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INCORPORATING "WIRELESS"

February 2nd, 1929.

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By Graale Fields

**SHOULD EXECUTIONS BE BROADCAST?**

By The Rt. Hon. J. M. Kenworthy, M.P.

**"P.W." White Print No. 9**





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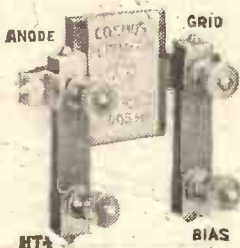


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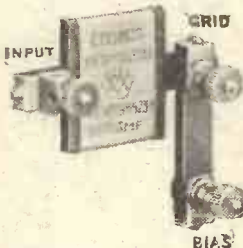
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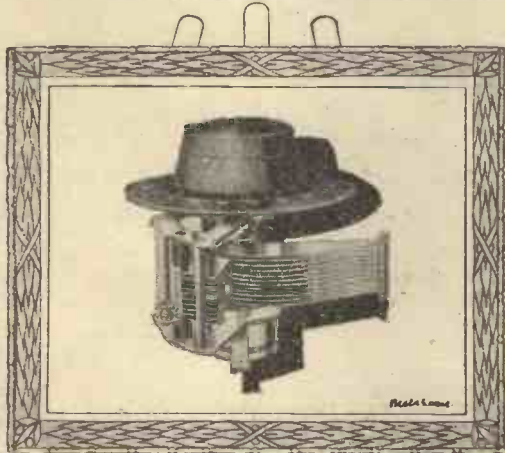
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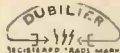
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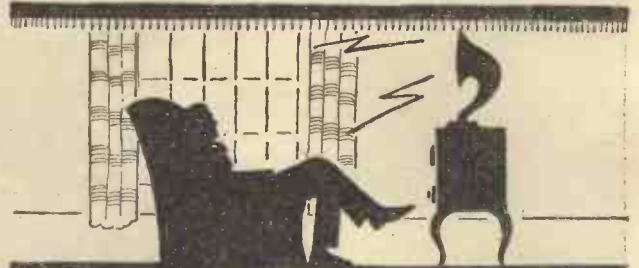
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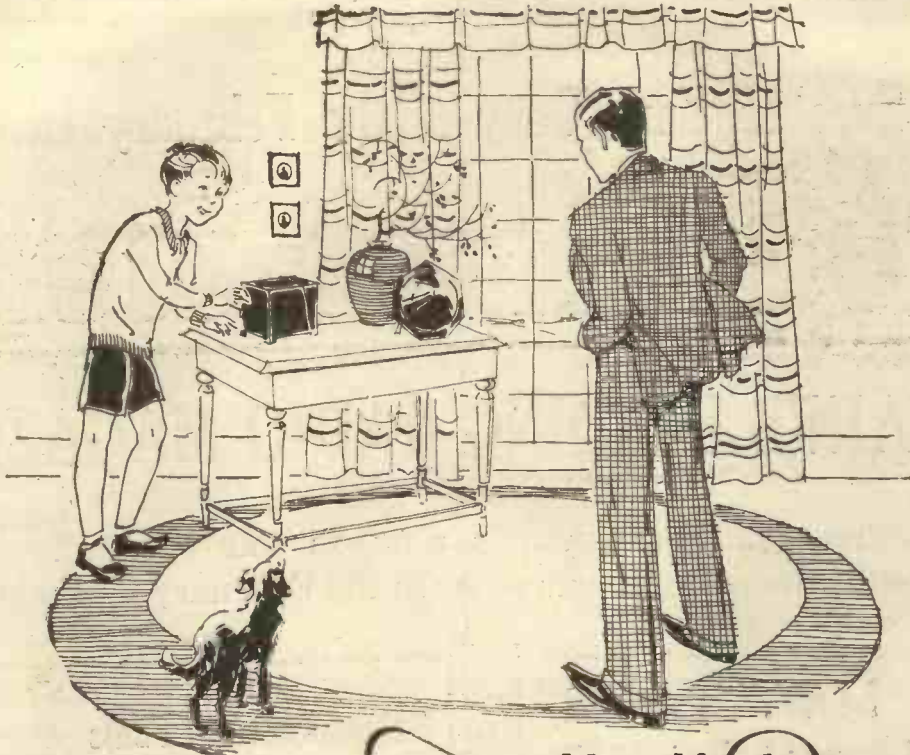
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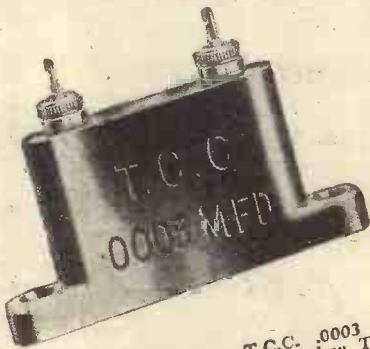
February Issue

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# MR. STRADIVARIUS DID NOT MAKE KETTLE DRUMS!



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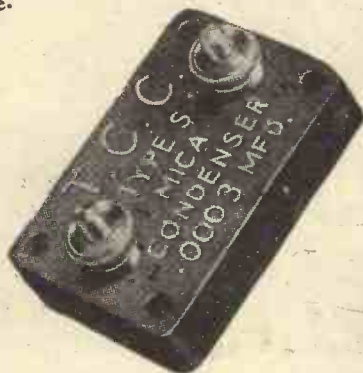


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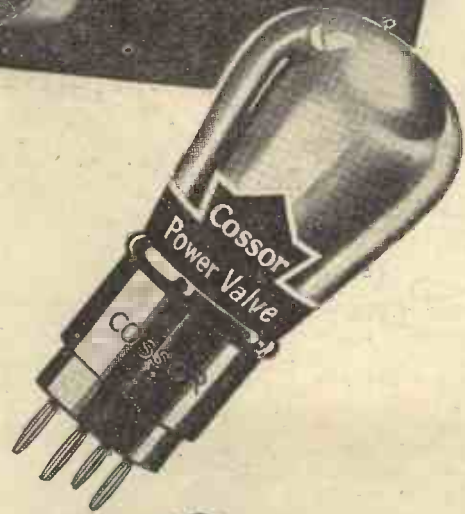
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## RADIO NOTES AND NEWS.

Science versus Crime—"Ariel's" Stable Tip—A Chance for Enterprise—Radio in Rajputana—Truth at Last—"Ariel" Unties the Knot.

### Wanted! The Benignant Beam.

I NOTE a recrudescence of reports about alleged "death rays" and I see that our old friend who kills mice by radio has battered his way into the papers again. Why do men dream so much about easier ways of killing, when to kill is so much easier than to cure. I want to see the scientists begin the search for the benignant ray which will heal tissue, purify blood, destroy evil germs and arrest the progress of malignant growths. Immortality waits for its discoverer.

### "Marjareen."

EVEN "The Times" has opened its columns to matter relating to the pronunciation of the word "margarine." That alone shows how much it matters. The B.B.C.—strangely enough!—plumps for "marjareen," which is how ordinary guys say it. But there is a "mar-gar-eeen" school who favour the "g" being pronounced as in Margaret. The miners are up a gum-tree; exports are not what they were; the flapper vote is shortly to cook our goose. So the B.B.C. teach their young men how to say margarine prettily. Verily, we are the people, and wisdom shall die with us.

### The Latest.

LET me see! We had radio music from a shovel in Scandinavia; and the same from a telegraph pole in Scotland. I now learn that Santa Barbara (Cal.) desires to cap the lot because one of its good wives heard "Ave Maria" from a pan of beans which were cooking on an electric range. She stirred and stirred, like one of the witches in "Macbeth" ("Double, double; toil & trouble"), and picked up a hunting song and a plantation melody. Yeh! In fact it was a regular beano. The "experts" say the pan picked the music from the mains and the bottom of it acted as a diaphragm. (Hem.)

### The Latest, Very Latest.

SCIENCE in Holland bids fair to plant its heavy hoof upon, and exterminate, one of the most pleasing sights of a Dutch hotel—the spider-legged, darling little pages, who, from the tightness of their nether garments seem always asking to be smacked.

The soulless proprietors of an hotel in the Hague have fitted the various rooms with loud speakers which are connected with the telephone exchange in the office. Hence when a letter, a dun, or a telephone call arrives for a guest the news is blasted simultaneously over every public room, whilst wee Jan goes tip-less.

### Science versus Crime.

EVER since they thought of science it has been a sad world for poor hard-working criminals. It was formerly quite bad enough at home, what with microscopes, bloodhounds, cameras and chemistry, but still, one could always go abroad. Then they began to shout a man's misdeeds on the wireless, and now they can send facsimiles of his handwriting, his finger-prints and his photograph by wireless. When they begin to broadcast gramophone records of his voice it will be high time for a poor man to go "into the City" and carry on his profession in a more genteel fashion.

### Reminiscent Mood.

MY office is a sort of clearing-house for radio men back from the Beyond and the Lands of the Seven Seas. Quite a large batch came in this week. Yesterday, I had to pay for teas for five at once, besides giving advice as to the best plays, the quickest route to Latvia, the law about carrying a gun in England and what a fellow ought to pay for a suit. One said, "Ariel, why the deuce do you keep a slipper on your desk?" "It saved my life," I replied. How can a slipper save a life? I'll tell you!

### The Signal and the Slipper.

FACT! Once upon a time, before De Forest thought of the anode, even before two-electrode valves were generally used, I was given a sort of glass bottle with lashings of copper gauze in it, and was told that I was to rig it up into a perfectly absurd circuit and listen for signals from "X." (Headquarters was  
*(Continued on next page.)*

## THE SEA-GULLS "CARNIVAL."



B.B.C. engineers capturing the cries of the sea-birds for the purpose of "background" in the broadcast version of "Carnival," recently produced by the B.B.C.



## NOTES AND NEWS.

(Continued from previous page.)

always springing tricks like that.) I hooked the thing up as per blue print and sat down to wait. I may say that I was running a station in a certain Mediterranean island where charcoal under sand was used for heating.

## The Signal and the Slipper (Part 2).

IF you think this is not real radio I will return your money. Well—it was deuced cold. Three o' the morning. I dozed. I roused and gobbled coffee. I smoked. No signal. Presently the telephones began to respond and I tried to be attentive, but somehow my dreams seemed to be more attractive; glorious dreams, golden visions! Suddenly a streak of Anglo-Saxon austerity roused me. Great Scot! I was being suffocated. I fought my way to the window, and with that slipper I smashed the window and breathed pure air again. Carbon monoxide is rotten stuff.

## "Ariel's" Stable Tip.

JUST in case you do not know about it, let me tell you that the "Wireless Constructor" for February is the rhino's lipstick, and absolutely thrown away at sixpence a copy. Just think of the "Pentwin," the new wonder 2-valver; the "D.C." Four; the "Business Man's" Four; "What the Pentode Really Does," and a nifty little amplifier for short-wavers. These are only a few items picked haphazard. Bless me! When I see the "Constructor" my fingers itch for the brace and the soldering-iron again. The craze never really dies, and with "P.W." and "Constructor" a man can defy a world full of trouble.

## "Words, Words, Words."

QUOTATION from "Hamlet": (See "Foundations of Shakespeare.") A Canadian visitor who has had his hotel room equipped with a portable said to me yesterday: "Say, what's the matter with your broadcasting people? Every time I switch on that goldarned thing, I get information about worms or bugs." A Cape Town reader, writing about 5 SW, complains of the "talks" and wants them abolished except when the King, the Prince of Wales, or G. B. Shaw are broadcast. I wish the B.B.C. would grasp the fact that "talks" are acceptable except when intended to educate us. It is so simple, yet they cannot see it.

## A Chance for Enterprise.

I UNDERSTAND that the Mexborough (Yorks) U.D.C. is to discontinue charging accumulators for listeners, on the grounds that the business resulted in the customers wandering "all over the place." Surely the alleged wandering habit might be stopped by less drastic means! Added to this, the Council's engineer declines to provide listeners with home-charging facilities. Well, here's a chance for the wireless trade to do itself some good. Radio is not going to cease in Mexborough because of the U.D.C.

## Science for All.

HAVING been interested in science from my youth up, I am always on the look-out for specimens of Nature's bounteous works—and to-day I have found the World's Prize Fossil: A schoolmaster,

too! And, b'gosh! he teaches science to his flock—so he says! Now he really and truly divulged to me that he has a second-hand, two-guinea, portable gramophone and a record of "Cavalleria Rusticana." He said: "It opened up to me the joys of music. A new world! You ought to get one." When I told him that I preferred wireless he said, "Jazz is the cocktail of Art. I prefer Mass-kag-nee." Now, I ask you! Did I chuckle?

## Radio in Rajputana.

S. S. B. previously had a 4-valver and an 8-valver, but he says that until he met "P.W." he was working in total darkness. He has tried the "Hartley" and with two L.F. stages gets Bombay on loud speaker at 600 miles, and Calcutta at 1,000. On short waves with the "Antipodes"

## SHORT WAVES.

A London reader writes to say that he made very good contact with a damp piece of earth—when he slipped in the snow the other day.

## WIRELESS AND THE SALES.

12.20. Seasonable Physical Exercises conducted by Miss Norah Bendabit. 1. The Overarm Grab. 2. The In-Sinuating Wiggle. 3. The Surreptitious Prod. 4. The Knee and Elbow Movements.

12.50. Song Cycle by Muriel Mngwump. "I saw three Maids a Sale-ing," "Wait," "The Crown of the Year."

1.15. Professor Boah's talk on the Psychology of the Odd Three Farthings.—"Daily News."

Boss: "Late again. Can't you do anything on time?"

Office Boy: "Ye-es, sir. I bought my radio set that way."

What is meant by the term "Damped Waves?"

A girl who has just paid a lot of money for a Marcel, caught in the rain without a hat.

Canstic.—The lady who said that if she got half as good a supply from the Gas Company as she does from 2 L.O. the dinner would never be late.

## EDISON'S GREAT RIVAL.

Casey: "My static eliminator was invented by an Irishman."

Jones: "What was his name?"

Casey: "Pat Pending."—"Radio News."

"Even the slightest crackling of paper held by speakers before the BIKE has been eliminated in the studio of K F I." Elmira (N.Y.) Telegram.

They'll be using motor cars next.

An elderly lady, who has just returned from a visit to America, says she was very disappointed at not being able to obtain any of that "radio ham" she heard so much about.

Adaptor, he gets 5 SW, PCJ, 7 LO, PCL, 2 X A F, 2 X A D, K D K A, Java, 2 F C, and 3 L O. Well, we are greatly encouraged by all this and hope to hear that S.S.B. has started a radio club. We thank him and wish him a cool New Year.

## Broadcasting in Holland.

MY recent Note about the Dutch is confirmed by Y.O. (Bussum, Holland), who says that there is no licence fee there but that listeners can send voluntary contributions to the station they like most. Five societies broadcast, four of which are political or religious. The odd one is the biggest and best. Not an ideal state of affairs and one which drives many Dutchmen to listen to B.B.C. stations. 5 G B is received best by daylight. Y.O. asks how readers get PCL, which he finds often distorted. He is now trying the "Empire"

Two. Thank you, Y.O. Glad you like the B.B.C. stuff. How do you like Chamber Music?

## Stop Press.

ERIC DUNSTAN is home again after his Indian adventure and is announcing for the B.B.C. The B.B.C. has had hundreds of letters about political parties broadcast on the subject of the De-rating Bill. Always on the look-out for something interesting! By the way, the big opposition to the B.B.C.'s new publishing venture was stimulated by the P.M.G.'s refusal to receive a deputation from the publishing trade. I should not be surprised to see some more official heads fall into the basket before the matter is over.

## The Truth at Last.

ALL radio men will be grateful for the comforting words of my dear old, reliable standby, the wireless expert of "Reynolds' News," who keeps us bright and merry in spite of the B.B.C. Attention! "The difference between a crystal and a valve is that a crystal uses the alternating impulses from the aerial, rectifies them, and uses them direct on the 'phones, while a valve stages them up besides rectifying, the detector valve turning the oscillating impulses into sound waves. It is in the relays of two, three, or more valves that a transformer comes into play, and the crystal experimenter seeks . . . vainly for an oscillating crystal so that transmission from one crystal to another may be boosted up like that of a valve."

## "Ariel" Unties the Knot.

NO prizes are offered for the solution of this puzzle, so I will explain it. A crystal "uses" the alternating impulses, but the valve does not "use" them; it prefers to "stage them up." (Always the little gentleman!) The detector valve turns impulses into sound waves—a sort of conjuring trick.

The vibration of the telephone diaphragm has, positively, nothing to do with the sound waves. Then, one transformer is sufficient for a 3-valve "relay." The expert has never heard of the oscillating crystal circuit. Sad! And so the amateur cannot boost up transmission from one crystal to another like the transmission of a valve. Well, well, well!

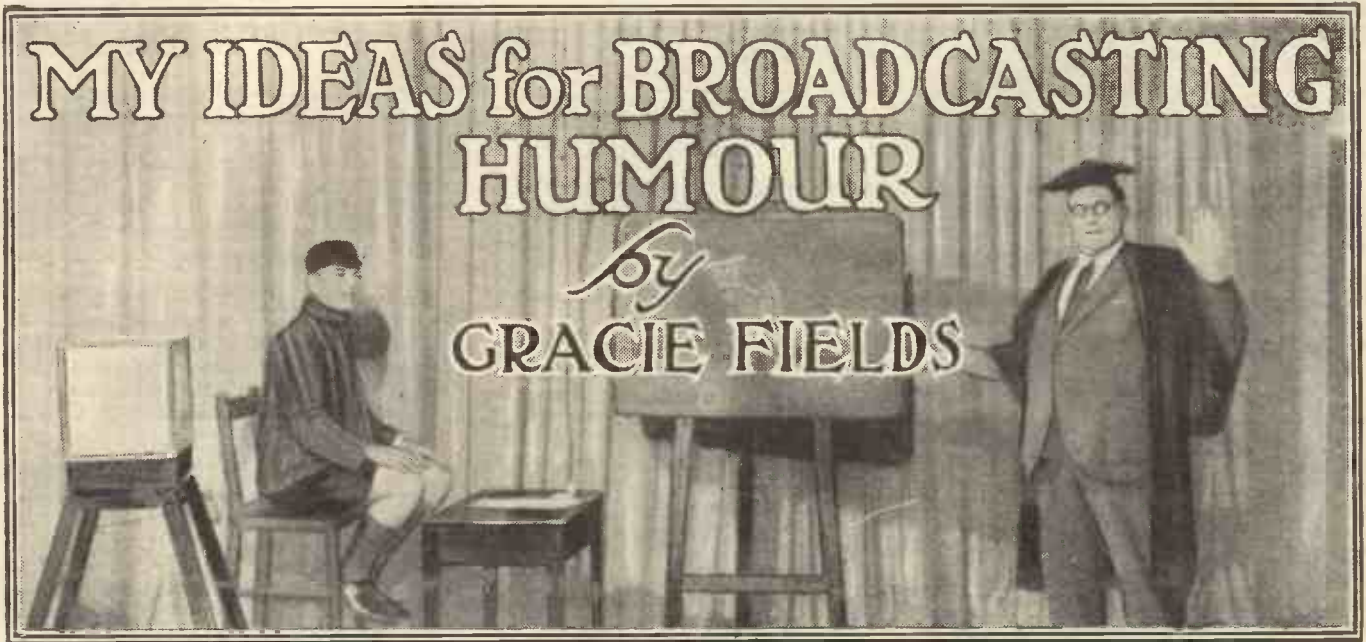
## An Acknowledgement.

ENERGETIC readers will please turn up "P. W.," January 5th, page 930, the paragraph "Sabbath Humour." I thank the 33 ex-telegraphists and 1 enthusiastic "Wolf Cub," who wrote to tell me that they can recognise the morsing of certain people owing to peculiarities of its style. But I beg leave to point out that what I took exception to was the suggestion that Morse is rhythmic. Still, I like these chaps who snap me up, because they read "P. W." with their "eyes open" and their minds like needles.

## Transmitting Note.

MR C. W. BEGBIE, 39, Smetham Downs Road, Purley, Surrey, having been allotted the call-sign G 5 Q H, will be working on a wave-length of 172 metres on Mondays and Fridays after 11 p.m. and on Sundays from 11 a.m. till noon, and from 6 p.m. till 8 p.m. He would be glad to receive reports. (He does not say whether he works Morse or telephony or both.) ARIEL.





An exclusive article by one of the most popular of modern music-hall and stage "stars," who has appeared several times before the microphone.

**B**RROADCASTING for me is a new experience. While, on the one hand, it is a very delightful experience, it also has its difficult moments. My success as a radio artiste, I am told, is entirely due to the fact that the sense of humour I am fortunate in having seems, to a lot of people, of an infectious type. It is no easy thing, though, being funny over the wireless. On the stage, you always know whether the audience is with you; on the wireless, you cannot be sure if there is any audience!

Humour has been, and always will be, the most important item in the wireless programmes of to-day. Wireless audiences insist on being amused, and it is up to the B.B.C. and their servants (among them, me!) to provide that amusement. Broadcasting is in a field all its own and, once the artistes realise that the Studio at Savoy Hill is not, and never will be, the stage of a legitimate theatre, so much the better.

#### Studying the Audience.

According to the correspondence received at the London station (for which, I am told, there is a special man to deal only with my mail—it being so large. Wigan always had good writers!), the most popular items in my programmes are my comedy songs. The result now is that I always make my radio turn seventy-five per cent comedy.

As much as possible, I study the audience I am likely to have. That may seem a very improbable proposition, but I have discovered that the time of day makes a very great difference to the age of the listener. In the evening, for instance, my audience is nearly always composed of older people and children; they both prefer my comedy numbers. At more general times of the day, the young people like my sentimental songs. With them, the ballads and popular songs are the most popular.

I think that my nephew, who is six years of age, is fairly representative of the type of child who likes wireless. He cannot stand the sentimental song and, whenever he hears either "Ramona" or "Blue Heaven" he lets out a fiendish yell and stuffs up his ears. If I happen to sing "Why does the

Hyena Laugh?" he goes into raptures over it.

To get down to the subject of this article, I would suggest that, as comedy songs are so very popular with all classes of listeners, everything should be done to see that more songs of this type should be introduced into the programmes. The kind of comedy song that is most popular is the one that lends itself to phantasy of expression. By that I do not mean one should shake one's hips (they can't see that, anyway!) and add two



Miss Gracie Fields.

or three *vo do he hos* in true American fashion. The songs I sing allow me to interpolate ideas of my own, and speak *asides* which are in keeping with what I sing about.

For instance, my Lancashire audiences are delighted when, at the end of a chorus, I speak a few words of dialect. The very use of the expression "Coom on, lads!" I am told, sends them into hysterics.

#### Local Colour!

Wireless humour would be greatly improved if each artiste studied the likes and dislikes of their audiences. A London programme of songs will not meet with the same reception at the Cardiff station. When I tour the provincial stations, I always make a point of introducing local colour. At Glasgow, I speak quite a lot of Scotch; in Wales I tell them all I know about the leek; and, if I were to broadcast in Paris, I would

do my best to give them the impression that I was late of the "Folies Bergere."

In my efforts to broadcast only the most popular type of wireless humour, I always choose my songs with the greatest care. "In a Woodshed She Said She Would," "Our Avenue," "The Cloisters" and "Ee, by Gum" are always extremely popular.

Humorous monologues, to be effective over the wireless, should be witty in almost every line; otherwise they mean very little. The so-called radio revue can only be a success if it is mainly a humorous one. A revue that is just the stringing together of a number of popular melodies interspersed with one or two sketches, means very little.

Humorous songs are very rare to-day and, as soon as they are written, they are snapped up by managers for use in legitimate theatres. A suggestion, I think, that might have some good results would be for the B.B.C. to have a humorous song-writer permanently on the staff, who would collaborate with the various artistes by giving them exactly what they want.

#### Revue Sketches.

Another important requirement for the really popular wireless programme is the sketch. To my mind, most revue sketches are written with a view to a good last line only. This, again, is a terrible mistake. Nobody likes listening to dialogue unless it is clever and funny.

If I were asked to compose a wireless programme after my own liking, I should make my humour my background, and build the funny stuff around the lighter material. It is the biggest mistake in the concoction of a revue to make the melody and the sentiment the most important part.

Six comedy songs, three sketches, two ballads and some carefully written dialogue in the form of gags stringing the whole thing together would be the ideal entertainment. Impromptu humour is the most successful form of humour over the wireless and, as long as it is in the hands of capable and experienced artistes, the result will be more than successful.



## TUNING-IN WITH THE ALL-WAVE H.F. UNIT.

Although this article deals in particular with an amplifier described recently in "P.W." much of the interesting information given is applicable to other instruments.

By THE "P.W." RESEARCH DEPARTMENT.

WE noted last week that tuning-in a short-wave station with the aid of the H.F. unit, then described, was no more difficult, if not easier, than without it. This may seem a rather surprising statement, since there is obviously an extra dial to tune, and we had perhaps better see, first of all, why this is so.

