see what selectivity you get. The beauty of "Flexi-coupling" is that you can adjust it to suit your exact selectivity requirements.

Thus, for more selectivity pull the two turns up on the dual coil to a position nearer the top and away from the single-layer winding, or try just one turn. For less selectivity and still better volume try three turns and adjust their position as before.

The Selector is not critical in its adjustment, and so the set remains practically as easy to operate as ever. You see, you can leave the Selector switch almost anywhere, pick up your station weakly on the tuning dial, then bring the aerial into tune, and get the extra power and knife-edge selectivity characteristic of a "Flexi-coupled" receiver.

It is important to understand that you will only get this wonderful selectivity when you have the Selector switch to the right stud. Do not expect to get your station absolutely clear of all interference, therefore, until you have adjusted the Selector.

### On the Long Waves.

Just a little practice will show you how to make these adjustments quite quickly and easily. When you have tuned-in a given station, for example, you will find it is a good scheme to keep moving the Selector switch a stud or so at a time to follow up the movement of the condenser dial as you search for other stations.

To go over to long waves, there is a special setting of the Selector switch, since "Flexi-coupling" is not used on the long-wave range. (The normal selectivity of the "Comet" Four is ample here.)

Accordingly, the Selector must be turned round fully to the right, until you feel it come up against the stop. It *must* be kept here all the time you are working on long waves, and only brought into operation again when you switch back to the lower wave-band.

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Extra Components required:

| | |
|---|---|
| ½-1 Megohm volume control (Igranic) ... | 6 0 |
| Output Filter Choke (Pye or Bulgin) ... | 12 6 |
| 2-mfd. Condenser (Dubilier or Franklin)... | 3 6 |

**Complete Kit "A" £5-2-0**
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### FLEXI-COUPLED "COMET 3"

Extra Components required:

| | |
|---|---|
| 1 Keystone Star-Turn selector coil ... | 12 6 |
| 1 400-ohm B.M. Potentiometer ... ... | 1 6 |
| 1 Bulgin Panel-Light (without bulb) ... | 2 6 |

**Complete Kit "A" £4-16-6**
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Extra Components required:

| | |
|---|---|
| ½-1 Megohm volume control (Igranic) ... | 6 0 |
| 1 Single Circuit open Jack and Plug (Bulgin) ... ... ... ... | 2 6 |
| 1 Single Pole Change-over Switch (B.M.) | 4 0 |
| Flex and G.B. Plug ... ... ... ... | 3 |

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P.W. 18/4/31

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# QUESTIONS AND ANSWERS

### THE "MAGIC" THREE AND SHORT-WAVERS.

W. P. (Preston).—"I am a regular reader of the POPULAR WIRELESS, and I have a set called the 'Magic' Three, which I built a few weeks back, and I am very proud of it, and I wish I had built it at first.

"And having purchased a set of short-wave coils, I tuned in on Saturday morning between the hours of 12.30 and 2 a.m. the American station Westinghouse Electric K D K A, Pittsburg, U.S.A. And another day I tuned W G Y and W 2 X A F and P C J Holland and Zeesen, Germany, and the short-wave station at Rome and two more U.S.A., but they were too weak to bring in on the 'phones.

"On the other broadcast bands I received plenty of stations, such as Cologne, Cork, (Ireland), Barcelona (Catalana), Nurnberg, Horby (Sweden), Turin, Moravska Ostrava, Goteborg (Sweden), Langenberg, Milan, Rome, Vienna, Budapest, Stockholm, Lyons, Katowice, Paris (Petit Parisien), Madrid.

"May I say that the above were received on the loud speaker, and not on the 'phones. I have not tried on the long waves yet to see how many stations I can get, but I can get Daventry 5 X X, Radio-Paris, Konigswusterhausen, Lahti, Hilversum, Eiffel Tower, Motala.

"I am thinking of putting in the dual-range coil in my 'Magic' Three, but I am not certain if it will get down to short waves. I am very keen on short waves. Does it get down as far as that?

"I received a short-wave station on March 8th, 1931, as near as I can tell you, between 40 metres and 130 metres. His call-sign was 'Allo, allo, H L Z Lyons.' He spoke in English and he had a lady announcer, who spoke in French.

"The man announcer said it was a French experimental station, call U S A. It was a concert of dance music.

"The transmission lasted about an hour. I received him at 9.35 G.M.T., and finished at half-past ten. Would it be Lyons, and, if so, would you tell me the wave-length for that station?"

We are glad to hear of your results—they are certainly very good indeed.

We are afraid that if you alter to the dual-range coil you will have to give up the idea of short-wave stations, or else rebuild the whole set on the lines of the "Interchange" Three. The dual-range coil covers only the medium waves and long waves. Not short waves at all.

Frankly, we should think very, very hard indeed before pulling your present arrangement adrift—it will take a lot of beating, you know. And you certainly have enough alternative programmes, haven't you?

As regards Lyons, we are afraid we can't give the wave-length, as during test broadcasts it is usual to shift the wave-length experimentally, to see which gives best results. It is doubtful if you could get the exact figures now, even by direct application to the station.

The only safe rule to find test wave-lengths is to listen for the announcement about them at the time and even then stations have been known to give them quite inaccurately. But undoubtedly it was Lyons you heard.

### CUTTING OUT THE LONDONS.

J. L. L. (Waltham Abbey).—"My uncle who has rather bad asthma, and, off and on, is laid up a lot, has asked me to help him cut out the Regional and the National. He has got a pretty good set (Detector, one resistance, and one low-frequency transformer amplifier), with plenty of foreign stations when the Londons are not on. At present his aerial goes straight to a tapping on a 60-turn X-coil, and we have tried a ·0001 condenser in series with it, but this does not get over the difficulty. What he needs is something that will take away the National programme while he is searching for foreigners low down on the scale, and do the same to the Regional when required.

"There is plenty of room inside the cabinet, as it used to be a gramophone cabinet, and he keeps spare batteries and all sorts of things inside it. I have a 60, 50, and a 40 plug-in coil, as well as a ·0005 variable. Could I use these?

"If so, what would be the connections?"

You could easily rig up a Brookmans Rejector, the extra parts being a ·001-mfd. fixed condenser, a ·00075 semi-variable condenser, a coil holder for your plug-in coil, an extra aerial terminal, and a plug, with two sockets.

Arrange the coil holder down on the baseboard well away from the other coils in the set, and near it mount your ·0005-mfd. variable condenser on the panel, with the additional semi-fixed condenser placed near. (These two condensers will only have to be set once, and then left, so if the ·00075 is of the baseboard-mounting type it does not matter.)

The ·001 fixed condenser is mounted near the plug-in coil holder, and the new A terminal is mounted near the ·0005 mfd. condenser.

If the ·00075 condenser is of the panel-mounting type one socket could be over each of the condensers or placed between them, and in any case you will need a small hole near the two sockets for the flex on which the plug is held to come through to the front of the panel.

Instead of your aerial going straight to a tapping on your 60-turn X-coil, this tapping will have a crocodile clip or plug as before, but it will be connected to one side of the new coil holder, and to the moving vanes of the ·0005-mfd. condenser and one side of the ·00075 condenser. The remaining side of the coil holder will go to one end of the ·001-mfd. fixed condenser.

The other side of this condenser will go to the new aerial terminal and to a flexible lead which goes through the panel and bears on the front of the panel a plug that can be placed in either of the sockets. One of these sockets goes to the fixed vanes of the ·0005 condenser, and the other socket goes to the remaining side of the ·00075 condenser.

Place the 50-turn coil in the holder and plug into the socket which is connected to the ·0005 condenser. (The aerial terminal of the set, of course, goes to the new A terminal.) Tune in the National on the set, and then adjust the ·0005 mfd. until the programme goes right down to a whisper or right out. Then change the plug over to the socket which is joined to the ·00075 and tune, first to bring in the Regional on the set, and then to cut it out with the new ·00075 condenser.

Once the Rejector has been properly set you should have no difficulty in finding foreigners.

### FLEXI-COUPLING THE "COMET."

J. S. (Belfast).—"What number was it, and how much do I have to send for the article on 'Flexi-Coupling the "Comet" Three'?"

This article was described in "P.W." No 455 (February 21st issue). Back numbers of "P.W." if they are still in print, are obtainable from The Amalgamated Press, Back No. Dept., Bear Alley, Farringdon Street, London E.C.4, price 4d. per copy, post free.

### TROUBLE WHEN USING A FUSE IN THE H.T. NEGATIVE.

P. P. N. (Warringdon).—"I was perfectly satisfied with the set as regards quality, but I thought I would like to put in a fuse between H.T. — and L.T. — to protect the valves. I did this merely by breaking the wire and inserting the fuse (as shown on my sketch herewith), and I am sorry to say it has spoilt the quality.

"With the fuse in I find there is a little tendency to rattle on certain notes which I

(*Continued on page* 184.)

### *"P.W." PANELS. No. 15.—LOUD-SPEAKER CONNECTIONS.*

**When two or more loud speakers are used they can be joined together in series or in parallel.**

**To join two of them in series, the + of the second speaker should be connected to the — of the first, the other terminals going to the set as marked.**

**To join two speakers in parallel, each L.S.+ should go to the + on the set, and each L.S. — to the set's — terminal.**

**In most cases the series connection gives best results.**

## "CAN'T GET THE SET 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.

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

# RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 182.)

never had before. And though I could not see any reason why the fuse should affect it, I put a piece of wire across the fuse terminals and I find that when I do this the distortion goes.

"So it must be the fuse. What would cause that?"

Your sketch shows the trouble up at once, and all you have to do to get over it is to leave the fuse joined to the H.T. — and the L.T. — terminals, but *transfer from the H.T. — terminal all other wires which go to it*, and put them the other side of the fuse. That is to say, on the L.T. negative terminal instead of on H.T. negative.

In other words, when you are using a fuse, the H.T. — terminal on the set should go to one side of that fuse *and to nowhere else*. Any other wiring which is normally fastened to H.T. — is placed on the L.T. — side of the fuse instead. Unless this is done, the fuse is in other circuits besides the H.T. supply. And if it happens to be of rather high resistance it may cause instability, or a tendency to motor-boating, or a little distortion, such as you are experiencing.

### HIGH-TENSION LEAKAGE.

Several readers have written appreciatively of the good effects of looking for H.T. leakage with a milliammeter when the set is supposed to be switched off. One Cardiff reader emphatically states that it would pay owners of dry H.T. batteries to check their milliamps, and gives his own experience as follows:

H. I. (Cardiff).—"I was interested in the description by H. G. (Parson's Green, S.W.) of milliamps leakage. My S.G. set when switched off with a push-pull switch breaking L.T. negative reads three milliamps. I tried every component in use and replaced the S.G. valve, then detector, then first L.F., and then the power valve (I have a spare set). By changing the power (S.P.) off it went.

"I sent it back to the makers for examination, although it worked just as good as the one replacing it. And it was replaced. No charge And now no leakage."

### FITTING A DIFFERENTIAL CONDENSER.

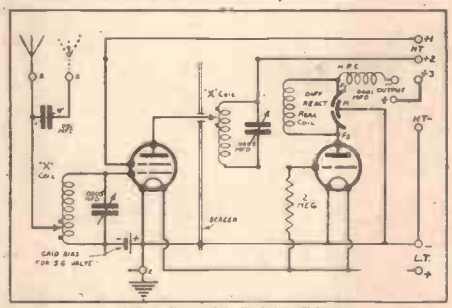
A. W. W. (Manchester).—"Does not the information given on page 1204, March 7th issue, in reply to one of your readers, rather contradict the details of 'missing link' on that page?"

No. There are several different ways of fitting a differential reaction condenser, according to the circuit used, and the diagram shows a favourite one-valve method, whilst F. L. H.'s query related to a four-valve set using an H.F. detector and two L.F. circuit.

### AN ADVERTISER'S CORRECTION.

Owing to an oversight the price of the Wufa loud speaker unit was given in their recent advertisement (page 117) as 25s. This was incorrect, and the advertisement should have shown the price as unit only—27s. 6d.

## MISSING LINKS, No. 6.




AN S.G. AND DETECTOR.
Here is an incomplete S.G. and Detector circuit, with simple screening.
There are three "breaks" in the diagram as given. Can you draw in the missing components?
LOOK OUT FOR THE ANSWERING DIAGRAM NEXT WEEK.

# FOR THE LISTENER

(*Continued from page* 170.)

in the Ganges before I bathe in the waters of Oblivion.

Then there is Russia. Russia is rather a bogey just now. The best thing to do with a bogey is to look it in the face.

"In the dark, imagining some fear, how easy is a bush supposed a bear!" If you run away from it, your very running away will make you more afraid.

What is life in Russia like to-day? What are the ordinary people there, people like you and me, working at and playing at, thinking and doing? Hotels, shops, factories, theatres, homes, churches—what are these like in Russia now?

I was talking the other day with a friend who had just come back from a visit to Russia, and I asked him for his chief impression. "Concentrated drive!" he answered.

India and Russia are to be the roast beef and Yorkshire pudding of the summer feast. There will be lighter dishes.

Compton Mackenzie and Hugh Walpole, for example, are going to give their holiday secrets away. I think that is rather noble of them. When a man has found a pleasant retreat, he is inclined to keep it to himself. He does not want it to become a popular resort.

I gave my secret away to you in this column last summer. Not quite, perhaps. I don't think I told you the place to book to! If a man is ever justified in being thoroughly selfish, it is on the question of where he goes when he wants a rest.

(*Continued on page* 186.)

# Cheaper Radio!

## *Everlasting High Tension for a trifle over the cost of 2-120 Volt Batteries*

Model A.C.244.

## *The Neatest & Cheapest A.C. Unit ever made*

**With alternating-current electric lighting in the home it is now possible for you to banish your Radio troubles and assure H.T. for your Set for a lifetime at a little more than the cost of a year's supply of Batteries—the secret is the "ATLAS" new Unit A.C.244. A development of the famous "ATLAS" Olympia Winner—Model A.C.188. It is no larger than a 60v. Battery, and no matter what your Set is—from one to four Valves, Standard or Portable—the facilities and output of A.C.244 will be found more than satisfactory. Three Variable Tappings are provided—60 80 Volts for Screen Grid Valve, 90/100 Volts for Detector Valve, and 120/150 Volts for Pentode or Power Valve. Output: 120 Volts at 20 m/A or 150 Volts at 15 m/A. It incorporates the Westinghouse Metal Rectifier, and is complete with Wander Plugs and Earth Terminal, and fully guaranteed for 12 months.**

**59/6**
**CASH PRICE**

## "CLARKE'S "ATLAS"

## MAINS H.T. UNIT—A.C.244

***Ask your Dealer for a demonstration of this amazing Unit, and, in case of difficulty, write direct for Folder No. 56 to the makers :—***

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**SENSATIONAL SUCCESS OF THE "GOLTONE"**

# CUB WAVE TRAP

**FIT THIS UNIT AND NOTE HOW MANY ADDITIONAL STATIONS *YOU* CAN GET**


**THOUSANDS BEING SOLD**

Enthusiastic letters from users continue to reach us from all parts of the country,

**THE GOLTONE "CUB" SELECTOR UNIT.**

Cuts out interference. Brings in selected stations, hitherto unobtainable, loudly and clearly. **TUNES UP TO 5GB. WAVE-LENGTH AND SUITABLE FOR THE NEW REGIONAL TRANSMITTERS.**

**FOR PANEL OR BASEBOARD MOUNTING.** **2/6**

R48/26 .....

*From all first-class Radio stores,* **Refuse substitutes.** *If any difficulty, write direct, Pamphlet with full particulars on request.*

**Ward & Goldstone** PENDLETON. MANCHESTER LTD

**READ WHAT DELIGHTED USERS SAY:**

Mr. N. S., Joicey Square, West Stanley. Writes—

"I think it is wonderful the results I have obtained with one of your 'Cub' Wave Traps. The selectivity is great, and every station comes in with great volume and as clear as a crystal. I am almost sure every listener would purchase one if they heard one in use."

Mr. J. K., Rusholme, Manchester. Writes—

"It gives me very great pleasure to advise you of the wonderful results I have obtained with one of your 'CUB' WAVE TRAPS. After fitting the 'CUB,' I could cut Manchester out in under 3 degrees, and receive any station around Manchester's wave-length absolutely free from trouble.

"I, therefore, think that you will have effectively solved the problem which will arise when the new Regional Station opens, and you are to be congratulated on the sound construction, neat appearance, and efficient manner in which your 'CUB' improves reception generally."

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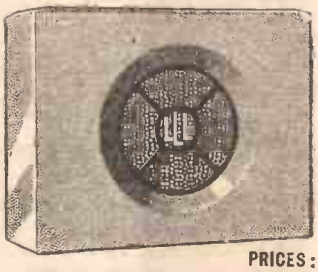

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*Write for particulars.*

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CAMCO TRUETONE SPEAKER CABINET

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Works: S. Croydon.

*Name* .....
*Address* .....
..... PW3

**Every CAMCO Cabinet bears the CAMCO Seal**

## FOR THE LISTENER

(*Continued from page* 184.)

Perhaps Mr. Walpole and the others will tell us of the lovely places where they USED TO GO!

First-hand stories of escapes from prisons during the War! You have probably read "The Road to Endor." The author of that exciting book, and other prisoners who managed to escape, will tell us how they did it. The planning and plotting; the devices and tricks; the moment of the attempt; how thrilling it sounds!

The problem of getting out of a prison must be comparatively simple compared with the problem of what to do when you are out! How shall you reach your friends?

**Our Idle Thoughts.**

I know a Russian naval officer who, at the time of the Revolution, was a prisoner in Moscow, and condemned to be shot. On the eve of his execution, there was a street fight just outside the prison. His guards went to watch it. So he slipped out by the back door!

But the really exciting part of his story was how he managed to make his way from Moscow to Riga. His courage and ingenuity were almost beyond belief.

"Idle Thoughts"—this title of a summer series is very attractive. It sounds like a contradiction in terms; and yet I have long been persuaded that my idle thoughts are the best.

When I sit down to think seriously, I never feel that I get very far. I soon get muddled and tied up in a knot. The best things have come to me when I have not been bothering about thinking at all. They come so clear and vivid, like the bubbles which quietly float up from the depths of a pool.

In my case, they are usually just bubbles; bright things, with nothing much in them. But that is because I am rather feather-brained. Harold Nicolson's "idle thoughts" now . . . but wait till you hear!

**For The Housewife.**

The morning programmes are chiefly designed for "busy housewives." These darlings wear the ear-phones, I suppose, at the wash tub and the cooking stove. A bevy of ladies are going to discuss with them, "Is school worth while?"

To most busy housewives it must be tremendously worth while, if only for the fact that it gets the kids out of the way! (You remember the opening scene in "Matinée.")

This seems to me rather a futile sort of subject. I think there will be a lot of platitude and flapdoodle spoken about it. But, as it is in the morning, and myself not being a "busy housewife," I shan't hear it!

## THE B.B.C. CANNOT BEAT THE BAND.

(*Continued from page* 169.)

"One can find an analogy in the cinema. In the old silent days just before the appearance of the talkies, the moving picture was rapidly becoming a serious menace to the theatre, for from an entirely new and somewhat disregarded entertainment it was fast becoming a serious art all on its own.

"The playgoer, attracted by the cheap seats which were made possible by the low costs incurred in showing a film, and the comfort made possible by the profit arising from these same low costs, was fast moving from old haunts. Came sound! The playgoer rushed back—and with him a host of new theatre fans, accustomed to the films, fresh to the theatre. Having heard voices, having seen an imitation play, they wanted to see a real one.

"Hear a symphony orchestra and then hear it through a gramophone or loud speaker. The feeling you experience is not the same. It never can be. For, no matter how perfect mechanical entertainment may become it will never oust the real thing—and especially the theatre, which had a limited public before broadcasting began and has that limited public now.

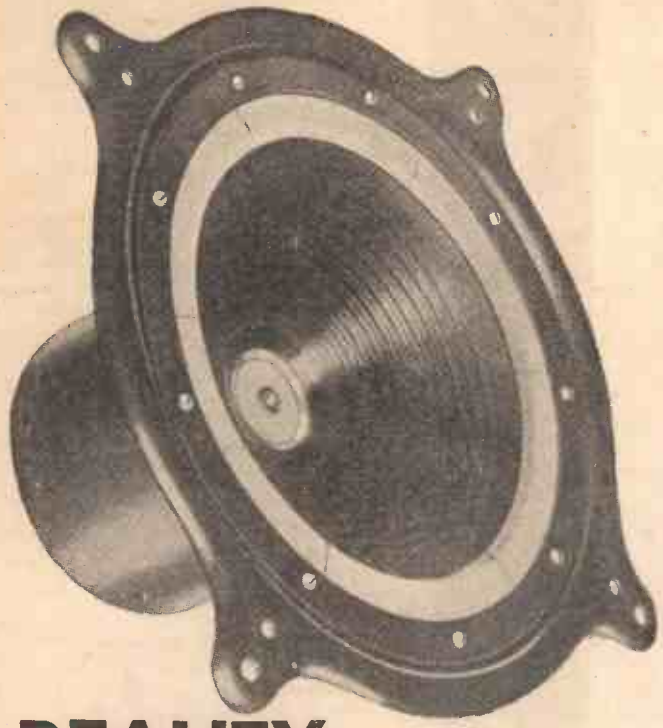
**His Own Publicity Man.**

"Can the advance of colour printing ever make a reproduction as good as an oil painting? I do not think so.

"In broadcasting, even television will make no difference. Indeed, it may only send still more people flocking to see the real thing."

You see, Cochran is optimistic. But perhaps that is because he is his own publicity man, and he is the publicity man supreme. He is even inclined to turn the B.B.C. into an advertising agency.

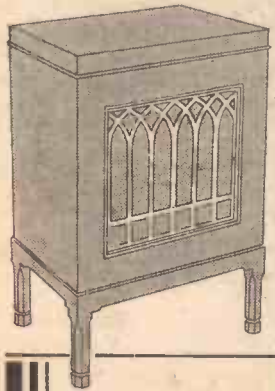
When he first addressed listeners he talked about a book he had written and informed the world how good the work was. The only other time, there was a debate between Hugh Walpole and Osbert Sitwell on "The Drama." Cochran took the chair!



# REALITY RECREATED *by* B.T.H. RK REPRODUCERS

The "R.K." is known all over the world as the best speaker obtainable—it has retained that reputation unchallenged for years.

The permanent magnet needs no battery or mains for its operation—it will work anywhere—off any set which incorporates a small power output valve such as the Mazda P220a class. The price is only £6-15-0 and our hire purchase terms are available.



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PERMANENT MAGNET R.K. UNIT (as illustrated). Price £6-15-0

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"GOLTONE" 'P.W.' & 'M.W.' DUAL RANGE COIL
Specified and recommended by Designers.
DW/12. 12/6

## GOLTONE STAR TURN SELECTOR COIL

Built to exact specification, with Engraved Dial. One Hole Fixing. For Flexi-Coupling and other Circuits. Laboratory Tested to give highest possible efficiency. No. R8/106. **10/6**

Ward & Goldstone PENDLETON MANCHESTER Ltd

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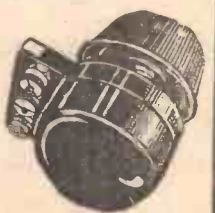
## WHATEVER YOUR 'COMET' SET



USE SOVEREIGN, the components that have been specified for this excellent series of sets. The Volume Control shown here (specified 3 times) has smooth silky action, is sturdy, dust-and-damp proof and is a necessity for any set. Fit Sovereign Components to improve any circuit.

50,000, 100,000 and 500,000 ohms 1 and 2 megohms **4/6** EACH

SOVEREIGN OF BRITISH MANUFACTURE S.F.B.

*Sovereign Components have been specified in the "Comet 4," "3" and "2" Why not consider for a moment where you can use other Sovereign Components as well? Send direct if your dealer cannot supply.*

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Mode No. 218

## HERE'S A FINE HOME FOR YOUR SET AN OSBORN RADIO CABINET

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A Queen Anne Radio or Radio Gramophone Cabinet, 3 ft 10 ins. high, 2 ft. 2 ins. wide, 1 ft 6 ins. deep. Size of baffle board behind fret, 24 ins × 24 ins. Metallic fabric for fret front included. Opening at top and back. Cabinet takes panel 2 ft. × 9 ins., or smaller.

PRICES:
Machined ready to assemble: Oak £3.10.0 Mahogany £3.15.0
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# TECHNICAL NOTES

**Some diverse and informative jottings about interesting aspects of radio reception**

**By Dr. J. H. T. ROBERTS, F.Inst.P.**

### Coils and Transformers

SEVERAL readers have mentioned to me at various times in their letters a peculiar fault which occasionally occurs with coils and transformers. The trouble is that a break occurs in the copper wire, and at the point in question a faint green spot will usually be noticed. It looks, in fact, as though a speck of some corrosive substance had attacked the wire at the particular point and gradually eaten through it.

Whether this is due to some kind of reaction with the material of the "former," or whether it is due to some contamination in the insulation, is not clear. I should mention that I have not had a case reported to me where the fault has happened with enamelled wire; generally it seems to be with silk-covered wire.

Also it seems to happen more frequently with certain types of materials for the "former." It would be interesting to know how many readers have experienced this trouble with coils or transformers. The effect is quite different from a mere mechanical break in the wire.

### A Curious Effect.

I have myself had this experience once, although as I say, I have several times had it reported to me. In the case which came within my own observation I had little doubt that the trouble was due to the silk covering having been chafed at the spot, and the copper wire having then become corroded by exposure to the atmosphere. In this case it was a coil in which the windings were exposed.

### Coils and Selectivity.

Talking about coils brings me to another point upon which I receive quite a number of queries, and that is the question of the selectivity of a set.

As you know the coils have quite an important influence upon the question of selectivity, and I should say that where the selectivity of the receiver is poor, in nine cases out of ten this is due to inefficient coils. Without going into further details, the obvious thing to do, if you suspect that the coils are responsible for poor selectivity, is first of all to borrow some coils of better type than the ones you are using and ascertain whether by substituting these better coils you get improved selectivity.

If so, all you have to do is to procure efficient coils and substitute them for the ones you were previously using.

### Losses

Along with the question of the coil is that of the coil holder. Some kinds of holder are made of very inferior moulding material, and consequently the high-frequency losses which occur in the holder itself may have a very adverse effect upon the selectivity.

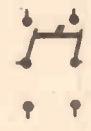
Many amateurs think that one coil holder or valve socket is as good as another and that cheapness is the only point to be aimed at. But I can assure you that, particularly in the high-frequency parts of the circuit, components such as coil holders and sockets may make an important difference to the operation of the receiver.

The aerial and earth naturally have a considerable influence on the selectivity, and if you are using a very large aerial this is likely to reduce selectivity, even though it may give you an increase in range. Selectivity is just as important as sensitivity (or range), and, in fact, the latter is generally of little use without the former.

(*Continued on page* 190.)

