POPULAR WIRELESS, February 4th, 1933.

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

84 PAGES

FREE BLUE PRINT OF THE "AIRSPRITE"

84 PAGES

Popular Wireless

Every Wednesday
PRICE
3d.

No. 557. Vol. XXII.

February 4th, 1933.

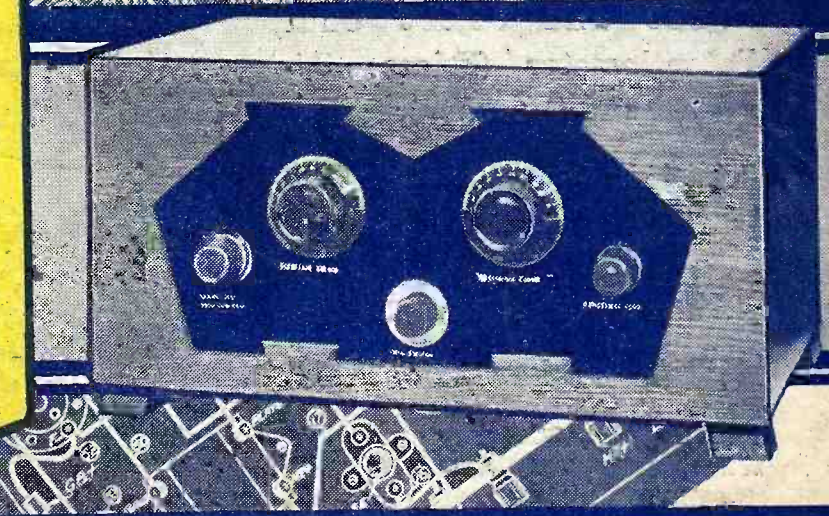
1/- DOUBLE-SIDED BLUEPRINT FREE!

Inside

This Week:

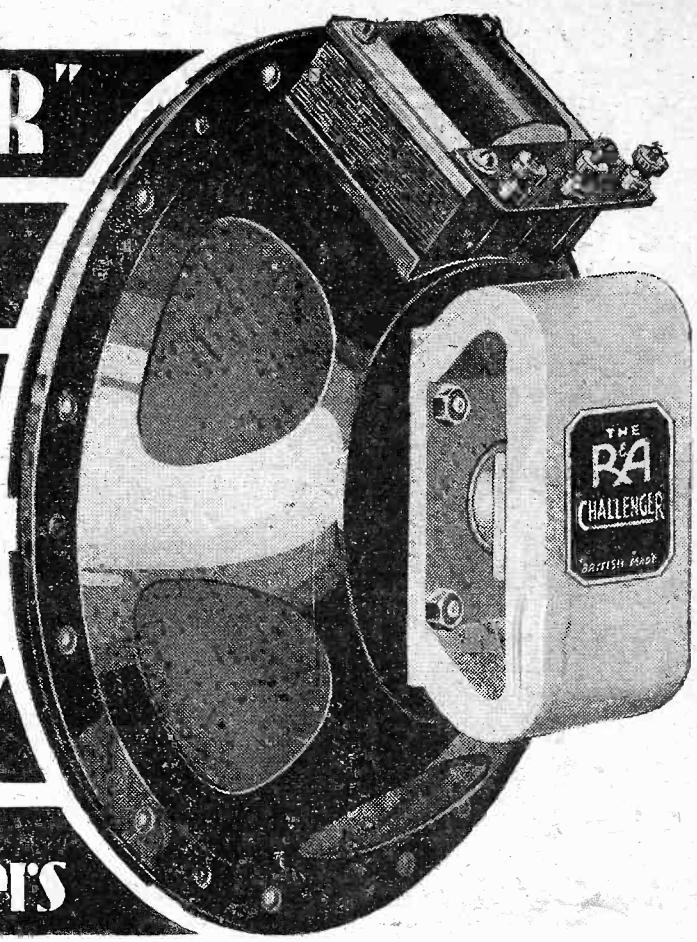
ALL ABOUT THE "AIRSPRITE"

A WONDERFUL NEW SET FOR CONSTRUCTORS WHICH IS BEING PRAISED BY THE WHOLE OF THE BRITISH RADIO INDUSTRY



DISCRIMINATING "AIRSPRITE" BUILDERS insist on DIRECT RADIO SPECIFICATIONS *(See pages 1148 & 1149)*

The "CHALLENGER" is the only reproducer which gives perfect results with the "AIRSPRITE" Battery & A.C. receivers



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353

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PERMANENT MAGNET MOVING COIL REPRODUCER

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Holdens

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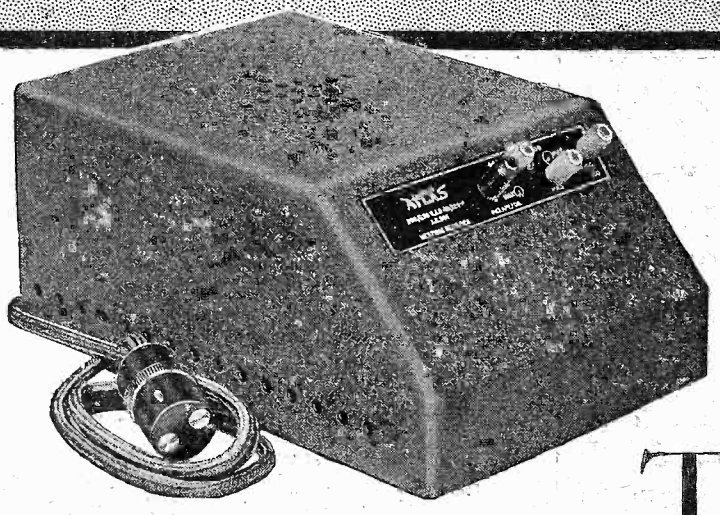
described in this number



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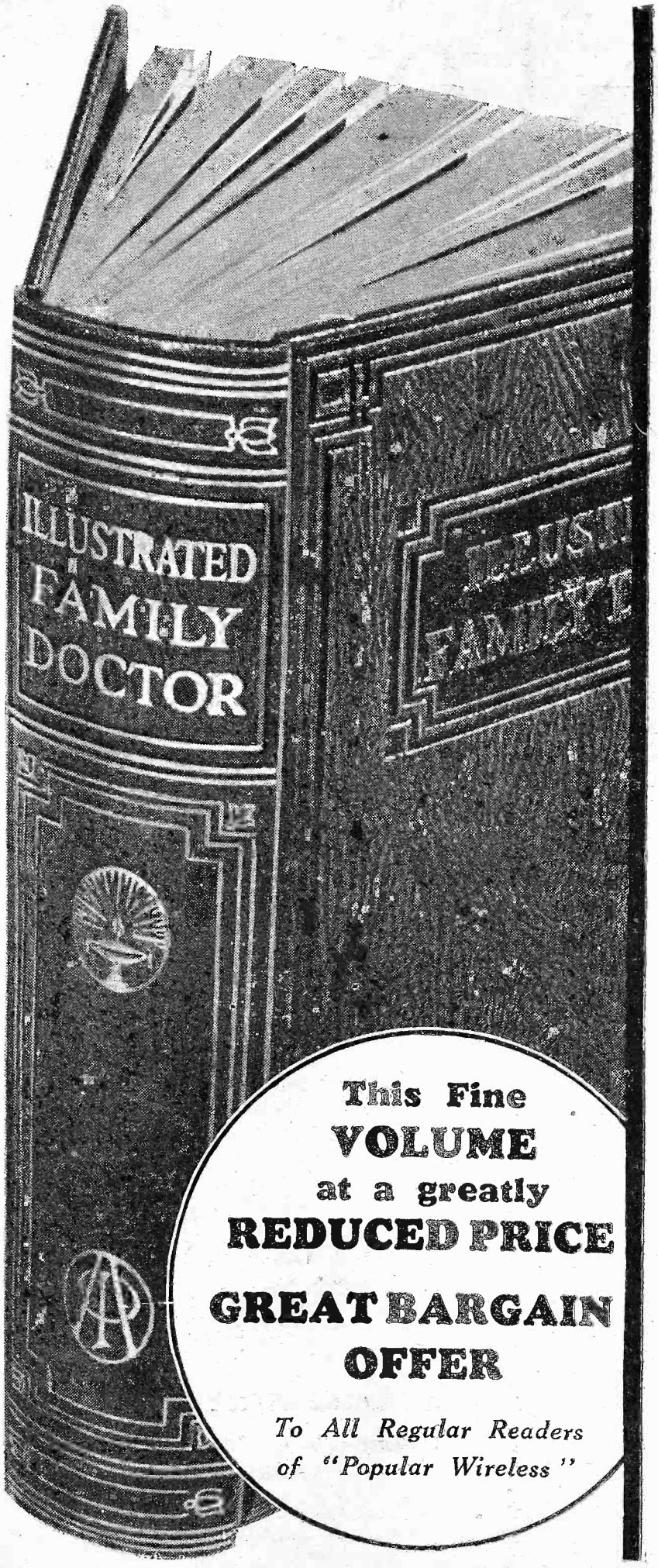

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(P.W.)

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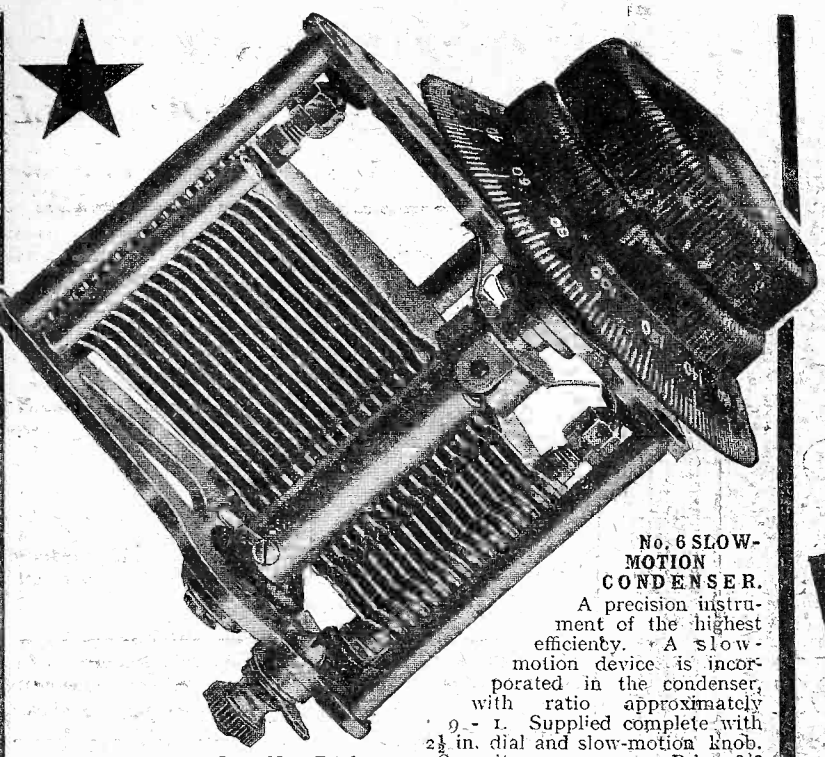

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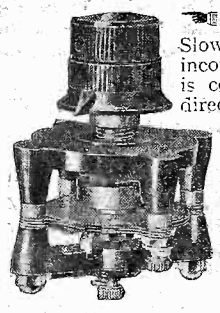

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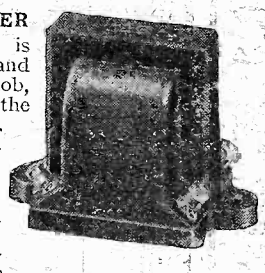

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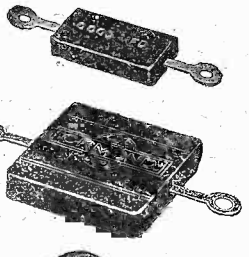

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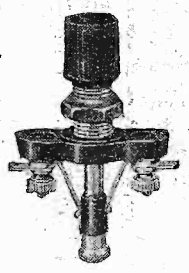

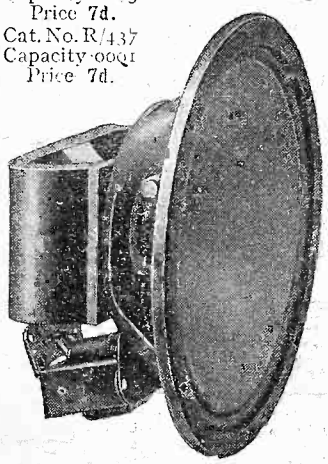

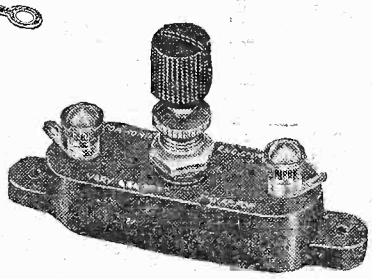

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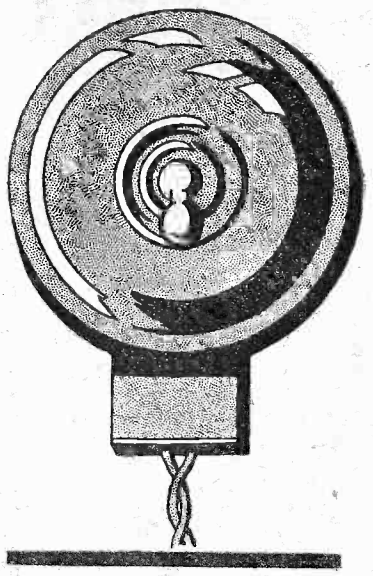

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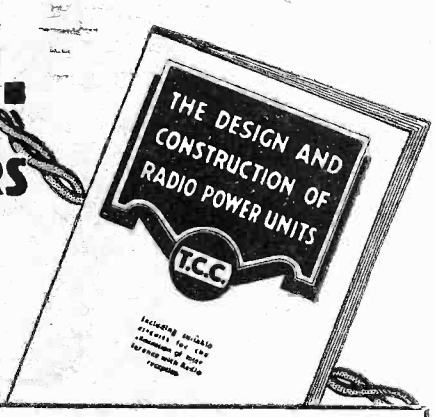

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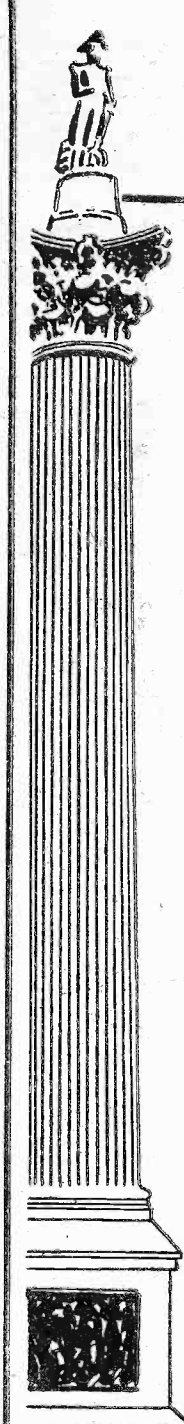

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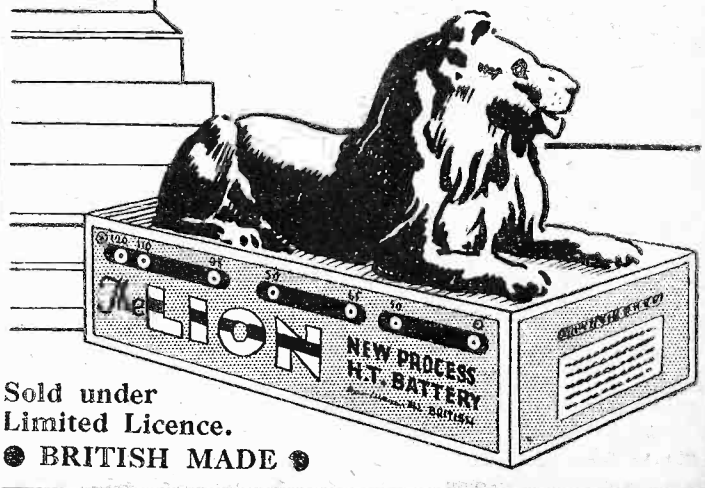

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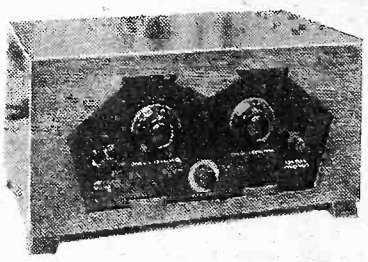

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Specially designed and constructed of hand french-polished oak with attractive silk-covered vignette. Speaker compartment suitable for Moving-Coil or other types of speaker, and batteries or mains equipment.

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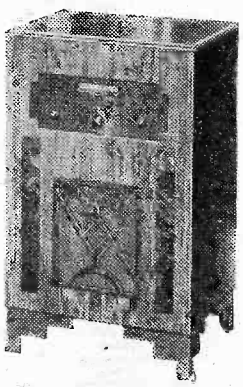

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1 VARLEY D.P.35 Transformer	11	6
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4 Valves, as specified	£3 0	0
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AIRSPRITE A.C. MODEL

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1 **READY RADIO** 3-point on-off switch	1	6
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1 **BULGIN** type B fuse and F.5 holder	1	0
12 **BELLING LEE** type R indicating terminals	2	6
1 **DUBILIER** type 9,200 0·1-mfd. condenser	2	0
1 **FERRANTI** Synthetic 2-meg. grid leak and holder	1	6
8 **CLIX** battery plugs	1	0
2 **CLIX** spade terminals		4
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Author's Kit of specified parts, including FREE BLUEPRINT, ready drilled Panel, but less Valves and Cabinet.

Balance in 11 monthly payments of 8/-

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12 monthly payments of 11/-.

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FIVE METRE TYPISTS
KING ZOG
UNHAPPY ROXY
INTERFERENCE FORBIDDEN

RADIO NOTES & NEWS

A "RECORD" TURKEY
SOCIETY NOTES
SCOTS WHA HAE—
SLEEPLESS NIGHTS

Empire Broadcasting.

UP to January 4th the B.B.C. had received some 300 cables and 1,500 letters reporting on the November tests of the new Empire Broadcasting Station. Generally speaking, the results are very encouraging and demonstrate great enthusiasm among Empire listeners. Many reports of good reception were from places outside the various zones.

Vagaries of Radio Waves.

THE value of reports on reception is well illustrated by the fact that although G S D, always transmitted to Australia in a westerly direction (i.e. the longer path), its *reception* was found to be better *from* the west (the shorter path) after about 11.0 a.m. G.M.T.

It was therefore arranged to change G S D's direction of transmission at that time. It is hoped that many more reports will be made by listeners overseas, because only by these can the B.B.C. learn about this service and improve it.

Radio Typewriter Tested.

JUST before Christmas a test was made in New York, over a distance of nearly four miles, of a system by means of which a typewriting machine can be made to function by receiving five-metre radio waves; it can also turn typed messages into radio signals which will, in their turn, operate such a device at a distance. At the sending station the power used was three watts. This invention is called the "Watsongraph"; Glenn Watson, of Detroit, being the inventor thereof.

Orders Placed

REMEMBERING how the British public has been told to "Buy British," and with a panoramic recollection of the beautiful posters issued by the Empire Marketing Board, it was with considerable astonishment that I read lately in an American journal this reference to the new Empire—I repeat, *Empire*—station.

"The apparatus for this British Empire station was manufactured and installed by subsidiary companies of the International Telephone and Telegraph Corporation. Backed by J. P. Morgan, the I.T. and T. is an implacable rival of British radio and cable communications all over the world." I commend this to the attention of M.P.'s and the Governors of the B.B.C.

The Edison Medal.

THE American Institute of Electrical Engineers has awarded the Edison Medal for 1932 to Mr. Bancroft Gherardi, Chief Engineer of the American Telephone and Telegraph Corporation. Mr. Gherardi has been engaged in communication work all his life, and is particularly friendly with our Post Office. It is through his New York installation that Britain is in radiotelephonic touch with the U.S.A., Mexico, etc.

South Africa and Interference.

SO badly have motor-driven devices interfered with radio reception in Natal—Dundee, to be exact—that the Town Council has before it a by-law to compel all users of electrical apparatus, which is connected with the public mains, to satisfy the Borough Electrical Engineer that it will not interfere with radio reception, before such connection will be granted.

Interference will not be allowed. Although our B.B.C. attaches so much importance to broadcasting, our Government is apparently not so greatly concerned with causes of interference as we should like.

Mr. Vernon Bartlett.

HAVING surveyed Europe from some of its capitals, Mr. Bartlett has returned to England. He will broadcast from London for a few weeks and then go on another European tour during which he will give talks on "The Leaders of Europe."

Some of these leaders will speak for themselves—no prizes offered for guessing *one* who will—and he will interview others before the microphone. The only one I really want to hear is King Zog!

The Progressive Pope.

ONE must admire the support which the Pope gives to the labours and life-work of his compatriot, the Marchese Marconi. I suppose that none of his predecessors made so much use of science in his work of directing the great Church of which he is the temporal head.

He is, I understand, to illuminate at Easter a huge steel cross which is to be set up on the top of the mountain called La Verna, 6,000 feet high, by wireless operated by the pressing of a button within the Vatican.

Radio City and Depression.

THAT great "city within a city," Radio City, planned by Rockefeller to cover twelve acres of New York, has not enjoyed a very happy start, owing no doubt to the terrible economic conditions prevailing in America.

The great Roxy Cinema has been abandoned, and the music-hall, which was to have been its companion, is to be converted into a cinema. These two places were opened only so recently as the last week in December. The music-hall referred to is said to have the largest stage in the world.

(*Continued on next page.*)

ARIEL CONTINUES HIS RUNNING COMMENTARY ON RADIO

Society Paragraph.

THE Southall Radio Society, whose spring session, now open, ends on March 14th, offers a very useful and attractive programme of meetings, and will welcome new members, who may join the session for half-a-crown.

I see that the syllabus includes single talks on radio subjects, circuit-design, television demonstration, pick-up tests, and radiogram demonstration. General Secretary: Mr. H. Rayner, 114, North Road, Southall.

Radio Burglar Alarm.

A SIKES-scarer of an unusual kind has been invented by a subscriber to a radio relay exchange. This ingenious person, not having to worry about wear and tear of valves or wastage of electricity, makes a practice of leaving his loudspeaker going at full blast whenever he leaves his house empty.

The theory is that a would-be burglar would infer that the family was at home and so would creep on to find another "crib" to crack. Rough on the relay and the burglar!

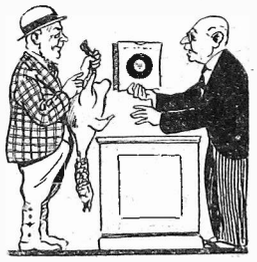
More Plays to Come.

THOSE who enjoy, as I do, radio plays, will no doubt be interested to know that four dramatists of note are working on plays for the B.B.C. These dramatists are Lord Dunsany, E. M. Delafield, Ashley Dukes and Richard Hughes.

Lord Dunsany's plays and stories are generally of the ecric, faery kind; E. M. Delafield is a well-known woman novelist; Ashley Dukes has already written for broadcasting; and Richard Hughes' "His Danger" was the first play ever written for the microphone.

Barter in Brigg.

A BRIGG (Lincs.) H.M.V. dealer resorted to the primitive trading method of barter at Christmas-time. He took twenty sheep for a radio-gramophone and a heifer for another. He accepted his turkey in exchange for two records—a Caruso and a Gracie Fields! The turkey is probably only a happy memory by now, but his flocks and herds are to go to the local market.



Television Notes

UNKNOWN—or at least unperceived—by most listeners, television broadcasts continue regularly, and have had the temerity to "star" certain artistes. Apparently meticulous care is taken in order to observe a B.B.C.-ean correctness in details, and I am told that the producer even went to the length of sending an artiste to the British Museum to copy a dress worn forty-five years ago.

Coming television broadcasts include Laurie Devine the dancer in the character of Miss Amelia Ruth Barry, an American.

Visitors Welcomed.

THE Croydon Wireless and Physical Society, whose Hon. Sec. is Mr. H. T. P. Gee, 51/52, Chancery Lane, W.C.2, welcomes visitors to any of its meetings, details of which, together with full information about membership, can be obtained from the Hon. Sec. A very strong and old-established society this, with an up-to-the-minute syllabus.

SHORT WAVES.

According to Dr. Bowker, the growth of some forms of vegetation can be encouraged by music. Ear-phones for wheat seem to be indicated.—"Punch."

* * *

The writer of a new and popular song which was broadcast last week stated, in an interview, that he composed the whole thing in less than an hour.

But we are afraid it will take some years to compose many of the poor listeners.

* * *

"How many valves did I tell you we have in our hearts?" asked the lecturer.

"I haven't any, sir," replied a student. "Mine's a crystal set."—"Evening News."

* * *

"It is impossible to get one's *poison*ality over the mike," says a well-known American.

That's a blessing, anyway!

* * *

It is said that an American woman died of laughing while listening-in to the funny jokes of a broadcaster.

That could never happen to a highbrow.

* * *

RADIO REGAINED.

When some egregious mutt
Sought to improve my radio's doubtful tone,
With one resentful groan
The thing went phut.
I said in sheer disgust
"Since clearly it is bust,
Throw it away!"
But now at last I own
A brand-new set, installed this very day,
With large loudspeaker (cone).

Now I am re-united to that throng
Who freely, by the twisting of a knob,
Tap the ethereal rivulets of song
Or listen to Professor Thingumbob
Coquetting with the spiral nebulæ;
Once more am free
To hear Big Ben's euphonious voice cry
"Bong!"
To learn the Fat Stock Prices
And news of sudden crises,
To share the largesse of the B.B.C.

—"Punch."

Athlone Gets Over.

THE new Irish Free State broadcasting station at Athlone, which has a 60-kilowatt transmitter, and which works on a wavelength of 413 metres, has been received well in Newfoundland, Iceland, India, Greenland, besides almost all over Europe.

My personal opinion is that the installation of transmitters which effectively carry beyond the confines of the territory which they are intended to serve, i.e. that of the nation owning them, is going to make trouble.

He Missed a Fortune.

MR. L. H. ROGERS has died, aged 85, at Portland, Oregon. He was an inventor. But when Alexander Graham Bell, inventor of the telephone, offered him a tenth interest in the Bell patent for 10,000 dollars, he refused to be hooked. (How those inventors trust one another!)

But, being an inventor, perhaps he hadn't 10,000 dollars at call. By the way, is this the Rogers whose underground aerial system attracted such a lot of notice in the early nineteen twenties?

The King's English.

IT has been found, in an investigation of the results obtained by the King's English broadcast to schools throughout the country, that the improvement in the speech of the children who have taken the lessons is almost twice as great as those who have not.

London has the greatest number of schools engaged in this work and Scotland none at all. The retort of the Scots to this may easily be imagined as being to the effect that only the sick need medicine.

New B.B.C. Station.

THE high-power station which is to replace the Daventry long waver, is of Marconi make and will incorporate novel features, including a new system of modulation—"series modulation"—up to 90 per cent, giving faithful reproduction between 30 and 10,000 cycles.

Five aluminium units comprise the new transmitter, the panels being sprayed with grey cellulose lacquer. A new type of transmitting valve, the C.A.T.14, will be used, the filaments of which operate at about 32 volts at 460 amperes; each valve has its own lighting dynamo, thus permitting independent adjustment of filament voltage.

Interference by Dynamo.

HERE is an instance of interference with sleep caused by a radio dealer's dynamo—not by a loudspeaker. A Burnley couple have succeeded in obtaining an injunction restraining a next-door radio dealer from running his dynamo between 9.30 p.m. and 7.30 a.m.; they secured also £20 damages, with costs. The injunction was suspended for the dealer to take steps to diminish the noise.

This is a difficult case in every aspect, for the best dynamo is bound to hum, the citizen is bound to sleep, and the dealer is probably bound to charge accumulators at night.

ARIEL

The P.W. "AIRSPRITE" 1933's STAR SET

ALL ABOUT A GREAT NEW RECEIVER WHICH HAS BEEN ENTHUSIASTICALLY PRAISED BY LEADING CHIEF ENGINEERS OF THE RADIO INDUSTRY AS A "DEFINITE ADVANCE." YOU CAN BUILD IT FOR EITHER BATTERY OR MAINS OPERATION.

THE pinnacle of the art of set designing is, as with any other art, shared only by an extremely few. And "P.W." is proud of the fact that, by its development and advancement of new circuits and lines of thought, it holds a firm place on that pinnacle. But such a place could not be held without unremitting effort.

It is only in industrial romances of the nineteenth century that you meet garret inventions and kitchen-table discoveries, and if a "struggling inventor" does now and then hit upon a good idea, that is only the exception that proves the rule.

THE "AIRSPRITE"

We must rely upon well organised laboratories staffed by creative and well-trained technicians for the sinews of our scientific progress. "P.W." has a well organised radio laboratory and creative technicians, and it is these which enable us to produce star sets which really are stars and not artificially illuminated concentrations of gas.

It doesn't pay for an inventor to bottle himself up within the unreality of his own imaginative limitations.

Our new star set is the complete antithesis of a one-man job. Two or three of us laid down its foundations, but the

(*Continued on next page.*)

NO OTHER RECEIVER POSSESSES ALL THESE STRIKING FEATURES

1. **Extreme ease of assembly. There are no screens, no baseboard metal work, no soldering, no complications, no intricacies and no snags. Anyone can build the "P.W." "Airsprite" and be certain of success.**
2. **The "P.W." "Airsprite" is the most efficient "S.G." Three ever devised. A very carefully selected team of the best modern components has been chosen.**
3. **It has colossal power and exceptional selectivity.**
4. **It is wonderfully simple to operate.**
5. **There is a flexible power (variable-mu) control.**
6. **Terminals for pick-up connection.**
7. **It is wonderfully stable despite its unusual virility.**
8. **It costs no more than an ordinary "three."**

That is the "P.W." "Airsprite," a magnificent S.G. Three capable of giving practically anyone anywhere two or three score stations. BUT the "P.W." "Airsprite" is THE WORLD'S FIRST SET to bring distant-station listening on a level with local-station listening. At negligible cost and without in any way adding to the controls, the "P.W." "Airsprite" gives you distant stations with uncanny clarity. Read what the Radio Industry has to say about this amazing development.

THE BRITISH RADIO INDUSTRY ENDORSES OUR CLAIMS

THE "P.W." "AIRSPRITE" 1933 STAR SET

(Continued from previous page.)

perfected instrument, as you see it in blueprint and photographs, is probably quite unique in that some thirty or forty of the greatest radio experts in the country have contributed either directly or indirectly to its final design.

After some months of intensive research and experimenting in the "P.W." laboratory (which really is a laboratory and not a mechanic's workshop), the first practical model was finally passed through the preliminary stages of test.

Not only was it tried out in the soundproof and metal-lined testing cabinet, but the most critical members of the staff took it to private residences in different parts of the country and tried it under home conditions.

Various minor alterations were made from time to time as slight deficiencies were encountered, and at last came the final and most stringent of all the tests.

Ready and Hearty Praise.

Chief engineers and other leading executives of all the great radio manufacturing concerns were invited to examine the "Airsprite" Three, and to give it any tests they desired. The circuit, and indeed everything concerning the set was freely disclosed. On other pages you will be able to see what these people, many of whom are members of the highest scientific circles, have to say about our new star set.

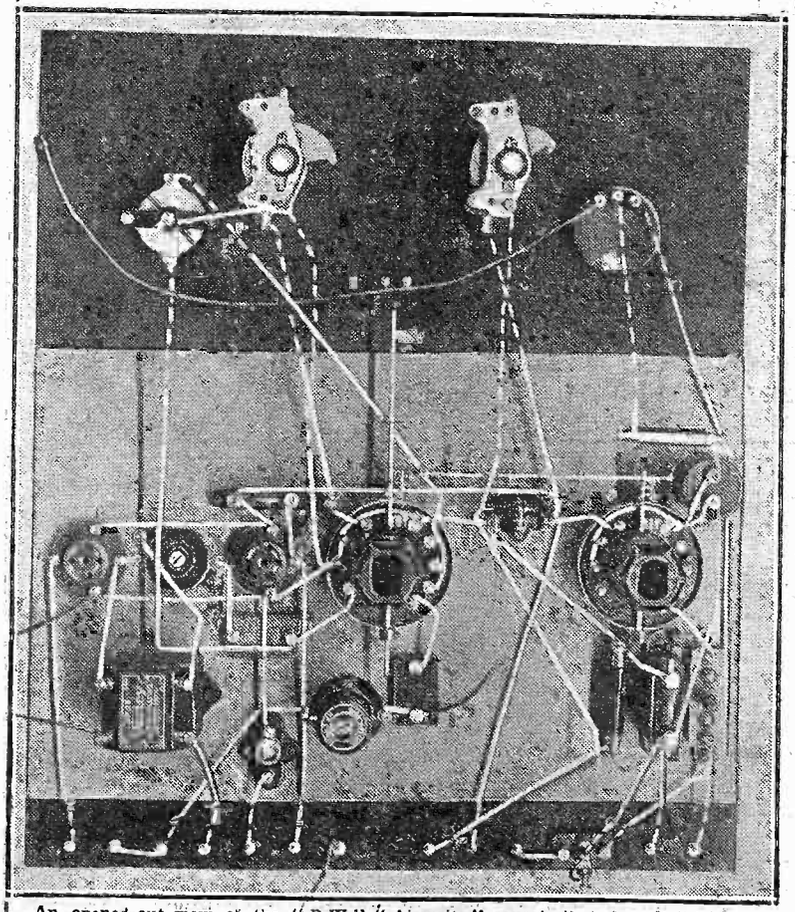
Never before was a new design made to undergo such a battery of expert criticism, and no other set has ever received such ready and hearty acclamation from a jury so scientifically well informed.

In many cases, although only the chief engineer or managing director has signed a letter, the firm concerned sent several engineers to examine and test the set. We had no less than three visits from, in all, six engineers in the case of one of the firms, and in addition this firm built up a model themselves and tested it under their own conditions! But their communication is among the most eulogistic!

Certainly nothing *we* could say about the set could be more glowing than what has been said by these completely impartial critics.

Constructors can build the "Airsprite" Three with the assurance of the radio industry itself that not only is it the best three-valver that has ever been produced, but also that it is well in advance of current technique.

AMAZING SIMPLICITY



An opened-out view of the "P.W." "Airsprite" reveals that, for all its epoch-making nature, it is an amazingly simple home-constructor design.

PROGRAMMES ON THE "AIRSPRITE"

All tuned in at full loudspeaker strength during one test. The readings are those of the anode tuning condenser.

MEDIUM WAVES.

Budapest	94·5	Northern National	35
Munich	90·5	Hilversum	33·5
Vienna	86·5	Scottish National	32
Brussels No. 1	84·5	Heilsburg	30
Florence	82·5	Lille	28
Prague No. 1	79·5	London National	27
Northern Regional	77·5	Leipzig	26·5
Langenberg	75·5	Hörby	26
Lyons la Doua	74	Gleiwitz	25·5
Beromunster	72·0	Belfast	23
Paris, Ecole Supérieure	69	Fécamp	19·5
Rome	67·5		
Madrid E A J 7	61	**LONG WAVES.**	
Sottens	58·5	Kaunas	85
Midland Regional	57·5	Huizen	80
Frankfurt	55	Lahti	74
Toulouse	53·5	Radio Paris	69
Scottish Regional	51·5	Berlin	63
Mühlacker	48	Daventry	58
London Regional	47	Eiffel Tower	51
Strasbourg	44	Warsaw	49
Poste Parisien	40·5	Motala	45·5
Breslau	39·5	Moscow	42·5
Genoa	37·5	Kalundborg	33
Bordeaux Lafayette	36	Oslo	29

NOTE.—These stations were tuned in without using a wavemeter, and all were definitely identified. In ordinary use a hundred stations could be logged on any "Airsprite" by almost anyone, and each station would, owing to A.T.B., provide full entertainment quality. In a subsequent issue we shall publish a graph showing *all* the stations we have logged on the "P.W." "Airsprite."

Indeed, there is already ample indication that the new features in the "P.W." "Airsprite" will be absorbed into general practice with unusual rapidity.

As you will note on other pages, it is the opinion of several important personages that the "P.W." "Airsprite" will have very "far-reaching effects on future radio development." (This is an actual quotation from one of the reports.)

But constructors have the unique opportunity of being able immediately to avail themselves of the new developments and thus place themselves well in advance of current radio reception technique.

Statements of Fact.

So that the full potentialities of this 1933 star set can be at once appreciated we have summarised its features, presented them as the plain statements of fact that they are.

In view of the unprecedented display of expert opinion we are able to publish, there is obviously no need at all for us to provide a lengthy analysis.

Suffice it to say that the "P.W." "Airsprite" comprises in the first place the most effective three-valve circuit known to modern radio science.

The circuit has been devised and components and layout chosen so that this 100 per cent effectiveness has been achieved without any constructional complications.

Anyone can build a "P.W." "Airsprite" at a cost not exceeding that of the average ordinary "three."

But having done so. . . .

The "P.W." "Airsprite" employs a special variable-mu control and, for the first time, A.T.B., Automatic Tone Balance—the invention which has aroused the keenest admiration of all the experts who have been privileged to test it.

The "P.W." "Airsprite" has immense power, its selectivity is superb; A.T.B. provides the finishing touch and, at practically no additional cost (that is the staggering truth), for the first time makes distant-station listening equivalent to local-programme reception in both ease of selection and tonal quality!

"A Definite Advance."

No other set can even remotely approach the "P.W." "Airsprite" for distant station listening. It may seem almost incredible to many of our readers that such a performance is possible in a set having no more controls or adjustments than the simplest home-radio outfit.

However, they don't have to take only our word for it! Note how the experts of the radio industry acclaim the "P.W." "Airsprite" as a "definite advance towards simple, and more efficient home radio."

In combining an increased efficiency with greater simplicity, the "P.W." "Airsprite" proves to the hilt that once again "P.W." has triumphantly vindicated its claim to lead the way in the cause of the home-constructor.

AUTOMATIC TONE BALANCE

EXCLUSIVE NEWS of a STRIKING NEW RADIO DEVELOPMENT

YOU cannot get a large number of foreign stations, or even the more distant British stations on an inexpensive set unless you use reaction. But reaction is a two-edged sword, for while it will enormously increase the sensitivity of a receiver, it is bound to upset its tonal balance very seriously.

It is for this reason that distant programmes have fallen into disfavour with critical listeners. The change from clear and distinct local programmes to the boomy muzziness of far-away transmissions is so marked that the most tolerant have to admit the imperfections of these latter.

An Absolute Fact.

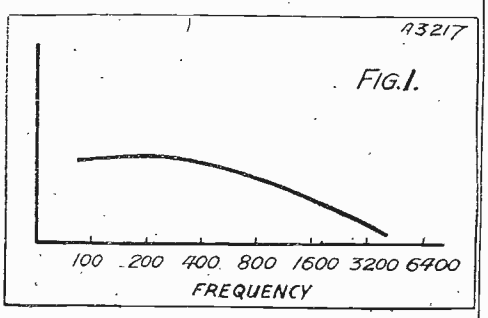
And the effect is made all the more noticeable because so many of the continental stations are boomy in their radiations to start with.

I suppose most people know that the application of reaction tends to cut off the high notes, but I wonder how many realise that this cut-off begins at as low a frequency as 400 cycles ?

> *"I have seen many attempts to solve this problem, and I am particularly impressed with the simplicity, amounting to genius, of your method."*
>
> *VARLEY.*

Yet this is an absolute fact. Less than one octave above the middle C on the piano the notes commence to dwindle. The distortion is further aggravated because reaction emphasises the bass notes as well !

Until recently the tonal deficiencies of distant reception were glossed over by the romance of its accomplishment, but nowadays it is a poor set which will not tune in at least one or two powerful foreigners.



And the listener is beginning to look for quality as well as quantity, and quite rightly.

Various tone controls have made their appearance, and these certainly do enable listeners to adjust for good quality in different conditions of reception. But they add to the controls of a set and impose an obligation on their users.

> **WHAT THEY SAY**
>
> *"This discovery is as important as that of the reacting valve itself, and will no doubt have as far-reaching effects on future radio development."—*
>
> *DIRECT RADIO.*

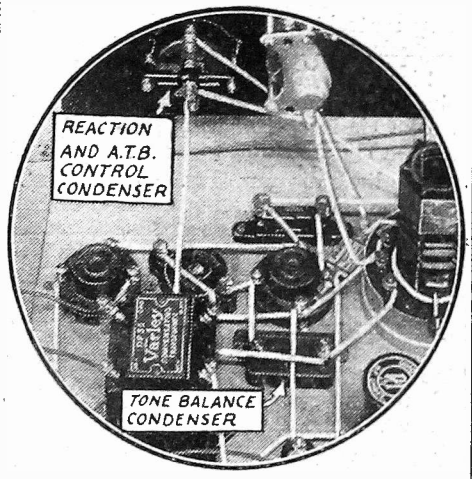
It is left to them to judge a given reception and adjust the quality accordingly. Actually, it is impossible to carry out such an adjustment with definite method. It must be blind guesswork.

Even an expert musician would find it difficult on the one hand to balance an organ transmission from Budapest for reaction distortion and on the other a variety turn from Berlin !

Obviously, some simple and purely automatic system to provide perfect balance in all circumstances simply had got to be invented. It remained one of the very few things needed to bring home-radio to practical perfection.

The Search for Simplicity.

I gave considerable thought to the matter in the closing months of 1932, and subsequent to experimenting with innumerable schemes, some of which seem absurdly complicated now, I finally had the good fortune to hit upon "A.T.B.," the Auto-



> **NOTHING TO "WANGLE."**
>
> **A.T.B. really is completely automatic and involves no initial or operating adjustments whatever.**

matic Tone Balance which appears for the first time in "P.W.'s." new star set.

Because of its complete success and its remarkable simplicity, it has been hailed as the work of a genius. I, personally, make no such claims. As I have indicated, it was a happy brain-wave that owed its generation to months of hard thinking and research.

I first took the known methods of compensating for reaction distortion (reaction must always distort, remember) and endeavoured to simplify them. If you glance at Fig. 1, you will see how the amplification falls off from 400 cycles. Obviously, if you can introduce something into the set which will provide an increasing amplification from 400 upwards, as at Fig. 2, the reaction deficiency will be off-set.

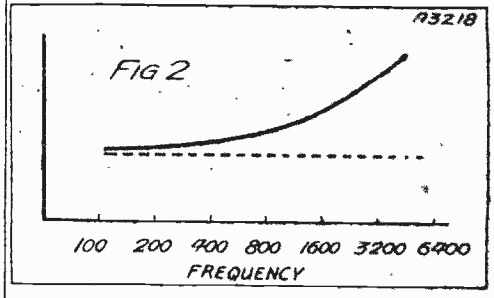
Efficiency with Economy.

I did not spend long with those special choke-resistance schemes, for these cost money. But it finally occurred to me that the effect could be obtained with L.F. transformers of certain characteristics.