Well, the fact is that the tuning of the H.F. dial is not at all critical. You can set it almost anywhere, find the station on the tuning dial in your set, using reaction as usual, and then turn your attention to the tuning of the H.F. stage. Until you do so you will find you are getting little or no H.F. amplification, and signals are just about the same as without the unit, but they will be quite easy to find in the usual way.

Next proceed to vary the H.F. dial, and you will presently run through a setting at which signals suddenly come up in volume, and you will know that you have, roughly, found the right adjustment.

### A Non-Radiating Unit.

At this point you will find you have to re-adjust slightly the tuning and reaction settings of the receiver itself, after which another slight touch on the H.F. dial will secure the exact adjustment needed for best results.

By the way, you can make the first preliminary adjustments with the set actually oscillating, and note the strength of the

carrier-wave as you vary the tuning of the H.F. dial. As you go through the right point the note of the squeal of the carrier will suddenly change and increase in strength.

After this, you can return to the adjustments on the set, and tune in correctly, slacking off the reaction and re-tuning as usual. We mention this method as a permissible one because with the H.F. unit in place the set becomes practically non-radiating and will not cause interference with neighbouring listeners.

### Reaction Indications.

Another point calling for explanation is the effect of the unit on reaction control on short waves. On most sets this is what you will find happens: If you tune in a carrier-wave with the set oscillating and then proceed to adjust the H.F. unit, you will observe that when it comes into tune the circuit will stop oscillating, and require re-setting to pick up the station again, unless it was oscillating very strongly.

You can use this peculiarity as a useful indication of resonance, and will soon get the trick of using it as a check on your tuning. When you have got a station properly tuned in, and with the set only just below the oscillation point, you will find that if you vary the tuning of the H.F. unit a little either way, the set will break into oscillation.

With certain types of short-wave sets the behaviour as regards oscillation will be a little different. In these cases the circuit will function in exactly the opposite way, and will oscillate most easily when the dials are in tune.

Then, if the receiver is set just below oscillation point it will break into oscillation as the H.F. dial comes into step and stop again on either side; and this, again, can be made to give you the indication you want.

So far as operating the unit on the upper (normal broadcast) waves is concerned there is nothing to be said, for it behaves in just the usual way. The extra dial requires rotating in step with the dial on the set, and the knack of this is soon learned.

### Tuning Tests.

To help you to keep them in step you can use the ordinary indication of the sound of liveliness heard when the circuits are in resonance. This sound is made up of a faint crackle of atmospherics, stray Morse signals, and so on, and it is easy after a little practice to manipulate the dials so that it is maintained as you search.

This sound, of course, is only prominent when the set is in its most sensitive state just below the oscillation point, so to make the best use of it you must be careful to readjust the reaction a trifle now and then as you go. This, of course, will also ensure that you do not miss any of the weaker stations.

It is quite possible to devise a method of tuning on the broadcast waves which uses a reaction indication similar to that described for the short waves, and you can do this if you like, for there is little risk of causing interference. There is practically no radiation from an oscillating set with this unit working in front of it, and so there is no harm in the practice. However, it is rather a clumsy method, and should not be necessary on ordinary waves.

## AN EASILY-MADE VICE.

OFTEN the busy radio constructor needs a vice of one description or another at a moment when no such article is available. In such an instance, as, indeed, in all others of a like nature, it will always pay the amateur to adopt at once the motto *Nil Desperandum*, or "Never Despair," it being really surprising how little practical difficulties and wants of this type can be overcome.

### Work of a Moment.

Perhaps, therefore, as we said, you may have need of a vice for the carrying out of a certain piece of work. No such article is available, you find. Cast your eye around the workroom, however. Perchance it will alight upon one or two old bench clamps which you have used in the past for fastening down odd pieces of apparatus.

If so, your vice is already provided. you merely having to arrange two of the clamps in the manner depicted in the illustration herewith.



Showing how two clamps of a most inexpensive nature, can be arranged so as to form a useful vice.

In fact, so successful has the writer found this temporary improvised type of vice to be that he is at present quite content to use it as a permanent adjunct to his work-den.

### Quite Steady in Use.

Even if you do not already possess two of these useful clamps, you can buy a couple of them for less than a shilling at any ironmongers, or at any of the cheap stores which are to be found in most towns nowadays.

A vice such as the one illustrated above will be found to be quite steady in use, and its thread will be found to be cut with sufficient accuracy and fineness for any but the most exacting uses.

## TWO USEFUL TIPS.

If telephones get burnt out or become demagnetised, they can be re-conditioned quite successfully by firms specialising in that class of work.

Never drop the telephones upon the floor, as the permanent magnetism is likely to be destroyed or weakened by shocks of this kind.



# LOCAL INTERFERENCE

There are numbers of things which can interfere with your programmes besides oscillators and atmospherics. This article deals with "man-made static," and tells you how to eliminate them, or, at the least, render them less troublesome.

By J. F. CORRIGAN, M.Sc., A.I.C.

**T**HE oscillating fiend is, to all intents and purposes, a product of the times. His numbers are rapidly diminishing owing to a better appreciation of the technicalities of radio-set operation.

Still, however, there is one very great trouble which the radio-set owner will always have with him. I refer to the presence of what may be termed "Man-made Static," or local interference due to the proximity of commercial electrical lines and apparatus.

Now, all interference of this nature—and it is common enough, goodness only knows—has one fundamental cause. Its nature is an inductive interference, the unwanted currents being induced in the aerial circuit of the receiving installation from the neighbouring electrical source.

## A Miniature Transmitter.

Take the case of an arc lamp situated near to the receiving installation. The arc is virtually a gigantic spark passing across two electrodes. And, being such, it broadcasts electrical waves of interference. These waves, however, are not of the one frequency or wave-length. In fact, an arc, like every other form of spark, generates interference over a very extended wave-length band, and thus it becomes almost impossible to tune the interference out by means of a wave-trap or rejector circuit.

Indeed, most wave-traps do not function very well when employed for the elimination of the type of local interference which we are at present considering, and on that account we shall not refer to them during the present discussion. The elimination of

unwanted local interference, however, is a pressing problem to many a keen radio enthusiast. Many are the homes in which the proximity of a tramway system renders radio reception during certain hours of the day almost impossible. No wonder, therefore, that the question, "How can I deal with this problem" has been echoed countless thousands of times.

To be candid, however, there is really a lot of luck in making a complete success of



as high as possible, making it as long as you can. On the other hand, if the source of interference is situated on one of the upper floors of a building, then, under such circumstances, you will probably find that a lower and a shorter aerial will succeed in reducing the trouble.

The same applies to interference derived from neighbouring tramway wires, high-tension lines, and so on. If you can get your aerial a good height above the lines, then you may be able to get above the interference, as it were. But, as is generally the case, if you are not able to erect the aerial at a great height, try the effect of an abnormally low and short aerial. The sensitivity of the installation will, of course, be affected, but it is very likely that the trouble will be decreased almost to vanishing point.

## Aerial Alterations.

Another line of attacking the problem is to erect the aerial in the most favourable position, as described above, and then to endeavour to provide some leakage path for any of the interfering currents which may still be present.

(Continued on next page.)



A flashing electric sign which produced much interference, but which was cured by placing fixed condensers across its contacts.

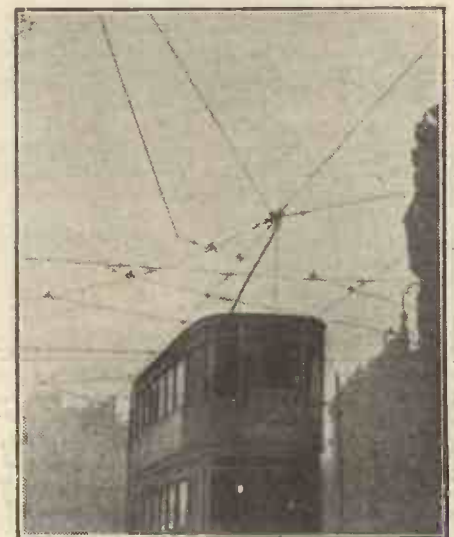
the elimination of unwanted local interference. This is the case, because in most instances you cannot remove or even modify the interfering source. You have just got to put up with it, and to make whatever alterations and modifications you can to your own receiving installation. Hence, therefore, the element of good fortune which enters into the task.

I give on this page a few typical illustrations of sources of local interference which, of their very nature, are more or less permanent sources, and therefore cannot be removed.

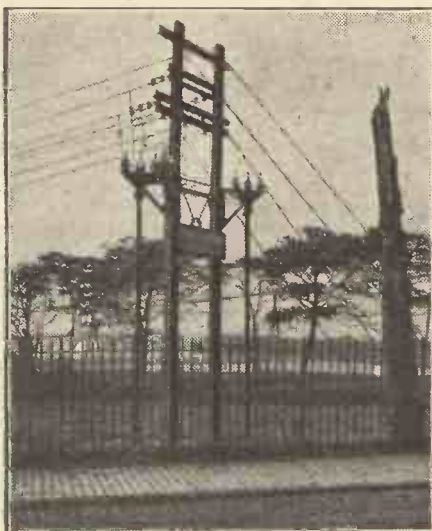
## Reducing the Trouble.

Take, first of all, therefore, the interference created by the proximity of an electrical generating station, or of a motor or alternator working in some adjacent factory. Some alleviation of the trouble set up by this type of interference can be effected by making a series of trials with new aerial positions. Try, for instance, to find out the exact lie of the source of interference, and then erect your aerial at right angles to it, if at all possible.

If the generators are situated on the ground floor or in the basement of the factory, then endeavour to erect your aerial



Electric trams can interrupt the programmes of nearby listeners. When you see the overhead trolley flashing-sparks you can be sure that "static" is being generated in the ether.



High-tension lines such as these sometimes cause considerable interference with listeners' sets.



## LOCAL INTERFERENCE.

(Continued from previous page.)

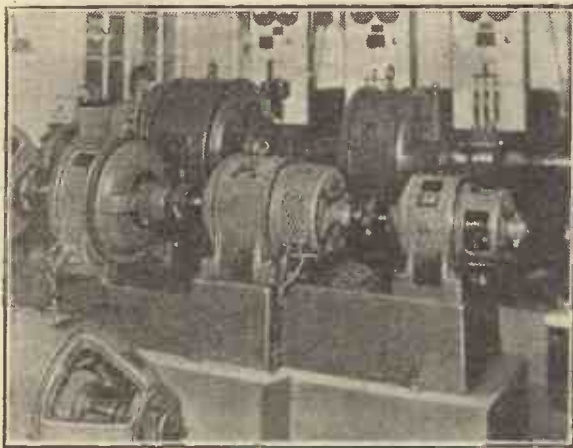
For instance, a few inches of the aerial down-lead may be wrapped round with a layer of rubber tape, on top of which may be wound several turns of wire, the free end of this wire being earthed. In this manner, the interfering current impulses may be carried away to earth, the greater bulk of the currents received from the broadcasting station being passed on to the set.

Faint generator hum due to the continual presence of some electrical machine situated a little distance away from the receiving installation may generally be cured readily by the simple expedient of connecting a 6-ft. length of bare wire to the earth terminal of the set and by allowing the free end of the wire to dangle on the floor. In this case, also, the unwanted interference is led away to earth.

### Series Condenser Helps.

Naturally, in dealing with questions of local interference, you will try the effect of placing a condenser in series with the aerial lead of the set. It may exert a good effect. On the other hand, possibly it may have none. But if you place a condenser in parallel with the aerial lead of the receiver and then connect one side of the condenser directly to earth, quite an appreciable diminution of the interference will be apparent. In this case, however, some of the signal strength of reception will "go west," and so it will be a question of deciding which is the better effect to put up with.

You may, perhaps, live on a main road, and in the vicinity of a flashing sign. Now, a device of this nature will probably give endless trouble owing to the constant series of clicks which it will create in your reception, such noises being due, of course, to the moving contacts which operate the sign.



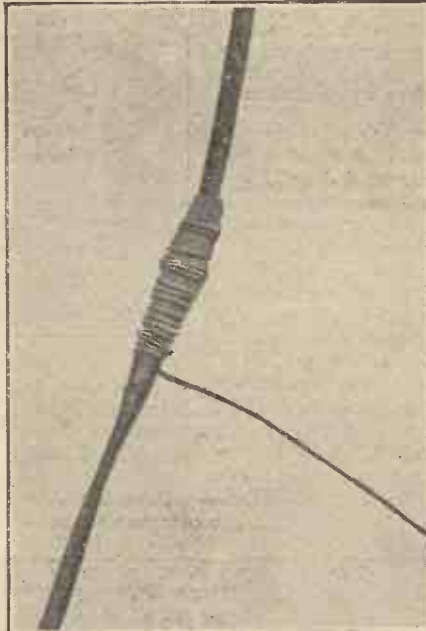
Generating rooms of works and factories are often sources of much interference.

If you can get the owner of the sign to place a 2-mfd. condenser across the contact leads, all will be well. If, however, such an arrangement is not possible, the interference will have to be treated on the lines suggested above.

Quite a lot of local interference may be eliminated by lining the inner sides and the

base of the radio set cabinet with tinfoil or silver paper, and by connecting this metallic lining to the earth terminal of the set, the relatively feeble interference currents being filtered off to earth in this manner.

In this article, I have said nothing about the excellent properties of the frame aerial in avoiding all unwanted local interference



Portion of an aerial down lead wrapped with rubber tape—an external wrapping of wire conveying interfering currents to earth.

of the nature described above, the interference-eliminating properties of such a device being very well known. If, however, the interference is really very bad and persistent it would, after all, be as well to construct a rough frame aerial, and by its use to determine just how it will function in your own particular case.

The use of an underground aerial provides a very good method of getting rid of interference, and it is really a matter for surprise that this expedient is not more often resorted to. You can construct an underground aerial by enclosing a length of aerial wire in a good thick rubber hosepipe and by burying this in the ground at a depth of 3 or 4 feet.

### American Methods.

This system of aerial construction is popular in America as an interference preventer. The underground aerial should be as long as possible, certainly not shorter than 20 ft., and it is very important that the aerial wire itself should be insulated from the earth. It is, therefore, necessary to run the aerial wire along the centre of a rubber tube, and, if the best results are required, the tube should also be enclosed in a leaden pipe in order to protect it against the deteriorating influence of the ground moisture.

Thus it will be seen that an effective underground aerial forms a rather expensive

article, and that its construction implies the necessity of having available a good stretch of land. However, when these conditions permit, the underground type of aerial is certainly one which is worth trying out, for it will be found to eliminate interference entirely, whilst, at the same time, not appreciably affecting the distance-reception qualities of the set.

The use of screening methods in modern set construction has done a great deal towards the reduction of common types of local interference. At the same time, however, it must still be emphasised that the adequate dealing with annoying problems of this nature necessitates the use of a loosely-coupled aerial circuit, together with some means of very sharply tuning the remainder of the circuit. Due attention to these factors, however, combined with a similar careful scrutiny of the position and construction of the aerial will, however, produce the desired result in the way of eliminating the interference.

### Try Counterpoise Earth.

Finally, in dealing with interference troubles of the nature described above, the properties of a counterpoise earth should be tried out in actual practice. You can easily make such an earth by placing a kitchen fender across two chairs, and by connecting the earth lead of the set to it.

The counterpoise should preferably be placed directly under the aerial, but, even when this is not possible, a trial of this nature will indicate how far the use of a counterpoise will be of advantage in any particular case. In most cases a decided advantage will be found to accrue from its use, and, therefore, having made a few preliminary experiments, a permanent counterpoise earth can be constructed and erected in some convenient position.

## BATTERY BREVITIES.

When celluloid accumulators are used it is a good plan to get the acid renewed about once a year.

The renewal of the acid in an accumulator is not a job for inexperienced persons, so that this is always better carried out at a reliable service station.

If the level of the liquid in an accumulator is allowed to fall below the top of the plates the deficiency should immediately be made good with distilled water.

For an accumulator to be in good condition it should be charged and discharged pretty regularly, so that the use of a very large battery for a small set is inadvisable owing to the fact that it will be standing for a long time in a partly discharged condition.

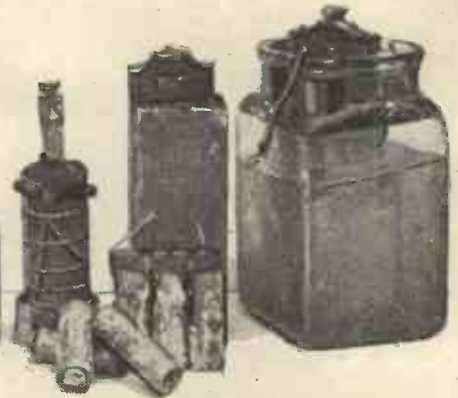
If a larger-than-necessary accumulator is used for running the filaments of a small set it will be necessary to charge it more often than the set itself would require owing to the necessity for preventing a tendency to sulphation due to the slow discharge.

One of the advantages of the use of wooden separators in an accumulator is that they not only separate the negative from the positive plates, but provide a barrier which prevents fragments of active material belonging to one plate from coming into contact with its neighbouring plate, and thus setting up local action.



# YOUR H.T. BATTERY

An article which records the inner secrets of one of the most essential of radio accessories.



THE "innards" of a single dry cell, or of a radio H.T. battery, are not a mystery to many radio amateurs, for, with a little care, such articles may be broken up into their component parts very readily.

At the very best, however, the pulling to pieces of a radio dry battery does not get the inquirer very much further in the matter, for it generally only reveals the presence of a carbon rod and a quantity of black, messy-looking material.

Nevertheless, there is a great deal of interest connected with the inner workings of a dry cell, and, therefore, I propose to devote myself to the topic in these columns.

Any chemical reaction involving a motion or interchange of electrons will, under

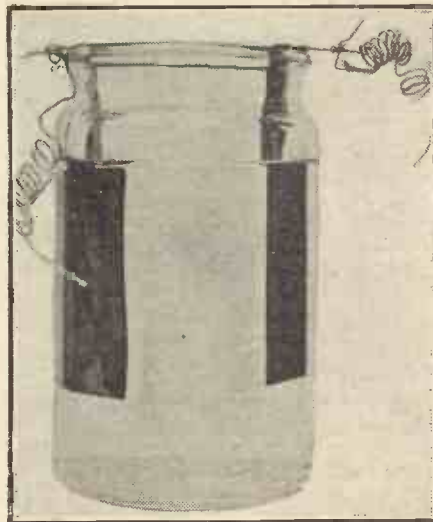


Fig. 1.—The simplest electrolytic cell, upon whose action the working principle of all other batteries is based.

suitable conditions, provide an electric current. Most chemical actions, of course, cannot be utilised for this purpose, either on account of the rapidity with which they are carried out, or for other more or less special reasons.

### The Simplest Cell.

Suppose, however, we place a copper and a zinc sheet in a weak solution of sulphuric acid. In such an instance we obtain the simplest type of electrolytic cell, an article of this nature—made up in a glass jar—being illustrated at Fig. 1. In such a cell a chemical reaction goes on. The acid attacks the zinc plate, liberating hydrogen ions which travel to the copper plate and

there give up their positive charge. Thus the copper plate becomes electrically positive, the zinc plate being negative.

Thus if, under these conditions, an external circuit is made, the positive current travels from the

copper plate through the external circuit, then back into the cell via the negative plate. This current flow proceeds until either the zinc is eaten away, or the copper plate becomes so loaded with hydrogen molecules that it inhibits the flow of current, the cell in that condition being said to become "polarised."

Now, the current provided by an ordinary dry cell or battery is derived on very similar principles. Dissect such a battery, say, an ordinary flashlamp battery, on removing the outer cover, and you will, be confronted with three separate cells connected up in series, as is depicted at Fig. 2.

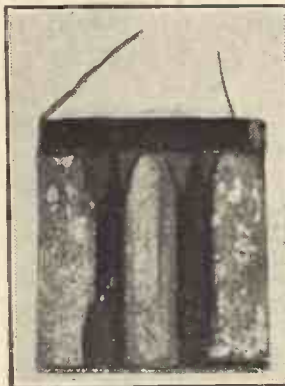


Fig. 2.—Flashlamp battery with outer casing removed, showing three component cells connected in series.

Inside the Battery. Taking one of these cells, and dissecting this further, after removing the zinc case, you will obtain a little fabric bag, similar to that shown on the right of the photograph, Fig. 3. Removing the outer covering of fabric from this, you will obtain a rod of carbon, around which is compressed a

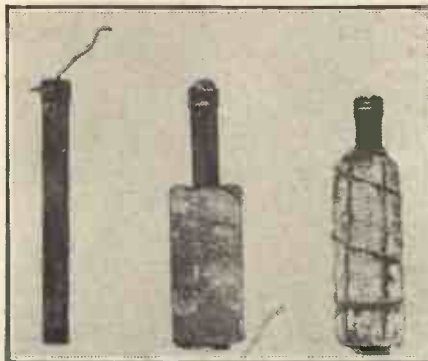


Fig. 3.—The component parts of a dry battery cell.

thick layer of black material. This latter may be seen clearly in the centre of the photograph, Fig. 3, whilst the carbon rod itself is depicted on the left of the photograph.

Or, perhaps, if you possess a fine saw, and a sufficient amount of patience, you will be able to saw through the cell, making a section of it, in the manner shown at Fig. 4.

### Depolarising.

From such illustrations it is evident that the component cells of an ordinary flashlamp or radio H.T. battery consist of nothing more than a zinc case enclosing a bag of black carbon material, and having in the centre a carbon rod.

How, therefore, do such cells obtain their supply of current?

Next to the zinc of the cell is placed a paste of sal-ammoniac (ammonium chloride) and water.

This is the "electrolyte" of the cell, and it takes the place of the sulphuric acid in the simple cell described above. The sal-ammoniac attacks the zinc, and thus causes a flow of positive hydrogen ions to the carbon rod. The latter, therefore, becomes positively charged, and a current flows through the external circuit of the cell.

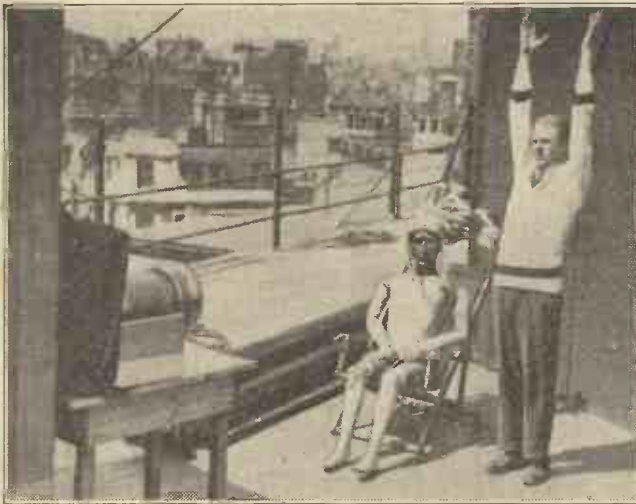
If, however, a dry cell consisted of nothing more than a zinc case with a carbon rod in the middle of it, the intervening space being packed with a sal-ammoniac paste, hydrogen gas would very quickly collect on the carbon rod, and would thus stop the flow of the current, the cell becoming polarised.

Consequently, something has to be introduced which will prevent the accumulation of hydrogen on the carbon rod—a something, in fact, which will act as a "depolariser." This "something" has been found in the material known as manganese dioxide, which comprises the black substance compressed round the carbon rod. Its function is to oxidise the hydrogen before it has time to accumulate round the carbon rod, and thus to remove it.



Fig. 4.—A dry battery cell in section.





A television test in progress in New York.

# TELEVISION NOTES AND NEWS.

Details of the progress of television in the various centres where experiments are being made.

From A CORRESPONDENT.

IS television to be general this year, or in the three to five years forecast by David Sarnoff, vice-president and general manager of the Radio Corporation of America? Mr. Sarnoff says that the things towards which we are working now are: photo-electric cells of much greater sensitivity, more brilliant and readily-controlled lighting devices, better means of synchronising light elements on the scanning apparatus at each end of the radio circuit, and some way of fitting in, or reducing, the wave-band of between 20,000 and 100,000 cycles now needed for television.

### In Great Britain.

What is concerning some people in Great Britain, however, is whether they are going to be able to judge for themselves what can be done in television in this country now. The B.B.C., in an official announcement, have turned down the rumours that Baird television was to be given a "try out" from a B.B.C. station. The message that came to me from the B.B.C., however, was not so definite. It said: "Keep your eye on it: it may come off some day."

### Von Mihály.

Round the system of Dénes von Mihály has now been formed the Telehor Aktien-

gesellschaft. A man well known to financiers in this country helped von Mihály along in his early experiments, and I was one of a party at a table in one of Berlin's most famous restaurants when influential men of several countries were discussing forming a company to develop von Mihály's work. I was asked whether operations should be extended to London and New York. I advised against, for the time being. As I said, New York could show better television efforts than von Mihály had to offer.

### Progress.

Now, however, I have been given figures (at present I must keep them to myself) which, if they are true, make Berlin's television efforts much more favourably comparable with those of other capitals.