**RADIO SYMBOLS. No. 15**

**THE D.P.D.T. SWITCH.**



By one movement it breaks two connections and makes two others. It is therefore of wide adaptability in radio circuits.

* * *

Its simplest form is that indicated, but the shape is often widely different from that indicated.

* * *

Imperfect connection at one of the contact-points will, of course, affect the circuit, but otherwise there is little to go wrong with this component.

# TECHNICAL NOTES

(*Continued from page* 188.)

For the most satisfactory results it is much better to use only a moderate aerial, and to make up in amplification what you lose in pick-up sensitivity. In this way you will be able to get all the range which you require and at the same time it should be much more easily possible to get the all-important selectivity.

**Efficiency.**

When speaking of an aerial being too large and so militating against selectivity, I should also say that if the aerial is inefficient it will have the same effect. An aerial will be made inefficient by running very close to a wall, and particularly to metal pipes, and so on.

Another cause of inefficiency in the aerial is a very long lead-in, especially if this runs for a considerable distance indoors where it cannot help being in close proximity to surrounding walls and other objects.

A good earth connection is equally important, but I do not think I need say anything further on that particular point.

By careful attention to the above points, particularly coils and aerial, you may find it possible to obtain a great increase in selectivity which will make all the difference in the world to the operation of the receiver. In fact it is no exaggeration to say that selectivity, probably more than any other characteristic of the set, depends upon efficiency at every point.

**Cones and Diaphragms.**

I have had a number of letters, recently, all dealing with the question of the comparative efficiency of cone and linen-diaphragm speakers, and have been rather surprised at the number of experimenters who use the linen diaphragm. Needless to say, all those who use this kind of speaker are enthusiastic about its merits, and declare it to be much superior to the regular cone type.

It so happens that I hope to deal with this subject in a separate article very shortly, particularly as the linen-diaphragm speaker is one which is so suited to the home-constructor. There are quite a number of different ways in which this kind of diaphragm can be made up and mounted, and it gives plenty of scope for those who delight in trying and comparing the different kinds of loud-speakers.

In particular, the advocates of the linen-diaphragm speaker claim that it gives the bass notes in proper proportion, and without the "over-emphasis" which is sometimes attributed to the moving-coil speaker.

**Using a "Losser."**

A variable resistance in series with the aerial tuning coil—sometimes called a "losser"—is a useful means of obtaining volume control and at the same time of improving quality. In a set using a screened-grid valve, for instance, and taking a value of, say, 400 ohms for the variable resistance, it is possible to control the volume of the local station and at the same time to deal with different incoming signal strengths from various distant stations.

Series resistances may be included in all the high-frequency circuits, including the aerial circuit, and this has the effect when

(*Continued on next page.*)

## TECHNICAL NOTES
*(Continued from previous page.)*

only weak signals are being received of increasing the sensitivity and selectivity of the receiver.

The reason for this is that on fairly strong signals the effect of the resistances is to broaden the response curve, whilst on distant stations, that is on weak signals, the effect is to sharpen up the response curve and so give selectivity, which is essential in these particular circumstances. The broadening of the response curve (within limits, of course) makes for quality, whilst the sharpening of the curve makes for selectivity, and although the arrangement necessarily gives something in the nature of a compromise its characteristics, as indicated above, are often very convenient.

**Awkward Designs.**

I wonder if you have noticed the awkwardness of some of the pick-ups and pick-up arms on the market? I have found with two or three radio gramophones which I have used lately that the pick-up is set in much too slanting a position, with the result that when you put a needle into the holder you have to fix it so that it is only held at its upper extremity, that is, it must be sticking out of the needle holder as far as ever possible so that the pick-up will just clear the surface of the record.

If you insert the needle fairly well into the needle holder in the ordinary way, you find that the projecting part is so short that, before the needle touches the record, the body of the pick-up is sliding on the record surface. In one particular case there was no possible adjustment of the angle between the pick-up and the record and the only solution was to use soft-toned needles of extra length so as to keep the pick-up clear of the record.

**Pick-up Adjustments.**

I have remarked before on the extraordinary lack of adjustment with pick-up arms; in fact, many of the arms are quite

*(Continued on next page.)*

## TECHNICAL TWISTERS

### No. 57. EARTHING SWITCHES.

An earthing switch should be employed when the aerial is not in use to keep the aerial at . . . . . potential.

* * *

The switch should be located . . . . . the house.

* * *

If it is placed directly under the lead-in the wires to the switch can be kept short, which is a great advantage.

* * *

An earth-arrester can be used instead of a switch. It takes the form of a very small air . . . between adjacent metal surfaces.

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

* * *

Last week's missing words (in order) were: Condenser. Condensers, Air, Mica, Air. Ganged. Increases, Decreases.

## TECHNICAL NOTES

*(Continued from previous page.)*

incapable of any adjustment whatever. It seems to be that in a properly designed pick-up arm it should be possible to vary the length of the arm, that is, the distance of the pick-up from the remote swivelling end of the arm, and also to rotate the pick-up about the axis of the arm and to rotate the pick-up about an axis at right angles to the axis of the arm, that is, to vary the angle between the needle and the record.

**Really Adjustable Arms.**

There is no reason why adjustments of this sort should not be provided, with locking screws, of course, to fix the whole arrangement in its final position. I think nothing is more aggravating than to find a mechanical arrangement of any kind, whether pick-up arm or anything else, which is incorrectly mounted by the manufacturers and which is incapable of adjustment by the user. I know that there are some pick-ups and pick-up holders which are excellent in the respects indicated above, but at the same time there are others which I am afraid could do with a good deal of re-designing.

**A Useful Coincidence.**

Talking of radio-gramophones, those of you who use all-electric A.C. instruments incorporating A.C. indirectly-heated valves will probably have noticed a little effect which, although accidental, happens to be rather convenient. If you switch on the whole of the outfit, including the motor, by a single switch and immediately put the pick-up on the record, it will be a few seconds before the indirectly-heated valves "come on," and by that time the outer part of the record will have been already "played."

If, however, you switch on the whole machine and wait a few moments before putting the needle in the groove, you will probably get a loud and raucous scratch for a few seconds before the music starts, especially with records which are getting a little old or worn.

**A Pleasing Effect.**

With one particular radio gramophone which I frequently use, I find that if I switch on and immediately put the pick-up in contact with the record (or if I fix the pick-up in position before actually switching on and then give the turntable a flick round with the finger) I escape all the introductory scratch, and with most records the valves "come on" just nicely in time to bring in the commencement of the music. The effect is quite pleasing and, as I say, is particularly advantageous where old or worn records are being played.





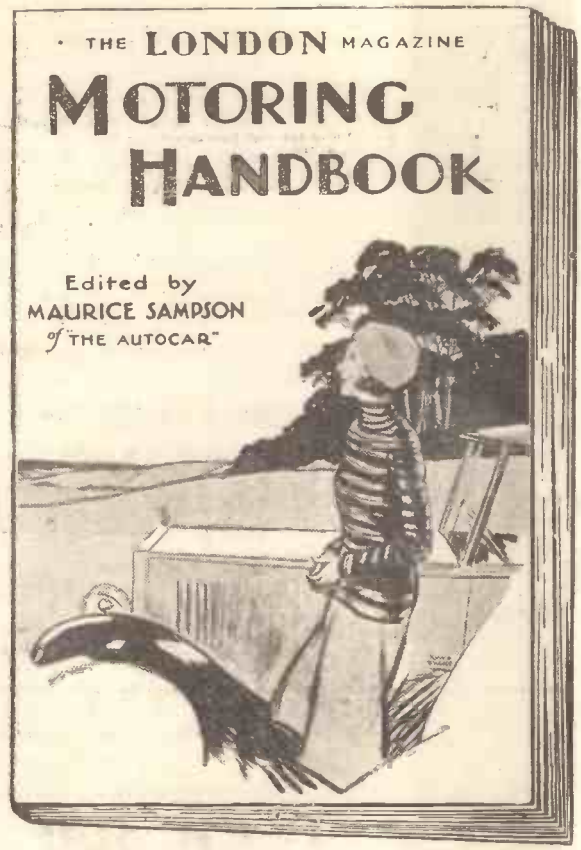




**AN ADVERTISER'S CORRECTION.**

The New Times Sales Co. have pointed out that in their "Comet Three" Kit advertisement last week (page 151) the price of the "three Mullard Valves" was incorrectly given as 17s. 6d. This, of course, should have been £1 7s. 6d.

# 64 Page Motoring Handbook FREE




Every user of the road will welcome this invaluable motoring handbook. Edited by Mr. Maurice Sampson of "The Autocar," it is a veritable mine of useful information. Sixty-four pages of advice and hints from acknowledged experts, five road maps printed in two colours and numerous black-and-white illustrations amplifying the text. Such is the LONDON MAGAZINE MOTORING HANDBOOK, a copy of which is presented FREE with the MAY Number of this splendid magazine. A few of the contents, listed below, will give you some idea of the utility of this amazing gift.

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POPULAR WIRELESS, April 25th, 1931 REGISTERED AT THE G.P.O. AS A NEWSPAPER

LARGEST RADIO CIRCULATION IN THE WORLD

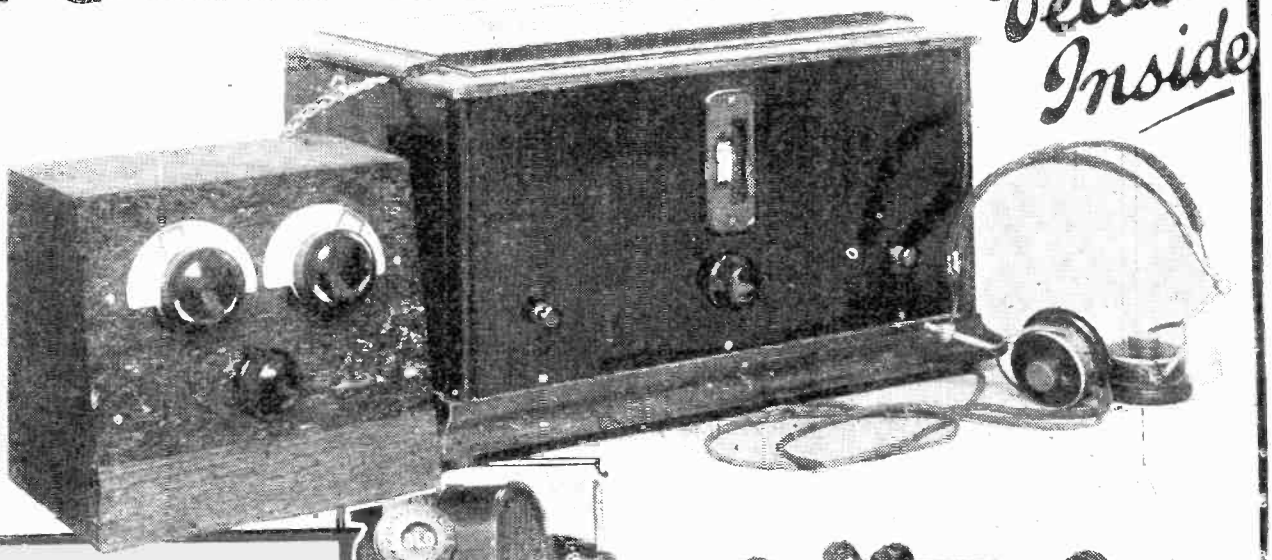
# Popular Wireless

Every Thursday PRICE 3d.

No. 464. Vol. XIX. INCORPORATING "WIRELESS" April 25th, 1931.

## SHORT-WAVES ON YOUR "COMET"

*See Details Inside*



*ALSO THIS WEEK*

JACK PAYNE LOOKS AHEAD

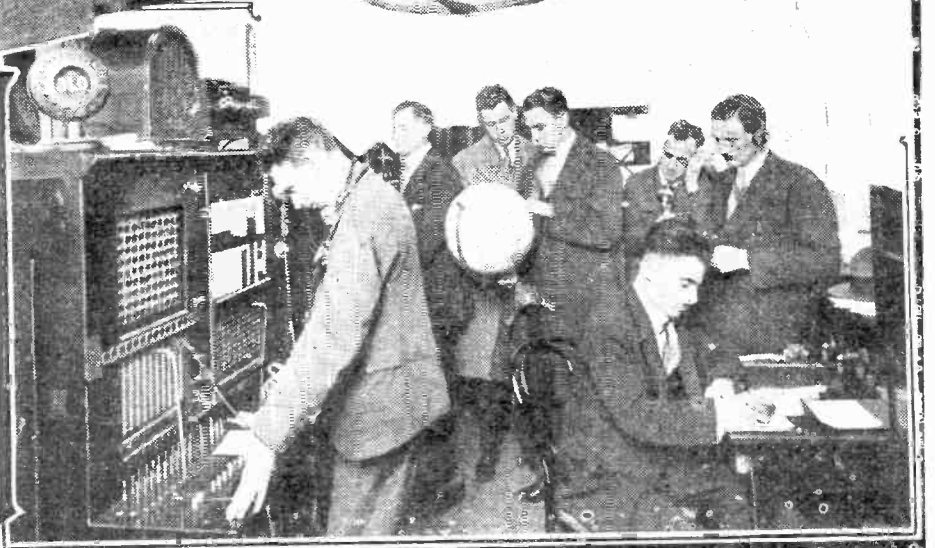
HOW TO FIND THOSE FOREIGNERS

OPERATING A FLEXI-COUPLED RECEIVER

JOTTINGS FROM MOORSIDE EDGE

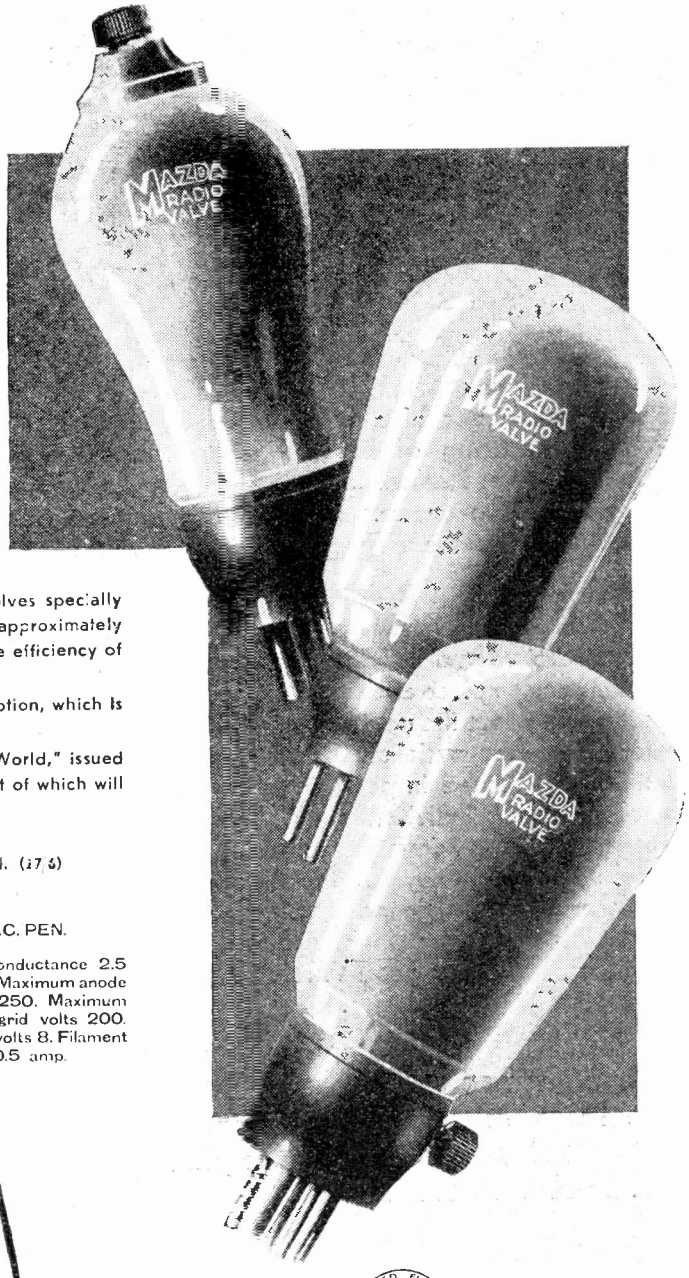
SIMPLIFIED RADIO

HOW TELEVISION WORKS



# VALVES FOR D.C. MAINS

## THREE NEW AMAZING MAZDA VALVES




Mazda Engineers are again first in the field, this time with Valves specially designed for operation from D.C. Mains. The characteristics are approximately the same as those of the well-known Mazda A.C. Valves, and the efficiency of the Valves is equally good in all other respects.

Economical working is ensured by the very low current consumption, which is only half that of other mains valves.

These valves are fully described in an article in the "Wireless World," issued January 7th, 1931, giving full data and suitable circuits, a reprint of which will be gladly sent on application.

The three types at present available are: —

D.C./S.G. (25/-) D. C./H.L. (15/-) D.C./PEN. (17/6)

and are in stock at all good radio dealers.

**D.C./S.G.**
A.C. resistance 600,000 ohms. Amplification factor 1,200. Mutual conductance 2mA/volt. Max. anode voltage ($E_A$) 200. Screen voltage ($E_S$) 80. Filament volts 6. Filament current 0.5 amp.

**D.C./H.L.**
A.C. resistance, 12,000 ohms. Amplification factor 3.0. Mutual conductance 2.5 mA/volt. Maximum anode voltage ($E_A$) 200. Filament volts 6. Filament current 0.5 amp.

**D.C. PEN.**
Mutual conductance 2.5 mA volt. Maximum anode potential 250. Maximum auxiliary grid volts 200. Filament volts 8. Filament current 0.5 amp.

**MAZDA**
***THE***
**BRITISH**
**VALVES**

V.120

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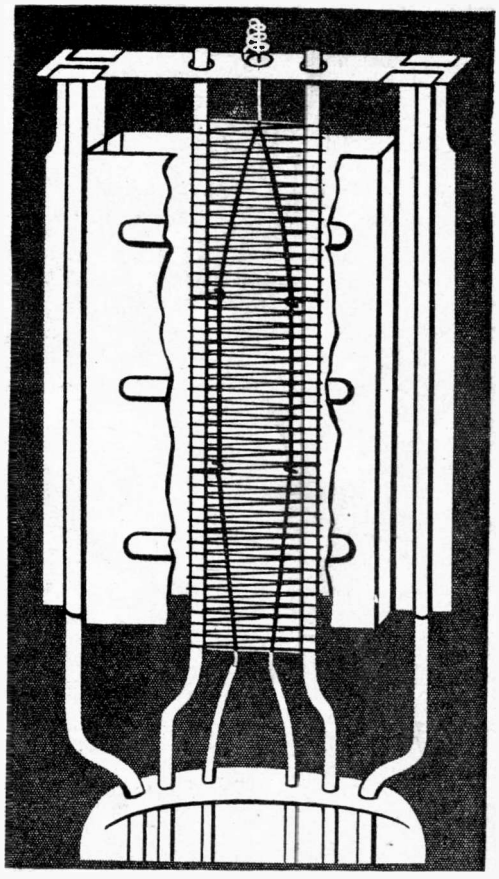
**EDISWAN**

Simple facts for Valve Users No. 2

# Why Cossor Valves never vary in performance

THE performance of a valve is largely determined by the spacing of its grid wires, the distances between the filament and the grid and between the grid and the anode. Any variation in these distances—will alter the characteristics of the valve.

The Cossor Insulated Bridge System of construction entirely eliminates the human element in assembly. These distances are automatically fixed by means of holes in the insulated bridge piece and by the use of precision instruments which space the upright supports with microscopic exactitude. Any variation is utterly impossible. The elements are locked in position in perfect alignment—there can be no individual movement even under the heaviest impact. Remember uniformity in manufacture means uniformity in results. For the finest performance, therefore, under all conditions, you will be wise to select Cossor Valves. There is a full range of types to choose from at every good Wireless Shop.



**Over 50 types of Cossor Valves are available from any Wireless Shop to suit all 2, 4, and 6 volt Battery operated and A.C. Mains Receivers.**

COSSOR

*A. C. Cossor, Ltd. Highbury Grove, London, N.5.*

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# Popular Wireless

LARGEST NET SALES

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Editor: NORMAN EDWARDS.
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Assistant Technical Editors:
K. D. ROGERS, P. R. BIRD,
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**COMFORT RE STUTTGART**
**DO YOU "FLUTTER?"**
**RADIO ADVERTISING**
**ADVANCE BRITANNIA!**

## RADIO NOTES & NEWS

**CUTTING CABLES**
**MICRO-RAYS**
**JOY TO COME**
**A NEW RECTIFIER**

### Slaithwaite is Slaithwaite.

AMONGST the most interesting facts which emerged from the talk given earlier this month by Mr. Noel Ashbridge was that he pronounced Slaithwaite "as it is spelt." That is good enough for me. He is the Chief Engineer of the B.B.C. and has to do the right thing. "Slewit" is hoff!

By the way, what a contrast his talk presented to that which his predecessor, Captain Eckersley, would have given; the one, level in tone, sober and downright in text; the other, good sense and technical knowledge in fancy dress! We have as listeners lost P. P. E., and we mourn the fact. But "The King is dead, long live the King." Mr. Ashbridge will, I believe, win a full measure of popularity by his clear expositions and evident sympathy with the listener.

### Comfort re Stuttgart.

IN his remarks about the interference caused by Stuttgart (Mühlacker), Mr. Ashbridge reminded us that the nuisance will automatically lessen with the advent of Summer Time here, because the dark hours of "listening" will become fewer.

Meanwhile, every possible means of solving the problem will be attempted.

That close co-operation with the German engineers, and goodwill on both sides, have been obtained is a promising sign and I firmly believe that the trouble will be surmounted, chiefly because it is not so formidable as some of those which have already been encountered.

### Do You "Flutter?"

MY contribution to the funds of the Irish Sweep—and incidentally to the much-disputed fortune of Mr. Scala and his friends and relations—having brought me nothing but a thrill which will not pay the water rate, I must forego still longer the luxury of that wave-meter for which I was saving up. I doubt not that many of you had a little flutter on the occasion of the Grand National, and I am wondering whether any of you twigged that Grakle's portrait was published in the advertisement issued by Player & Sons just prior to the race and followed the "tip." I understand that that was not the first occasion on which the winner of a big race has been "tipped" in a Player's announcement.

### Spring Cleaning.

TO my dying day I shall never understand why women will permit cobwebs from May till March of the next year, and declare war on 'em in April. Take my case! My home ladies are now scrubbing, scraping and fumigating a room which is used to store the trunks and portmanteaux,

### WHAT'S THE TIME?


**They can always tell you to the tick, what time it is in Hythe, where this radio-controlled clock runs in connection with the local radio exchange.**

whilst in the dining-room there is a cobweb on the chain which supports the inverted bowl of the electric light.

That cobweb has been obvious to me since 1929! My radio set has been covered with a huge d'oyley whereon has been placed a pot of heather. I am told that the "earth" and aerial wires disfigure the *tout ensemble*. Perhaps I can paint them with invisible ink!

They have made a sort of tea-cosy to hide my accumulator, and want to paint the loud speaker to match the *motif* of the wall-paper. Help! But I might as well yell down a well!

### Radio Advertising.

WHILST there is a tendency in Europe to flirt with radio advertising there are signs across the Atlantic, where it has been exploited freely, that it is losing ground. I do not believe that in the States it is generally a source of profit to the advertisers, such are the heavy fees which they have to pay; and in Canada, where of late there has been a reaction in favour of adopting our methods of handling broadcasting, the radio organisations have decided to reduce radio advertising to one-twentieth of the total programme time, and on Sundays to prohibit sales talk over the ether.

### Radio Society Item.

THE announcement of a meeting of the Harrow and District Radio Society on April 20th was received here too late for me to give it space in last week's issue. Club secretaries might note that in order to ensure publication they should submit announcements a month in advance. The Harrow people will welcome new members and those interested should write to Mr. E. A. Hillman, Chairman, "Lindhurst," Headstone Drive, Wealdstone, Harrow.

### Danish Stations.

FROM a usually well-informed source we are advised that Hjoerring and Odense are purely military stations, and that Sorö is a commercial telephone station giving weather information and other official matter not intended for broadcast listeners. This reminds me that "World-Radio" was not flattered by my note about the Danish "Politikens Radio," which I described as the equivalent of our "World Radio." Bless me, how these editors love each other! Well, wash out "equivalent" and substitute "the Danish attempt to equal 'World Radio.'" Patriotism for ever!

### Too Much Chlorine.

A WEEK or so back, whilst referring to Ghandi and his seaside larks, I let $NaCl_2$ slip by as the chemical formula for common salt, an error about which

(*Continued on next page.*)

# RADIO NOTES AND NEWS

*(Continued from previous page.)*

H. S. G. (Streatham) promptly pulled me up. It should have been Na Cl. I freely confess that my memory played me false, though that is not very dreadful when it is considered that I wangled my last equation in 1904. That extra atom of chlorine would tie the All-India Congress into knots better than those produced by a King Cobra. Sorry, old thing, and all that! Much more important is the tribute paid by H. S. G. to the "P. W." Dual Coil, the results of which astounded him. Nothing astounds me so much as the astuteness of our readers; they are the Na Cl of the earth!

### Advance, Britannia!

DESPITE the "economic blizzard" and the moans of the Little Englanders, this country is keeping its head well above water. We may lose a few sporting events, but we collar the speed records, so that British motors, aeroplanes and engines are hall-marked all over the world—and America.

I now learn that no less than six African Administrations have ordered from Marconis wireless stations for use in connection with the Cape-Cairo air route. This doesn't look like decay and disintegration of the Empire, does it?

### Cutting Cables.

A MILD sensation in the telegraphic world was created by the news that one of the transatlantic cables was found to have been sawn in two; doubtless the work of some "bucko" mate of a tramp steamer, thinking it was a relic of the war.

I was told, however, that the cable which connected the transatlantic telephony station in Buenos Aires with the box of the announcer of the proceedings of the opening of the British Empire Trade Exhibition was found, just before the ceremony, to have been cut through with a pair of pliers So you nearly missed hearing the Prince of Wales because of the action of some skunk or skunks unknown.

### Further Note for "Seven Fans."

THE seven valued fans wanted elementary instruction. Now, here I have a nice note from F. W. R. (Holborn, W.C.), who says, in effect, that eighteen months ago he knew no more about radio than an ant-eater knows of elephant-steaks. Then a friend suggested that he should follow the light and leading of "P.W." Now he writes to acknowledge his appreciation of all that he has gleaned from our pages. What we can do for one we can do for seven or seventy times seven. Thanks, F. W. R.! "Seven Fans," kindly read, mark, learn, inwardly digest and copy.

### Echo Answers—"Probably Not."

A. B. T. (Toro, Uganda) relates how, while he was listening on 15 metres, he heard a station sending fast Morse and what he thought was another station "jamming" it. Further observation led him to believe that he was hearing an "echo," the echo occurring at intervals of from ½ sec. to 1½ secs. I am afraid that he really heard a station sending "words twice," as had there been an echo it would have muddled-up the original signal. Thanks for your letter, A. B. T. Your query about the station you hear on 45 metres is unanswerable. There are so many languages to choose from besides those you mention. Perhaps Fred Easter will drop you a line if he sees this. (Mr. A. B. Trewin.)