Many cheap L.F. transformers have the required characteristics, but they do not give the good amplification necessary for a first-class set although, of course, some would be prepared to forgo that. Even so, there is no guarantee that any one particular "cheap" transformer will "fail" in just the way required.

> *"Your clever solution of an old problem is an achievement of which you may well be proud."—*
>
> *WHITELEY ELECTRICAL.*

However, this problem was solved by the independent production by Varley, Ltd., of an L.F. transformer of identically the type needed for the job. Actually, this happened after I had ironed out the "A.T.B." scheme and had fixed upon two or three "cheap" transformers that fairly well suited me, although I was faced with the difficulties of



telling the truth about these transformers' performances on the one hand and justifying amplification loss on the other !

The special compensating transformer swept all these objections away. It gives exactly the result needed without loss of amplification, and actually costs less than most other good transformers. What a stroke of good fortune !

(Continued on next page.)

AUTOMATIC TONE BALANCE

(Continued from previous page.)

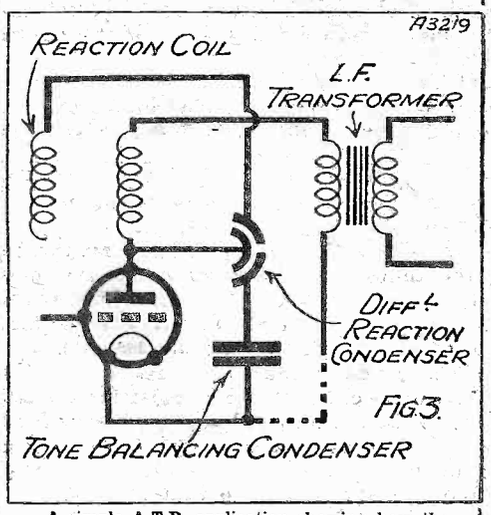
But the use of a special transformer of this nature, instead of a normal one, is not Automatic Tone Balance. Its ordinary application is to sets, such as super-hets, which give constant frequency distortion.

My "A.T.B." renders it possible for an inexpensive S.G. Three (the receiving set for the million) to maintain tonal equilibrium with and without reaction—the essential differences lying between distant and local reception.

It does this through the reaction control itself. Towards minimum reaction the special compensating characteristics of the L.F. transformer are negatived by carefully planned progressive capacity. At minimum reaction the compensation is completely nullified. Thus you have the condition for pure, straight-line local station results.

As reaction is brought in to boost up weak transmissions, so is the transformer compensation given more and more play, and the output of the set is maintained at "straight-line" purity

A.T.B. IN PRACTICE



A simple A.T.B. application showing how the invention works. In the "Airsprite," A.T.B. appears in a form slightly different from this.

> ***"When listening to a distant station on the edge of reaction your tone compensation made all the difference between enjoyable music and the usual deep, muffled noise, and more important still is the fact that it made it possible with a very weak, distant station to hear the announcer's voice clearly and understand what he was saying."—Belling and Lee.***

All this is purely automatic. The listener has no extra knobs to fiddle with. He just operates the set as he would any ordinary one, plying the reaction and tuning controls in the ordinary way. But "A.T.B." lifts his results miles above those hitherto attainable.

And it costs him practically nothing to enjoy this great boon. The special transformer is, if anything, cheaper than most others, and the only additional piece of apparatus employed is a fixed condenser costing a shilling or two, which might be there to prevent H.T. shorts in any case!

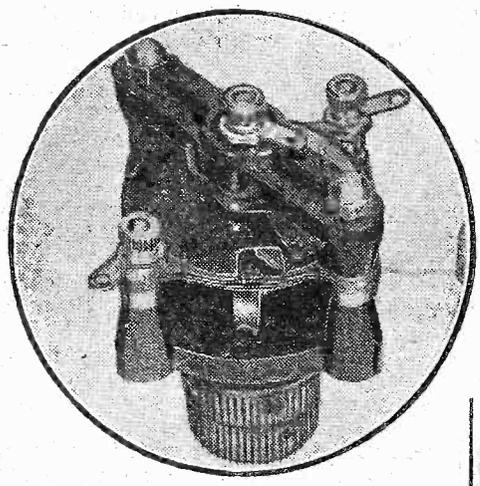
Don't think that this scheme is one of those theoretical conceptions which look fine on paper, but which hardly make themselves noticeable in practice. You will be amazed at the marvellously clear-cut results you will get from the distant stations, and I will defy you to distinguish a tonal difference between weak distant stations boosted up with reaction and the local programme.

You can easily test the full powers of "A.T.B."—if you want to. Listen to the local with the usual minimum reaction adjustment, and then advance the reaction control.

Controls Record Tone

The high notes will simply leap up in amplification. You could hear that if yours were the dullest ears in the world!

Incidentally, "A.T.B." functions just as markedly if and when you use the "A.T.B." Three with a gramophone pick-up. Your reaction control then becomes a pick-up tone control! Rather a strking economy of controls, isn't it?



The Ormond differential reaction condenser modified for the "Airsprite"—an extremely easy task.

Simplicity of application, utter inexpensiveness (practically cost-free), perfectly automatic in operation, uncanny effectiveness—they are the attributes of "A.T.B."

The little diagram, Fig. 3, shows plainly how the invention works. As the differential reaction condenser is adjusted towards minimum, so does more and more of the capacity of the fixed condenser become effective until, at minimum reaction, it is brought fully across the primary winding of the L.F. transformer. The interposition of the H.F. choke and the H.T. is quite immaterial.

Then the special L.F. transformer is made to function as a normal L.F. transformer of high-class quality.

It should be noted, however, that other factors in the set tend to contribute to the work of "A.T.B." "P.W.s." new star set has been designed for 100 per cent "A.T.B." results. It is the ideal vehicle for my latest, and, I think, greatest radio invention.

"A.T.B" itself is without doubt the perfect example of what constitutes a really valuable invention.

No Extra Cost

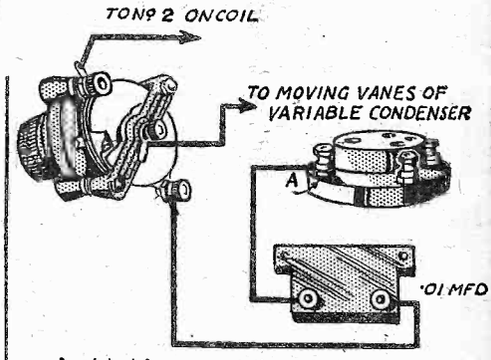
I have no hesitation in saying that, because my own personal opinion (an inventor could be forgiven for viewing one of his own creations in its best light!) has been more than substantiated by expert and impartial critics, as you will see elsewhere in this issue.

> ***"The problem of maintaining fidelity of reproduction without a separate tone control has hitherto defied solution. It is therefore to your credit that you should have overcome this without additional cost. Your scheme does all that is claimed for it and is a definite advance towards simpler and more efficient home radio.—Colvern.***

"A.T.B." costs nothing above the price of ordinary components in an ordinary set, it introduces only about one extra lead in the wiring; it adds nothing to the operation or control, but gives an existing control more than twice its usefulness and effectiveness and, finally, it tears out that terrible distortion hitherto inevitable with distant-station reception without the introduction of comparatively complicated compensating circuits.

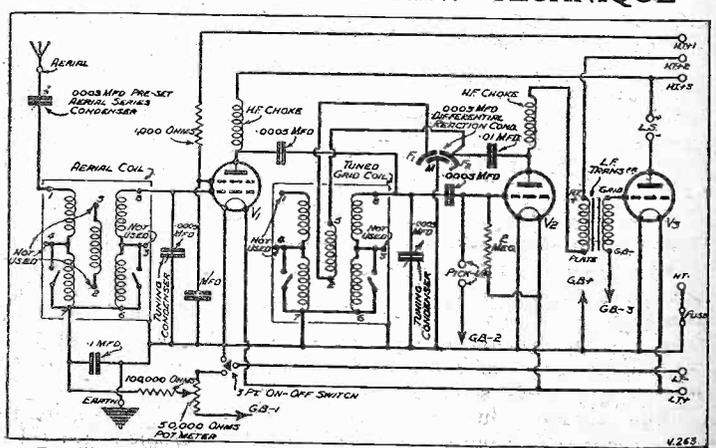
G.V.D.

"AIRSPRITE" A.T.B.



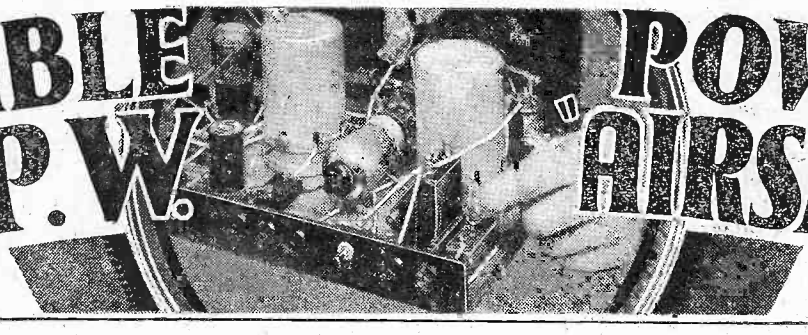
A pictorial representation of A.T.B. in the "Airsprite."

THE KEY TO THE NEW TECHNIQUE



The "P.W." "Airsprite" circuit embodying Variable-Mu. S.G., and Automatic Tone Balance.

VARIABLE POWER for The P.W. "AIRSPRITE"



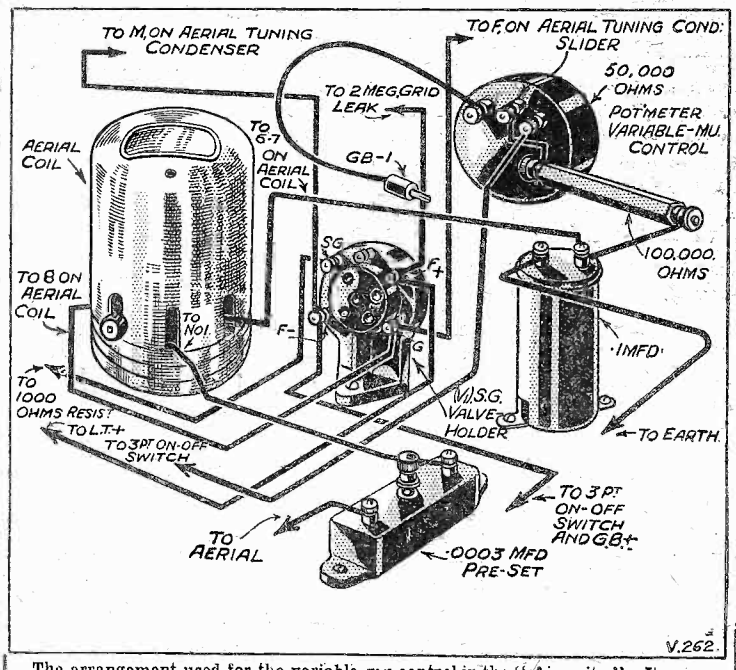
The output power of the "Airsprite" is controlled by means of a specially decoupled circuit operating on the variable-mu S.G. valve. This ensures smooth, even control throughout the reception range of the receiver.

THERE are two main ways of controlling the volume of output from a radio receiver—by controlling the H.F. amplification or the H.F. input to the detector, and by varying the amount of low-frequency amplification.

Many methods of achieving these two can be devised, and the valve manufacturers have gone to the trouble of designing a special valve for one of them.

We refer to the method of volume control provided by the variable-mu screened-grid valve. This is undoubtedly the best system yet devised, for it allows complete control of the H.F. input to the detector, thereby not only determining the amount of L.F. that shall be amplified and passed to the speaker, but providing prevention of detector overloading—a very important point.

SAFE AND SILENT POWER CONTROL



The arrangement used for the variable-mu control in the "Airsprite." Its use prevents H.F. getting through to the bias battery and causing instability and motor-boating. It is especially valuable when a mains unit is used.

This control is easily obtained by means of a potentiometer and a bias battery. This latter will depend for its most suitable voltage upon the distance of the set from the nearest station. In most locations a 9-volt battery fully applied to the potentiometer of the variable-mu valve is quite sufficient to provide reduction of strength to well below maximum on the local station.

From a Whisper to Loudspeaker Strength.

With these 9 volts it should in most cases be possible to decrease the H.F. amplification of the set to a point where it is a mere shadow of what the valve can do. In fact it will be reduced to so low a value that you will get less energy on the detector when the variable-mu valve is being used than you would with only the detector valve—the screened-grid stage being cut out.

From this low value we can go to maximum by just turning the knob of the potentiometer, thus allowing the volume of the set to be controlled from a mere whisper to full loudspeaker strength.

If the set is very near the local—say within 12 or 15 miles—it may be necessary to use a 16½-volt bias battery (whether or not the L.F. valve requires such a voltage), so that further bias can be applied to the variable-mu valve, otherwise it may not be possible to reduce the volume of local reception to as low a level as is desired.

Safeguard Against Instability.

An important feature in the variable-mu bias control arrangements of the "Airsprite" is the decoupling resistance shown in the diagram on this page.

This resistance is a safeguard against motor-boating or similar forms of instability, and is a most important factor in the success of the set from an H.F. point of view.

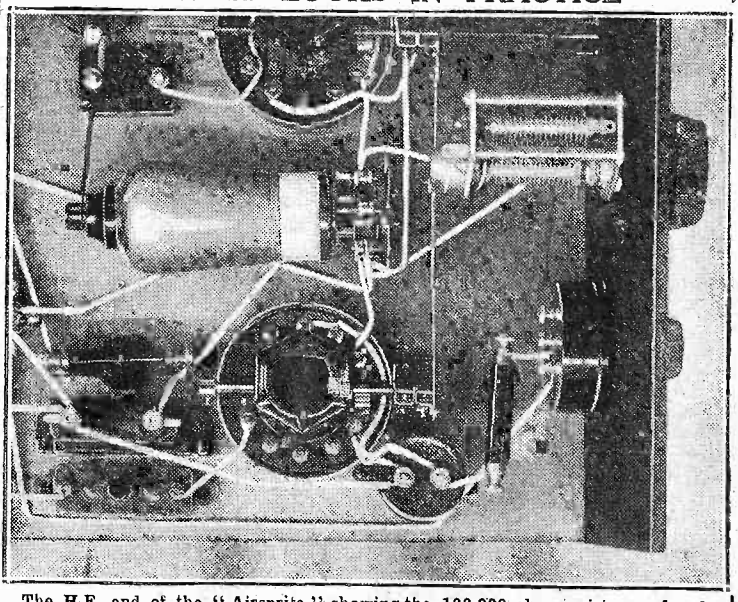
It is connected in series between the slider of the bias potentiometer and the earth end of the tuning coil. From this end of the tuning coil is taken a ·1-mfd. condenser to the L.T.— side of the wiring. Thus when the three point switch is closed we have the resistance of the potentiometer between L.T.— and slider, and the extra series resistance shunted by the ·1-mfd. condenser to earth.

In other words this condenser prevents H.F. impulses from getting into the potentiometer, and thus being applied across the bias battery and along the lead for the potentiometer to G.B.—. It must be remembered that this battery is the same as that used for the L.F. side of the set, and so it is important to see that no H.F. gets into it.

Distinguishing Features of a Good Set.

It is such decoupling devices and other schemes that cause one set (having them) to stand out above others (not having them), which at first sight appear to be equally good. The "Airsprite" is one of the latest and best in this respect. It is perfectly stable at all frequencies, it is properly decoupled so that it can be used safely with an H.T. mains unit, and the H.F. grid-bias decoupling prevents feed of H.F. through the potentiometer, and the bias lead from that to the battery—a cause of instability in some cases that is often unsuspected.

HOW IT LOOKS IN PRACTICE



The H.F. end of the "Airsprite" showing the 100,000-ohm resistance placed between the slider of the potentiometer and the H.F. circuit of the S.G. valve.

AUTOMATIC TONE BALANCE

(Continued from previous page.)

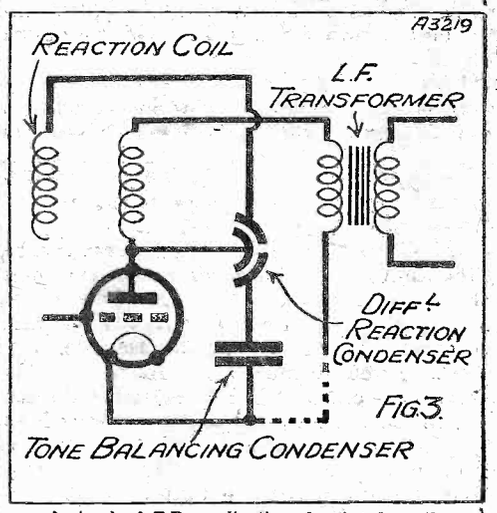
But the use of a special transformer of this nature, instead of a normal one, is not Automatic Tone Balance. Its ordinary application is to sets, such as super-hets, which give constant frequency distortion.

My "A.T.B." renders it possible for an inexpensive S.G. Three (the receiving set for the million) to maintain tonal equilibrium with and without reaction—the essential differences lying between distant and local reception.

It does this through the reaction control itself. Towards minimum reaction the special compensating characteristics of the L.F. transformer are negatived by carefully planned progressive capacity. At minimum reaction the compensation is completely nullified. Thus you have the condition for pure, straight-line local station results.

As reaction is brought in to boost up weak transmissions, so is the transformer compensation given more and more play, and the output of the set is maintained at "straight-line" purity

A.T.B. IN PRACTICE



A simple A.T.B. application showing how the invention works. In the "Airsprite," A.T.B. appears in a form slightly different from this.

> ***"When listening to a distant station on the edge of reaction your tone compensation made all the difference between enjoyable music and the usual deep, muffled noise, and more important still is the fact that it made it possible with a very weak, distant station to hear the announcer's voice clearly and understand what he was saying."—Belling and Lee.***

All this is purely automatic. The listener has no extra knobs to fiddle with. He just operates the set as he would any ordinary one, plying the reaction and tuning controls in the ordinary way. But "A.T.B." lifts his results miles above those hitherto attainable.

And it costs him practically nothing to enjoy this great boon. The special transformer is, if anything, cheaper than most others, and the only additional piece of apparatus employed is a fixed condenser costing a shilling or two, which might be there to prevent H.T. shorts in any case!

Don't think that this scheme is one of those theoretical conceptions which look fine on paper, but which hardly make themselves noticeable in practice. You will be amazed at the marvellously clear-cut results you will get from the distant stations, and I will defy you to distinguish a tonal difference between weak distant stations boosted up with reaction and the local programme.

You can easily test the full powers of "A.T.B."—if you want to. Listen to the local with the usual minimum reaction adjustment, and then advance the reaction control.

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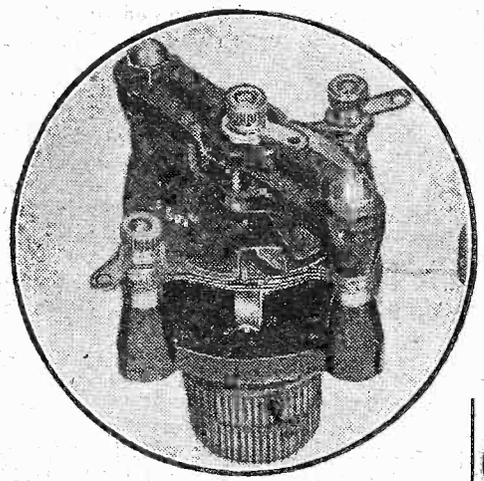

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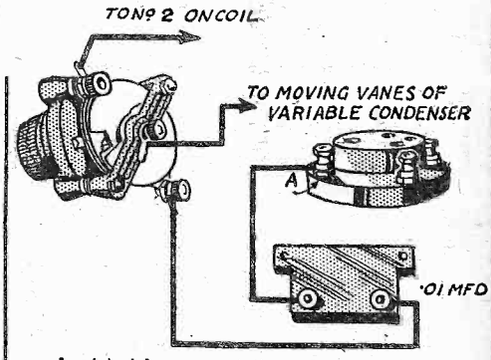

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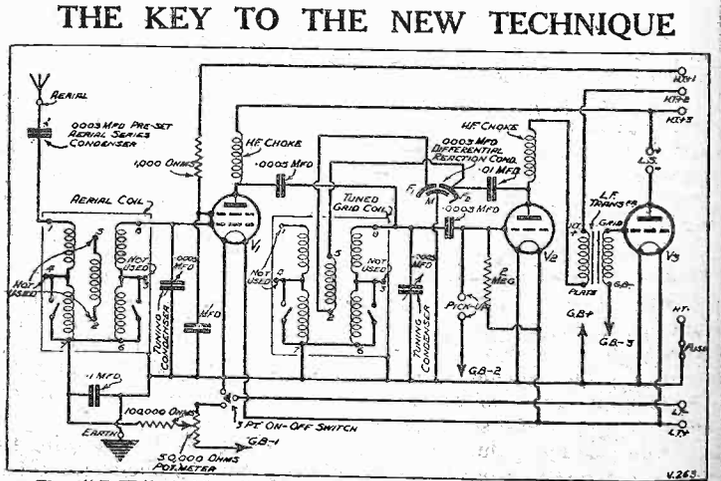

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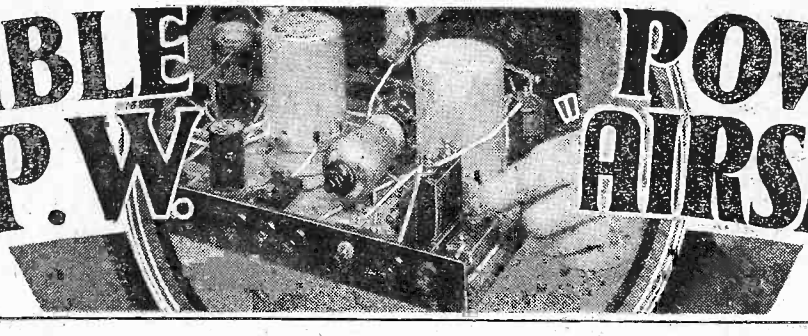

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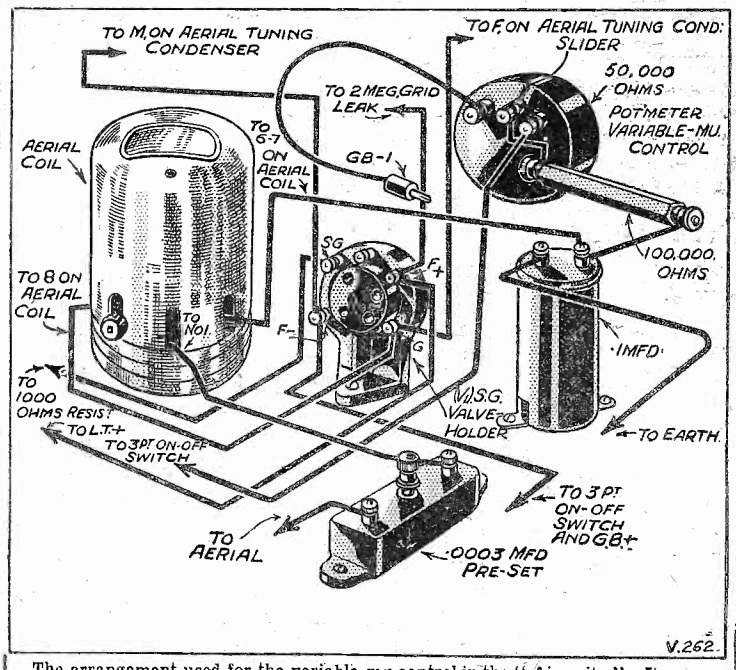

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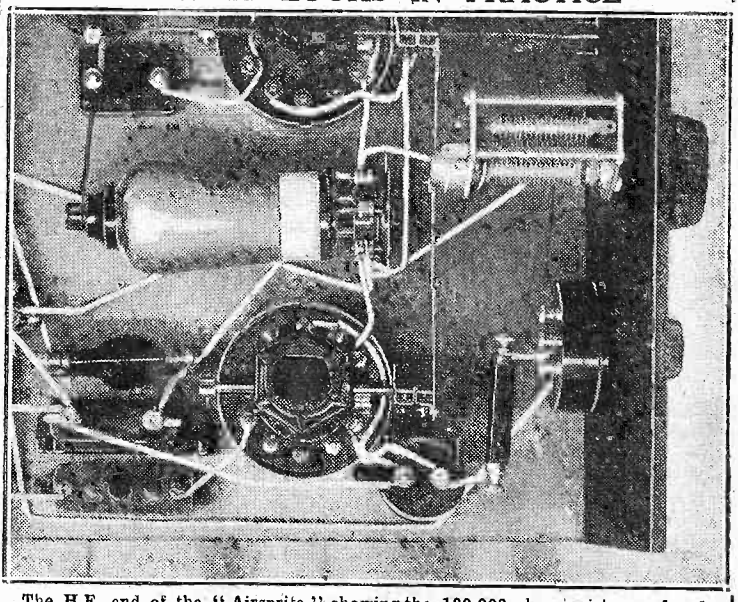


The H.F. end of the "Airsprite" showing the 100,000-ohm resistance placed between the slider of the potentiometer and the H.F. circuit of the S.G. valve.

PRAISE!

From TELSEN ELECTRIC CO., LTD.

Dear Sir,—I was very pleased to have an opportunity of examining your "P.W." **"Airsprite" Three,** and congratulate you heartily on the results obtained with **this remarkable receiver**; from the point of view both of quality and selectivity **its performance on British and Continental stations is excellent.**

Mr. A. W. MACNAMARA.

I am confident that it will make an irresistible appeal to all readers of POPULAR WIRELESS, and that they will acclaim as **a real achievement in Radio** its perfect quality of reproduction and simplicity of operation. I feel sure that this new home-constructor set will immediately make for itself a name throughout the country, and that **it will add yet another triumph to the long list of successes enjoyed by the receivers designed by your technicians.**

Yours faithfully,
A. W. MACNAMARA,
Managing Director.

From MULLARD WIRELESS SERVICE CO. LTD.

Dear Sir,—I was very interested in the demonstration of your new receiver, and **greatly impressed by its performance.**

The design of an efficient receiver is not merely a matter of connecting up the due complement of high-quality components and valves. It is essential to select each component with due regard to its electrical constants, and to those of every other component, in order to achieve a well-balanced circuit.

Mr. T. E. GOLDUP.

In the "P.W." "Airsprite" receiver, by the wise exercise of this choice, **"Popular Wireless" technicians have produced a set which, in addition to high electrical efficiency, embodies an ingenious yet simple and effective form of automatic tone control.** High-note loss when using critical reaction is greatly reduced.

This feature will appeal equally to the discriminating listener who desires quality reproduction first and foremost; to the experienced constructor who will appreciate the technical merits of this interesting device; and to **the newcomer to radio who here has an opportunity to build a receiver which embodies an extremely novel and useful feature whereby excellent quality is obtained on both distant and local stations.**

Yours faithfully,
FOR THE MULLARD WIRELESS SERVICE CO. LTD.,
T. E. GOLDUP, Head of Technical Dept.

From PETO-SCOTT CO. LTD.

Dear Sir,—Subsequent to a close examination, and the witnessing of scientifically conducted tests of an eminently practical nature, **I am able to state that I consider your new set to be a most praiseworthy achievement.**

Its power and selectivity, and the manner in which it automatically adjusts for tone balance on local and distant reception, make it an exceptionally attractive proposition.

Mr. W. SCOTT WORTHINGTON

I was particularly impressed by the cleanness and simplicity of its design, and you are to be congratulated on attaining such exceptional results with a receiver which can obviously be duplicated by anyone for an outlay within reach of all.

Yours faithfully,
For and on behalf of
The PETO-SCOTT CO., LIMITED,
W. SCOTT WORTHINGTON,
Managing Director.

From VARLEY (Oliver Pell) CONTROL, LTD.

Dear Sir,—I thank you for affording me the opportunity to examine and test your new automatic tone balance scheme.

I find that it does all you claim for it, and think that it will have a distinct appeal to all your readers.

With this highly efficient solution to the vexed problem of maintaining good tonal balance in all conditions of reception, which you have accomplished at no cost additional to that required for the usual components in ordinary sets, **you have contributed an important step towards the development of simpler and better home radio.**

Mr. K. HIGGINSON.

I have seen many attempts to solve this problem and I am particularly impressed with the simplicity, amounting to genius, of your method, reminiscent of Columbus and the egg.

I congratulate you.

Yours faithfully,
K. HIGGINSON
(Chief Engineer.)

From READY RADIO LTD.

Dear Sir,—The demonstration you gave me of the powers of **"P.W.'s" new star set impressed me so much** that I have had a model made up for trial under my own conditions.

This model, using the specified compensating transformer and Colvern coils, amply lived up to all the claims you made. **It is certainly a very fine set indeed,** and I think much credit should be given to you for making the valuable modern principle of tone-correction available for the first time to users of normal and uncomplicated receivers.

Mr. G. P. KENDALL, B.Sc.

Yours sincerely,
G. P. KENDALL.

From THE GENERAL ELECTRIC CO. LTD.

Dear Sir,—I have to thank you for your courtesy in demonstrating the new "Airsprite" Three circuit to me prior to its publication.

I would like to take this opportunity of congratulating you on the excellent design of this circuit—a design which will meet the difficult "ether" congested conditions which exist to-day, and which at the same time will be within the purse of any constructor.

The circuit is simple and neatly set out and although during the demonstration I

THE RADIO INDUSTRY and THE P.W. "AIRSPRITE"

witnessed, it was operating practically on the reaction point—bringing about the necessary selectivity—no high-note loss was noted in the loudspeaker reproduction, which was confirmed by subsequent meter readings.

Mr. de A. Donisthorpe

After all the American "Hook-ups" we are hearing so much about lately, **it is most refreshing to see a novel circuit produced on this side of the Atlantic, and I wish the "Airsprite" all the success it deserves.**

Yours faithfully,
DE A. DONISTHORPE.

From WINGROVE & ROGERS, LTD.

Dear Sir,—I was very, very pleased to have had the opportunity of hearing tests made on your new receiver, and thank you for this courtesy extended to me.

The tonal quality on local broadcasts was excellent, and I was very much impressed with the good overall response. The outstanding feature of the set, however, is the very noticeable maintenance of the reproduction of the high notes when the set is tuned in to distant stations, and even with maximum reaction this effect was preserved. At the same time, there is no reproduction of boom under these conditions.

I would like to add, also, that I feel you are pursuing the correct policy in concentrating your efforts on the production and very complete description of certain "star" sets, and I do definitely feel that this is more likely to extend the interest in wireless constructing as a hobby, and thus bring better and better home-constructed sets within the reach of everyone.

I wish you every success with this set, and feel sure that many constructors will appreciate the definite advance you have made.

Yours faithfully,
GUY D. OZANNE.

From WHITELEY ELECTRICAL RADIO CO., LTD.

Dear Sir,—Thank you for the convincing demonstration of your new Set "THE AIRSPRITE."

You are certainly to be congratulated on your ingenious method of automatic tone compensation. Because it allows the use of full reaction without impairing reproduction of the higher frequencies, this simple device materially increases the effective range of the receiver. Stations whose programmes would normally be almost unintelligible owing to the amount of reaction necessary may on this set be received clearly and with good entertainment value.

The test carried out in my presence decisively proved all your claims. Your clever solution of an old problem is an achievement of which you may well be proud.

Yours faithfully,
G. TAYLOR.

From COSSOR, LTD.

Mr. C. A. Quarrington

Dear Sir,—I was most interested to hear the demonstration of the Tone Compensator in the new "P.W." receiver.

I must say that I consider the tone compensation adequate for all normal purposes, and that I was **most impressed** with the simplicity of the device.

The compensation being automatic is, in my opinion, an important advantage.

Yours faithfully
C. A. QUARRINGTON,
Technical Service Dept.
For A. C. COSSOR, LTD.

From FERRANTI, LTD.

Dear Sir,—The writer had much pleasure in visiting the laboratories of POPULAR WIRELESS for the express purpose of witnessing the performance of the new POPULAR WIRELESS "Airsprite" Receiver.

This receiver, although of easy construction, is so arranged that the reproduction on distant stations approaches closely to that obtainable from local stations, this result being provided in a very simple manner.

Tests were made under conditions corresponding to broadcast reception, and in every case the reproduction was noticeably good, the higher musical frequencies up to 4,500 cycles being well maintained, notwithstanding the good selectivity of the circuit used.

Mr. J. Baggs

An important point is that these remarks apply to both the Mains and Battery models, and the writer feels that both these sets are likely to have the wide popularity which one expects from POPULAR WIRELESS designs.

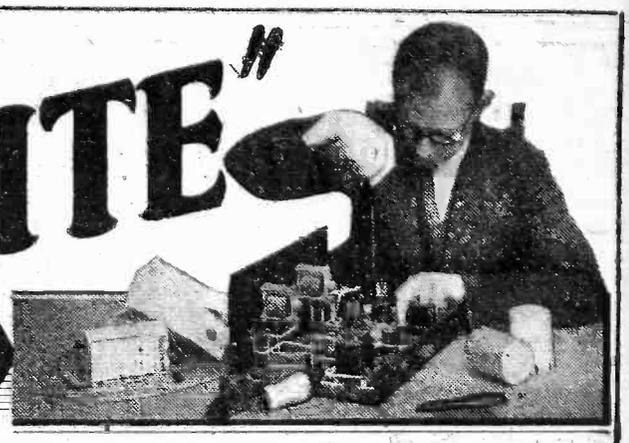
Yours faithfully,
FERRANTI LTD.,
J. BAGGS,
Radio Sales.

A FURTHER SELECTION OF REPORTS WILL APPEAR NEXT WEEK.

"IT DOES ALL YOU CLAIM FOR IT"

The "P.W." "Airsprite" undergoing scientific meter tests under the vigilant eyes of (from left to right) G. V. Dowding, Technical Editor of "P.W." and inventor of A.T.B., Mr. Joseph (Managing Director) and Mr. Hale (Technical Dept.), Radio Instruments, Ltd., K. D. Rogers, Chief of "P.W." Research, and Mr. Scott Worthington, Managing Director of Peto Scott, Ltd.

BUILD the "PW" "AIRSPRITE"



IN order that a maximum number of constructors can enjoy "P.W." "Airsprite" reception without delay, we are describing at once the construction of both a battery and a mains version (and presenting with this issue a blue print of each).

The two sets are essentially similar; they stand right in the forefront of their respective classes. And you can rest assured that the performance of the all-electric model is not marred by residual hum and other ailments common to A.C. sets.

Never before has the home constructor had such an opportunity as is presented to him now, for here is a set embodying an entirely new circuit which has commanded the commendation and congratulations of the whole of the British Radio Industry—an absolutely unprecedented guarantee of complete novelty and sterling worth.

Local Station Clarity on DX.

As a matter of fact, even were it robbed of its valuable A.T.B. and Variable Power features, the A.C. "Airsprite" would still constitute a first-class mains receiver deserving of the attention of the most critical set builder.

But with its A.T.B. its performance, as with the battery model, is almost breath-taking. The uncanny clarity of the distant stations at times makes one doubt their very distance; you think you have tuned in a "local" by mistake!

The "P.W." "Airsprite" has merited the acclamation of the radio industry; it obviously deserves respect in construction.

It is in no sense of the term a "temperamental" instrument; its performance is most emphatically not based on an "on-edge" approach to instability. Actually, it is "rock-like" in its stability.

Suitable Parts.

But it must be clear to the least expert of our readers that the finished job won't be a "P.W." "Airsprite" if other components and accessories than those we recommend are used, or if a departure is made from our carefully detailed plans of construction.

Note what the Marconiphone Co. says in its report on the "P.W." "Airsprite"—"... it would be a pity if the results obtained in your design were to be lost through the use of unsuitable valves, condensers, etc." It would indeed be a pity, a thousand pities. However, all the components specified are standard components easily obtainable anywhere at prices within the reach of everyone.

Some of you will no doubt have a number of them already in your possession, because they are widely used, popular components almost to the last item.

Making Construction Simple.

We ensured that this should be the case; it was one of our first requirements of design.

The omission of particular makes from our list does not necessarily mean that these makes are neither popular nor efficient in themselves, but that their characteristics do not conform with the "P.W." "Airsprite" formula.

For it must be clearly understood that while "A.T.B." for example, does not demand finicky selection of circuit values, it is veritably a keystone in the "Airsprite" circuit and cannot give its full amazing effects unless there is circuital sympathy with its functions.

Readers will notice that several advertisers in this issue of POPULAR WIRELESS are offering all the necessary parts for the "Airsprite" Receiver, and in several cases complete kits of parts.

Available Everywhere.

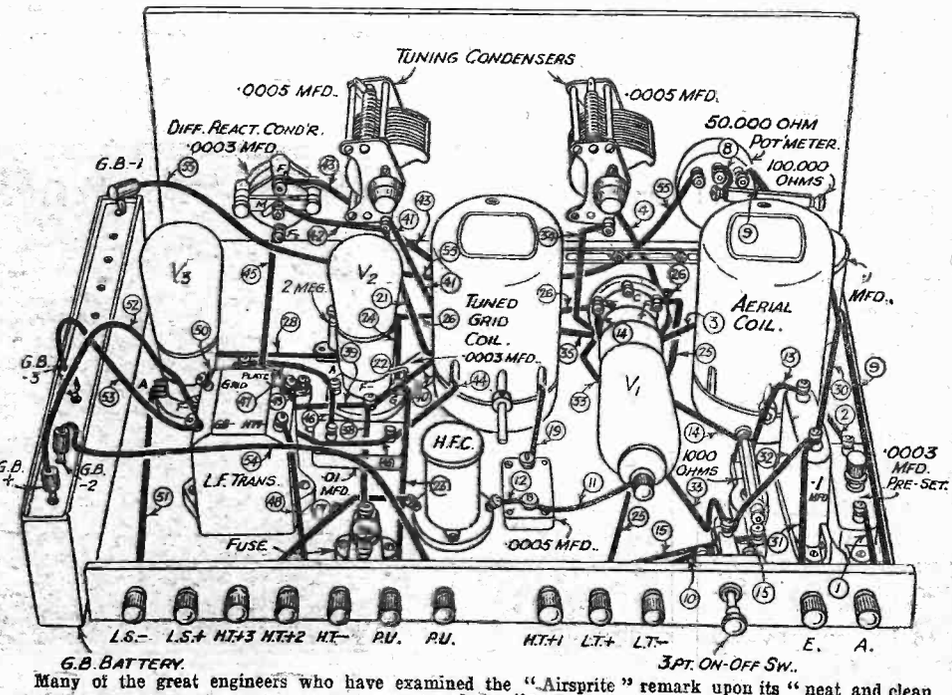
Messrs. Ready Radio are distributing "P.W." "Airsprite" kits through the trade, which means that readers will be able to get kits at a local dealer's. The Ready Radio "Airsprite" kit is neatly packed in a dustproof display carton, and is absolutely complete, even including a special Ready Radio shorting differential.

This kit also includes Colvern coils which, of course, are suitable and eminently efficient. All the other parts offered in the kit are of approved makes and types, and are tested under the personal supervision of G. P. Kendall, B.Sc. Messrs. Peto-Scott are also supplying the famous Pilot Author Kit of the "Airsprite." As with all these kits you will find drilling, etc., has been done for you, and the kit is complete to the last screw and wire.

Another famous firm, Messrs. Telsen of Birmingham, are also displaying advertisements in this issue of POPULAR WIRELESS showing a complete list of the necessary parts. These can of course, be obtained from local dealers.

Messrs. Direct Radio are offering readers a De Luxe "Airsprite" kit—a kit with quality components only. This is a new and bold policy on their part, and one which we feel is deserving of congratulation.

"ITS NEAT AND CLEAN DESIGN"



Many of the great engineers who have examined the "Airsprite" remark upon its "neat and clean design."

THE BATTERY VERSION

IN addition to the full-size blue print of the battery version of the "P.W." "Airsprite," constructors have both photos and perspective drawings to help them.

As a further aid every wire is numbered on the blue print and these numbers are repeated on the drawings.

Additionally to even that, you will find five photos of the set in succeeding pages. These photos show the set in the course of wiring so that you can actually follow it lead by lead.

All the leads in these photos are numbered.

As readers can well imagine, all these special designs and photos took a long while to prepare (and even longer to check!) but we were determined to spare no pains in ensuring that *anyone* could build the "Airsprite."

Actually, it is one of the very simplest home-assembly jobs of any kind that has ever been produced, but, because it opens up an entirely new radio reception series of standards and will doubtless attract tens of thousands of people to build it who know nothing whatever of radio, we have taken exceptional steps to ensure 100 per cent success for everyone.

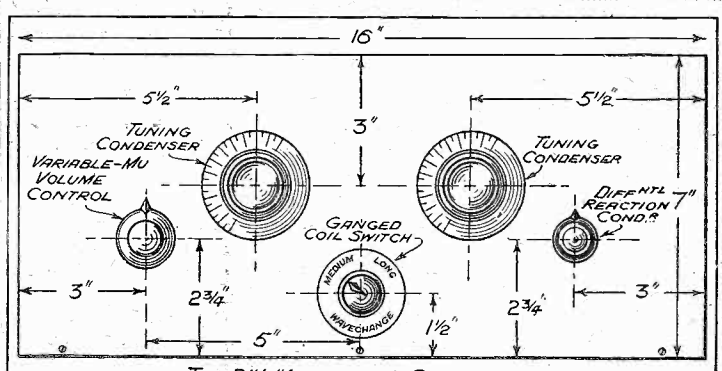
THE MAINS VERSION

THE construction of the average all-mains receiver is approached by many with a certain amount of trepidation. Sometimes this diffidence is warranted, but in spite of its compactness the A.C. "Airsprite" need give rise to no doubts either as to your ability to construct it or to your skill in handling it when on the air.

It is dead simple to build and just as easy to operate as the battery model described in these pages—for as regards controls it is exactly the same.

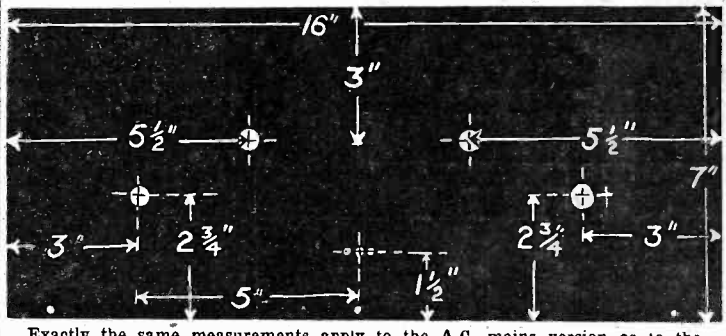
If you examine the blue-print and illustrations you will find that the A.C. "Airsprite" is not only similar in its controls to the battery model, but that its size is only a matter of two inches deeper. It is the same width (or length) and the same height.

This compactness was achieved by a method of design which at the same time greatly assists in simplifying construction. It is that of having the set laid out normally on a baseboard, but mounting the mains part of the receiver (rectifier, smoothing choke, mains transformers, etc.) on a separate baseboard fixed on panel brackets at right angles to the main baseboard.