### Jenkins, Too.

Financiers are seeking to help C. Francis Jenkins, the Washington inventor you all know, to hurry his television sets on to the market. Jenkins Television Corporation will have a capital of £2,500,000.

### New Bell Cell.

A film of rubidium one atom thick is the sensitive surface in a new photo-electric cell produced by A. L. Johnsrud, of the Bell Telephone Laboratories. The metal was evaporated and its vapour deposited in a vacuum to form the film.

### American Television.

This is yet another paragraph about America; you see it is over there that the really frenzied television enterprise is taking place. The Federal Radio Commission of America, however, issued an order towards the end of last year which severely restricted both television and still-picture transmission "until such time as the Commission are able to ascertain the value of such to the advancement of the science of radio." Probably the U.S. ether would otherwise have been filled with unreceivable interference.

### Chinavision.

Einstein, as a relaxation from his mathematics—and to give him inspiration—plays his violin. Professor Max Dieckmann, who still hopes to harness cathode rays as a television transmitter, practises sculpture. A box came for me from him, and I thought that here at last was a new cathode ray apparatus he had sent me to test. Instead it was a china woman so beautiful that the womenfolk not only allow me to have it in the house but threaten to confiscate it.

### Square Holes.

"Are square holes better than round holes in a television disc?" asks a correspondent who is making his first home receiver. It has been calculated that only 78 per cent as much light passes through a round hole as through a square one, and some amateurs find that circular holes cause dark bands across their images.

### Standardised Discs.

It appears that the radio manufacturers of America have standardised the Jenkins television disc, and that these will universally be produced for experimenters.

## PRACTICAL POINTERS.

IF an aerial is surrounded by tall buildings, trees, etc., these absorb some of the energy which should reach it from distant broadcasting stations, and the aerial is therefore said to be "screened."

A good high aerial is always an advantage, but it is particularly so in the case of crystal receivers, as this class of set is worked entirely from the power which is picked up by the aerial.

Good conductivity copper wire makes the ideal aerial, the sort known as 7/22 having proved particularly efficient in operation.

Instead of using stranded wire, of the 7/22 type, for aerials, it is possible to use one single wire of heavier gauge with good results (it should preferably be enamelled wire, and a suitable gauge is 18 or 20).

It is essential to allow good spacing for wiring of the high-frequency circuit of any valve receiver.

Crystal detectors of the semi-permanent type in which two crystals are used in contact with each other, are often rendered more sensitive by varying the pressure—holding the two crystals together.

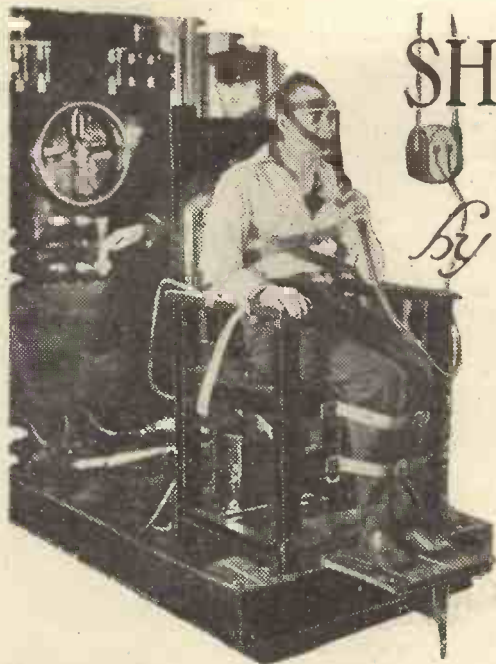
To avoid the annoyance of the need for continual adjustment it is a good plan to wire a spare crystal detector close beside the existing detector of the set. A switch can then very easily be arranged to bring either one or the other

detector into circuit, so that if one is temporarily out of adjustment the programme is not interrupted whilst this is put right.



The wireless station at Kabul, the only means of communication with the outside world.





# SHOULD EXECUTIONS BE BROADCAST?

By Lt. Commander the Hon. J. M. Kenworthy  
R.N.M.P.

An unusual type of article for "P.W.," isn't it? However, we must point out that the very well-known author of this article advocates the broadcasting of a commentary on at least one murder only, because he thinks it would do more than anything else to bring about the abolition of the Death Penalty in this country—a cause to which he is an adherent.

country with the keenest of interest, and the B.B.C. has ample means of finding out whether a repetition would be desired.

Why should we not, however, go a step further and broadcast the execution? It is not many years since all executions took place in public. Citizens demanded the right of assisting as eye-witnesses at such tragedies. Statesmen and judges considered it was a useful deterrent to others to see the death of the miscreant:

For some years now we have abolished public executions. The Sheriff, the Chaplain, the Prison Governor, the Warders, the Executioner and his assistant are present in their official capacities. But there are always two or three pressmen present at an execution as well. They are not, however, allowed to give descriptive accounts.

Nearly always the same formula is used. We are told the prisoner ascends the scaffold with a firm tread, and that death is instantaneous. But these are the only details that the public, who pay to keep up the prisons and who find the salary of the hangman and warders, are permitted to know. No doubt there are valid objections to the general public being admitted to executions nowadays; but would these same objections hold against the proceedings being broadcast? At any rate the experiment might be tried.

We are sometimes told what the condemned man has for breakfast, but no other details, gruesome or otherwise, are given to us. We never hear of the well authenticated cases where death is not instantaneous owing to some miscalculation of the length of the drop required, and where the hangman has had to finish off the condemned by jumping on his shoulders or pulling at his feet.

## End of Capital Punishment?

At the other extreme was the case of the man John Conway, who was hanged in August, 1891. The drop was too great, and his head was nearly pulled off his body. There must be many details of this kind which the public surely have the right to know, so long as capital punishment remains the law of the land for certain crimes.

At this point I may as well enlighten the readers of POPULAR WIRELESS by telling them that I am opposed to capital punishment, for very many reasons, and I believe that if one execution were broadcast the popular outcry against hanging would be so great that we should follow the lead of 23 other countries and eight of the United States of America in substituting penal servitude for life.

But to return to the actual execution.

(Continued on next page.)

**B**BROADCASTING can never be too bright. And it should, when possible, be realistic. The listener has a right to hear about matters of public interest and especially about events so absorbing as a sensational murder, the trial of the accused and the extreme penalty on the scaffold.

A great murder trial is always followed with close attention by hundreds of thousands of people of both sexes and all ages. As many as possible cram themselves into the Court-room. The others must be content with the reading of the evidence in full in the papers, helped out by realistic pen-pictures of the Judge, the Counsel for the Defence, the Prosecutor for the Crown, the witnesses, the accused, and the final scene when the verdict of "Guilty" is brought in and the Judge, assuming the Black Cap, pronounces the sentence and orders that the prisoner be "hanged by the neck until dead."

All this is so engrossing a subject for newspaper readers that I have often wondered why listeners are not permitted the privilege of hearing a murder trial broadcast. Also, a public service would be rendered, because we are told that the trial and the death of the accused are a warning to those with criminal propensities and inclined to a life of crime.

## The Trial Scene.

One of the excellent B.B.C. announcers could bring each scene more clearly to the minds of listeners by describing the return of the Jury after their deliberations, the foreman's report to the Judge of "Guilty," and the demeanour of the prisoners and his friends and relatives. Thus: "The Judge is assuming the Black Cap; you will now hear the Judge's words." Then the prisoner will be asked what he has to say in his final defence, and if the wretched man or woman decides to say anything it will be broadcast from a microphone suitably placed in front of the dock. The whole broadcast would be vivid and dramatic enough for anyone.

So much for the trial scene. At least one broadcast of an important murder trial would be heard by listeners all over the

## HOW THEY DO IT IN AMERICA.



Oregon's murderer, Leon Tarel, broadcasting a speech during the course of the trial for his life. America has had several broadcasts of this highly sensational character.



## SHOULD EXECUTIONS BE BROADCAST?

(Continued from previous page.)

It takes place in the early morning by present practice. But in view of the great public interest that would, no doubt, be evinced when it was known that an execution was to be broadcast, Sir William Joynson-Hicks, the present Home Secretary, if then in office, who is always so ready to please the public, would, I have little doubt, order the execution at a more convenient hour for the listeners.

What should we hear?

First, the tolling of the bell. The Prison Chaplain then joins the two warders who have spent the last night in the condemned cell with the convicted felon. His sacred office completed, the Executioner enters. If the convict is not then in a state of collapse it is customary for him to take leave of his attendants and he gives them, as a rule, some small token or keepsake.

### A Vivid Account.

Now I will take the place of the announcer at the hanging of Mr. X.

"The Executioner is pinning X's arms. The procession is being formed. The Chief Warder leads the way, followed by the Chaplain reading the service of the Burial of the Dead." (This will be broadcast). "Behind the Chaplain follows the convict, supported by four warders; immediately behind him is the Executioner. Then the principal warder, the Governor of the Prison, the Sheriff, two officials bearing wands, survivals of the great days of public ceremonial, and, lastly, the Prison Doctor.

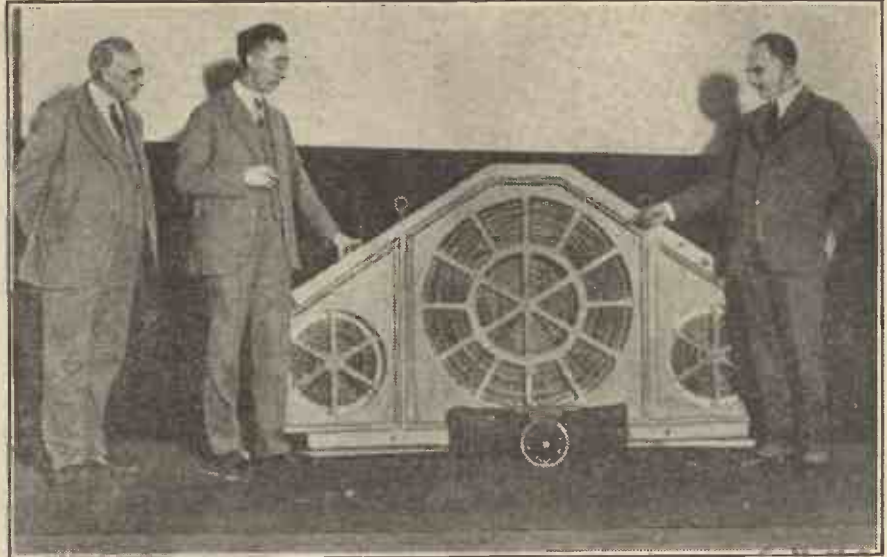
"The condemned man is walking with a firm step. He has now reached the

scaffold. He has been asked if he has any final confession to make. He has shaken his head. He is now standing on the 'drop.' The Executioner is pinning his legs, just below the knees, with a strap. The Executioner has placed a white bag over his head. The noise is being adjusted round his neck. We now hear the Chaplain . . .

the penalty of his crime. The body will now be left hanging for an hour, in accordance with the regulations."

I have never assisted at an execution; but I have outlined the announcer's probable programme from official accounts of executions and from the prison rules and regulations.

## A LOUD-SPEAKER FOR THE "TALKIES."



One of the huge loud-speakers used in an American cinema in conjunction with Talkie films. Left to right are C. A. Hoxie, Dr. C. W. Hewlett and C. W. Stone, who were responsible for the perfection of the scheme employed.

'dust to dust, ashes to ashes.' The Executioner has taken his stand at the bolt. He has withdrawn it. The drop has fallen. There are a few convulsive movements, but the body is out of sight."

A decent interval of silence, and then: "All movement has ceased. X. has paid

None will deny the dramatic possibilities of such an item in the B.B.C. programme!

Some may argue that such an item would be gruesome. If these listeners will indulge in a little self-examination, they will find that they are already converted to the abolition of the death penalty.

And because I wish my country to follow the lead of so many other civilised nations in its abolition I strongly advocate the broadcast of at least one execution.

Those who claim that the death penalty is a deterrent can hardly object. Owners of wireless sets, who have paid their licences, have a right to be put in touch with all great events in the world. So I would allow wireless to bring home to the people what hanging really means far more intimately than can ever be done by any newspaper report.

## AMERICA'S RADIO CHANGE-OVER.



The Engineer-in-Charge of W.E.A.F. (New York) resetting the dials on the amplifier to conform to the new 860-kilocycle wave of that station, which, among many others, was altered by order of the Federal Radio Commission.

## INDOOR AERIALS.

One of the great drawbacks of the indoor aerial is that, in addition to being short, it generally has to be arranged close to walls or other surfaces which, either through the presence of metal or damp, act as "screens."

Both the shape and the direction of the indoor aerial have a great effect upon its efficiency, so that all possible variations should be tried until the best arrangement is found.

As a general rule an indoor ariel should be shaped like an outdoor one and not zig-zagged across the room from one point to another.





# That pure top note

## upon this silent background -

High notes undistorted in amplification if you use the Lissen Transformer: they are given their true value against a background that is dead silent. That is why instruments like the tenor saxophone are so popular with the hundreds of thousands of amateurs who have a Lissen Transformer in their set. These transformers can be used in every modern circuit—no matter what receiver you are building, you will ensure the fine quality of reproduction by using a Lissen Transformer in each stage of amplification.

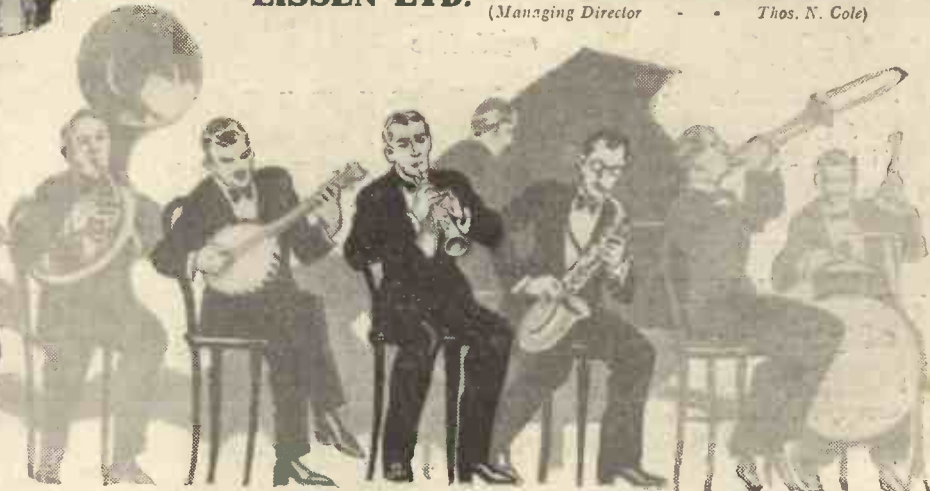
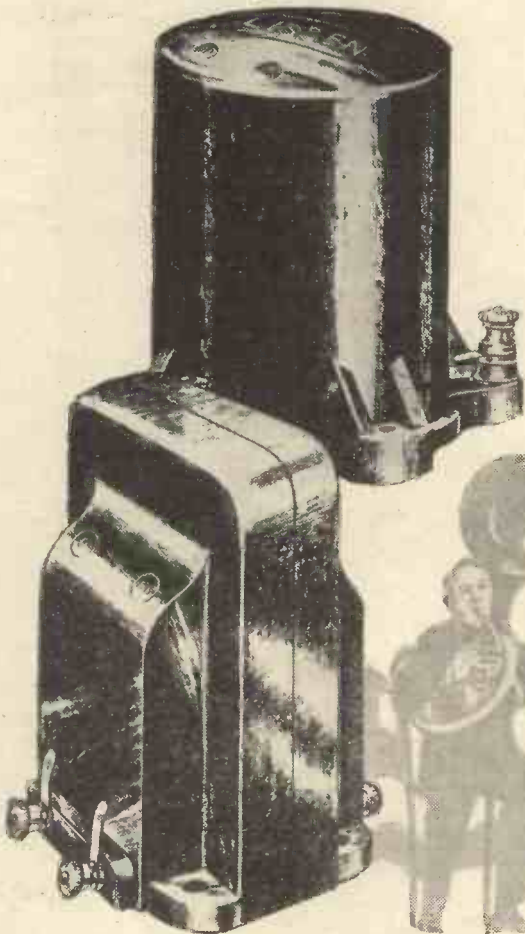
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### The LISSEN SUPER TRANSFORMER

This Super LISSEN Transformer is made in two ratios, 3½ to 1 and also 2½ to 1. The 3½ to 1 is suitable for use in either the first or the second stage of an L.F. amplifier, or can be used in cascade for both stages, and with practically any valve. The 2½ to 1 transformer is suitable for use after a high-impedance rectifier valve without fear of distortion or loss of high notes and overtones. The price is the same for both ratios **19/-**

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(Managing Director - Thos. N. Cole)







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*Extra Quality  
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Extra  
Cost*

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4 POINTS  
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HAVING AT  
NO EXTRA COST

1. Altogether purer tone.
2. A more abundant volume with distortion eliminated.
3. "Background noises" will have ceased.
4. Foreign stations will be more easily tuned in and seem perceptibly nearer.

# Osram Valves

with the

MADE IN ENGLAND

Sold by all  
Wireless Dealers.

# "TENACIOUS COATING"



**OSRAM VALVES** are the valves with "Tenacious Coating," the secret of purity and maximum power throughout an abnormally long life.



**NEUTRALISING A DETECTOR!**

The Editor, POPULAR WIRELESS.

Dear Sir,—The following experience may be of interest to your readers.

I have been using the original Cossor "Melody Maker" for some considerable time, but have only been able to get 2 Z Y and 5 X X with it, although my aerial and earthing systems are good.

In considering ways and means to improve matters, I hit upon the expedient of treating the detector valve in somewhat the same way as an H.F. valve, i.e. by neutralising it with a "Polar" vernier condenser, which I happened to have by me.

The results have been somewhat astonishing. I can now get Munich at any time on I.S. At the time of writing I am listening to Dublin. I have also had Langenberg on I.S. and Breslau on 'phones, with one or two other German stations not yet identified. On the long waves I can now get Radio Paris and two others not yet identified. Tuning is extremely sharp, so that I have had to fit vernier adjustment.

On the local station (2 Z Y) and 5 X X the quality of reception is greatly improved and volume increased.

I don't know whether this idea has been tried out before, but I have never seen it mentioned in "P.W." which I have taken since No. 1.

Should any of your readers care to try the experiment with other sets not employing H.F. stages, it would be interesting to hear of the results.

I am, Sir,

Yours faithfully,

"VECTIS."

Oldham, Lancs.

**A HOME-MADE LOUD SPEAKER.**

The Editor, POPULAR WIRELESS.

Dear Sir,—Since you are at present publishing articles on the construction of cone loud speakers, etc., perhaps my own experience of them may be of some use to some of your readers.

My own set is resistance-coupled throughout, with super-power valve last and choke-capacity output, complete with all anti-motor-boating devices, etc.

The combination loud speaker I have finally arrived at is a large 14 in. white drawing-paper cone (two thicknesses at the edge to prevent any paper rattle), freely suspended in 1-in. border of oil-silk, in a large cabinet of heavy oak with 3-ply front, and no back. Size of front, 20 in. by 30 in. The cone is driven by Blue Spot adjustable unit. Inside the cabinet, facing backwards, is a large Brown loud speaker in series with the Blue Spot, and across the terminals of the loud speaker is an Itronic high-value variable resistance. This combination gives as high a quality as I have yet heard, and the reason for arriving at it are as follows:

First started with 10 in. buckram cone alone. Fault, resonant on some low notes, poor below that. Continuing to experiment with various sizes of cone and various weights. The bigger and lighter I made the cone, the better the bass notes. Kraft paper I scrapped, since I failed completely to make a cone of this material which did not have a peculiar papery tone, rather like a Japanese fiddle.

Finally I arrived at the present cone, and found that whilst the bass was splendid, without resonance, I had lost a good deal of purity and volume on high notes.

I next tried the small cone at the back, as described in your article last week. This certainly improved matters greatly, but still I had not got anything

**CORRESPONDENCE**

**NEUTRALISING A DETECTOR!**

**A HOME-MADE LOUD SPEAKER—MAKESHIFT CRYSTAL SETS, Etc.**

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

like the brilliance on high notes which the Brown used to give. I made eight cones for this job, varying in size from 2 in. to 8 in. of both paper and buckram. Finally I put the Brown back inside. Result, perfect on lower notes, too loud on high; obviously out of balance. Finally put variable resistance across Brown to control its volume without affecting the Blue Spot. Result, as near perfection as one could wish to hear.

The effect of altering the resistance whilst the set is in operation is very interesting. With the resistance full in, the lower notes predominate. As it is gradually altered, the high notes start to increase until everything is in perfect balance. Gradually they get too loud and finally are right out of balance again. The set is used also with gramophone pick-up, and on such records as "The Ride of the Valkyries," "Oberon Overture," "Invitation to the Waltz," etc., the Re-entrant H.M.V. simply isn't in it.

I have heard three moving-coil speakers, one a Panatrope. It is impossible to say whether this combination is as good or not, since when I heard them each was giving tremendous volume in large show-rooms, and it was impossible to judge whether everything would be in perfect balance at reasonable volume in an ordinary-sized drawing-room. Personally, I thought the middle notes were far more powerful than either the high or low notes. Hoping the above may be of interest to some of your readers.

Yours sincerely,

C. C. S.

Birkenhead.

**MAKESHIFT CRYSTAL SETS.**

The Editor, POPULAR WIRELESS.

Dear Sir,—I thought that it might be of interest to you to know of the remarkable results that I am obtaining from a "Makeshift" crystal receiver that I wired up a few days ago. It consisted of a No. 75 coil shunted across a '00025 variable condenser, and connected to the detector and 'phones in the usual way.

Without an earth of any kind whatsoever, the results obtained from London and 5 G B were only slightly inferior to, and those obtained from 5 X X (with No. 200 coil) were even better than, those obtained in the ordinary way from my variometer-tuned crystal set. The results were only slightly im-

proved on an earth being added. The variometer-tuned crystal set, as might be expected, will not produce a sound unless connected in the orthodox way with an aerial and earth.

I should be interested to know if any of your readers can explain this curious phenomenon.

Yours very sincerely,

G. DE C. TAYLOR.

West Ealing, W.13.

**THAT PCJ STATION.**

The Editor, POPULAR WIRELESS.

Dear Sir,—Of late a considerable amount of correspondence has been published in your columns relative to the reception of P C J, and we note that quite a number of listeners state that they cannot hear this station.

We shall be glad if you will once more draw your readers' attention to the fact that a new P C J Time Schedule came into operation as and from December 6th, 1923, copy enclosed herewith.

Possibly everybody is not yet cognisant with the new times in force, and may be wasting time listening in in accordance with the schedule in use up to December 5th, 1923.

Yours faithfully,

PHILIPS LAMPS LIMITED.

Phillips House, 145, Charing Cross Rd., London, W.C.2.

**NEW PCJ TRANSMITTING SCHEDULE.**

On and from Thursday, December 6th, 1923, weekly transmissions from P C J will be timed as follows:

DAY	TIME	
THURSDAYS	18:00-20:00	British India, Europe and South Africa. Spain (in Spanish).
	23:00- 0	
FRIDAYS	0-01:00	Brazil (in Portuguese). The South American Republics (in Spanish). Europe.
	01:00-03:00	
	18:00-20:00	
SATURDAYS	0-01:00	The Dutch West Indies. Central American and Antillean Republics, as well as for the British and French Colonies in America (in English, Spanish, and French). Australia and New Zealand (in English).
	01:00-04:00	
	04:00-06:00	

**ALL FOR 7s. 6d.**

The Editor, POPULAR WIRELESS.

Dear Sir,—I have just completed "The 7/6 Three-Valver," and at this very moment am listening to the London programme coming through at full loud-speaker volume and good quality. I think it is a wonderful set. I have just been listening to several foreign stations and 5 G B at good volume on loud speaker, with about 80 volts H.T.

I might add that I did not take much trouble in making the grid leaks, condensers, etc., the sizes and the paper for the resistances being only approximate, and the variable condensers were made with several pieces of foil.

Thanking you for a very cheap but wonderful set, Yours faithfully,

R. PARISH.

Essex.

**M**ANY thanks to those of my readers who have been good enough to write, either to correct me for some of my misstatements or to tell me of their own experiences! Two or three letters have been particularly interesting, especially that from the reader who is unable to produce any form of threshold howl, even if he goes out of his way to do it! Would that I were so placed!

**A New Three-Valver.**

I have a new three-valver going now which appears to be absolutely immune from threshold howl, and I put it down to the fact that I have incorporated an anti-motor-boating device consisting of a decoupling resistance of 30,000 ohms and a by-pass condenser of 2 mfd. I have tried various valves, run-down H.T., all sorts of different grid-leaks, etc., and cannot produce the noise. With any other set I have handled, however, what a difference! A little slackness in any one of these directions produces it at once.