### Another Point of View.

SOMEONE writing to a daily newspaper says, "Thanks to Mr. —— for his article on Sir John Reith. Now we know what is wrong with the B.B.C." In case this mistaken idea is contagious, I am going to say plainly. that the chief of the B.B.C. must be a sound business man first, foremost and all the time—and that is exactly what Sir John is. I hope the news will comfort all those who fear for the way in which their ten shillings are being administered. If Sir John has his pet ideas about Sundays, etc., you must take him as he is, that's all; we certainly cannot entrust broadcasting to a man without high principles.

## SHORT WAVES.

**Brown: Hullo Smith! What luck to find you in. Quick! I've booked a table at the "Blitz" where I want you to meet two magnificent girls. I've got four front stalls for "Not So Green," and then we're all going on to "Chez Fifi" for a supper dance. It won't cost you a bean, because I've had a fortune left me!**

**Smith: I'm awfully sorry, old man. Another time, perhaps. You see, there's rather a decent programme on the wireless to-night.—"Humorist."**

* * *

**TOO MANY.**

**"Broadcasters take liberties with the ether." It is time listeners used a little!—"Pictorial Weekly."**

* * *

**TRUE TO FORM.**

**The railway porter who bought a wireless set and couldn't separate the stations—"Sunday Pictorial."**

* * *

**"My receiver seems to work just as well without the earth as with it," writes a correspondent.**

**And does he get heavenly programmes too, we wonder?**

* * *

**GOOD FOR WHAT AILS YOU.**

**Would you know the time of day?**
**Dial in.**
**Like to hear some music play?**
**Dial in.**
**Is it market news you crave,**
**Or the newest way to shave?**
**How to make the kids behave?**
**Dial in.**

**For historical romance**
**Dial in.**
**For fox-trots for your dance,**
**Dial in.**
**For health and beauty dope,**
**For proper use of soap,**
**For messages of hope—**
**Dial in.**

**—"Radio Digest."**

### Micro-Rays.

THIS is the name which is being applied to the waves of lengths ranging from 10 centimetres to 1 metre with which the International Telephone and Telegraph Corporation is experimenting, though why "micro" I do not understand. Attempts have been made recently to use these short waves in radio communication, and I understand that the results are encouraging. We could do with some new bands of frequencies, and it is to be hoped that the formidable difficulties which confront engineers who seek to use for telegraphy or telephony such kittle-cattle as ultra-short waves will soon be vanquished.

### Joy to Come.

PEACEFUL penetration—a phrase which falls on the ear with a queer pre-war ring—is coming, I fear, across the North Sea in no uncertain manner and in the most peaceful guise. By the end of the month Königswusterhausen is expected to be endowed with an extra 5 kw. Langenberg, with a mere 75 kw., will begin to boom in a few months. A high-power station is to be built for Breslau, and Frankfurt is to be promoted to 25 kw. All of which will give you more value for your half-sovereign, and a bit over.

### Down at Chippenham.

THE other day, feeling a trifle stale, I took advantage of an invitation and buzzed down to Chippenham for a day's sight-seeing, the subject being the Westinghouse Brake and Saxby Signal Company's factory. I had a first-class time, wandering about like a boy at a fair—the proper way to see a modern factory in full swing. The machines are wonderful, and do almost anything except train sea-lions.

### A New Rectifier.

GREAT activity was being manifested in the making of the well-known Westinghouse metal rectifier which, as you may know, has a high efficiency, low voltage drop, and does not deteriorate with normal use. A new type has been produced, having an output of 100 m/a. at 200 volts or 60 m/a. at 300 volts. Home constructors should look for these at the next radio show. Well, to jog along, I saw all sorts of most interesting demonstrations connected with railway traffic control and brakes. Everybody was delightfully informative and helpful, and I came away feeling much more optimistic about Britain and her place in the world's trade.

### A Good Getaway.

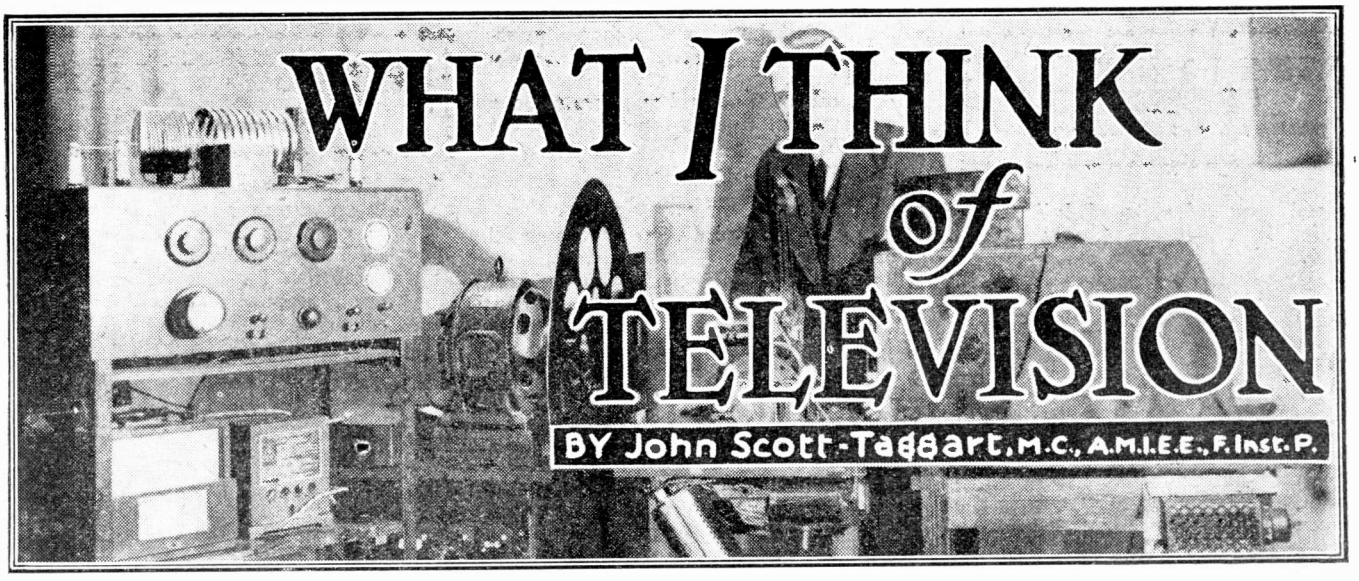
A STRANGE case was reported in the press not long ago, so strange, in fact, that I should like to call further attention. A Tottenham lady was summoned for not having a radio licence. She had been using a three-valver for two years and said that until the inspector called she did not know that a licence was necessary—a statement on which I do not propose to comment.

But the strange thing is that *the case was dismissed*, and, in addition, a P.O. official said that the back fees could not be recovered. The lady ought to have been fined enough to pay all the fees which she ought to have paid from the beginning.

### The Dream that Failed.

A. E. G. (Plymouth) begins his letter with, "Ariel. Ariel, wherefore art thou Ariel?" The answer is, "Just my luck! I should have liked to be Drake or Columbus' cabin-boy." He goes on to describe a dream in language reminiscent of Revelation, which dream was mighty complimentary to "P.W." It seems, however, that the sons of the earth bowed down and bumped their nobs on the earth, saying, "Give us a 'Cometised' 'Magic' Four." Now, isn't that just too bad? Because, you see, a "Cometised" "Magic" Four is only a pipe-dream, A. E. G. So sorry! Dream again!

**ARIEL.**



# WHAT I THINK of TELEVISION

BY John Scott-Taggart, M.C., A.M.I.E.E., F.Inst.P.

**Before giving his final and considered opinions regarding the future prospects of television, Mr. Scott-Taggart is going to explain the essential principles of the subject. And in the following contribution to this exclusive "P.W." series he commences to outline the subject in his usual very lucid and very readable manner.**

**3. HOW TELEVISION WORKS.**

AT first sight the technique of television appears very difficult to understand. It can, however, be very simply explained, and I intend to assume—which is probably entirely wrong—that you know nothing about it.

First of all, don't imagine that television is something very new. Its practical technical development is certainly a matter of a few years, but the basic ideas are as old as the hills; and, curiously enough, the present-day technical progress in most television systems is merely an elaboration in detail of ideas dating from 1880.

### Very Little Inventing.

There has been singularly little inventing done of an outstanding character, and most of that has been cribbed from photo-telegraphy. One reason is that television involves so many different applications of physics.

And whenever inventing becomes very troublesome it drifts into the hands of a few keen men like Baird or big corporations like the Bell Telephone Laboratories.

In the case of picture transmission which preceded television, we saw the same sort of thing—voices crying in the wilderness, and then important companies taking it up as a commercial proposition. By that time the early inventors were probably dead.

In earlier days inventors made a point of dying in great poverty, and posterity reaped the harvest. Modern company flotation methods have changed all that. The inventor now makes a fortune before the children of his brain are out of their swaddling clothes. Which is the right time, because so many go straight from their swaddling clothes into their winding sheets.

### "Sending" and "Seeing."

In nearly all the text-books on television there is a big distinction drawn between "sending" a photograph of a person along a wire and "seeing" that person along a wire by television.

I am afraid that, in spite of trying very hard, I have failed to appreciate any very great gap between the two operations.

When we see a picture on the television receiver screen we are getting an illusion—the finished product of a complicated chain of electrical, optical and mechanical processes both at the receiver and transmitter.

We are certainly not taking an ordinary photograph of the person and then sending a photo of that person along the wire or by radio. That would take time; but we are really doing the same thing, only almost instantaneously.

### Practically the Same.

And if we see the person by television actually move, this is pretty much the same thing as taking a cinematograph picture of the person moving and then sending those pictures by television.

Of course, you may say that in one case we're sending a "dead" picture (or "canned" picture), and in the other a "live" picture. But this strikes me as essentially a matter of time and attitude of mind. If you weren't told, you wouldn't know that a cinematograph film of a boxing match sent by television a few minutes later was any different from "seeing."

The film would be just a little later than the direct "seeing." If you could speed up the developing of the film enormously, the two systems would become indistinguishable. The various processes in television are not unlike an enormously speeded-up form of telegraphed photography.

### The "Time-Lag" Question.

An interesting example of the relative nature of "time-lag" is in ordinary direct vision. When you look at another person it takes a small fraction of a second for the sight of them to reach you.

If you were on a distant star and you were able, by a miraculous telescope, to see a man shooting himself in London, at the moment you saw him raise the revolver to his temple he would actually have been dead perhaps five hundred years!

This, of course, is because it took five hundred years for light to travel the enormous distance between earth and the star. Televisionaries (my suggested name for television enthusiasts who are thinking of running before they can stand steadily) loathe any comparisons between photo-telegraphy and television because they think television ceases to appear quite so wonderful.

As a keen proponent of television (but not one who is blind to present defects and future difficulties) I find such comparisons helpful in many ways.

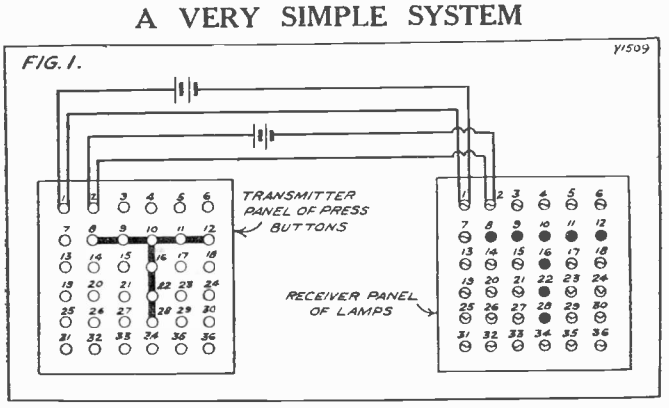
### Interesting Experiment.

Let us consider the sending, first of all, of a letter such as T along a wire or wires so that it will be visible as a T at the other end. Let us pretend we have never heard of any method of doing this before. A way which seems obvious is as follows:

We arrange a square board which consists entirely of

(*Continued on next page*)

## A VERY SIMPLE SYSTEM




**With this elementary apparatus, which the author describes in detail in the accompanying article, very crude pictures can be transmitted from one point to another.**

## WHAT I THINK OF TELEVISION

(Continued from previous page.)

rows and rows of sorts of bell pushes (see Fig. 1) which are simply electric switches. We now have a second board, which may be in the next room or a hundred miles away.

That is the receiving apparatus, and it consists of lots of little electric lamps similar to those used in flash-lamps. There are thirty-six lamps just as there are thirty-six press-button switches at the sending end.

### Sending Letters.

Each press-button switch in the transmitter has two wires connecting it to the corresponding lamp in the receiver, a battery being inserted in each circuit. If button No. 1 is pressed, lamp No. 1 will light up. If press-button No. 2 is pressed down, lamp No. 2 will light up, and so on.

Now, if the letter T is to be transmitted, the man at the transmitter board will select any convenient set of press-buttons which form a T. For example, 8, 9, 10, 11, 12, 16, 22, 28. These buttons have been joined by a black line to make them stand out. If these were all pressed down at the same time by the man using the fingers of both hands, the corresponding lamps 8, 9, 10, 11, 12, 16, 22, 28 in the receiver would light up at once and show the letter T.

We have, therefore, transmitted the letter T. We could send a recognisable S by pressing buttons 11, 4, 9, 15, 22, 28, 33, 26. The letter E could be sent by 9, 10, 11, 12, 15, 21, 22, 23, 27, 33, 34, 35, 36. And so on.

### A "Face" Transmitted.

But we could go further and send very simple pictures. For example, a very simple face could be sent by 3, 4, 5, 12, 18, 24, 28, 34, 27, 26, 32, 19, 13, 7, 9, 11, 16, 20, 21, 22, 23. I should not care to have a face like that, but if you had enough press-buttons and lamps you could transmit quite good pictures.

Now, there are several ways we can use this apparatus for sending pictures, and the principles have been used in different modern television systems.

### Building Up the Picture.

We can get a human operator to press all the buttons at once. This, of course, is not automatic. It needs the human brain of the operator. An alternative is to make a stencil of the letter or picture to be transmitted.

For example, we could cut out the letter T in wood and press it on the transmitting board. The press-buttons under the T would be pressed down and a letter T would appear in lights at the receiving end.

Another way of using the apparatus is as follows. Instead of the press-buttons being like bell-pushes which only work while pressed down, we could substitute press-buttons which, once depressed, *stay* down, with the result that the corresponding lamps at the receiver remain lighted. Now we may send the letter T in stages. We press down 8 first, then 9, then 10, and so on.

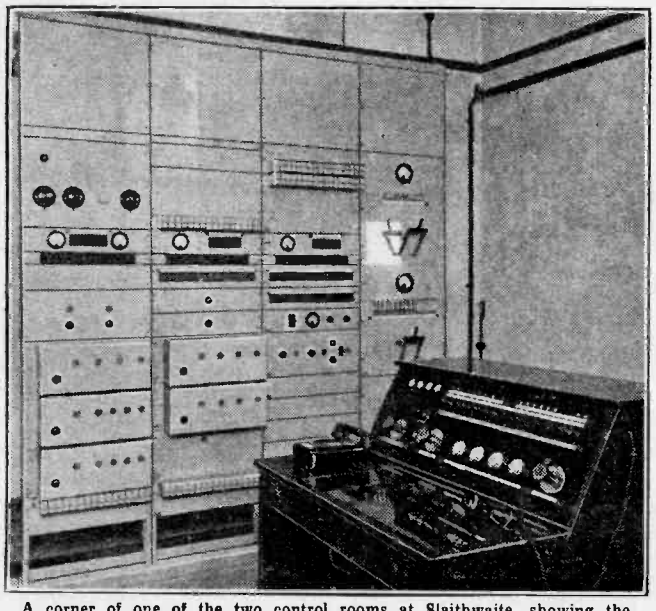
At the receiver the letter T is built up gradually as lamp 8 lights up, then lamp 9, then 10, and so on. This gradual process may be called "integrating" the picture, i.e. building it up. The person at the receiver does not know what is coming till the letter is finished or nearly finished.

### Persistence of Vision.

But if the process were very rapidly carried out the completed letter T would be there before the person at the receiver could think about it.

The third method of sending the letter T, which is most like modern television technique, is to use the ordinary bell-push type press-buttons, and to press the buttons 8, 9, 10, etc., in very rapid succession. Each lamp only stops on while its corresponding press-button is pressed, but the letter T is flashed momentarily to the receiver because the human eye "remembers" all the individual flashes and, if they follow rapidly, builds up a letter T, which then disappears.

## CONTROLS FOR THE NORTH



A corner of one of the two control rooms at Slaithwaite, showing the apparatus rack and the control desk.



## THE NEW VALVES

By K. D. ROGERS

A FEW weeks ago two completely new ranges of valves made their appearance on the British market. The Electrical Trades Association, Ltd., of Aldwych House, have brought out the Eta valves, seventeen different types of which are so far available.

With keen appreciation of the requirements of the average set owner and home constructor, a very useful method of classification has been adopted. It is a more or less obvious system, and one which was put forward by the writer some time ago.

The method is simplicity itself, and merely consists in giving the valve a letter group denoting whatever the makers like, and then figures following to provide at a glance the two main characteristics amplification factor and impedance.

### Logical Classification.

The latter, being in thousands of ohms, can be denoted to the nearest thousand by two figures, while the former does not exceed two figures except in the case of screened-grid valves. Therefore all valves except the S.G.'s can be designated in the following manner:

A valve having an amplification of 20 and an impedance of 10,000 ohms becomes a 2010, and in the battery class (which consists solely of 2-volters) the Eta valve having these characteristics goes under the classification of B.Y. (battery ?) 2010. The L.F. power valve is B.W.1304 (amplification factor 13 and impedance 4,000 ohms). Simple, isn't it?

The range of valves covers a screened-grid and two H.F.'s, detector, L.F., and power and super-power types in the 2-volt class. In addition, there are indirectly-heated valves for A.C. work, and a few directly-heated A.C. valves. Finally, we have a 350-volt full-wave rectifier.

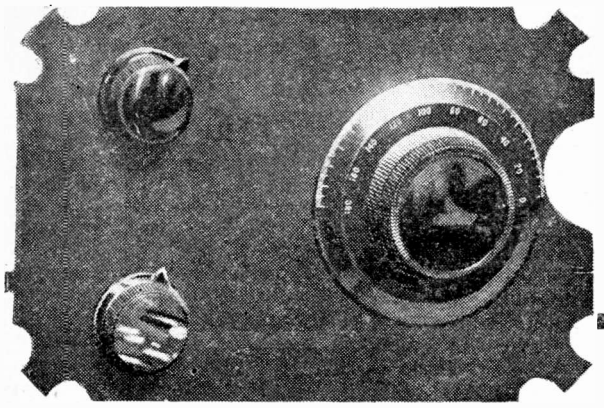
On test all these valves acquitted themselves very well, and we can recommend them with confidence to the notice of our readers. The screened-grid valve is a particularly outstanding member of the 2-volt family, as also is the B.Y.1304, which, as you see from the figures, has a mutual conductance of over 3.

All the 2-volters take 150 volts maximum anode voltage, and the filament current varies between ·12 and ·32, according to the type of valve.

### The A.C. Valves.

The A.C. valves have rather peculiar filament currents in the cases of the directly-heated type. Two of these are quite suitable for operation off 4-volt accumulators, for they consume 0·15 and 0·23 ampere respectively. The remaining "direct" valve takes 1·05 ampere, however.

No pentodes are yet available, and so far there is no sign of 4- or 6-volters, though we must say that these two latter voltages would be unnecessary. The modern 2-volter is so efficient that it is difficult to see why the 4- and 6-volt valves are still retained. Let us hope that Eta will lead the way in the valve world in this respect, and limit themselves to the most valuable types—2-volters and A.C.



# SIMPLIFIED RADIO

**More about the entirely new tuning method that is going to have a very striking effect on the future of radio-set design.**

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

THIS week I am going to tell you something about the practical applications of the "Extenser." It can, of course, be used in any set, from the simplest crystal receiver to the most intricate multi-valver.

And, by its very nature, it is obvious that the bigger the set the more advantageously can the Extenser be used.

One Extenser replaces one ordinary variable condenser and the wave-change switch figuring in the circuit in which it is used. Extensers can be ganged just as easily as variable condensers.

The simplification in set construction is most marked. There is only the one component to fix on the panel and to wire up instead of two.

### Immensely Important!

Increased efficiency is likely to follow because the wave-changer is situated on the end of the Extenser and just where, for economy and efficiency in wiring, it requires to be. Leads do not have to be run from the dual-range coil or coils over to some point on the panel where a wave-change switch is located.

Valuable though this is where simple single-tuned circuit outfits are concerned, it is an immensely important point in the case of sets using one or more H.F. stages with their associated H.F. circuits. Using Extensers such complications as a team of wave-change switches dotted along the set's panel, or intricate mechanical switch-ganging devices, are entirely unnecessary.

In regard to the operation of a set using an Extenser (or Extensers) we find quite a gold mine of virtues. First of all, a panel control is wiped right out. Instead of having, say, an on-off switch and a wave-change-switch, you have only the former and there is no confusion between two similar items.

You can't accidentally change the wave-range instead of operating the on-off, and so leave the set with its batteries running down for long periods, as has quite often happened!

### Exit Two Phases!

Admitted, there are sets having combined on-off wave-change switches, but I do not think the idea is a particularly good one. There is still the danger of doing what I have referred to in the above paragraph. Anyway, I fancy the ideal is "one thing, one job" on a set's panel. To combine two jobs in one knob is surely to create difficulties for the inexperienced listener.

Perhaps you think that the Extenser is a good example of one thing that does two jobs. But it isn't really, you know. The task of the Extenser is merely that of station selection. You don't have to think of its automatic wave-changing.

If you were handing over an Extenser set to a new listener you would not need to mention wave-changing at all. You'd point out that merely by rotating the Extenser dial he tunes in the stations he wants to listen to.

You might casually mention that unlike a variable condenser the Extenser embraces both medium and long waves. In the future, when all sets are fitted with Extensers the term "medium and long waves" as indicative of two separate groupings of broadcasting stations will cease to have any real meaning to the ordinary listener.

He will be told that his set covers, say, 200 to 2,000 metres, and that all stations coming within that range are available by rotating the one station-selecting dial.

And with the Extenser there aren't two sets of wave-lengths applicable to the one set of dial readings, 30 standing, for instance, for both London National and Motala. No, the Extenser dial carries two progressive sets of markings running from zero to 99 in the one direction and zero to 200 in the other.

These dial readings assume a vital significance, too, if you want to look closer at them than you usually do at our present illogical condenser dials, for the two-figure numbers (0–99) stand for the medium-wave stations which are all three-figured (261, 525, etc.), and the three-figure numbers (0–200) indicate that you are sweeping through the long waves (which are all four-figured, 1885, 1551, etc.). Thus, as your dial readings glide from tens to hundreds, so do you jump from hundreds to thousands in wave-lengths. I do not claim that this is one of the Extenser's greatest advantages, but it is well worth mentioning as being indicative of the mass of incidental virtues it seems to have.

### All Very Simple!

In operating an Extenser you turn the dial from zero in a clock-wise direction to tune up the medium waves, and thus follow the usual plan. But to tune in the long-wave stations, you turn from zero in an anti-clockwise direction and this again seems a logical sort of process.

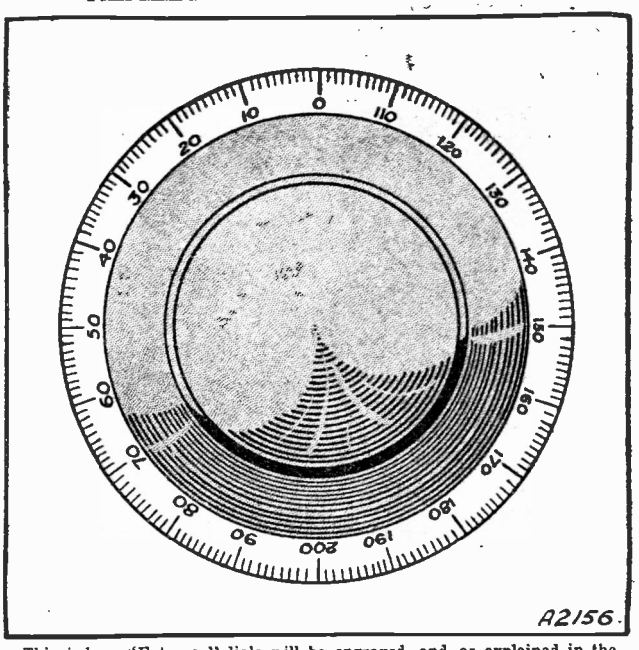
With a drum-drive, all the above applies except that you must imagine that the dial has been turned edgewise—which, actually, is what really happens.

The calibration of an Extenser set is of fundamental simplicity. The one curve showing dial readings running from 0–200 plotted against the one set of wave-lengths 200–2,000 metres is all that is required. There cannot possibly be any confusion. Whatever the station the listener wants to tune in, whether it is a medium- or long-waver, there is only the one number on the Extenser dial that applies to it.

Now imagine the simplicity of the directions necessary for a maiden aunt about her new set!

Although "I says it as shouldn't," I fancy the Extenser is going to have a mighty big effect on all aspects of the technique of radio set design in the future.

## REALLY READABLE READINGS




**This is how "Extenser" dials will be engraved, and, as explained in the accompanying article, the figures will convey a definite meaning and not be purely arbitrary.**

# RADIO FACTS AND FIGURES.

**Some interesting comparisons.**
**By THE EDITOR.**

FIGURES supplied by the G.P.O. throw interesting light on the distribution of broadcasting licences, and the "Wireless Trader" has prepared a valuable analysis which serves to illustrate some interesting facts.

For example, it is shown that in the London area the largest number of licences, 116,706, were issued in the South-Eastern postal district. The Eastern district follows with 109,049 and the Northern district next with 100,816.

### London Leads?

Then comes Paddington 68,047, Battersea 66,979, North-Western district 65,352, South-Western district 50,700, Western 6,989, West Central 5,896, and East Central 4,973.

The figures for towns and cities other than London can best be noted from the following table:

| | |
|---|---|
| Birmingham | 99,221 |
| Manchester | 94,517 |
| Liverpool | 82,672 |
| Glasgow | 60,904 |
| Sheffield | 46,199 |
| Leeds | 44,693 |
| Newcastle | 43,860 |
| Bristol | 43,535 |
| Nottingham | 42,454 |
| Leicester | 37,574 |
| Edinburgh | 33,987 |
| Bradford | 32,981 |
| Hull | 30,430 |
| Cardiff | 28,119 |

Towns where more than 20,000 licences are in force include: Stoke-on-Trent, 25,034; Portsmouth, 23,015; Brighton, 22,601; Belfast, 22,329; Plymouth, 22,298; Southend, 20,641; and Coventry, 20,356.