THE P.W "AIRSPRITE" PANEL X907

THE "AIRSPRITE'S" PANEL DIMENSIONS



Exactly the same measurements apply to the A.C. mains version as to the battery "Airsprite."

The "P.W." "Airsprite" can't let you down; it completely re-vitalises distant-station reception.

Apart from the Compensating L.F. Transformer there is only one other component which cannot strictly be styled "standard" in its use, although that may not apply to its actual form.

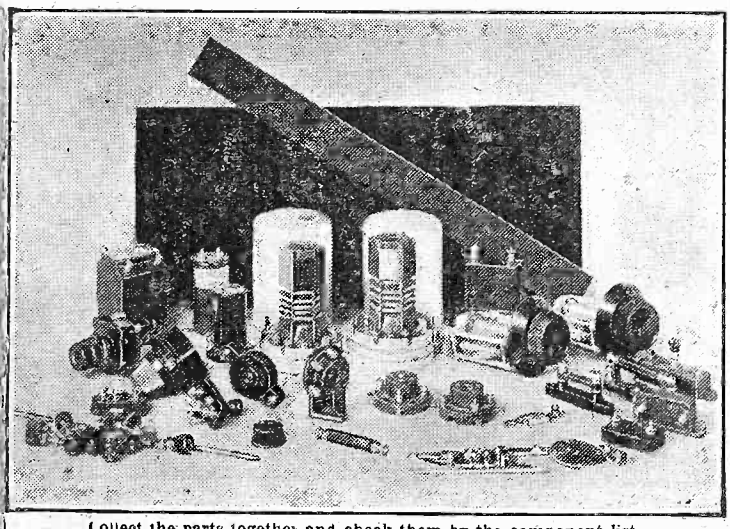
We refer to the Differential Reaction Condenser. This has to short-circuit between its F_2 fixed vanes and its moving vanes when the control is hard over to the left (at the position for minimum).

At least one firm (Ready Radio) is selling a special version of its differential condenser which is suitable for the "P.W." "Airsprite,"

This enables both the set itself and the mains power pack to be constructed independently and then by a few flexible connections the two can be linked and the mains pack fixed in position.

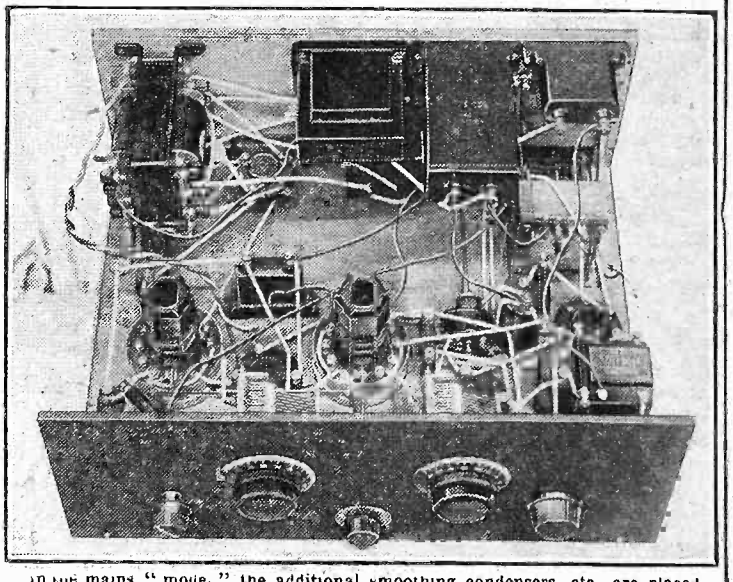
The first thing to do in the construction of the A.C. "Airsprite" therefore (after getting the requisite components) is to lay out the two sections of the set very, very carefully, taking care that the various positions of the components correspond reasonably accurately

FIRST STAGE—THE COMPONENTS



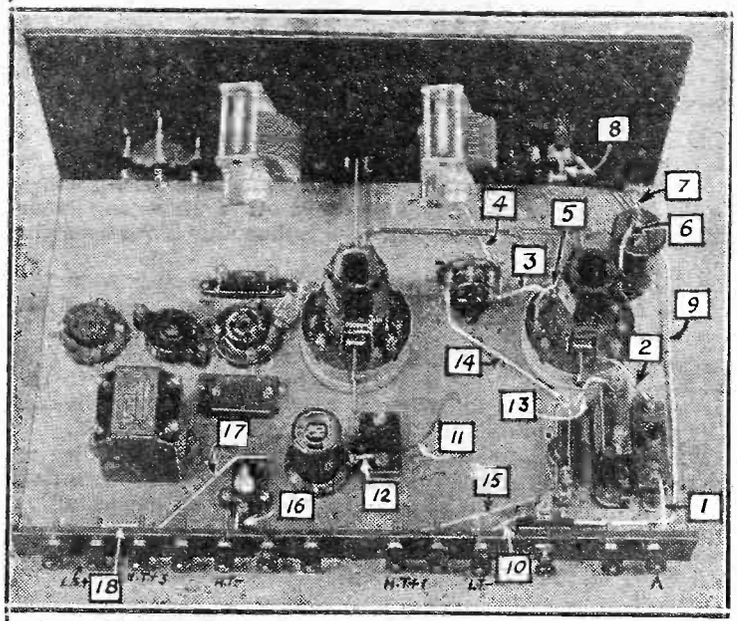
Collect the parts together and check them by the component list.

EXTRA BASEBOARD FOR A.C.



In the mains "mode," the additional smoothing condensers, etc., are placed on an extra "baseboard," at the back.

THE BATTERY VERSION—*continued.*



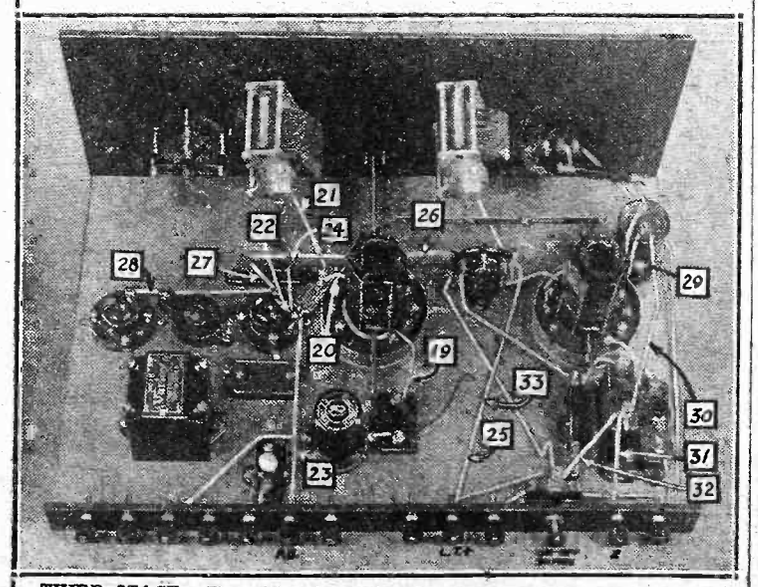
SECOND STAGE.—Panel drilled and fixed to baseboard, components mounted, wiring commenced.

and there are a half a dozen others which can be modified by anyone without the use of special tools and mechanical skill.

We give the names of these makes in our list of parts, and next week we will tell you how the simple little alteration is made.

"AIRSPRITE" LEAD LENGTHS

No.	Inches	No.	Inches	No.	Inches
One	3	Eighteen	2¼	Thirty-five	3½
Two	3½	Nineteen	6¼	Thirty-six	3⅝
Three	3¾	Twenty	2¼	Thirty-seven	1¾
Four	5	Twenty-one	4½	Thirty-eight	4¼
Five	1¾	Twenty-two (Direct)		Thirty-nine	4½
Six	6½	Twenty-three	6¾	Forty	3½
Seven	2	Twenty-four	2¾	Forty-one	4⅝
Eight	1⅞	Twenty-five	8¾	Forty-two	3⅞
Nine	15	Twenty-six	9	Forty-three	10¾
Ten	2⅜	Twenty-seven	2¼	Forty-four	3½
Eleven	3	Twenty-eight	5	Forty-five	10
Twelve	1¾	Twenty-nine	3¾	Forty-six	2¾
Thirteen	3½	Thirty	6¼	Forty-seven	3½
Fourteen	6½	Thirty-one	3¾	Forty-eight	3¾
Fifteen	5½	Thirty-two	3¾	Forty-nine	3¾
Sixteen	1¾	Thirty-three	9½	Fifty	4½
Seventeen	5¼	Thirty-four	3½	Fifty-one	6½



THIRD STAGE.—The wiring is continued. The lead numbers correspond with those on the blue print.

THE MAINS VERSION—*continued.*

with those shown on the blue print. If they do not there is a great risk that the parts on the baseboard and those on the mains pack will foul each other when the latter is in position.

This clearance should be checked up by trial before any of the wiring is proceeded with.

Obviously the two parts of the set can be wired up separately, and it is not a bad plan to begin with the mains unit.

MAINS VALVES AND THEIR APPROXIMATE RESISTANCES

Make	Variable Mu	Detector	Bias Res. (ohm)	Output	Bias Res.	Rectifier
Mullard	MM. 4V	354V.	1,000	—	—	D.W.2
Cossor	MV.SG	41M H.L.	750	41M.P.	350 ohm	506B.U.
Mazda	—	A.C./H.L.	1,000	—	—	U.U.2
Marconi	VM.S4	M.H.4	600	—	—	U.10
Osram	VM.S4	M.H.4	600	—	—	U.10
Six-Sixty	SS4MMAC	S.S.4G.P.A.C.	1,000	—	—	S.S.W.462
Tungsram	AS4105	A.R.4101	600	—	—	P.V.495
Lissen	VSGA1	A.C./H.L.	700	—	—	U.U.41
Micromesh	AC/SGV	H.L.A.1	300	P.A.1	325 ohm	R.1

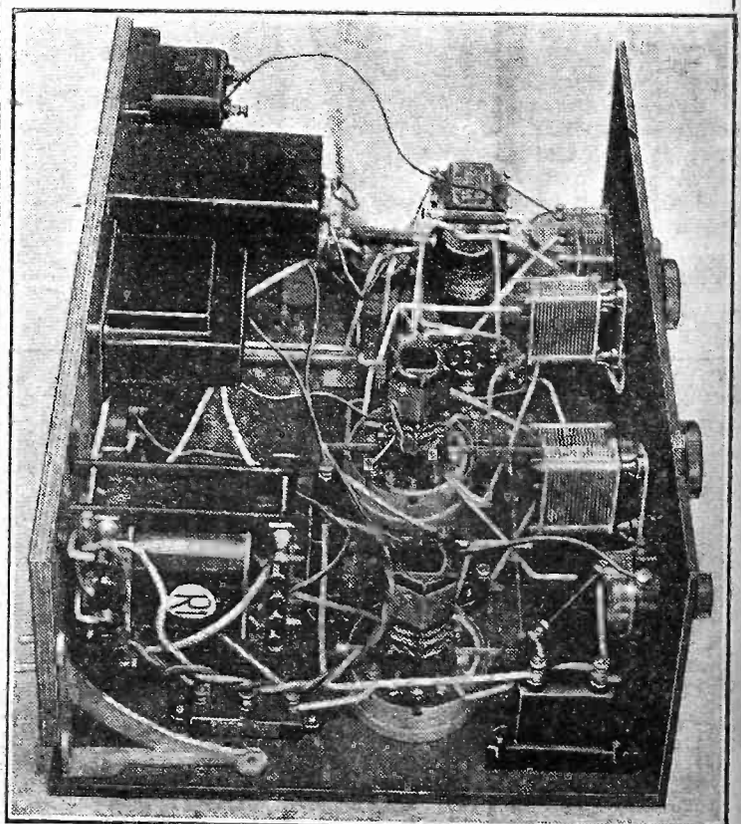
This is built on a piece of baseboard 16 in. long and 5½ in. wide. It is to be mounted flush with the back of the main baseboard, though above it, and therefore should be fitted with its panel brackets and tried in position before any wiring is attempted.

The actual wiring is very simple, though it will be noted that unavoidably a few leads will have to be soldered to their point of connection, a requirement we try to avoid in POPULAR WIRELESS sets, but necessary in this case.

The points are those on the thermal delay switch, which has four leads going to it and which is fitted only with soldering tags. The T.C.C. condenser shown in the blue print and the photographs also needs soldered connections, but the type of condenser having terminals can be obtained if desired, provided that it is of the right capacity and not less than 400 volts D.C. working, or 300 volts A.C.

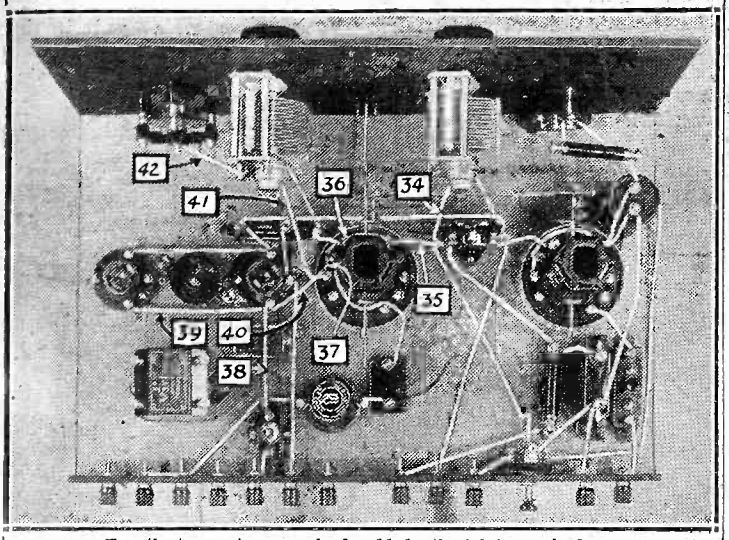
A slot in the baseboard (mains unit) will have to be cut as shown to give clearance for the combined mains plug and fuse, while the on-off rotary switch is mounted through the baseboard. The radiogram switch extension is fitted on the terminal strip which is fixed

THE PLACING AND SPACING



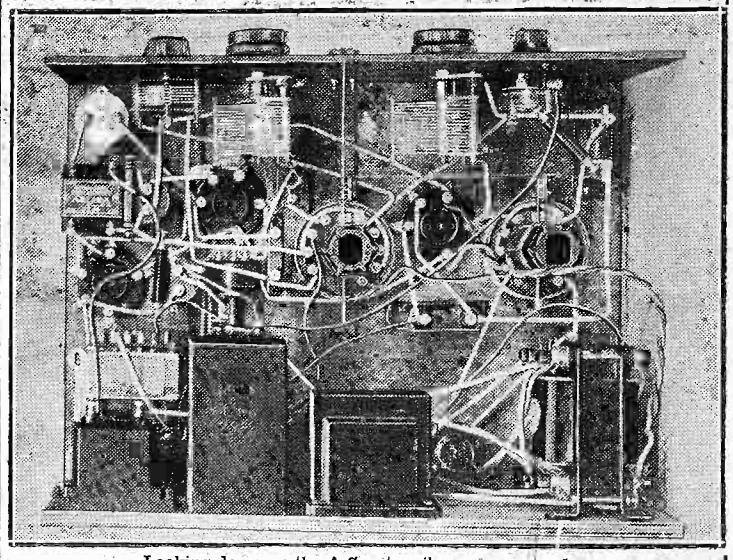
Completely mounted, as shown, there is no unwanted interaction between components when the coil unit covers are in place.

THE BATTERY VERSION—*continued.*



Fourth stage, nine more leads added—the job is nearly done.

THE MAINS VERSION—*continued.*



Looking down on the A.C. set, coil covers removed.

THE "P.W." "AIRSPRITE" (BATTERY MODEL)

THE EASILY OBTAINABLE AND INEXPENSIVE COMPONENTS

1 PAIR OF MATCHED TWIN SCREENED COILS (Telsen W 287).
1 COIL SWITCH COUPLING ASSEMBLY (Telsen W 217).
2 ·0005-mfd. VARIABLE CONDENSERS (Polar No. 2 S.M., Ormond No. 6 Slow Motion, Utility W 319).
1 ·0003-mfd. to ·00035-mfd. DIFFERENTIAL REACTION CONDENSER (Ormond R/190 ·0003, Lotus D.C.3, J.B. No. 1080, Telsen W 185, Ready Radio) See text.
1 ·0003-mfd. max. PRE-SET CONDENSER (Ready Radio, Goltone, Formo, Sovereign, Ormond, Colvern, Telsen, Polar).
1 ·1-mfd. CONDENSER (Dubilier 9200, Telsen, T.C.C., Lissen).
1 ·1-mfd. CONDENSER (Lissen LN110, Dubilier, Telsen, T.C.C.).
1 ·01-mfd. CONDENSER (Graham Farish, T.C.C., Dubilier, Lissen, Telsen.)
1 ·0005-mfd. CONDENSER (T.C.C. Flat S type, Dubilier, Goltone, Ferranti. Lissen, Telsen, Graham Farish, Sovereign).
1 ·0003-mfd. CONDENSER (Igranic tag type, T.C.C., Dubilier, Ormond, Goltone, Bulgin, Telsen).
1 50,000-ohm wire-wound POTENTIOMETER (Ready Radio, Bulgin, Wearite, Sovereign, Varley, Igranic, Watmel, Colvern, Lissen, Magnum, Tunewell, Telsen, Lewcos).
1 2-meg. GRID LEAK, with holder (Ferranti, Graham Farish "Ohmite," Ready Radio, Goltone, Telsen, Igranic, Watmel, Dubilier, Bulgin, Lissen, Tunewell).
1 1000-ohm RESISTANCE and holder (Graham Farish "Ohmite," Watmel, Lissen, Sovereign, Bulgin, Ferranti, Wearite, Colvern Strips, Telsen).
1 100,000-ohm RESISTANCE with terminals or tags (Graham Farish "Ohmite," Dubilier 1-watt, Lissen).
2 4-pin VALVE HOLDERS (Lotus, Telsen, Igranic, W.B., Lissen, Tunewell, Clix, Bulgin, Benjamin, Wearite, Ready Radio, Peto-Scott, Goltone).
1 HORIZONTAL VALVE HOLDER (Lissen LN 739, Telsen, W.B., Bulgin, Wearite).
1 S.G. H.F. CHOKE (R.I. Quad-Astatic, Graham Farish L.M.S., Slektun, Wearite, Lewcos, Keystone, Telsen, Dubilier, Ready Radio, Lotus, Lissen, Varley, Sovereign, Tunewell, Watmel, Graham Farish, Bulgin, British General, Goltone).
1 H.F. CHOKE (Lewcos type M.C., or as above).
1 COMPENSATING L.F. TRANSFORMER (Varley D.P. 35, Telsen Audio-Former).
1 THREE-POINT ON-OF SWITCH (Ready Radio push-pull, Lissen, Bulgin, Tunewell, Telsen, Sovereign, Wearite, Goltone).
1 EBONITE PANEL, 16 in. × 7 in. (Peto-Scott, Permcol, Goltone, Lissen, Wearite, Becol, Direct Radio).
1 BASEBOARD, 16 in. × 10 in. (Peto-Scott).
1 CABINET, to fit, 16 in. × 7 in. panel and 16 in. × 10 in. baseboard (Peto-Scott, "Airsprite," Camco, Morco, Pickett, Direct Radio, Gilbert, Osborn, Lock).
1 EBONITE TERMINAL STRIP, 16 in. × 1½ in.
12 INDICATING TERMINALS (Belling & Lee type "R," Walnut, Clix, Bulgin, Igranic, Goltone).
1 ANODE CONNECTOR (Belling & Lee).
1 FUSEHOLDER (Bulgin type F 5, Telsen, Goltone, Belling & Lee).
1 FUSE (Bulgin, Type B, Belling & Lee, 100 m/a Scrufuse, Goltone, Telsen).
8 BATTERY PLUGS (Clix, Belling & Lee, Bulgin, Igranic, Goltone).
2 SPADE TERMINALS (Clix, Belling & Lee, Goltone).
4 YARDS INSULATED SLEEVING and 6 yards 18-gauge tinned copper wire (Goltone, Wearite).
FLEX, SCREWS, etc.

ACCESSORIES FOR THE BATTERY "AIRSPRITE"

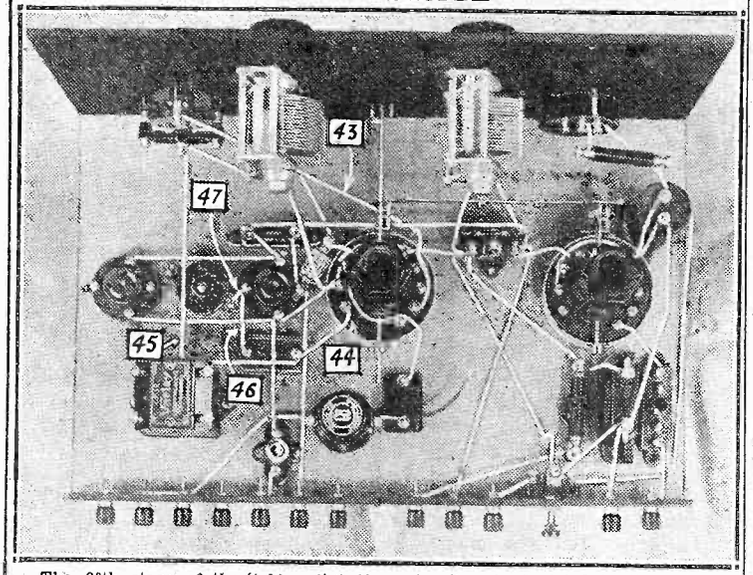
LOUDSPEAKERS. — Marconiphone, Celestion, B.T.-H., Blue Spot, G.E.C., R & A, Epoch, Clarke's Atlas, Igranic, Baker's Selhurst, Ferranti, Lanchester, Ormond, H.M.V., W.B.).
H.T. BATTERY—120 v. Super Capacity Ediswan, Ever Ready, Siemens, "Silver Knight," Pertrix, Marconiphone, Drydex, Lissen, Magnet, Oldham).
G.B. BATTERY:—16 volt Ever Ready, or see above.
L.T. BATTERY.—Exide, Ediswan, G.E.C., Oldham, Pertrix, "Block," Lissen.
AERIAL AND EARTH EQUIPMENT.—Electron "Superial," Goltone "Akrite," Graham Farish "Filt" earthing device.
MAINS UNIT.—This should have three positive tappings with outputs to suit valves chosen (Clarke's Atlas, Ferranti, Ekco, Regentone, R.I., Heayberd, Tunewell, Formo).

COMPONENTS FOR THE A.C. "AIRSPRITE"

1 SET TWIN MATCHED SCREENED COILS (Telsen W 287).
1 COIL SWITCH COUPLING ASSEMBLY (Telsen W 217).
2 ·0005-mfd. VARIABLE CONDENSERS (Utility W 319, Polar No. 2 S.M., Ormond No. 6 Slow Motion).
1 ·0003 to ·00035-mfd. DIFFERENTIAL REACTION CONDENSER (J.B., Ormond Slow Motion, Lotus, Telsen).
1 ·0003-mfd. max. PRE-SET CONDENSER (Ready Radio, Telsen, Goltone, Sovereign, Ormond, Polar, Colvern, Formo).
1 4-mfd. FIXED CONDENSER (Dubilier B.S., T.C.C., Igranic, Formo, Ferranti).
1 4-mfd. FIXED CONDENSER (T.C.C. 87, Dubilier L.E.C.).
1 2-mfd. FIXED CONDENSER (Telsen W 226, Dubilier, T.C.C., Igranic, Lissen, Ferranti, Formo).
2 2-mfd. FIXED CONDENSERS (Dubilier 9200, or as above).
1 2-mfd. FIXED CONDENSER (Lissen L.N. 134, or as above).
2 1-mfd. FIXED CONDENSERS (Lissen L.N. 133, or as above).
1 1-mfd. FIXED CONDENSER (Telsen W 227, or as above).
1 ·01-mfd. FIXED CONDENSER (T.C.C. Type No. 34, Graham Farish, Lissen, Dubilier).
1 ·0001-mfd. FIXED CONDENSER (Graham Farish, T.C.C., Dubilier, Goltone, Ferranti, Sovereign, Lissen, Telsen).
1 10,000-ohms WIRE-WOUND POTENTIOMETER (Lewcos Standard, Bulgin, Wearite, Sovereign, Watmel, Igranic, Colvern, Varley, Magnum).
1 50,000-ohms FIXED RESISTANCE WITH TERMINALS OR WIRE ENDS (Colvern strip, Graham Farish "Ohmite," Dubilier, Wearite).
1 25,000-ohm FIXED RESISTANCE WITH TERMINALS OR WIRE ENDS (Colvern strip, or as above).
1 20,000-ohm FIXED RESISTANCE WITH TERMINALS (Colvern strip, Graham Farish "Ohmite," Wearite).
1 10,000-ohm FIXED RESISTANCE WITH TERMINALS OR WIRE ENDS (Graham Farish "Ohmite," Wearite, Dubilier).
1 1,000-ohm FIXED RESISTANCE WITH TERMINALS OR WIRE ENDS (Graham Farish "Ohmite," Dubilier, Wearite).
1 350-ohm FIXED RESISTANCE WITH TERMINALS OR WIRE ENDS (Graham Farish "Ohmite," Wearite, Dubilier).
1 200-ohm FIXED RESISTANCE WITH TERMINALS OR WIRE ENDS (Graham Farish "Ohmite," Dubilier, Wearite).
1 1-meg. GRID LEAK WITH WIRE ENDS OR TERMINALS (Goltone, Lissen, Igranic, Ready Radio, Dubilier, Graham Farish "Ohmite").
1 POWER TRANSFORMER (R.I. EY 30, Wearite Standard T.21.A.
1 SMOOTHING CHOKE (Ferranti B 10).
1 OUTPUT CHOKE (Igranic CH 2, Bulgin, Varley, R.I., Lotus, Lissen, Ferranti, Wearite, Heayberd).
1 COMPENSATING L.F. TRANSFORMER (Varley D P 35, Telsen Audio-Former).
1 H.F. CHOKE (Bulgin H.F. 9, Lewcos, Telsen, R.I., Ready Radio, Slektun, Lissen, Lotus, Wearite, Graham Farish, Tunewell, Goltone, Igranic, British General, Keystone, Dubilier, Sovereign).
3 5-pin VALVE HOLDERS (Benjamin, W.B., Telsen, Ready Radio, Bulgin, Clix, Wearite, Lotus, Goltone, Tunewell, Lissen).
1 HORIZONTAL MOUNTING VALVE HOLDER (W.B., Lissen, Wearite, Telsen, Bulgin, Goltone).
1 ROTARY RADIO-GRAM SWITCH (Ready Radio, Tunewell, Bulgin).
1 PUSH-PULL ON-OFF SWITCH (Lissen L.N. 5070, Ready Radio, Goltone, Wearite, Lotus, Benjamin, Bulgin, Keystone, W.B., Ormond, Igranic).
1 ROTARY MAINS TYPE ON-OFF SWITCH (Bulgin S 85, Ready Radio, Wearite G.22).
1 EBONITE PANEL, 16 in. × 7 in. (Peto-Scott, Goltone, Permcol, Lissen, Becol, Direct Radio, Wearite).
1 BASEBOARD 16 in. × 12 in. (Peto-Scott).
1 BASEBOARD 16 in. × 5½ in. (Peto-Scott).
1 TERMINAL STRIP, 5½ in. × 1½ in. (Peto-Scott, etc.).
1 TERMINAL STRIP, 3 in. × 1½ in. (Peto-Scott, etc.).
1 COMBINED MAINS FUSE AND PLUG (Bulgin F.15).
1 COMBINED PLUG-ADAPTER (Goltone R.80/90).
1 THERMAL DELAY SWITCH (Bulgin S.100, Varley).
6 INDICATING TERMINALS (Belling & Lee Type "R" Walnut, Clix, Igranic, Goltone, Bulgin).
2 PANEL BRACKETS, 4 in. × 4 in., or 4 in. × 3 in. (Magnum, Bulgin).
1 ANODE CONNECTOR (Belling & Lee).
1 SWITCH BRACKET, 2 in. × ⅜ in. (Wearite).
1 COUPLING LINK, 1 in. × ⅜ in. (Wearite).
1 SPINDLE, 5½ in. × ⅜ in. (Wearite).
1 BUSH FOR SPINDLE (Wearite).
6 YARDS INSULATED SLEEVING and 10 yards 18-gauge tinned copper wire (Goltone, Wearite).
FLEX, SCREWS, etc.

THE BATTERY VERSION—*continued.*

FIFTH STAGE

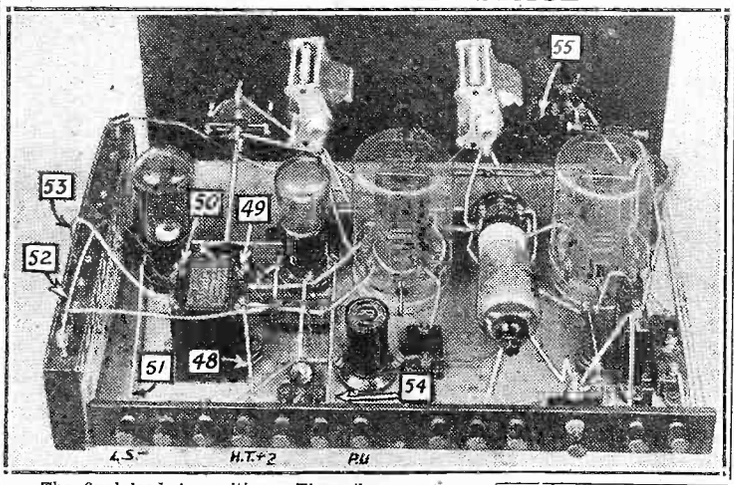


The fifth stage of the "Airsprite's" construction is depicted in the above illustration.

VALVES FOR THE BATTERY VERSION

Name	H.F. Stage	Detector	Output	Output Mains Unit
Cossor	220VSG	210HL	220PA	230XP
Mullard	PM12V	PM1HL	PM2A	PM202
Marconi	VS2	HL2	LP2	P2
Mazda	S215VM	HL2	P220	P220A
Osram	VS2	HL2	LP2	LP2
Lissen	SG2V	HL2	P220	PX240
Tungsram ..	—	H210	P220	SP230
Eta	—	BY1814	BW604	BW602
Six-Sixty	SS215VSG	210HL	220PA	220SP
Micromesh ..	—	HLB1	PB1	—
Clarion	—	H2	P2	—

SIXTH AND FINAL STAGE



The final leads in position. The coil screens have been "ghosted" so that the coil connections can be seen.

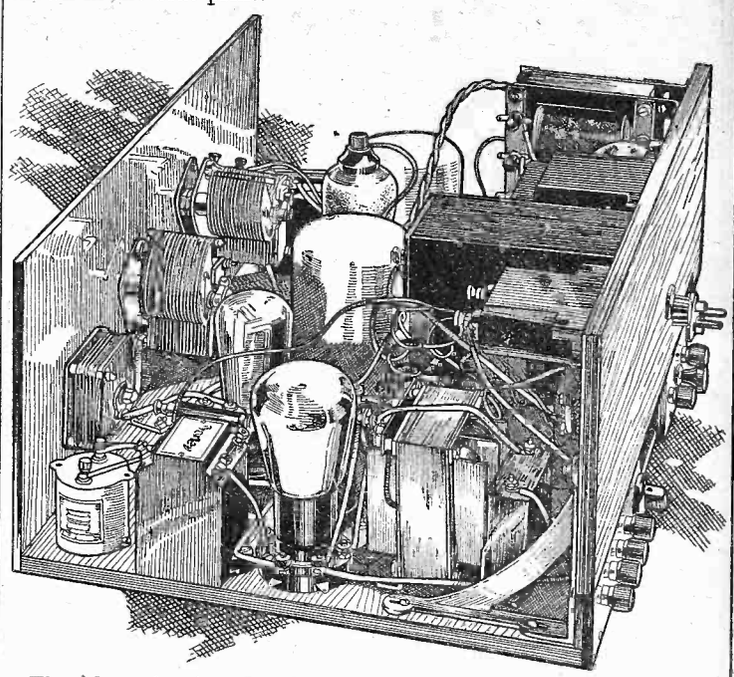
WE HAVE PURPOSELY CROWDED IN AS MANY ILLUSTRATIONS, ETC., AS POSSIBLE INTO THIS NUMBER, SO THOSE WHO DESIRE TO DO SO CAN START BUILDING THEIR "AIRSPRITES" AT ONCE. NEXT WEEK WE SHALL BE GIVING

DETAILS TOGETHER WITH METHODS OF MODIFYING CERTAIN ORDINARY REACTION CONDENSERS SO THAT THEY CAN BE USED IN THE "P.W." "AIRSPRITE."

THE MAINS VERSION—*continued.*

on the set and not on the power pack. The mains unit is thus complete in itself regardless of the set.

Flex is used to connect the power pack to the various points on the set, such as the valve heater terminals, H.T. feed, H.T.—, variable-mu potentiometer and so on, and these leads are clearly shown in the blue print.



The idea of using flex here is to allow the power pack to be completed and wired to the set before being placed in position on the main set baseboard. Such arrangement greatly simplifies the construction.

There is not a great deal to say about the building of the set itself except to emphasise the importance of setting the layout substantially the same as that of the original set. The photographs and perspective drawings show very clearly how the wires run between the various connecting points and, of course, the blue print indicates exactly how the components should be laid out.

A local-distant switch is included in the mains model, and this is situated between the aerial and earth terminals.

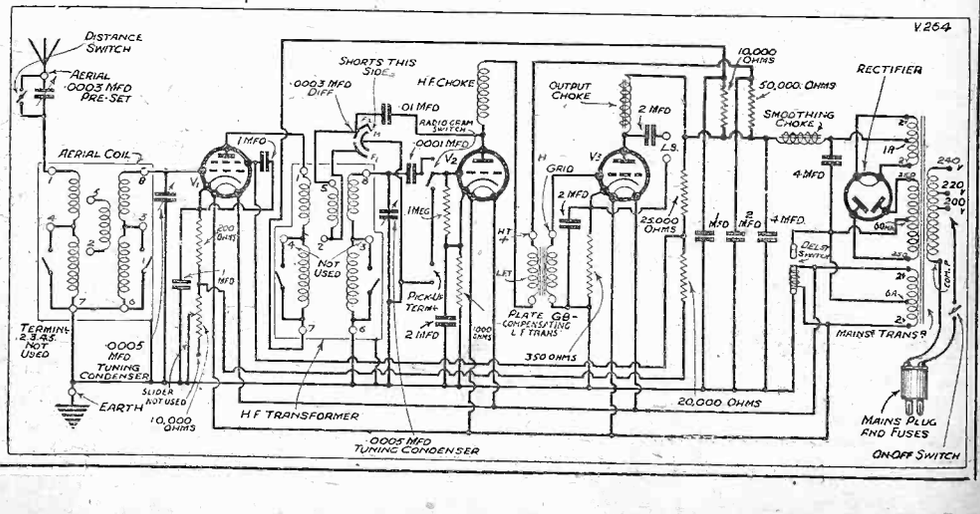
It is extremely useful and enables the sensitivity of the set to be adjusted in a moment to suit individual requirements.

Space forbids further details this week of the construction of the A.C. "Airsprite" so we must leave you at this point and postpone our description till next week.

A.C. "AIRSPRITE" ACCESSORIES

LOUDSPEAKERS. — Blue Spot, B.T.-H., Clarke's Atlas, Celestion, Ferranti, H.M.V., R & A, Marconiphone, Lanchester, Ormond. W.B., Igranic, Baker's Selhurst, G.E.C., Epoch.

AERIAL AND EARTH EQUIPMENT.—Electron "Superial," Goltone "Akrite," Graham Farish "Filt" Earthing Device.

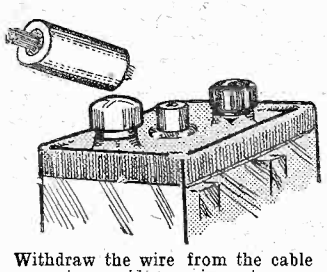


RECOMMENDED WRINKLES

A NOVEL ACCUMULATOR STOPPER.

DURING the last year or so the designs of accumulators have been wonderfully improved, and for those who own one of the modern types this hint will be of no value. There must be many readers, though, who still have old accumulators in use, and to those the following remarks may be of interest.

The rubber stopper fitted to the old type of battery is surely a most elusive thing. You take the accumulator to



Withdraw the wire from the cable to provide an air-vent.

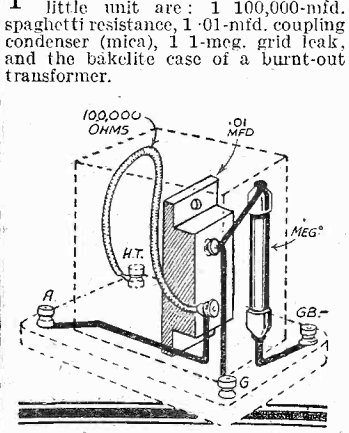
the charging station with the stopper in place, but when it is returned you are told it has been mislaid.

Perhaps you replace it with a small cork and, having drilled a hole to act as an air vent, you think your trouble solved until you take it out again to be charged. What a mess, the hole has become blocked and the acid has frothed up and overflowed!

To prevent this sort of thing occurring, call into the local garage and buy a piece of H.T. sparking plug cable. Cut half an inch off and withdraw the centre wires. This leaves a nice clean hole and will be found to act quite suitably as a vent plug.

COMPACT R.C. UNIT.

THE parts required for this neat little unit are: 1 100,000-mfd. spaghetti resistance, 1 ·01-mfd. coupling condenser (mica), 1 1-meg. grid leak, and the bakelite case of a burnt-out transformer.



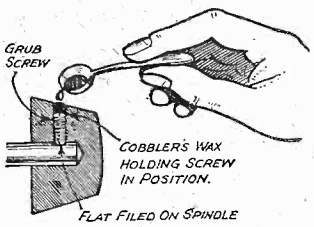
The case of a burnt-out transformer contains this unit.

Carefully remove the core and windings and connect the R.C. components as shown. This method keeps them tidily together and is much easier to wire into a set.

THOSE IRRITATING GRUB SCREWS.

IT is well known that filing a flat on the spindle of a variable condenser or a potentiometer will make it more difficult for the knob to slip when being operated.

At the same time there is always a tendency for these irritating screws to work themselves loose on the slightest provocation.



The wax will quickly melt, when required.

A little cobbler's wax poured into the hole in the knob after tightening the screw will prevent this. To unscrew the knob it is necessary only to heat the screwdriver.

WAX FOR STRENGTH.

WHEN making a home-made battery-connector, or an adapter for a plug-in short-wave set it is a good idea to fill the valve base with molten paraffin wax or with the bitumen composition from the top of an old H.T. battery.

This makes a much stronger and more solid job.

Be sure to plug the small hole in the bottom with a small piece of wood first of all. This can afterwards be removed.

INSPECTION LAMP.

WHEN tinkering about in the dark depths of the cabinet of a wireless receiver, some form of lighting is almost essential if the work happens to be of at all an intricate nature, or if the set is installed in a large, deep cabinet which is not illuminated by any other means.

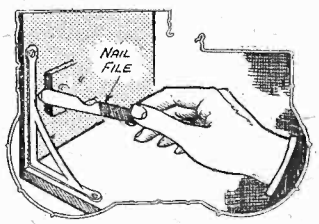
In such cases I have found one of those little electric flash-lamps, designed to clip into the pocket like a fountain-pen, to be extremely useful, both on account of its small size and because, being long and narrow in shape, it can be poked into corners and into places which would be more or less inaccessible to any other form of lamp.

If the clip on the side of the lamp is bent outwards slightly it can be fixed temporarily to the side of the cabinet, to a variable condenser end-plate, or in some other convenient position, thus leaving both hands free for the work to be done.

Owing to the comparatively light weight of the lamp, no harm will be done by clipping it on to the more robust of the components, or even to short and stout parts of the wiring, while adjustments are being made, but the batteries or mains should always be disconnected before inserting the lamp into the receiver, in order to prevent short-circuits.

EMERGENCY SCREWDRIVER.

A VERY good emergency screwdriver for use when the proper tool is not available, or when a sufficiently small one is not to hand, is one of those flat-type nail files.

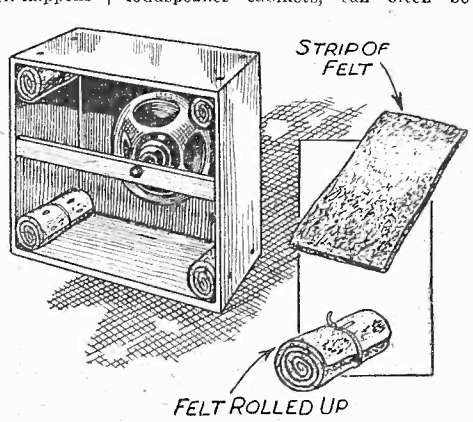


An idea for small screws which will appeal to the constructor.

The round end is used in the screw. The idea is, of course, for small screws only, but will be found very effective where awkwardly placed ones are concerned, because the file is slightly flexible, and will also get into places where the length of an ordinary screwdriver prohibits its use.

PADDING FOR BOOM.

BOOMING noises which are sometimes present in "box-type" loudspeaker cabinets, can often be removed by padding-out the corners of the cabinet.



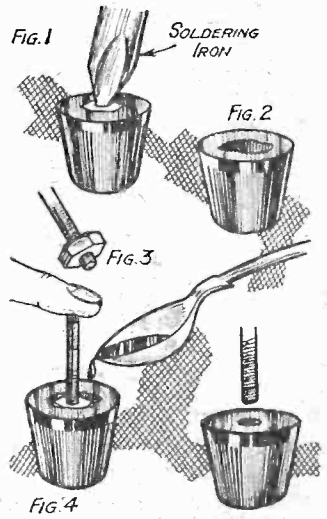
A strip of felt rolled up and placed in the corners of the cabinet will often stop "boom."

Very suitable material for this purpose consists of soft-felt pads, such as those used under stair-carpets. Four pads should be chosen, each one rolled up, tied with string and then nailed down as illustrated.

REPAIRING OLD KNOBS.

FIRST remove the old nut (see Fig. 1). Heat up the soldering iron as for soldering, then hold the iron on the old nut. It will soon warm sufficiently to soften the surrounding ebonite and it can then be removed with the finger and aid of a penknife, leaving the knob as in Fig. 2.

Now put a new nut on the spindle to be used as in Fig. 3. This should be heated up the nut end, and placed in the knob as in Fig. 4, with the finger pressing tightly while the nut makes its new bed. When cold, it will be found to be stuck in the required position.



Use an old spoon for preference.

Now, to finish the knob, take a little pitch; this can be had off the top of any old dry batteries which may be discarded. Melt the pitch in a spoon, as sketch, then pour in and, when cold, you have a new knob.

MICROPHONIC VALVES.