For some peculiar reason the Americans do not seem to be coming in at all well

**SHORT-WAVE NOTES.**

By W. L. S.

just yet. Probably those who are new to short-wavers since last year will think that 2 X A F is quite in order, and that there is nothing wrong with transatlantic conditions at all. My answer to them is "Wait and see what he can be like." On some of the really good nights last year the strength of 2 X A D on an ordinary two-valver could only be compared with that of 2 L O at a distance of about six miles, and 2 X A F usually ran him fairly close.

Have you noticed Eindhoven working under his new call-sign, P C J? He has dropped one J, as have all the other Dutch commercials dropped the final letter. P C L is very seldom heard nowadays. The old familiar A G J (Nauen) has had

his call-sign changed to D H E, since under the 1923 regulations no call-signs are to begin with A or B, and all German calls begin with D.

How many of my readers who have persuaded their receivers to take the plunge down to 10 metres have found that it is possible to tune anyone in down there? For one point, your condenser and slow-motion dial must be absolutely silent and smooth in action, or you will not hear the man in the first place. And then it is by no means everything to hear him.

**Eliminating Hand-Capacity Effects**

You must also hold him, or try your hardest, and this requires complete freedom from hand-capacity effects on the tuning dials. It is quite essential to use a throttle-control circuit, or some similar arrangement under which both sets of moving plates can be earthed. The use of a metal dial which can also be earthed is a help. In the usual case these precautions should be sufficient, without the necessity for using a metal panel or a screen behind the panel.



## LATEST BROADCASTING NEWS.

## PRESSING THE B.B.C.

TELEVISION: THE TRUTH—  
TECHNICAL QUERIES AT  
SAVOY HILL—DANCE CHAM-  
PIONSHIP BROADCAST—  
MUSIC AT CARDIFF.

## Pressing the B.B.C.

THE recent war between the B.B.C. and the Press, composed by a truce, has proved the signal for a revival of several quiescent feuds. For instance, it is understood in musical circles that fresh difficulties have arisen in connection with the Queen's Hall. Messrs. Chappell have never made any secret of their opposition to the B.B.C., and with the consideration of an extension of B.B.C. sub-tenancy came the opportunity to make things uncomfortable, if not impossible, for Savoy Hill.

It looks as if there will be a considerable curtailment, if not a complete termination, of B.B.C. concert work at Queen's Hall. This would entail a return to the Albert Hall. Meanwhile, the theatre industry is getting ready to try to exploit the difficulties of the B.B.C. There are rumours of other hostile moves, and it is quite on the cards that the truce with the Press will not survive the General Election.

Efforts are being made to get one of the parties to take up "Charter Revision" as an election plank. This would be an interesting development. The Liberals are the most dissatisfied party at the moment. If they made it their big election issue there would not be much trepidation at Savoy Hill.

If, however, the Conservatives adopted the idea, and got in first with it, things might be distinctly awkward. In any event, Savoy Hill has a more difficult and anxious time of it than at any time since the Sykes Committee. The pity is that so much energy is diverted from programme building to political protection.

## Television: The Truth.

With other troubles in the foreground, television has not attracted much attention lately; but with the reassembly of Parliament it again becomes a very live issue. It was the lobby of the House of Commons that revealed the fact that political pressure had succeeded in getting the P.M.G. to insist on the B.B.C. agreeing to a new "secret" trial some time in February.

The full publicity which this received, coupled with the usual furious attacks on the B.B.C., was hardly calculated to improve the "atmosphere" of negotiation. The result is that the chance of rapprochement is far more remote than it was two months ago.

It remains to be seen whether the political pressure can be brought to bear once more,

Meanwhile the Fultograph continues to gain ground. The B.B.C., in addition to extending the experiments until October 30th, is considering whether some of the programmes may not be illustrated by this method.

## Technical Queries at Savoy Hill.

Over 26,000 letters were received by the Technical Correspondence Section of the B.B.C. at Savoy Hill, during 1928. Complaints of interference by oscillation, Morse, heterodynes, and other causes were responsible for about 50 per cent of this correspondence, technical queries coming next on the list with approximately 5,000 letters.

The section reports that letters are becoming more difficult to answer, probably because of the definite improvement in the design of receiving sets. A careful analysis

## A LESSON IN HOWLING.



A demonstration with "howling" tubes of various audio and other phenomena at the Wheatstone Laboratory, King's College, W.C.2. This laboratory is the oldest for teaching of Physics in Europe, dating from 1834.

## TECHNICAL NOTES.

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

## SMALL BEGINNINGS

WHAT CAN YOU HEAR?—MILLIONTHS—ETC., ETC.

## Small Beginnings.

IN recent articles in this journal by a well-known contributor, some interesting facts and figures were given showing the extraordinarily small amount of energy actually received from the ether by a wireless receiving aerial.

This energy is so small in the average case that it would be necessary to accumulate it for years before it reached an amount comparable with that expended in the smallest mechanical operation with which we are familiar—for example, the energy used by a fly in walking up a wall.

## What Can You Hear?

It is very interesting to consider also some of the other extremely minute quantities which are met with in radio. For instance, the amplitude or extent of the vibrations of the diaphragm in a headphone is generally exceedingly small (unless, of course, the sound which is being reproduced is exceptionally loud, when the diaphragm may vibrate at its centre to an extent of perhaps 1-1,000th of an inch).

Generally, however, the extent of the

of the correspondence has revealed the fact that the technical talks by the Chief Engineer were extremely helpful, inasmuch as that lightened the work of the section by preventing a considerable number of inquiries which have hitherto had to be dealt with in writing.

## Dance Championship Broadcast.

Jack Payne and the B.B.C. Dance Orchestra, together with Debroy Somers' Band, the Piccadilly Players, and the Ambassador Club Band, all of which are frequently heard by listeners, will play for the finals of the Amateur Ballroom Dancing Championship organised by the Columbia Graphophone Company at the Royal Albert Hall on Thursday, February 7th. The championship will be under the supervision of Santos Casani, well known for his microphone dancing lessons, and music from the hall will be broadcast between 11 p.m. and midnight.

## Music at Cardiff.

Sir Henry Wood is to conduct the National Orchestra of Wales in a concert at the City Hall, Cardiff, on Thursday, February 14th. During the same week the orchestra will play in a performance of "King Olaf" to be given on Sunday, February 10th, by the Cardiff Musical Society, and also at other concerts at the National Museum on February 11th, 13th, and 16th, and at the City Hall on February 16th, when the artistes on the last-mentioned occasion will be Kenneth Ellis (bass) and Eda Kersey (violin).

vibration is only a small fraction of 1-1,000th of an inch; the ear can actually perceive a sound when the amplitude of vibration of the air in contact with the ear-drum is as small as one-ten-thousand-millionth of an inch! Naturally people differ a good deal in the sensitiveness of their ears, but the figure I have just mentioned represents a fair average for a normal ear.

## Millionths.

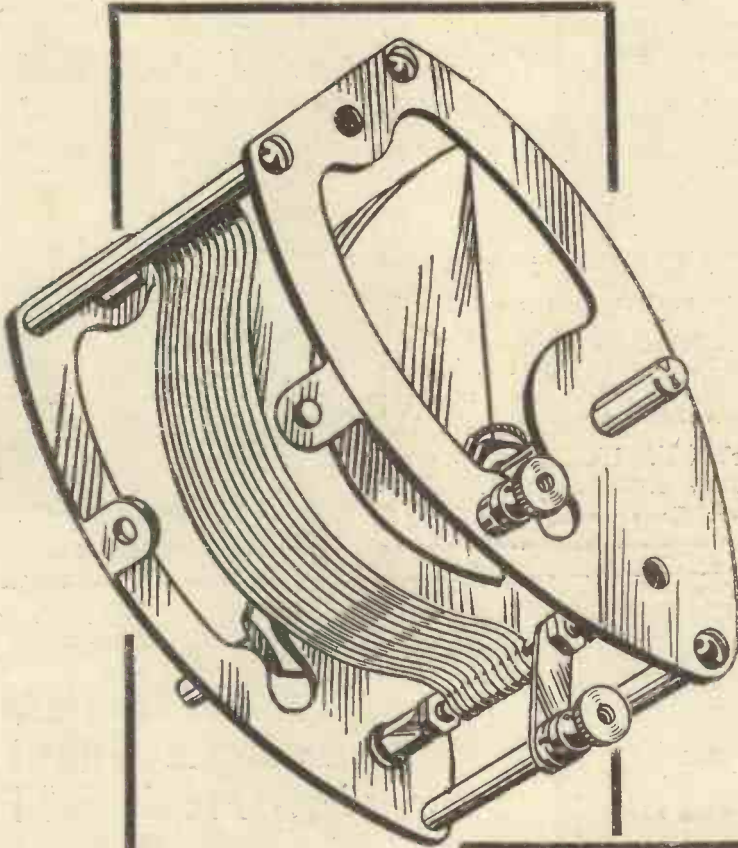
To talk about one-ten-thousand-millionth of an inch, or even one-millionth of an inch, conveys little to the imagination unless some reference is made to some object with which one is familiar. Take one of the ordinary pages of this magazine—I have not measured them, but I imagine they are roughly about 1-400th or 1-500th of an inch in thickness.

A sheet of paper one-millionth of an inch in thickness (if we could make such a thing) would therefore require 2,000 sheets laid one on top of another to make up the thickness of a single sheet of this paper. If the thickness were one-ten-thousand-millionth

(Continued on page 1124)



# You've got to tune with this Lissen Condenser to appreciate how fine it is



You'll find it an aristocrat among condensers. Feel how it separates stations close together; look at its rigid unshakeable construction—examine its long bearing. Notice the entire absence of end pressure; think of it as everlasting—finally look at its price, and ask yourself if you have ever seen a condenser to compare with it anywhere.

Remember, this is a standard condenser which you can use in any and every circuit. You can gang it; use two or three of them together. You can use a drum control for it instead of a dial. You can mount it on a panel and it has feet for baseboard mounting, too.

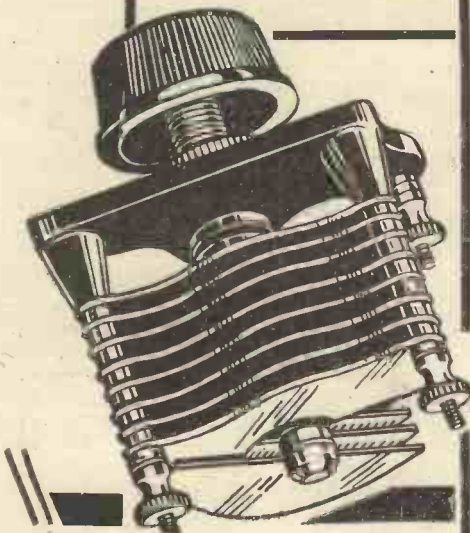
·0001 mfd. capacity	-	-	<b>5/9</b>
·0002 " "	-	-	<b>5/9</b>
·0003 " "	-	-	<b>6/-</b>
·00035 " "	-	-	<b>6/3</b>
·0005 " "	-	-	<b>6/6</b>

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**REACTION CONDENSER**

Embodies many of the exclusive features of the big Lissen Condenser, including no end pressure on any end plate to distort frame or vanes.

"A" Type

**4/-**

"B" Type with insulated bushes for mounting on panel **4/6**

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**ALL POWER UNITS FOR SUPPLYING H.T. AND L.T.**—Model A.C.4, All-Power Unit for A.C. Mains. With power supply costs only 2d. per week. Model B. 1153 for 100-125 volts, and 200-250 volts, 40 cycles and over. Price, including valve and royalty £4 15 0.

**MODEL D.C.4, All-Power Unit for D.C. Mains.** Entails little or no alteration to existing circuits. Model B.1154 for 200-250 volts, £5 5 0.

**H.T. SUPPLY UNITS.** Model A.C.2 for A.C. Mains. Supplies H.T. to receivers of almost any type. Output 40 milliamperes at 120 volts. Two models available for 100-125 and 200-250 volts. Price, including U.S. valve, £6 10 0.

**Model D.C.2 for D.C. Mains.** Output 50 milliamperes at 120 volts. Tappings at 42 and 84 volts. Suitable for use on 100-250 volt mains, £4 2 6.

**For One or Two-Valve Receivers, Models A.C.3 and D.C. 3.** Model A.C.3 for A.C. Mains. For 100-125 or 200-250 volts. Complete with valve and royalty, 70s. Model D.C.3 for D.C. Mains. For 100-125 or 200-250 volts. Price 35s.

Write for Publication No. 453, mentioning POPULAR WIRELESS.

**THE MARCONIPHONE COMPANY, LIMITED,**  
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FORMER UNWOUND 5/-.  
COIL FOR "TITAN" SET  
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**H.F. CHOKE (Standard) 6/6**  
do. (Short Wave) 4/6  
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Push-Pull Switch . . . 1/-  
(With Terminals)

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Guaranteed Moving Coil Speaker Resemblance.

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Members of the "P.W." Technical Staff discuss the "Titan." Left to right: K. D. Rogers, G. V. Dowding, P. R. Bird, G. P. Kendall and A. Johnson Randall.

# The "TITAN" THREE

The story of the production of this remarkable new set.

By G. V. DOWDING, Grad. I.E.E.  
(Technical Editor.)

LOOKING at the "Titan" standing before me on a desk as I write, it seems difficult to believe that so much time and work has been spent on this apparently so simple an assembly of radio components.

One wants to hear the set in operation, and to handle its dials, in order fully to realise what an extraordinary instrument it is. That it can give one a feeling that there aren't enough parts and not enough dials to enable remarkable results to be obtained is proof that it is indeed an outstanding production.

Work was started on the design of the "Titan" a month or so before last Christmas. We set ourselves out to evolve a set that would be not only as good as anything else, but would be so much in the van that there would be no chance of its being superseded for a very long time.

#### A High Standard.

But this was by no means our sole aim, indeed, it would be a hard job to tabulate our ideals (which I believe we have attained in the "Titan") in order. However, I can list them haphazardly as follows. The "Titan" was to be:

1. So up-to-date that it would lead the way for a very long time. This is a general requirement which really overlaps a large number of the others.
2. Very easy to operate (simple wave-changing essential).
3. Inexpensive and simple to build.
4. Very compact and very powerful, and giving a very pure output, and everything else the perfect set should be and do.

A pretty high standard to aim at, readers will agree, and they will also begin to see why it has taken so long to achieve: for I honestly think we have done so.

#### Experimenting for Weeks.

Mr. G. P. Kendall, B.Sc., and his assistants were for weeks experimenting with rough layouts, special coils, and so on; and during this intensive research most valuable information was collected. And one of the incidental results is that a

tuner unit has been designed that is so good that it has been adopted as a standard component, and will appear in a large number of "P.W." and "M.W." sets in the future.

But this tuner is only one special feature of the "Titan," and probably by no means the most spectacular. That this remarkable set has one-dial tuning, without ganging or other complications, and with no loss in sensitivity, is a technical triumph on the part of the "P.W." Research Department.

A screened-grid valve for the H.F. stage



Completing the final model of the "Titan" Three in the "P.W." Research and Construction Dept.

was inevitable, but we were not going to make it essential that a pentode should be used. The individual constructor can use one if he likes, or he can, on the other hand, employ an ordinary valve. The "Titan" is nothing if not accommodating!

The tuner to which I have already referred enables astonishingly simple wave-changing to be incorporated in the set, and it is effective, too; no sacrificing selectivity on one band or sensitivity on the other, or both. You merely push in or pull out the tiny panel switch, and over

you go from the 2 L O to the 5 X X band, or vice-versa. There is no coil changing with the "Titan."

#### Special Testing Plant.

A preliminary "hook-up" more or less similar to the completed "Titan" was achieved after a few weeks, and then followed a series of comparative tests, comparing the skeleton "Titan" with certain of our best sets, in order to see at which point there was real gain and where more headway was needed.

Valve voltmeters and other such instruments were used by Mr. Kendall, and every section of the set was examined as through a microscope. And especially for the "Titan," an entirely new testing plant was laid down. This consisted of a unique control operating at a distance a modulated wave-meter. The effect of proper transmitters providing carefully graduated field strengths was thus obtained. Sometime this outfit will have to be described in detail, for it is a most interesting arrangement.

#### Extraordinary Results.

But readers must not think that the "Titan" tests were confined to the laboratory. It is possible to duplicate practically every condition likely to be met with, but it would not be fair to "pass out" a set without thoroughly putting it through its paces under ordinary "house" conditions.

Therefore, after the "Titan" had been found completely satisfactory in the "P.W." Research Dept., and had passed every gruelling test now laid down for all "P.W." productions, the receiver was transferred to the home aerial of one of the members of the Technical staff.

For several weeks the "Titan" was operated as an ordinary broadcast outfit, although the results it gave were quite extraordinary, for such a simple, compact little instrument. Then it was tried on other aerials in other districts and then, at last, it was considered to be ready for anything!

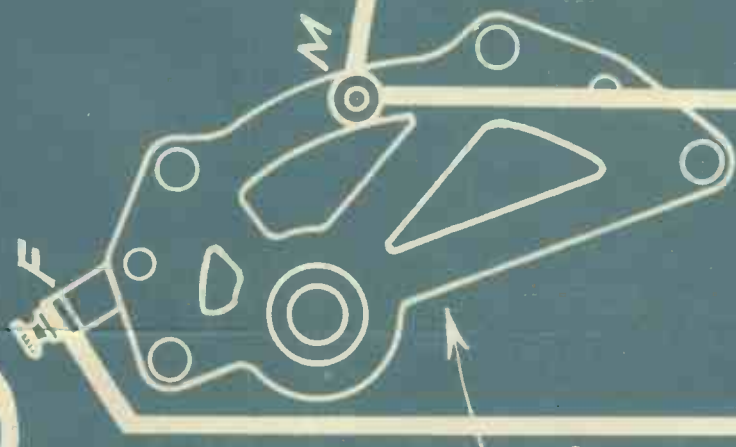




# The "TITAN" 3

DESIGNED BY	ERA
DRAWN BY	Harb
CHECKED BY	918-KR

L.T. SWITCH



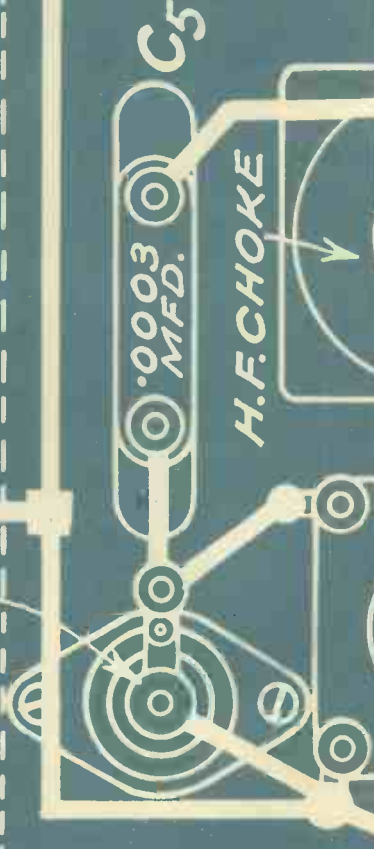
C1  
•0005 MFD.  
TUNING  
CONDENSER



WAVE-  
CHANGE  
SWITCH  
S1



2MEG. GRID LEAK

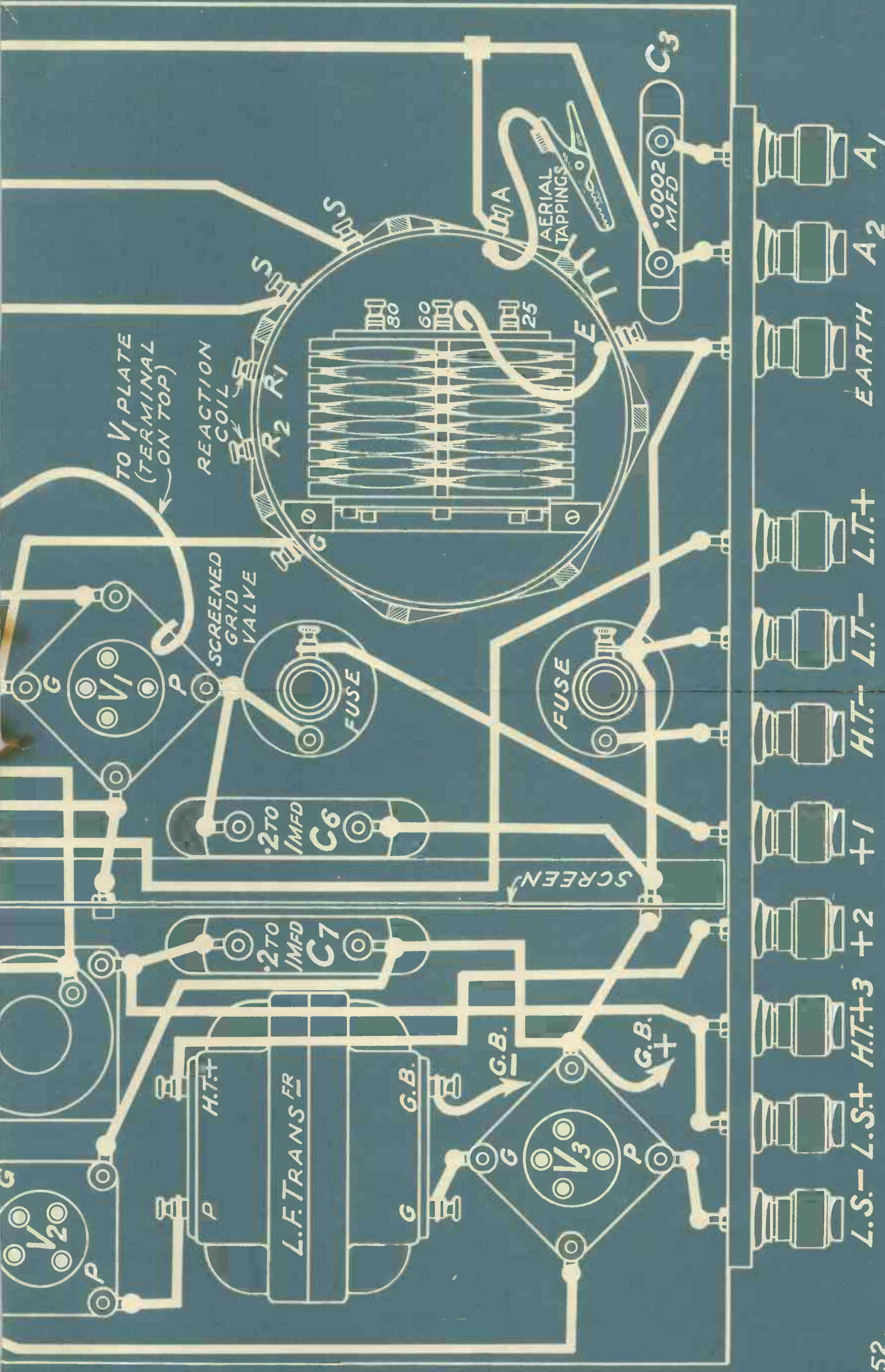


H.F. CHOKE

•0003 MFD.







T.52.



OF all the long-cherished ideals of the wireless enthusiast, one of the most difficult to achieve so far has been that rosy dream—one-dial tuning in a really powerful set. All sorts of schemes have been evolved, using "gang" condensers, but they have all suffered more or less from two serious drawbacks, i.e. cost and the difficulty of making the preliminary adjustments.

For this reason none of them have really solved the problem, for they were not safe

which we confidently believe approaches very close indeed to the complete realisation of our ideal. The "Titan" Three is definitely and truly a one-dial tuning set, for it has only one tuned circuit in the whole receiver, and there is no "ganging" of controls whatever.