Analysis also shows the comparative figures between the number of homes in certain districts and the number of licences issued. Comparison between the two sets of figures results as follows:

| | Homes | Licences |
|---|---|---|
| London | 1,410,000 | 595,507 |
| Middlesex | 278,000 | 57,853 |
| Lancashire | 1,094,000 | 357,314 |
| Yorkshire | 930,000 | 295,514 |
| Durham | 328,000 | 41,087 |
| Essex | 326,000 | 102,591 |
| Warwickshire | 308,000 | 145,323 |
| Staffordshire | 300,000 | 76,682 |
| Glamorgan | 277,000 | 68,982 |
| Kent | 254,000 | 117,846 |
| Cheshire | 228,000 | 52,705 |
| Surrey | 206,000 | 121,114 |
| Hampshire | 202,000 | 86,606 |

The above figures show how great is the difference in the degree of popularity in different districts; incidentally the radio trade should find them very valuable, for the figures help to show where intensive radio propaganda and selling campaigns are obviously needed.

### Where are those Pirates?

Radio is certainly a "boomer!" Nothing seems to affect its onward progress—not even "hard times." And the Radio Industry in particular has done extremely well, and will obviously do even better in the future. Consider this:

In December, 1922, there were only 35,774 wireless licences in force, but to-day the number is very nearly 3,600,000. From 1923 to 1926 the increase was at the rate of more than half a million per annum.

During the next three years the increase fell to about half that rate, but last year the increase over 1929 was 445,127, and as during January and February of the present year 178,000 additional licences were issued it is generally considered that the total for 1931 will be well over 4,000,000.

The "Wireless Trader" estimates the value of the Radio trade to-day at about £20,000,000. We should be inclined to put the figure even higher. Recently published figures also show that there are now nearly three million homes in this country which have an electrical supply, and the number is steadily increasing. The number of mains-operated sets now in use is approximately 1,500,000, and an increase of at least 250,000 of this type of receiver is estimated for the current year—perhaps a great deal more if electrical power developments are speeded up.

### "Portables" very popular.

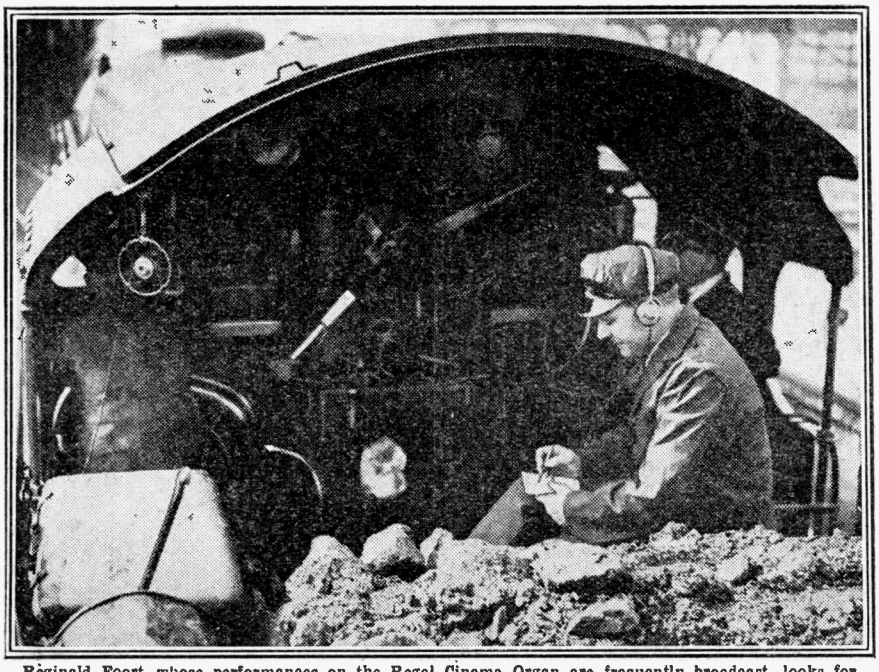
The total production of complete sets during 1930 is calculated at a little under 650,000. This total embraces 61,200 four-valve portables and 102,500 five-valve portables. Electrically-operated sets include 65,000 of two valves, 99,600 of three valves and 34,400 of four valves.

Coming to battery-operated sets, exclusive of portables, the "Wireless Trader" analysis shows 89,700 of two valves, 140,200 of three valves and 47,500 of four valves. A liberal addition to the gross total must be made for battery sets employing five or more valves and also for radio-gramophones.

And, finally, compare the prices of sets of a few years ago with the prices of to-day. The average price of a three-valve set in 1923 was £20. By 1930 this had fallen to £4 10s. A mains-driven set which in 1927 cost £30 can now be bought for £20.

Truly, no one can say that Radio is any longer an expensive hobby.

## FOORT TRAVELS ON THE "FOOTPLATE"



Reginald Foort, whose performances on the Regal Cinema Organ are frequently broadcast, looks for "local colour." He recently travelled on the footplate of an express to the West of England making notes of the noises heard via the "mike" and phones you can see in the photo. When next he plays "Chou Chou" during one of his broadcasts you will no doubt hear some very realistic effects!

## DO YOU KNOW?

**Here are some very interesting facts, showing the importance of Radio at sea.**

Automatic alarm apparatus to ring a bell when S.O.S. is received, is now fitted on about 1,200 ships.

* * *

Many ships lifeboats carry wireless apparatus for emergencies, and it is estimated that the number of such radio-equipped lifeboats is now about 500.

* * *

An agreement that all passenger vessels of 5,000 tons or over must be fitted with direction-finding wireless was signed recently by eighteen nations, and is to be enforced on July 1st, 1931.

* * *

There are at present more than 3,000 vessels equipped with wireless direction-finders, this being about over one-fifth of the vessels carrying radio apparatus.

* * *

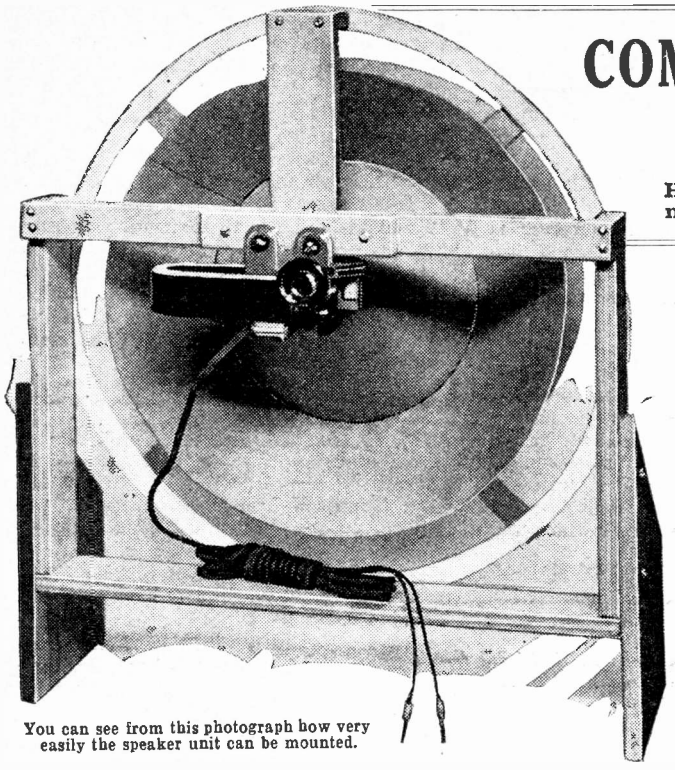
The wireless beacons, or "wireless lighthouse" stations, work on wave-lengths between 950 and 1,050 metres.

* * *

There are to be 20 automatic wireless beacons, round the coast of Great Britain and Ireland, and most of these are now in action.

# COMPLETING THE CABINET "CLEAR-CUT"

**Here are the final diagrams and instructions for the cabinet model of the "P.W." "Clear-Cut" speaker described last week.**



You can see from this photograph how very easily the speaker unit can be mounted.

LAST week we constructed the cones for this Cabinet speaker and left them drying. They ought to be thoroughly dry by now, didn't they? So we will continue the construction, very little of which remains to be done.

With the two cones stuck together we can now tackle the mounting.

This is simple. You make the hole through the main cone and fix the unit on in the usual manner, being careful that the nuts are tightly done up, special conical washers being in position on each side of the cone.

### Fix the Cone on Tightly.

This is essential if you are to be free from rattle and other disturbances that may be generated by careless fixing of the cone on the reed. The position of the cone on the reed can, of course, be adjusted, and this is necessary in order that the back edge of the secondary cone comes directly in line with the cardboard ring.

Remember that the whole success of this loud-speaker depends upon the rigidity of the mounting of the unit and the firmness of the chassis, and at the same time upon the freedom of suspension of the edge of the cone.

This suspension is carried out by means of paper strips fixed at intervals round the edge of the back cone and attached to a cardboard ring supported on the framework of the speaker. This ring is somewhat flexible and so provides a strong but flexible support for the edge of the cone.

### Arranging the Suspension Strips.

The cardboard ring should be about half an inch wide, and to it are stuck strips of Kraft paper of the same width. These are then left for fixing to the back cone round the outer edge of the latter. You will probably have taken the unit off the frame for mounting the cone; it can now be replaced and the position of the cone on the unit spindle adjusted so that the paper strips on the ring come dead in line with the edge of the back cone.

Now carefully stick the two top strips so that the cone is hanging by these in such a position that there is no tension either up or down on the spindle going through the middle of the cone. The two bottom pieces can be stuck, and then the diaphragm should be found to be perfectly central without any strain occurring on the apex of the cone due to the pulling of any paper strip, or the weight of the diaphragm on the spindle of the speaker unit.

Any strain on the spindle of the unit might easily result in most unsatisfactory results, especially if the pull is badly to one side.

Modern speaker units do not have very much gap between the armature and the pole pieces, and such a strain might easily cause the armature to touch one or other of the pole pieces on fairly loud passages.

Adjustment of the loud-speaker unit (where an adjustable unit is employed) is carried out in the usual way by means of the screw at the back of the unit, and before placing the speaker in its cabinet it is advisable to place it on test, so that in the event of your having got something wrong with the construction, this can be remedied while the speaker is still get-at-able.

### Final Adjustments.

There should be no reason why any trouble should be experienced, but you may want to adjust things if you have not got it quite right.

For instance, it is not unknown to find a piece of enamel in the armature gap of the speaker unit, and if this were the case you would find the loud-speaker would not adjust properly, but would continually chatter. This is not a likely thing to happen, but we have had cases brought to our knowledge and it is just as well to be prepared, isn't it?

This completes the construction, and the only thing now is to mount the cone in the cabinet after all the "slack" parts are perfectly hard and set. The cabinet is one supplied by Camco, and suits this loud-speaker admirably.

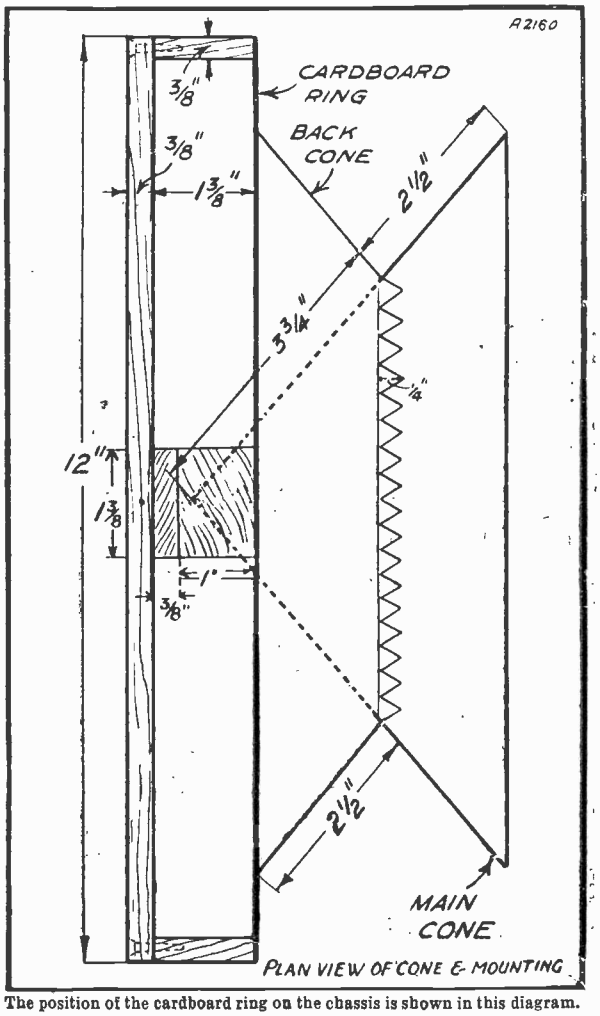
### The Cabinet Acts as Baffle.

The loud-speaker unit and chassis are pushed forward into the cabinet, care being taken that the cone is close up to the board behind the loud-speaker fret, the diameter of which is roughly the same as that of the diaphragm of the loud-speaker. Then the rest of the face of the cabinet is used as a baffle. After screwing the chassis to the cabinet so that it is perfectly rigid, there is nothing else to be done but to use the loud-speaker, obtaining considerable benefit from your labours.

But perhaps we ought to say one or two things about the "Clear-Cut" Cone in

(*Continued on next page.*)

## SUPPORTING THE RING




The position of the cardboard ring on the chassis is shown in this diagram.

# REMOTE TUNING

**Details of an elaborate scheme whereby a set can be adjusted to different stations by "button pressing."**

A NEW system of remote control has been brought out in the United States. By this, the receiver may be completely controlled from a remote point by means of ten differently marked buttons mounted on a small metal box, which is attached to the receiver by means of a flat ribbon cable of twelve small wires. The functions of these push buttons are as follows:

Black, with white dots: Momentary depression turns the receiver on.

Black: Momentary depression turns the receiver off.

Red, with white dot: Depression increases volume until the button is released.

Red: Depression decreases volume until released.

Brown buttons: Each of these buttons corresponds to one of six predetermined stations, any one of which may be tuned in by depressing the corresponding button.

When the receiver is turned on, a green "jewel" in the remote control box is illuminated. When one of the six brown buttons is depressed, this jewel dims in brilliancy, indicating that the receiver is being tuned in. In a few seconds the brilliancy of the jewel becomes normal, indicating that the receiver is now in tune.

### Any Setting Possible.

It is possible to secure stations other than the six pre-determined ones by manipulating two of the buttons, a high wave-length and a low wave-length button, and tuning the receiver by ear. The high wave-length button, of course, will tend to turn the tuning knob of the receiver in one direction, and the low-wave length button in the other.

By properly manipulating these two buttons, it is possible to tune the receiver to any wave-length situated between the two wave-lengths represented by these two buttons.

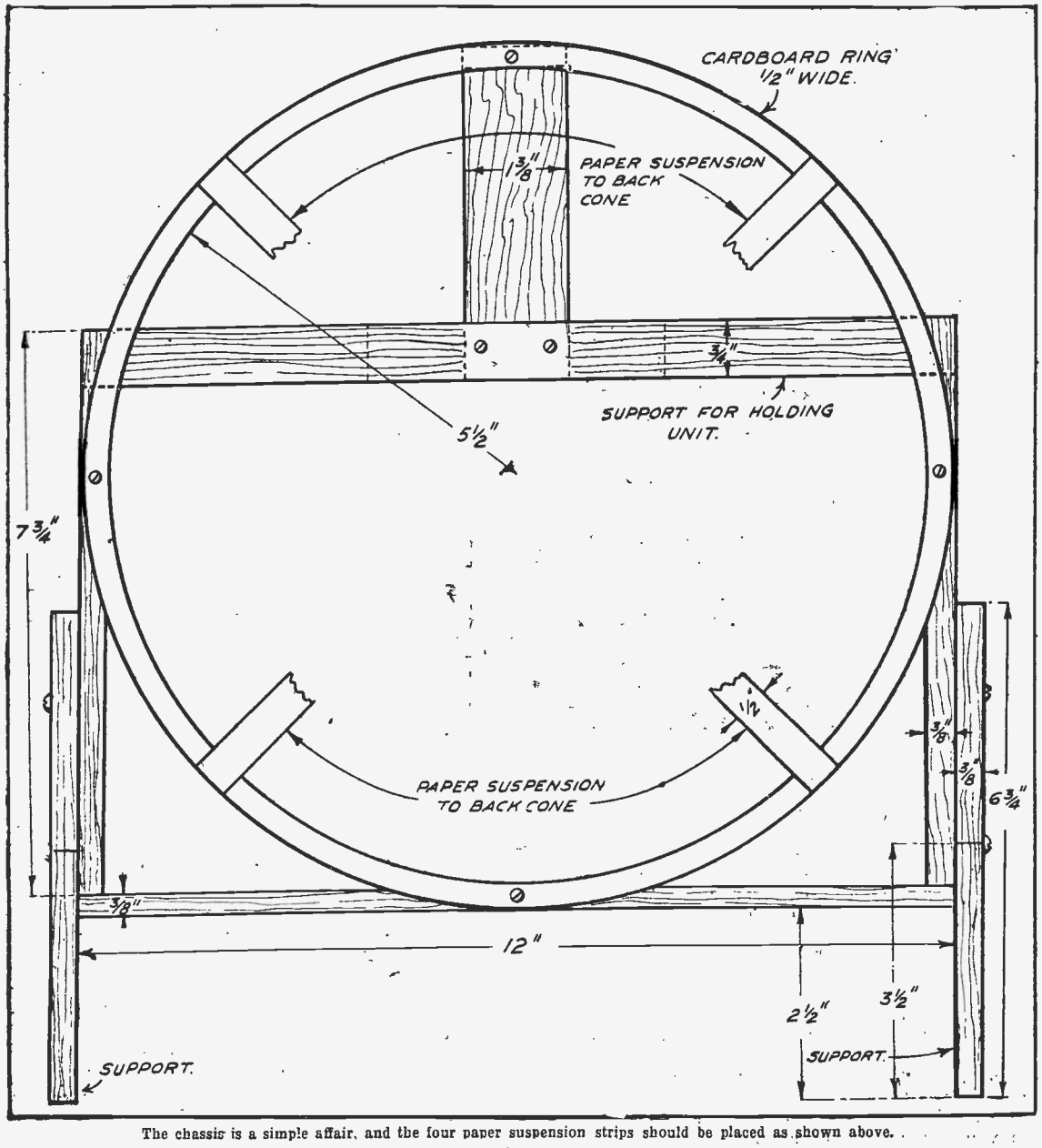
At the receiver, a duplicate set of buttons is provided, which may be used in the same manner as described for the remote buttons. In addition, six metal buttons are provided just below the six tuning buttons.

These metal buttons are employed only when determining which six stations are to be available by means of the remote control. For instance, in any given area the stations which would most likely be chosen for the automatic tuning device would be the most consistent or desirable ones.

# COMPLETING THE CABINET "CLEAR-CUT"

*(Continued from previous page.)*

## RIGID, BUT REMARKABLY SIMPLE




The chassis is a simple affair, and the four paper suspension strips should be placed as shown above.

action. The first concerns the adjustment of the unit.

This should be carefully carried out, as hurried screwing up of the adjusting knob might quite easily result in slight displacement of the armature, and consequent chatter on loud notes. Also be sure to connect the speaker the right way round (+ to L.S.+ on the set) if you have no output filter.

The second point concerns chatter on loud notes. This may be due to the wrong adjustment of the gap between the armature and the pole pieces, but it is just as likely to be due to valve overloading in the set.

### A Sensitive Speaker.

The "Clear-Cut" Cone is so sensitive that even the slightest overloading is enough to spoil the reproduction — a state of affairs not found on many of the less efficient types of cone speakers.

So don't blame the speaker if you get a little "blasting" on strong high notes, it is more likely to be the set at fault than the loud speaker. That is the one "disadvantage" about changing on to a better speaker, it *does* show up the faults in the set.

# CAPT. ECKERSLEY'S QUERY CORNER

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

INSTABILITY ON LONG WAVES—CONTROLLING THE VOLUME—TWO VALVES IN PARALLEL—SOME COLD FACTS.

**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.**

### Instability on Long Waves.

G. H. (Manchester).—"I have just built a set with an S.G. stage, with a screen between the aerial and H.F. coupling coils. The receiver is quite stable on the medium wave-band, but directly I switch over to the long waves, it oscillates and is quite uncontrollable.

"I have been very careful with the wiring and the spacing of all the parts, and I am wondering whether the fact that larger coil windings are used on the long waves is likely to have anything to do with the oscillation trouble. Ought I to use more screening, or would it suffice if I cut down the size of the long-wave coils?"

It is very difficult to say. There is only one royal road to stability and sensitivity in a screened-grid stage and that is *complete* screening.

A partial screen may make matters worse than no screening at all. If the tuning coils are inefficient (i.e. small) the instability is reduced, but sensitivity must suffer in a like manner—why not make good big coils of thick wire and use a complete screen?

You might also try screening the coils complete in a metal cylinder decently far away from the windings. Or remove the partial screen altogether just to try (success *not* guaranteed), or make the long-wave coils smaller and less efficient?

But these latter ideas are merely to cut down sensitivity, to produce stability there is only one real way—complete screening.

### Controlling the Volume.

B. R. S. (Leicester).—"I should like to fit a volume control to my H.F., detector and L.F. receiver, and I find that I have the choice of three methods.

"The first is controlling the voltage to the screening grid of the S.G. valve with the aid of a variable resistance in series. The second is the use of a variable resistance across the primary of the L.F. transformer; and the third, a high resistance potentiometer across the secondary of the L.F. transformer.

"Do you consider that there is anything to choose between these schemes, and if so, which do you think is the best?"

I doubt if you have exhausted all the methods and I think that the methods you cite are not ideal. In the first place, you must realise that to control volume alone is easy, but to control it while keeping the system undisturbed as regards its response performance is difficult.

Thus while you can control the volume of the sound from your loud speaker by controlling pre-detector volume, it is not always advisable to do so. Ideally, whatever the strength of your signal, you should be able to keep the volts of high frequency applied to the detector the same, and then control the volume of the emitted sound in the low frequency circuits.

*Pre-detector volume control should, therefore, be separate from post-detector volume control.*

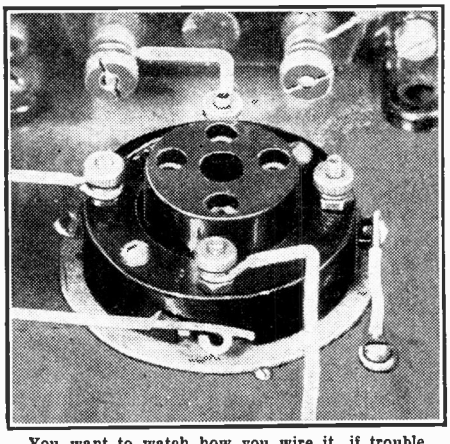
You can obtain a pre-detector volume control by varying screen-grid volts, but it is better to leave the valve conditions alone, otherwise varying its amplifying properties may vary its linearity of response. I think a potentiometer (50–100 thousand ohms) across the tuned circuit is about the best way of controlling the input to the H.F. valve, and hence the input to the detector.

You can judge to some extent how far you are loading the detector by a detector-feed meter. The feed should reduce by about 10 per cent for good conditions.

For low-frequency volume control a potentiometer, arranged as you have suggested, will do. Do not in any case just shunt a transformer by a variable load, you upset the conditions terribly by so doing. A potentiometer is better.

The best volume control is a constant impedance potentiometer arrangement in the loud-speaker lead. This arrangement is the subject of a patent. It has the great advantage of being controllable from one's armchair.

### ONLY A VALVE HOLDER, BUT—



**You want to watch how you wire it, if trouble is to be avoided. If to be mounted on metal, slip an insulator under it, as shown. And make sure that all its nuts are screwed down tightly, and its soldering tags firmly fixed.**

### Two Valves in Parallel.

S. J. (Coventry).—"I recently purchased a new loud-speaker, and find that the output from my set is not adequate. Will I get a very much greater output by using two valves in parallel in the output stage?"

No. The apparent increase of output from two valves in parallel as compared with one by itself is just too disappointing a quantity to be adequately described.

You see if you were lighting a lamp from a battery and it seemed a bit weak, another battery in parallel wouldn't help much if the regulation of the first battery were all right. I should say you are most probably suffering from a lack of volts rather than a lack of power.

Now, two valves in push-pull is a much better scheme and has the other advantages of push-pull itself. Of course, if you are using much too small a valve and are suffering from lack of power then the parallel valve will help. But get another valve and try as parallel and as push-pull.

### Some Cold Facts.

J. P. (Exeter).—"I take it that any accumulation of ice on the aerial insulators of a transmitting station would prevent the station from functioning. I should imagine that, in severe winter weather, it is quite feasible for the aerials to become frozen, and would like to know if any precautions against such eventuality are taken in the design of modern transmitters?"

Certainly the formation of ice on insulators is bad. The formation of ice on the aerials is also bad because the weight to support becomes even a hundred times greater, and the whole of the aerial comes tumbling down if precautions are not taken.

The solution of the problem is to pump kilowatts of low-frequency energy, which does not interfere with, and can be blocked off from, the high frequency, into the aerial, and thus heat it and prevent the formation of ice anywhere.

(Provision has been made for this at the B.B.C.'s new North Regional station.)

LATEST BROADCASTING NEWS.

## THE NEW FOOTBALL "WAR."

### SIR JOHN REITH IN AMERICA —TOWN-PLANNING 700 YEARS AGO—"BAGDAD ON THE SUB-WAY"—"IDLE THOUGHTS" —EMPIRE DAY, Etc.

THE attack by the B.B.C. on the League Management is a very serious and determined affair. Following so close on the altercation with the Canadian Pacific Railway, it seems to reveal a new attitude of confidence at Savoy Hill. Obviously the idea is to make it very difficult, if not impossible, for the League Management to get a hostile policy endorsed at a May meeting.

Meanwhile relations between the B.B.C. and the Football Association are most cordial. If the campaign against the other body succeeds, it may encourage the B.B.C. to the adoption of more aggressive tactics generally.

**Sir John Reith in America.**

A tremendous reception is being prepared for Sir John Reith when he reaches New York on the "Aquitania" in the third week of May. One of his official hosts will be Mr. Owen D. Young. Others will include members of the Federal Administration, and he is almost certain to visit the White House.

American journalism is smacking its lips at the prospect of such an exceptional subject for varied publicity. Sir John's commanding stature, his vivid personality, and his remarkable career, all find favour in the United States, where his friends and admirers are as numerous as on this side of the Atlantic.

**Town-Planning 700 Years Ago.**

On Tuesday, May 5th, at 9.40 p.m., National listeners will hear speeches by the Lord Mayor of Hull and Mr. John Drinkwater on the occasion of a banquet celebrating the 600th anniversary of the granting of a charter to Hull by King Edward III.

It seems that Hull had a charter even before its present one, which it received in 1229 from King Edward I, who changed the name of the port from Ravenspur, as it then was, to Kingston-upon-Hull, and gave it the distinction, which it shares with Winchelsea, of being the only places in England which were definitely built on town-planning lines in the Middle Ages.