OCCASIONALLY the listener is troubled by a humming noise or a howl which gradually grows in intensity until it completely drowns the programme which is coming through at the time.

This is generally due to a microphonic valve and is caused by external vibrations, such as slight "jars," or by the sound waves from the speaker impinging on the valve bulb.

Although complete isolation of the valve from all external vibrations, i.e. by screening and mounting on Sorbo rubber, is really the best remedy, it is sometimes possible to effect a cure in the following manner.

Obtain a piece of plasticine and place it on the top of the bulb. Then embed in the plasticine a small coin or lead shot.

Another scheme is to wrap cotton wool round the bulb and a combination of the two methods is worth trying.

(*Continued on next page.*)

WE PAY FOR YOUR IDEAS!

Readers are invited to send in a short description, with sketch, of any original and practical radio ideas of their own.

Each week £1 1s. will be paid for the best "Wrinkle" from a reader, and others published will be paid for at our usual rates.

Each hint must be on a separate sheet of paper, written on one side of the page only. Send your idea to-day, marking the envelope "Recommended Wrinkles," to the Technical Editor, "Popular Wireless," Tallis House, Tallis Street, E.C.4.

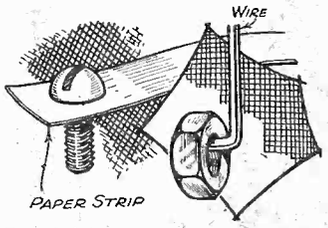
This week our guinea is paid to Mr. R. F. Goodfield, of 25, Parish Road, Tynant, Pontypridd, for the "wrinkle" entitled "Repairing Old Knobs."

RECOMMENDED WRINKLES

(Continued from previous page.)

SCREWS IN AWKWARD PLACES.

OFTEN a screw or bolt has to be inserted in a part of the "works" where the hand cannot reach. The awkwardness can be overcome simply by first pushing the screw through the end of a strip of paper and hanging it against the spot required. Then once a start has been made with the thread, the paper can be torn away.

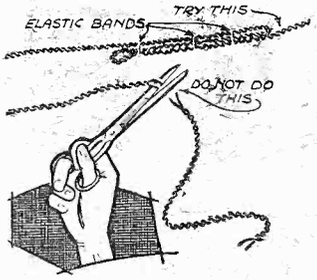


Two helpful suggestions for nuts and bolts.

Many of the nuts used for wireless components have a groove round them, so these can be "slung" in a similar way. If there isn't a groove, the best plan is to suspend the nut by a piece of wire bent over a little at the end.

SHORTENING FLEX LEADS.

HOW often it happens that, having carefully cut flex leads to batteries or loudspeaker extensions to suit the requirements of Wednesday, Thursday brings along a sudden need for longer leads! This means a join in the flex, insulating tape and, more often than not, a loss in efficiency.



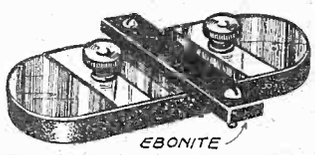
Ability to lengthen a flex lead often proves handy.

Make it a rule never to cut flex leads which seem a bit too long. Instead, shorten them by looping the wire up and down on itself for the required distance and securing it with two or three small elastic bands.

The job looks tidy enough for a permanency—and you always have something in reserve.

WASTE NOT——!

DON'T discard your old fixed condensers because you have broken off the fixing-down lugs. They



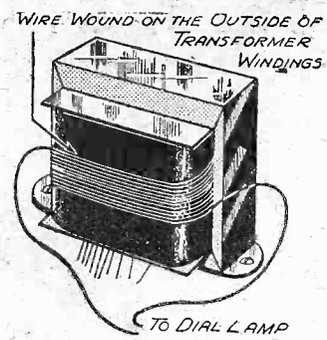
There are several ways of fixing down a condenser!

can be stuck down to the baseboard with Chatterton's Compound or fixed as illustration, or short connecting wires will hold them firm enough.

MAINS DIAL LAMP.

I HAVE found the following idea useful where a small current is required to illuminate the tuning dial of an A.C. mains-operated receiver.

A few turns of wire wound on the outside of the mains transformer windings will provide enough current to light a small bulb. The number of turns will, of course, depend on the size of transformer, size of bulb, etc.



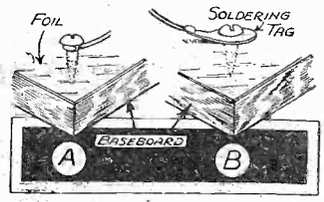
The mains transformer will light the lamp for you.

The number of turns necessary can easily be determined by winding on about twelve turns of No. 24 D.C.C. wire and adding or removing turns as required. The ends of the wire are connected direct to the dial lamp, which will light automatically when the set is switched on.

CONNECTIONS TO FOIL.

WHEN using a foil covered baseboard trouble is often experienced in making a good connection to the foil, especially if aluminium foil is employed.

When the wire is merely passed round a wood screw and the screw



A tag is better than a loop on the fixing wire.

fixed to the baseboard, only a small portion of the wire is in contact with the foil A.

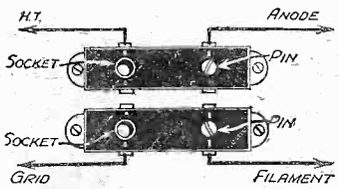
If, however, the wire is first soldered to a soldering tag and the tag then screwed to the foil and baseboard an efficient contact results.

PLUG-IN COILS.

WHERE plug-in coils are used it is necessary to ensure that the correct connections are made to the coils via the holders. This is for two reasons:

1. So that correct reaction effects are obtained.

2. In the case of the coil used in the aerial position—since in all probability this will be an "X" coil—that the



Bad tuning with plug-in coils may be due to reversed connections.

connections to this are such that the tapping points on this coil are towards the end which is joined to filament or earth.

To obtain correct reaction effects it will be found that, providing coils of a similar type and make are used, and providing that the anode and grid terminals of the respective coil holders are arranged so as to be diagonally opposite, correct reaction will result.

Since, however, the earth end of an "X" coil is usually the socket, it will mean therefore that the socket of the holder of the aerial coil is always joined to grid.

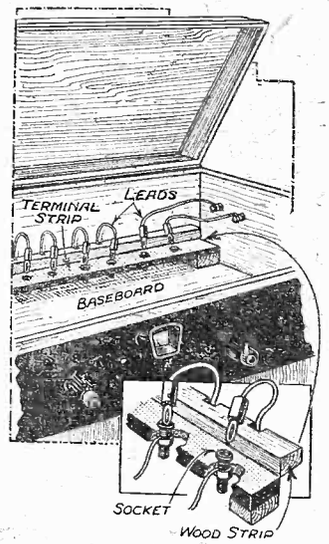
The whole point to bear in mind is that the connections shown above hold good so long as two coils of a similar make and type are used.

As explained above, the aerial coil connections are in any case fixed, because of the simple fact that the pin of the holder in the case of an "X" type aerial coil must be joined to earth or filament, therefore it follows that if correct effects are not obtained, reverse the leads to the two terminals on the reaction coil holder.

BANANA PLUGS AND SOCKETS.

INVARIABLY, one finds that the terminal strip at the back of a set (which provides connection to H.T., L.T., A. and E.) carries terminals of the pillar type.

To disconnect and connect the leads of such a set (as many constructors wish



Minor repairs are quickly carried out in this manner.

to do to attend to minor repairs, etc.) is a tiresome business, as the nuts are awkward to get at and are often dropped into the set when connecting up, so that the set has to be removed to find lost nut.

If the pillar type of terminal was replaced by the banana plug and socket all this trouble would be eliminated, and it is only a few moments job to connect or disconnect these leads.

This arrangement applies particularly to sets which are fitted to the All Enclosed type of cabinet, as the leads can be fixed permanently into position with the banana end just free enough for insertion or extraction.

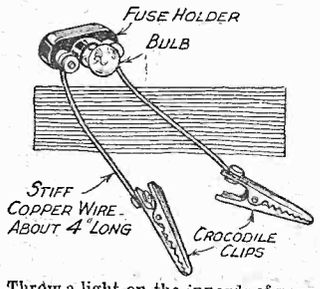
The contacts are very reliable if good banana plugs and sockets are used, and the price is no more, being about 2d. each plug and socket.

A USEFUL "GADGET."

WHEN working inside your set adjusting something or other, there are times when a light is wanted to play right on to what you are doing.

More so when your set is fixed in the corner of the room away from the gas or electric light.

This little gadget described below will clip on anywhere in your set, one clip on L.T.+ circuit and the other on



Throw a light on the innards of your set when attending to the components.

L.T.—, that is, when the accumulator is connected up.

Don't forget to disconnect the H.T. battery.

PANEL ECONOMY.

MANY constructors who build a new set or modify their existing instrument, find that panel holes drilled for the last layout are now unused and exposed.

In such circumstances it is common practice either to spend seven or eight shillings on a new panel or to fill the holes with pitch, sealing wax, or some similar substance.

The results of the latter method are almost always unsightly, and a better solution is to be found in veneer.

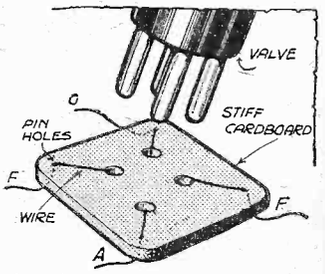
Enough veneer to cover a large panel (24 ins. by 8 ins.) can be obtained at any woodworker's shop for about sixpence. It should be cut to size and glued firmly to the old panel, holes being cut where necessary with a sharp penknife.

There are many advantages in the method. The veneer can be of the same wood as the cabinet, and stained and polished to match, resulting in a most delightful appearance. It can be glued after the panel is fixed, thus concealing the bolts of the angle brackets, and, with the aid of a chisel, it can be removed in readiness for the next set in a few moments.

The ebonite panel itself should be $\frac{3}{16}$ in. rather than $\frac{1}{4}$ in., but where the thicker grade is used difficulty will very rarely be found in mounting the components, since the thickness of glue and veneer is only about $\frac{1}{8}$ in.

TEMPORARY VALVE-HOLDER.

YOU may sometimes want to connect a valve temporarily in a circuit but have no holder. Cut a small square of



As a temporary job this will prove quite satisfactory.

stiff cardboard, punch in it four holes portioned and spaced to correspond to the valve prongs, and four pin-holes near the corners.

Four wires put through the pin-holes and then bared ends pushed round through the valve prongs' holes. These are bent back underneath so that there is no possibility of them pulling out. Each hole is marked, the new holder connected in the circuit and the extra valve inserted.

PREVENTING VIBRATION.

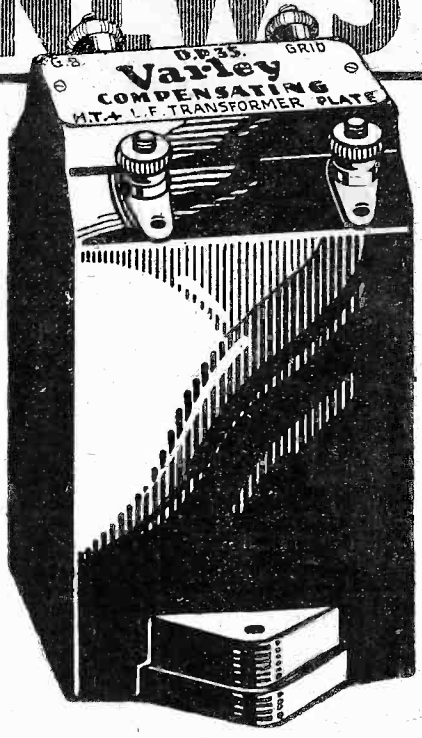
SORBO rubber or sponge is often recommended underneath the baseboard of a receiver in a radiogram

Cheaper than sponge—and quite as effective.

cabinet as a cure for vibration, microphony, etc.

The old inner tube from a motor car tyre is just as successful, and has the added advantage of being cheaper.

A NEW STAR CIRCUIT



and this Varley Transformer made it possible

SPECIFIED *in the "Popular Wireless"*

AIRSPRITE

From the very inception of this "P.W." wonder set, Varley's research department and the technical staff of "Popular Wireless" worked in close collaboration. Finally, after the most stringent tests, ***"P.W." declared that the Varley compensating L.F. transformer D.P.35 was exactly what they required.***

Obviously it would be foolhardy to use any other transformer—***everything depends upon the exact characteristics of the L.F. transformer chosen.*** In fact, Mr. G. P. Kendall, B.Sc., Chief Engineer of "Ready Radio," has found on test that this Varley transformer is the only one suitable for the job and is using it exclusively.

Get the correct transformer, Varley D.P.35—specially designed for this great set—and you will get the results the designers got! Ready now.

COMPENSATING L.F. TRANSFORMER D.P. 35 11/6

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Capt. ECKERSLEY'S QUERY CORNER

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

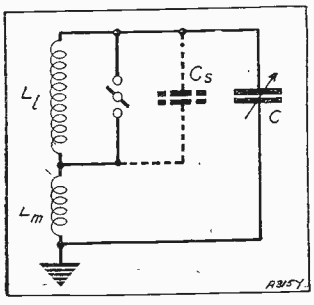
WAVE-CHANGE SWITCHES.

B. B. N. (Goodmayes).—"When using an ordinary push-pull switch for wave-change switching by shorting the long-wave section of a dual-range coil would not the capacity between the switch points affect the tuning on long waves, unless the switch has extremely low capacity?"

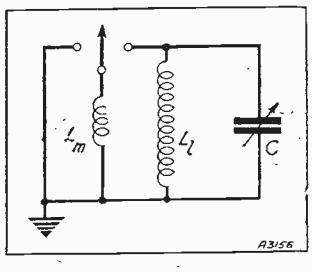
I suppose you have a circuit not unlike this, and you close the switch when going on to long waves.

Now there is a possibility of having capacity as shown by the dotted line. The

AVOIDING STRAY CAPACITY



The usual arrangement of wave-change switching may introduce a "stray" capacity as shown by the dotted condenser Cs.



A recommended expedient to avoid the capacity effect of a wave-change switch is to have the medium and long wave windings in parallel.

inductance L_m is in circuit and it makes, if C_s is large, a curious and to me incalculable arrangement of tuned circuit.

But L_m is about $\frac{1}{16}$ the value of L_l and so we might assume that C_s is practically in parallel with C. If it was it wouldn't matter. However, I think the best way to arrange the long-medium switch is as I have shown it when, on one side, L_m is in parallel with L_l, or on the other side when the resultant inductance value is practically L_m. L_l remains across C, but L_m is short-circuited to earth.

* * *

USING TWO LOUDSPEAKERS.

A. D. B. (Melton Mowbray).—"I am desirous of using two moving-coil loudspeakers, but, after making several inquiries, I am uncertain as to whether one or two output transformers should be used. Can you please help me?"

One output transformer could easily be designed to work two loudspeakers in parallel, but it's a question whether one designed to feed one would work when asked to feed two.

I have designed transformers to work 1,000 loudspeakers in parallel, but I should have been silly to have tried to make a standard transformer work.

I cannot give you better advice than that you should write to the makers of the speakers or transformers, or write to a good transformer maker and tell him what speakers you want to use, when you will get *quantitative* advice, where obviously I can only give you *qualitative* advice.

* * *

HOW MANY LAYERS?

N. C. (Birmingham).—"How many Heaviside layers are there, one or two? I ask this question because I understand that a second one has recently been discovered.

"How far above the earth's surface are these layers? What happens to those layers during daylight, since it is apparently only at night that they become effective?"

There is not one, nor are there two Heaviside layers.

The Heaviside layer, it is now thought, consists of a multi-layer structure. It's as if a ceiling of a room were made up of layers of mosquito netting and gauze and even stuff, when you would have a multi-layer ceiling; obviously you would find that such a ceiling would reflect waves (sound) of different frequencies differently.

So the Heaviside layer behaves differently to waves of different length. Also the structure of the ceiling changes with changing conditions of the sunlight and the season.

The layer which affects broadcasting wavelengths gets very fuzzy and non-reflecting during daytime, but reflects well at night. This layer is about 60 miles above the earth.

Other layers which are effective for short waves are higher up and more steady—they reflect sometimes more sometimes less during daylight.

You will appreciate, therefore, that short wave long-distance transmission is dependent upon many factors as (1) Wavelength. (2) Time of day and night. (3) Season, and (4) because of (2) great circle between points of transmission and reception.

MODIFYING AN OUTPUT CHOKE.

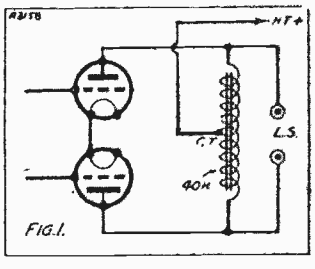
F. E. A. (Billericay).—"I am thinking of converting the output stage of my receiver to push-pull, employing a centre-tapped choke as shown in my first sketch.

"The choke I have, however, is not tapped, and I propose arranging matters as in my second diagram. Is this in order, and what values of resistances would be suitable? The valves have impedances of 830 ohms."

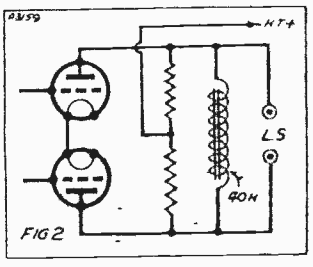
No! Unless you double your high tension, and then it's no use using a choke.

Thus (1) Every valve requires for proper working a proper impedance in its anode

TOO GOOD TO BE TRUE



A centre-tapped choke is required with push-pull power valves when an output transformer is not employed.



Unfortunately for F. E. A. an untapped choke cannot be pressed into service by the simple expedient of using two resistances.

circuit. (2) Every valve requires for proper working a given voltage *on its anode* and in the case of output stages proper means lots. (3) Every valve takes current to work it.

But your diagrams show *not* a low D.C. resistance high impedance *choke* which satisfies (1) and (2), but the current has to go through a resistance. And a resistance drops the anode volts. And if you have a resistance that is an impedance you don't need the choke.

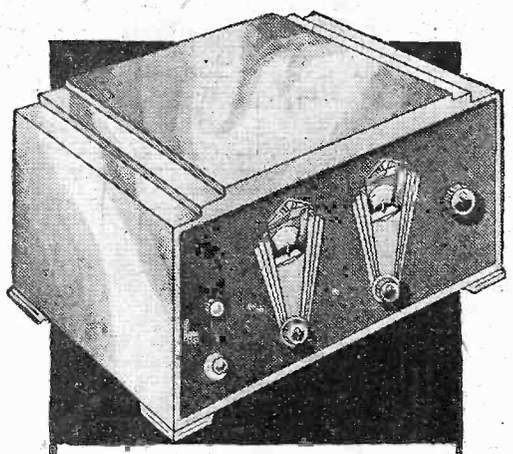
But if you use a resistance to get the proper voltage on the anodes, you must have very much more high tension! Quite twice as much or more than if you use the choke.

I think if I were you I should buy another choke or, very gingerly and if you can, take your present choke to bits and then see if you can grab hold of a centre tap.

For the finest results at the lowest

construct your exclusively of TELSEN

Matched Components



This view of the front panel of the completed ALL-TELSEN 'P.W. Airsprite 3' shows the handsome commercial "finish" given by the silver oxidised escutcheons of the Telsen Disc Drives.

BE *sure* that the 'P.W. Airsprite 3' which you build will give you lasting efficiency at the lowest cost consistent with quality. *Make it an ALL-TELSEN receiver*—with the Telsen Matched Components shewn in the list on the next page. Specially prepared for you by Telsen technicians, every component in this list has been individually tested for immaculate performance, the complete ALL-TELSEN 'P.W. Airsprite 3' being itself subjected to prolonged testing to ensure its lasting efficiency. Take this list to your dealer's—now.

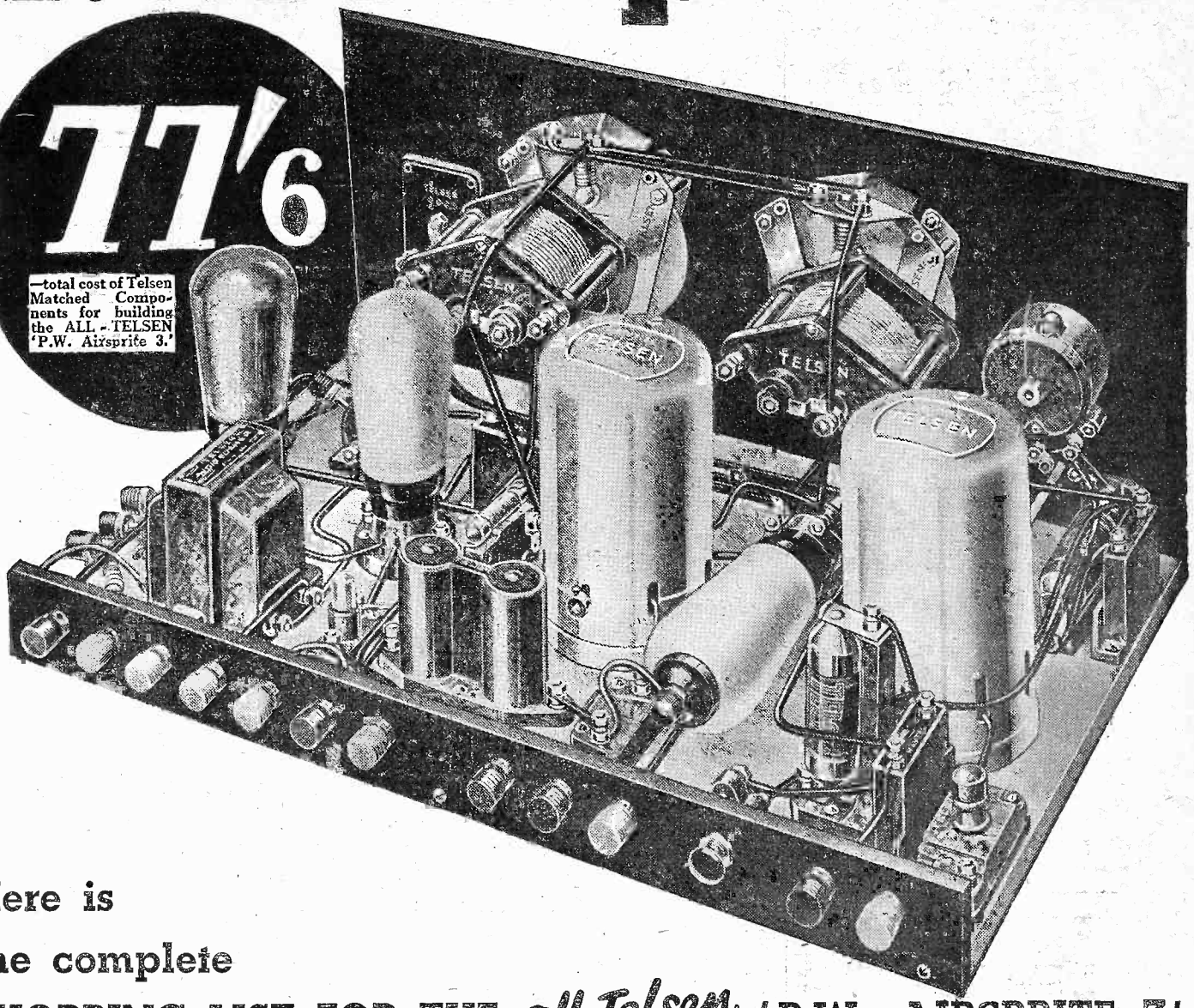
TELSEN
RADIO COMPONENTS

cost consistent with quality . . . .

'P.W. Airsprite 3'

77/6

—total cost of Telsen Matched Components for building the ALL-TELSEN 'P.W. Airsprite 3.'



Here is the complete SHOPPING LIST FOR THE *all Telsen* 'P.W. AIRSPRITE 3'

Quantity.	*Description.*	*Cat. No.*	*Price.*
2	Twin-Matched Screened Coils -	W.287	17 0
1	Coil Switch Coupling Assembly -	W.217	0 6
1	Log. Variable Condenser, L.H. .0005 mfd.	W.256	4 6
1	Log. Variable Condenser, R.H. .0005 mfd.	W.132	4 6
2	Illuminated Disc Drives - - -	W.184	7 0
1	Standard H.F. Choke - - - -	W. 75	2 0
1	Binocular H.F. Choke - - - -	W. 74	5 0
2	.1 mfd. Mansbridge Condensers -	W.231	3 6
1	.01 mfd. Mansbridge Condenser -	W.232	1 6
1	.0005 mfd. Mica Condenser - -	W.244	1 0
1	.0003 mfd. Mica Condenser - -	W.242	1 0
1	.0003 mfd. Pre-set Condenser - -	W.151	1 6
1	.0003 mfd. Bakelite Differential Reaction Condenser	W.185	2 6
1	1,000 ohm. Cartridge Resistance -	W.268	1 9
1	100,000 ohm. Cartridge Resistance	W.282	1 9
2	Cartridge Resistance Holders - -	W.286	1 6
1	2 meg. Grid Leak - - - - - - -	W.251	1 0
1	Fuse Holder - - - - - - - -	W.146	0 6
1	Fuse Bulb - - - - - - - - -	W.318	0 6
1	Universal Valve Holder- - - -	W.198	1 0
2	4-pin Solid type Valve Holders -	W.224	1 6
1	Telsen Audioformer - - - - -	W.327	11 6
1	Three point Switch - - - - -	W.108	1 3
1	50,000 ohm. Volume Control - -	W.295	3 9

Obtainable from radio dealers everywhere

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO., LTD., ASTON, BIRMINGHAM

THE MIRROR OF THE B.B.C.

COMING FRAY IN PARLIAMENT

Adult Education Matters—Canada Surprises the B.B.C.—A Temperance Question—Universities Debate—Lady Simon to Talk.

PARLIAMENT reassembles next week, and concentrated against the B.B.C. will be the most violent attack in the ten years of its history. But somehow I do not see the B.B.C. being seriously upset.

For one thing, the attack is not well timed. The bother about Poland, reasonably settled by Sir John Reith, will not attract much interest or attention. Moreover, more urgent problems of war debts, unemployment, and disarmament are certain to monopolise the attention of ministers.

Another factor is that there has been growing reaction against the campaign to make the B.B.C. entirely subservient to a "Vigilance Committee" of the House of Commons. No doubt there will be some row in Parliament about the B.B.C.—at least, as far as its constitution is concerned.

Speakers With Reputation.

Meanwhile, however, the B.B.C. would be well advised to provide as few weapons as possible to its opponents; by this I mean chiefly careful consideration of the personalities engaged for talks and debates. I do not suggest any censorship or silly restriction; but I do say that more depends on the reputation of the speaker than on what he actually says.

If I had my way about the talks, I would make a point of confusing critics by producing such unexpected situations as the virtual pronouncement of Socialist views through a recognised Tory mouthpiece, and *vice versa*.

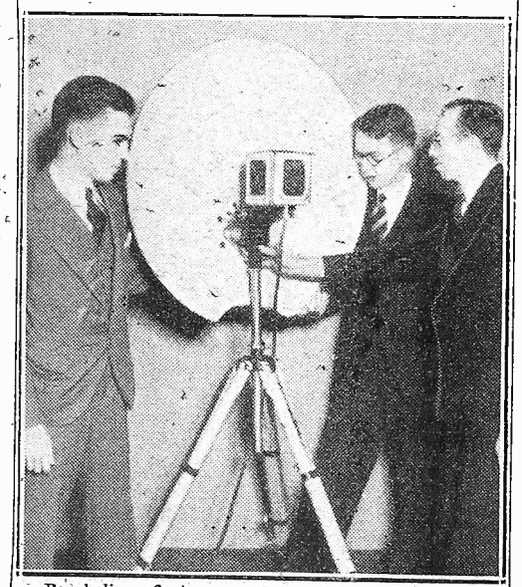
Interesting B.B.C. Romance.

Broadcasting House is much interested in the forthcoming marriage of Mr. Beadle, the Assistant-Director of Programmes, and Miss Rae, the very popular Illustrations and Photographic Assistant to Mrs. Lines, Head of the Photographic Department.

Group Leaders for Training.

The Adult Education Council, sometimes known as the "Central Elephant," which advises the B.B.C. on Broadcast Adult Education and which, in conjunction with the Carnegie Institute, has been carrying out intensive experiments in Group Listening in selected areas from Kent to Scotland, recommends an extended system of training for Group Leaders.

MICROPHONE REFLECTIONS



Parabolic reflectors are being tried in America behind microphones for broadcasts from large halls. So far very successful results have been obtained.

No Liquor at Broadcasting House.

The retirement of Lady Snowden has made no difference to the policy of the B.B.C. in declining to provide alcoholic refreshment either for its staff or its artistes.

There is apparently a small, carefully guarded and definitely secret special supply of the forbidden stimulant for the use of distinguished visitors. But the distribution is zealously controlled.

Nevertheless, I understand that temperance organisations are promoting a protest against the apparent inconsistency.

Canada Criticises.

There is a good deal of resentment and surprise at Broadcasting House because of the virulent criticism of British Broadcasting which, according to press reports, seems to have constituted the agenda of the first meeting of the Canadian Broadcasting Commission. I understand that representations have been made.

Rush of Variety Talent.

The B.B.C. is being overwhelmed with applications from variety artistes not subject to the ban of the General Theatres Corporation, and I hear that those who are responsible for sifting applications have never been so busy as they are now.

Yale v. Cambridge.

There should be much interest in the debate, via the Atlantic Telephone Service, between the Yale University Debating Society and the Cambridge Union Society, which is to be simultaneously broadcast in England and America on Saturday, February 11th. For half an hour this long-distance discussion will be carried on by means of microphones and loudspeakers, the Yale men in the New York Headquarters of the National Broadcasting Corporation,

(*Continued on page* 1164.)

CONSERVING THE BASS

Connections for parallel-feed transformers.

By H. CROSS.

LOSS of bass is particularly noticeable when cheap transformers are employed.

The parallel-feed system has the advantage of removing steady anode current from the transformer primary and thus, in effect, increasing its impedance, with a resultant increase in bass note amplification. By suitably proportioning the parts a good bass response can be obtained with even a quite small transformer.

The actual calculation of the resistance and coupling condenser is somewhat difficult, but as the object of suitable proportioning is to prevent any "peaking" of one particular frequency, the problem, in practice, is simply resolved by substitution of different values of condenser or resistance, if necessary.

In most cases, however, general values may be assumed. The actual procedure for conversion from the ordinary connection is quite simple.

You disconnect the primary of the transformer as a start, and between the plate of the detector valve and H.T. positive connect a resistance. A suitable value will be about 50,000 ohms and a simple spaghetti can be conveniently used.

The plate terminal of the valve holder is joined also to one terminal of a fixed condenser. The other side of this condenser goes to P terminal of the transformer.

The H.T. positive terminal is simply connected to that marked G.B. The coupling condenser can be about ·25 mfd.

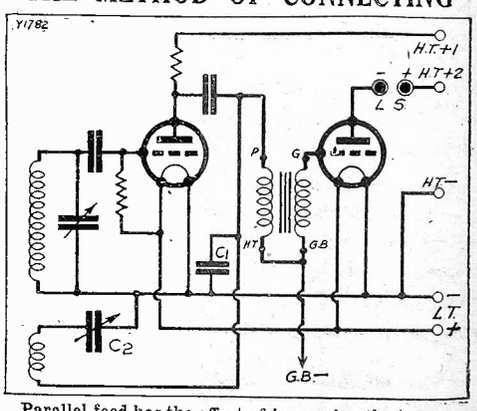
Obviating Shorts.

An even more advantageous scheme when the transformer follows the detector is to arrange for the reaction condenser and the by-pass condenser, when one is used, to be joined so that there is no high tension on them.

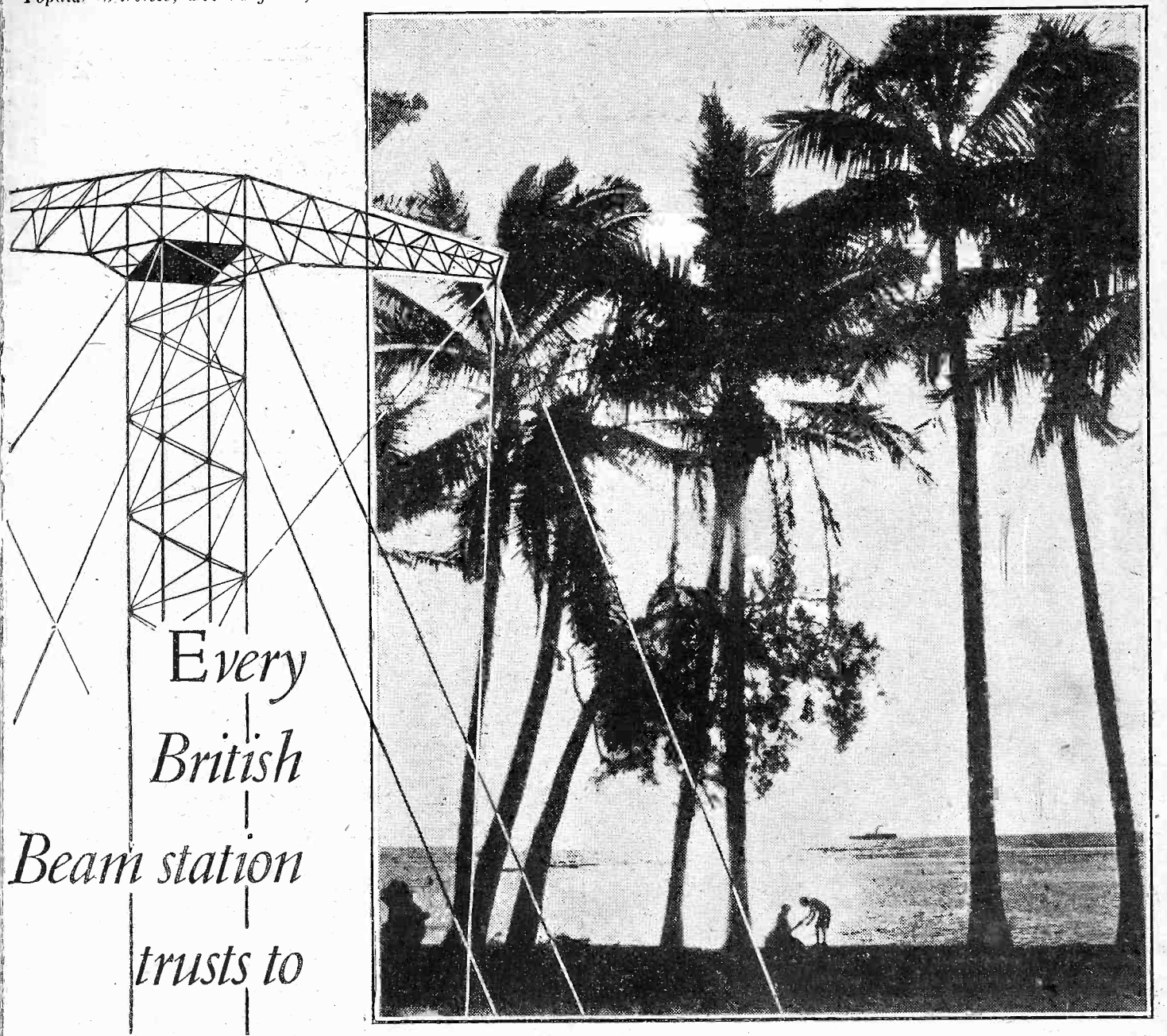
The risk of shorting the H.T. battery by a faulty reaction or by-pass condenser is thus obviated. The accompanying circuit clearly indicates the connections.

The resistance and condenser used for coupling may be of the values mentioned previously. The high tension is fed to the valve anode via the coupling resistance, and whereas the voltage would normally be applied to one set of the plates of C_1 and C_2, by using the scheme shown here this is obviated. In other words the coupling condenser, which must necessarily be of high insulation, is made to serve a dual purpose.

THE METHOD OF CONNECTING



Parallel feed has the effect of increasing the transformer's primary impedance, because direct current is removed from it.



Every British Beam station trusts to

MARCONI VALVES

As one drives across Bodmin Moor or along the Sedgemoor Road, or in a few other parts of England, one sees rising against the sky a line of delicate masts, spaced widely apart, and joined by gently curving traceries of wire. These are the great wireless Beam Stations. Those mast tops are the last points in an elaborate organisation. Still and remote as they seem they yet draw the whole world closer together.

The valves evolved for that organization have to be the last word in reliability. Do you realize that they are made *under the same conditions and in the same factory* as the Marconi valves you see on the counter in your own dealer's shop?

MARCONI D.C. MAINS VALVES

Marconi D.C. valves are standardised by many leading set manufacturers on account of their unequalled economy and durability and consistently high efficiency. The range includes a type for every possible purpose, each one fitted with the standard Marconi heater requiring only 0.25 Amp. at 16 Volts, giving a total power consumption of only about 60 Watts for the whole set.

We show here the curve for Marconi VDS, the new high-conductance Variable-mu type. Note how the amplification decreases evenly and smoothly with rising grid bias, and the enormous reserves of sensitivity, all under perfect control.

MARCONI D.C. MAINS VALVES

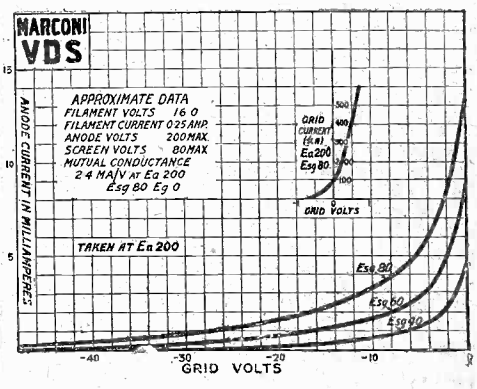
DSB	Screen Grid (Single Stage) ...	19/-
DS	Screen Grid (Multi Stage) ...	19/-
VDS	Variable-Mu	19/-
DH	General Purpose.....	13/6
DL	L.F. and Power.....	15/-
DPT	Power Pentode	20/-

WHAT IS THE PURPOSE?—

WE HAVE THE VALVE!

Ask your local-dealer or write direct to The Marconiphone Company, Radio House, Tottenham Court Road, London, W.1, for the Marconi Valve Folder which gives curves, facts and figures for all types of valves.

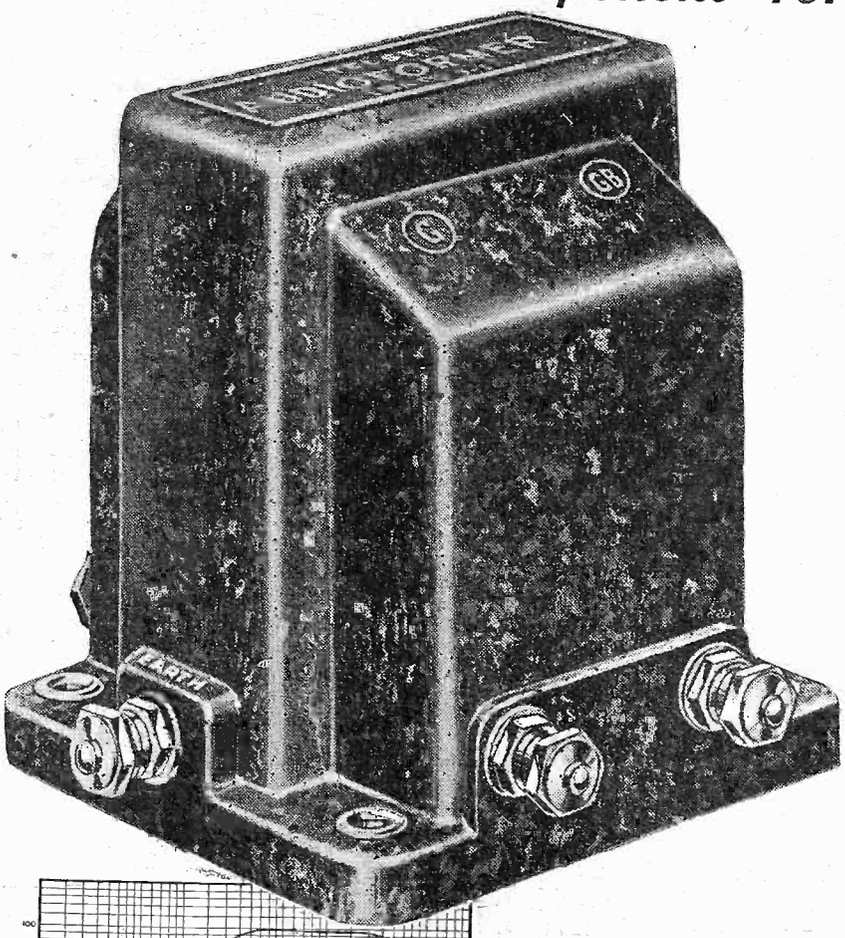
G. Marconi



NOW — a component which solves the problem of TONE COMPENSATION without necessitating an extra L.F. stage!

TELSEN AUDIOFORMER

—the essential component for all selective circuits

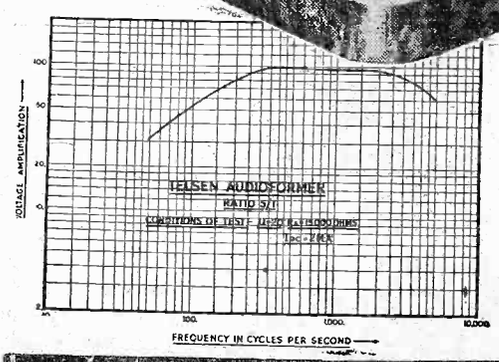


SPECIFIED FOR THE 'P.W. AIRSPRITE 3'

THE Telsen Audioformer solves the problem of tone compensation which has been created by to-day's demand for super selectivity. Its fixed compensation restores all the high notes which have been lost by the cutting of the sidebands, yet it does so without any loss of amplification or reduction in bass response, and without necessitating either an extra L.F. stage or any additional components. Absolutely self-contained, this single brilliant component is all you need to achieve that perfect reproduction which your critical ear demands, but your set is at present unable to provide. You will be amazed at the improvement it effects. Obtainable everywhere now.

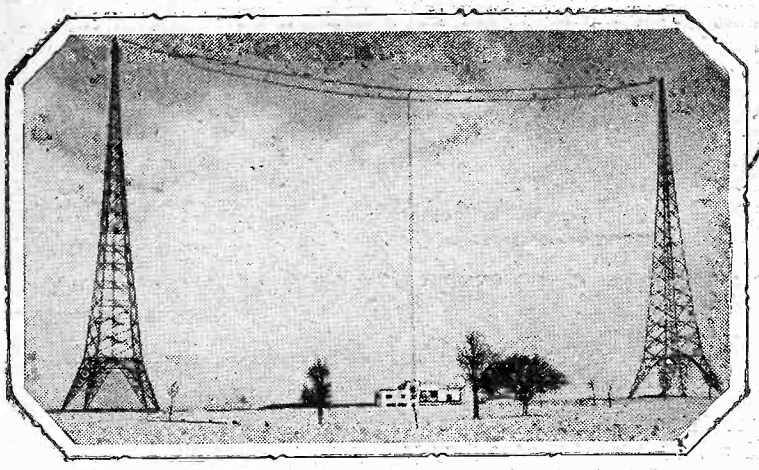
Ratio 5 to 1.