#### Outstanding Results.

Nevertheless, it has a high-efficiency H.F. stage, with a screened-grid valve, which gives tremendous power and sensitivity, and

#### COMPONENTS.

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>1 Panel, 14 in. × 7 in. × <math>\frac{1}{4}</math> in. or <math>\frac{3}{16}</math> in. (Resiston, Becol, "Kay Ray," Trolite, etc.).</li> <li>1 Cabinet to fit, with baseboard 10 in. deep (Raymond, Arcraft, Lock, Pickett, Cameo, Gilbert, Caxton, Bond, etc.).</li> <li>1 .0005-mfd. variable condenser, slow motion or with vernier dial (Lotus, Igranic, J.B., Cydon, Ormond, Burton, Lissen, Colvern, Utility, Bowyer-Lowe, Raymond, Peto-Scott, G.E.C., Pye, Marconiphone, Dubilier, etc.).</li> <li>1 Micro condenser (Igranic in set. A panel-mounting neodyne condenser could be used provided it has a very smooth and gradual adjustment).</li> <li>1 L.T. switch (Lissen, Lotus, Benjamin, Igranic, Decko, Peto-Scott, Burne-Jones, Wearite, etc.).</li> <li>1 L.T. switch of type used for wave-change switching (Lissen, Burne-Jones, Lotus, Wearite, Decko, etc.).</li> <li>1 "P.W." standard screen, 10 in. × 7 in. (Burne-Jones, Ready Radio, Paroussi, etc.).</li> <li>1 Titan coil unit (Burne-Jones, Paroussi, Ready Radio, Wearite, etc.).</li> <li>3 Sprung valve holders (W.B., Benjamin, B.T.H., Lotus, Pye, Bowyer-</li> </ul> | <ul style="list-style-type: none"> <li>Lowe, Burndept, Ashley, Burton, Burne-Jones, Wearite, Igranic, Marconiphone Formo, Redfern, etc.).</li> <li>1 L.F. transformer, low ratio (Lissen, Brown, Ferranti, Philips, Marconiphone, Mullard, R.I.-Varley etc.)</li> <li>1 H.F. choke (Note: this must be of a good make with a high natural wave-length. A few examples are: R.I.-Varley, Lewcos, Bowyer-Lowe, Burne-Jones, Wearite. The requirements here are somewhat unusual).</li> <li>1 Fixed condenser of .0002 mfd. (Dubilier, T.C.C., Lissen, Mullard, Clarke, Igranic, Goltone, Burne-Jones, etc.).</li> <li>2 Fixed condensers of .0003 mfd.</li> <li>2 Mansbridge type condensers of any capacity from .2 to 1 mfd. (Lissen, Dubilier, Mullard, Ferranti, Hydra, T.C.C., etc.).</li> <li>2 H.T. fuses (Burne-Jones or similar type).</li> <li>1 2-meg. grid leak and holder (Dubilier, Pye, Lissen, Igranic, Mullard, Ediswan, Marconiphone, etc.).</li> <li>1 Terminal strip, 12 in. × 2 in. × <math>\frac{1}{4}</math> in.</li> <li>11 Terminals (Belling &amp; Lee, Burton, Eelex, Igranic, etc.).</li> <li>Wire, screws, flex, G.B. plugs, etc.</li> </ul> |
|---|---|



just what gives the set its remarkable properties. First of all, about the one-dial feature: this results from the use of a special circuit for use with S.G. valves which has only been developed of recent months and is due in its present form to Mr. Percy W. Harris.

Let us next take a look at the circuit diagram and see just how the special arrangements are made. You will see that the H.F. valve is provided with what appears on paper to be a perfectly standard tuned grid circuit with a tapped loading coil and wave-change switching. So far all is normal, and it is only when we pass on to the anode circuit of the H.F. valve that we see the first really striking novelty.

#### Extraordinary Simplicity.

Instead of the usual tuned anode, H.F. transformer or parallel feed circuit you will see that there is nothing at all here but a simple H.F. choke. This may seem a little strange until you remember that all the S.G. type of valve needs to make it amplify powerfully is a very high "impedance" in the anode circuit. This a good modern H.F. choke will provide, within certain practical limits with which we need not trouble you. The grid of the detector is connected to the anode end of this choke through the usual grid condenser, with leak down to filament, and there you have the whole H.F. intervalve circuit complete. Simplicity itself!

Literally months have been spent by the Research and Construction Department on the evolution of the design of this remarkable new receiver.

Now you begin to see why the set is so inexpensive to construct. The one-dial tuning feature saves you the cost of one complete tuned circuit, with its variable condenser and coils, and the H.F. choke mentioned is *not* an extra component, since no choke is used in the detector anode circuit in this set. The construction, too, is obviously simplified here, but this is not

things to recommend for the use of all classes of home-constructors. They failed just where they might have been most valuable: they were unsuitable for the comparative novice, who was really just the man who wanted one-dial tuning most of all. The reason, of course, was that they required a considerable amount of skill to make the first adjustment of the "ganging."

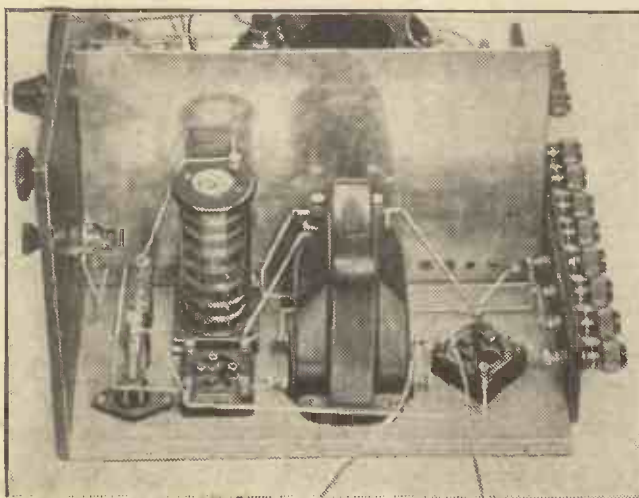
Here at last is a solution of the problem

a degree of selectivity you would never believe possible with only one tuned circuit.

In results you will find that it will administer a handsome beating to many a four-valver of the older type. It is perfectly stable, doesn't require neutralising, and is very easy to operate. There are no coils to be changed for different wave-lengths (ordinary or long at the touch of a single special switch) and it is as easy to make as the average three-valver of the simplest "Det. and L.F." kind.

What does it cost to make? Well, this is the best point of all. Not merely does the special one-dial feature not increase the cost, but it *reduces* it! Actually, the "Titan" Three costs less than the great majority of sets of the H.F., Det. and L.F. type, and is just about equal (in this respect!) to a "three" of the Det. and two L.F. kind.

By this time the reader will no doubt be beginning to wonder how it is all done, so we had better go into details a little and see



Real simplicity! Here you see the whole of the detector and L.F. circuits, and it is obvious that they are no more elaborate than in the most elementary of sets.





the only point at which it is made easier for you.

One of the main reasons why the "Titan" Three is such an easy set to make you will

could release it, for we wished to avoid as far as was humanly possible the defects and limitations of the other similar units which have appeared on the market from time to time in the last year or so.

The main difficulty in producing a really good and efficient unit of this type is two-fold; first of all, it must obviously be of high efficiency in the electrical sense, for there is a great risk of losses and undesired interaction. Secondly, and this is even more difficult still, the unit must be a universal one, capable of use in all sorts of different circuits and for widely varying purposes

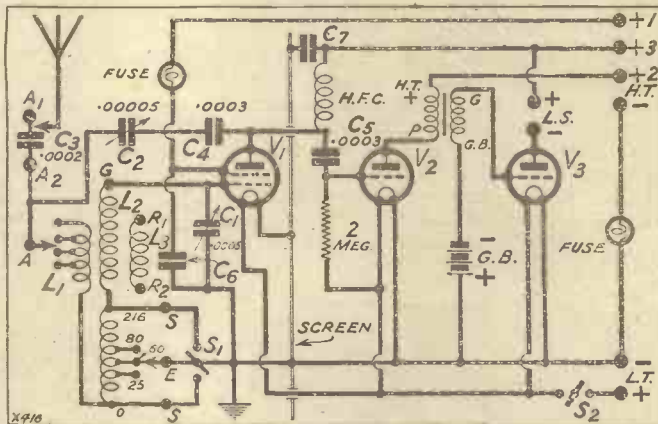
**Difficulties Overcome.**

This last is very closely bound up with the question of cost, for if elaborate provisions are made for different circuit schemes the unit is apt to become very expensive. Moreover, it is liable to become so complicated that it will be awkward to use and will frighten off the very man who needs it most—namely, the comparative novice in set building.

We have spent a lot of time on this question, and have finally produced a unit which we confidently believe will go a very long way towards meeting all requirements perfectly. It is highly efficient, very simple, not at all expensive, and yet will cover an extraordinary number of different purposes (watch future issues and you will see!).

Careful tests have been made, and it has

been forgotten. On the contrary, you will see it included in a great number of designs in the future, so that you can safely count upon being able to use it over and over again. For the benefit of those who may like to have a shot at making up the unit for themselves we shall publish a detailed



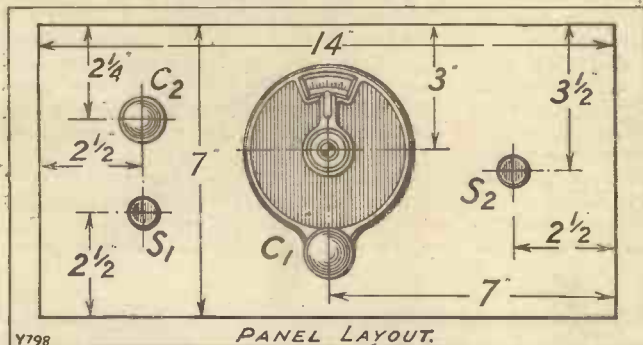
description in an early issue, but space will not permit it at this point. (In any case, we imagine most constructors of the set will prefer to purchase the unit and so save themselves the rather tedious job of winding, especially in view of its reasonable cost.)

**The New Coil.**

Meanwhile, the following brief description will enable you to get a general idea of the arrangement of the unit. The ordinary broadcast waves are covered by a coil unit wound in single layers on a large diameter (4-in.) Pirtoid or Paxolin tube. This carries first of all a tuned secondary coil, over this a primary (aerial) coil with tappings and a clip for varying the number of turns in use to adjust selectivity and suit different aerials, and so on.

Below the lower edge of the secondary is a reaction winding, which, by the way, is not used in the present set but will be

(Continued on next page.)



find in the special new wave-change coil unit we have designed for this set. Now, in most wave-change designs in the past there have been a number of coils to mount up, and quite a lot of wiring to do to complete the tuned circuit, and so many constructors have held back from such designs and have missed their great conveniences.

Now, however, all that is at an end, for in the new "Titan" coil unit you have a component which only requires a couple of screws to fasten it down, and in which a

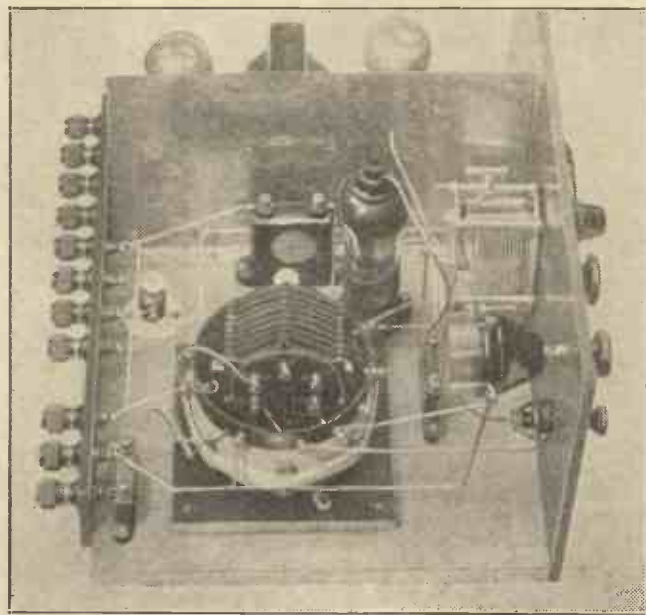
been found that the electrical efficiency of the combined unit is quite up to the standard of a normal coil particularly designed for any one special purpose. If losses are present in the new unit they are so small that we could not detect them with quite delicate tests, and so they may surely be regarded as non-existent for any ordinary purpose.

A specification of the unit has been circulated to various manufacturers, and at least four firms have made up models which have been tested and approved, so you need not fear the slightest difficulty in obtaining one. Nor, again, need you fear that if you invest in one of those units it will appear in one set only and then

Despite its extraordinary power and sensitivity the "Titan" Three is outstandingly inexpensive and simple in construction and operation.

great deal of the wiring is done ready for you. All that remains is to connect up the terminals of the unit to the other components and the job is done. Since the unit is provided with terminals you do not even need to solder these few leads.

The adoption of this coil unit is a measure which we have long had in view, but much experimental work was needed before we



The secret of the set is revealed in this view showing the H.F. portion. Note the new coil unit, the small reaction condenser, and the simple but effective screening.



## BUILDING THE "TITAN" THREE.

(Continued from previous page.)

required in future ones. The long-wave portion comprises a standard "P.W." loading coil mounted up in a special manner which is found to reduce interaction effects to vanishing point, and on this there is another flex wander lead for attachment to the various tapping terminals (25, 60, and 80) for controlling selectivity on long waves. (No. 25 tap is the one for this set in practically every case.)



Here you begin to get an idea of the simplicity of the controls. The tuning dial is in the middle, to the left are the knobs controlling reaction and wave-changing, and to the right the on-off switch.

Round the upper edge of the 4-in. tube are 7 terminals, marked G, R<sub>2</sub>, R<sub>1</sub>, S, S, A, and E, and these are wired up very simply in accordance with the wiring diagram for any set, for their position has been worked out very carefully to simplify matters as much as possible.

### Getting Reaction.

Now let us complete our survey of the circuit. It might appear, remembering that the interval coupling is an untuned one, that it would be difficult to obtain reaction in this circuit. However, the difficulty has been overcome in a very simple manner by taking reaction from the anode of the H.F. valve through a very small variable condenser back upon the tuned grid circuit.

For this purpose only a very small reaction winding is needed, and the one actually used is the primary (aerial) coil, which possesses certain important advantages. An unexpected virtue of this method of reaction is that it is almost constant over the tuning range when suitable voltages are applied to the H.F. valve.

This naturally makes the set extraordinarily easy to operate, for you will find that the reaction will "stay put" over considerable parts of the tuning range, so that you can bring in station after station merely by turning the tuning dial slowly. As a matter of fact, the "Titan" Three behaves in exactly the opposite way to an ordinary receiver, because it requires *least* reaction at the *upper* end of the dial, and slightly more at the bottom.

Consequently, if you set it so that it just doesn't oscillate at the upper end of the dial, you can run right down without touching the reaction again, and bring in quite a string of stations. Naturally, better results still will be obtained by bringing up the reaction a trifle at intervals as you go,

but this is only needed for the weaker stations.

The rest of the circuit is very straightforward indeed. A metal screen partitions off the H.F. part of the set, and on the other side is the detector valve (ordinary grid condenser and leak type) and the L.F. valve, which builds the signals up to proper strength for the loud speaker. This last is of the ordinary transformer-coupled type, and there is nothing to say here beyond urging you to choose a really good transformer. The set deserves one, for it will give excellent quality.

### Making a Start.

Now for some constructional details. First of all, note that the screen is one of our standard type, ready drilled for screwing down, and provided with a row of perforations through which the various leads are passed. It is also supplied with several small screws and nuts, which can be fixed through the perforations at convenient points and used for making the necessary connections to the screen itself. You will see, therefore, that using a screen makes very little difference to the amount of work involved in the set.

Next, about the coil unit. The important points here are to see that you put it down in the right position according to the diagram and photos, so that the spacing to other parts is correct, and, further, to get it the right way round, so that the terminals come in the right places.

The wiring you will find very easy, because everything is so well spaced out and arranged for simplicity of connections. With the aid of the photos you will be able to make a good copy of the original quite easily, and this is advised. The set is not really critical, and is indeed far less so than most sets of anything like equal performance, but just a little care here will be well repaid.

The remainder of the work is very simple, and is just the usual job of panel drilling, mounting components, and wiring up, and you will need no further instructions here.

**Here at Last! Real one-dial tuning without complication, expense or difficult preliminary adjustments.**

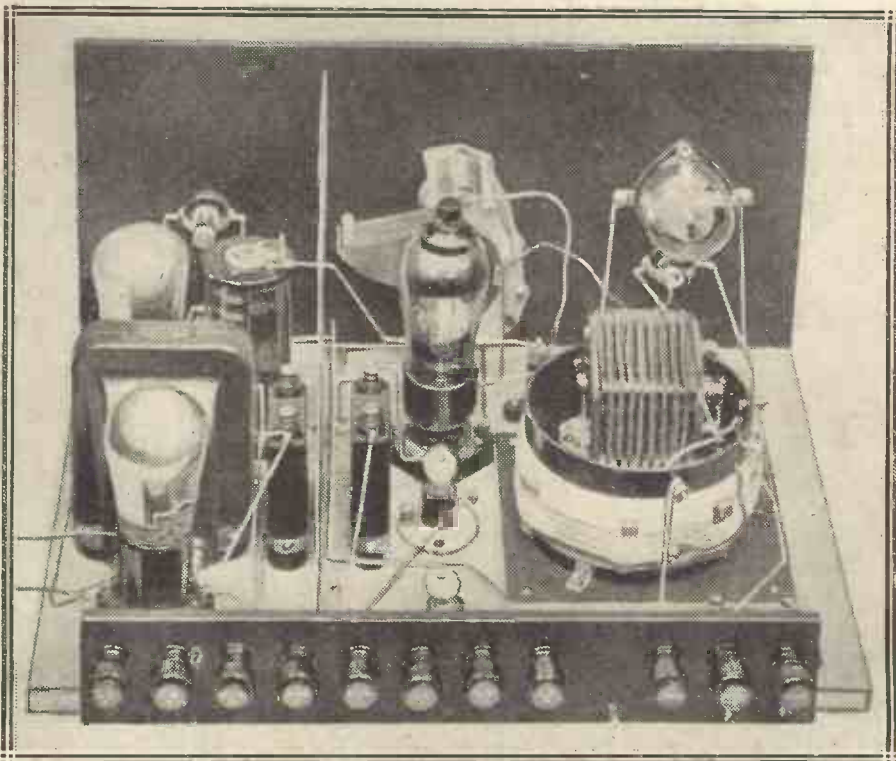
By the way, you will notice in the photo at the foot of this page that the coil unit which we used was built up on a square piece of wood, whereas the one which you will obtain will have feet or other attachments fixed direct to the tube, and no wooden base.

The reason for the difference is this: the unit you see in the photo is one of our own models made up in the laboratory, and is not a commercial version. Professionally made ones are a little neater in appearance, and have this different method of mounting.

### Economical to Run.

A feature of the set which will appeal to the constructor who aims at the best results for a minimum outlay is that it is essentially a 2-volt outfit. The valves used in all our tests were 2-volters, and our estimate of the set's performance is based entirely on the use of these valves. With the types generally employed, too, the actual current consumption was quite low, being just under half an ampere with most combinations, and as low as .4 amp. in some cases.

At this point we must leave you until next week, when we shall be going into operating matters and many other details which space considerations compel us to hold over.



This general view will show more clearly than any words of ours the remarkably straightforward and easy nature of all the work in the "Titan" Three.



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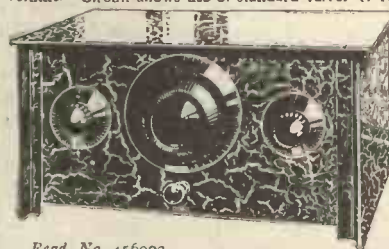
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## ANOTHER CONTROVERSY SETTLED.

**T**HE agitated controversy between the B.B.C. and the Press with regard to the publication of the B.B.C.'s new journal, "The Listener," has now more or less simmered down. A deputation of the representatives of the newspapers and the Master Printers interviewed the Prime Minister recently, and, at the Prime Minister's suggestion, the deputation conferred with Sir John Reith, and points of a possible agreement emerged as a result of this Conference.

### B.B.C. Contentions.

At a later meeting, a basis of agreement was confirmed by both parties. It is interesting to note, however, that the B.B.C. contends that although the Royal Charter granted to it contains comprehensive powers in respect of publishing, these powers have not been unfairly used, the criterion being that the B.B.C.'s publications are distinctly pertinent to the service of broadcasting.

The B.B.C. states that it will recognise and deal with a Committee to be established representing the newspaper interests, etc., which met the Corporation, and it is also prepared to discuss with the Committee any new publishing proposals and to consider representations by the Committee concerning existing publications.

The B.B.C. further states that it is not intended that "The Listener" should contain more than 10 per cent original contributed matter not related to broadcasting. The rest of the paper will consist of talks which are being broadcast, and comments thereon. News relating to broadcast programmes and programme personalities, and news of the broadcast service generally will also be included in "The Listener."

### Loopholes.

The B.B.C. has no intention of publishing any further daily or weekly newspapers, magazines or periodicals. It also has no intention of publishing books or pamphlets not pertinent to the service of broadcasting. And, further, the B.B.C. states that as an evidence of its good will, it does not intend to accept for "The Listener" more advertisements than are necessary, with its other revenue, to cover its total cost.

As a matter of fact, this agreement will probably not remain in force very long, should the B.B.C. care to take advantage of the loopholes of the agreement.

For it is perfectly obvious that, although the B.B.C. states it has no intention of publishing books or pamphlets not pertinent

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**The air is cleared in regard to the B.B.C.'s publishing activities—  
A successful political broadcast  
and how it was arranged.**

**By THE EDITOR.**

\*-----\*

to the service of broadcasting, there is a very wide scope still left for the publication of the books, pamphlets and periodicals which are pertinent to the service of broadcasting; when you come to think of it there is very little to-day which is not pertinent to broadcasting and, furthermore, although the B.B.C. states that "The Listener" will not contain more than 10 per cent original contributed matter not relating to broadcasting, it is obvious that it would be perfectly easy for any competent editor to fill "The Listener"

part in the broadcast discussion would have sat at a small table, each having his own (or her own) microphone; but in this latest political broadcast, each broadcaster had a small studio to himself while speaking. The speakers, with their secretaries, assembled in the drawing-room, or reception room, at Savoy Hill, where they were enabled to hear each other while waiting to make their bow before the microphone.

As the turn of each speaker came, he was taken up to a studio on the first floor and, when he had delivered his talk, was again shown into the drawing-room before his successor began broadcasting. This probably accounted for the slight pause between each speech.

The discussion, on the whole, was very successful, although perhaps a touch of formality was apt to make it become a little monotonous. Nevertheless, this De-rating broadcast showed the great

### SEVEN SEAFARING S.O.S. SENDERS.



These wireless operators have all, during the course of their lives, sent out the dramatic S.O.S. call for assistance. This photo was taken in a New York broadcasting station where the men appeared in a radio play entitled "Signing Off."

with matter very casually linked with broadcasting.

However, we make these suggestions in no disparagement of the B.B.C.'s statement of good will, but we feel, from the legal point of view, that the agreement is certainly very one-sided and that, technically, it affords many loopholes.

### The De-rating Debate.

It was interesting to note that the B.B.C. employed a new method in presenting the Party political discussion on the De-rating scheme which was broadcast the other day. In the old way, the two speakers taking

potentialities of wireless broadcasting as a political medium and, although it would be injurious to the service of broadcasting to have too many of these political discussions, there is no doubt that on important occasions they make a very welcome and interesting break from the regularity, if not the monotony, of ordinary programmes.

Properly handled, broadcasting should prove an invaluable medium for the dissemination of proper information when General Election time draws near, and we hope that all parties will be allowed a fair and unbiased opportunity of placing their Party's views before the country.



## FROM THE TECHNICAL EDITOR'S NOTE BOOK



### NEW LEWCOS COMPONENT.

"MOST circuits are arranged so that the grid of the rectifying valve is connected to the low-tension positive through the grid-leak resistance. When this is done reaction is very sudden or floppy, and the reaction control knob has to be moved several degrees backwards before oscillation ceases, with consequent loss in volume or signal strength."

This is what the London Electric Wire people say in a leaflet accompanying their new Lewcos fixed potentiometer for smooth reaction control. I, personally, would only completely agree if the second sentence had started with "sometimes" or "in many cases." However, it is undoubtedly a fact that one frequently has to resort to a potentiometer in order to achieve smooth reaction and, especially, in short-wavers, in order to eliminate threshold howl.

By using a potentiometer one can take the grid to anywhere between plus and minus L.T. Reading again from the Lewcos leaflet: "The Lewcos fixed potentiometer consists of a high-resistance winding connected between L.T. + and -, and the grid is taken to the tapping point which has been carefully selected as the result of a considerable amount of experimental research work, and is suitable for all types and voltages of valves."

"The accurate setting of the potentiometer will be appreciated by all users. The device includes a large by-pass condenser between L.T. - and the potentiometer tapping,



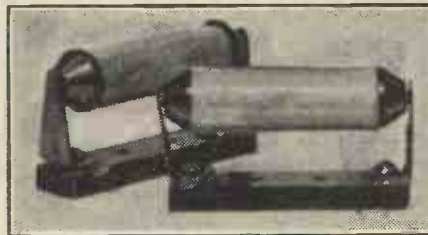
The "Lewcos" Fixed Potentiometer.

also grid-leak clips, so that if the grid leak of an existing receiver is connected across the grid condenser, all that is necessary is to remove the grid leak from its present position, insert it in the clips of the fixed potentiometer, and make the other simple connections to the receiver wiring as shown in the diagram."

The resistance of the potentiometer is 600 ohms, and the bypass condenser has

a capacity of .0015 mfd. You will see from the above that the Lewcos potentiometer has a tapping point, instead of the usual slider or series of tappings taken to switch studs. Of course, that point cannot be absolutely the best one for every conceivable circuit; but from a series of tests we have given the device, it would seem to be the best one for the majority of circuits, and not far from perfection for the remainder.

The London Electric Wire people have said, as you will see above, that the position of the tapping point is the result of a considerable amount of experimental research, and I would add to



Two Quest Radio "Puritors."

this that it has been devoted to a good end. The device is very small, its actual dimensions being  $1\frac{1}{2}$  in. by  $1\frac{1}{4}$  in. by  $1\frac{1}{8}$  in. There should be room for it in the most compact of sets, and there must be a large number which would benefit by its addition. This most novel arrangement is a little more than a mere refinement, for it would undoubtedly add to the power and distance-getting qualities of most receivers.