**"Bagdad on the Sub-Way."**

John Watt's radio version of New York, entitled "Bagdad on the Sub-Way," which has already been broadcast from London after a successful first performance in Belfast, will be repeated for National and London Regional listeners on Tuesday and Wednesday, May 5th and 6th respectively. The cast will be composed mainly of Americans.

**"Idle Thoughts."**

A new series of talks entitled "Idle Thoughts"—a continuation of Mr. Harold Nicolson's recent commentaries on 'People and Things"—starts on Saturday, May 1st, when Mr. Denis Mackail is the speaker. Lord Ponsonby, Mr. Compton Mackenzie, Mr. Harold Nicolson, and Captain Robert Hartman will also contribute to the series.

**Empire Day.**

The broadcast celebration of Empire Day will be given this year on Saturday afternoon and evening, May 23rd. Arrangements are not yet complete but it is definite that the Prime Minister will participate. There is likely to be a relay of a big patriotic demonstration in Hyde Park during the afternoon.

**Command Performance Broadcast.**

Listeners throughout the country will learn with a good deal of pleasure that the Variety Artists' Benevolent Fund Command Performance, which takes place at the Palladium on Monday evening, May 11th, is to be broadcast from all stations taking the National programme. The various artistes have, of course, not yet been selected, but the relay will be given in two sections, the first between 8.15 and 9 p.m. and the second between 9.40 and 10.40 p.m.

**Mid-Week Religious Broadcast.**

A religious broadcast will be heard on Wednesday, May 13th, when the Centenary Celebration Service of the Congregational Union of England and Wales is relayed from the City Temple, London, as part of the National programme. The service, which begins at 11 a.m. and lasts until noon, will contain addresses by the Rev. Albert Peel and the Rev. J. D. Jones, others taking part being the Rev. Charter Piggott and the Rev. S. M. Berry, Chairman and Secretary, respectively, of the Congregational Union of England and Wales. When a religious service is thus introduced into a week-day National programme there is usually a good deal of reaction among the mass of "lay" listeners.

**The Grand Opera Season.**

Among the notable artistes taking part in the forthcoming season at Covent Garden is Noel Eadie, who will be Queen of Light in Mozart's "Die Zauberflote," and Gilda in Verdi's "Rigoletto," while the list also includes Josephine Wray, Gladys Palmer, Heddle Nash, Gladys Cole, and Mabel Richie,



## 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.**

**"The Jockey."**

I SEE that "The Jockey" is to be brought from Berlin to Savoy Hill. This is not a play, or a successor to Steve Donoghue. It is a German "Night-Place"—a sort of cabaret.

We have had so-called cabaret shows in our programmes before now; but they have been fake. The word has been used as a kind of spice to cover up a re-hash of old songs and old jokes, and old turns by some of our old friends in vaudeville.

The official programme has sometimes added the allure of a poster displaying scantily-clad and high-kicking damsels. Anything more unlike the actual performance could scarcely be imagined! One does not look to the B.B.C. for spicy numbers.

But there is, I suppose, for the untravelled Englishman a certain whiff of "naughtiness" about the word "cabaret"; so he feels he is getting something special under the name, "under the rose," whereas all he gets is an old dish in a new guise: sometimes, indeed the relics of previous dishes warmed up—and not always very warm at that!

**All Very Informal.**

"Cabaret" is a French word. I rather think that the entertainment which goes by that name is a French institution: but I am not sure. Certainly the first cabaret I ever visited, more years ago now than I care to remember, was in Paris.

The word means "a place where one drinks": and, being a diminutive, should

(*Continued on page* 224.)

# —How To Find— Those Foreigners

**Some really practical hints on picking up those distant programmes.**

**By R. W. HALLOWS.**

THERE is a great deal more in the art of finding foreign wireless stations with the receiving set than the mere twiddling of knobs. One of the most instructive ways of spending a wireless half-hour is to put first a beginner and then an old hand to work on the same receiving set, allowing each fifteen minutes and seeing just what number of stations each will bring in at good volume. One needs to be no prophet to foretell that the old hand's score will be certainly double and probably three times that of his rival.

### Taking One's Bearings.

Can we find the secret of the old hand's success? I think we can, particularly if we have an opportunity of watching him work. When he takes on a new set for the first time you will find that the first thing he does is to find his bearings. This is how he does it.

He knows that with most sets the London Regional will come in somewhere about the middle of the dials, usually rather below the 50 mark on a 0-100 dial.

He spins the right-hand dial (we will presume that there are two) to 35 and turns the left-hand one to a slightly lower reading. Keeping the right-hand one still, he moves the other a few divisions up and down.

Then he advances a couple of degrees with the former and repeats his performances with the latter. In a matter of a few seconds he has tuned in the London Regional and he makes a mental note of the dial readings. We will say that these are left 45 and right 50.

### The Next Two Stations.

His next step is to find whichever of the shorter-wave home stations is within range. This will be the London National, Belfast, one of the relays, Aberdeen or possibly Cardiff, according to locality.

Experience has shown him about where these are usually to be found. If, for example, the London National is being sought, he will look for it between 15 and 25.

He goes to work just as before and in a miraculously short time he has found the station. The readings we will say are left 20, and right 25. Next he moves up towards the top end of the scale in search of the North Regional. This he finds at say 70 left and 75 right.

All of this takes much less time to carry out than to describe in writing. A skilled hand would pick up these three stations and note their readings even on an unknown set in thirty seconds or less. Now just think what can be learnt from those three sets of readings which we may tabulate in this way:

| | *Left Condenser* | *Right Condenser* |
|---|---|---|
| London National .. | 20 | 25 |
| London Regional .. | 45 | 50 |
| North Regional .. | 70 | 75 |

In the first place we have three key wave-lengths of 261·3 metres for the London National, 356·3 metres for the London Regional, and 479·2 metres for the North Regional. Secondly, we know that the left-hand condenser lags about five scale divisions behind the right in its readings.

Now we come to a third very important point. The expert realises that he is not dealing with straight-line wave-length condensers. Subtracting 261 from 356 he finds that the twenty-five divisions between 25 and 50 represent on the average rather less than 4 metres per division.

On the other hand, the subtraction of 356 from 479 shows that over the upper half each represents almost 5 metres.

The beginner will probably make a perfectly general search over the wave-band, starting at the lowest condenser scale reading, and working up to 100. The expert gets his three key stations first of all, makes deductions from the readings, and then proceeds to fill in the gaps by using these stations as what we may call stepping stones.

### Further Stepping Stones.

First of all he goes for strong stations always well received, which will act as further stepping stones. Heilsberg is about 15 metres above the London National (15·2 to be exact), so he knows that it will come in about four condenser divisions higher.

His next stepping stone will probably be Turin on 296 metres. This is just over 60 metres below the London Regional, so he will try with a setting about 15 degrees less than that needed for the British station. Next he will probably go for Strasbourg on 345 metres, which he is sure to find about three divisions below the London Regional, since the wave-length difference is 11.

Between the London and North Regionals he will use stations such as Hamburg, Toulouse and Rome as stepping stones; whilst above the North Regional, Milan and possibly Budapest will tell him nearly all that he wants to know.

### Filling in the Gaps.

So far as we have got, the search will have taken the expert, perhaps, five or six minutes out of his allotted quarter of an hour. He now proceeds to fill in, and the stations that he finds it worth trying for will depend naturally a good deal upon the selectivity of the set and the locality in which he is situated.

Heilsberg immediately gives him Bratislava, since the two are on neighbouring wave-lengths. Just below Turin he will look for and almost certainly find Kosice, whilst just above is Hilversum. He will probably take Breslau as a kind of secondary stepping stone in the space between Hilversum and Strasbourg, and once having found the necessary settings he will have no difficulty in filling in Bordeaux Lafayette, Gothenburg, Brussels No. 2 and Brno. With a selective set or at some distance from London he will also find Barcelona and Graz.

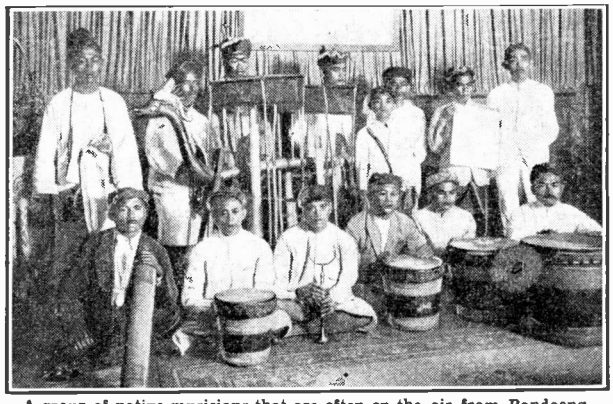
### The Key to Success.

Still working on the same lines he brings in Stuttgart if he is far enough away from London and then, with Hamburg as a stepping stone, Lwow. And so he goes on right up to the top of the scale.

In the nine or ten minutes of his quarter of an hour that remained after his preliminary exploration, the expert would find the great majority of the stations covered provided that they were within the range of the apparatus. It is more than likely that he would have a minute or two to spare which he would devote to trying for the weaker transmissions.

Stepping stones, then, are the key to successful searching. Find your strong stations, for they are easy, and make a note of the settings that each needs. If you have these stepping stones you divide the whole broadcast band into parts, and therefore narrow down your field of search.

## THE BAND OF BANDOENG



**A group of native musicians that are often on the air from Bandoeng, on the short waves.**

## FROM THE TECHNICAL EDITOR'S NOTE BOOK.

# Tested and Found—?

### KONDUCTITE METALLIC PAPER.

GRAMO RADIO AMPLIFIERS, LTD., are selling a most useful material. It is Konductite, a metallic paper for screening in radio sets. It can easily be applied to a baseboard or to behind a panel, or even to pieces of wood shaped for interstage screening. The retail price of a piece measuring 30 in. by 20 in. is 2s. On test we found it excellently conductive even after being folded tightly and subsequently straightened out.

### EXPRESSION OF CONFIDENCE.

Messrs S. G. Heayberd & Co. are in future issuing two-year guarantees with every Heayberd kit or unit that is sold.

### SPA SAFETY AERIAL FUSE.

The Spa safety aerial fuse appears to me to provide a quite adequate protection against lightning. Besides the series aerial fuse there is also an automatic switch, which comes into operation the moment the fuse "blows," and this directly connects the aerial to the earth.

### THE NEW UNDY LOUD SPEAKER.

You will perhaps remember my report concerning the Undy loud-speaker unit. Well, I have now been sent one of the latest types of these, the Super Dynamic 8. A special feature of this new production is that it incorporates an auto transformer with three tappings so that it can be rendered suitable for working with any normal output valve from one of low impedance to one of high impedance.

There is also a switch which can be brought into action when large power is being dealt with, and this enables the loud speaker to stand a high constant anode current and a high anode voltage without receiving injury.

It is certainly an attractive proposition, and the results it gives are distinctly impressive. One is given a striking example of the necessity of matching the output impedance to that of the valve if the greatest undistorted output is to be obtained.

But I would like to suggest that the makers of the Undy unit would be doing the user of the speaker a service if they would indicate roughly what they consider to be (1) valves of low impedance; (2) valves of medium impedance; and (3) valves of high impedance.

The constructor ought to be able to find out the impedance of his output valve, but he could not be blamed for not being able to categorise it as above. If he is left to experiment with the three tappings, he is going to have an unhappy time, for broadcasts are of an unhappily fluctuating character, and the ear is a very blunt "meter." But perhaps the Undy people do supply the information when they send their products out on to the market. In which case I have wasted the space occupied by the preceding couple of paragraphs!

**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.**

### DRYDEX H.T. BATTERIES.

I hear that Exide are reaping a full reward from that courageous enterprise, their entry into the dry battery market. There may be depression, economically and otherwise in this country, but authoritative reports indicate that this is no immediate concern of Drydex.

### NEW TANNOY MAINS UNIT.

Grid bias has hitherto been a nasty little snag where mains apparatus is concerned. To say that an H.T. unit having a trickle-charger incorporated in it makes a set "all electric" is, perhaps, legitimate. But the fact remains G.B. demands a replaceable battery if mains supply is not used for it.

That a G.B. battery is small and lasts long is all the more trying from the designer's point of view; because G.B. from the mains is usually a fairly complicated business, as Dr. Roberts recently pointed out in his Technical Notes.

But Tannoy have patented a method enabling G.B. from the mains to be obtained efficiently and without necessitating costly gear. Moreover, it operates independently of the H.T. in the same unit—a very important advantage this.

The new and ingenious scheme is to be found in the Tannoy G.B.1 Unit, which costs only £4 15s., and replaces both H.T. and G.B. batteries and provides L.T. trickle charging.

I will quote the makers for the detailed description of this excellent unit:

"High tension, low tension, and grid bias are all drawn from the mains at negligible cost, and with a constant efficiency completely absent when using batteries with their attendant troubles and recurring expenditure.

"By an ingenious and prov. patented scheme, the Grid Bias (which hitherto has only been available on much more expensive mains units) is incorporated in this model, quite independent of the H.T. supply. The voltage is constant, there being little likelihood of variations with fluctuations in anode current, as in the case with other forms of grid biasing.

"The L.T. is provided by incorporating in the switching an efficient trickle charging arrangement, whereby a small accumulator (2, 4, or 6 volts) is still retained, but this never requires to be removed from the set, since when the set is switched off the battery is automatically trickle charged at a rate which is never likely to be harmful even if left on indefinitely for long periods.

"The size of the instrument is 8¼ in. long, 5¼ in. wide, and 3¾ in. high.

"The Mains consumption is approx. 3/5 watts or over 300 hours per unit. It is supplied for A.C. mains 200/250 v. at 40/50 cycles, and its outputs are:

"*High Tension.*—1. Max. 150 v. at 15 m/amps., or 120 v. at 20 m/amps. 2. Tapping at 80/90 v. Tapping at 60/70 v.

"*Grid Bias.*—G.B.1, 1½ v. G.B.2, 4½ v. G.B.3, 12 v.

"*Low Tension.*—Trickle Charger, 2 v., 4 v., or 6 v.

"NOTE.—Special intermediate voltage tappings for H.T. and G.B. can be made at 1/- extra per tapping."

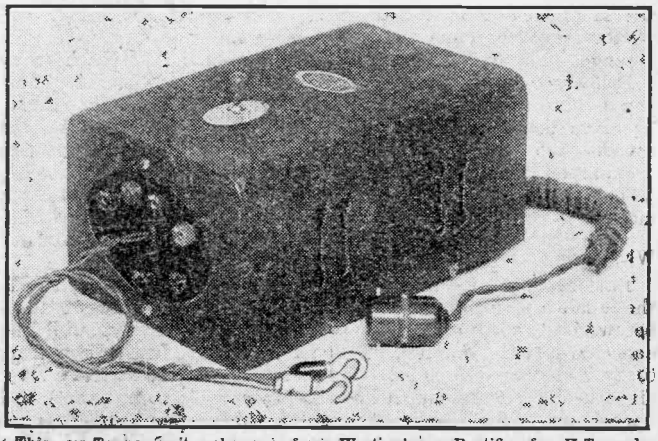
It is a neat little unit and it gives fine results, the outputs being up to the specification and the smoothing excellent. I can thoroughly recommend it to the attention of all "P.W." readers having A.C. mains.

### USEFUL SCREENING DEVICE.

For the type of screen that is generally used in "P.W." sets the Magnascreen, made by Burne-Jones, is excellent. It is of the vertical partition kind, and, being fashioned from heavy gauge aluminium, is wonderfully rigid.

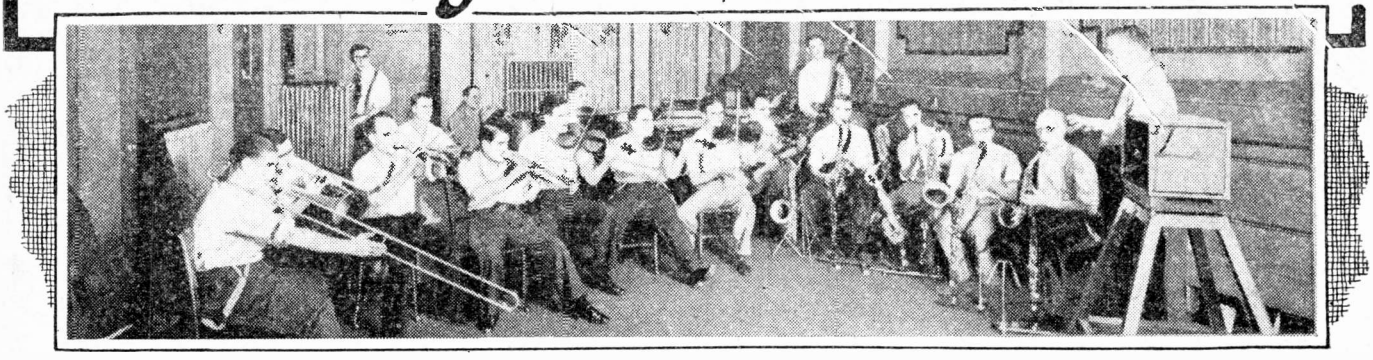
Earthing terminals and fixing screws are provided, and there are slots to facilitate the wiring.

Magnascreens are available in three sizes, 10 in. × 6 in., with three terminals at 2s.; 9 in. × 6 in., with three terminals at 1s. 9d.; and 7 in. × 6 in., with two terminals, at 1s. 6d.



**This new Tannoy unit makes use of one Westinghouse Rectifier for H.T., and, by an ingenious patented method, another for L.T. trickle charging and grid bias.**

# Jack Payne Looks Ahead



**The B.B.C.'s popular dance orchestra conductor tells a special "P.W." representative what he thinks the future holds for radio dance music.**

WE live in an age of advancement and speculation—advancement because the progress of knowledge brooks no denial, and speculation because it is but human to attempt some prophecies on ourselves and our surroundings in the future.

Think of it—thirty years ago, a would-be motorist was compelled to hire a man with a red flag of danger to walk in the road before his juggernaut. But a few years before the war, dancing was considered a social penance rather than a pleasure. And even ten short years ago, there was no such thing as national broadcasting.

### Most Popular Entertainment.

Even during the war years, dancing, then definitely established as a popular pastime, never developed into an art. Dance bands of the period rarely, if ever, produced anything in the nature of real music. Now, little more than twelve years later, we have our properly-called dance orchestras, composed of first-rate musicians who make it their business to produce first-rate rhythmic music.

In such a short time, these changes have occurred. Wireless has come, dancing and dance music have progressed. And wireless and dance music and Jack Payne have combined to progress still further.

For Jack Payne's B.B.C. Dance Orchestra is something more than a first-class dance orchestra. It is a first-class entertainment, and, I would say, easily the most popular radio entertainment.

The B.B.C. Dance Orchestra of to-day is second to none in its ability to play dance rhythm. Furthermore, it has developed an amazing and almost unique technique in the production of novelty numbers. The patter, cross-talk, and comic singing of Jack Payne and certain of his "boys," and the versatility of all the "boys" on their various instruments, represents the most advanced stage of the development of the modern dance orchestra.

### What Will It Be Like?

The inevitable question arises—what will the broadcast dance orchestra of the future be like? What tunes will the broadcast dance musicians of, say, 1951, be playing to us? A fantastic theme and one that gives play to the imagination of every dancer and every wireless listener of this age. I decided to put the questions to the one man who might be able to answer them—Jack Payne.

I was fortunate in finding Mr. Payne in his office at Savoy Hill, and still more fortunate, I think, in obtaining an interview. When Jack Payne is not answering correspondence, he is rehearsing or making gramophone records or broadcasting or arranging programmes. His capacity for work is little short of superhuman.

"What can I tell you?" he asked, switching off a gramophone, and motioning me to a chair.

### "Certainly Come To Stay."

I told him that I should like to hear his ideas on the broadcast dance orchestra of twenty years' time.

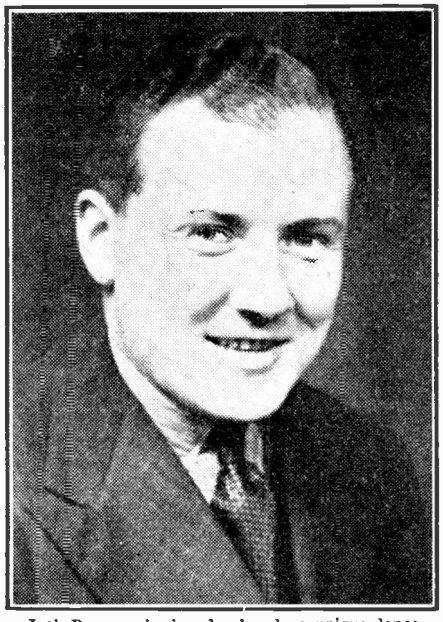
He smiled.

"That's a matter for sheer speculation," he said. "It depends on so much."

"You think the broadcast dance orchestra has really come to stay, and that in the future it may undergo many changes?"

"It has certainly come to stay" said Jack Payne. "Dance music programmes are tremendously popular, and my letter bag, which at one time brought me about twenty or thirty letters each week, now fetches me something like eight hundred a week. And I certainly think the broadcast dance orchestra of the future will differ, possibly in many ways, from the present one.

## UNIQUE TECHNIQUE



Jack Payne, who has developed an unique dance orchestra technique for broadcasting.

### The Immortal Waltz.

"The changes that will occur depend on a great number of things. Popular taste, of course, is the most important, and that is something which is changing all the time, sometimes slowly, sometimes drastically.

"Then again, scientific development may affect the broadcast dance orchestra to a great extent. The microphone of twenty years' time may be vastly different to that we use at the present time."

"Television may have arrived," I suggested.

"Exactly, although I don't think television would affect the issue to any great extent. If the broadcast dance orchestra of the present time were to be satisfactorily televised, I think it would only serve to create additional interest in the individual musicians. There would be a certain fascination to the public in watching the musicians at work. But I fail to see in what way it might affect the actual structure of the dance orchestra.

"No, the most important thing to consider is popular taste. What tunes will the dancers of future years be dancing to? I have heard it said that there will be a reaction towards the jazz music of the war years. I do not believe it. The present dancing and listening public is too well educated in music. I am firmly convinced that in twenty, thirty, or a hundred years' time, the waltz will still be with us.

### Large Orchestras.

"Thinking things out on the most reasonable lines, I foresee there may be a considerably larger broadcast dance orchestra in future years than at the present time. There may be an increase in the number of stringed instruments—violins, harps perhaps, 'cellos, double basses and so on.

"There will, of course, still be the brass instruments—the saxophone and cornet are essential parts of the dance orchestra—

(*Continued on next page.*)

# THOUGHTS WHILE LISTENING

**A collection of questions raised in the mind of F. G. Lidstone after a goodly experience of listening to his local station.**

Where " Perris," the French city often mentioned by B.B.C. announcers, is situated.

* * *

How many radio sets in use really give good reproduction.

* * *

Why an item is announced to follow " in a few moments' time."

* * *

Why there is no musical transmission on Sunday morning.

How old such compositions have to be before they are deemed " respectable."

* * *

Why *six* pips for the time signal.

* * *

How many unsightly aerial masts could not be dispensed with.

**" Little Numbers."**

Why Jack Payne calls all his items " little numbers."

* * *

If his statement, oft repeated, that " Several of these numbers are played by request " is really an apology.

* * *

And if not, why tell us ?

* * *

Why Schubert's Serenade was recently given four times in three days.

* * *

How many wireless sets are worked with insufficient H.T.

Why there are so few pianoforte recitals.

* * *

Why Christopher Stone is not allowed more Gramophone Time.

* * *

How many listeners really wanted to know " When a Blackbird Lays Eggs."

* * *

What will happen when there are no Bach Cantatas left.

* * *

Whether a recent talks title " What do we learn from all this ? " was not the worst yet.

* * *

Who is the announcer at Savoy Hill who talks in a low mumble ?

**Longer Intervals.**

Why the intervals between items are increasing in length.

* * *

Why the Epilogue must be broadcast exactly at the half hour.

* * *

If it is necessary to have sometimes a five-minutes pause in the programme before the time signal.

* * *

Why it is not possible to superimpose this signal on the programme in such instances, if items are likely to run past their allotted time.

* * *

If the cinema organ could not be utilised as a supplier of broadcast entertainment far more than is the case at present.

## MIKE, "MUTES," AND A NOTED COMPOSER

**John Ireland (right) consults Jack Payne regarding the use of " mutes " to tone down trumpets, and trombones, while members of the B.B.C. Dance Orchestra provide a practical demonstration of the effects obtainable.**

If there exists a restaurant orchestra leader who does not like playing on the last half-inch of the E string.

* * *

Why the only historic drama given by the B.B.C. is of the poetic kind, in which everyone speaks in a continuous tremolo like a cinema organ.

* * *

How many listeners would be disappointed if eighty per cent of soprano singers were banned from the ether.

* * *

And what number would be glad.

**Old and New.**

Why a Sunday orchestral programme can include an old-time waltz but not a new one.

* * *

And why the same applies to musical comedy selections.

And if the owners realise the difference in reproduction a good supply makes.

* * *

What the military bands would do without Gilbert and Sullivan.

* * *

And who on earth persuaded one of them recently to blare its way through an arrangement of a Brandenberg Concerto.

* * *

If James Agate really speaks as indistinctly as my set makes him.

* * *

When the " Foundations of Music " will be regarded as strong enough to build on ?

* * *

If Harold Nicolson and A. J. Alan are not the two best microphone personalities outside vaudeville.

* * *

Why repetition on National and Regional is allowed to kill the alternative programme.

# JACK PAYNE LOOKS AHEAD

*(Continued from previous page.)*

but they will probably not increase to the same proportion as the strings. The demand will be for softer, less extravagant tunes, with, of course, a dance rhythm.

" There will be greater scope, however, in the future broadcast dance orchestra for novelty effects. The microphone of twenty years' time will not be the comparatively insensitive instrument we have now ; it will probably be capable of accepting and reproducing more fantastic effects than at the present time. And novelty effects will always be required of the broadcast dance orchestra unless——"

" Unless what ? "

" Unless the public loses its sense of humour, which is not in the least likely.

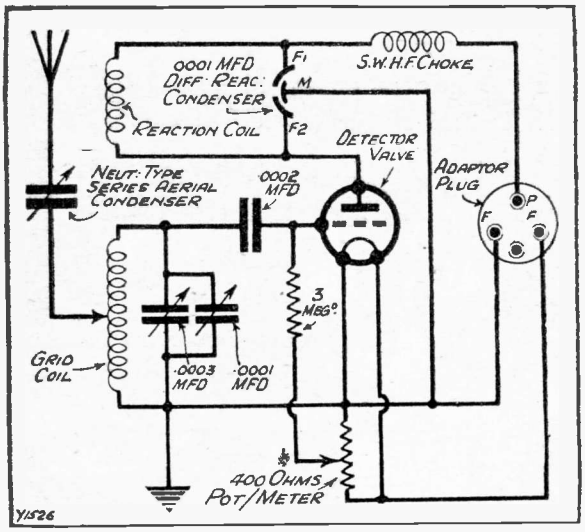
**Weird Instruments.**

" Again, I believe there will be a greater number of nationalised instruments in the years to come, so that the dance orchestra will be capable of producing Russian, Italian, Hungarian, African—in fact, any type of national music quite as well as any orchestra of one of those countries. That will be a most important consideration, for broadcasting is gradually assuming an international rather than a national aspect."