PRICE **11/6**



The excellent treble response secured can be seen at a glance in this graph showing the Telsen Audioformer curve.

TELSEN
RADIO COMPONENTS
FOR LASTING EFFICIENCY



ALL ABOUT

Switzerland's NEW REGIONAL Station

Tests of the Tessin transmitter described.

By A SPECIAL CORRESPONDENT.

THE new Tessin Station, which will soon be transmitting on 760 metres from Monte Ceneri, in Switzerland, is the last link in the Regional scheme which British wireless experts have planned for Swiss listeners.

I have had the opportunity of an interesting chat with a Marconi official who has been largely responsible for planning the new Regional scheme, and by special permission I was enabled to see factory tests of the Tessin transmitter before it was sent out to Monte Ceneri.

I saw this big 15-kilowatt broadcaster being put through its paces within a comparatively short distance of our own London stations, and although the Tessin transmitter was being worked on a "dummy" aerial, it struck me as very fortunate that no interference was caused.

The official explained to me that of the five stations officially possessed now by Switzerland, only two, Sottens and Beromunster, are part of the Regional scheme. The others, at Geneva, Basle and Berne, are very small, Berne, for instance, being only half a kilowatter.

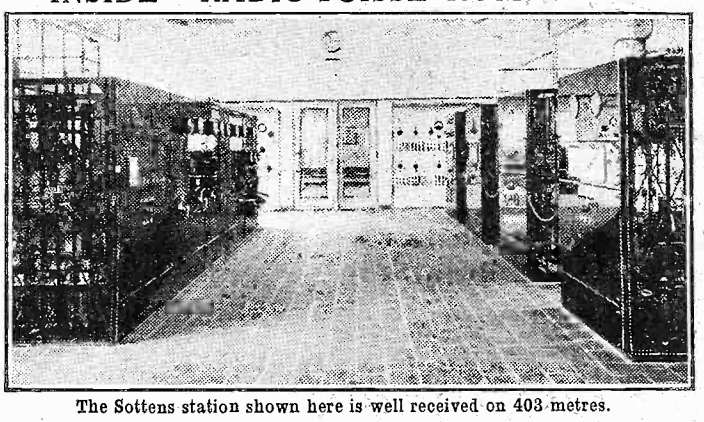
Together we studied a map and it was made clear how the huge Beromunster 60-kilowatt transmitter covers the German-speaking part of Switzerland while the new Tessin station will cover Italian-speaking Switzerland.

As a result, I shall look forward with more than usual interest to the first broadcast from Tessin, and I think you may be interested in a description of the gear as I saw it when being put through its factory tests.

Similar types of broadcaster, I was told, had been built at Trieste, Bucharest, Bratislava, and many other places, and it is the type known to experts as the P.A. outfit.

The P.A. plant at Tessin works with 15 kilowatts. As the distortionless modulation can be put up to a depth of about 80 per cent., Tessin should have a good range, especially for crystal users. It tunes from 400 to 800 metres and it will first be tested on 760 metres. The Swiss telegraph administration told the engineers at the factory that that is the wavelength on which it would most probably be worked and so the tests were carried out on 750 metres.

INSIDE "RADIO-SUISSE ROMANDE"



The Sottens station shown here is well received on 403 metres.

Not Crystal Controlled.

I was shown the broadcaster in the factory and I saw that the front of the transmitter was constructed in the form of a switchboard, while the valves were in groups behind.

The engineer said that Tessin was not going to be controlled by a piezo crystal, but that a valve controlled oscillator, with a chain of harmonic selectors, would be used. Technical enthusiasts should note that choke control modulation is used and that after the preliminary modulated stages, there is a water-cooled valve as a power amplifier.

One of the engineers went to the little control desk in front of the transmitter switchboard and started up the broadcaster for my benefit. It had only just finished a closed circuit test, so that the valve-cooling water and the big generators were already running.

After about five minutes of slow control of field current regulators, the engineer carefully watching the dials all the time with the anxiety of a submarine pilot, the transmitter was passed as O.K., and on a side tone receiver I was privileged to hear the test frequency transmissions.

At Tessin the station will get all its power from the huge high-voltage cables coming over the hillside to Monte Ceneri. I have seen the big glass mercury vapour valves which are used for rectifying the three-phase A.C. supply. These valves handle the 10,000 volts or so needed for the anodes of the water-cooled valves.

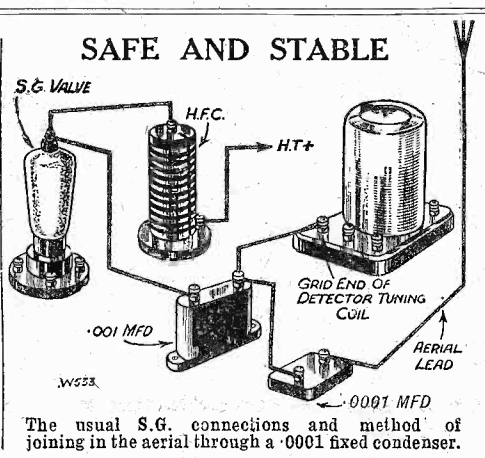
There are large oil-cooled smoothing-circuits, cabled up to the mercury vapour rectifiers, ensuring that there is no hum on the transmission. The engineer says that the frequency response curves of the new Tessin is flat from 30 cycles (deep down in the base) to 10,000 cycles.

CUTTING OUT THE S.G. VALVE

A good method that prevents instability.

LISTENERS residing near a powerful broadcasting station, who have sets of the S.G. det. and L.F. type, sometimes wish to cut out their S.G. stage, and to use just the detector and L.F. stage for receiving the local.

SAFE AND STABLE



The usual S.G. connections and method of joining in the aerial through a ·0001 fixed condenser.

To employ a switch in order to do this is to invite trouble in the form of instability, but in many cases the following scheme is quite practicable.

Connect the grid end of the detector tuning coil to a small fixed condenser, say about ·0001 mfd. Remove the aerial from its usual terminal and instead connect it to the other side of the fixed condenser.

In this way the aerial can be tapped directly into the detector circuit, the filament of the S.G. valve being switched out by means of an additional "on-off" switch wired into the positive filament lead to the S.G. valve holder.

RADIO PARIS SUNDAY NEXT — 6.30 P.M.

This Choke represents the very latest in High Frequency efficiency, because it embodies all the advantages of the costly Binocular choke with the undoubted benefits of the Twin screen.

For all H.F. circuits where ultra-efficiency is such a necessity you cannot do better than follow the lead of the experts and Wireless Journals and fit the

LONG **L** MEDIUM **M** SHORT **S**

TWIN SCREEN

H.F. CHOKE

Silk wound, of extremely high inductance and negligible capacity, this handsome component is priced within the reach of every constructor.

4/6 EACH

GRAHAM FARISH
RADIO COMPONENTS

GRAHAM FARISH LTD., MASONS HILL, BROMLEY, KENT.

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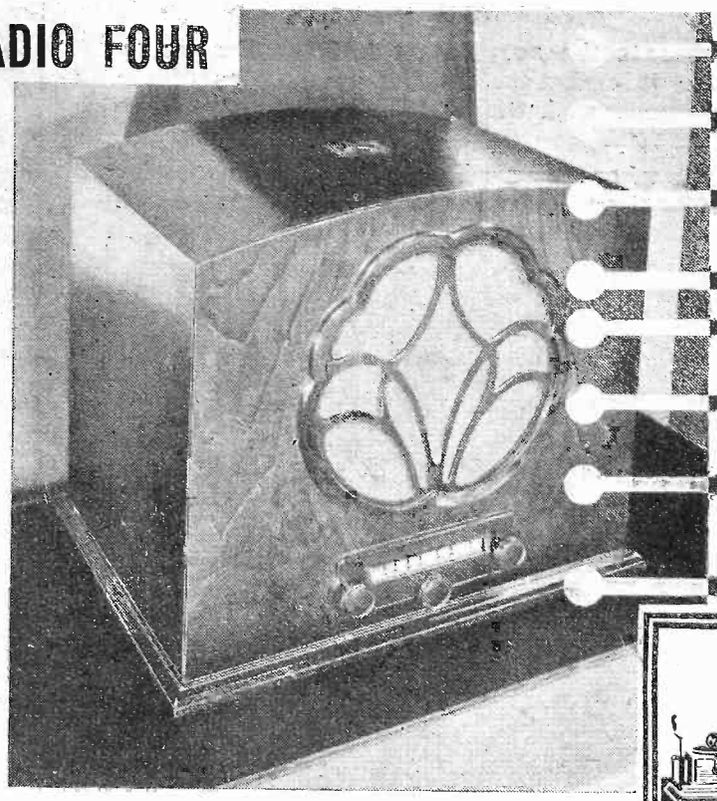
BY YOUR FIRESIDE...TRAVEL EUROPE...

WITH THE DE LUXE RADIO FOUR



Wide range

Moving-coil Speaker

Tone—"true-to-life"

All-electric

Simple to control

Sockets for gramophone pick-up

Cabinet—special selected walnut

Price 17 guineas—or by hire purchase

Yes, the concert-halls of Europe as if you were in them. The Paris Opera as a Paris Audience hears it. That, and no less, is the meaning of "true-to-life" tone. The De Luxe Radio Four will give you other things, of course. It will give you all the stations in its wide range. It will give them simply, surely, immediately. It will give you volume enough for your largest room. It will let you reduce that mass of sound to a whisper—control it smoothly as well as completely—reduce its strength without reducing its richness. It will feed additional loud-speakers or connect with your gramophone pick-up. But . . . this above all . . . it will give you realism of tone . . . because it is by "His Master's Voice."

. . . BUT IF YOU TRAVEL . . . . THEN

THE SUPERHET PORTABLE SIX

Superhet Selectivity

Great sensitivity

Low battery consumption

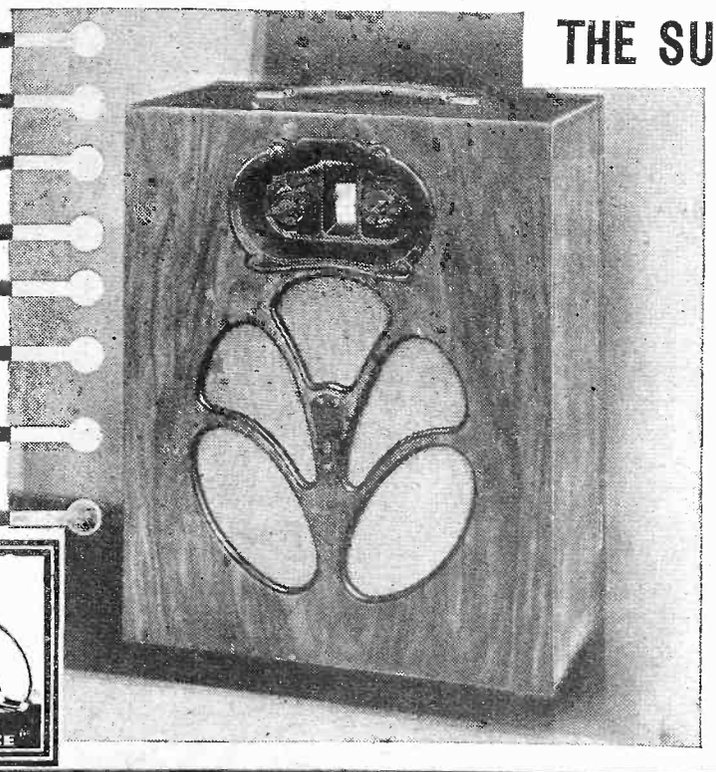
Local-distance switch

Easy to carry

Entirely self-contained

Figured walnut cabinet

Price 17 guineas—or by hire purchase



For here you have a "His Master's Voice" receiver you can take anywhere. And you have an event in radio. For "His Master's Voice" have succeeded in bringing superhet circuit—modern selectivity at its very keenest—into the compass of a portable. The result is a self-contained, easily carried receiver, which stands out, even among far larger receivers, because of its power to isolate a difficult station. A six-valve receiver with an amazingly wide range. Childishly simple to control. With single-knob tuning. With low battery consumption. And—really pleasant to look at! . . . Remember that this is a superhet portable; that Captain Robinson, wireless critic of the "Observer," has described it as "the finest portable on the market"; and that your dealer will let you hear it, without any obligation.

"His Master's Voice"

"True to Life" RADIO & RADIOGRAMS

The Gramophone Co., Ltd., London, W.1.

Prices do not apply in I.F.S

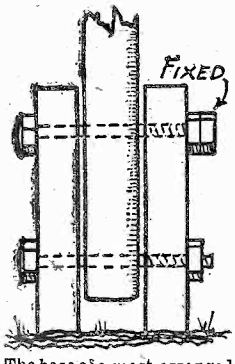
RADIO SIMPLIFIED

A PRACTICAL OUTLINE FOR BEGINNERS

Here is the second of a series of weekly supplements designed to provide readers with a practical and up-to-date knowledge of radio. As well as interesting the thousands of new readers who have taken up radio as a hobby in 1933, these articles will provide older readers with an excellent "reminder" of all phases of the most fascinating hobby in the world.

THE rapid advance made in radio development during the past three years or so has completely altered the situation as regards listeners' aerials.

The very long, high aerial, instead of being considered the ideal arrangement, is now generally inadvisable; and the arrangement which will give the best results from a 1933 wireless set, such as the "P.W." "Airsprite," is quite different from that generally recommended only two or three years ago.



The base of a mast arranged so that it may be lowered.

Here are the main and important differences to be noted in the design of up-to-date outdoor aerial equipment:

HEIGHT.—Instead of the 40 ft. or so, previously considered advisable, an average of about 25 ft. is usually sufficient.

LENGTH.—From the farthest insulator, along to the lead-in wire, and down this to the point of entry into the house should not measure more than about 60 ft., and much shorter aerials are often advisable.

NUMBER OF WIRES.—A single wire is nearly always to be preferred to two or more.

SHAPE.—The T wire, with down-lead from the centre, is old-fashioned. An inverted "L" with down-lead from the end is usually better.

DIRECTION.—Quite unimportant so far as directional reception is concerned, but should be at right angles to any adjacent telephone or telegraph lines.

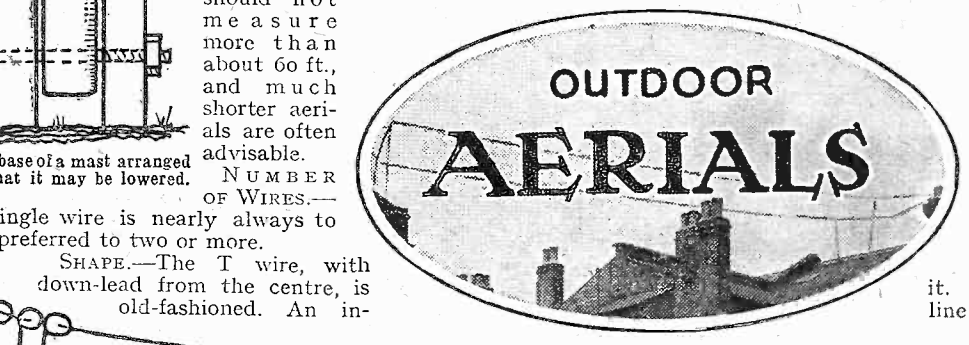
The reason that ideas about aerials have changed so considerably is twofold.

(a) The broadcasting stations, both home and foreign, are now using much greater power;

(b) The receiving sets are of enormously higher efficiency than formerly.

If, however, you are **not** using an up-to-date set, the old-fashioned long and high aerial will be quite suitable. For readers employing crystal detectors or low-powered simple valve sets, a 40-ft. high aerial, 70 or 80 ft. long, is probably as good an arrangement as it is possible to provide.

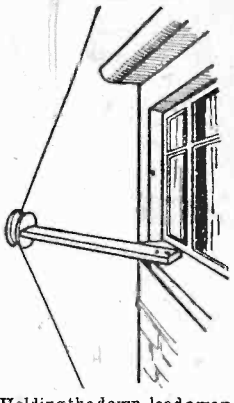
But with an up-to-date set employing a screened-grid S.G. valve, a shorter aerial is definitely better. It makes the tuning easier, and the modern set amplifies so efficiently that any slight loss of power is immaterial.



In a good aerial arrangement the lead-in wire runs up from the window, or other point of entry, well clear of all walls, roofs, gutter-pipes, etc. At the point where it passes round an insulator and becomes the flat top of the aerial, **the wire is not broken, but continues in one piece to the insulator at the far end of the aerial.**

The wire itself should be of low electrical resistance—the kind known as "bare 7/22 copper" is excellent. But in seaside districts, or in situations close to factory chimneys, an "enamelled" variety is preferable to the bare copper wire, because the insulating coating resists the attack of salt or soot.

Porcelain insulators of the "egg" or "reel" type are perfectly satisfactory, but all insulators require an overhaul every six months or so, which means that the aerial should be capable of being lowered easily.

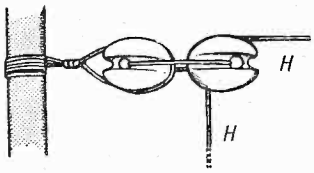

Holding the down-lead away from the metal gutter.

So, instead of trying to attach the aerial permanently to the top of the mast, a pulley or a large egg insulator should be fixed there, with a continuous wire halyard running through it. (Galvanised "clothes-line" wire makes an excellent halyard.) Fix the aerial insulator to this, and then when one side of the halyard is pulled, the aerial will be raised to the top of the mast.

Secure the double wires of the halyard to the mast near the ground until an overhaul is required, when it will be the work of only a moment to undo the loop and let the aerial down again.

Arranged in this way, an aerial need never go wrong or give trouble.

The porcelain type "egg" insulators require a soap and water wash every six months or so, except in sooty areas, where a coating of dirt may form on them much more quickly.

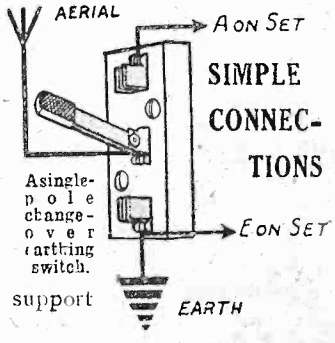


How insulators can be joined to give a pulley action.

Don't use a cheap pulley at the mast top, or the wire halyard may foul it. An egg insulator is better, and the small sketch in the centre of this page shows how the double halyard wire (H) which holds the aerial insulator can be passed through it without this danger.

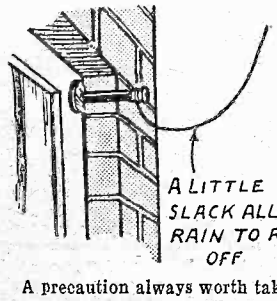
It pays to keep the lead-in or aerial well away from roofs and gutter-pipes.

An insulator can be mounted on a wooden support for this purpose.



A single-pole change-over earthing switch.

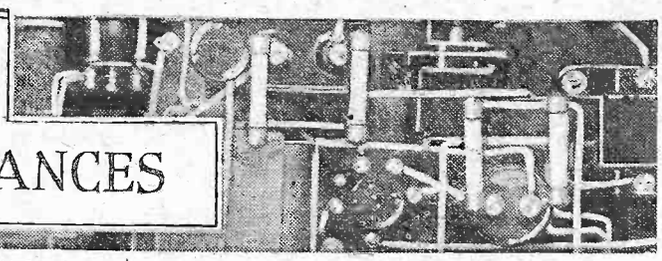
KEEPS LEAD-IN DRY



A precaution always worth taking.

Special Beginners' Supplement, Page 2.

ALL ABOUT RESISTANCES



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The word **megohm**, which is commonly employed in connection with grid leaks, is simply a convenient way of saying that the value of the resistance is one million ohms. Thus, a grid leak of 2 megohms has a value of two million ohms.

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One of the most important points in the manufacture of resistances is that of ensuring a perfectly constant value under all normal working conditions.

Many of the older types of resistances were definitely unreliable and were apt to cause crackling noises, due to variations in their value.

THEY RARELY GIVE TROUBLE

But much research has been carried out since those days, and the resistances now on the market rarely give trouble of this nature.

The wire employed in the wire-wound types of resistance is usually an alloy, such as nichrome, the characteristic of such alloys being a high resistance for a given length of wire, and little or no variation in value with change of temperature.

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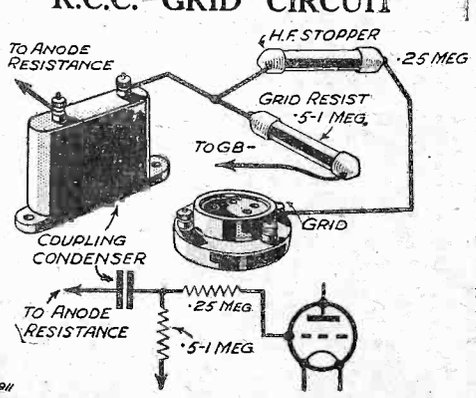

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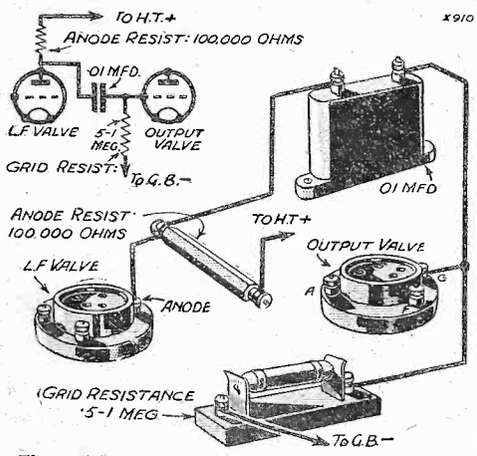

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When the internal resistance of the H.T. battery or unit reaches a certain value, there is a marked tendency for the receiver to become unstable, and that is why we have to decouple or separate the set from the H.T. supply.

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One convenient method of stopping these currents is to connect a ½ megohm resistance directly in the grid circuit of the first L.F. valve. There is a right and wrong way of doing this, and the correct method is shown in a pictorial diagram.

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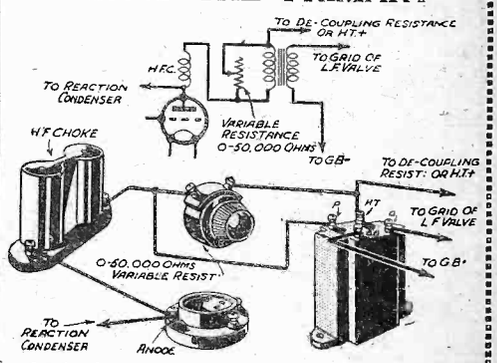

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Special Ba[illegible]ers' Supplement, Page 3

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Assuming a perfect insulation [illegible] between the two sets of plates, a condenser forms an

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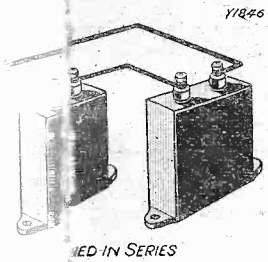

[illegible]rrier to the flow of [illegible]rts but permits alternating [illegible]nt effects to pass.

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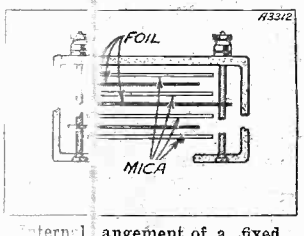


[illegible]ternal [illegible]angement of a fixed condenser. The black lines indicate the foil and the double lines the spaced insulation.

The L.F. currents, or in other words the broadcast speech and music, are constantly varying, and because of their alternating character "pass through" the condenser and work the loudspeaker.

Generally speaking, the fixed condensers used in radio can be divided into two main types. In the first group we have those whose capacities range from ·0001 mfd. to ·01 mfd., and in the second the larger sizes employed for by-passing and smoothing (·25 mfd. to about 4 mfd.).

The smaller capacities are usually constructed of copper foil and mica, each sheet of copper being separated from the next by a sheet of thin mica, the thickness of the mica being approximately equal to that of a visiting card.

The best ruby mica, such as is used in high-grade fixed condensers, is a remarkably good insulator, and therefore it is advisable to employ condensers with dielectrics of mica wherever the highest insulation is required.

Take for example the coupling condenser of an R.C. amplifying stage. Here is a case where faulty insulation between the two sets of condenser plates would be disastrous. The function of a coupling condenser in an R.C. circuit is to prevent any H.T. flowing from the anode circuit of the preceding valve on to the grid of the following valve.

If the insulation of the coupling condenser is in the smallest degree faulty, some of the H.T. volts may leak through and completely nullify the effect of the negative grid bias normally applied to the grid of the valve. Hence, serious distortion will occur and unfortunately it is by no means easy to locate a fault of this nature.

So it pays to play for safety here and to purchase a really good mica condenser rather than to "economise."

Good insulation is equally necessary in S.G. circuits of the parallel feed type, where a small fixed condenser is inserted between the anode of the S.G. valve and the H.F. tuning coil. In this case faulty insulation may short-circuit the H.T. supply to earth.

Fixed condensers larger than ·01 mfd. usually consist of tin foil interleaved with waxed paper, and many of them are now constructed non-inductively so that they can be used for by-passing H.F. currents. The use of mica as a dielectric in condensers of large capacity is ruled out on the score of expense.

The early Mansbridge type condensers were not always satisfactory on the high-frequency side of a circuit, the inductive effect due to their construction partially defeating the object of the condenser.

Large condensers are chiefly used for by-passing, and for smoothing in mains circuits. Suitable values for decoupling purposes are ·5 to 1 mfd. for S.G. valves, and 2 mfd. for L.F. valves.

When it is found that 2 mfd. is not quite large enough to stop "motor-boating" the capacity of the by-passing may, with advantage, be increased to 3 or even 4 mfd., the enhanced by-passing effect due to the additional capacity often remedying the trouble.

Perhaps one of the biggest problems is to know how to test a condenser in the absence of the proper testing equipment.

Those constructors who possess a voltmeter can test for a leak as follows:

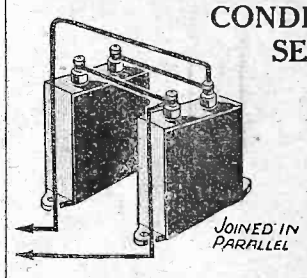
Join the positive socket of a high-tension battery to one side (+) of the meter and connect the other terminal of the voltmeter to one terminal of the condenser under test. The remaining terminal of the condenser is joined to negative on the H.T. battery.

If the condenser is a good one the needle of the voltmeter will move **momentarily** when the circuit is completed by connecting up the H.T. battery. This will recur when one of the battery wander plugs is removed and re-inserted.

If the needle shows a steady reading the condenser is "leaky."

On this page there are two diagrams illustrating the method of connecting two condensers in

—CONNECTING TWO CONDENSERS

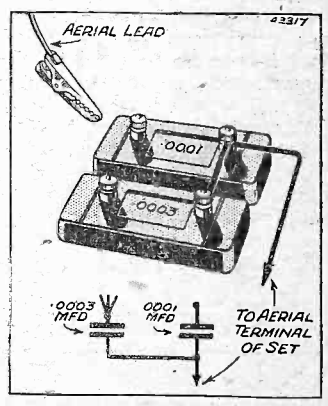


series or parallel. This is a convenient means of increasing or decreasing the total capacity should it be necessary to do so.

Suppose for instance we wish to increase the value of a 2-mfd. condenser to 3 mfd. This is quite straightforward and is readily achieved by obtaining a 1-mfd. condenser and connecting it in parallel with the existing 2 mfd. (See above.)

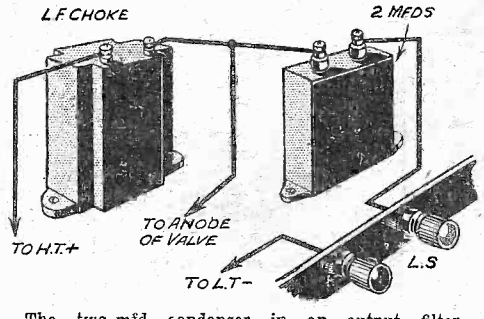
In the case of series connections the total capacity of two condensers of the same value when joined together in this way is exactly half of either one of them. Thus two ·0005-mfd. condensers joined in series will have a total capacity of ·00025 mfd.

Similarly, a pair of 2-mfd. condensers joined in series would have an effective capacity of only 1 mfd. If the same pair of condensers were then re-wired in parallel their effective capacity would be 4 mfds.



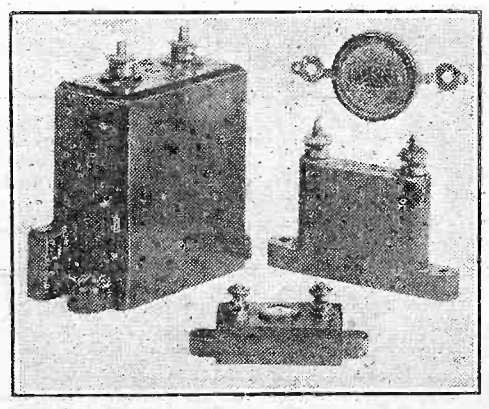
By varying the size of the series condenser in the aerial lead, the degree of selectivity obtainable can be altered.

STOPPING D.C.—PASSING A.C.



The two-mfd. condenser in an output filter circuit has a double duty to perform: It keeps the anode current out of the speaker, and allows the speech currents to flow.

SOME TYPES AND SHAPES



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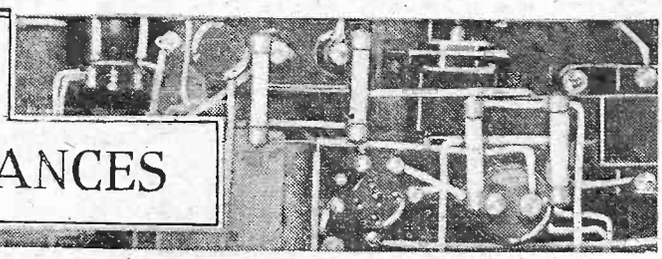
ALL ABOUT RESISTANCES



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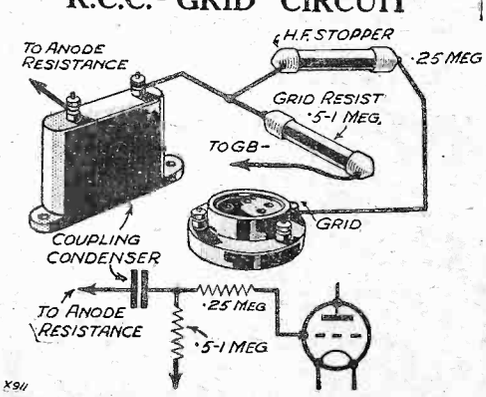

X911

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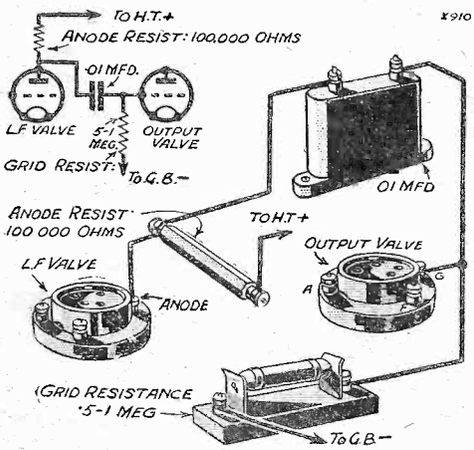

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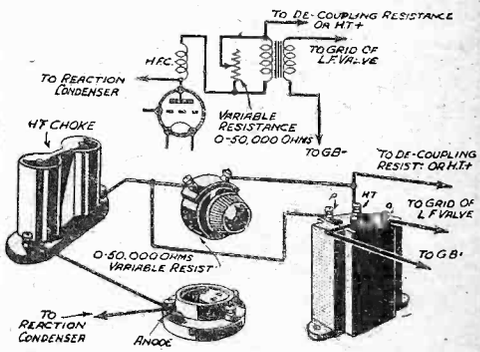

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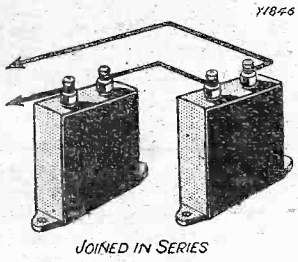
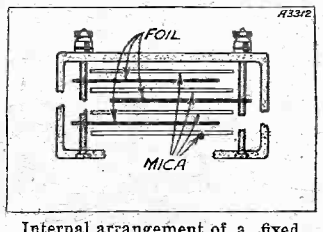


One example of this is the well-known output filter, consisting of a choke and 2-mfd. condenser. The steady current from the H.T. supply flows through the choke to the anode of the valve; it also tries to flow along the wire to the filter condenser, but is stopped directly it reaches the condenser terminal which is joined to the L.F. choke. Hence no H.T. passes through the loudspeaker windings.



Internal arrangement of a fixed condenser. The black lines indicate plates, and the double lines interspaced insulation.

The L.F. currents, or in other words the broadcast speech and music, are constantly varying, and because of their alternating character "pass through" the condenser and work the loudspeaker.

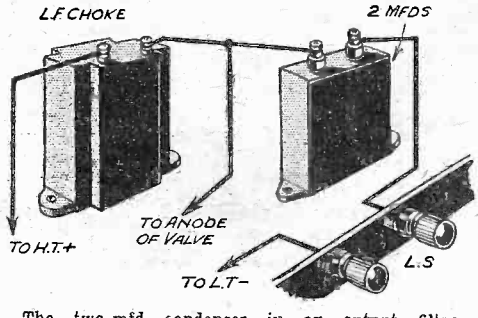
Generally speaking, the fixed condensers used in radio can be divided into two main types. In the first group we have those whose capacities range from ·0001 mfd. to ·01 mfd., and in the second the larger sizes employed for by-passing and smoothing (·25 mfd. to about 4 mfd.).

The smaller capacities are usually constructed of copper foil and mica, each sheet of copper being separated from the next by a sheet of thin mica, the thickness of the mica being approximately equal to that of a visiting card.

The best ruby mica, such as is used in high-grade fixed condensers, is a remarkably good insulator, and therefore it is advisable to employ condensers with dielectrics of mica wherever the highest insulation is required.

Take for example the coupling condenser of an R.C. amplifying stage. Here is a case where faulty insulation between the two sets of condenser plates would be disastrous. The function of a coupling condenser in an R.C. circuit is to prevent any H.T. flowing from the anode circuit of the preceding valve on to the grid of the following valve.

STOPPING D.C.—PASSING A.C.



The two-mfd. condenser in an output filter circuit has a double duty to perform: It keeps the anode current out of the speaker, and allows the speech currents to flow.

If the insulation of the coupling condenser is in the smallest degree faulty, some of the H.T. volts may leak through and completely nullify the effect of the negative grid bias normally applied to the grid of the valve. Hence, serious distortion will occur and unfortunately it is by no means easy to locate a fault of this nature.

So it pays to play for safety here and to purchase a really good mica condenser rather than to "economise."

Good insulation is equally necessary in S.G. circuits of the parallel feed type, where a small fixed condenser is inserted between the anode of the S.G. valve and the H.F. tuning coil. In this case faulty insulation may short-circuit the H.T. supply to earth.

Fixed condensers larger than ·01 mfd. usually consist of tin foil interleaved with waxed paper, and many of them are now constructed non-inductively so that they can be used for by-passing H.F. currents. The use of mica as a dielectric in condensers of large capacity is ruled out on the score of expense.

The early Mansbridge type condensers were not always satisfactory on the high-frequency side of a circuit, the inductive effect due to their construction partially defeating the object of the condenser.

Large condensers are chiefly used for by-passing, and for smoothing in mains circuits. Suitable values for decoupling purposes are ·5 to 1 mfd. for S.G. valves, and 2 mfd. for L.F. valves.

When it is found that 2 mfd. is not quite large enough to stop "motor-boating" the capacity of the by-passing may, with advantage, be increased to 3 or even 4 mfd., the enhanced by-passing effect due to the additional capacity often remedying the trouble.

Perhaps one of the biggest problems is to know how to test a condenser in the absence of the proper testing equipment.

Those constructors who possess a voltmeter can test for a leak as follows:

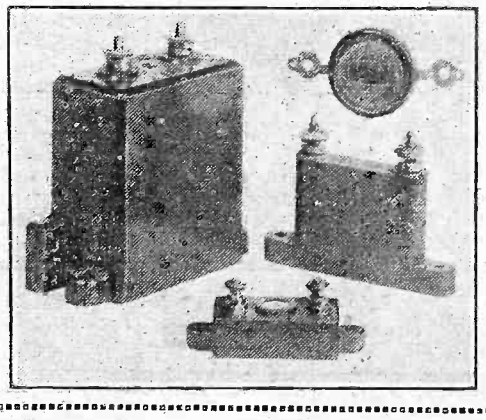
Join the positive socket of a high-tension battery to one side (+) of the meter and connect the other terminal of the voltmeter to one terminal of the condenser under test. The remaining terminal of the condenser is joined to negative on the H.T. battery.

If the condenser is a good one the needle of the voltmeter will move **momentarily** when the circuit is completed by connecting up the H.T. battery. This will recur when one of the battery wander plugs is removed and re-inserted.

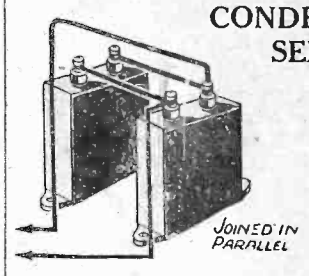
If the needle shows a steady reading the condenser is "leaky."

On this page there are two diagrams illustrating the method of connecting two condensers in series or parallel. This is a convenient means of increasing or decreasing the total capacity should it be necessary to do so.

SOME TYPES AND SHAPES



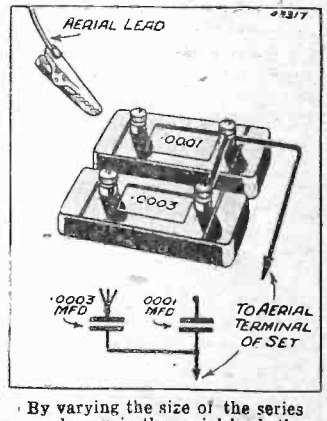
—CONNECTING TWO CONDENSERS



Suppose for instance we wish to increase the value of a 2-mfd. condenser to 3 mfd. This is quite straightforward and is readily achieved by obtaining a 1-mfd. condenser and connecting it in parallel with the existing 2 mfd. (See above.)

In the case of series connections the total capacity of two condensers of the same value when joined together in this way is exactly half of either one of them. Thus two ·0005-mfd. condensers joined in series will have a total capacity of ·00025 mfd.

Similarly, a pair of 2-mfd. condensers joined in series would have an effective capacity of only 1 mfd. If the same pair of condensers were then re-wired in parallel their effective capacity would be 4 mfds.



By varying the size of the series condenser in the aerial lead, the degree of selectivity obtainable can be altered.

Special Beginners' Supplement, Page 4.

YOUR EARTH CONNECTION

The importance of making a good ground contact is explained, and practical advice is given on the best way to obtain and maintain a connection which will ensure good and reliable results.

IN considering aerials we commented on the fact that modern requirements were often quite different from those of the past. This state of affairs does not apply to the earth connection.

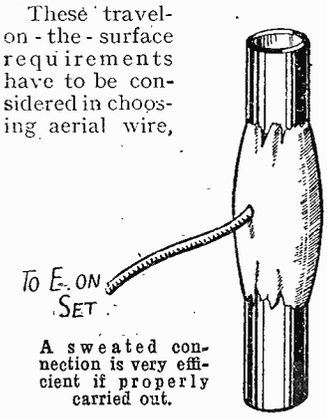
Its importance has always been considerable, and even with the most up-to-date sets the earth continues to be a great factor in successful reception.

LARGE SURFACE WIRE.

One prime requirement for the earth connection is to use a good conductive wire, such as copper.

The currents flowing in the earth wire travel principally on the surface of the conductor, and not inside it, so the wire should preferably be one of large surface area.

These travel-on-the-surface requirements have to be considered in choosing aerial wire,



A sweated connection is very efficient if properly carried out.

also, and in practice we generally find that aerial wire is the best possible stuff to use for the earth lead.

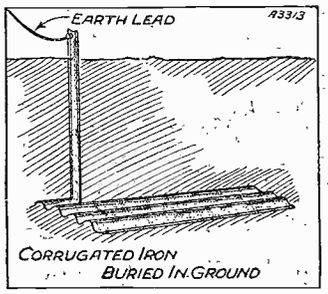
NO BREAKS.

Obviously there should be as few breaks in it as possible; in fact, like the aerial, it is never really satisfactory unless it is one continuous and unbroken lead from set's terminal to the termination, at the earthing point.

There is no need to insulate the ordinary earth wire. It is always an advantage to keep it short, so generally an earth-plate buried in damp soil under the lead-in is quite satisfactory.

The area of the earth plate should be as large as practicable

PLATE EARTH



—"biscuit-tin earths" are too small to be really efficient, but, on the other hand, the buried sheet of galvanised iron roofing, super-excellent though it undoubtedly is may prove too elaborate for your needs.

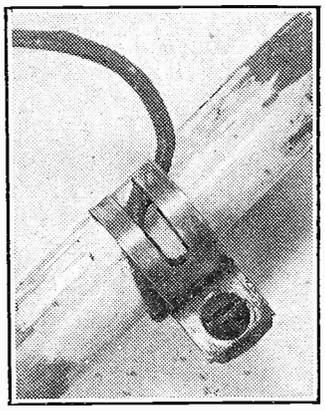
One advantage of a big metal plate is that a strip of it can be bent up to form the connecting-point above ground. This is a great gain. **Even a soldered connection underground develops poor contact in time, and being inaccessible is often an unsuspected cause of poor long-distance reception.**

When trying to keep the earth lead short, take care not to bury the earth-plate too close to the wall of the house. It should generally be at least 3 or 4 feet away, where the ground keeps continually moist.

A good suggestion for shortening the earth-lead is to run it straight down from the set through the floor-boards.

Often there is a ventilating grating in the outer wall of the house, and a stiff wire poked through this will pick up the earth-lead, as it hangs down from the floor boards. It can then be pulled through the grating, and so run out to the earth plate by an almost direct route.

A REMINDER



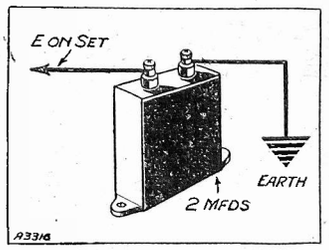
The water-pipe should be thoroughly cleaned before the earth-clip is fixed.

Quite recently the percolative or "chemical earth" (e.g. the "Filt") has achieved great popularity, its advantages being very marked in situations where the ground is apt to get dry and hard. A secondary advantage is that of ease of installation. While it is very quickly fitted, the lasting powers of this type of earth have proved to be very satisfactory indeed.