### FROM QUEST RADIO.

The grid-bias battery is always an awkward item to dispose of. Sometimes room can be found for it on the baseboard, but at other times it is necessary to fix it in the back of the cabinet. An attractive alternative is made possible by the use of the new Quest Radio panel brackets. These are sold in pairs at 2s. 6d. per pair. One of the brackets is provided with clips in which a grid-bias battery can be fixed edgewise. The brackets are made of steel and are both light and strong.

The Quest Radio people have also produced a resistance having a value of 20,000 ohms which they style the "Puritor." It is wire wound and is specially designed for use in anti-motor-boating arrangements. There is undoubtedly a demand for a cheap wire-wound resistance for this purpose, and it is at hand in the Puritor at 3s. 6d.

### STEPHENS' VEGETABLE GLUE.

Henry C. Stephens, Ltd., of Stephens' Ink fame, have produced a glue which has

no smell and is a clear, practically colourless liquid, particularly suitable for use in the construction of loud-speaker cones. One of the glue's chief advantages is that it will not discolour white or light-coloured papers.

There are, of course, other jobs for which glue is required in the construction and assembly of radio accessories and sets, and for these Stephens' Vegetable Glue deserves consideration, as it is cleanly to apply and tenacious. It is retailed in tubes

Traders and manufacturers are invited to submit radio sets, components and accessories to the "P.W." Technical Department for test. All tests are carried out with strict impartiality, under the personal supervision of the Technical Editor, and readers are asked to note that this weekly feature is intended as a reliable and unbiased guide as to what to buy and what to avoid.

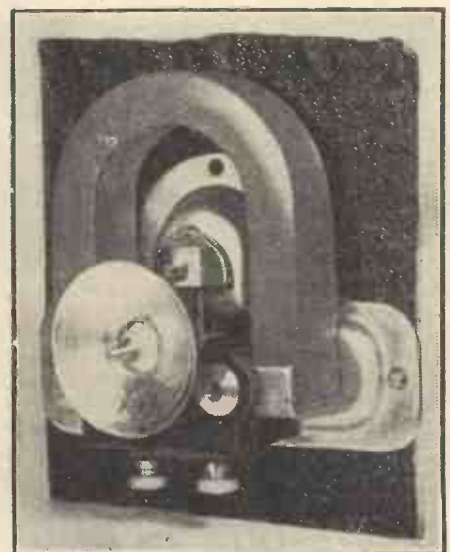
at 9d., 6d., and 2d. per tube, and can be obtained from all stationers. Besides its radio uses it has, of course, multifarious applications in the household.

### TRIOTRON FOUR-POLE SPEAKER UNIT.

The European countries certainly know how to make loud-speaker units. For instance, the Triotron four-pole double-balanced cone unit is an excellent product. It is a heavy article, solidly made, the "works" being concentrated at the poles of a massive horse-shoe magnet. There is an adjustment at the back of the unit.

On the projecting spindle there are two small cones of metal separated by felt, and it is an easy matter to mount a cone diaphragm between these by means of the small nuts provided.

The unit is sent out mounted on a small piece of rough wood and this and the special box made for it ensures its safe travelling. The unit gave fine results. Its response is free and bright, and its bass creditable. Used in any of the cone constructions recently described in "P.W." the results should prove most pleasing. The majority of the cone speaker cradles now obtainable will take a Triotron unit.

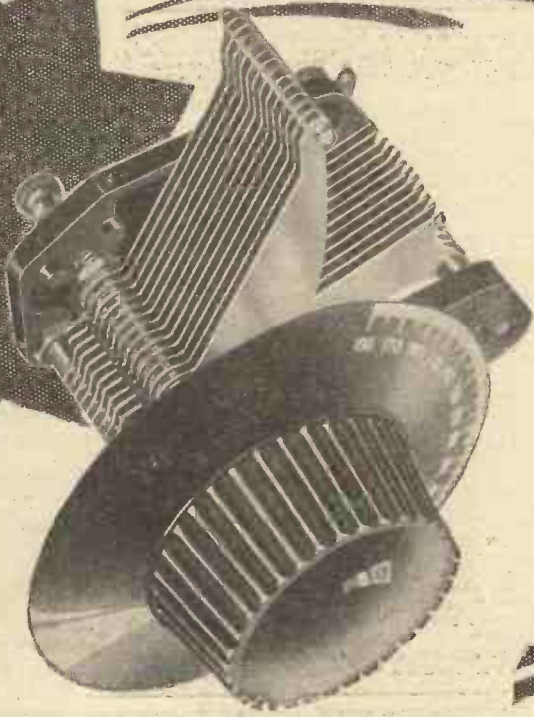


The Triotron Loud-Speaker Unit.



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Ormond Components are undoubtedly leaders of the Radio Industry. Not only for quality and value but for sheer efficiency the name "Ormond" stands supreme. The keenest enthusiasts insist on Ormond Components for every circuit. Be wise and use Ormond on every occasion.

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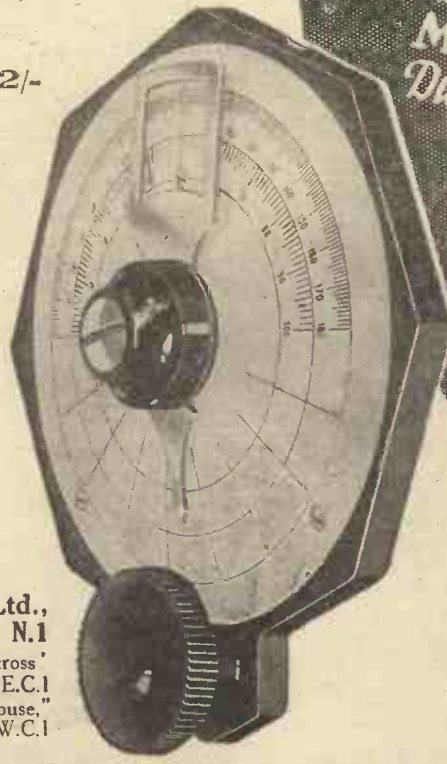
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# RADIOTORIAL

All Editorial Communications to 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 and 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 instructional 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 receivers. 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.

### TESTING WITH 'PHONES AND DRY CELL.

"FAULT FINDER" (South Africa).—"What is the correct method of testing a circuit with a pair of telephones and a dry cell?"

Defects in the wiring of a receiver, or those arising from faulty components, may often be detected by a very simple series of tests with a pair of 'phones and a dry cell. One tag of the 'phone should be connected to one terminal of the dry cell, and two flex leads should be connected, one to the remaining 'phone tag and the other to the remaining terminal of the dry cell (a flash-lamp battery is quite satisfactory).

These two flex leads, if now touched lightly together, will produce a strong double click in the

'phones—one click when they make contact with each other, and another when they are separated again. They may thus be used for testing for continuity in leads, etc., since the loud double click is ample evidence that everything is satisfactory.

A fault in a coil holder, for instance, such as a break between the terminal and the plug or socket to which it is connected, may now easily be detected, since if one flex lead is connected to the terminal and the other to the side of the holder to which the terminal should make connection, absence of the double click is positive evidence that the component is faulty.

On the other hand, if one of the flex leads is connected to the socket of an "empty" coil holder and the other to the plug, if a double click is heard, there is a short-circuit across the holder.

Similar tests may be made with valve holders, both for testing for a connection between each terminal and its socket, and for testing for short-circuits between the sockets.

Variable condensers also may be tested by this method, a short-circuit between the plates giving rise to the usual double click, which should not be present in the usual way.

## "P.W." TECHNICAL QUERY DEPARTMENT

### Is Your Set "Going Good" ?

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

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

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

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

on the aerial terminal and the other on the earth terminal will give a certain test for continuity between these points.

It will be seen from the foregoing that this method may be extended to tests for almost any component or circuit.

(Continued on page 1118.)



EVERYONE likes good banjo playing, it's a human mixture of music and mirth. But there's art in it; it needs such reproduction as the Marconiphone "Universal" Transformer to make sure you get just the expert's lightness on the strings, the clear decision that sounds as if he twanged "de ole banjo" in the chair beside you.

The test of a transformer is in its handling of these unusual notes. Marconiphone Universal transformers are definitely the most efficient at their price, and in correct conditions approximate closely to a level amplification curve. Windings are rendered immune from moisture and climatic change and the high quality iron and generous cross section preclude saturation of the core. Two ratios are available, 27 to 1 and 4 to 1. Price (either type), 16/-.

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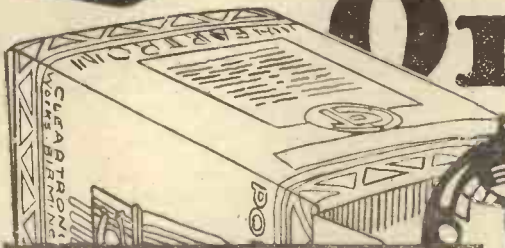
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# 2 Valves for One



The price you pay for an expensive valve will buy two Cleartrons.

Cleartron Valves are inexpensive because nowadays there is no reason why any valve should be dear.

Have Cleartrons tested against any other make you know. You will need no greater proof of their pure reception, signal strength and sensitivity.

Every valve is guaranteed to give you the fullest satisfaction. No Cleartron leaves the factory unless it has passed seventeen efficiency tests.

If Cleartron Valves are not readily obtainable, order direct. A postcard will bring you our new brochure describing two- four- and six-volt types for all purposes in wireless.

GENERAL PURPOSE

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No special knowledge or skill is needed and you will find no difficulty about the manufacture. With our new and improved process no expensive "plant" or machinery of any kind is required, and, even though you have not the slightest knowledge of Electricity or Wireless, you can commence to turn your spare hours into GOLDEN Hours! There is no drudgery. Indeed the work is so simple and easy that you require no special accommodation—the kitchen or any spare room can be your workroom—and the whole of the family, including the children, can help you. The work is of fascinating interest and your profit is only limited by the amount of time you have to spare.

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Print your name and address boldly in capital letters on a plain sheet of paper and pin this Coupon to it.  
"Popular Wireless," Feb. 2nd, 1929.



## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1116.)

### A HYDROMETER QUERY.

F. J. D. ("Lizzie," Mediterranean).—"I am interested in how the hydrometer works. What is the composition of the coloured balls used in the hydrometer, and also what is the effect of the sulphuric acid on the same?"

The working principle of the hydrometer does not depend upon the composition of the coloured balls as these are merely hollow receptacles, coloured for the purpose of easy identification. They can be weighted with lead or with any other convenient substance. The most important thing about them, being that some (say, the red) are heavier for their size than others (say, the white).

When they are immersed in the acid no change goes on inside the coloured ball, or is caused by the coloured ball, but what happens is this: The acid or electrolyte of the accumulator is constantly undergoing certain chemical changes which take place in it directly the accumulator is either charged or discharged.

The effect of these chemical changes, is to make the sulphuric acid, of which the electrolyte consists, either stronger or weaker. Taking advantage of this fact, the coloured balls in the hydrometer are of such a size and such a weight that when the accumulator is newly charged even the heaviest of the three balls in the hydrometer will float to the top of the liquid. But when the accumulator is run down a little the chemical change in the acid results in this acid becoming weaker.

As the weight and size of the coloured ball has not been altered the tendency is for one of the balls—the heaviest—to sink to the bottom of the acid. If the accumulator be now recharged the acid will be strengthened, and consequently the ball will rise to the surface again.

If, however, the accumulator is still further discharged, not only the heaviest of the coloured balls will sink to the bottom, but the medium one also will find that the acid in which it is floating is not so heavy as itself, and consequently will sink to the bottom of it. Finally, when the accumulator needs recharging, the chemical action of the electrolyte will have advanced to a point where even the lightest of the three balls is heavier than the liquid, and consequently this ball, too, sinks to the bottom, thus indicating that recharging is required.

It will thus be seen that the actual composition of the little "beads," or coloured balls, is not important, but what matters is their weight relative to size. This is fixed at the factory in such proportions that, by sinking in turn, they tell what the condition of the electrolyte is; in other words, whether the battery wants recharging or not.

### SHORTING OUT A CONDENSER.

M. G. A. (Harpenden, Herts).—"Will an ordinary on-off switch of the push-pull type do for shorting out a condenser, which is wanted in connection with a short-wave tuning stunt?"

Such an on-off switch is quite O.K. provided that it is of good make with contacts that are strong and firm in action. Before installing it examine the switch and make sure that there is a really good,

### A Wonderful Shillingsworth!

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is NOW ON SALE, containing the cream of the month's radio reading  
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strong contact when the switch is in the on position, and if necessary dissemble the switch a little in order that the contact spring may be strengthened by pressure. Generally a switch of this type is perfectly satisfactory provided the spring is not loose or slack.

### A BATTERY-SWITCHING QUESTION.

D. J. (Chesterfield).—"I use high-tension batteries to supply my anode circuits, and I have found that the maintenance of these is a pretty costly item. One thing I have wondered about is switching them off. I have an ordinary on-off switch for the low tension, but nothing for the high tension.

Upon enquiry I was told that the switching off of the low tension automatically cuts off the high tension as well, but is this so?"

In effect this is perfectly correct, but there are one or two little points to watch which may be the cause of your batteries costing more than necessary.

If you examine a diagram of the circuit you will find that the high-tension negative is connected to the filaments of the valves and to various other points, whilst the high-tension positive is connected to the plates of the valves. The reason that the low-tension switch acts as a make-and-break for the high tension is that when the switch is at the "on" position the valve becomes in effect a high resistance, allowing a certain amount of current to flow through it from the high-tension battery. This only happens when the filament is glowing, and if the L.T. switch is placed in the "off" position the resistance of the valve increases to such an enormous extent that it becomes an insulator, and no current can flow that way. (Note the words "that way.")

If there are any other ways for the current to flow it will certainly do so, and this will "eat up" your high-tension supply, and should be stopped by inserting a switch in the high-tension negative lead, as well as in the low-tension negative lead. Sometimes where long leads to the loud speaker are used it happens that these in time get worn and come in contact with the earth or any earthed object.

As the earth wire is connected to H.T. negative it will be obvious that such a connection will provide a path via the earth (probably through a high resistance, but nevertheless a path through which current will flow and "run down" the battery). It is for this reason that all the insulation of the high-tension leads should be good. For instance, if there is a conductive deposit upon your valve holder, between the plate and filament terminals, a certain amount of current will flow across between these two, even when the valve is switched off. If, however, good insulation exists, the filament switch automatically becomes an efficient high-tension switch as well.

### CUTTING OUT THE LOCAL.

G. M. A. (nr. Newcastle).—"I have had the set for over two years and am absolutely satisfied with it, except for one thing. You will see from the photograph enclosed that it is a good-looking set, and though it uses the old-fashioned plug-and-socket type of coil which

(Continued on page 1120.)

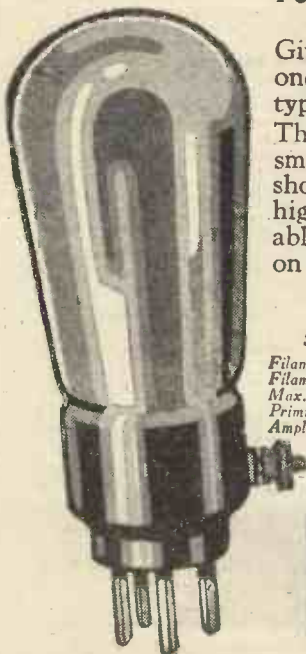
# Now Available

Pentode (5 Electrode) Valves for 2 and 4 Volts.

Give greater volume whilst dispensing with one stage of L.F. and can be used with any type of loudspeaker.

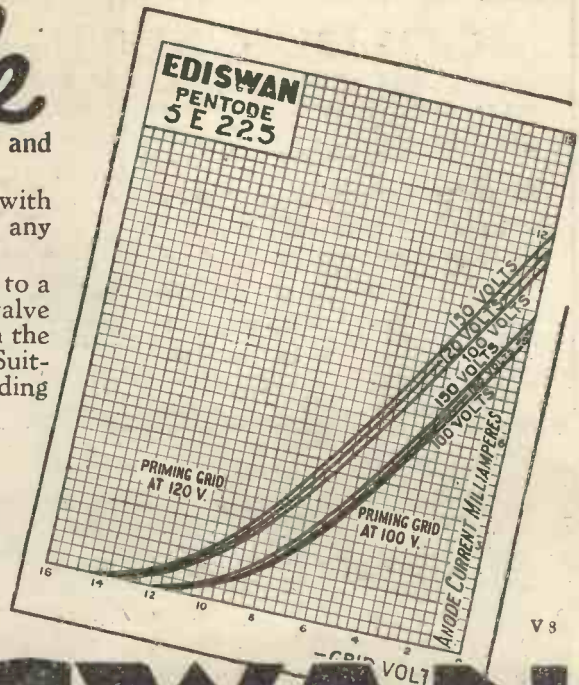
The "priming grid" which is connected to a small terminal on the caps of the valve should be joined directly to a tapping on the high tension supply at 100-150 volts. Suitable grid bias values are 6-12 volts depending on the anode voltage in use.

PRICE:—25/- each.



**5E. 225  
SPECIFICATION**  
Filament Volts ... 2  
Filament Current 0.25 amp.  
Max. Anode Volts 150  
Priming Grid Volts 100-150  
Amplification Factor 80  
Impedance 66,000 ohms.  
Slope ... 1.2 ma/v.

**5E. 415  
SPECIFICATION**  
Filament Volts ... 4  
Filament Current 0.15 amp.  
Max. Anode Volts 150  
Priming Grid Volts 100-150  
Amplification Factor 50  
Impedance 27,000 ohms  
Slope ... 1.8 ma/v.



# EDISON SWAN PENTODES

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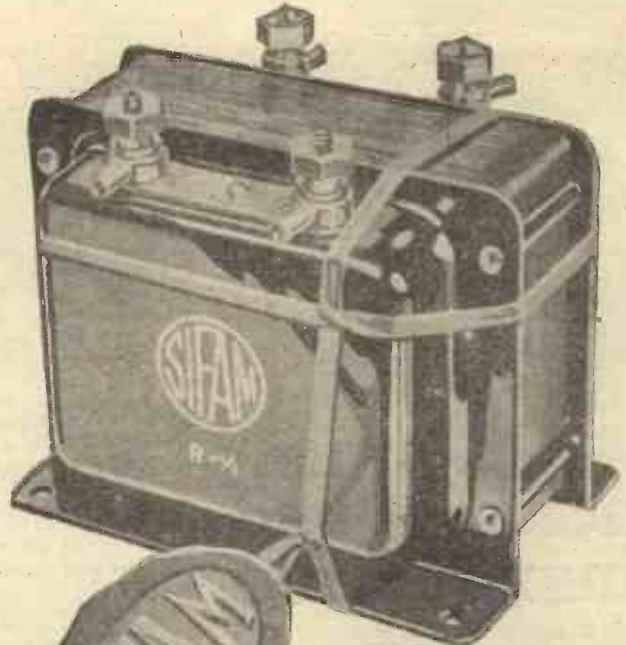
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The Sifam "Hevicore" incorporates a particularly heavily constructed core, that our research engineers have discovered renders the super performance and action of this transformer still more capable of withstanding the heaviest demands of present-day radio. Can be supplied in 3-1 ratio models, by post direct or ask your dealer to obtain.

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Agents in: Manchester, Glasgow, Paris, Lyons, Turin, Montreal, Winnipeg, Vancouver, Johannesburg, New Zealand, Auckland, Calcutta, etc., etc.



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## L.F. TRANSFORMER

# Radio's Final Word!



Finished in black or beautifully grained mahogany.



neat-accurate and inexpensive

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**BROWNIIE**  
WIRELESS

"DOMINION" VERNIER DIAL  
The BROWNIIE WIRELESS COMPANY (G.B.) Ltd.  
MORNINGTON CRESCENT, LONDON, N.W.1

**RADIOTORIAL  
QUESTIONS AND ANSWERS**

(Continued from page 1118.)

was then in vogue, it seems very efficient, bringing in a large number of foreign stations as well as the local.

"This latter is very powerful indeed, of course, but that is partly the trouble. I have lately acquired a taste for the long-distance stations, and am having a great deal of trouble to cut out 5 N O. At first I used to think this was an advantage, because there are about twenty degrees on the dial where this station is very strong, but now I wish that I could cut it out a bit.

"Amongst the suggestions made by my friends several favour the idea of shortening the aerial, which is a particularly long and efficient one. As I went to a good deal of trouble in erecting it, and as I put down a great deal of my good results to it, I am very reluctant to do this, so can you suggest any other method for reducing the interference from the local station so that I can get more foreigners?"

There are several methods of doing this, one of the best being a simple form of wave-trap tuned to cut out 5 N O. Details of a suitable trap have frequently been given in these columns, but if you do not wish to go to the expense of constructing a wave-trap, there is another simple method of reducing the interference on a set like yours.

We notice from the photograph that your aerial lead is connected direct to one end of the grid coil. This is a very non-selective arrangement and we advise you to try inductive coupling, by the addition of another coil holder similar to the pair you already have. The idea is that instead of joining the aerial lead to the same coil which is connected to the grid lead and condenser and to the tuning condenser (i.e. the grid coil), you should take the aerial away from this coil altogether and join it to a separate coil, which is placed close to the grid coil.

You could either use a three-coil holder similar to the present two-coil holder, or you can have an additional single coil holder mounted about one and a half or two inches away from your present aerial

coil. In any case, the wiring will be very simple to alter, the reaction coil connections remaining as at present, the grid coil connections remaining the same except for the fact that the aerial lead is taken from there, and finally one end of the new coil is connected to earth and to the filament, etc., whilst its other end goes to the aerial lead-in.

You will find that by plugging in various sizes of coil you will get various degrees of selectivity in the aerial circuit, the smaller the coil the greater the selectivity obtained. This method of using an extra coil holder is a very good one if you have a large number of plug-in coils and can vary the degree of selectivity by this means quite easily, or if you use variable coupling for the aerial coil, though both these methods have the disadvantage that they will throw out the tuning a little.

The addition of a wave-trap would give sharper selectivity (far more than by the previous method), and would have the further advantage that it makes very little difference to the tuning.

**A FILAMENT CALCULATION.**

C. P. (Cannock, Staffs).—"How is it possible to tell the resistance in ohms of a valve filament without actually measuring instruments?"

The resistance of any valve filament can be calculated in a moment from the figures given by the valve-makers. All that is necessary is the well-known application of Ohm's Law, i.e.

$$\text{Resistance} = \frac{\text{voltage}}{\text{current}}$$

Examination of the valve-makers' chart will show that both the voltage required and the current taken by the filament are given, so that it is only necessary to divide the latter into the former to ascertain what is the resistance of any particular filament.

If, for instance, we have a valve which is rated to take 8 volts on the filament and consume .25 of an ampere, the actual resistance of its filament is given by dividing .25 into 8, i.e. 24 ohms. Similarly, if the valve whose filament resistance we wish to determine requires a 2-volt accumulator and has a current consumption of .1 amp, the resistance of its filament will be given by dividing the .1 into 2, the answer being in this case 20 ohms.

**A CURE FOR MOTOR-BOATING.**

C. C. (Nuneaton, Warwickshire).—"When the set was working with batteries it seemed to be quite O.K., but when it was put on to

(Continued on page 1122.)



**BULGIN**  
RADIO PRODUCTS

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ON THE  
PULSE OF!  
YOUR SET!**



PRICE **10/6** EACH

Fit a "Bulgin" Milliammeter 0/15 or 20 m.a. and do not be put off with cheap Continental substitutes. Our instruments are finished with a dead Black rim and accurate movements, and the Silver Dial engraved with the name "Bulgin," your guarantee for a whole year.