" Of course, there may be weird and as yet unheard of instruments in the broadcast dance orchestra of future years. Who can say ? Nobody can predict anything with certainty——"

So perhaps, after all, it is best to follow the advice of the famous politician, and—Wait and See !

## IT USES YOUR OWN DETECTOR




**Don't be frightened at seeing a valve in the circuit—it's not an extra one, but your own detector promoted to short-wave work!**

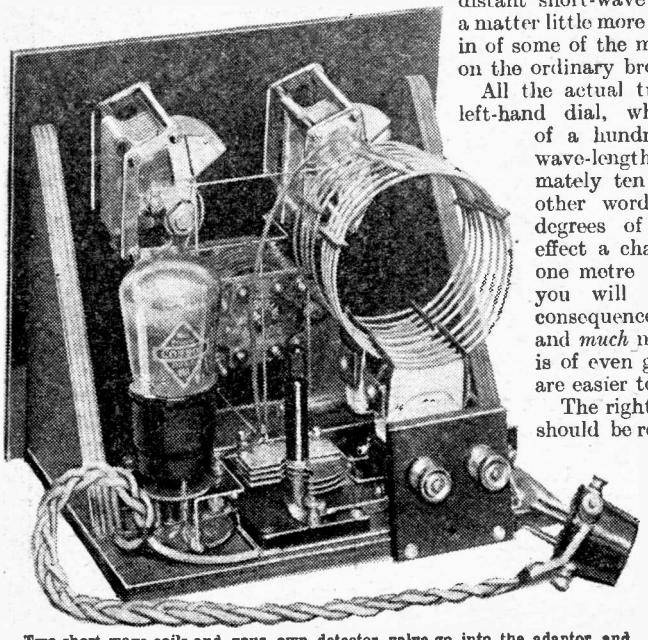
HOW would you like to hear *your* "Comet" receiver "turfing out" the Yanks on the short waves in much the same way as it now puts over pretty well everything that there is worth hearing in Europe on the medium and long waves?

You like the idea?

### America is a "Cert."

Perhaps yours is only a "Comet" Two? It matters not the slightest whether you are using the "Comet" two-, three-, or four-valver (with or without refinements), or even the single-valve version. You can tune in programmes with your "Comet" set from America—and in the case of the three, the four, and possibly the two—from Australia, or Africa! In fact, from every part of the world, and all for an additional expenditure of forty shillings, or even less!

## READY TO ROPE THEM IN



**Two short-wave coils and your own detector valve go into the adaptor, and its plug then goes into the vacant valve holder. Very easy!**

This all sounds very fine, you may think, but what most concerns you no doubt is exactly how it is done. Well, all you have to do is to build the "Comet" Short-Wave Adaptor, the parts for which will cost at the most two pounds.

When you have finished it, you simply take the detector valve out of your present set and place it in the adaptor. You then fix the plug from the adaptor into the detector valve socket of your set, and when you have joined the aerial and earth leads to the adaptor terminals—well, the range of your set has been increased from one to ten thousand or more miles! And all for forty "bob," or at almost twenty miles a penny!

You make absolutely *no* alteration to your existing set in order to hear these distant programmes, and to put the adaptor in or out of use is the work of a few moments. There are no extra battery connections to make, all the necessary "juice" for the adaptor being obtained through the plug which connects it to your set.

Perhaps your mind turns to the difficulties which are normally associated with the operation of a set on the short waves—or, shall we say, more correctly—to the difficulties by comparison with the operation of a set on the ordinary broadcast waves? Let me hasten to assure you that you can forget the word difficulty in so far as the "Comet" Short-Wave Adaptor is concerned.

### Extremely Simple Tuning.

You see, this little unit incorporates the very latest idea in short-wave receiver design, the scheme of using two variable condensers in parallel across the tuning coil, and in consequence the finding of distant short-wave transmissions becomes a matter little more difficult than the tuning-in of some of the more elusive continentals on the ordinary broadcast waves.

All the actual tuning is done with the left-hand dial, which for a movement of a hundred degrees only alters wave-length to the extent of approximately ten to fifteen metres! In other words, a movement of ten degrees of this knob may only effect a change of little more than one metre in wave-length, and, as you will appreciate, stations in consequence become "spread out" and *much* more easy to find. What is of even greater importance, they are easier to tune in.

The right-hand condenser control should be regarded solely as a wave-length adjuster, and—if you desire to take full advantage of the simpler tuning scheme


(Designe

**Had America on your "Comet" yet?—or Nairobi?—or and hundreds more with the aid of this remarkable ad —and gives you all the earth! Read eve**

—it should never be used for actual tuning purposes. You simply advance it ten or twenty degrees at a time, and then for every movement of this dial you rotate the tuning dial (the left-hand one) throughout its range of 100 degrees.

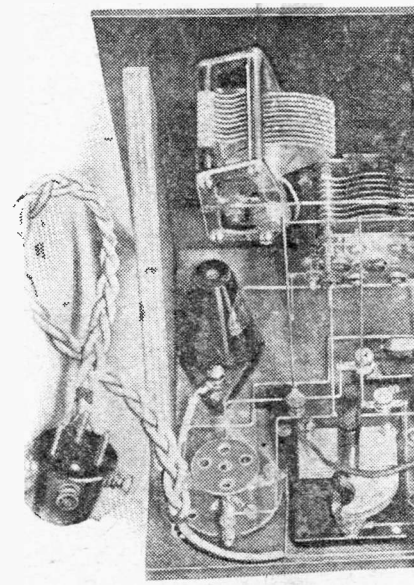
Let me make it a little more clear. Supposing the set with both condensers at minimum (dials set at 0) is tuned to approximately twenty metres. If you rotate the actual tuning control from 0 to 100 (or 180) degrees the set will then be tuning between roughly twenty and thirty metres.

When 100 (or 180) is reached, you move this condenser back to minimum and adjust the wave-length adjuster to *thirty* metres, which may be at 20 to 25 degrees. If you now tune once again with the left-hand control, you will be covering the band between 30 and 40 metres, and so you proceed until the whole range of the set has been explored!

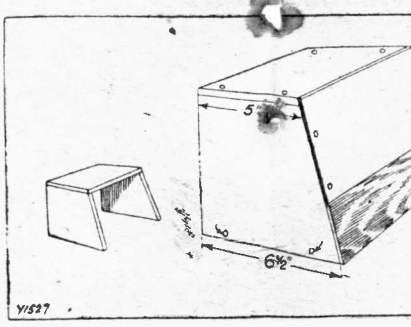
### Inexpensive.

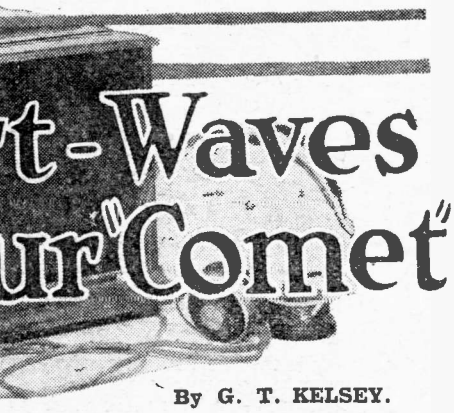
These figures are, of course, only approximate, and will depend upon the coil sizes in use, but at least they will show the general principle—not

## PROGRAMMES OVER THOUSA



**That's what this adaptor can bring in—stations and all for less than £2. Below are the details**





# t-Waves ur "Comet"

By G. T. KELSEY.

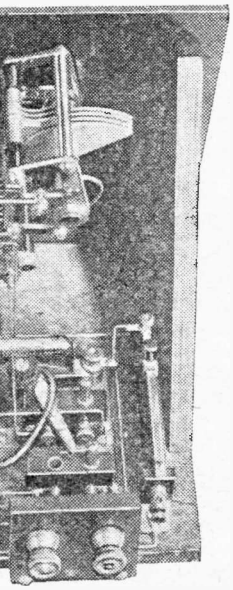
**er of the "P.W." Antipodes Adaptor).**

**Buenos Aires? You can get all these daptor. It costs less than two pounds erything about it below.**

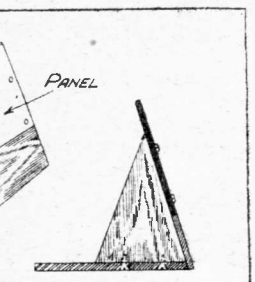
to mention the tremendous advantages—of the two-condenser-tuning idea.

In short, the "Comet" Short-Wave Adaptor is one of the final sparkles in the tail of the remarkable "Comet" series. It is inexpensive, easy to build, and perhaps above all remarkably simple to operate. But the proof of the pudding is not in talking about it!

## ANDS OF MILES!



s thousands of miles away—
s for making the cabinet.




You know what it will do, and how it will do it, so now study the component list, get together the necessary parts, and then set about building one for yourself.

### On Any Set.

Just before telling you how to proceed with the constructional work, let me add that if there *are* any readers who have not tackled one of the "Comet" sets, but who are interested in this adaptor, there is no reason why you, too, should not build one, for although it was primarily designed for "Comet" constructors, it can be used quite successfully in conjunction with any straight two-, three-, or four-valve receiver.

Before you can proceed very far it will be necessary for you to tackle the wood-work part of the business, so we may as well start off straight away with this part of the construction. All the wood, with the exception of the small strip at the front, is cut from $\frac{3}{8}$-in. material, and the dimensions for some of the pieces required can be obtained from the diagram in which the cabinet is shown.

The angle of the two wooden brackets by which the ebonite panel is secured to the baseboard can be obtained from the side pieces of the actual wooden cover. These side pieces are 7 in. high, and slope away on one side from $6\frac{1}{2}$ in. at the bottom to 5 in. at the top.

### Panel Drilling.

The small wooden strip along the front below the panel is cut from three-ply wood, but as it is only there for the sake of appearance, you can, if you like, leave it out altogether providing you increase the depth of the panel accordingly.

When the cabinet and panel assembly is finished, remove the panel, mark out the three holes for the condensers and then drill it in the usual manner. You can then proceed to fix the condensers to the panel, but do not refix the panel to the baseboard supports until all the baseboard components have been fixed and—with the exception of the wires to the tuning and reaction condensers—wired up. This procedure is necessary as otherwise you will have the greatest difficulty in getting at the components which come close to the condensers.

The flexible leads from the adaptor to the plug (which, by the way, can be obtained commercially if you ask for a four-pin valve adaptor, or alternatively can be made from the base of a defunct valve) are made from ordinary flex wire, and should be just sufficiently long to reach comfortably inside the set when the adaptor is standing next to it.

### Testing Out.

There is really nothing else to tell you about the construction. It is all quite straightforward, and if you work from the diagrams you will not be likely to go very far wrong. So now let us pass on to the more interesting task of trying out the unit.

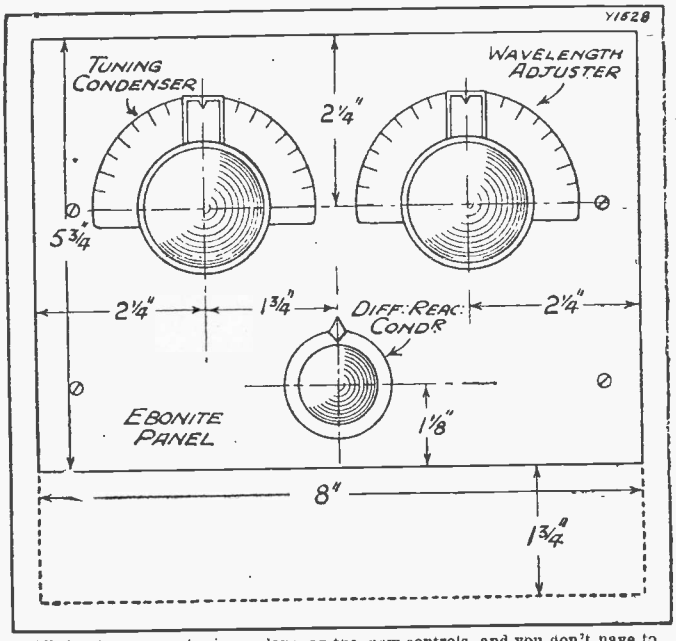
First of all remove the detector valve from your set, and place it in the adaptor. If, by the way, your set is the "Comet" Four or any other set in which an H.F. stage is included, the H.F. valve or valves preceding the detector should also be removed.

### The Coils To Use.

Next insert the adaptor plug into the detector valve holder of your existing set, transfer the aerial and earth leads from the set to the unit, and substitute for the loud speaker a pair of 'phones. Place a five-turn short-wave plug-in coil in the socket

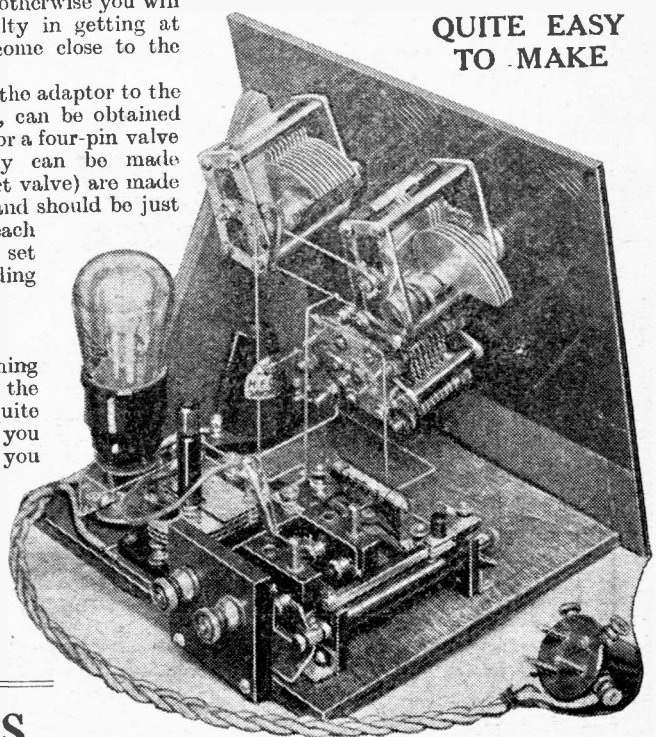
(*Continued on next page.*)

## IT COVERS THE WHOLE WORLD




All the short-wave tuning is done on the new controls, and you don't have to bother with your ordinary tuning and reaction dials.

## QUITE EASY TO MAKE



The wiring is simple, the components are few—but the extra range is really staggering.

# ALL THE OTHER CONTINENTS

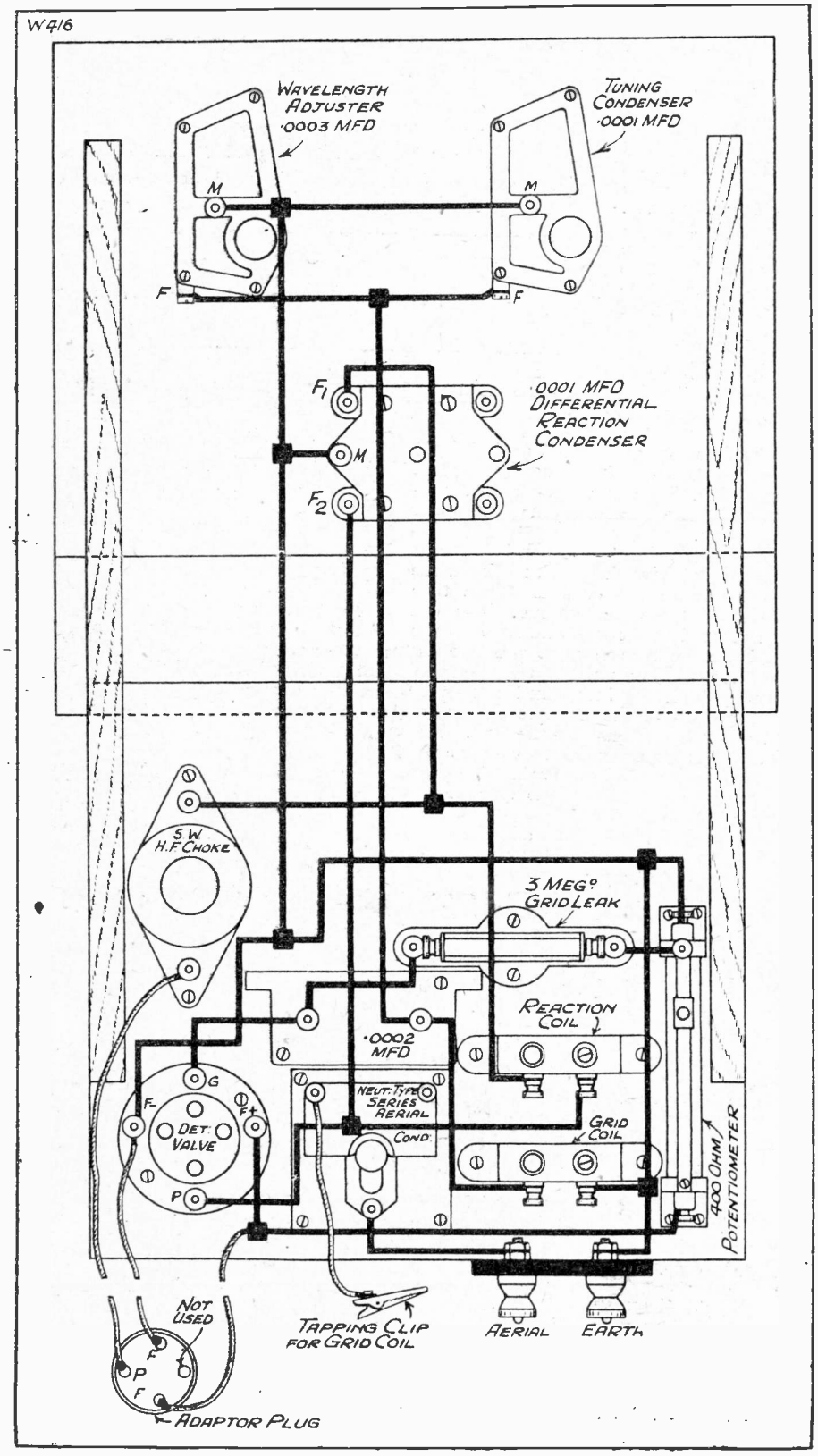
## SHORT WAVES ON YOUR "COMET."

*(Continued from previous page.)*

nearest the back of the unit, and a four- or five-turn coil in the other coil holder.

Join the clip at the end of the flex lead from the series aerial condenser to a point about midway on the grid coil (the one nearest the back), and all is then ready.

### HOW THE PARTS ARE PLACED AND WIRED




Note how the three long "flexes" go to the adaptor plug.

First of all increase the reaction condenser to make quite certain that the set will oscillate quite satisfactorily. (This, by the way, should be done at every ten degrees or so of the wave-length adjuster to make certain that the set will oscillate over the whole range.)

**Bringing in the Stations.**

You may find small bands of four or five degrees here and there over which the set will not oscillate, but these "dead spots" are caused by the aerial, and unfortunately seem unavoidable. It is usually possible to shift them, however, by altering the series aerial condenser.

**INSIDE THE ADAPTOR.**

- 1 ·0003-mfd. variable condenser, slow-motion type, or with vernier dial (Jackson "Tiny," or similar small type—not solid dielectric).
- 1 ·0001-mfd. variable condenser, as above.
- 1 ·0001-, or any capacity up to ·0002-mfd. differential reaction condenser (Cyldon, or Lotus, Igranic, Ready Radio, J.B., Dubilier, Parex, Ormond, etc.).
- 2 Single coil holders (Lotus, or Igranic, Bulgin, Wearite, Magnum, Lissen, etc.).
- 1 400-ohm potentiometer (Ready Radio, or Igranic, Lissen, Wearite, etc., round type).
- 1 3-megohm grid leak and holder (Graham Farish, or Lissen, Ferranti, Dubilier, Igranic, Ediswan, Mullard).
- 1 ·0002-mfd. fixed condenser (Lissen, or Formo, T.C.C., Telsen, Ferranti, Ediswan, Dubilier, Igranic, Ready Radio, Mullard, Watmel, etc.).
- 1 Neut.-type series aerial condenser (Bulgin, or Magnum, J.B., etc.).
- 1 Four-pin valve holder (Clix, or Benjamin, Igranic, Lotus, Lissen, Bulgin, W.B., Junit, Formo, etc.).
- 1 Short-wave H.F. choke (Magnum, or Igranic, Wearite, etc.).
- Flex, valve adaptor plug, terminals, wire, wood for cabinet, screws, etc.

The potentiometer is for the purpose of obtaining smooth reaction control, and the slider should be adjusted until the set changes into the oscillating condition without the slightest trace of "ploppiness." It should, however, be used as near to the positive end as is consistent with smooth reaction control.

When searching for stations, the reaction condenser should be adjusted so that the set is just—but *only* just—in the oscillating condition. The tuning condenser (don't forget, it's the *left*-hand dial) should then be slowly rotated until a carrier wave, or in other words a whistle, is heard. Providing it is a telephony station, decreasing the reaction until the set justs stops oscillating and slightly retuning enables you to hear the programme.

**For a Slightly Higher Band.**

The coils mentioned above will cover from approximately 20 to 55 or 60 metres. The range of the set can be extended from 50 to about 100 metres by replacing these coils with a ten-turn grid coil and an eight-turn reaction coil.

Here again the clip on the flex from the series aerial condenser should go to a turn about midway on the grid coil, the best position being found by trial.

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KIT C - £7 2 6 Or 12 monthly payments of 13/-
(As Kit B with attractive oak cabinet.)

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### FLEXI-COUPLED "COMET" THREE

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(Complete Kit of Components, as specified.)

KIT B - £6 10 9 Or 12 monthly payments of 12/-
(As Kit A, with set of Mullard valves.)

KIT C - £8 0 9 Or 12 monthly payments of 14/8
(As Kit B, with attractive oak cabinet.)

**Completely Assembled FLEXI-COUPLED "COMET" THREE**
Ready for use aerial tested, valves, cabinet and royalties included. £9.5.9, or 12 monthly payments of 17/-.

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### "MAGIC" THREE CONVERSION KIT £1-8-9

### THE "COMET" TWO

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**Components for completing the "COMET" TWO**
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KIT B - £8 17 6 Or 12 monthly payments of 16/3
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KIT C - £10 10 0 Or 12 monthly payments of 19/3
(As Kit B, with attractive oak cabinet.)

**Components for completing the "COMET" FOUR.**
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KIT A - £3 8 6 Or 12 monthly payments of 6/3
(Complete Kit of Components, as specified.)

KIT B - £4 8 6 Or 12 monthly payments of 8/-
(As Kit A, with specified valve.)

KIT C - £5 3 6 Or 12 monthly payments of 9/6
(As Kit B, with attractive oak cabinet.)

### THE "COMET" ONE

| | | | | |
|---|---|---|---|---|
| KIT A | (less valve and cabinet) | £2 19 6 | or twelve equal monthly instalments of | 5/6 |
| KIT B | (with valve less cabinet) | £3 8 0 | or twelve equal monthly instalments of | 6/3 |
| KIT C | (with valve and cabinet) | £4 3 0 | or twelve equal monthly instalments of | 7/7 |

### THE "COMET" A.C. SAFE-POWER UNIT

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## THE "COMET" SHORT WAVE ADAPTOR

| | s. | d. |
|---|---|---|
| 1 Ebonite Panel 8" x 7½" x 3/16" drilled to specification | 2 | 6 |
| 1 Cabinet to specification | 7 | 6 |
| 1 Jackson Bros. ·0003 mfd Tiny variable condenser | 9 | 6 |
| 1 Jackson Bros. ·0001 mfd Tiny variable condenser | 8 | 6 |
| 1 ReadiRad ·00015 mfd differential reaction condenser | 5 | 0 |
| 2 ReadiRad Single Coil Holders | 1 | 8 |
| 1 ReadiRad 400 ohm baseboard mounting potentiometer | 2 | 9 |
| 1 ReadiRad 3 megohm Grid Leak and Holder | 1 | 4 |
| 1 ReadiRad ·0001 mfd fixed condenser | | 10 |
| 1 Bulgin N.Y. Neutralizing Condenser | 4 | 9 |
| 1 Telsen sprung valve holder | 1 | 0 |
| 1 Igranic Short Wave H.F. Choke | 2 | 0 |
| 1 pkt. ReadiRad "Jiffilinx" for wiring | 2 | 6 |
| 1 ReadiRad Terminal Block with terminals | | 9 |
| 2 Atlas Short Wave Coils 4 and 6 | 5 | 3 |
| Flex, plug adapter, tapping clip, etc. | 1 | 11 |
| | £2 | 17 9 |

**or 12 monthly payments of 5/2.**

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To:
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**C.O.D. ORDER FORM.** Please despatch to me at once the goods specified for which I will pay in full the sum of £.....

**HIRE PURCHASE ORDER FORM.** Please despatch my Hire Purchase order for the goods specified for which I enclose first deposit of £.....

*Name* .....

*Address* .....

.....

*Kit Required* .....


**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.**

IT is a great pity that some of the countries whose official representatives signed the agreement upon which the Prague Plan is based are not carrying out to the letter the undertakings that they gave.

It was distinctly agreed by almost every country in Europe, with the exception of Russia, that stations should work upon the wave-lengths allotted to them, and should not cause interference by wandering about all over the band.

### Bad Interference.

Certain countries are very much to blame for the way in which they are allowing their stations to cause widespread interference. By far the worst offender at the present time is France, some of whose stations seem to be doing exactly as they like.

The best behaved stations are Radio-Paris, Lyons Doua, Paris P T T, Toulouse Midi, Strasbourg and Bordeaux Lafayette. Of the others Radio Maroc, by butting in, is interfering with both Witzleben and Dublin. Radio L L ruins Hamburg; Radio Algiers heterodynes both Bergen and Mühlacker; the Poste Parisien causes a good deal of trouble: Radio Vitus interferes with Genoa; Radio Lyons seems to be working on any wave-length he likes and interferes with numerous stations between 280 and 290 metres.

Juan-les-Pins has grabbed a wave-length and is making a nuisance of himself; Beziers is doing the same. Bordeaux Sud Ouest has not had the same wave-length on two consecutive nights in recent weeks; Radio Binche heterodynes Lodz by working off his wave-length; Fécamp interferes with Cork, and Toulouse P T T, though provided like most other French stations with a U.I.R. wave-meter, has never been recently within a kilocycle of his proper carrier-frequency.

### Other Offenders.

Other offending countries are Italy with her Bolzano station, Norway, whose relays are distinctly troublesome, and Sweden—Falun often completely spoils Bordeaux Lafayette and the Swedish relays are rarely on their correct wave-lengths.