Failing an outdoor earth, the water-pipe connection is generally best. Try to get the clip attached to the rising main, and make sure that this is sand-papered clean and bright before the clip is tightened. Good firm joints are essential throughout if the set's contact with earth is to be and to remain good.

ROOF EARTHING.

In flats, etc., the water-pipe earth is particularly useful, but occasionally a large lead roof gives even better results. Care must be taken in connecting to this, as a hole without a lead under-coat will allow damp to penetrate, so connections should be made to the edge or where there is a double layer of the lead.



A series earth condenser for safety when using D.C. mains.

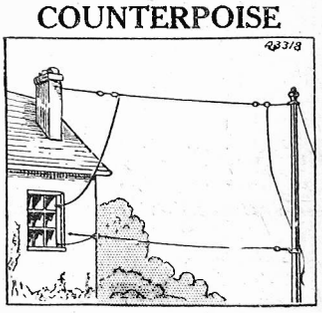
Where an earth connection seems impracticable altogether the counterpoise earth may be used. It consists of a second aerial erected directly below the true aerial, if possible, as shown in the sketch below.

FOR SAFETY'S SAKE.

It must be properly installed, just like the aerial itself, and its insulated lead-in then goes to the earth terminal on the set.

For safety's sake it is advisable to keep the aerial earthed when not in use, and especially during thundery periods. (Lightning causes loud crashes in the loudspeaker, and on the approach of a storm listening should always be abandoned, and the aerial earthed by a switch fitted out of doors—until the storm has passed.)

COUNTERPOISE



DIAL DILEMMAS

Why do some dials read up to 100 deg. and some to 180 deg.?

There is no special significance in the dial-readings, as these only form a convenient scale that enables the condenser to be re-set to any desired position.

But mechanically and in practice the dial is very important. It must be clearly divided, and boldly marked if tuning is to be easy.

Such an easily-read dial is often called an "open-scale" dial. If it rotates with the condenser spindle behind an opening (usually called the "escutcheon plate" or "window") a fine line in front of it gives great accuracy of tuning. For obvious reasons this is often referred to as a "hair-line."

For mains-driven sets constant illumination is generally provided by a "pilot" or "dial" light. (It is best placed behind a dial, which is of celluloid or similar material, but can give good results from the front of it, if well arranged.)

Battery sets may be fitted with dial lights if desired, but it is then generally advisable to fit an on-off switch in the wiring, to economise current when there is no tuning alternation to be made.

NEXT WEEK:

The Special Beginners' Supplement next week will deal with Indoor Aerials, Insulation, H.T. Voltages, Valve Tips and Set Construction.

Build your "AIRSPRITE" with the GUARANTEED KIT

POPULAR WIRELESS

"With regard to the Ready Radio 'P.W.' 'Airsprite' Kit which you are offering to the public, I am pleased to inform you that it meets with the requirements of my Technical Staff and I therefore have pleasure in giving the Kit the official approval of this journal."

(Signed) NORMAN EDWARDS.

G. P. KENDALL, B.Sc.

Every Ready Radio Kit is tested, passed and packed under the personal supervision of Mr. G. P. Kendall, B.Sc. It contains only the components approved by him, and when you buy a Ready Radio Kit from your wireless dealer you are assured that it is exactly the same as the one approved by the designers. Note particularly that Mr. Kendall insisted on the inclusion of Colvern Coils and Varley Transformer for guaranteed results.

REGISTERED USERS SCHEME

Every purchaser of a Ready Radio Kit is entitled to be entered as a Registered User. You are then entitled to our complete Service which is your safeguard and guarantee of satisfaction. Only purchasers of Ready Radio Kits are entitled to this unique service.

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Ready Radio Kits represent the highest possible efficiency at the lowest possible price. Ready Radio S.T. 300, S.T. 400 and other Kits have become famous and have contributed tremendously to the success of the Sets. You can be sure of equal satisfaction from your Ready Radio "Airsprite."

Everything you need down to the last screw to build your "Airsprite," including panel ready cut and drilled, baseboard, Jiffilinx for wiring and all screws, nuts, etc.,

With full instructions and full-size Official Blue Print FREE.

£4.9.6

or 12 monthly payments of 9/-

WARNING. Constructors should be on their guard against so-called complete Kits, which are neither complete nor to specification.

A Ready Radio Guaranteed Kit is your safeguard of good results. Ready Radio Kits consist only of components which have been tested and passed in the Ready Radio Laboratories, under the personal supervision of Mr. G. P. Kendall, B.Sc., and are packed in special display cartons, so that you know the Kit you buy is absolutely complete and exactly as it left Ready Radio.

Only if your Kit is packed in the special carton is it a genuine GUARANTEED AND APPROVED READY RADIO KIT. Refuse all substitutes.

Ready Radio Kits can be seen in all leading Radio Shops throughout the country. In case of difficulty or delay owing to the large demands order direct from :

READY RADIO, LTD.,
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BLACKHEATH, S.E.3.

SEE ALSO PAGES 1137 and 1138.

READY RADIO

A FILTER FOR THE "AIRSPRITE"

Details of the simple way in which a really worth-while refinement may be added to a set which already has many fine features.

A MILLIAMP or two more on the H.T. current of a set does not matter much while it is working, but if that extra milliamp is being drawn from the batteries all the time, right through the day and then right through the night, week after week, it will soon run the high-tension battery down.

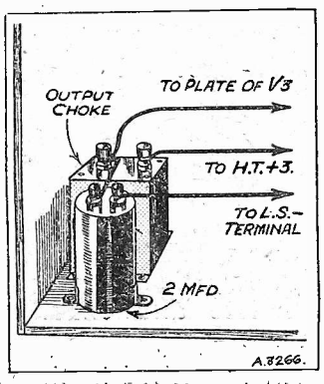
That is the chief reason why it is so desirable to use a filter output circuit with a battery set when extension leads, long or short, are used to work loudspeakers situated away from the set.

Only Two Components.

It requires great care to arrange such extension wires so that their insulation is perfect, while if a filter is employed, practically any old wire and staples will serve the purpose. A second reason concerns the drop of voltage that may take place in the wire, and volts on the output valve being all too precious, one can ill afford to lose even a few.

So you see, an output filter is a refinement that is well worth adding to any really good receiver, and that is the reason why we are giving details for fitting one to the "P.W." Battery Model "Airsprite."

You will need just two extra components, a 2-mfd. fixed condenser of the ordinary paper type and a good output choke. The desirable features of the output choke are high inductance and low direct-current resistance, and a good example of the type necessary is the Bulgin L.F.16.

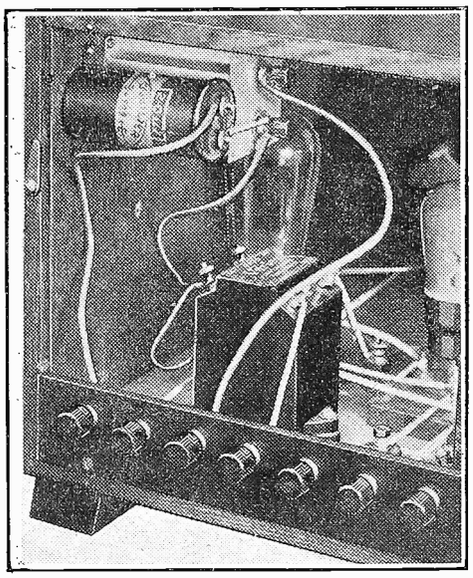


What the filter does is to tend to keep the D.C. current out of the extension leads and the fluctuating speech currents out of the H.T. battery. That is why the choke has to have a high impedance to the speech currents and a low one to direct current. With the fixed condenser the opposite applies, it won't let the D.C. pass but welcomes the fluctuating currents.

It is not convenient to fix the two new components to the baseboard of the "Airsprite" so they should be screwed to the side of the cabinet. The photograph will make their exact position quite clear.

So that these two components may be quickly disconnected from the remainder of the set when it is desired to remove it from the cabinet, it is a good idea to wire them up with flexible leads.

FIXED TO THE CABINET



Only two extra components are required, an output choke and a 2-mfd. fixed condenser. These are connected as in the diagrams, and their positions are shown by the photograph.

Point-to-Point Connections.

Assuming the receiver has been wired up complete without the filter circuit the following are the alterations that have to be made to the wiring.

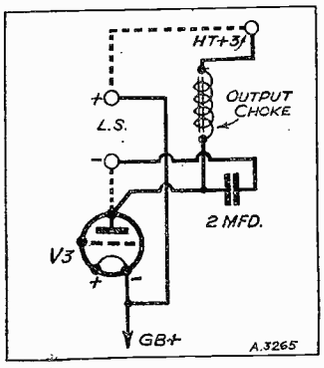
Remove lead from Plate of V3 valve holder to L.S. negative terminal.

Remove lead from H.T. positive 3 to L.S. positive terminal.

Connect plate of V3 valve holder to one terminal of output choke and one terminal of 2-mfd. fixed condenser.

Connect remaining terminal of output choke to H.T. positive 3.

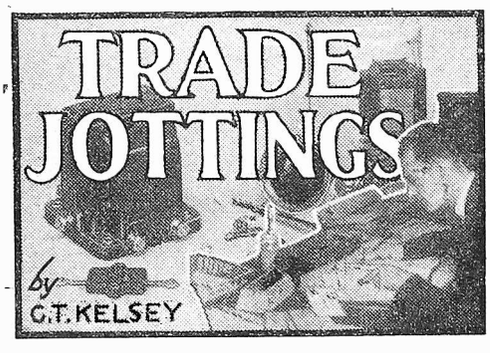
Connect remaining terminal of fixed condenser to L.S. negative terminal.



Connect L.S. positive terminal to Neg. Fil. terminal of V3.

That completes the addition and the loudspeaker may be connected up in the usual way.

TRADE JOTTINGS



I LEARN with considerable interest that the makers of that very famous aerial wire, "Superial," have just reached the astonishing figure of 7,000,000! I am sure that the Post Office officials will be relieved to know that the discrepancy between that figure and the number of licensed listeners in this country (5,000,000) is accounted for not by "pirates," but by export business!

All the same, it's a very remarkable achievement, and I feel that I cannot let the occasion pass without a word of congratulation to the makers.

In passing, it seems appropriate to mention that Electron "Superial" is the ideal wire for indoor aerials, and it is interesting to note that it carries with it a £100 free lightning insurance.

Ferranti Constructional Power Units.

Any reader of these notes who is contemplating the construction of a mains unit has my strongest recommendations first to obtain a copy of the Ferranti book entitled "The Construction of Power Units."

Technically, it is a superb production; and from the point of view of the enthusiast who knows little or nothing about the subject, the constructional details leave nothing to be desired.

The book contains full constructional details for almost every conceivable type of A.C. unit—eight of them in all—and a D.C. output curve is given in each case.

Applications for copies of the book should be addressed to Messrs. Ferranti, Ltd., Hollinwood, Lancashire. The price is 4½d. post free.

A New W.B. Line.

Readers will be interested to learn that deliveries of the new "Mansfield Junior Cabinet Speaker" upon which there has been such a rush can now be made from stock.

This new W.B. production incorporates one of their P.M.5 speakers, and it is built up around the new Mansfield magnetic system. Considering that the cabinet is a well-finished oak model, the price of 39s. 6d. appeals to me as being extremely modest.

The reputation of the W.B. series of permanent-magnet speakers is such that reference to the technical aspects seems quite unnecessary.

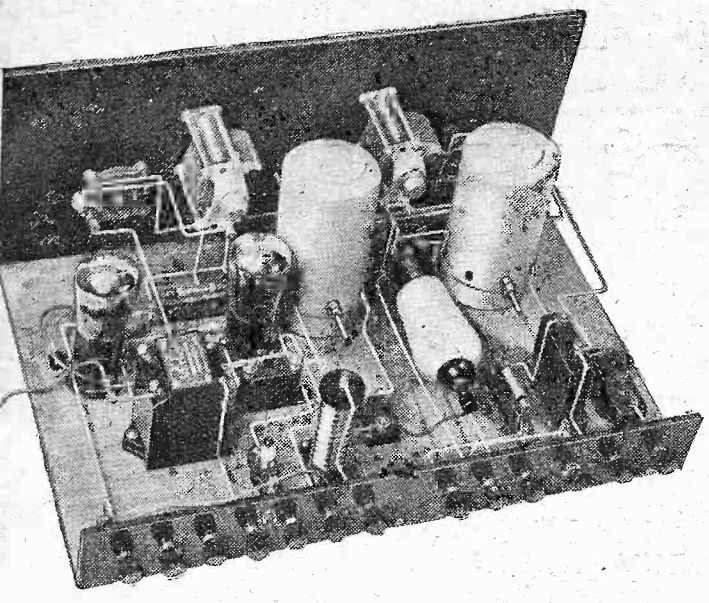
A Scotch Story?

There would not appear to be much scope for humorous incidents in the sales organisation of a gramophone record company, yet one good lady appears to have been responsible for quite a hearty outburst of laughter at the head office of the Gramophone Company.

It appears that the lady in question 'phoned up first of all to acquaint the H.M.V. people with the fact that she had purchased one of their twelve-inch records which was faulty. After close cross questioning, it transpired that the "fault" was nothing more than an inch of space at the end of the record.

In the usual courteous manner, it was explained to her that the piece recorded had been too long for a ten-inch disc, and that in consequence it had been put on a twelve-inch. One might imagine that at this juncture the incident closed, but in point of fact it didn't! No, after expressing regrets that in these days of economy the remaining inch had not been filled up with music, enquired whether she could return the record for this to be done!

(*Continued on page* 1166.)



This is how your "Airsprite" will look when built with a Ready Radio Kit.

.....

MAINS KIT

The Ready Radio Mains Kit for the "Airsprite" contains everything you need to build the set exactly as described by the designer. The components are specially chosen to make construction as simple as possible, and to give the highest possible efficiency and reliability.

£10.17.6

or 12 monthly payments of 21/9.

For full details of the Battery model see pages 1135 and 1138.

Insist on the Kit with the GUARANTEED PERFORMANCE

In order that you may have the highest sensitivity Mr. G. P. Kendall, B.Sc., has chosen Colvern coils for the Ready Radio Kit. He also insisted on the use of the Varley Transformer for efficient tone correction. Make sure that your Kit contains these essential components by insisting on Ready Radio.

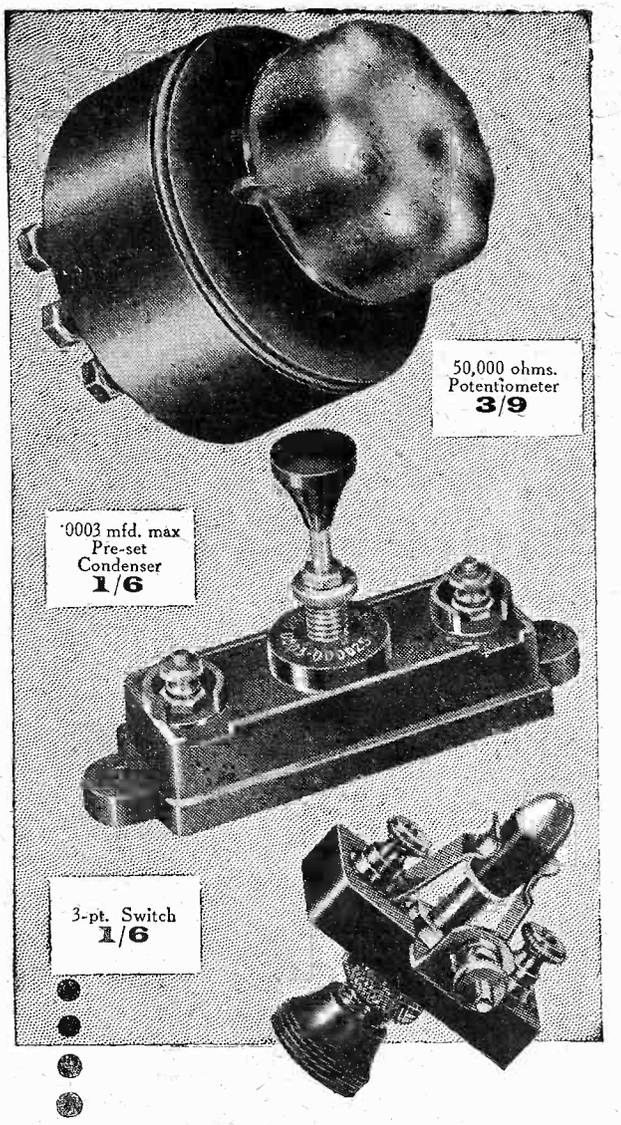
Ready Radio Kit—absolutely complete

£4.9.6

or 12 monthly payments of 9/-

Genuine Ready Radio "Airsprite" Kits are packed in special display cartons so that you can be sure every component is in the same perfect condition as when it was tested under the personal supervision of Mr. G. P. Kendall, B.Sc.

READY RADIO



Specially Chosen COMPONENTS for your "Airsprite"

All the components listed below have been specially chosen for use in the Ready Radio "Airsprite" Kit, and possess special features which assure you maximum efficiency. Do not accept substitutes—only Ready Radio Components can give you the efficiency you want—the best.

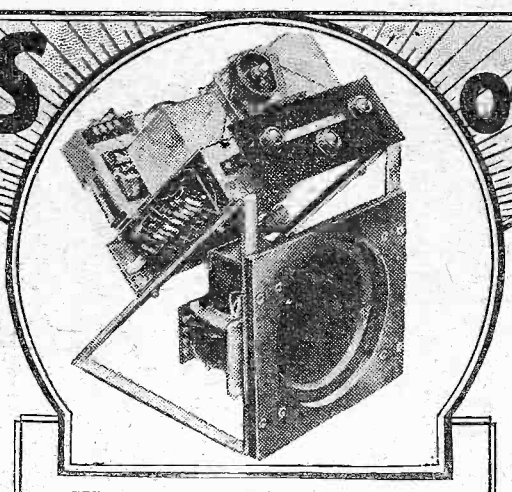
Ready Radio are the largest Distributors and Manufacturers of Kits in the World and are recognised as Official Distributors for all "Popular Wireless" and other Press sets. The large Ready Radio Factory is specially equipped for testing all components and all Kits and components carry the personal guarantee of Mr. G. P. Kendall, B.Sc.

For details of Ready Radio "Airsprite" see pages 1135 and 1137.

Ready Radio 50,000-ohm Potentiometer	3/9
Ready Radio 3-pt. Switch ..	1/6
Ready Radio Pre-set Condenser	1/6
Ready Radio Valve Holders, each	6d.
Ready Radio S.G. Valve Holder	1/-
Ready Radio S.G. Choke ..	5/6
Ready Radio Reaction Choke	1/6
Ready Radio Thermium Resistances : 1,000 and 100,000 ohms each	10d.
Ready Radio Thermium Grid Leak (2 meg.)	10d
Ready Radio Grid Leak Holder	6d.
Ready Radio Fuse and Holder each	6d.

READY RADIO

RECEIVERS of RENOWN



THE MARCONIPHONE MODEL "254" RADIOGRAM

REAL enjoyment in the listening sense comes from hearing something you like. It may be a particular tune or perhaps some favourite artiste, yet for its duration, even with the poorest types of sets, you are apt to become entirely oblivious of the radio link simply because your attention is riveted on that something which is pleasing you.

That is where broadcasting is apt to fall short of the mark, for once an item is finished, well, it is finished for all time—at least, until such times as the B.B.C. feel disposed once again to include it in a programme.

But need it be finished ?

Particularly Good.

Few are the tunes, or for that matter the artistes, that are not available these days on gramophone records, and if the broadcast has given you *real* enjoyment, well, why let it end at that ?

It will be obvious that we are working round to an introduction for a radiogram review. Quite true, we are, but only because the sentiment expressed happens to be particularly true and because the radiogram in question happens to be particularly good. At least, it doesn't just *happen* to be good, it is good because the prestige of the Marconiphone Co. does not allow of anything else.

Is not this distant-station complex a little overdone ? We would be the last to deny the tremendous advantages of owning a set that will sweep round the continent with the minimum amount of trouble and inconvenience, but what percentage of your listening time do *you* spend overseas ? Do you not more often take what is offered from the local stations, with a particular relish for the high-lights which give you so much enjoyment ? Perhaps Gillie Potter, perhaps the Wireless Military Band, perhaps Roy Fox ?

Your Own Programmes.

With the likes and dislikes characteristic of human nature, home entertainment can never be complete unless you have the wherewithal occasionally to make your own programmes, to listen to that which pleases you, and conscious all the time of the fact that when it is finished you are not dependent upon the powers that be at Broadcasting House for a repetition. We would even go so far as to say that only under these conditions can home entertainment be complete.

It should not be imagined for one moment that we are attempting in any way to decry the advantages of having a set with which you are not tied to the local stations. To many of us, Sundays would be incomplete without a "dose" of Radio Paris, and besides which many of the programmes put out from overseas are definitely worth while.

Delightful Experience.

So that, in order of merit, radio, for its news bulletins, for its endless variety, for all the fascination derived from searching for distant stations, is definitely first and foremost. It is only because in the model under review the radio side is so very excellent that we have attempted to expound its application as a true-to-life gramophone—an application which, frankly, is often underrated.

These impressions are recorded while we are yet fresh from the delightful experience of testing the Marconiphone model "254." On the radio side, it is representative of all that is good in modern practice, and as a gramophone, it is like having the artistes in your own home. Could more be said ?

Working down logically to finer details, the "254" is the essence of simplicity. One's first impression, which is fully borne out under practical test conditions, is that everything is just where it ought to be, and that nothing has been included as a control except where it is absolutely necessary.

Simplicity the Keynote.

The master mechanism which brings the set to life in one quarter of its travel is responsible also for wave-changing. With little or no effort this same control effects the complete change-over from radio to record. A four-way switch, simple, yet completely effective, and its every movement is unmistakably recorded in the illuminated window.

Here, again, simplicity is the keynote of the arrangements, for it is in this illuminated window that the stations are calibrated in actual wavelengths. You just turn the main tuning control, which is located centrally, until the pointer is at the wavelength of the station you desire to hear, and that is all there is to it ! You may want to increase or to reduce volume, but that simply means an adjustment of the knob on the left.

The instrument is designed for use with an external aerial and earth system, under which conditions there must surely be few stations in Europe that are outside its range. Frankly, we counted them in our tests until we became tired of counting. But numbers of stations is a very negative sort of argument these days, in any case, and counts for little or nothing.

Complete Home Entertainer.

What does really matter is strength, quality, and freedom from interference of those stations that are received, and in these essential respects, the "254" certainly leaves nothing to be desired.

Even when using a mains aerial, for which application the "254" is adapted, the range is by no means limited to the local stations, which only goes to show the high sensitivity of the instrument.

Summed up, the "254" is as near to being the complete home entertainer as it is possible under modern conditions. It is a credit to the designers, and our tests have revealed that the progress for which the name of Marconiphone has become famous is fully maintained in this, one of their latest achievements.

AN OUTSTANDING RECEIVER

TABULATED DATA FOR—

GENERAL DESCRIPTION.—All-electric Radiogram for A.C. mains.

NUMBER OF VALVES.—Four : screened-grid, detector, pentode and rectifier.

CONTROLS.—Single dial ganged tuning (central knob) ; volume control (left) ; four-way switch giving "medium waves," "long waves," "gramophone" and "off" (right). Gramophone motor "stop" and "start" is automatic.

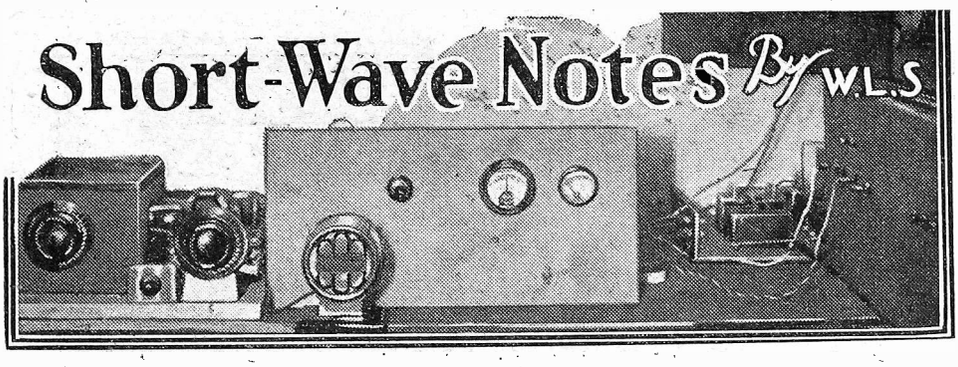
—THE TECHNICALLY MINDED

SPECIAL FEATURES.—High sensitivity combined with adequate selectivity ; illuminated dial calibrated in wavelengths ; extreme simplicity of control ; "hum adjuster" ; aerial selector switch for adjusting degree of selectivity ; provision for external speaker.

PRICE.—32 guineas.

MAKERS.—THE MARCONIPHONE CO., LTD., 210-212, TOTTENHAM COURT ROAD, LONDON, W.1.

Short-Wave Notes By W.L.S



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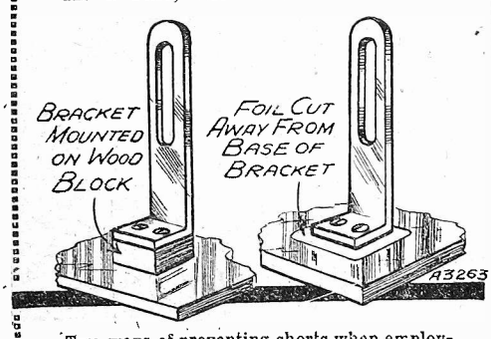
As a rule, the brackets are of the slotted variety with all-metal construction, so that if the foot of the bracket is mounted on the foil it will make contact between the foil and the spindle of the volume control. This might not matter if the spindle of the component was not connected to the slider inside, but this so often being the case it is necessary either to mount the bracket on a piece of wood or to cut the foil away round the foot.



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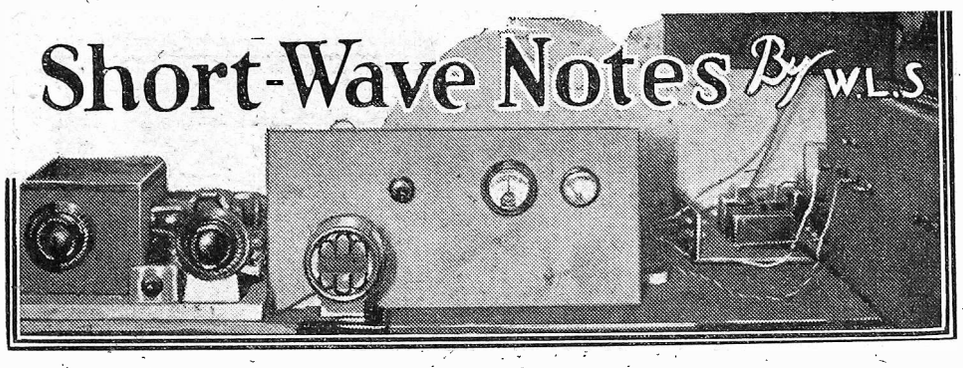

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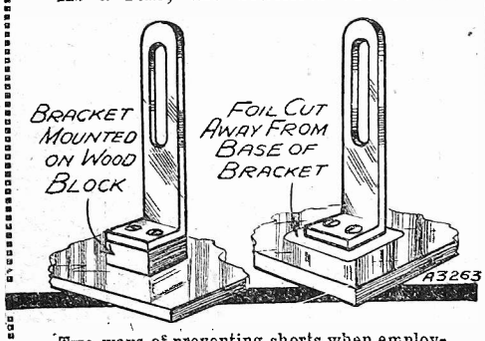

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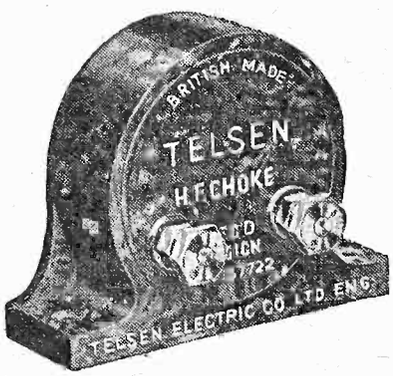
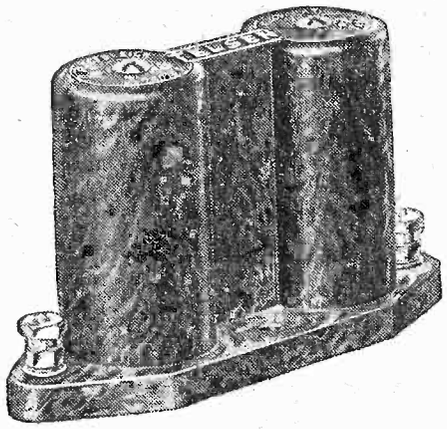
TELSEN H.F. CHOKES and DIFFERENTIAL, REACTION and TUNING CONDENSERS



TELSEN STANDARD H.F. CHOKE

Covers the entire broadcast band, yet occupies only the minimum of baseboard space. With an inductance of 150,000 microhenrys, a resistance of 400 ohms, and an extremely low self-capacity, it is highly suitable for use in reaction circuits, and is constantly being specified in this respect by the leading set designers - - **2/-**



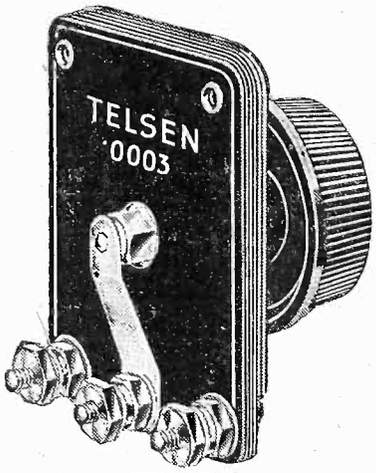
TELSEN BINOCULAR H.F. CHOKE

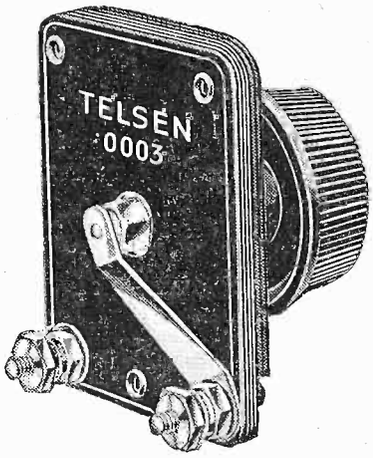
Where the highest efficiency is the primary requisite, the Telsen Binocular H.F. Choke is the inevitable choice. It has a high inductance of 250,000 microhenrys, with a very low self-capacity and a practically negligible external field (due to its binocular formation). It is definitely the essential choke where high class circuits are concerned - - - - **5/-**

TELSEN DIFFERENTIAL CONDENSERS

Improved type of exceptionally rigid construction. The rotor vanes are keyed to the spindle and fitted with definite stops. A strong nickel silver contact makes connection to the rotor, a positive connection being made to the stator vanes. Supplied complete with knob.

In capacities .0003 .00015 and .0001 - - - - **2/6**





TELSEN REACTION CONDENSERS

Embodying every improvement and refinement indicated by the latest research. The vanes are interleaved with the finest solid dielectric, the construction throughout being of great rigidity and exceptional precision. Supplied complete with knob.

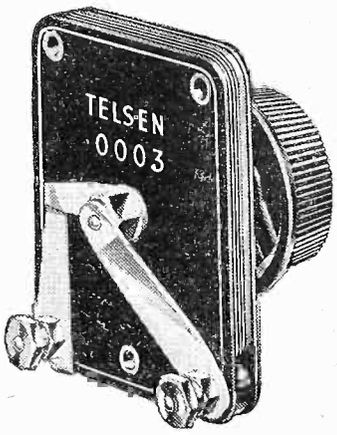
In capacities .0003 .00015 and .0001 **2/-**

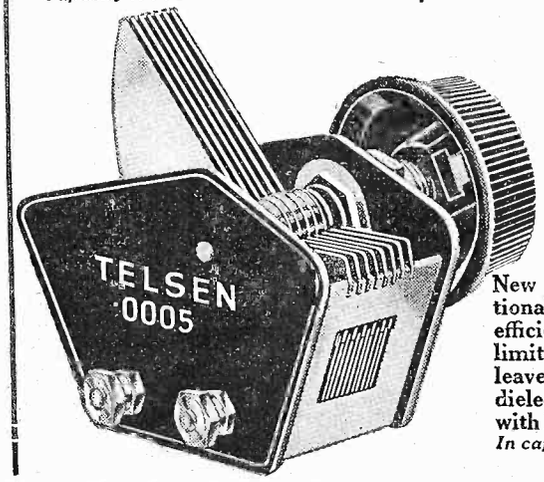
In capacities .00075 and .0005 - **2/6**

TELSEN AERIAL SERIES CONDENSER

The ideal volume and selectivity control, solidly constructed, with very low minimum capacity. The externally keyed switch-arm when rotated to a maximum position, connects with a contact on the fixed vanes, thus short-circuiting the condenser for maximum volume. Supplied complete with knob.

Capacity .0003 - - - **2/3**





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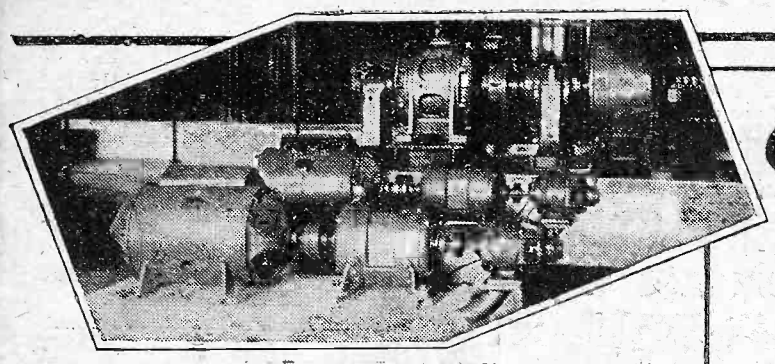
New design of great rigidity and exceptional compactness, ensuring the utmost efficiency in use even where space is very limited. The well-braced vanes are interleaved with a minimum of the finest solid dielectric. Supplied complete with knob.

In capacities .0005 and .0003 - **2/6**

TELSEN

RADIO COMPONENTS FOR LASTING EFFICIENCY

ANNOUNCEMENT OF THE TELSEN ELECTRIC COMPANY, LIMITED, ASTON, BIRMINGHAM



The NOISE LEVEL

All about the limiting factor in long-distance reception.

By K. P. HUNT.

A FRIEND of mine recently constructed with more than ordinary care a six-valve super-heterodyne of modern design. I heard the set a few days ago and considered the performance normal, but its owner was greatly disappointed.

"It's not all that much better than my old straight four-valver," he said, "on which I've logged over fifty stations. I thought when I had a really powerful and ultra-selective receiver I'd be able to get practically anything."

My friend is typical of a large number of listeners to-day who think that the power of a distant station and the amplification factor of their set are the only two items of any importance governing its reception.

Theoretically, we can calculate the field strength of any station anywhere. Theoretically, any high-power station can be heard anywhere in the world with a receiver of sufficient sensitivity and selectivity. But in practice, as you go on increasing the amplification you ultimately arrive at a point where the general background of multitudinous sounds or mush is amplified to such an extent that really distant stations cannot be distinguished.

Practical Demonstration.

The limitations imposed by this bottom layer of noise can be realised by anyone having, say, a good three-valver if he will spend half an hour listening with headphones. When the reaction control is adjusted to the most sensitive point a certain background of noise will be heard. You cannot tune it out, and often, if you listen carefully, you can catch glimpses of a far-distant station just below the noise level.

If there were less noise or a dead quiet background the signal, though extremely weak, would be understandable. But if the number of valves in the set were trebled it is unlikely that any of those just indistinguishable stations would be much closer.

Adding valves, especially after the detector, merely increases the noise as well as the signal. The general noise level then becomes a continuous roar which drowns everything else.

Where Amplification Fails.

Unless the required signal is strong enough to give a voltage across the aerial tuning coil definitely distinct from that due to the other million and one oscillations chasing up and down the aerial, no amount of H.F. or L.F. amplification can make it clearly audible. In other words, if a signal is not above the general noise level, a three-valver or a nine-valver super-het. is equally powerless to rescue it.

Tackling Receiver Noise.

The important point, then, in DX work, assuming that the receiver is sufficiently sensitive, is the ratio of signal strength to this noise level. Success in long-distance reception depends largely upon the extent to which that ratio can be increased.

What are the ingredients that go to make up this noise? And what can we do to lessen the proportion of any of them?

RECEIVER NOISE AND "LOCAL" NOISE ARE THE TWO INGREDIENTS WHICH MAKE UP THAT BACKGROUND OF RECEPTION. READ WHAT CAN BE DONE ABOUT IT.

Receiver noise should be tackled first because it is not often recognised or admitted, and yet is more directly under our control than the other two items. If you disconnect the aerial from a single-valve set and listen with headphones you can tell unmistakably if the set is switched on or off.

There is a certain background which cannot be described, but it is there. Increase the reaction a little and a peculiar "liveliness" becomes definitely present although no signals are being received.

When amplified in a set having several stages, this receiver noise makes a substantial contribution to the general noise. Good quality condensers, coils, valve holders, good insulation, a liberally-sized reservoir condenser across the H.T. battery, not to forget a frequent dusting of the vital parts of the set, are the well-known precautions, but there is one particular component it is always well to suspect—the grid leak.

On local or medium-distance reception the ratio of signal strength to noise is so great that no attention is directed to a grid leak unless it is very noisy. But on DX work great improvement is often obtained by changing a leak you have no particular reason to question.

Receiver noises in general appear to arise from minute disintegrations of the valve filaments, and before the detector these are not of much consequence as the inter-valve coupling cannot pass them on. In the detector valve or after, however, they get the full benefit of the L.F. amplification of the set.

Suggested Cures.

By amplifying principally at high frequency, using anode-bend detection and only one L.F. stage, the proportion of receiver noise to signals is reduced to a considerable extent.

Local noise, the second ingredient in the general noise level, is practically non-existent in the country, but in towns is often really unbearable. In many parts of London, for instance, a simple two-valver on a short indoor aerial bring in an almost continuous loud background of local noise; a hot-pot of whirrings, crackling, grinding, humming and clicks caused by motors, trams, lifts and the other innumerable electric circuits all around.

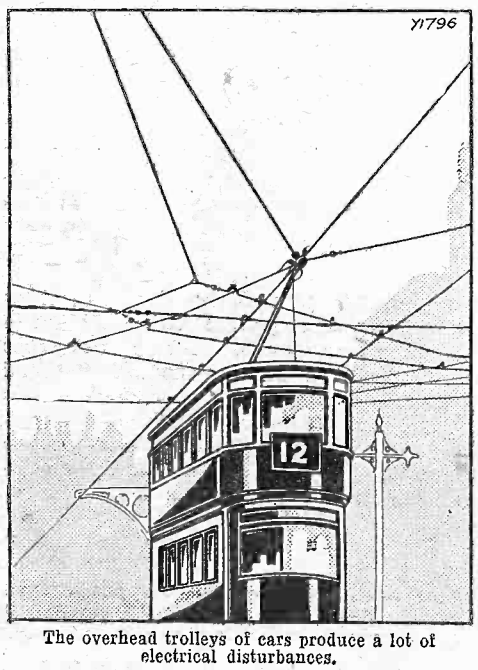
The Only Remedy.

The time will come, no doubt, when most of this kind of interference will be stopped at source; but, until then, the listener's only remedy is to ascertain how this noise is received by the set and to devise means to prevent its reception without lessening the response to legitimate radio signals.

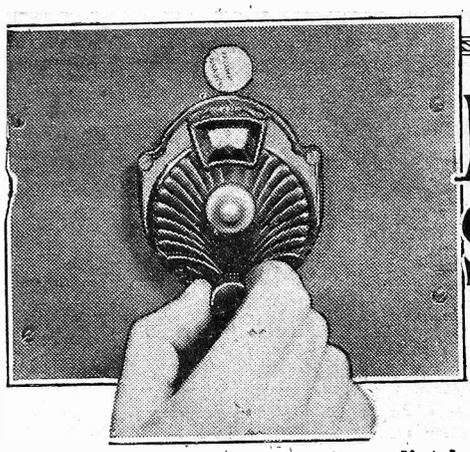
Experiments show that the best part of this noise is communicated to a receiver through water and gas pipes, iron gutters, house stack pipes, electric bell circuits, telephone wires and, of course, the electric lighting mains and any power lines in the

(*Continued on next page.*)

A SOURCE OF TROUBLE



The overhead trolleys of cars produce a lot of electrical disturbances.



A FAMILY STATION FINDER

This simple device identifies immediately the station which is tuned in.

By E. A. BASSETT.

AS the radio expert of the home, you have probably been troubled by certain members of your family grumbling that such-and-such a station had something good on last night. "But I couldn't get it," "Where is such-and-such a station on the dial?" etc.

You cannot always be at hand, and yet the questions are always awaiting you—have you tried to remedy it? Here is the ideal station indicator for the home, a useful little gadget that can always be at hand.

Simple to Make and Use.

All the material you need is a square piece of three-ply wood with two triangular supports, an old dial, and a circular piece of Bristol board. It is neither hard to make nor fussy in operation, the circular card being marked with the station names on, in order of their wavelength.

By setting the card to the known degree of a certain wavelength on your set, you can see at once where the stations come in on your receiver.

Cut a piece of plywood 7 in. by 6½ in. deep, then 2⅞ in. from the base, and central, drill a hole to take your dial spindle. Place the dial in position and mark where your observation circle will be cut; the base of this touching the dial or escutcheon.

Having cut this, measure from the spindle to an eighth of an inch above the circular opening, and taking this as your radius draw a circle on your card.

Cut your card and place it on the spindle, mark with a pencil the top and bottom of the aperture. Remove the card and draw two circles from the marks made. Divides the circumference equally, according to the figures on your set's dial.

The numbers are placed above the top pencilled line so that they do not come into view when the finder is not in use. (That illustrated was divided by one hundred degrees on the left and right, one for medium waves and the other for long waves.)

Between the two remaining pencilled circles place the station names as they come in on your set, Fécamp at 9, Trieste at 21, London National at 30, and so on.