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TWO VOLTS.		FOUR VOLTS.	
General Purpose,		General Purpose,	
'05 amp.	5/6	'05 amp	5/6
R.C.C., '06 amp.	5/6	R.C.C., '07 amp.	5/6
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'18 amp.	7/6	'1 amp.	7/6
Super H.F. & R.C.C.,		Super H.F. & R.C.C.,	
'18 amp.	7/6	'1 amp.	7/6
Pentodion		Pentodion,	
'15 amp.	21/-	'15 amp.	21/-

*From your dealer or direct*

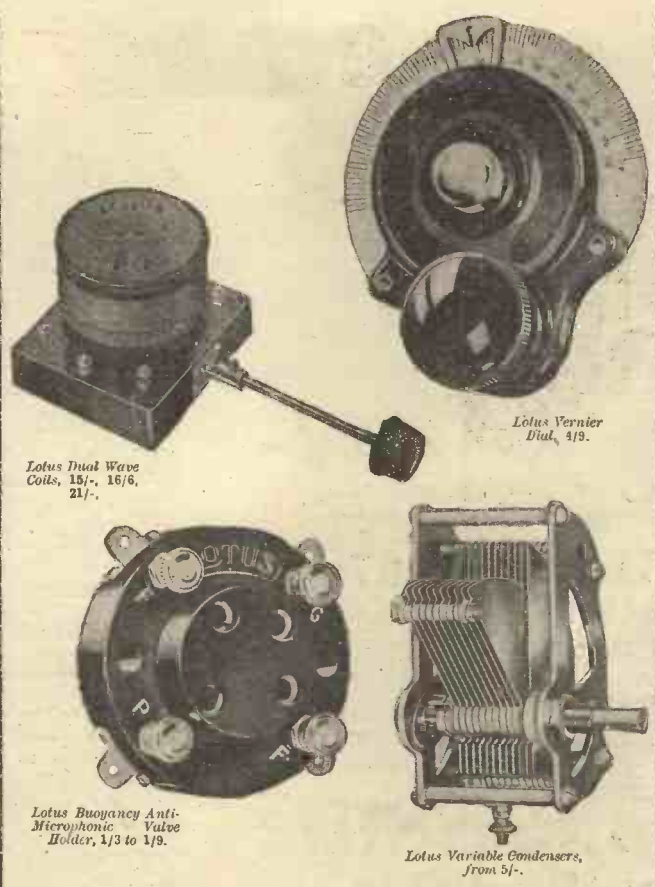
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**5'6**

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by  
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**RADIOTORIAL  
QUESTIONS AND ANSWERS**

(Continued from page 1120.)

the mains this regular loud, strong, ticking noise started, and nothing that I have been able to do can stop it. I am told that this is motor-boating, and that there is a method of putting in a resistance which will stop it.

"As you will see from the sketch enclosed the detector valve plate-circuit at present goes

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**The "Pentwin"**  
a remarkable two-valver using  
the new Pentode Valves.

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to a reaction coil and to one end of an H.F. Choke, and the other side of this goes to H.T. positive 1, and to the second valve, etc. Where shall I put the resistance in, and what value should it be?"

A resistance of about 20,000 ohms generally seems to suit this purpose nicely, and in conjunction with this you will require a fixed condenser of good quality, a suitable value to use being 1 mfd. The method of joining these in circuit is as follows.

Leave the connection from the detector valve's plate to the reaction coil as it is, and also that from the

high-frequency choke to the plate. Disconnect the other side of the choke from the H.T. positive lead, but leave all the other connections on the H.T. positive lead as formerly, so that the H.T. supply to other valves is not interfered with.

Between the H.T. positive lead and the choke terminal, which is now vacant, insert the anode resistance, which, by the way, should be of the wire-wound type. This will restore H.T. to the first valve, the only difference now being that it flows through the resistance instead of direct as formerly. Now connect up the fixed condenser by taking one side of it to the L.T. negative-and-earth lead (any point on this lead will do).

The remaining side of this fixed condenser is now joined to the junction of the wire-wound anode resistance and H.F. choke, that is to say, it is now connected to the choke on that side which is farthest away from the plate of the detector valve. This completes the wiring and should solve your trouble.

**SHORT WAVES AND SUPER-REGENERATION.**

M. N. A. (Tarporely, Cheshire).—"Before I went in for a multi-valve set I used to be very fond of playing about with a super-regenerator, and now that I have started dabbling in small sets again with the advent of short-wave reception (which is quite new to me) I have wondered whether it is possible to apply the super-regenerator to short-wave work. Has it ever been done?"

Yes, it has been done, although it is not at all an easy matter to get a super-regenerator to work on short waves unless one has lots of time to spare and plenty of material to choose from. However, there is no need to break fresh ground in this way, as full details of a really practicable little short-wave super-regenerator were published in "The Wireless Constructor" for October, 1928.

The set was a remarkably sensitive one on which the American stations could be received with great strength.

**Back Numbers of "P.W."**

M. J. (Oxfordshire).—"Where can I get back numbers of POPULAR WIRELESS?"

Back numbers of POPULAR WIRELESS which are still in print can be obtained from The Amalgamated Press, Ltd. (Back Number Dept.), Bear Alley, Farringdon Street, London, E.C.4., price 4d. per copy.

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**THE LOUD SPEAKER  
TO EMPLOY WITH  
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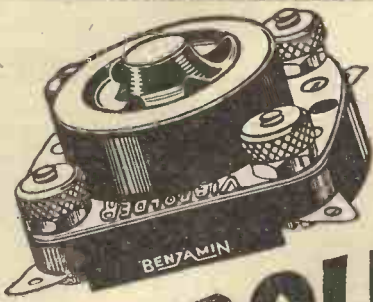
We strongly recommend the Squire No. 97, aluminium frame, price 12/6 and cone kit, price 2/6, which can be used in conjunction with either the Triotron unit, price 17/6, or the adjustable Blue Spot unit, price 25/-, and fitted in the cabinet shown herewith. Complete Loud speaker can be constructed in one hour.  
Cabinet - - - 25/-



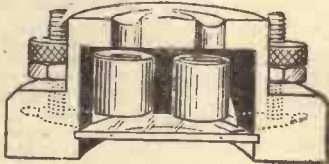
Size of Cabinet 20½ in. by 20½ in. by 10 in. deep approx. No backboard, to avoid box effects in reproduction. Cabinet can be supplied with fret 6½ inch dia. or for Squire No. 97 frame. Please quote size when ordering. When a cabinet is ordered with any particular set of parts it will be understood the fret has to be of the same diameter as the cone, unless it is otherwise stated.

**PEARL & PEARL,**  
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# VIBROLIDER



The valveholder that keeps your valves young!

Section through the Vibrolider showing self-aligning contacts and jointless one-piece springs.

The valve-leg sockets of the Vibrolider are unique because they are formed by the coils of the shock-proof springs themselves. For this reason Vibroliders are exceptionally suitable for portable sets, for while the filament is protected from every shock, no amount of vibration can cause the valves to work loose.

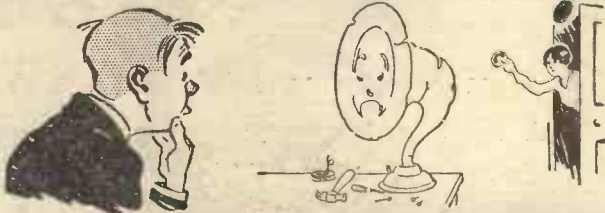
Price **1/6**

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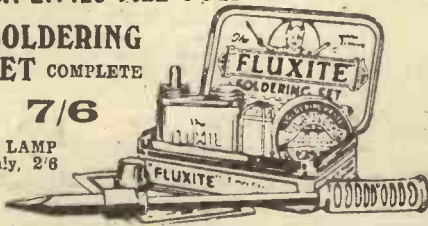
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21 in. high with 14 in. Bell, Mahogany finished with plated arm and stand.

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## TECHNICAL NOTES.

(Continued from page 1104.)

of an inch—which represents about the smallest movement of the air which can be perceived by the ear as audible sound—then 10,000 sheets would need to be laid on top of one another to make the thickness of a sheet one-millionth of an inch in thickness or about 20,000,000 of such sheets piled up would only reach the thickness of a single sheet of this journal.

### Aerial Currents.

In the same way the currents which flow in some parts of the receiving circuit, more particularly at the aerial end of the H.F. part of the circuit, are exceedingly small, generally much too small to be measured by an ordinary form of measuring instrument.

A fairly sensitive galvanometer will give a readable deflection for a direct current of a-millionth-of-a-millionth of an ampere, so that this will give you some idea how exceedingly small are the alternating currents which flow in the aerial and adjacent parts of the receiving circuit.

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## MODERN WIRELESS

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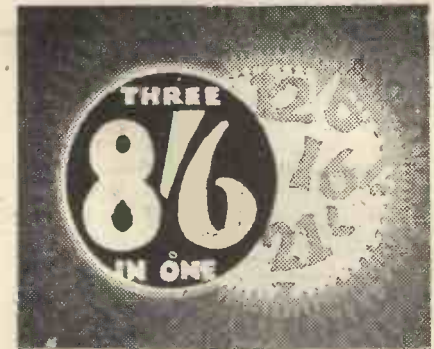
When considering the question of low-frequency amplification, using R.C. coupling, you should remember that only a portion of the voltage is set up across the anode resistance used in series with the H.T. supply to the anode of the valve, inasmuch as the valve itself is bound to have a certain amount of impedance (and usually quite a considerable amount in the case of a valve used for this type of coupling).

It is clear that some portion of the voltage will be developed across the valve itself and is, therefore, not available. Speaking roughly, the actual voltage developed across the ends of the anode resistance will bear the same relation to the voltage across the valve as the resistance value of the anode resistance bears to the impedance of the valve.

### Amplification.

For instance, if the anode resistance and the valve resistance are equal, there will

(Continued on page 1126.)



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This wonderful feature incorporated in the Wates Meter has caused a stir throughout the Radio World. Every preconceived notion of meter value has been swept away. This amazing Meter tells you all you want to know—NOW a variety of single-purpose testing instruments are a totally unnecessary waste and expense. The Wates Meter gives three dead-beat readings from one clearly engraved dial. It is in every sense a precision job. Exceptionally handsome appearance. Fully guaranteed. Dead-beat readings. From your dealer or direct with explanatory free leaflet.

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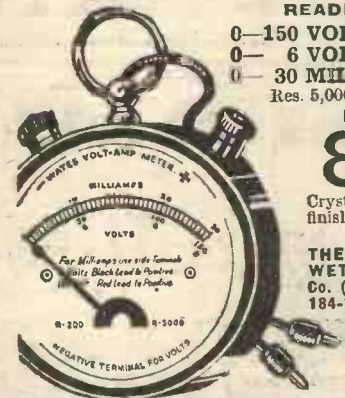
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PR 3	2	0.095	15,000	8	L.F.
PR 4	2	0.095	120,000	32	R.C.
PR 9	3.5-4	0.063	18,000	14	H.F. Det.
PR10	3.5-4	0.063	10,000	8-7	L.F.
PR11	3.5-4	0.063	88,000	40	R.C.
PR17	5-6	1	18,000	17	H.F. Det.
PR18	5-6	1	9,500	9	L.F.
PR19	5-6	1	80,000	40	R.C.
POWER					
7/6	Each				
PR20	2	15	7,000	6	Power
PR40	4	15	7,000	6	"
PR60	6	1	5,000	6	"
SUPER-POWER					
12/6	Each				
PR120	2	3	2,750	4	S.P.
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LEYTON—Flower & Son, 621/623, Lea Bridge Rd.; J. Saunders, 359, High Rd.; Trumbles, 424, High Rd.

MANOR PARK—"Felix" Radio, 943, Romford Rd.

LEYTON—Flower & Son, 621/623, Lea Bridge Rd.; J. Saunders, 359, High Rd.; Trumbles, 424, High Rd.

WALTHAMSTOW—Wilkin, 12, Blackhorse Lane.

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POPLAR—Bottoms & Co., 241, East India Rd.

PLUMSTEAD—Grover & Smith, 158, Plumstead Rd.

PECKHAM—C. & W. Thew, 5, Station Parade, Queen's Rd.

PUTNEY—Job-co, 24a, Florian Rd., Putney Bridge Rd.

SHEPHERD'S BUSH—W. Canning, 47, Goldhawk Rd.

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## PAROX

COILS

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### THE 'TITAN' THREE COIL UNIT 15/-

As used and recommended by the Technical Dept. of this paper.

COPPER SCREEN, as specified (10 in. x 7 in.) . . . . . 4/6

H.F. CHOKES, high wave 6/6

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Obtain a Broadsheet from your dealer and read why you should—**Completely Screen the Grid**

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"I have recently been experimenting and demonstrating with your 'Screened Grid Three' and I must say that although I have been able to build many sets of good design, of four and five valves, and have just dismantled a good five-valve set with two H.F. stages, Detector and two L.F. screened coils, etc., I find your Receiver beats them all, and I am more than pleased with its performance."

The above is one of many UNSOLICITED TESTIMONIALS.

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**PROTECTS**  
RADIO CIRCUITS



Protects your radio circuit just as an electrical house circuit. Connected in series. Completely protects valves and meters from overload. Saves untold trouble and cost. Price: 50 up to 500 M.A., 2/6; 1.5 to 4.5 amp., 2/-. Complete with clip from dealers, or direct.

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See page 1121

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Why buy expensive Sets!  
BUILD YOUR OWN CIRCUIT & BUY THE PARTS  
ON  
**EASY TERMS**

FROM WOOLLDRIDGES,  
41 & 22, LISLE STREET, LONDON, W.C.

**TECHNICAL NOTES.**

(Continued from page 1124.)

be half the total voltage developed across the former, whilst if the anode resistance is three times that of the valve, there will be three-quarters of the voltage developed across the anode resistance. Incidentally, I should mention that something between one-half and three-quarters of the total voltage across the anode resistance is as much as can reasonably be expected under practical conditions.

**Attenuation.**

Several papers have been published recently dealing with the radiation of electromagnetic energy from a transmitting aerial and the absorption of this energy in different directions. This is a very important subject from the point of view of the broadcast engineer and, although the average listener may not realise it, it affects him considerably.

If the transmitter were stationed in absolutely uniform surroundings (for example, in the centre of a large tract of sea or in

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the middle of a desert) it is presumable that the energy would be radiated fairly uniformly in all directions. But these ideal conditions are very much departed from in practice, and the radio waves, on their way from the transmitter to your receiver, have to pass all manner of obstacles as well as to suffer a great deal of absorption. The absorption of the waves is much greater when they strike a metallic object, or a system which is tuned to their frequency and capable of oscillating electrically in sympathy with them: such an object, of course, is the average receiving aerial and receiving set.

This means that wireless receivers situated nearer to the broadcasting station absorb quite an appreciable proportion of the broadcast energy and so rob the ether to that extent, reducing the field strength for radio receivers situated at more distant parts. This, of course, is in addition to the attenuation which would take place in the normal course.

**Screening and Absorption.**

It has been shown by various experimenters that trees and buildings (especially steel-girder buildings) have a considerable influence upon the attenuation of wireless waves.

(Continued on page 1128)

The **Easy Way**  
TO PERFECT RADIO

Satisfaction and Service is the keynote of the Peto Scott Easy Way to Perfect Radio. Every conceivable and well-known accessory is stocked by us, and may be obtained on the easiest of

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**LEADING MAKES OF H.T. ELIMINATORS** from 4/7 down. Balance in 11 monthly payments of 4/7.

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BRITISH MADE.  
Moving Coil  
Reproduction  
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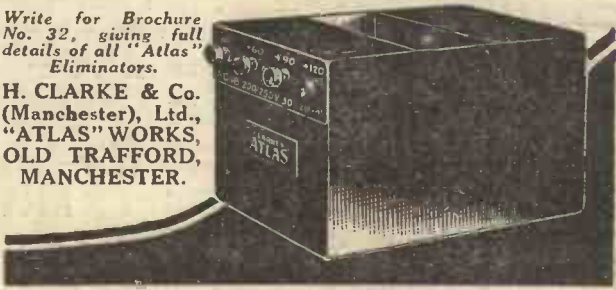
makes noisy, expensive H.T. Batteries a thing of the past. The model illustrated (A.C.18, for Alternating Current) is especially suitable for "Cossor Melody Maker" and "Mullard Master Three" Sets, and is priced at £4 17s. 6d. with half-wave rectifying valve and Royalty. Full-wave rectifying valve 7s. 6d. extra. There are also Direct Current models at prices ranging from £1 17s. 6d.

Each model is covered by the "ATLAS" guarantee of safety and efficiency, and provides perfect, reliable high tension current, practically without cost.

"ATLAS" Eliminators are recommended for use with Pitman's "All Europe Three."

Write for Brochure No. 32, giving full details of all "Atlas" Eliminators.

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  2. OUT OF PRINT.
  3. 1-VALVE L.F. AMPLIFIER.
  4. CRYSTAL DETECTOR WITH L.F. AMPLIFIER.
  5. H.F. (Tuned Anode) AND CRYSTAL WITH REACTION.
  6. H.F. & CRYSTAL (Transformer Coupled, without Reaction).
  7. 1-VALVE REFLEX WITH CRYSTAL DETECTOR (Tuned Anode).
  8. 1-VALVE REFLEX AND CRYSTAL DETECTOR (Employing H.F. Transformer, without Reaction).
  9. H.F. AND DETECTOR (Tuned Anode Coupling, with Reaction on Anode).
  10. H.F. & DETECTOR (Transformer Coupled, with Reaction).
  11. DETECTOR AND L.F. (With Switch to Cut Out L.F. Valve).
  12. OUT OF PRINT.
  13. 2-VALVE REFLEX (Employing Valve Detector).
  14. OUT OF PRINT.
  15. OUT OF PRINT.
  16. H.F. (Tuned Anode), CRYSTAL DETECTOR AND L.F. (With Switch for Last Valve).
  17. CRYSTAL DETECTOR WITH TWO L.F. AMPLIFIERS (With Switching).
  18. 1-VALVE REFLEX AND CRYSTAL DETECTOR, with 1-VALVE L.F. AMPLIFIER, Controlled by Switch.
  19. OUT OF PRINT.
  20. OUT OF PRINT.
  21. THE 2-VALVE LODGE "N."
  22. "THE GUARANTEED REFLEX."
  23. THE 1-VALVE "CHITOS."
  24. THE "SPANSPACE THREE." Three-Valve Receiver employing 1 Neutralised H.F. Valve, Detector with Non-radiating Reaction Control, and 1 L.F. Valve.

- P.W. BLUE PRINT Number
25. OUT OF PRINT.
  26. A "STRAIGHT" 4-VALVER (H.F., Det. and 2 L.F. with Switching).
  27. OUT OF PRINT.
  28. A "MODERN WIRELESS" 5-VALVER (H.F., Det. and 3 L.F.).
  29. AN H.T. UNIT FOR DIRECT-CURRENT MAINS.
  30. A REINARTZ ONE-VALVER.
  31. A STANDARD TWO-VALVER (Detector and L.F.).
  32. THE "CUBE SCREEN" THREE (H.F., Det. and L.F.).
  33. A "KNIFE EDGE" CRYSTAL SET.
  34. AN H.F. AND DETECTOR TWO-VALVER.
  35. THE "UNIVERSAL THREE" (Det. and 2 L.F. stages resistance-coupled).
  36. THE "SPANSPACE FOUR" (H.F., Det. and 2 L.F.).
  37. THE "LONG SHORT" CRYSTAL SET.
  38. A TWO-VALVE L.F. AMPLIFIER.
  39. THE "SYDNEY" TWO.
  40. THE "SUPER SCREEN" THREE.
  41. THIS YEAR'S "CHITOS" ONE-VALVER.
  42. THE "Q AND A" THREE. (A simple set (Det. and 2 L.F.).
  43. THE "INEXPENSIVE FOUR."
  44. THE "ECONOMY FIVE." For long-range loud-speaker work.
  45. A SIMPLE A.C. H.T. UNIT.
  46. THE "REGIONAL" THREE.
  47. THE "WAVE-CHANGE" ONE.
  48. THE "REGIONAL" CRYSTAL SET.
  49. THE "ANTIPODES ADAPTOR."
  50. THE "ANY MAINS" TWO.
  51. OUT OF PRINT.
  52. THE "BANDMASTER."

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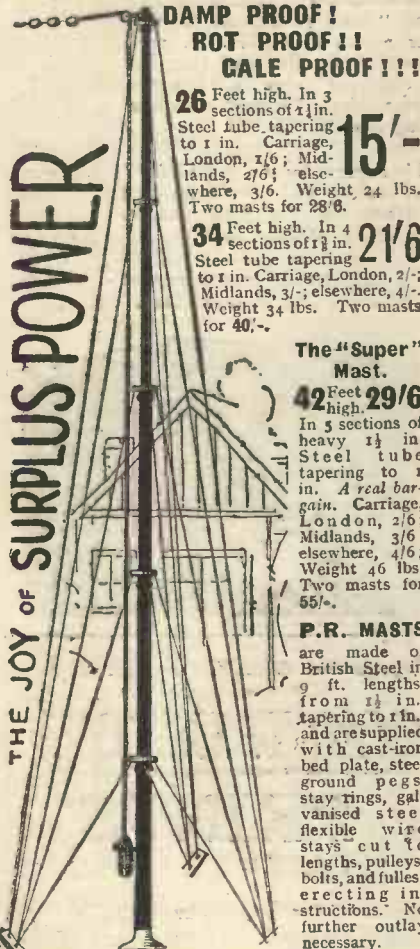
All orders for these Blue Prints should be sent direct to the "Popular Wireless" Queries Department, Fleetway House, Farringdon Street, London, E.C.4, enclosing a stamped-addressed envelope and a postal order for 6d. for each Blue Print ordered.



# A HIGH MAST IS EQUAL TO TWO EXTRA VALVES

Everybody knows that to have a high aerial is to get extra powerful signals. The difficulty of fixing up a high aerial is banished if you fit a

## P.R. PATENT STEEL WIRELESS MAST



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Any intelligent man can assemble and erect a P.R. Mast in a couple of hours. Our patent Mast being tapered, it is easy for anyone to raise it from the ground into position. Ordinary tubular masts require several hands and difficult rigging to do this. To help you the wire rope is sent out to size—a saving of endless worry. Imagine sorting out 500 ft. of rope in your back garden!

Minimum Radius 3 ft. 6 in.	<b>GUARANTEE</b> Money refunded without question if not satisfied.	The easiest Mast to erect.
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**PAINTING.** Any protective coating applied before dispatch gets so damaged by the Carriers that it is essential to paint the Mast before erection. All P.R. Masts are sent out oxide-finished ready for painting. One coat of P.R. Colloid covering applied—a 10 minutes' job—to all parts of the Mast when ready to erect sets dead hard in an hour and protects it against all weathers.

**PRICE OF ACCESSORIES.** P.R. Colloid Covering sufficient for a Mast—with brush, 2/6. Halcyon Log Line—Byland's patent rot-proof: For 25 ft. Mast, 1/6; 34 ft., 2/-; 42 ft., 2/6. For 100 ft., 3/- Note—Double length supplied to make lowering of Aerial easy.

**A HIGHLY EFFICIENT AERIAL.** P.R. Aerial is made of 14-28 High Conductivity Pure Copper Enamelled Wire—each strand insulated from its neighbour to give the highest signal strength obtainable. 100 ft., 4/3; 50 ft., 2/3.

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**IF YOU USE VALVES** it will pay you to write to us for particulars of the famous 3/6 range of P.R. valves. Each valve has a written guarantee of life and performance.

## TECHNICAL NOTES.

(Continued from page 1126.)

### Choke-Filter Circuits.

I was referring the other day to choke-filter circuits, and in this connection I have received various questions as to suitable sizes for choke coils for different purposes.

It is not easy to answer these questions in any very general way since, of course, so much depends on the actual condition in any particular case. Some general observations may, however, be useful.

### Impedance and Resistance.

In the first place, if the choke is intended to carry fairly heavy currents (when I speak of heavy currents in this connection I do not mean amperes, but currents which are fairly heavy compared to the average for which such a choke coil is ordinarily used) it is important, in order that it shall be effective, that its inductance shall be of a sufficiently large value. I would recommend a choke having a core area of between half a square inch (not 1/2 in. square) and two square inches. In passing, a square core of half a square inch area will have a side measurement of approximately 1/2 in.

### Going to Build a Set?

Why not get one of the

## Wireless Constructor ENVELOPES

No. 1. The "Radiano" Three

No. 2. The "Concert" Four

Price 1/6 each at any Booksellers.

Or 1/9 by Post from The Amalgamated Press Ltd. (Wireless Constructor Envelopes), Bear Alley, Farringdon St., London, E.C.4.

### Effect of Gap.

If the core is continuous—that is, if there is no gap—it will be more effective as a flux channel, but will be less effective for the purpose of the choke. You should remember that the basic difference between a choke and a transformer is that in the transformer the function is generally to transform energy from one winding to another with as little loss as possible, whilst on the other hand the efficiency of a choke depends upon its ability to dissipate energy of certain types.

### Best Conditions.

The ohmic resistance of the windings of the choke should be as low as is conveniently possible, since the object of the choke is to cut out alternating current, or fluctuations of direct current, whilst allowing the filtered direct current to pass as freely as possible.

A certain amount of ohmic resistance is inevitable, but the less its value the better. Ohmic resistance, as distinct from impedance, is no more effective in cutting out unwanted A.C. than in cutting out wanted D.C., since it does not differentiate between the two. The differentiation between the A.C. and the D.C. depends upon the impedance of the choke, and consequently what we require is a large impedance with a low value of D.C. resistance.

**YES! WE WILL**  
SUPPLY YOU WITH ALL COMPONENTS TO MAKE YOUR OWN SET ON  
**EASY TERMS**  
EVERYTHING WIRELESS COMPONENTS FOR ALL "P.W." CIRCUITS NEW COSOR MELODY MAKER MASTER THREE\*, ETC. COMPLETE SETS OF ANY MAKE LOUDSPEAKERS, H.T. UNITS, ETC.  
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AMPLIFIERS 50/-. 3-VALVE SET 24.  
**P. TAYLOR, 57, Studley Road, STOCKWELL, LONDON**

**THE NEW CROXSONIA RANO PANEL SENSATION**  
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POSTAGE FREE WRITE FOR NEW FOLDER  
Mahogany Finish 1/4 square-inch or part inch Black Gloss Finish 1/4. " " " " Black Matt Finish 1/4. " " " " Made to the standard thickness of 1/8".  
"Wireless World" writes:—"Good insulation, infinite resistance. Free from leakage. Exceedingly strong. Not liable to warp. Recommended."  
Recommended for all specified sets, including Cosor Melody Maker and Mullard Master Sets, as being efficient and satisfactory in every respect.  
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# THAT DE-LUXE APPEARANCE.