At present the slogan amongst European broadcasting authorities appears to be: shout your neighbour down and if you can't, grab another wave-length, no matter whose transmissions you may spoil

What a pity it is that we have not in Europe some body with real authority like the Federal Radio Board in the United States, which jumps with both feet on any station which deviates even for a brief period more than a few hundred cycles from its assigned frequency.

Despite these wails (both mine and those caused by heterodynes) the number of stations receivable at fine strength and with good quality is remarkably large. The owner of a receiving set of reasonable selectivity and containing at least one efficient stage of H.F. amplification should have, at any time, a choice of a dozen or more programmes really worth listening to.

### Some First-Rate Stations.

As the summer draws on the number of first-rate stations naturally decreases, and to save time and trouble it is as well to keep a list of the stations which in your locality and with your own set are best worth trying for when conditions are none too favourable.

As a basis for such a list I suggest the following stations. Long waves: Huizen, Radio-Paris, Kœnigswusterhausen, Warsaw, Motala, Kalundborg, Oslo. Medium waves: Budapest, Vienna, Brussels No 1, Milan, Langenberg, Rome, Stockholm, Witzleben, Katowice, Sottens, Frankfurt, Toulouse, Strasbourg, Bruen, Brussels No. 2, Breslau, Gothenburg. Hilversum, Heilsberg and Nuremberg.

From this you should be able to pick from ten to a score which are really outstanding. Note down their condenser settings and you will be able to have a chance of alternative programmes instantly all through the summer.

# SHORT-WAVE NOTES

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

THIS week I propose to clear up such letters as are of sufficient "general interest." Please note that this excludes the "W 2 X A D Department"!

First, we have a report from "D. P.," of Chesterfield of the reception of W 1 X A D on about 50 metres. Has anyone else heard him? "D. P." reports general conditions very good, and has also received some Americans on the broadcast band.

Next S. F. C. (N.W.10) wants confirmation of the existence of W 3 X A L, Bound Brook, working on about 21·76 metres. So far as I know, there should be no broadcast on that wave, but can anyone help with further reports? S. F. C., incidentally, does not agree with all these different short-wavers being published.

### "And There You Are."

He says: "All you want is a detector and an amplifier, and there you are," or words to that effect. Yes, S. F. C., but one detector and amplifier does not bear the *least* resemblance to another, when it comes down to question of detail. I know of detectors that don't detect, *and* amplifiers that don't amplify. But perhaps you have been more fortunate.

C. A. S., of Southampton, sends in an excellent log of short-wave broadcasts, and also of amateur telephony, with a "P.W." two-valver. He wants to know whether he is my youngest correspondent, his age being sixteen! Who is going to break this record? Forward, all the short-wave infants-in-arms.

J. S., of Magull, Lancs. writes an interesting letter on things in general, and the Russian programmes in particular. His caustic remarks might cause trouble if I printed them, although I heartily endorse them all.

By the way, he, among others, inquires whether I am too lazy to write a full page of notes any more, as used to be the case. The answer to this is that the Editor has arranged for these regular weekly notes to occupy half a page, but, in addition, I shall be writing other articles on less general short-wave matters. So, in the long run, I shall be doing just as much work, and the accusation is unfounded!

### Was It Strasbourg?

Now we have S. F. L., of Bristol, who wants to know whether anyone has a prior claim to his of hearing Strasbourg, A N C. Is this call-sign right? There should be nothing beginning with A or B nowadays.

A. J. A., of Burton-on-Trent, describes his set, and inquires whether the "Antipodes Adaptor" would be any good to him for short-wave work. Certainly, A. J. A., the set mentioned is suitable for anyone with almost any kind of receiver, and certainly appears to be suited to your circumstances. Next, I have to acknowledge a long and interesting letter from G. E. C., of Porto Alegre, Brazil, who is a regular "P.W." follower. He confirms the final remarks in these columns about the Buenos Aires station and his announcements.

He also gives a good station for the DX-hound, in the shape of "P R A G Radio Sociedade Gaucha, Porto Alegre." This chap transmits on 35·5 metres with an input of 500 watts between 13.30 and 14.00 G.M.T., and G. E. C. lives in the hotel, to the roof of which this station's aerial is attached! Hence his ardent desire that other people should hear it as well.

### All the Way From Japan.

Brazil appears to be well placed for short-wave reception, particularly from the States. Many thanks, G. E. C., and I should like to hear again.

Three readers report reception of K A 1 X R, Manila, for the first time for a long period. This confirms the sudden improvement in conditions "out East" on 20 metres. For the first time on record several Japanese amateurs have been received really well here, and several of our higher-powered transmitters have had good two-way contacts with them. This is quite an unparalleled event in amateur radio, for only very half-hearted contacts have been possible before, and even they were extremely rare.

Generally speaking, conditions continue to be extraordinarily good, and there is a good prospect of their remaining so for a long time.

# OPERATING A FLEXI-COUPLED RECEIVER

**Some hints and tips that will help you to enjoy to the full the wonderful results that are obtainable with sets employing the new and uncannily effective "P.W." system for super-selectivity.**

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

MOST of us know how to operate the more conventional types of sets, and instructions for handling them to the best advantage are scarcely necessary nowadays. Their controls are usually very much alike, and it is just a matter of getting used to handling one, two or in some cases even three dials, to become perfectly at home with any particular receiver.

In "Flexi-coupling," however, we have something quite out of the ordinary, and to get the best out of a set incorporating it you have one or two new tricks to learn. It is really very simple, but since the scheme is so new it has occured to me that possibly a few special hints on the subject might be of assistance.

**Not a Critical Control.**

Users of such sets as the "Comet" Two and the "Comet" Three will already have discovered that they are very much easier to operate than any receiver with two tuning dials, although both the single dial and the selector knob must be set to the right positions for the best results from a given station.

The reason is, of course, that the selector knob is very much less critical in its setting than the ordinary tuning dial. You can thus pick up your station on the condenser dial alone, and you will hear it after a fashion with the selector knob set almost anywhere.

It is consequently quite possible to search for the stronger stations at first on the condenser dial alone, and only when one has been picked up, to bring the selector to the correct stud. When you do so, of course, the station will come up in strength and interference will disappear in the delightfully complete manner characteristic of a "Flexi-coupled" receiver.

The fact that this can be done renders searching a decidedly easy process, but it brings me to the first operating hint which I want to give you. Now, it is decidedly easier to pick up the weaker stations when you are searching, if your selector switch is kept roughly in step with the tuning dial as you proceed in your search, and there are several ways of doing this.

**Searching For Stations.**

Here is a rough-and-ready method which works quite well. Tune-in a station anywhere on the lower wave-band, and find the right selector stud for the best volume. Now suppose you want to search in an upward direction, i.e. in the direction of higher dial readings.

Turn your condenser dial slowly, using reaction to keep the set just below the edge of oscillation, and for the first five degrees or so leave the selector coil on its present stud. Having covered these five degrees, move the selector onwards one stud in a right-hand or clock-wise direction and continue your search for another five degrees, and so on.

To search in a downward direction from a given point, you will naturally proceed in the opposite fashion, and by using this method it is a very simple business to cover the whole dial in a matter of a few moments. In effect, as you will see, you keep your aerial circuit, controlled by the selector coil, pretty closely in step with the secondary circuit the whole time, and so the final adjustments each time you pick up a station are very quickly made.

The method I have just described is probably the best to use when making a systematic search over the whole dial, picking up the stations as they come along, but when you are looking for some particular station whose position among the others you know roughly, it is less convenient. In such cases I would suggest you proceed as follows.

This, as a matter of fact, is a hint which I should advise all users of "Flexi-coupled" sets to follow. For a start, tune-in a station very near the top of your dial; as near the top as you can actually get. Find for this station the best stud on your selector coil, and then make a pencil mark on the panel to denote the position of the knob pointer.

**Those Little White Scales.**

Now tune-in a station as near to the middle of the dial range as you can find one, and again make a pencil mark to indicate the position of the selector knob pointer. Finally, repeat the process for a station very near the bottom of the dial at a dial reading of, say, ten degrees or thereabouts, once more making a pencil mark upon the panel. (This will not be necessary if you have one of those makes of selector provided with a marked dial.)

Now you have three pencil marks upon the panel to denote the position of the pointer at the upper end of the range, at the middle and at the lower end. Incidentally, some people even go so far as to make out a little white cardboard scale for their selector knob, and stick this to the panel, but I, personally, have never found this necessary, the simple device of three pencil marks meeting practical conditions quite well.

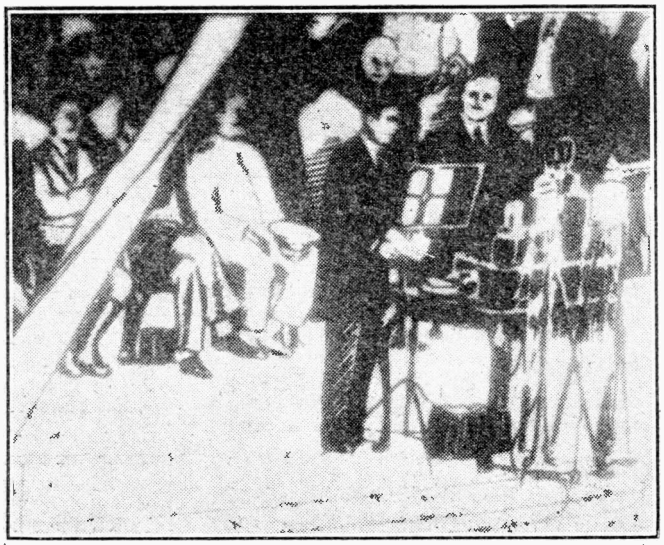
With their aid it becomes a very simple matter to estimate the position for the pointer for any given station whose position on the tuning range you know even roughly.

**Easily Found.**

Thus, suppose you expect your station to come in somewhere on the upper half of the dial; just put your selector knob halfway between the upper limit mark and the mid-point mark, and tune-in upon the condenser dial. You will almost certainly

(*Continued on page* 224.)

## FLASHED THROUGH THE ETHER



A photo of the Prince of Wales giving his opening speech at the Buenos Aires British Trade Exhibition. This picture was flashed across by radio to London in 13 minutes, and it is claimed that this is a quite unique feat.

# JOTTINGS FROM MOORSIDE EDGE.

**We have already told readers many of the wonders of the North Regional, and here is an account of the official visit by the Press.**

**FROM OUR SPECIAL REPRESENTATIVE.**

IN every room at Moorside Edge there is a series of coloured signal lights on the wall. Each light has a significance. Thus, if an engineer gets into difficulties with an obstinate piece of apparatus he presses a button, and in every room a bell rings and one of the lights flashes, and everybody dashes to the rescue.

Another light, I believe, signifies "Big Noise arriving." When the Chief Engineer, the North Regional Director, the Director of Information from Savoy Hill, the Assistant Director of Information, the North Regional Director of Information, the North Regional Dramatic Producer, sundry other high officials, and about fifty pressmen all arrived at the station one wet and misty afternoon, the "Big Noise" light must have flashed more insistently than ever to put the station on its best behaviour.

"And which light," I asked, "do you put on when Sir John Reith appears on the horizon?"

"We jam the lot on!"

### Five Years' Progress.

My mind went back five years or so to just such another wet day when 5 X X was opened, and when just such another party of pressmen walked up Borough Hill at Daventry, and were conducted round the new high-power station by enthusiastic engineers whose talk of oscillators, potentials, and amperes completely flummoxed the representatives of the lay Press.

On that occasion in 1925, Captain Eckersley and his colleagues showed us with evident pride their greatest achievement—the largest and most perfect broadcasting station in the world.

To-day 5 X X is definitely old fashioned, and now Mr. Noel Ashbridge and his fellow technicians put Moorside Edge before us as the highest point reached by the B.B.C. engineers in their constant endeavour towards better and better transmission.

The difference between 5 X X and North Regional represents five years of progress. To-day North Regional is as fine an achievement as 5 X X was in 1925. Shall we, five years hence, look upon Moorside Edge as old-fashioned and be singing the praises of some new wonder?

### 30 to 10,000 cycles.

During the engineers' tests of Moorside Edge you may have heard the transmission of a tuning note which started at a very low note and went slowly up the scale until it was a high-pitch whistle.

This was a test of North Regional's frequency characteristic. I am told that the new transmitter is capable of transmitting any note between 30 cycles and 10,000 cycles perfectly.

This represents a range from the deepest grunt of an organ to notes higher than are produced by any orchestral instrument. With such a quality performance, Moorside Edge has naturally aroused the enthusiasm of Northern listeners.

I was told that both Brookmans Park and Midland Regional have very similar characteristics, but I understand that 5 X X is not so good. Any listener with a good set can, in fact, mark the difference in quality between the old Daventry and these new regional stations.

### Improvements at Moorside.

I was chiefly interested in the differences between Moorside Edge and Brookmans Park. The aerial system is, of course, quite different. The masts are more than twice as high, and with such high aerials and the long (479 metres) wave-length the North Regional transmitter has a wider range than London Regional.

There are a few detail differences in the transmitters. At Brookmans Park the five cabinets of each transmitter are connected by bare copper strips running from the top of one cabinet to the top of the next. At Moorside Edge these intercoupling leads are hidden inside metal tubes, giving both an improved appearance and better screening.

### Tell-Tale!

An innovation at Moorside Edge is that each transmitter has a meter which gives a direct reading of the degree of modulation. If the engineer on control over-modulates, the needle of the meter flicks over *but does not return immediately* normal modulation is resumed.

Thus, if the engineer protests that he did not make the mistake the tell-tale meter remains for some time showing the over-modulation.

### Higher Power.

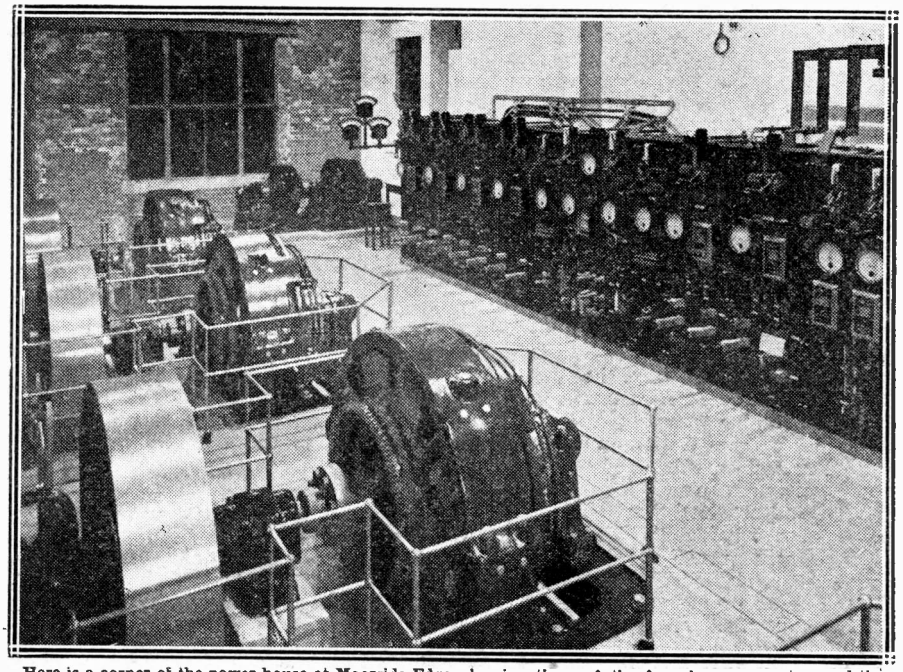
The four Diesel engines at Moorside Edge each give 345 horse-power at 335 revolutions per minute, to drive the main dynamos. Those at Brookmans Park give 300 horse-power at 300 r.p.m.

North Regional's two aerials are supported by three masts, whereas Brookmans Park has four masts. The Moorside Edge masts stand on porcelain insulators which completely insulate them from earth, and I was interested to learn that each mast can be "tuned" to minimise its screening effect on the transmission. A very necessary precaution at Moorside Edge is the provision of means to switch the main generators direct to the aerials, to melt any ice attaching to them.

### Spectacular.

"This is even more impressive than Brookmans Park," I remarked to Major Gladstone Murray, the Director of Information from Savoy Hill. Major Murray agreed and suggested that it was due to the contrast with the surroundings of the station—primitive, mist-covered moorland does indeed throw into spectacular relief the brightly illuminated building with its whining generators, its throbbing engines, and its rows of huge glowing transmitter valves.

## WHERE THE WATTS COME FROM



Here is a corner of the power house at Moorside Edge, showing three of the four huge generators and the main switchboard.

*NEXT WEEK:*

**"BROADCASTING IN THE NORTH"**

BY THE NORTH REGIONAL DIRECTOR OF THE B.B.C.

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## For BEST RESULTS Specified and Recommended by "POPULAR WIRELESS"


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Extraordinary Selectivity, Clear Reception, Exceptional Efficiency. When operating on Short Wave, the Long Wave winding is paralleled, thus ensuring the avoidance of losses usual in other types of Dual Range Coils. No. DW/12.

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*Extract from* **"Popular Wireless," January 31st, 1931.**

**GOLTONE CONTRA-DYNE AND "P.W." DUAL RANGE COILS.**

I would urge constructors to choose their makes with care. I've had samples sent me by Messrs. Ward & Goldstone, Ltd., and these are **absolutely to specification, and very well made indeed.**

## GOLTONE STAR-TURN SELECTOR COIL


Built to Rigid specification, with Engraved Dial. One Hole Fixing. For Flexi-Coupling and other Circuits. For Laboratory Tested to give highest possible efficiency No. R8/106. **10/6**

You can always get BETTER RESULTS if famous Goltone "No-Mast" Aerial be fitted. **Price 24/-.** Illustrated pamphlet giving press reports, extracts from testimonials and full particulars sent on request.

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### TENS OF THOUSANDS ALREADY SOLD


Tunes up to 5GB wave-length and suitable for the new Regional Transmitters.
There is no need for you to lose those distant stations with the opening of MOORSIDE EDGE and other high-powered Regional Stations.
The "CUB" will eliminate this interference, and enable you to bring in the selected stations **loudly** and **clearly.**
Fitted in a moment to **any** set.
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**No. R.48/46** (Long Wave Model) - **4/6** each.
Simple instructions with each Unit.

**Pamphlet with full particulars and testimonials sent on request.**

READ THESE.

Mr. F. B., *Lytham St. Annes.* **The performance is truly remarkable**

Mr. F. C., *Spring Terrace, Waterloo Street, Hull.* **Unit is simply marvellous**

Mr. L. H., *The Oval, Firthpark, Sheffield.* **Found it very remarkable.**

Mr. J. K., *Rusholme, Manchester.* **Wonderful results.**

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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

### COILS FOR THE "MAXIPOWER."

S. J. (Newcastle).—"I have got a 'Maxipower' Four; but I do not know the proper coil sizes to use for different wave-lengths. What coil sizes are required for this set, and where should they be placed? (Which coil holder?)"

In order to know which coil goes where you had better number the coil-holders as follows. Looking at the set from the back of the baseboard, that is to say, over the terminal strips, there is, to the right of the screen, a group of three coil holders, two placed close together and the other one separate. Number the outer or right-hand coil holder 1, the adjacent holder as 2, and the single holder standing towards the panel as 3.

On the other side of the screen there are three more holders, one pair standing near the screen and the other one by itself. These should be numbered 4, 5 and 6, No. 4 being that nearest to the screen, 5 the coil beside it, and 6 the isolated holder near the H.F. choke.

The coils to be inserted in these holders are as follow:

A No. 25 or 35 in the holders marked 1 and 4. A No. 60 coil in the holders marked 2 and 5. A No. 150 or 200 in the coil holder marked 3.

All these are ordinary coils, but of course, centre-tapped coils can be used if they are on hand. For the remaining coil holder, No. 6, you *must* use an X coil, and this can be either a 200 or a 250 X.

Where two coil numbers are given above either may be used, but the smaller coil will give the greater selectivity. Thus, if a 25 coil is used instead of a 35 coil it will give sharper tuning, but there may be a little loss in signal strength as a result of using a smaller coil. So that if the set is to be used rather near to a powerful station, the smaller coil size should be used, or if it is to be used farther out, the larger will be better.

### "IT ROCKS THE HOUSE."

W. F. L. A. (Peterborough).—"Do sets ever go mad? Mine seems to, anyway, and on two occasions it has been quite startling. It rocks the house.

"I cannot make out why this should be, as usually it gives every satisfaction with good quality, plenty of strength and so on, but I am always dreading that it will do once again what it has done several times in the past—suddenly and without any cause whatever, developing a sort of singing noise which gets louder and louder and louder, until it is simply unbearable.

"The last time it happened my neighbour could hear it howl in his house, which is not attached to mine, but stands about twenty feet away, and he tells me there was nothing wrong with the broadcasting at that time as he was listening to the same programme.

"What causes a set to make this awful row, and most important, how can I stop it?"

This is a very old trouble and one which is easily stopped when the cause of it is understood. It happens because you place your loud speaker too close to the set, thus allowing the sound waves from the loud speaker to affect the valves.

It can be caused by almost anything that shakes the valves, as you will find if you tap your detector with your finger. What happens is that a mechanical shock of this kind, or a powerful sound wave from your loud speaker cause the valves to *shake* slightly, thereby altering to a small degree the very careful spacing between its electrodes.

The effect of this is to set up an audible note in the loud speaker and if this is placed near the set it naturally emphasises the disturbance, causing the howl to get louder and louder until the set is howling for all it is worth.

The remedy is simply to protect the set from little shocks of this kind. Sprung valve holders instead of those of the rigid type will be necessary, and the set can be cushioned on a rubber mat or other such shock-absorber, instead of standing direct on a table. It must be protected from the loud-speaker vibrations by keeping the speaker well away from it, and if these precautions are observed the trouble will disappear.

### THAT MAGNETISED WATCH.

Recent remarks in these columns on the demagnetising of a watch have brought many interesting letters from readers, and enquiries as to the results of experiments on these lines. In this connection the following letter from a Worthing reader (who is an A.M.I.E.E.) will be of interest.

"Dear Sir,—My attention has just been drawn to your reply to a correspondent in 'P.W.' of Feb. 7th, re demagnetising a watch. I was successful in curing this trouble as follows.

"A coil of vulcanized wire about 10 in. in diameter and 110 yards in length was inserted in a 60-watt lamp circuit on a 200-volt alt. supply. This was done by connecting the end of the coil to the terminals of the tumbler switch controlling the lamp, and leaving switch in the open position, thus putting the coil in series.

"The watch was then held in the centre of the coil and then very slowly withdrawn. This seemed to put matters right, for the watch resumed its previous regular habits.

"A coil of the particular diameter and length employed was just chosen because it was handy (No. 18). Perhaps one with more turns and more like a solenoid would do even better. Hoping this may interest you, and with many salaams.

"Yours faithfully,

Worthing. "J. H. S., A.M.I.E.E."

### RESISTANCES IN YOUR SET.

F. C. I. (Dollis Hill, London, N.10).—"In the article, 'Resistances In Your Set,' page 19, 'P.W.,' March 21st, 1931, you say about fixed condensers: 'Connect a battery across the two terminals and no current passes.' Yet in the bottom right-hand corner of the same article it says . . . 'will hold charges of electricity for days at a stretch.' If no current passes, how can a fixed condenser get saturated with electricity?"

Yours is not an easy question to answer in a few words, and perhaps the best way to put it briefly is the following:

First of all let us generalise and say that an electric current is electrons which are moving, and also that an insulator is a substance through which electrons find it very, very, very difficult to travel. Having cleared the air in this fashion, let us remember, now, that a fixed condenser is an arrangement of an insulator on both sides of which there is a large conductive surface.

If such a large condenser is connected in series with a battery and a suitable measuring instrument, the latter would show a large momentary movement of electrons. In other words a large electric current might flow, at least for a time, but this does not necessarily mean that current will pass through the insulator.

If some electrons left the battery and simply took up a new position on one set of plates on the fixed condenser, this movement of electrons would represent electric current, although none of these electrons might actually pass the insulation. Similarly on the other side of the insulation the electrons which were already in the condenser might migrate from it into the battery, and this, too, would be an electric current although none of these electrons would actually pass through the condenser's insulation.

Such a procedure would completely alter the potential on both sides of the condenser and if it were disconnected from the battery, etc., and if its insulation were miraculously good, the potential-difference effect would be noticeable for days. In other words it would hold a charge of electricity for days.

(*Continued on page* 220.)

### "P.W." PANELS. No. 16.—RADIO RECEIVER CURRENT.

**The main purpose of the L.T. Battery is to supply filament current. But in some circuits the potentiometer also draws current from the L.T.B.**

* * *

**Anode current comes from the High-Tension Battery, but the screening grids also derive current from the H.T.B.**

* * *

**In a set with S.G. and pentode valves the screening grids generally require much more current from the H.T.B. than is taken by the detector valve.**

# RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 218.)

So if you connected such a condenser across the mains for a second instead of across an H.T. battery, you could, as mentioned in the article, "post an electric shock in it!"

This latter must not be taken too literally, for the P.M.G. would certainly have something to say about such a procedure. But it was a very picturesque way of illustrating the above point.

### WHAT WAS WRONG WITH IT?

We have often commented in these columns on the fact that one small fault will ruin the performance of an otherwise perfect set. Examples of this are continually coming to light, and the following interesting letter from a reader to the Editor is a good instance.

**RADIO SYMBOLS. No. 16.**

**RESISTANCE AND CONDENSER.**

**This symbol combines a resistance and fixed condenser, so it often represents the paralleled grid leak and condenser.**

* * *

**It is usual to state the respective values against the symbols on the diagram.**

* * *

**Common values for the above purpose would be ·0002 and 2 megohms.**

Moreover, it is a good example of a puzzling fault that was manfully tackled and put right by the owner of the set himself. He says:

"Dear Sir,—I am writing you this letter as it may interest you to know what happened when I built the 'Comet' Three. I used all brand new British parts, including the Star-Turn selector coil.

"On trying the set out I was greatly surprised to find that on the ordinary waves with reaction full on, I could only get the British stations very faintly and on the long waves only 5 X X. Of course, the two London stations came in very powerful and no reaction was needed.

"It took me many hours before I could trace the trouble, which proved to be the reaction condenser.

"On taking this to pieces I found a thick film of black oil between the fixed arm and the spindle. When this oil was removed and the condenser put back the 'Comet' did everything it was supposed to do. Wishing you every success, I am,

"Yours truly,
"E. W. (London)."

### LOOKING AFTER THE L.T. BATTERY.

C. S. T. (Redhill, Surrey).—"Now that Spring is in the air I shall be neglecting my set in favour of the old side-car. But I have so enjoyed it this winter that I want it to be in tiptop condition in the autumn, and I think I have seen it somewhere in 'P.W.' about the care of accumulators when they are not being used very much. Could you please tell me the few points to bear in mind so as to keep the battery in good condition?"

There are several things to watch when an L.T. battery is not being used very much, for as a matter of fact constant use is good for the battery and consequently disuse is liable to be bad for it. However, it will be quite O.K. and will keep right up to scratch provided the few following simple rules are carefully observed.