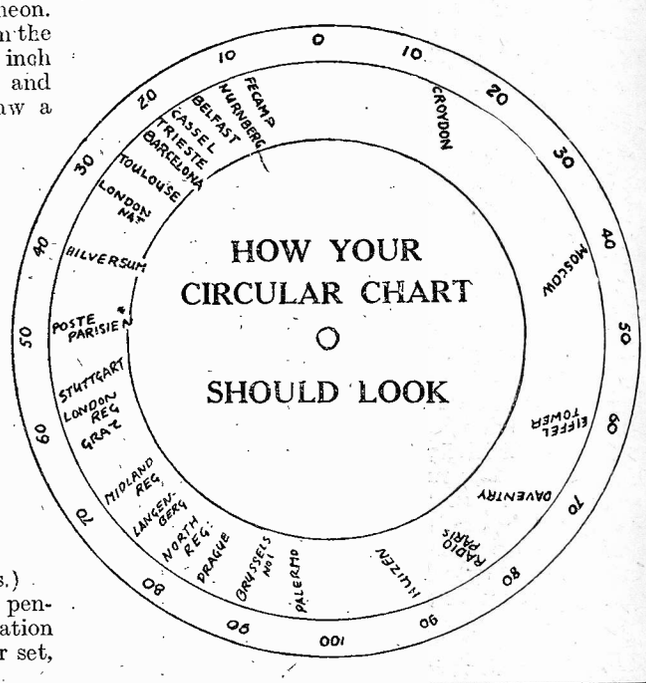
Keep the names sloping slightly from left to right, so that they are readable. As it is primarily intended for family use, it would be better only to give those stations best received, and mostly in demand.

Before fixing the card, cut two triangular pieces of plywood for supports and screw to the board. Now place the card over the spindle and adjust the dial and station name in accordance with the set's reception, and tighten the card securely with two nuts.

Stations Without Trouble.

Probably in turning the dial you will see two names at once, but the card should be so adjusted that the name which is dead centre is the one indicated.

By twisting the dial the station names will appear in their order, and the family will be able to get the stations without any further trouble if you are not at home.



THE NOISE LEVEL

(*Continued from previous page.*)

vicinity. The amount of direct low-frequency pick-up by the set is small and the chance of it is obviated by using shielded L.F. transformers, or none at all.

Most of the apparatus to which this interference can be traced appears to originate in H.F. oscillation carrying a modulation; and this energises girders, gas-pipes, electric-bell circuits and the like just as if they were receiving aerials. That the lighting mains act in this way is well known, not only because they can be utilised as a receiving aerial but because a suitable H.F. choke filter, when mains valves or an eliminator are employed, usually makes a great reduction in noise.

Picked Up on the Earth.

It is not so apparent that a water-pipe acts in a similar manner. Many listeners consider it beyond argument that a water-pipe earth must be O.K.

Yet experiment demonstrates that where an earth connection is made to a water-pipe in an upstairs room, or even downstairs if at some distance from the main water-pipe, interference is undoubtedly picked up in an electrically noisy locality. The remedy is to avoid a water-pipe earth connection and to arrange a short low-resistance connection direct to an earth plate buried at least 3 ft. down.

The best part of the interference, however, gets into the set via the aerial, and as this is the energy-collecting part of the whole outfit, it deserves the closest attention from anyone aspiring to real DX reception.

Avoid Indoor Aerials.

Many listeners with sensitive sets employ a short indoor or picture-rail aerial; but in London, for example, it is safe to say that such a practice increases the noise to signal ratio enormously. I am aware that it is often done for selectivity reasons, nevertheless it virtually makes long-distance reception impossible. In London an indoor aerial is literally in a bedlam of electrical oscillation.

Use of a good outside aerial and a short direct earth affords at once the best and simplest method of cutting down local noise. The aerial need not be long, but it is essential that the whole of the wire should be remote from any conductors, gutters, trees, in fact, as isolated as possible. How many listeners realise that the most important part of an aerial conforming to our present limitations is the down-lead? Many erect a beautiful "top" but arrange the down-lead anyhow. Yet it is here that the principal amount of noise, as well as signals, gets in.

Destined to Disappear.

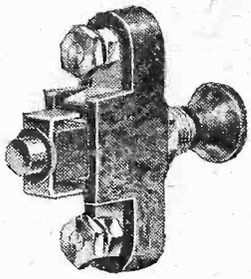
This wire must drop down at least five or six feet from the house, preferably vertically, and should be guyed to enter the window at right angles. Pick-up from the numerous oscillating metallic fixtures in or around the house is then reduced to a minimum.

It may be objected to this solution that a good outside aerial, say in London, increases ordinary station interference so much that DX work is hampered on that account though the general noise level is reduced. "Losser" methods of obtaining selectivity, such as shortening the aerial, using series aerial condensers or aperiodic couplings are destined, in the writer's opinion, to disappear shortly from general practice.

They merely kill, or at any rate half strangle, the goose that lays the golden eggs.

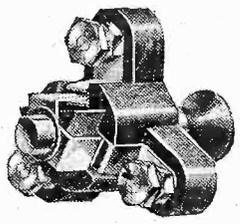
TELSEN DUAL-RANGE COILS
PUSH-PULL SWITCHES AND VALVE HOLDERS

TELSEN TWO-POINT SWITCH



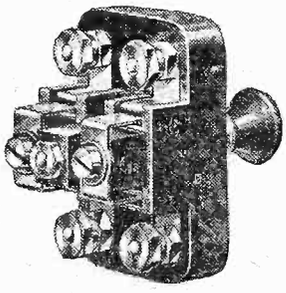
Particularly suitable for use as wave-change switch with the dual-range S.W. coil unit. Employs electrical 'knife' type self-cleaning contact with wedge shaped plunger, and a positive snap action, a series gap reducing self-capacity to a minimum - - **1/-**

TELSEN THREE-POINT SWITCH



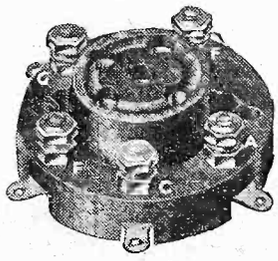
Soundly constructed on engineering principles, this is the perfect wave-change switch for use with a dual-range aerial coil or for breaking L.T. and H.T. currents simultaneously. Minimum self-capacity - **1/3**

TELSEN FOUR-POINT SWITCH



Highly suitable for use in wave-changing on two coils or an H.F. Transformer, or for switching pick-up leads or an additional speaker. No possibility of crackling. Minimum self-capacity - - **1/6**

TELSEN VALVE HOLDERS



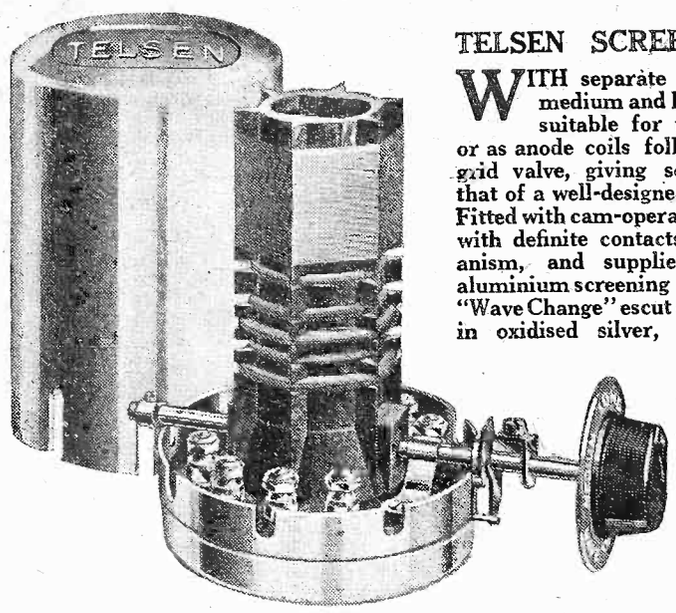
An improved range of valve holders in both rigid and anti-microphonic types. Employ special contact sockets of one-piece design with neat soldering tag ends and terminals. Extremely low self capacity

Rigid type 4 pin . . **9d.**

Rigid type 5 pin . . **1/-**

Anti-Microphonic 4 pin **1/-**

Anti-Microphonic 5 pin **1/3**



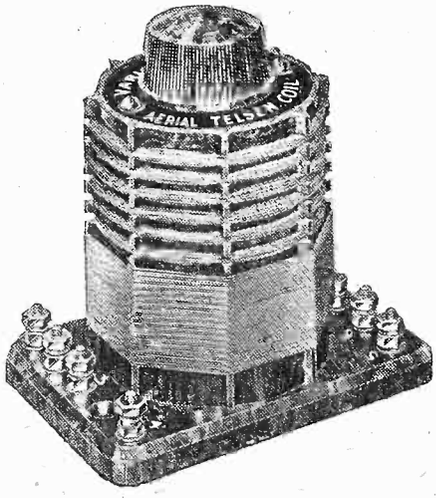
TELSEN SCREENED COILS

WITH separate coupling coils for medium and long waves. Highly suitable for use as aerial coils or as anode coils following a screened-grid valve, giving selectivity equal to that of a well-designed band-pass filter. Fitted with cam-operated rotary switches with definite contacts and click mechanism, and supplied complete with aluminium screening cans, bakelite knob, "Wave Change" escutcheon plate finished in oxidised silver, and full instructions for mounting **8/6**

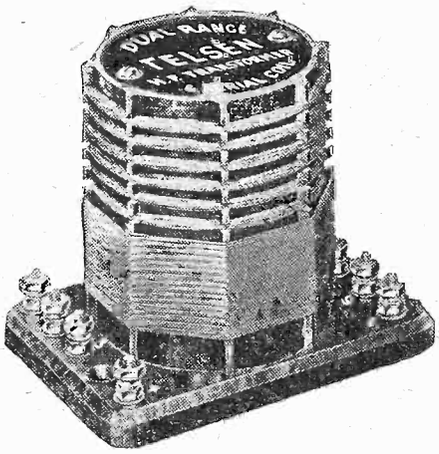
Twin Matched **17/-**

Triple Matched **25/6**

TELSEN DUAL-RANGE AERIAL COIL



incorporates a variable selectivity device, making the coil suitable for widely varying reception conditions. This adjustment also acts as an excellent volume control, and is equally effective on long and short waves. The wave-band change is effected by means of a three-point switch and a reaction winding is included - - **7/6**



TELSEN H.F. COIL

may be used for H.F. amplification with Screened-Grid Valve, either as an H.F. Transformer, or, alternatively, as a tuned grid or tuned anode coil. It also makes a highly efficient Aerial Coil where the adjustable selectivity feature is not required. **5/6**

TELSEN

RADIO COMPONENTS FOR LASTING EFFICIENCY

ANNOUNCEMENT OF THE TELSEN ELECTRIC COMPANY, LIMITED, ASTON, BIRMINGHAM

BEFORE *the* RADIOGRAM

On this page you are introduced to the very first talking machine, and told the circumstances which brought about its invention.

By J. F. CORRIGAN, M.Sc.

HAVE you ever wondered how it all started? This radio-gram business, I mean.

You know, of course, that that fertile genius of practical science, the late Thomas A. Edison, was the driving force behind the world's early talking machines, and that he actually invented the first sound-producing instrument.

Probably that's as far as you'll go, however, because, despite the enormous popularity of Edison's first commercial "phonographs," there is a great deal of obscurity as regards his actual invention of the principle of sound recording and reproduction—the principle which in a little more than half a century of time has led up to the perfection of the modern radio-gram.

If, then, you are at all interested in these matters, let me take you back to the year 1877. In that year, Edison, already a successful inventor with a multitude of patents to his credit, was working with his usual concentrated interest in his laboratory. An automatic telegraph machine was the subject of his attentions.

The Inventor's Own Words.

Let the renowned inventor speak for himself:

"I was engaged upon a machine intended to repeat Morse characters which were recorded on paper by indentations that transferred their message to another circuit automatically when passed under a tracing-point connected with a circuit-closing apparatus.

"In manipulating this machine I found that when the cylinder carrying the indented paper was turned with great swiftness, it gave off a humming noise from the indentations—a musical, rhythmic sound resembling that of human talk heard indistinctly. This led me to try fitting a diaphragm to the machine, which would receive the vibrations or sound waves made by my voice upon an impressible material placed on the cylinder.

The material selected for immediate use was paraffined paper, and the results obtained were excellent. The indentations on the cylinder, when rapidly revolved, caused a repetition of the original vibrations to reach the ear through a recorder, just as if the machine itself were speaking.

"I saw at once," concludes Edison, "that the problem of registering human speech so that it could be repeated by mechanical means as often as might be desired was solved."

Edison, of course, had toyed with the idea of a talking machine before he began his automatic Morse-repeater experiments. Indeed, the idea of a machine which would reproduce sound at will was one which was getting hold of scientific minds.

To Edison alone came practical success in the construction of a talking machine and his first patent application was filed in Britain, on July 30th, 1877, No. 2,909.

A Historic Wager.

John Krusei was the man who actually constructed the first talking machine. He died in 1899. He was Edison's most trusted mechanic, and he was on intimate terms with the inventor.

When Edison confided to John Krusei the details of his projected machine, Krusei doubted whether it would ever work, and he even went so far as to bet Edison a box of cigars that the thing would fail. However, the machine *did* work, and one can only trust that the cigars were forthcoming and that they were of a brand worthy of the occasion.

The very first words to be recorded were spoken by Edison. They comprised the first verse of that well-known poetic masterpiece, "Mary Had a Little Lamb."

As Krusei turned the handle of the newly-constructed mechanism, Edison related to the machine the peculiar history of Mary and her little lamb. Then when the machine was returned to its starting-point, the words, very, very faint, but perfectly clear, came from the mechanism. Sound-recording and reproduction had been accomplished. Edison's first talking machine, constructed by old John Krusei, is still in existence. It is a curious contraption, as you will see by examining the photograph of it which appears here.

It consists of a brass drum 4 inches long, and about 3½ inches in diameter. It was revolved by a handle carried on a screw shaft which advanced the drum 1 inch at each revolution. The surface of the drum was covered with a layer of tinfoil.

A thin ferrotype diaphragm, set up against the drum, had fixed to its centre a projecting stylus which, when set into vibration by the sound waves falling upon the ferrotype diaphragm, caused minute indentations to be made on the tinfoil layer.

Born of Electrical Experiments.

On the other side of the drum was fixed a tube which was closed at its outer end by a paper diaphragm. Attached to the centre of this diaphragm also, was a light stylus which made contact with the indentations in the tinfoil and so reproduced the sound.

The diaphragm and stylus idea, you see, was there, even in this, the very earliest of talking machines, and it is an idea which has never fundamentally changed.

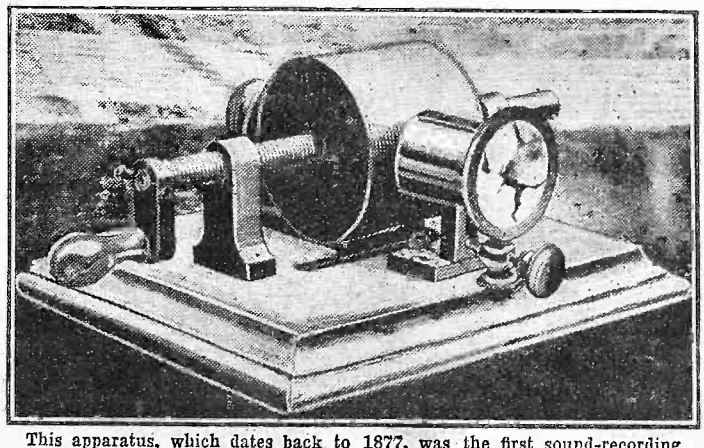
Wax cylinder records came in due course and, with them, methods for their duplication.

Then, when Edison's phonograph was at the height of its fame, the disc machine—the *Gramophone*—came into being, and gradually displaced the phonograph.

Finally came the radio-gram—that masterpiece of modern electrical sound reproduction, with its tremendous tonal capacity and its amazing fidelity of reproduction.

But it all started, however, with Edison's very simple and very crude hand-cranked machine, which, although non-electrical in nature, was born of electrical experiments.

EDISON'S FIRST SOUND RECORDER



This apparatus, which dates back to 1877, was the first sound-recording and reproducing instrument. The paper diaphragm, now broken, is seen in the front of the "machine."

DIRECT RADIO DIRECT RADIO AIRSPRITE RADIO DIRECT DIRECT DE LUXE

DIRECT RADIO AIRSPRITE KITS ARE OFFICIALLY APPROVED BY MR. NORMAN EDWARDS Read what he says:

"With regard to the Direct Radio P.W. 'Airsprite' kit which you are offering to the public. I am pleased to inform you that it meets with the requirements of my Technical Staff, and I therefore have pleasure in giving the kit the official approval of this journal.

Yours faithfully,
NORMAN EDWARDS, Managing Editor."

DIRECT RADIO

The AIRSPRITE De Luxe Battery Model

	£	s.	d.
1 Pair Telsen matched twin screened coil type W. 287	0	17	0
1 Telsen coil switch assembly type W. 217	0	0	6
2 Polar ·0005-mfd. Variable condensers No. 2. Slow Motion	0	13	0
1 Ormond R190 Slow Motion Differential Condenser ·0003-mfd.	0	3	0
1 Ready Radio 50,000-ohm Potentiometer	0	3	9
1 Ready Radio 3-pt. on-off switch	0	1	6
1 Sovereign ·0003-mfd. max. pre-set condenser	0	1	3
2 4-pin valve holders	0	1	0
1 S.G. Valve holder	0	1	0
1 T.C.C. 1-mfd. condenser	0	1	10
1 Ready Radio S.G. H.F. choke	0	5	6
1 Ready Radio Reaction Choke	0	1	6
1 Varley Rectatone L.F. Transformer type D.P. 35	0	11	6
1 T.C.C. ·01-mfd. Condenser	0	2	6
1 Graham Farish 1,000-ohm resistance and holder	0	2	0
1 Dubilier 100,000-ohm resistance with wire ends	0	1	0
1 T.C.C. ·0005-mfd. condenser	0	1	3
1 T.C.C. ·0003-mfd. condenser type M	0	1	0
1 Fuse and holder	0	1	0
12 Belling-Lee indicating terminals	0	2	6
1 Panel 16" x 7" drilled to specification	0	4	6
1 Baseboard 16" x 10"	0	1	6
1 Dubilier ·1-mfd. condenser type 9200	0	2	0
1 Ready Radio 2-meg. grid leak and holder	0	1	4
8 Belling-Lee battery plugs	0	1	4
2 Spade terminals	0	0	4
1 Terminal strip 16" x 1½" drilled to specification	0	1	6
1 Belling-Lee Anode Connector	0	0	4
Flex, screws, etc.	0	1	10
3 Mullard Valves: PM12V, PM1HL, PM2A	1	12	3
1 Cabinet "159" type in walnut	1	1	0
Total	£7	5	0

KIT No. 1
(less valves and cabinet)

£4 : 8 : 3

or 12 monthly payments of - 8/3

KIT No. 2
(with valves, less cabinet)

£6 : 0 : 6

or 12 monthly payments of - 11/3

KIT No. 3
(with valves and cabinet)

£7 : 1 : 6

or 12 monthly payments of - 13/3

The Direct Radio Airsprite De Luxe Kit costs no more than any other—BUT it consists solely of Quality Components — especially chosen for you after exhaustive tests by expert critics for a Quality Set. —That is why the following well-known British Radio Manufacturers advise you to build it with Absolute Confidence with a Direct Radio De Luxe Kit.

Belling & Lee	Polar
Bulgin	Radio Instruments
Colvern	Ready Radio
Dubilier	T.C.C.
Erie	Telsen
Graham Farish	Varley
Igranic	Ward & Goldstone
Lewcos	
Mullard	

Never before have the leading Radio Manufacturers joined together in such unanimous praise of a new receiver. Be guided by their judgment and build the Airsprite with the Direct Radio De Luxe Kit.

Direct Radio

Telephone : HOP 3000

159 BORO HIGH ST.

DIRECT RADIO DIRECT RADIO AIRSPRITE RADIO DIO DIRECT DELUXE

The AIRSPRITE De Luxe
A.C. Mains Version

	£ s. d.
1 Set Twin Matched Screened Coils. Telsen W. 287	0 17 0
1 Coil Switch Coupling Assembly. Telsen W. 217	0 0 6
2 Polar type S.M.2 ·0005-mfd. Variable condensers	0 13 0
1 Polar ·0003 mfd. Slow-motion Differential Reaction condenser	0 6 6
1 Sovereign ·0003-mfd. Preset condenser	0 1 3
1 Dubilier type B.S. 4-mfd. Fixed condenser	0 5 0
1 T.C.C. type 80 4-mfd. Fixed condenser	0 8 6
2 T.C.C. type 50 2-mfd. Fixed condenser	0 7 8
2 Dubilier type 9200 2-mfd. Fixed condenser	0 7 6
3 T.C.C. type 50 1-mfd. Fixed condenser	0 8 6
1 T.C.C. type 34 ·01-mfd. Fixed condenser	0 3 0
1 T.C.C. type "S" ·0001-mfd. Fixed condenser	0 1 3
1 Lewcos 10,000-ohm wire-wound Potentiometer	0 3 0
1 Colvern 50,000-ohm Strip resistor	0 2 3
1 Colvern 25,000-ohm Strip resistor	0 1 9
1 Colvern 20,000-ohm Strip resistor	0 1 9
1 Erie 10,000-ohm wire end resistance	0 1 0
1 Erie 1,000-ohm wire end reistance	0 1 0
1 Erie 350-ohm wire end resistance	0 1 0
1 Erie 200-ohm wire end resistance	0 1 0
1 Erie 1-meg. wire end Grid Leak	0 1 0
1 R.I. E.Y.30 Mains transformer	1 10 0
1 Smoothing Choke R.I. 28/14 henry	1 1 0
1 Igranic Output Choke Type C.H.2	0 9 6
1 Varley Tone Compensating Transformer D.P.35	0 11 6
1 Ready Radio S.G. H.F. Choke	0 5 6
3 5-pin valve holders	0 2 0
1 S.G. valve holder, 5-pin	0 1 0
1 Ready Radio Radiogram Switch	0 2 9
1 Ready Radio Push-Pull Switch	0 0 10
1 Bulgin Mains Switch S.85	0 1 6
1 Permcol Panel 16" x 7" drilled to specification	0 4 6
2 Baseboards 16" x 12" and 16" x 5½"	0 2 9
2 Terminal Strips 5¾" x 1½" and 3" x 1½"	0 1 0
1 Bulgin F.15 Mains fuse and plug	0 3 6

	£ s. d.
1 Goltone combined plug adaptor, flex, mains lead and plugs	0 3 0
1 Bulgin Thermal delay switch S.100	0 7 6
6 Belling-Lee type "R" Indicating terminals	0 1 3
2 Panel Brackets	0 0 6
1 Belling-Lee Anode Connector No. 1030	0 0 4
1 Set switch, Bracket, coupling link, spindle, and brush	0 1 6
6 Yards Systoflex, connecting wire, flex, screws, etc.	0 1 5
4 Valves, Mullard MM4V, 354V, DW2, Cossor 41MP	3 0 0
1 Cabinet "159" type in walnut	1 5 0
TOTAL	£14 18 6

KIT No. 1
(less valves and cabinet)
£10 : 2 : 0
or 12 monthly payments of **- 19/3**

KIT No. 2
(with valves, less cabinet)
£13 : 2 : 0
or 12 monthly payments of **- 24/-**

KIT No. 3
(with valves and cabinet)
£14 : 7 : 0
or 12 monthly payments of **- 26/9**

Donald P. Marcus, Managing Director of Direct Radio, writes :

"I join with the leading manufacturers in recommending you to build the 'AIRSPRITE.' The claims made by 'Popular Wireless' may seem extravagant to you, but you will find in practice they are perfectly justified."

AIRSPRITE MAINS ACCESSORIES

	£ s. d.
WB.Pm.2 speaker (or 12 monthly payments of 7/9)	4 5 0
Epoch A.2	3 3 0
Celestion Reetone, Dual Matched Pm.M.C. Speaker (or 12 monthly payments of 12/-)	6 10 0
Collaro A.C. Induction Gramo Motor	2 10 0
Henley "Solon" Electric Soldering Iron	0 7 6
"159" Radiogram Cabinet	3 10 0

AIRSPRITE BATTERY ACCESSORIES

	£ s. d.
Siemens 120-volt H.T. Battery	0 13 6
Siemens 9-volt G.B. Battery	0 1 0
Block Type L.T. Accumulator 2-volt, 80 amp/hrs	0 11 6
Oldham 120-volt Wet H.T. Accumulator, 5500 m.a./hr. capacity (or 12 monthly payments of 7/6)	4 1 0
Atlas A.C. 244 H.T. Mains Unit	2 19 6
Atlas A.K. 260 H.T. Mains Unit with L.T. Trickle Charger (or 12 monthly payments of 8/6)	4 10 0
Atlas D.C./15/25 H.T. Mains Unit for D.C. Mains	1 19 6
Celestion Soundex Permanent Magnet Moving-Coil Speaker with Input Transformer	1 7 6
W.B. PM.4 Permanent Magnet Moving-Coil Speaker with Input Transformer	2 2 0
Bowyer Lowe AED Pick-up	1 10 0
Collaro Double Spring Gramo. Motor with Automatic Stop	1 13 0
Cop Aerial Lead in and Lightning Arrester	0 2 6
Selectanet Indoor Aerial	0 2 6
Filt Earth	0 2 6

To DIRECT RADIO, LTD., 159, Borough High Street, London Bridge, S.E.1.

Please dispatch to me at once the following goods.....

.....

for which (a) I enclose (b) I will pay on delivery (c) I enclose first deposit of {cross out line not applicable} £.....

NAME.....

ADDRESS.....P.W. 4/2/33

TO OVERSEAS CUSTOMERS.
We specialise in Radio for Export. Goods to your exact specification are very carefully packed and insured, all charges forward. Terms: Cash with order or deposit one-third with order. Balance C.O.D.

AIRSPRITE DELUXE

Airsprite De Luxe

LONDON BRIDGE S.E.1. *Telegrams : DIRRAD SEDIST LONDON.*

WIDE WAVE-COVERAGE

THE Slektun is one of the first radio components I have seen to have a large, brightly-coloured label. It occupies the whole height of the choke and clearly states its nature and the wavelength range with which it can deal.

You can identify its characteristics at a glance. Apart from this purely utilitarian advantage its colourfulness is to be commended. A radio set can so easily become a drab confusion of natural tints!

The Slektun H.F. choke is efficient from 30 to 2,500 metres.

The Slektun H.F. choke is a straightforward sectionised design, having a low capacity and freedom from peaks within the specified wave-range. We have used it with complete success in both broadcasting and all-wave sets.

A good feature from a constructor's point of view is that the two terminals are as widely spaced as possible and that the bottom one is inclined at a slight angle to facilitate wiring.

A COMPACT TRANSFORMER

Radio Instruments, who are ever in the van of radio transformer progress, have now produced the "Di-Feed," a new L.F. type of most interesting design.

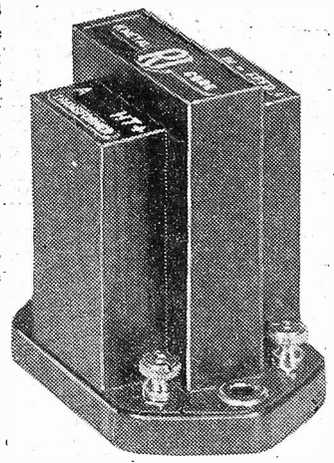
It is unusually small in size, but owing to the fact that its core is composed of a new metal, it can be used in the normal way and handle a reasonably high current without saturation. I understand that the new metal is a nickel alloy but obviously it is very superior in character to that which is commonly employed in inexpensive L.F. transformers.

As most readers will know, it is not possible to employ the majority of the small, nickel-iron-core transformers in a direct coupling. They have to be "parallel-fed."

That is to say, the circuit is so arranged that the H.T. does not pass through the primary winding of the L.F. transformer, but reaches the anode of the valve via a fixed resistance or, sometimes, an L.F. choke.

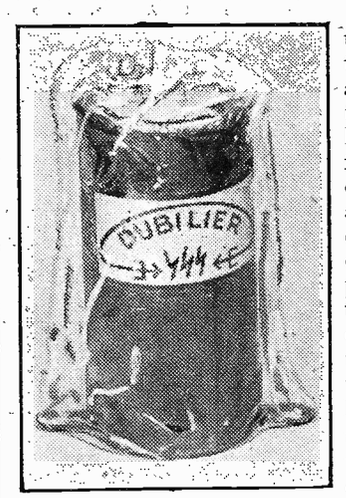
And now you can see why this latest R.I. transformer is called the "Di-Feed"; the name means "Direct Feed" as opposed to "Parallel Feed."

The R.I. "Di-Feed" is a good little transformer, and at 7s. should prove a best seller and add still further to the prestige of its manufacturer.


The R.I. "Di-Feed" L.F. Transformer.

CAPACITY WITHOUT INDUCTANCE

Just as you cannot have inductance in a coil or choke without at least some degree of capacity, however undesirable that might be, so it is impossible to obtain capacity in a fixed or even variable condenser without some inductance.



A Dubilier non-inductive fixed condenser.

As a matter of fact, the inductance of certain of the larger value fixed condensers may assume quite appreciable proportions. In the majority of applications this will matter little or nothing, but there are cases when it is practically essential to have capacity without such inductance.

I can instance several of the Variable-Mu circuits. In such cases a "non-inductive" condenser must be employed.

Fortunately, they are now obtainable at little if anything above the cost of ordinary ones. Messrs. Dubilier have a series of most satisfactory "non-inductive" fixed condensers.

In appearance, as you can see by the photo, they are something like those tubular single cell grid-bias batteries except that they are built into stout metal cases having nicely accessible mounting feet.

"SILVER KNIGHT" BATTERIES

There are no tests by which the quality of an H.T. battery can be closely ganged "while you wait"; a voltmeter test tells you little or nothing.

Therefore, it is vital that listeners should confine their choice of make to those of known reputation.

Among the dependable makes which I can thoroughly recommend is the "Silver Knight," a particularly well-designed and manufactured H.T. battery due to a British firm who are pioneers of Leclanché cell manufacture.

I have had two "Silver Knight" H.T. batteries under close observation for just over ten weks, during which time they have been given controlled life tests.

Both batteries have rendered excellent service in conditions approximating to home-radio (but rather more severe than the average).

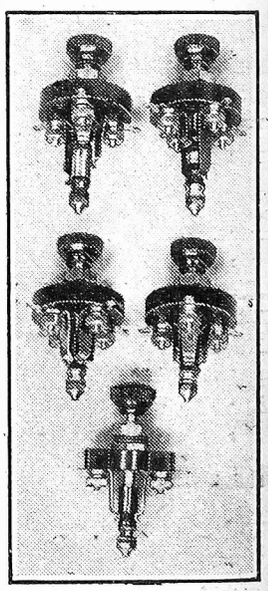
Their capacities were found to be above normal and their voltage decline delayed and beautifully even.

GOLTONE SWITCHES

I have had occasion several times of late to say especially complimentary things about radio products of Messrs. Ward & Goldstone, Ltd.

And once again I find myself faced with this pleasant necessity.

In this present case the particular components concerned are push-pull switches—essentially simple enough articles, but how badly they *can* be made!


The five types described.

Not so these Goltones. They are very fine productions indeed and reveal thought and care in both design and manufacture. Here is just one thing to prove my point. There are two lock-nuts on each switch (one recessed) and two fibre washers. These enable the switches to be mounted on panels of any thickness up to ½ in.

Every constructor will appreciate the practical value of that.

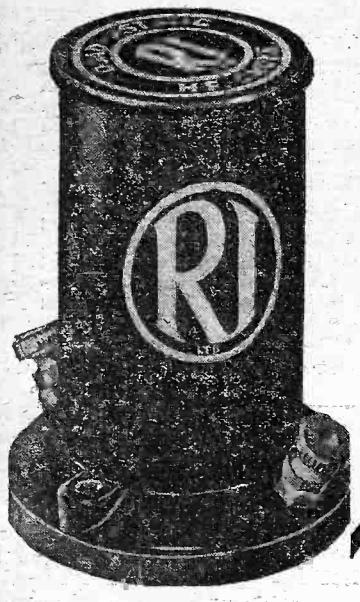
Again, the actions of the Goltone switches are perfect. That horrible "no man's land" of adjustment when a switch is neither over to the one side or the other, is impossible to obtain for the switches "click" through like "toggles."

Finally, without making the switches unduly difficult to operate, exceptionally heavy contacts have been achieved.

SPECIFIED by Popular Wireless *for the*

AIRSPRITE

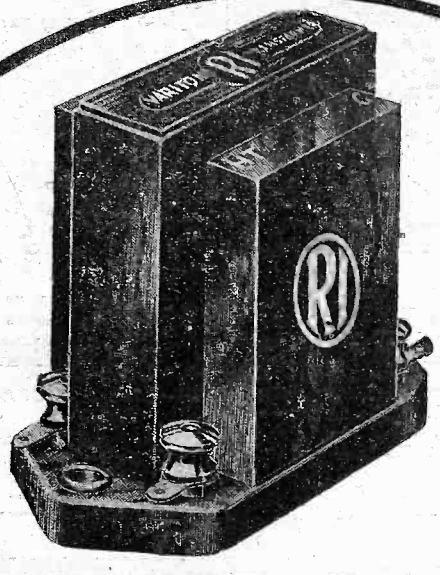
The success of the "Airsprite" is, of course, primarily due to its design, but, equally important, to the designer's wise selection of R.I. components for the vital stages and sections of this receiver. R.I. productions are built to do their job irrespective of price, yet cost no more than ordinary components.



QUAD-ASTATIC H.F. CHOKE

Selected for the "Airsprite" to give absolute freedom from resonant losses and blind spots and to ensure highest stability in conjuction with the very critical reaction employed. The method of astatic winding of the "Quad Astatic" choke prevents possible H.F. interference with adjacent components.

List No. F.Y.2. Resistance D.C. 700 ohms. Induction 150,000 micro-henries. Size: base 2 in. diameter, height 2-1/8" **3/6**



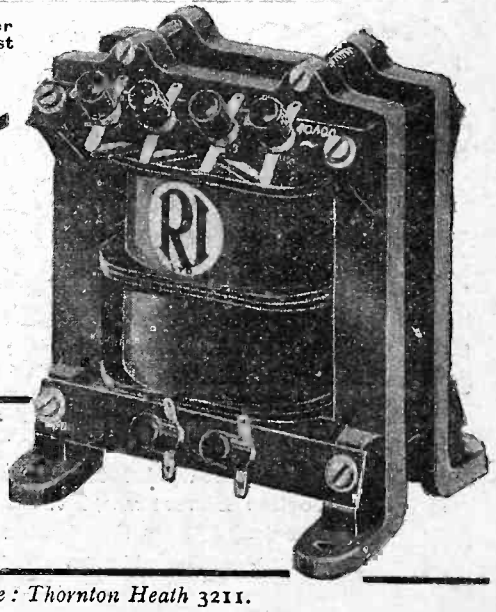
SPECIALLY DESIGNED AND *RECOMMENDED for the* AIRSPRITE

VARITONE COMPENSATING L.F. TRANSFORMER

The ideal transformer for the job—nothing can be better.

Designed specially to give the full tone compensation absolutely necessary to follow the highly selective tuned circuit of the "Airsprite," ensuring perfect performance with reaction advanced almost to the point of oscillation. List No. D.Y. 36. "Varitone" Transformer with the nikalloy metal core as used in our latest "Quiescent" Transformer.

11/6



VALVE RECTIFIER TRANSFORMER

Selected specially for the important mains section of the "Airsprite" to give ample output and maximum freedom from hum and other mains noises. **30/-**

List No. R.Y. 30. Output 250 volts-0-250 volts 60 milliamps; 4 volt, centre tapped, 1 amp; 4 volt, centre tapped, 5 amp.

R.I. COMPONENTS BEST *for all* CIRCUITS

Radio Instruments Ltd., Croydon, Surrey. *'Phone: Thornton Heath 3211.*

WHY NOT USE MORE PLUGS?

There are cases in which plugs and jacks can be more convenient than terminals.

IT is a curious thing that in wireless, particularly amateur wireless, terminals have always been preferred to plugs and jacks. While a number of sets, of course, have plugs and jacks, the majority use terminals. Telephones are usually connected to the set by terminals, aerial and earth, battery connections and so on.

Yet in the great electrical engineering companies, plugs and jacks are invariably preferred to terminals and in the huge engineering concerns, or the Post Office terminals are almost unknown and nearly all connections are made by plugs and jacks.

Now the point arises, which is the better:

The terminal is easy to wire up, is inexpensive and is easily dealt with if anything goes wrong. On the other hand, terminal connections incline to be untidy, get dirty and work lose.

The plug and jack method of connection, while it is more expensive and slightly more difficult to wire up, is a much neater job and does not get dirty, cannot work loose in the same way as a terminal, and is altogether a very neat and workmanlike job. Hence its poplarity in the professional engineering world.

Pulling Them Out.

It has certain drawbacks, of course, the connecting cord or wire where it enters the plug is inclined to break. This, however, is not due so much to inherent weakness of the wire or cord as to careless handling. For example, people will pull the plug out of its jack not by grasping the plug, but by jerking the cord.

Then again, no particular effort has been made on the part of manufacturers to design plugs suitable for wireless work. The present type of plug and jack, of course, was designed solely for ordinary telephone work, that is, low voltage direct current and low-frequency alternating currents—i.e. speech currents.

Unsuitable For H.F.

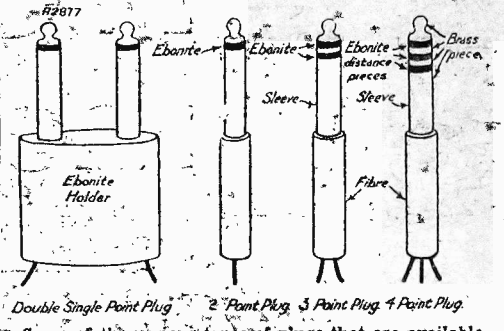
This type of plug, while it can be used, is not suitable for high-frequency currents and high-tension voltages such as are found in wireless, but there is no reason why special wireless plugs and jacks should not be produced.

In the case of the telephones or loud-speaker the plug and jack method of connecting to the set is only efficient when the high-tension current does not pass through the 'phones or loudspeaker, if it does then the terminals are the better method of connection.

The reason why plugs and jacks are not efficient in this respect is because usually the H.T. battery is liable to be short-circuited during the time in which the plug is being pushed into the jack—that is if a standard two-point plug is used.

Yet a special type of plug could easily be designed which would prevent this short-circuiting, such as is used in preventing short-circuiting on telephone switchboards.

PLUGS FOR ALL PURPOSES



Some of the various types of plugs that are available for constructors.

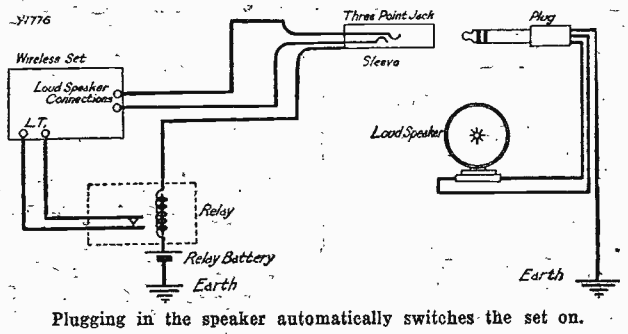
For aerial and earth connections, also the various batteries L.T., H.T., and grid neg., single-point plugs and jacks are most effective—that is to say a separate plug and jack for each connection.

Avoiding Wrong Connections.

These look infinitely neater than a row of terminals, and it is merely the work of a moment to disconnect all the connections from the wireless set. Such a row of plugs look very effective if each pug is painted a different colour; there is then no possibility of pushing the wrong plug home.

Plugs and jacks are extremely useful for remote control—i.e. switching a set on and off from a distant part of the house. Thus by using the sleeve of a 3-point plug (see sketch) the set can be switched on when the loudspeaker plug is pushed into the jack and is automatically switched off when the plug is withdrawn. By similar switching it is possible to switch the set from a long to a short wavelength by remote control.

FOR REMOTE CONTROL OF SET



Plugging in the speaker automatically switches the set on.

THE LISTENER'S NOTEBOOK

A rapid review of some recent radio programmes from home stations.

DESPITE the close secrecy surrounding the choice of play for the last performance in London of the present season of Savoy Operas, many listeners guessed it would be the "Mikado." The fact that in this performance Sir Henry Lytton was making his last appearance before retirement was itself a sufficient reason for thinking that the choice would fall on the "Mikado," and apart from this, it is the pick of the bunch, though perhaps many people would rather plump for "The Gondoliers."

* * *

It is generally known, too, that Sir Henry is very fond of playing Koko. In a farewell performance when an ovation could reasonably be expected, could anything be more apt than the line (the first to be uttered, too, on the first appearance of the actor concerned) than this: "Gentlemen, I'm much touched by this reception," which is an authentic line in the opera.

* * *

I've always wondered why the anti-temperance fraternity have never been tempted to use as its slogan (with apologies, of course, to W. S. Gilbert) that famous line of Nanki-Poo's, "Were you not to Koko plighted."

* * *

I was terribly sorry when the Benn-Maxton debate on Death Duties and their abolition was brought to a premature end, although it was to make way for the relay from the Savoy Theatre. And this because it had been a most enjoyable battle to follow.

For once, both combatants kept to the point. Wireless debates aren't usually like this. A usually asks B a poser which B answers by asking another poser, which has no bearing at all on A's. And so on for twenty minutes.

* * *

The new series, "Should they be Scrapped?" couldn't have hoped for a better send-off. Sir Ernest Benn and Mr. James Maxton were both superb. I've never heard a more devastating debater than Mr. Maxton.

Obviously, complete justice isn't done him when he is reported. He must be heard. But I will say that Sir Ernest faced him squarely, and provided good opposition. The best debate ever broadcast.

* * *

I don't know how the two gents received the news that they would have to finish their fight off all to themselves. Personally, I would have been very annoyed.

I can quite see that the Savoy Theatre couldn't be kept waiting. I can also see that the relay from the Savoy Theatre had to begin at the beginning. There would have been a deal of grumbling had listeners been taken over to a performance already under way.

* * *

I suppose the trouble was caused by Desmond MacCarthy's unexpected "appreciation" of the late George Moore. I don't think I care for these suddenly interpolated items, unless they are of a serious or urgent nature. They just throw things out of gear.

Without wishing to be disrespectful to George Moore, an appreciation of his life and work isn't a matter of extreme urgency. Any evening the following week would have done just as well; and there's always the quarter-hour from 6.15 p.m. to 6.30 p.m. going begging every day.

* * *

Jean Forbes-Robertson is the latest famous recruit to broadcasting. As was to be expected, she made her first appearance in a rôle that was eminently suited to her art, "The Ghosts at Solberga."

I always feel that in a ninety-minute play an interval would be a welcome innovation. At the play one likes to speculate, especially in the second interval, as to how it will all end, and the Third Act becomes additionally interesting.

The radio play denies us this "extra." A five-minute interval, if only for this purpose, might be very welcome where family or group listening is practised. It isn't so urgent where the listener listens alone.

* * *

I would also like to hear a play that gets one guessing. Unfortunately, the B.B.C. doesn't seem to favour this sort of play. I was bold enough not long ago to suggest the type of comedy I would like to hear broadcast. This week I will suggest a different type, one that invites speculation during the second interval as to how it will finish.

A. A. Milne's "The Truth About Blaydes." This isn't a problem play, of course, but, by setting one wondering, it does sustain interest throughout.