By A. BETTS.

**WIRELESS** fashions and fancies change quickly, particularly with regard to cabinets and panel layouts. Consequently, the proud constructor must needs be ever changing the appearance of his set if he wishes to present it to his friends as the latest thing in wireless design. Doubtless there are many people who, having constructed their set, perhaps a year ago, are extremely satisfied with its performance, but would wish it to present an appearance more in conformity with some of the extremely "de-luxe" models now on view. They do not wish to go to the trouble and expense of altering their circuit and baseboard layouts, but would, perhaps, not be averse to a few refinements which would give their set the 1929 de-luxe appearance.

**Making a Start.**  
For the benefit of such, let us take a look at an average panel for a two- or three-valve set, constructed, perhaps, a year ago. In the first place, a new panel will be necessary. Plain black ebonite, while not obsolete, is giving way to rather more elaborate affairs.

By studying the sets marketed by well-known firms, the constructor will gain many ideas. A mahogany panel, surrounded by a carved wooden framework, is becoming popular. The idea is not so fearsome as it sounds. Carved beading to form the framework can be bought fairly cheaply, and the constructor with little skill can construct a really elaborate affair. In any case, a mahogany or other fancy finish panel presents a better appearance to most eyes than does one of plain black.

The constructor should now plan out his new panel layout, bearing in mind that as little as possible should appear on the panel. If he can confine himself to a switch and two dials, so much the better.

Looking at his old set, he will probably find that it bears several terminals. These should be transferred to the strip at the back of the set. Upon the front of the really up-to-date set there should be no aerial or 'phone leads to mar the appearance.

### Rheostats and Dials.

Much has been said concerning rheostats, but, without going into technicalities, it is generally agreed that these are becoming obsolete. If you have two rheostats, take out one, joining the two connections, and replace the other by a simple battery switch, of which several types are now marketed. If you are using, for example, a 4-volt battery for 2-volt valves, baseboard resistances can be inserted to give the requisite drop in voltage.

We can next turn our attention to the condenser dial or dials. If, as is probable, you have those totally inadequate knobs and 3-in. dials, you would do well to consign them to the scrap-box.

There are on the market several excellent drum drives which can be adapted to standard condensers, and which, while giving an excellent slow-motion drive, add greatly to the appearance of a set. If you do not care to go to the expense of one of these, there are a multitude of slow-

(Continued on next page.)

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Kit of Parts & Valves.  
£8 : 12 : 6.  
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**WESTINGHOUSE METAL RECTIFIER TYPE H.T. 1 84/- REGENTONE**  
Mains Transformer **30/-**  
Please State Voltage.

**CYLDON CONDENSERS**  
Triple Gang and Shields, £4/17/6; Dual for "Furze-hill," 25/6; Synchronator for "Inceptor," 47/6.  
LISTS FREE.

**THE 1929 TRINADYNE** P.W. 19 Jan. '29.  
0005 Formo or similar, 6/-; 0/0 Switch, 1/3; 0001 Reaction, 4/-; Semi-permanent Detector, 2/6; Sprung Valve Holder, 1/3; Lissen Choke, 5/6; Wammel, 5/-; B.B. Neutralizing, 5/-; R.I. Varley, 15/-; Lissen L.F., 8/6; 002 and 001, Lissen, 2/6; 2 Coil Sockets, 2/6.  
**POST FREE 59/6 PLUS 2/- EXTRA**

For 2/- extra with parts I will include High-grade Ebonite Panel, 12 x 7, Baseboard, Strip 10 x 2, 8 Engraved Terminals, Wire, Flex, G.B. Clips, Plugs, etc.

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  - All-Wave 4, B.B.C. and Base.....pr. 20/-
  - Long Wave, no Base.....pr. 18/-
  - Regional Receiver, Standard 4, B.B.C., ea. 16/3; Long Wave, 20/-; Bases.....2/-
  - 2 H.F. Everyman 4, B.B.C. Coils, 35/-; 5X.....22/-
  - "W. World" Five Coils.....45/-
  - Selection Four Coils, B.B.C. 24/6; 5X 16/-; Bases.....2/-
  - New All-Wave Four, B.B.C. 16/3; 5X 20/-; Bases.....2/-
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  - Pentode 2 Cond., B.B.C. or 5X, 3/6 ea.; B.B.C. in Litz Europa III Coils (with loading coil).....set 22/-
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**ONLY ONE COUPON ON ANY ONE ORDER**  
If you spend 25/- or more you can buy for 3d. extra any one (only) of the following:  
S.M. Dial, 100 ft. 7/22 Copper Aerial, 12 yds. Lead-in, Fuse and Holder, 12 Nickel Terminals, 50X Coil, H.F. Choke, Permanent Detector, Battery Switch, 0003 and 2 meg. Leak, 90 ft. Grid Bias, Panel Brackets, 6-pin Coil Base, 100 ft. Insulated Aerial, Loud Speaker Silk Cord, 30 ft. Covered Connecting Wire, Ebonite Panel, 9 x 6, 12 yds. Twin Flex, 100 ft. Indoor Aerial, Cycle Rear Reflector.

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(Only available at K. Raymond's).  
**POST or CALL with this coupon, and if your order is £2 or over FOR 6d. EXTRA you can buy one of the following (state which required):**  
2 mfd. Mansbridge Condenser; 0005 S.L.P. Variable Condenser; 4 in. Slow Motion Dial; 100 ft. Silk Frame Aerial Wire; 0001 Reaction Condenser; 16-volt Grid Bias, tapped 14; 12 yds. Extra Heavy Double Rubber Lead-in; 5-way Battery Cord or H.T. and L.T.; 10 Engraved Terminals (take plug or spade), state names required.  
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**CABINET 12/11** POST 1/3

**Blue Spot 25/-**  
66K (101)  
OR THE LOT WITH BUCKRAM CCNE 12" Carriage **35/-** Paid

**SQUIRE CONE KIT**

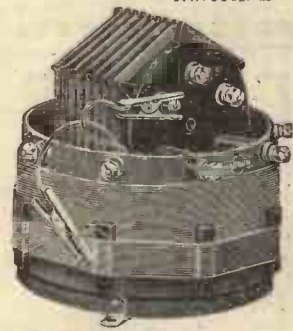
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- Postage extra under 3/-

# 'TITAN' THREE

P.W. 2 Feb. '29.



The latest wonderful P.W. Coil Unit described and used in this set as shown. Supplied by as with kit of parts made by Burne-Jones (Magnum) **15/-** (In Stock)

### Components.

Lotus or Ormond 0005 Variable S.M. Dial, Igranite Micro, Lissen L.F. (8/6), Wave-change Switch, L.T. ditto, Titan Coil Unit, 3 Spring V.H., H.F. Choke (R.I.-Varley or Lewcos), Dubilier 002, Two of 0003, and 2 meg. leak, 2 Mansbridge condensers.

**FOR 2/6 EXTRA** (engraved), Wire, Screws, Flex, Plugs, and 14 x 7 Grade A Ebonite Panel. **POST FREE C.O.D. (U.K.) 72/-**

**Total 69/6**  
Total 69/6 plus 2/6. **POST FREE.**  
**USE YOUR COUPON. IT'S FOR YOU.**

**Traders Supplied with COILS and SCREENS FOR ALL SETS.**

**MULLARD MASTER 3\***  
3 Valve Holders, Lotus, at 1/3; Combined Wave Coil, 17/6; Permacore Transformer, 25/-; Climax "LFA" Transformer, 25/-; Climax H.F. Choke, 7/6; Benjamin Battery Switch, 1/3; J.B. 0005 Log, 11/6; 00035 10/6; Mullard 0003 and 2 meg. 5/-; Magnum Panel Brackets, 2/6; Mullard 0001 Fixed, 2/6.  
**Total £5 : 12 : 6** Carriage free, U.K.

**FOR 3/6 EXTRA, I-** will include :  
2 Handsome S.M. Dials, Set of Connecting Links, 8 Plugs, 2 Spades, 4 Engraved Terminals, 2 Ebonite Strips, Twin Flex, Splendid Aluminium Panel, 18 x 7, drilled ready for use, 9-volt. Grid Bias, Baseboard



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3 Minutes from London Bridge Southern Ry.  
and Tube Stations. Phone: HOP 5555

Immediate Dispatch of ALL the  
CORRECT Parts for

## 'TITAN' THREE

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1 Cabinet	15 0
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1 Granitic Micro Condenser	5 0
1 Lissen L.T. Switch	1 6
1 Lissen Wave-change Switch	2 6
1 READY RADIO 'P.W.' SCREEN	15 0
1 READY RADIO 'TITAN' COIL UNIT	3 9
3 Sprung Valve Holders	8 6
1 Lissen L.F. Transformer	6 0
1 Wearite H.F. Choke	1 0
1 Lissen .0002 Condenser	5 0
2 Lissen .0003 Condensers	3 0
2 Dubilier 2 mid. Mansbridge Condensers	1 6
2 H.T. Fuses	1 3
1 Lissen 2 meg. Leak and Holder	2 9
1 Terminal Strip, 12 x 2	45 6
11 Belling-Lee Terminals	2 0
3 Valves, as specified	
Wire, Flex, Screws, G.B. Plugs, etc.	

PRICE (including Valves) **£6 17 3**

Any of the above parts can be supplied separately.

Ready Radio products used in 'TITAN' 3	
'TITAN' COIL UNIT	- 15/-
P.W. SCREEN	- 2/6

CALL AND HEAR THE SET,

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144-page Illustrated General Catalogue, 1/- post free.  
All orders post free. See also our priced advertisements in "Wireless Constructor," "Wireless Magazine," and "Modern Wireless."

## THAT DE-LUXE APPEARANCE.

(Continued from previous page.)

motion dials of excellent appearance and performance which will give your set that finishing touch.

It is when we come to the handle of the moving-coil holder on a swinging-coil reaction set that we strike our first snag. This component cannot, of course, be dispensed with without materially altering the circuit, and it is difficult to make a really neat job by bringing the handle out through the panel.

### The Reaction Control

One idea I have actually seen, but do not advocate, consists of bringing out the long extension handle, not through the front, but through the back of the set. The coil holder is reversed and a hole drilled in the back of the set.

The handle is pushed through and the knob screwed on. If adjustments to the reaction coil are infrequent the idea may serve, but it is only useful to the enthusiast who demands a clean panel and who is ready to sacrifice convenience to neatness.

By following these instructions the constructor will find that he has transformed entirely the appearance of his set. Further ideas to suit individual sets will, of course, occur to the constructor, but he should bear in mind that the ornamental panel with the minimum of controls is the "dernier cri" in wireless fashions.



## RADIO METERS

This enterprising innovation marks a new step forward in after-sales meter service. Now you can buy Sifam, the unchallenged leader in popular priced Radio Meters, and at the same time be assured of a first-class meter repair service. Repairs are carried out in our own works by a staff of experts. In price and guaranteed accuracy Sifam meters are all that you need. Ask your dealer to show you the complete range and send for free leaflet "What Simple Meters Can Show You" to :-

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## NEXT WEEK.

More about the  
**'TITAN' THREE**  
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## EMERY PAPER.

EMERY PAPER is so useful an article to the radio amateur and constructor that it is a matter for surprise that very few workers ever attempt to make their own supplies of this commodity.

The process of its manufacture is a simple one, however.

Take a small quantity of good glue, and prepare it in the usual manner. While the glue solution is still hot, add to it a quantity of fine emery-powder (or powdered glass) so that, on stirring, a grey or black liquid is obtained.

Spread this prepared glue lightly and rapidly over the surface of thick brown paper, and then set aside the sheets of paper to dry. The result will be an abrasive paper of good quality.

Of course, any of the glue preparation which has been unused may be set aside and employed for the preparation of further supplies of the paper on future occasions. The preparation will keep indefinitely.

J. F. C.

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is a capital Table Vice for WIRELESS WORK

It gives a Wireless Constructor a workshop in a moment—anywhere. Rigid, accurate, finely finished and British Made throughout. Fitted with accurate steel screw, detachable unbreakable jaws. Ample clamp clearance. Jaws: Width 2"; Opening to screw 1 1/2"; clearance to screw 1 1/2". Price 3/9 post free. Supplied also with detachable White metal Grips, see "x" to hold rods and screws without damage. Price complete with Grips 5/- post free. Cash with Order. Money refunded if not fully satisfied.

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COMPLETE KITS OF PARTS FOR:  
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AND OTHER WIRELESS ACCESSORIES  
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EELIX HOUSE, BUNHILL ROW, LONDON, E.C.1.



THERE is a good deal to be said in favour of the scheme of building an entirely separate set for short-wave reception. It is quite possible to make a set which works well on short and broadcast waves, and plenty of such designs have been published; but there is something of a drawback to be found in the fact that such dual-purpose receivers are practically all of the "Det. and L.F." type.

If your set has an H.F. stage, it is not likely to be capable of working on the short waves, and extensive alterations would be needed to make it so. In such circumstances a separate small short-wave set is the obvious solution, and it need not be a particularly expensive one. It can be a very simple little set, and yet give very good results, for high efficiency on the short waves does not involve a complicated circuit.

This week's design is for such a receiver, and although it only provides for two valves, it can be depended on to give you really strong 'phone reception of at least one American station on almost any night during the winter. On very good nights you may even be able to get one of them on the speaker with an efficient aerial (not a large one). To do this with any frequency, however, really calls for three valves, and you should not count upon it.

**A Good Standard Circuit.**

The circuit comprises the usual combination of a detector valve with reaction and one L.F. stage. The latter is of just the ordinary type with transformer coupling, and the only point to note here is the fixed condenser C<sub>5</sub> of .001 mfd. from plate to filament of the valve. This is intended to reduce body-capacity troubles while tuning, and generally helps considerably, since it by-passes stray H.F. currents and keeps them from wandering along the 'phone leads.

The success of a short-waver depends chiefly on the tuning and reaction arrangements, and we have been very careful to provide all the more important of the

# THE "P.W." "WHITE PRINTS."

A NEW SERVICE FOR OUR READERS.

*White Print No. 9. :: :: A Short-Wave Two-Valver.*

This week we publish the ninth of our White Prints. This page may be easily and safely torn out—along the dotted line overleaf—and the White Print filed. In due course you will thus have available an encyclopaedic collection of the best circuits used in modern radio practice. A "White Print" will be published on the last page every week in "P.W." until further notice—THE EDITOR.

This is intended to overcome the difficulty of "flat spots," i.e. places on the tuning range where reaction is difficult to obtain. When one of these is found (they are only troublesome on some aerials) bring the condenser into circuit and try it set at various capacities (it is actually a neodyne type used simply as a small-sized

special devices which experience has shown to be worth while here. First of all, there is a series condenser in the aerial circuit

variable). Its use reduces signal strength to some extent, so only use it when you must, and keep it set at maximum when possible.

A better method of shifting flat spots is to vary the coupling between the aerial and grid coils (L<sub>1</sub> and L<sub>2</sub>), and this should be the first thing done.

The receiving circuit proper is a form of Reinartz, with aerial coil L<sub>1</sub>, grid coil L<sub>2</sub>, and reaction coil L<sub>3</sub>. The grid coil is tuned by a .0003 mfd. variable condenser C<sub>1</sub> (.00025 or .00035 mfd. will do), and reaction is controlled by the small variable condenser C<sub>2</sub> of .0001 or .00015 mfd.

**Getting Smooth Reaction.**

An important feature of the set is the potentiometer which adjusts the voltage on the grid of the detector valve through the grid leak.

In general, you will find that the nearer the slider is to the negative end the smoother the reaction, but the farther towards the positive end, the louder the signals, so keep it as far that way as you can without making reaction too floppy.

Just one constructional point: the holder for the aerial coil L<sub>1</sub> should be fixed to the baseboard with only one screw, and the connections to it should be of flex, so that the coupling to L<sub>2</sub> can be varied.

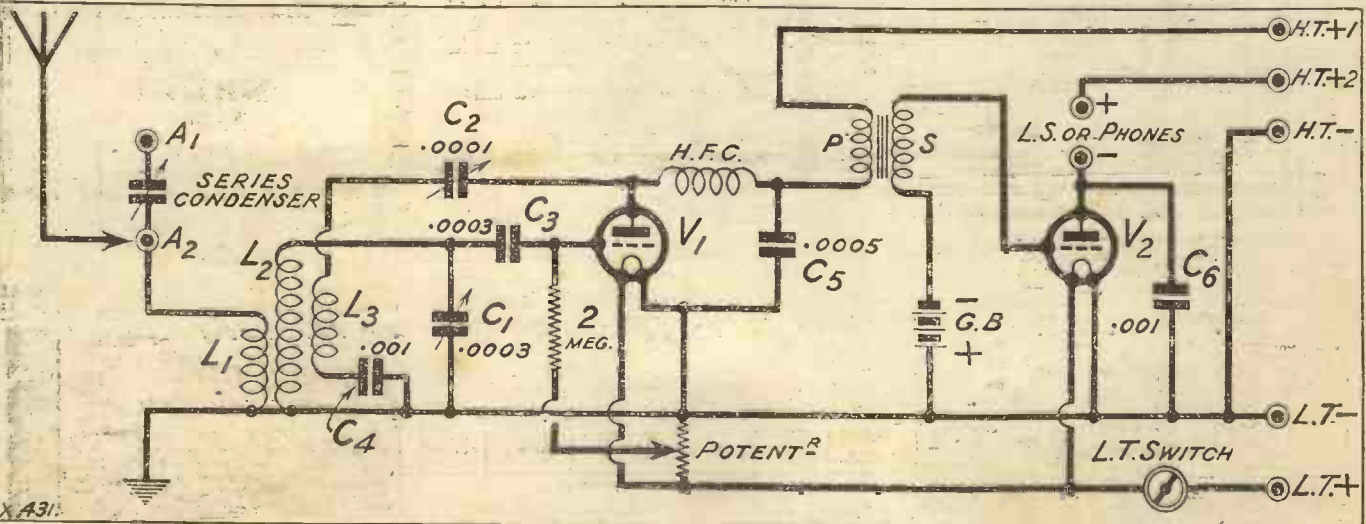
Coil sizes: for waves between 20 and 35 metres L<sub>1</sub> should be of 2 turns, L<sub>2</sub> 4 turns, L<sub>3</sub> 6 turns. For 30 to 50 metres, L<sub>1</sub> 4 turns, L<sub>2</sub> 6 turns, L<sub>3</sub> 9 turns. For the highest band, i.e. 50 to 100 metres, L<sub>1</sub> 4 or 6 turns, L<sub>2</sub> 9 turns, L<sub>3</sub> 6 or 4 turns.

The detector valve should be of the H.F. type (impedance about 20,000 ohms), and the L.F. of the "general-purpose" or small L.F. type (7,500 to 15,000 ohms).

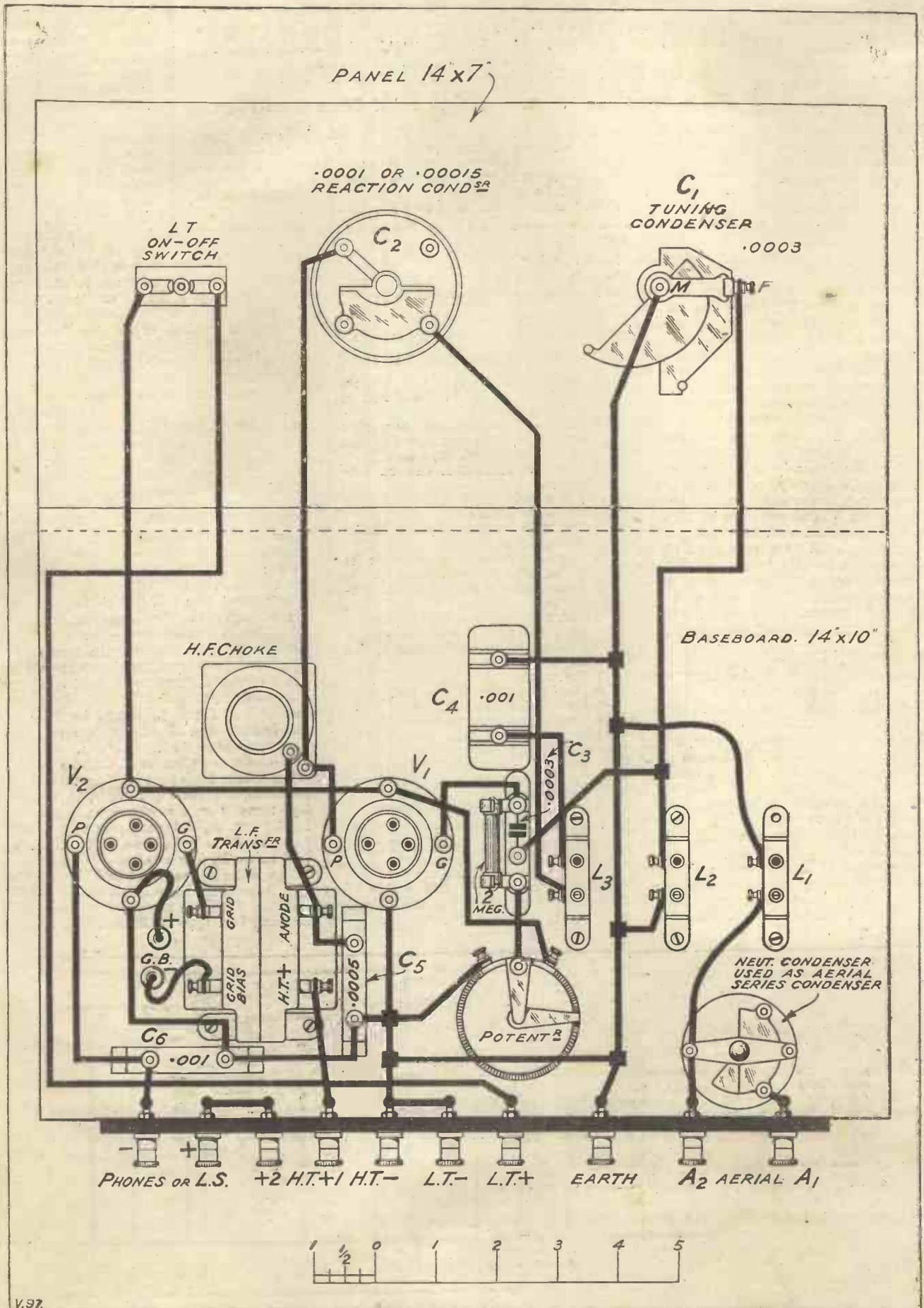
**COMPONENTS REQUIRED.**

- 1 Panel, 14 in. × 7 in. × ¼ in. or ⅜ in.
- 1 Cabinet to fit, and baseboard 9 in. or 10 in. deep.
- 1 .0003-mfd. variable condenser, slow motion or with good vernier dial giving very smooth and slow drive.
- 1 .0001 or .00015-mfd. reaction condenser.
- 1 L.T. switch.
- 3 single-coil sockets.
- 1 Baseboard-mounting potentiometer (200 or 400 ohms).
- 1 Baseboard neutralising condenser for use as series condenser in aerial.
- 2 Sprung valve holders of a good low-loss type.
- 1 L.F. transformer. (Note: choose a fairly high ratio of 4 or 6 to 1 if it is available in the particular make you decide upon.)
- 1 H.F. choke.
- 2 Fixed condensers of .001 mfd.
- 1 Fixed condenser of .0003 mfd.
- 1 Fixed condenser of .0005 mfd.
- 1 Grid leak of 2 meg. (with separate holder if special type of grid condenser with "series parallel" clips is not used).
- 1 Terminal strip, 12 in. × 2 in. × ¼ in. and 10 terminals.
- Wire, flex, G.B. plugs, screws, etc.
- 1 set of short-wave coils.

which can be brought into action when desired by connecting the aerial lead to terminal A<sub>1</sub> instead of A<sub>2</sub>.









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hear every note of every instrument  
clean, clear, and well-defined, full of life  
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It can be used after a power or super-power Valve, and will carry anode currents up to 15 m/a without becoming saturated.

When experimenters are striving to obtain the utmost purity of reproduction, they take care to avoid overloading the last valve, but often lose sight of the fact that one of the earlier valves may be overloaded. By employing a power valve in this stage one can ensure that the input to the last valve is undistorted, and thus obtain full benefit from the super-power Valve in the last stage.

The use of two transformer-coupled stages is becoming increasingly popular. In this case we recommend using our Straight Line Transformer in the first stage and the Bi-duplex in the second, especially when the last stage is push-pull.

PRICE  
27/6