First of all, remember that the ordinary L.T. battery needs re-charging at least once in eight weeks, whether it is used or not. This generalisation does not, however, apply to every type, because some L.T. batteries are specifically constructed to stand up to very long periods of disuse. But every ordinary battery needs the two-monthly charge.

Regular charging and discharging is one of the best means of keeping a battery in good condition. As soon as it is run down it should be taken to the service station and re-charged.

The best way of checking its condition is not by the voltmeter only, but by the voltmeter in connection with the hydrometer, which will show the specific gravity of the acid. A regular check with these two instruments, say once a fortnight, will indicate the beginnings of any trouble and will enable you to nip it in the bud.

If one or other (voltage or specific gravity) is found not to be up to standa d a prompt call to the service station, and a liberal dose of charge and discharge for a day or so will generally overcome any tendency to sulphation.

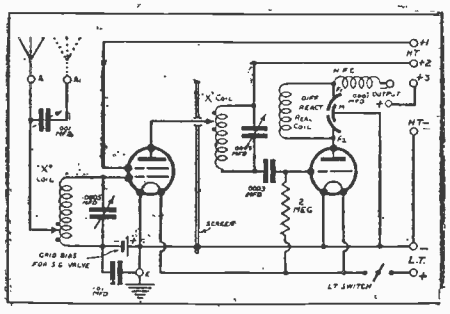
Although the battery may be standing idle a certain amount of evaporation is liable to go on all the time, and it is important that the liquid inside should always be sufficient to keep the top of the plates covered.

Cleanliness of the terminals (ensured by emery paper and a coating of petroleum jelly), and attention to such little matters as keeping the connecting bars tight and the vent plugs clean and open and in place, will also ensure long life. Finally, do not forget that the old acid should be turned out and the battery filled with new acid at least once a year. This, however, is generally a job for the service station, and not for the listener himself.

(*Continued on page* 222.)

## MISSING LINKS, No. 6.

**AN S.G. AND DETECTOR.**




**If you compare this with last week's diagram you will see that two fixed condensers and a switch have now been inserted to complete the circuit.**

# RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page 220.*)

### RECEPTION OF W 2 X A D.

Since W. L. S. was incautious enough to admit that he was finding it difficult to receive W 2 X A D, many letters referring to this have been received.

As W. L. S. has explained in his Notes since, the failure to pick up W 2 X A D was only a temporary one, and all correspondents who helped with reports on reception are hereby thanked. The really practical and helpful information tendered in this way is well illustrated by the following letter from a reader who lives at Athy.

"Dear Sir,—I was very surprised to read in 'Short Wave Notes' of your valuable paper that 'No one seems to be able to find W 2 X A D nowadays on his 19·56 metres wave.' I receive this station stronger than any other American every evening from 6 p.m. to 8 p.m. He is so loud on speaker that I have to cut down volume to make it pleasant.

"I use the 'Magic' Four, with Philips H.T. unit, battery valves. The following tips may be useful to users of this circuit.

"I was troubled with bad threshold howl and I tried the following cures—600-ohms resistance in H.T. lead to plate of S.G. valve, then a ·0005 condenser across output terminals, but there was no improvement.

"I then added a short-wave Igranic H.F. choke in series with Lewcos choke in plate lead of detector valve with ·001 condenser to earth. This improved matters.

"I finally placed another ·001 condenser from plate of last valve to earth, and now I have beautiful, smooth reaction without howl or handcapacity effects.

"In addition to W 2 X A D I get the following at great strength on speaker, as I never use 'phones. Rabat, 23·28; Rome, 25·4; P C J, 31·38; W 1 X A Z, 31·35; Zeezen, 31·38; W 2 X A F, 31·48; O X Y, 31·51; W 8 X A L, 48·86; W 3 X A L, 49·18; W 8 X A L, 49·5; and Vatican station on both waves.

"One night I had four American stations on broadcast band between midnight and 1 a.m. I firmly believe in the S.G. valve for short waves.

"Yours faithfully,
"T. C. O'G."

## TECHNICAL TWISTERS

### No. 58.
### USING A MILLIAMMETER.

**The milliammeter (m/a) has innumerable uses in radio maintenance. It measures the current flowing from the . . . . . .**

* * *

**The m/a should be joined in the H.T. . . . . lead to ascertain the current flowing from the H.T.B.**

* * *

**To measure the plate current of any particular valve the m/a must be joined in series with its . . . . .**

* * *

**It is essential to connect the m/a in accordance with its polarity markings. (In certain circuits a . . . . . should be joined across its terminals.)**

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

Last week's missing words (in order) were: Earth, Outside, Gap.

### FROM A FILADYNE ENTHUSIAST.

Admirers of that famous and favourite old circuit, the "P.W." Filadyne may perhaps be able to help the writer of the following letter.

"Dear Sir,—I have been listening to a friend's set and have been struck by its wonderful volume and DX qualities. He called it the "P.W." Filadyne (det., 1 L.F.).

"He gave me the copy of 'P.W.' dealing with this set, remarking that the Filadyne was very critical as to the type of valve used, he mentioned a few suitable types such as the D.E.R. B.5, D.R.2, D.E.2 L.F.

"I would like to build a set like his, but on inquiring for one of those valves I was told that they were old valves and consequently gone off the market.

"My object in writing this letter to 'P.W.' is hoping it will catch the eye of some reader who has come across a valve equally as good as the old types, which might be easily procured. Hoping some reader will oblige for the benefit of all Filadyne enthusiasts.

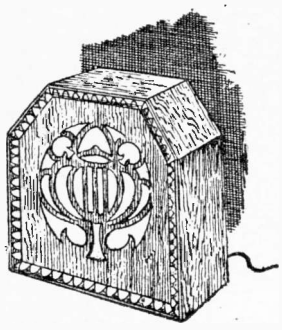
"Yours faithfully,
Dublin. "J. ROGERS.

"P.S.—Maybe Mr. English could give us a suitable modern type?"

### THOSE BACK NUMBERS.

Will P. M. (Kingsnorth), J. W. (London, S.W.1), "Atlas," and others please note that we regret we cannot publish their requests owing to lack of space. We are very sorry, but on previous occasions when we have tried to do this we have been inundated with so many similar letters that we have disappointed more readers than we could possibly please.

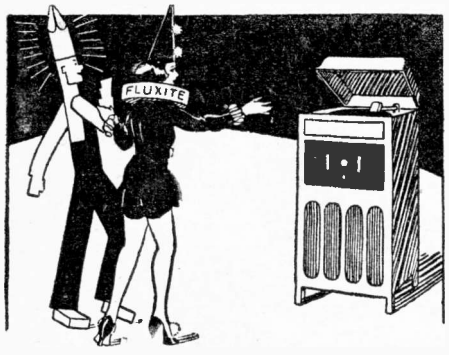
Nevertheless, the requests have been noted and if we are able to help later we will certainly do so.



**Everybody's calling for**

**Player's Please**

PLAYER'S NAVY CUT

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COMPLETE 7/6.
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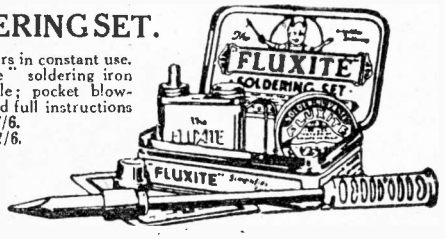


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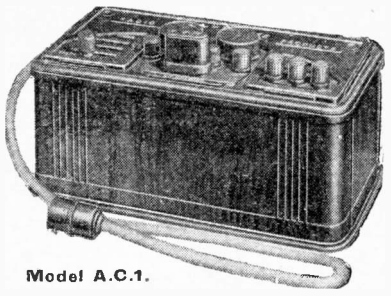
*Incorporating Westinghouse Metal Rectifiers*

## A.C.1 ELIMINATOR

3 Tappings, 2 Variable, 1 Fixed. Output 120 volts at 20 milliamperes.

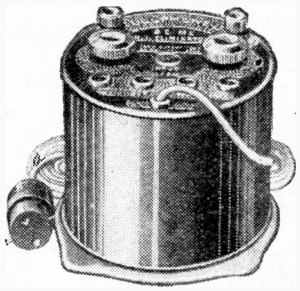
**In Bakelite Case.**

**65/-**



Model A.C.1.

*With Trickle Charger* **£4-5-0**



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**In Bakelite Cases**

25 Milliamperes Output **27/6**

**Model D.C.2.** 30 milliamperes output with 2 variable resistances **37/6**

## BULLPHONE LTD. (Dept. P.W.),
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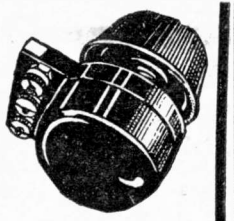
# WHATEVER SET YOU BUILD



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50,000, 100,000 and 500,000 ohms 1 and 2 megohms **4/6** EACH

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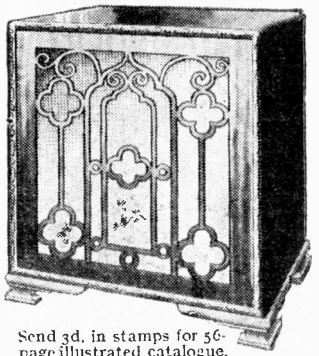

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## FOR THE LISTENER

*(Continued from page 204.)*

be "a little place where one drinks." It is a tavern. In fact, being an urban institution, it is a "Tavern in the Town."

But in France where, not as with us, drinking is not an end in itself but an adjunct of entertainment, the proprietor of such a place would bestir himself to provide some sort of amusement for his clients.

It was all very informal. Much of it was impromptu. Poets sang their songs; rhymesters recited topical verses, "taking off" some political personage, some local event, or even some member of the audience actually present; and so on. It was all very intimate; indeed, the last thing in the world intended to be broadcast.

### A Shock for "Philemon."

A year or two ago I was present in such a place in Cairo. There were perhaps fifty of us in a small room, and hardly a petticoat among us. We were all drinking. Most of us were drinking coffee!

A rather bedizened lady on the platform, our hostess, sang for three-quarters of an hour, on and off. I did not understand her language, but it was translated for me in my ear. Those who did understand were laughing all the time, sometimes shaking with laughter.

Her verses were accompanied by a guitar and a wheezy fiddle; and were interspersed with a good deal of merry backchat between herself and persons in the audience—obviously friends.

She made some daring rhymes about her guests; worse, some of them, than the way Tom Webster handles Mr. Inman! In the midst of this, and suddenly, she made a rhyme about me!

She called me, in her own tongue, her "little English cabbage." She invited me (in the verse only!) to rest like a posy on her bosom! Everybody was delighted; and I was delighted to be the cause of such universal merriment.

She called other men something a good deal worse than cabbages; but I suppose she felt she must be polite to me. Then a man recited some political lampoons; and the man-apes became man-tigers; and I felt that revolution was in the air and that daggers might be up the sleeve!

It was all rather Rabelaisian; but there was nothing sly and suggestive about it; most of it was pretty straightforward!

### Sensational Side-shows.

The modern cabaret, even in Paris, is not perhaps quite like this; not the cabarets you hear your Paris-week-end friends talk about. Both the word and the entertainment have degenerated from their originals. Much of the old intimacy has gone. They are sensational side-shows for foreigners.

And in our own country the cabaret is chiefly associated with the supper-rooms and night-resorts of the rich, and is usually an affair, often a brilliant affair, of jazz and acrobat dancing. Here and there, oddly enough, you may visit a "cabaret" on the outskirts of a church bazaar!

### A Studio "Wonder Bar."

"The Jockey" is a famous Berlin night-club. I understand that the actual persons who provide the fun there, the proprietor and the barman and the rest of them, will come to Savoy Hill. One of the studios will become a "wonder bar." If the thing can be adequately reproduced here, it should prove an interesting and amusing experiment.

The great difficulty will be to get the right atmosphere, for this is everything. If there is no intimacy, there is no cabaret. If there is no frank and pungent and daring, there is no cabaret. We shall see.

## OPERATING A FLEXI-COUPLED RECEIVER

*(Continued from page 215.)*

be able to find your station quite easily, and then you can get the selector switch accurately set to give the best results.

You will quite likely find, by the way, that the mark for the lowest station is that obtained with the selector coil turned fully to the left, for it is with this adjustment that you will tune-in quite a number of the very low-wave stations.

### Exceptionally Large Aerial.

Just a hint in this connection. If you get the feeling that your selector coil does not tune down quite low enough, it may be that you are using an exceptionally large or large-capacity aerial, in which case a series condenser of a suitable capacity, permanently in the aerial lead, may be an advantage with a "Flexi-coupled" set. Try one of ·001 mfd., in the unlikely event of your aerial proving of this type.



Again, you will almost certainly discover that your mark for the upper limit of the tuning range will not be at the extreme right-hand end of the effective travel of the selector arm. This is because the coil has been designed to cover even quite small aerials, and so there is something to spare on one of average size.

### Different Tuning Points.

This is a point worth noting. You must remember that you are working with a fully-tuned aerial circuit, and so allowance has been made for variations in aerial size and tuning properties. This means that in designing the selector coil we have to allow for aerial variations, and so on different aerials, different selector coil settings will be required for any given station.

This is not a point that need concern you in the case of a set working always upon the one aerial, but if you ever take your set to a friend's aerial you will naturally expect to find different selector coil readings in most cases.

# TECHNICAL NOTES

**By Dr. J. H. T. ROBERTS, F.Inst.P.**

### Special Broadcasting Records.

THE use of records as parts of broadcast programmes dates back, of course, to the beginning of broadcasting, but a somewhat novel type of record is now being introduced which is expressly designed for broadcasting purposes.

This record, which is of large diameter, so as to carry a much greater amount of recorded matter, is specially made up by re-recording (or "duping" as it is called) existing records, thus combining several records into one.

In this way it is easy to record an entire broadcasting programme upon a small number of records so that the whole programme can then be forwarded to different broadcasting stations in a sort of "potted" form.

### Potted Programmes.

This method is rapidly gaining ground in the United States where, as you know, there are an enormous number of individual broadcasting stations scattered throughout the country, some of which are comparatively small stations unable to undertake the expense of maintaining programmes of artistes.

A central organisation makes up the recorded programmes—for all the world like making up the menu of a dinner, or a set of lantern slides for a lecture—and compiles an expensive library of complete programmes, which can be supplied to stations at a fraction of the cost of maintaining programmes of living artistes

Any particular programme is, of course, only distributed to stations fairly widely separated, so there is no likelihood of two nearby stations both sending out, say, programme No. 1 at the same time. The records are officially referred to as "electrical transcriptions," and the system has already been adopted by a number of stations in the United States. In view of the number of subscribers to the scheme it is possible for small stations to have practically the same talent as the larger ones.

### Time Factor.

Another important point in the United States, although it would not be important in this country, is the question of the difference in time.

For example, a programme sent out at 8 o'clock Eastern Standard Time, would be heard in San Francisco at 5 o'clock in the afternoon, whereas by the use of these electrical transcriptions or potted programmes the items can be broadcast at the appropriate time in any part of the country.

There are, naturally, some people who object to recorded programmes and who feel that without the voice of the living artiste the radio loses its most vital and characteristic feature, but on the other hand there is a good deal to be said for a really first-class programme, even though produced from records.

I understand that at the present time some 95 per cent of the broadcast stations throughout U.S.A. have indicated their

*(Continued on next page.)*

# TECHNICAL NOTES

*(Continued from previous page.)*

willingness to accept electrical transcriptions for broadcasting. The organisations engaged in this electrical transcription work, in almost every case select talent, arrange the programmes, supervise the making of the records, book time "on the air" and, if necessary, supply suitable reproducing apparatus to broadcasting stations.

### Valve Design.

It is often said that present-day broadcasting conditions in the British Isles and on the Continent have produced a state of affairs which makes selectivity of radio receivers more important than sensitivity. The modern three-valve or four-valve screened-grid receiving set has, in fact, such a high magnification that its extreme sensitivity is sometimes apt to become a disadvantage rather than an advantage to the user.

There is no lack of sensitivity, therefore, and the problem now confronting designers is rather that of making sets sufficiently selective. In achieving this aim the design of screened-grid valves is undoubtedly a most important factor and not only should the leakage between electrodes be reduced to the lowest possible minimum in order to assist in stabilising the valve, but also the valves should be capable of a reasonably large working grid-swing at moderate anode currents so as to maintain a high degree of selectivity free from cross-modulation.

### Amplification Factor.

In this connection I should mention that I recently received samples of the New Osram M.S.4 screened-grid valve, which has been specially designed with the above points in view. The inter-electrode leakage capacity has been reduced to an exceedingly low value (roughly 0·0017 micro-microfarads) as shown by National Physical Laboratory tests.

### Mutual Conductance.

Furthermore, the amplification factor and mutual conductance of this valve have been specially chosen to facilitate volume control, which is one of the most important points in modern receiver design, and also to eliminate cross-modulation, which is such a frequent trouble under modern broadcasting conditions.

A further advantage of the particular values of amplification factor and mutual conductance is that there is no need for very critical adjustment of grid voltage; this is an important point because with a critical grid voltage the performance of a screened-grid valve is liable to be impaired owing to the danger of running into grid current on the one hand or rectification on the other.

As regards the importance of increasing selectivity in receivers as much as ever possible, it is interesting to note that this point has lately been very much emphasised by the Chief Engineer of the B.B.C.

I should add that I have some other samples of screened-grid valves on hand, as well as other types of valve submitted to me, and I hope to say something about these very shortly.

*(Continued on next page.)*

# TECHNICAL NOTES

(*Continued from previous page.*)

### Practical Photo-Electric Cells.

It is not so long ago that the photo-electric cell was regarded rather as a scientific toy and the prospect of reducing it down to a really commercial form seemed rather remote, not to mention the question of finding any real practical applications for it.

Far and away its most important use, of course, is in connection with talking pictures, of the sound-on-film or optically recorded variety, but in addition to this the photo-electric cell is finding increasing uses in industry and in other directions. It is now being used for all manner of "counting" purposes, for automatic operation of artificial lighting and for "sentinel" duty, burglar alarms and so on.

So far as this latter application, the cell has been reduced to commercial form, and several manufacturers in the United States are now marketing simple and compact forms of photo-electric "relay." In one form the source of light and the electric relay are combined in a small instrument about the size of a pocket camera and this device is equipped with two lenses, one above the other; from one lens a beam of light is projected and this is reflected from a remotely placed mirror back to the other lens, where it is received by the photo-electric cell.

Interruption of this beam of light by any object causes the relay contacts to close, thereby operating a counter, power switch, signal, burglar alarm or other device, as the case may be.

### G.B. from Mains.

Some little time ago I was writing in these Notes about the question of taking grid bias from the mains unit and I remarked that many people found it simpler to take their grid bias from a small G.B. battery in the ordinary way, rather than to complicate the wiring of the unit and at the same time to run the risk of a greater tendency to hum and instability.

The grid-bias battery—in most cases, at any rate—is a comparatively small and inexpensive item, and the cost is much less than the additional cost involved in providing grid bias in your mains unit.

At the same time, one of the greatest advantages of a mains unit is that—to give it its original name—it is a "battery eliminator," and the more completely it eliminates the batteries and the consequent need for attention, the more complete its advantages, so that if you are making up your own mains unit and you care to go to the length of including provision for grid bias, you will at any rate be cutting out one further item which would otherwise require periodical attention.

### An Ingenious Circuit.

Talking about the arrangement of the circuit of the unit for getting grid-bias tappings, I have recently been examining and testing one of the new "Tannoy" mains units which were mentioned in POPULAR WIRELESS a little time back, and I notice that the Tannoy people have recently patented a very simple and ingenious arrangement, which is incorporated in this unit, for obtaining grid bias, the voltages

(*Continued on next page.*)

# TECHNICAL NOTES
*(Continued from previous page.)*

available being 1½, 4½ and 12; in addition intermediate voltage tappings on the unit, both for H.T. and G.B., can be had at an insignificant additional cost.

The arrangement makes use of the trickle-charging rectifier and transformer winding, the output being adequately smoothed and decoupled by means of a 1-mfd. condenser and suitable resistances and small decoupling condensers, and it seems to work perfectly. Messrs. Tannoy Products have done a good thing in providing this undoubted advantage in such a comparatively inexpensive unit as the one in question, which is their type G.B.1.

### Home Records.

I wonder how many of you have experimented with the making of home records? I have had several home recording outfits sent to me during the past few months and I have from time to time been making a number of very interesting experiments with these outfits.

For the benefit of those of you who may be interested to go in for home recording, I should say right away that, so far as my experience goes, and I think it agrees with the experience of others who have experimented in the same direction, you should not expect to get perfect results at first.

In other words, you cannot expect merely to fit up the device on your gramophone and produce a perfect home record at the first shot. As a matter of fact, it is this very point that gives much of its fascination to home recording.

If you could do it perfectly at the first attempt, it would not be nearly so interesting as it is when you have to keep trying and improving this, that and the other factor in order to improve results. In most of the home recorders at present on the market, the "blank" upon which the record is to be made consists of a thin disc of aluminium or celluloid.

In some cases the cutting needle is a specially shaped and sharpened steel needle, not unlike the ordinary reproducing needle, and in other cases a sapphire or diamond needle is provided. I have found that the diamond needle is very satisfactory if you get a good one, by which I mean one with a suitably shaped point, but it requires a certain amount of manipulation before you discover precisely the right setting and also the right angle between the needle and the face of the disc.

### Tracking.

Usually the aluminium blanks supplied are of about 6 in. diameter, but on this quite a surprisingly large amount of matter can be recorded. The "tracking" of the recording needle across the blank disc is effected in some cases by means of a larger "tracking disc" which is placed upon the turn-table first with the aluminium blank upon the top of it, and in other cases by a tracking screw or screw-feed arrangement which is driven by the rotating turn-table.

The tracking disc has the advantage of simplicity, although unless the gramophone is perfectly level and a good deal of care is taken. I have found that often the tracking needle, "pilot" needle, as it is sometimes called, is apt to slip out of the tracking groove, with the result that the whole arrangement slides over the record face.

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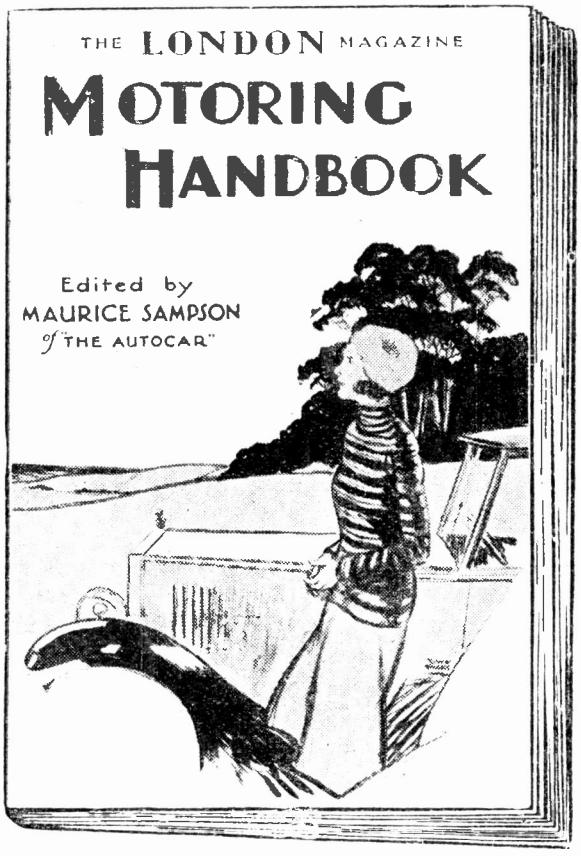


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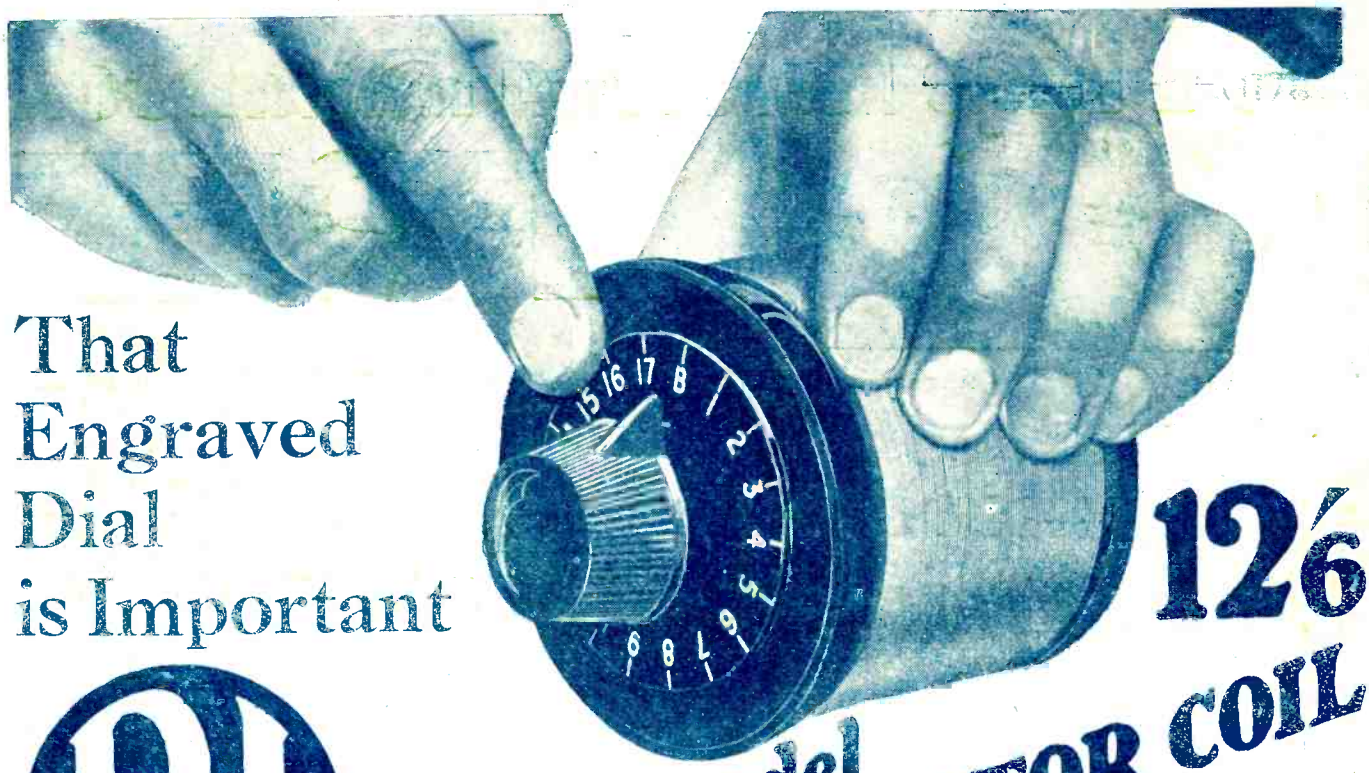

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