* * *

The truth is, we are getting far too many plays with the wind-swept heath atmosphere. If we are to have atmosphere, let us have something that warms rather than chills. A crackling fire in the background has obvious advantages over a heath, at this time of year especially.

* * *

Mr. S. P. B. Mais doesn't seem quite his old self with the "S O S" series. It is perhaps inevitable that there can't be much for him to say that differs greatly from what he said the week before. No two depressed areas can contrast conditionally as strongly as, say, the Fens and the Brontë Country do geographically.

* * *

So, if the talks fail to fascinate us as did his former ones, it is not his fault. Of course, we don't expect to be fascinated by such a series of talks. By their very nature they couldn't possibly fascinate.

On the other hand, one is struck by the note of sincerity Mr. Mais imparts into the talks, and one cannot doubt that he has the work very much at heart. In less capable hands, one feels, they might peter out ingloriously.

NOW—for 39/6 most brilliant set

The Ultra Selective TELSEN

Full size Blueprint, with complete building and operating instructions supplied FREE with every kit!

THE Ultra Selective TELSEN 'ASTRALA 3' smashes all existing standards of kit set value and design. It costs less to buy and less to run. It is easier to build and easier to operate. It is up-to-the-minute in design and ahead of all the rest in performance. Its selectivity is simply astounding, its range enormous, its reproduction superb. Yet every component you require for building it, together with full size blueprint and detailed instructions, is contained "complete in the box" for 39/6! You may already have some of the components by you, in which case you can obtain the blueprint and full building and operating instructions post free for 1/-. Whichever you do, you can be sure that in building the TELSEN 'ASTRALA 3' you are building the finest set from every point of view. Go to your dealer now.

TELSEN RADIO COMPONENTS

Complete kit of parts, including panel, baseboard, terminals, battery cords, and all accessories

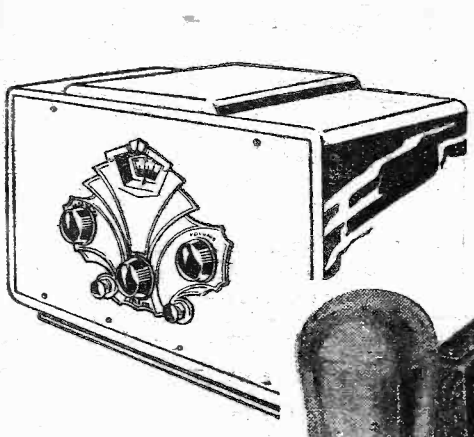
39/6

Obtainable from all radio dealers.

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO., LTD., ASTON, BIRMINGHAM

you can build the ever designed....!

'ASTRALA 3'



Shewing the dignified 'commercial' appearance imparted by the handsome silver oxidised escutcheon of the Telsen 313 Disc Drive.

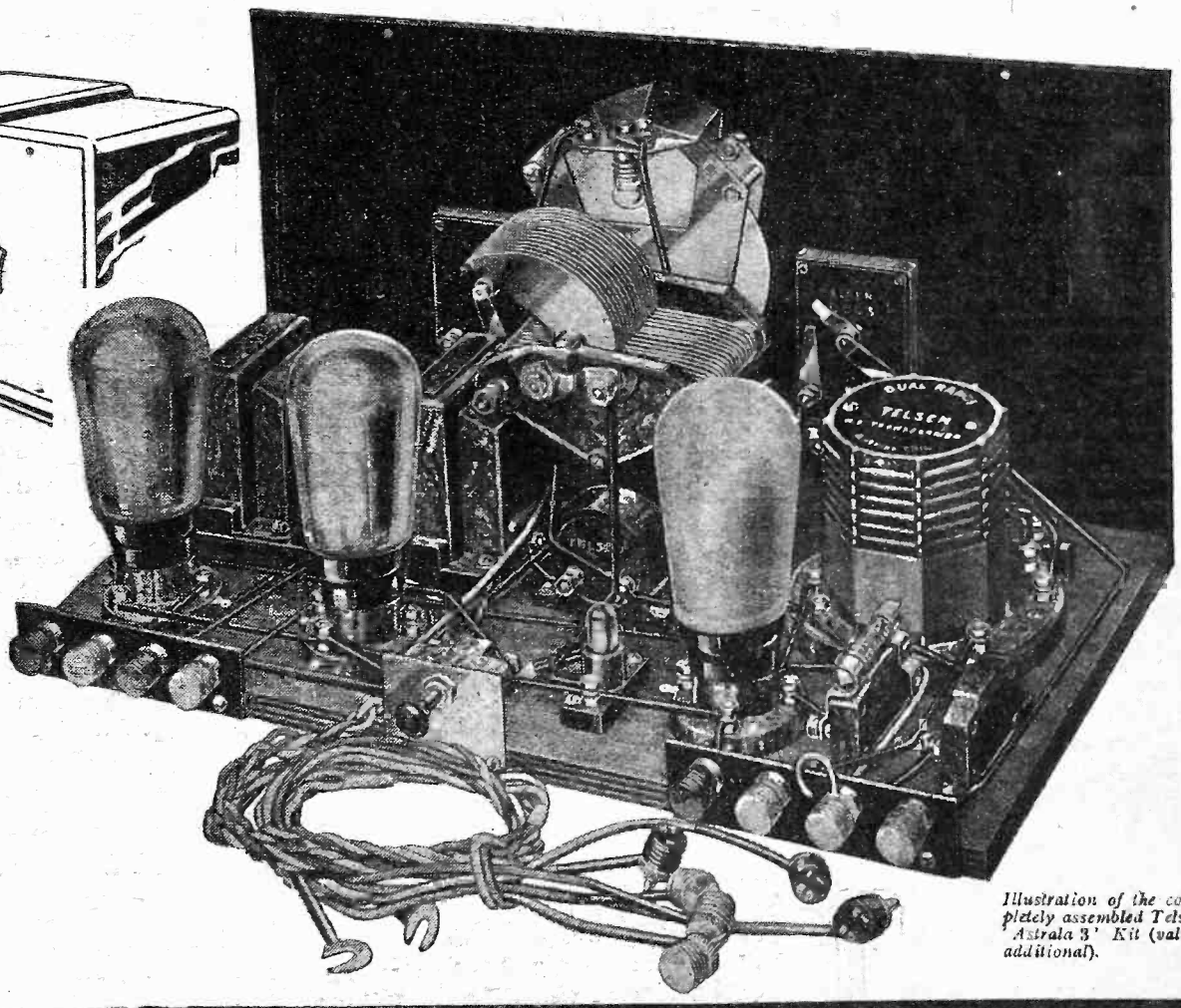


Illustration of the completely assembled Telsen 'Astrala 3' Kit (valves additional).

The TELSEN *'ASTRALA 3'* embodies every ultra-modern refinement, including slow-motion disc drive control, air-spaced logarithmic condensers, decoupling in circuit, separator control and handsome silver oxidised escutcheon plate.

RADIOTORIAL

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

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

The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world some of the arrangements and specialties described may be the subjects 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.

Technical Queries Editor: A. JOHNSON-RANDALL

QUESTIONS AND ANSWERS

THE "P.W." A.C. CHARGER.

Several enquiries have been received regarding the rheostat to be used in the A.C. Charger which was described in "P.W." dated January 14th. Quite a number of readers appear to have old rheostats in hand which they would like to incorporate if there is no objection.

As a general rule the use of an old-type rheostat is not recommended, partly because its current-carrying qualifications are likely to be unsuitable, and because to line up with the trouble-free nature of the outfit the rheostat should be of sound and robust design, which was often not the case with old-type rheostats. As the rheostat may have to carry a current of up to about one ampere round the few turns near the minimum position, it is advisable to make sure of trouble-free operation by getting an up-to-date and suitable one for the purpose.

One reader suggests that for the flex connection to the H.T. Unit, it would be better to use a socket on the charger and a plug on the H.T. mains unit flex lead, thus enabling the mains to be plugged direct into the H.T. Unit if desired.

This is a good idea for those who may wish to cut the charger right out of circuit sometimes; and as our correspondent points out, it has the additional advantage of obviating any chance of anything coming into accidental contact with the prongs of the "to mains unit" plug on the charger when the mains lead itself is connected, and they are thus "alive."

(*Continued on page* 1158.)

DO YOU KNOW—

the Answers to the following Questions?

There is no "catch" in them, they are just interesting points that crop up in discussions on radio topics. If you like to try to answer them you can compare your own solutions with those that appear on a following page of this number of "P.W."

(1) **Which will be the next new Regional station to be opened by the B.B.C.?**
(2) **If 10 ohms is the resistance of a wire of a certain thickness, what size would a wire of similar length and material have to be for the resistance to be 5 ohms?**
(3) **If the resistance of 100 yards of wire is 30 ohms, what would be the resistance of 50 yards of it?**
(4) **Why is it usual to connect a fixed condenser of about ·001 mfd. or less in series with the aerial terminal of a D.C. mains set?**

COIL SCREENS

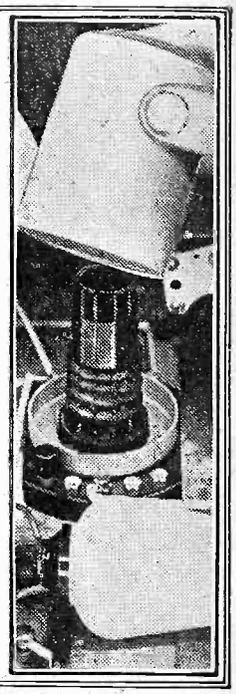
Don't attempt to work your set with the coil covers removed, or you may be troubled by bad instability.

* * *

Even if the set does not become unstable the tuning range will be upset.

* * *

The screen removal usually makes stations tune in at lower readings.



RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 1156.)

MODERNISING AN OLD SET.

T. E. S. (Reading, Berks.).—"I have had the 'P.W.' '3-Coil' Three ever since it was described in your paper in 1930, but last autumn we had to give up the wireless altogether for a time.

"Now, thank goodness, we are able to use it again and I hear that this set was recently brought up to date and the plug-in coils done away with. I should much prefer to alter my old friend than have a new set, so please say when the description for this was given, and also where I can write for the back number of 'P.W.'"

The description of alterations to the "3-Coil" Three was part of an article entitled "Modernising Your Set" which appeared in the January 7th issue of "P.W." No. 553.

Any back number of "P.W." which is still in print can be obtained from the publishers:

The Amalgamated Press, Ltd.,
Back Number Dept.,
Bear Alley,
Farringdon Street,
London, E.C.4.

Price 4d. per copy, post free.

FITTING A FUSE CAUSES SET TO PACK UP.

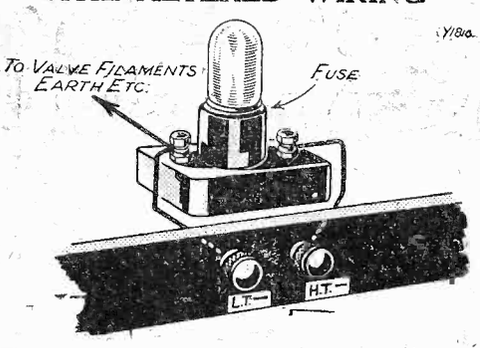
T. T. (Chelmsford, Essex).—"I put a fuse between H.T. negative terminal and the L.T. negative terminal, but had to take it out again because the set packed up with the fuse in.

"As soon as I took it out again everything was O.K., so I returned the fuse, but was told it was in good order and something must have been wired up wrong. What would be the cause of the set stopping? It has got me beat."

Probably some of the set's L.T. wiring was connected to the H.T. terminal, for having been joined together formerly these two terminals might justifiably have been regarded as being in effect one and the same.

If, however, a fuse is inserted, the set-owner must make sure in such circumstances that *all the connections except the single lead going to the H.T.B. negative are on the L.T. negative side of the fuse.*

THE ALTERED WIRING



The correct connections for a fuse in the H.T. negative lead are very clearly shown here. There must be only one wire from the side which goes to H.T. negative, and that wire must go to the H.T. minus terminal. Every other lead, grid bias positive included, must go to the L.T. negative side of the fuse.

The sketch shows clearly how this works out, and that nothing but the wire to H.T. — must be between fuse and H.T. — terminal. If you try again, on these lines, we think you will find the set will work perfectly.

WHERE THE WIRES GO.

"JOHN" (High Barnet).—"One thing which rather puzzles me when trying to follow out a diagram is the actual places where the wires go. For instance, in my present set the 'A' terminal of the detector has only one connection on it, which is a wire to the top terminal of an H.F. choke.

"This top terminal of the choke has two connections, one being the other end of the valve's 'A' connection and the other a flexible lead to moving plates of the differential.

"A friend of mine who put in a new differential for me put this flexible (differential) wire on the 'A' terminal of the valve holder, leaving the top choke terminal with only one wire to it. It certainly works O.K., so I don't like to ask him to shift it, but I am surprised that it works just as well going to the valve as it did when going to the choke.

"I always thought it was very important to get the wires going to exactly the same place as before."

You forget that there is a wire joining the "A" terminal on the valve direct to the top terminal on the choke. In effect those two are one, from an electrical point of view, because there is negligible resistance in the wire that joins them.

It would not do, however, to proceed always on the assumption that any two points that are joined together can be regarded as being equally good for connecting to, because sometimes the length of wire and its proximity or otherwise to another wire is important.

(Continued on page 1160.)

"P.W." PANELS. No. 109.—GENOA.

The Genoa station shares its wavelength (312·8 metres) with Cracow (Poland) and Radio Vitus (Paris), but all these stations are at times clearly received in this country.

* * *

Genoa forms part of the North Italian group of stations, and so shares programmes with Trieste, Milan and Turin.

* * *

The power of Genoa is 10 kilowatts. Distance from London 645 miles.

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 1158.)

So it is just as well to keep closely to the original arrangement, though it often happens, as in your case, that such a modification has no apparent effect on reception.

SIMULTANEOUS SPEAKERS.

L. M. S. (Wolverton).—"What is the advantage of having two different types of loudspeaker working in the same room at once?

"An acquaintance of mine who has plenty of time and money for wireless gets really life-like speech and music from a four-valve set and he uses two loudspeakers mounted on a big board—one is a moving-coil and the other a cone with balanced armature.

"They both work all the time, and he showed me how much of the naturalness went when only one speaker was used instead of both. But I still did not understand why two different kinds of speaker should be able to give better quality than two of the same kind?"

It is merely a case of combined resources.

If loudspeaker No. 1 were perfect, loudspeaker No. 2 would not assist. But if No. 1 is good on low notes but not up to much on the high, and loudspeaker No. 2 is excellent on high notes but poor on the low, it is likely that by combining them the overall result will sound much more natural than either speaker separately.

Apparently this is what your friend has done. It is always worth trying where several loudspeakers are available for the purpose.

AN INSULATION PROBLEM.

J. G. (Ramsgate).—"Being on the wrong side of sixty years, I don't find anything to do at the top of a mast at all congenial! Especially as the last time I embarked on the job I was wrongly advised, and made the aerial insulator a fixture there.

"If it had been made movable I could have looked over the insulator, but as it is, I dread having to get that mast lowered again. (Ours is a small garden, and the task seems a very formidable one.)

"The reason I suspect the insulator is that reception has been falling off slowly for a long time, and all stations appear to be affected.

THE ANSWERS

TO THE QUESTIONS GIVEN ON PAGE 1156 ARE GIVEN BELOW.

(1) The West Regional, in Somersetshire. It will be testing in a few months.

(2) The resistance of any wire is inversely proportional to its cross-section area. So if it has twice the area its resistance will be halved. In this case, 5 ohms.

(3) 15 ohms. The resistance of a wire is directly proportional to its length.

(4) This prevents the aerial from becoming "alive" if the positive side of the mains happens to be earthed, as is often the case in practice.

DID YOU KNOW THEM ALL?

"This, I am told, is what happens on a small set like mine (detector and low frequency) if the aerial insulator gets leaky, so I should like to know if there is any time limit to insulators working properly. It has been up since September, 1931."

The fault that you mention—gradual loss of volume—is certainly consistent with a failure of aerial insulation, but in practice this is not such a common complaint as some of the others which give rise to similar symptoms.

The loss of emission of one of the valves for instance, frequently gives a slow fall-off of results, and so will a deterioration of the high-tension supply.

Fortunately, too, when there are doubts about an aerial's insulation being cracked or inefficient and it cannot be taken down easily, it can be tested with a milliammeter and H.T. battery. Perhaps you have one, or could borrow one? It is necessary simply to join up the negative of the H.T. battery used for the test to — on the milliammeter, and milliammeter + to the set's earth terminal. Then touch the aerial lead-in wire momentarily on 9 volts or so to see if an appreciable current flows.

If not, increase the voltage by steps up to the maximum of the battery, making sure that no small *steady* current is indicated on the milliammeter.

It is likely that you will get a small "flick" of the needle, but it is a *steady* if slight reading that will indicate a definite leak to earth.

If you can get no appreciable deflection when using 120 or more volts on a sensitive milliammeter you can rest assured that it is not a failure of aerial insulation that is causing the loss of volume.

RECEIVING MORE BRITISH STATIONS AND FEWER FOREIGNERS.

F. H. (Ealing Common, London, W.).—"I have only just started wireless, but I already look forward to Wednesday and 'P.W.'

"What surprises me in reading about the sets is the absence of claims about the reception of British stations.

"Neither the author who writes the article nor the constructor of the set who writes about it seem to feel as I do—that one other British station would be worth half a dozen of these gibberish foreigners who crop up all round the dial.

"I know that wireless broadcasting is an all-round-the-compass affair, but surely it is easier to get our other B.B.C. stations than to pick up the Czecho-Slovakian or German programmes?

"Come on, 'P.W.'! Give us more British and fewer foreigners!"

You say "surely it is easier to get our other B.B.C. stations than to get Czecho-Slovakian or German programmes." The rather surprising answer is, No!

(*Continued on page* 1162.)

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 1160.)

To explain why this is so would need some rather involved statements about how waves are radiated, and how they travel—subjects which are better dealt with in article-form. (You will find the matter will be clearly explained in forthcoming "P.W.'s.") But in fact and common experience the reception of many foreign stations is vastly better than the reception of much nearer British stations.

Despite this fact, it is possible to get quite a good bag of British stations on an up-to-date three-valver—the "P.W." "Airsprite," for instance, would give you a wide variety of programmes in English. But the number of foreign programmes easily receivable would be far, far greater!

And Czecho-Slovakia and Germany would undoubtedly figure very prominently, for these countries have some very fine stations, and owing to a kind of "sky-reflected" effect their programmes are receivable at much greater strength than those of British stations which are situated only a comparatively short distance away from the receiving aerial.

PLUG-AND-SOCKET TUNING.

P. A. (Ilfracombe).—"I get so many reliable medium-wave stations now the H.F. stage is going properly that I am thinking of arranging for plug-and-socket tuning, each socket to be marked with the name of a different station.

"With a flex lead coming out through a hole in the panel I thought I could fit the plug on the end of this into any chosen socket, and without further tuning get the station straight off—providing he is not 'off,' of course!

"I know the general idea is to have a separate semi-adjustable condenser between each socket and earth, but I have never seen any hints on fitting up such an arrangement. Please say if there are any special snags to watch for, or useful suggestions to bear in mind."

Such an arrangement is quite practicable, and not difficult to get going successfully if restricted to only, say, four stations. If you attempt to get too many the wiring is apt to get crowded, and spacing becomes difficult.

Choose good quality semi-adjustable condensers, of a kind that have a lock-nut on the adjusting control to fix it at any chosen position. (The very cheap semi-adjustables are apt to "stick," and thus fail to tune properly, and to make good contact internally.)

Mount them close together and near the tuning coil and grid of S.G. valve. We should be inclined to leave the tuning condenser in place, disconnecting its fixed vanes from the rest of the circuit, and joining them instead to one of the sockets provided.

Each other socket goes by a short lead to one side of a semi-adjustable condenser, all the other terminals of these being earthed.

The grid and end of tuning coil which formerly went to the fixed vanes of tuning condenser are left connected together, and are fitted with the flex lead, the plug on which can reach to any desired socket.

When it is placed in that socket joined to the fixed vanes of the original tuning condenser you revert to your present circuit arrangement.

Each other socket may be used in turn, the appropriate semi-variable condenser being adjusted until the desired wavelength is obtained. The use of different maximum value semi-adjustable condensers will be advisable, the larger ones, of course, being used for the higher wavelength stations.

Provided you keep the wiring short and well spaced the scheme should enable you to select any predetermined programme at will, once the initial adjustments have been settled.

EXAGGERATED S's.

W. S. P. (Huddersfield).—"When we moved to this neighbourhood from Cumberland I expected my 2-valve set (detector and 1 L.F.) would be very powerful on the North Regional, which is only just over the horizon.

"But I had no idea what an enormous kick I was going to get from the loudspeaker, even when using just a 3-wire aerial in the loft. I put it up as a temporary arrangement, but there will obviously be no need for an outdoor one, as it is the Northern programme we mostly listen to.

"What I cannot quite make out, however, is a sort of pronounced hiss on speech—the 'S's' all sound exaggerated. It only happens on the North Regional and North National.

"What would be the cause of this?"

The likeliest cause in your case would be the overloading of the detector valve, which can result in the type of reproduction you describe.

As you are situated only a very short distance from a very powerful station—the North Regional is generally considered the B.B.C.'s Best Yet—it is quite possible that even on the aerial you describe the detector is unable to handle all the input you are getting.

Some sort of volume control preceding the detector would cure such a fault, or alternatively you might reduce the size of your aerial still further.

One good, and easily applied, form of volume control, is a differential condenser with aerial lead to moving plates, one set of fixed vanes to the set's "A" terminal, and the other set of fixed vanes to earth. Or a high-resistance potentiometer may be connected similarly.

Anything which enables the aerial's output to be reduced at will should have the desired effect of improving the quality.

IS YOUR SET BEHAVING ITSELF?

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

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

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

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

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

MIRROR OF THE B.B.C.

(*Continued from page* 1124.)

and the Cambridge men in a studio at Broadcasting House.

The motion has not been definitely fixed, but it is said that Cambridge favours a more complete elucidation of the question: "That the cancellation of War Debts and Reparations is necessary for the recovery of World Trade."

The "Hassan" Production.

"Hassan," the only stage piece of the poet, James Elroy Flecker, will be given in two instalments, such as was done in the broadcasts of "St. Joan" and "The Three Musketeers." Part one will be heard on Tuesday, February 7th, and the second part on the following Friday evening.

Henry Ainley (as Hassan) and Leon Quartermaine (as Ishak) will take the parts they played in the original production at His Majesty's Theatre, while the cast will also include Gwendolen Evans, Iris Baker, and Ivor Barnard. "Hassan," with its musical accompaniment by Frederick Delius is particularly suited for broadcasting, because, unlike most "poetic" plays, it has a strong story.

The musical part will be provided by the Theatre Orchestra, conducted by Stanford Robinson. Listeners may remember that as far back as 1926 an abbreviated version of the play was broadcast as part of a Sunday afternoon programme.

Horace Kenney.

Few comedians have evolved such a characteristic act as Horace Kenney, whose sketch introducing the fearless fireman and laughing cobbler is as well known to wireless audiences and gramophone enthusiasts as to those who attend the music halls. On Thursday, February 9th, Horace is making his first appearance outside vaudeville when he plays the leading part in "Ring o' Roses," which is described as a "Cockney comedy programme."

Two days later another light programme is down for performance, as the broadcasters say, but not, for once, in the studios at Broadcasting House. It is being relayed from Berlin, and is called "Funk-Karussell" (Radio Revels), and will be performed by a cast of well-known German artistes, which includes Renate Muller, who did so well with Owen Nares and Jack Hulbert in the film "Sunshine Susie."

Some of us can look forward to hearing this German production as some compensation for having missed "Hier ist Berlin" last November when, during the Birthday Week programmes, it clashed with John Watt's "Tour of Broadcasting House."

By the way, mention of John Watt minds me that he is busy devising a new programme called "Tin Pan Alley," which will deal with the history and "manufacture" of song successes.

The Mike Follows Roy.

The B.B.C. apparently sticks to a good combination for outside broadcasting purposes, and that it is not a question of where a particular band happens to be playing that decides its value for the microphone. A case in point is that of Roy Fox and his Band, which was first heard by listeners playing at the Monseigneur.

True, when he left the Monseigneur, Lew Stone and his Band kept the restaurant on the list of "O.B." points, but the microphone followed Mr. Fox to the Café Anglais, and now it has gone with him to the Kit Cat Restaurant, owned by Gaumont British.

Another interesting sidelight is provided by the fact that whereas the Kit Cat was acoustically unsuitable for broadcasting (and no relays were made from it for several years) the Gaumont British sound engineers have overcome the difficulties.

Forthcoming Programmes.

Lady Simon, wife of a famous industrialist, and herself an active worker in the civic life of Manchester, is giving the first of a series of North Regional talks entitled "Individual Happiness in an Industrial World," on Wednesday, February 15th. Other contributors to the series will include Professor Stocks, Professor Pear, and the Rev. Leslie Weatherhead.

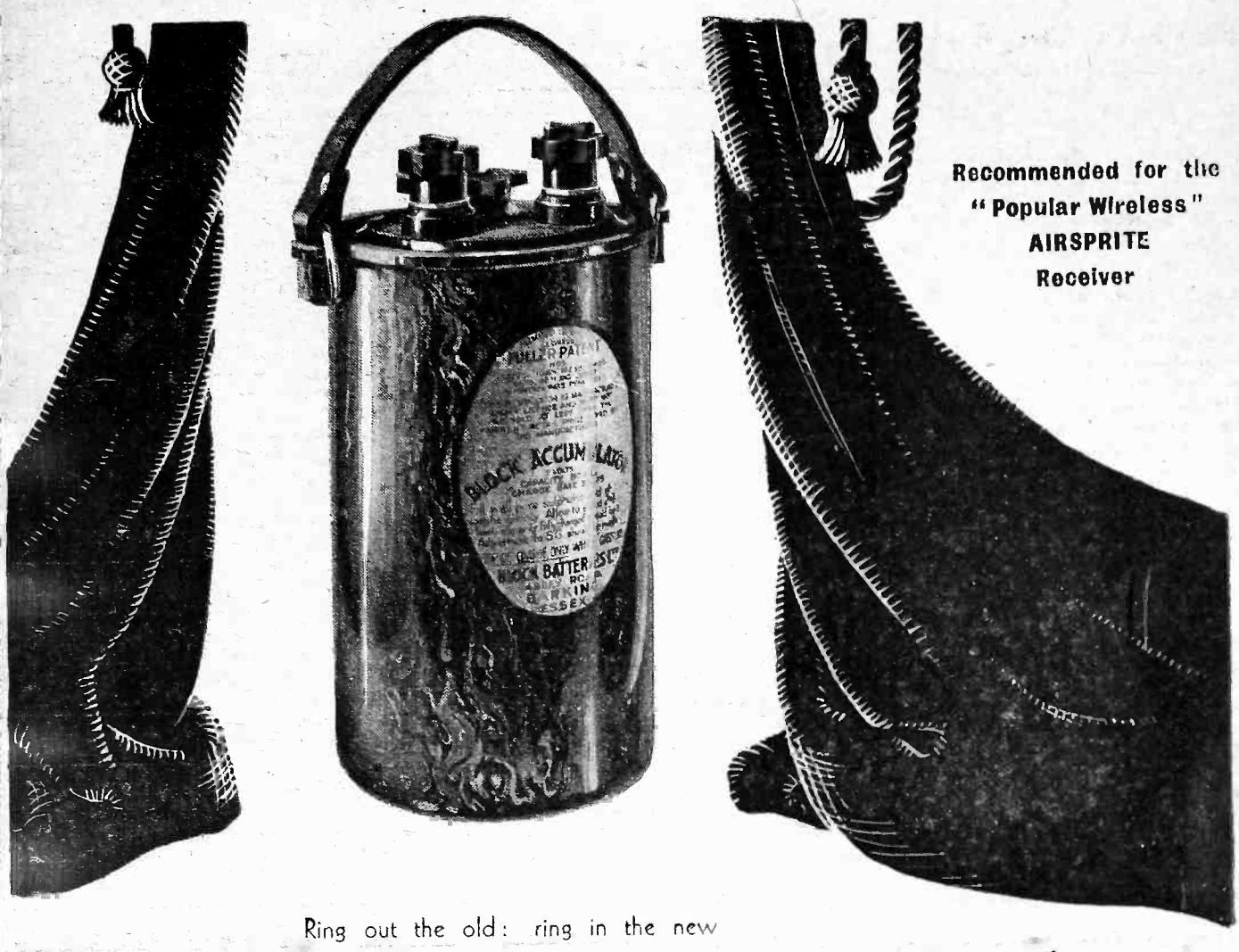
Songs from Africa.

No one, it is believed, has ever heard in England some of the songs of Nyasaland, which Paul Mortimer is including in his recital for Northern listeners on Saturday, February 18th. The tunes were collected by Ella Kidney, who translated the text, and brought them to this country to be arranged by Theodore Holland.

Prizes for Drama.

Although the B.B.C. has been offering prizes for Radio Drama at the Royal National Eisteddfod of Wales for several

(*Continued on page* 1166.)



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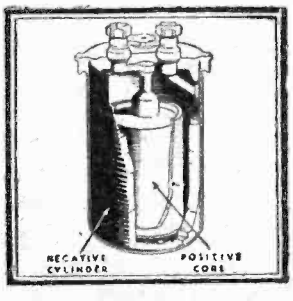

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TAS.Bb.13

MIRROR OF THE B.B.C.

(Continued from page 1164.)

years, no competitor has succeeded in winning one because in the opinion of the adjudicators the plays have failed to come up to broadcast standard.

Perhaps this year's Eisteddfod, which takes place at Wrexham next August, will bring an improvement, but in case it should not, the B.B.C. has decided to make certain changes in the competition at the 1934 Eisteddfod to be held at Neath.

The value of the prizes, one for a play in Welsh and another for a play in English, will be increased from ten to twenty guineas, and should these more tempting awards not be won there will be consolation awards for efforts which show promise.

Quite apart from these prizes, the B.B.C. is badly in need of plays possessing a West Regional interest for inclusion in the programmes from the new transmitter soon to be started at Washford.

One of the difficulties with Welsh people is that although very keen on the drama they prefer acting in plays to writing them. Indeed, in some villages the problem is not to find actors so much as an audience.

Here is an excellent chance for would-be playwrights, whom I would warn to listen before attempting to write, because radio drama requires a very different technique from that of stage plays.

TRADE JOTTINGS.

(Continued from page 1136.)

Had I been the patient one at the H.M.V. end of the line, I think I should have made a suggestion. And the suggestion would have been for her first to obtain a metronome, then to play the record and to set the metronome ticking at second intervals the moment the needle reached the last groove. I feel that it would have made quite an effective interval signal!

Concerning Ferrocart Coils.

A correspondent wrote to me last week to enquire whether I could put him into touch with any firm in this country from whom he could obtain Ferrocart coils.

For the benefit of this reader and others who may be interested, I am able to state that exclusive manufacturing rights for home construction have been secured by Messrs. Colvern. The coils are not yet available to the public, but interested readers who care to write to Messrs. Colvern will be informed the moment the coils are released.

The address to which applications should be forwarded is Mawneys Road, Romford, Essex.

Manufacturing Precision.

I was recently privileged to make a tour of the famous Bulgin works at Barking, and I must confess that until that recent enjoyable visit, my education with regard to the manufacture of such things as switches had been sadly neglected!

The extreme care and precision that is lavished upon the manufacture of even the smallest parts is nothing short of astonishing, and it is no doubt in large measure responsible for the high esteem in which Bulgin products are held both by the Trade and the Public.

Some of them employ considerably more than twenty parts and when one remembers the size of the average switch, it is easy to see that success is dependent upon a high degree of accuracy, not only in the tiny parts, but in the assembly.

The visit was most enjoyable, and the spirit of enterprise and ingenuity which seems to pervade the atmosphere of this Barking hive of industry is no doubt directly due to the electric personality of its chief, Mr. A. F. Bulgin, who is responsible for almost all of the ideas which have done so much to simplify the task of the home constructor.

New "Clix" Home.

I am advised by Messrs. Lectro Linx, Limited, of a recent change of address. The makers of the famous "Clix" connecting devices are now installed at 79a, Rochester Row, Westminster, London, S.W.1, to which address all correspondence, etc., should in future be directed.

Their new telephone number is Victoria 3541-2.

* * *

The Block Accumulator.

One of the most interesting electrical developments of the early part of the century was the Fuller block accumulator.

We are, therefore, not surprised to hear from Block Batteries, Ltd., of Abbey Road, Barking, that the new Block plateless accumulator, which has been developed from the original Fuller model by the son of the inventor, is meeting with commendable success in radio circles.

Our Technical Editor reported on the merits of the Block some weeks ago, and the enthusiasm of other users seems to confirm his opinion.

"P.W.'s" postcard literature scheme saves you time and money! Week by week in these columns, reviews are given of all the latest catalogues and leaflets appertaining to every aspect of radio, and if you want any or all of the literature to which reference is made you need only send a postcard giving the numbers of those in which you are interested and the required literature will be sent off to you free of charge except where otherwise stated. The reference numbers in each case are given at the end of the appropriate paragraph, and applications need not be limited to any one particular issue of "P.W." Postcards, on which your name and address should be printed in block capitals, should be sent to G. T. Kelsey, at Tallis House, Tallis Street, London, E.C.4.

Telsen's New Kit.

The Telsen Electric Co., Ltd., informs us that, owing to an error and an oversight, the Telsen "Kit" announced in last week's issue of "P.W." was called the Telsen "Astral 3" instead of the Telsen "Astrala 3."

TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio technique.

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

Condenser Tests.

SOME people think that all condensers should have the highest possible insulation resistance and that a leaky condenser is of no use whatever. This is not necessarily true, because there are positions in the set where you can make excellent use of a leaky condenser, provided the leakage is not too great. Of course, if a condenser is leaking badly it is scarcely acting as a condenser at all, and you may get all kinds of noises and crackles set up by it.

A condenser in the grid circuit should have a high insulation resistance, but a condenser which is used in a filter circuit may be none the worse for a slight leak. On the other hand, if you are using a condenser in a resistance amplifier for coupling purposes you should take care that it is quite satisfactory, otherwise you may get noises and the working of the amplifier be interfered with.

Try This.

A simple way to test a condenser, particularly one that has a fair capacity, is to charge it up with, say, 100 or 120 volts from the H.T. battery (or 200 and odd volts if you happen to have D.C. mains), and then to leave it over different measured intervals, say 10 seconds, 30 seconds, one minute, five minutes, one hour, and so on, re-charging, of course, for each test, and trying the effect of short-circuiting the condenser at the end of these respective periods.

You will soon get an idea whether it is holding its charge well. If a condenser of fair capacity will not hold a charge sufficient to give a spark after having been standing on charge for a few seconds the leak must be pretty bad.

I *have* known condensers of two or four microfarads capacity which will give a spark after having been standing charged for many hours.

Pick-up Pointers.

When you want to connect a gramophone pick-up into your receiving set you know, of course, that you can easily use the detector valve, at any rate on most sets, as the first low-frequency amplifier; for this purpose the detector must have a suitable negative bias given to its grid.

In a commercially-made set in which provision is made for plugging in a pick-up the negative bias is generally provided for at the same time and usually the pick-up switch does the whole business complete.

Mind the Last Stage.

What is not commonly recognised, however, is that some care must be exercised in regard to the strength of the impulses from the pick-up which are communicated

(*Continued on next page.*)

TECHNICAL NOTES

(Continued from previous page.)

into the detector, or what is now the first L.F. amplifier.

It is more than likely that if the full strength of the impulses is used, although the first L.F. amplifier may be able to cope with them all right, the output stage of the set will be overloaded, and you will generally find that it is necessary to employ some form of volume control so as to keep down the input into the detector to a value which will prevent overload of the last valve.

Perhaps the most usual form of control for this purpose is a potentiometer of a maximum value of, say, 50,000 ohms, connected across the pick-up leads, one of the terminals being also connected to one of the input pick-up terminals on the set, whilst the other pick-up terminal on the set goes to the slider of the potentiometer.

In this way we have the resistance element of the potentiometer shunted across the pick-up, whilst the input pick-up terminals of the set are tapped across a selected part of this resistance. It is important to have the maximum resistance of the potentiometer element sufficiently high in value, otherwise the higher notes in the reproduction will be sacrificed.

An External Amplifier.

I had a case a day or two ago where I was using a radiogram of a very good make for demonstration in rather a large hall and although the sound was ample when the hall was empty, it became quite insufficient when the hall was full of people owing, of course, to the well-known damping effect produced by the audience. It then became necessary to use an external mains amplifier and special loudspeaker to match. At first I intended to disconnect the pick-up leads from the amplifier, inside the radiogram, and to connect them straight to the external amplifier, so leaving the amplifier of the radiogram out of circuit altogether. This, I think you will agree, would be the obvious thing to do to avoid any sort of distortion trouble, particularly as the external amplifier was a powerful one capable of giving an undistorted output of about 25 watts.

A Suitable Point.

Before I had an opportunity of fixing this, however, I found that one of my assistants had already disconnected the output loudspeaker leads of the radiogram and had connected these direct into the input power terminals of the separate amplifier.

As the whole thing was then working "top-hole," as he proudly explained, there seemed to be no point in altering it. But more often than not, if you ever want to make a similar arrangement you will find that you will get better results, as regards purity of reproduction, by using your pick-up direct on to your separate amplifier, or at any rate tapping in after the first or second, preferably the first, stage of the L.F. amplifier of the radiogram.

Divided Secondary.

Many experimenters do not seem to realise the great advantage of a transformer with a divided secondary when a rectifier is to be used with it. If you have a

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TECHNICAL NOTES

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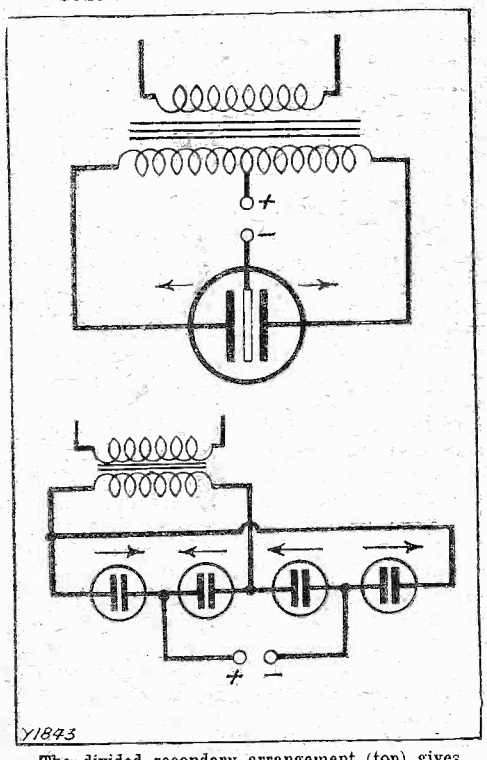
divided secondary for the output it only needs a three-pole rectifier, that is to say, one rectifier with three electrodes, one neutral electrode, and two rectifying electrodes.

For example, if this rectifier is a liquid rectifier, say a tantalum rectifier, it requires one lead electrode and two tantalum electrodes. Connections are as shown in the Figure herewith.

If, on the other hand, the output winding of the transformer is not divided, then for full-wave rectification (the above-mentioned arrangement gives full-wave rectification, of course) we require four separate two-pole rectifiers which are joined together in series and then connected up as shown in the second part of the Figure.

In a metal low-tension rectifier the four rectifiers are actually clamped together into what appears to be one unit, but in point of fact the connections shown are as in the diagram, where the rectifier is to be used with an undivided output winding.

CIRCUIT CONNECTIONS



The divided secondary arrangement (top) gives full-wave rectification much more easily than a transformer with an untapped winding.

Smoothing.

If you are content with single-wave rectification, then naturally you only need to use one rectifier even with an undivided secondary (assuming, of course, that the voltage to be rectified is not too great for the single rectifier).

Generally speaking, full-wave rectification gives you a much smoother and more satisfactory effect, and when used for supply to the set—as distinct from battery charging—much easier to smooth out with the minimum of condenser and inductance.

The direction in which the current can flow through the various rectifiers is indicated in the Figure by means of small arrows.

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TECHNICAL NOTES

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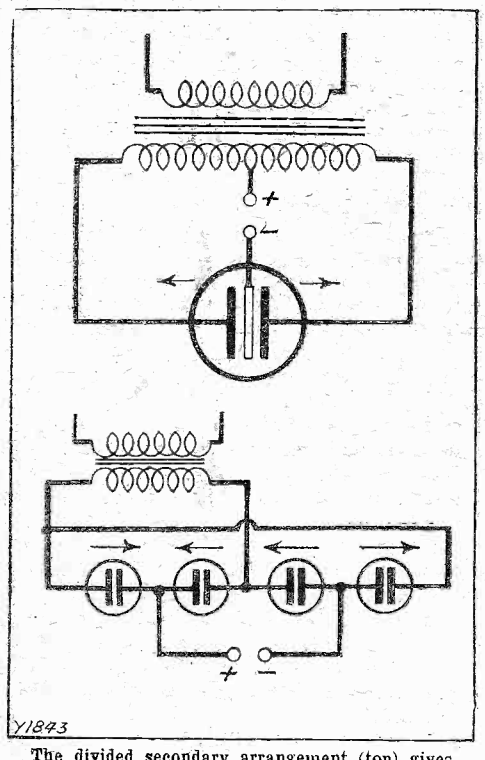

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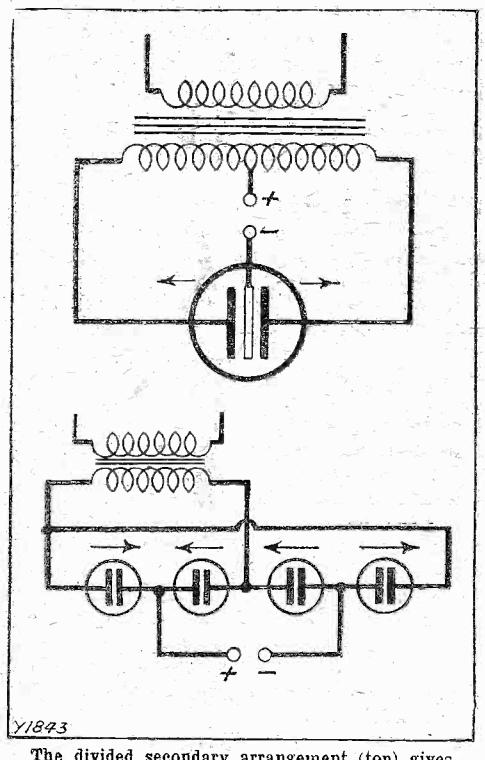
CIRCUIT CONNECTIONS



The divided secondary arrangement (top) gives full-wave rectification much more easily than a transformer with an untapped winding.

point of fact the connections shown are as in the diagram, where the rectifier is to be used with an undivided output winding.

Smoothing.

If you are content with single-wave rectification, then naturally you only need to use one rectifier even with an undivided secondary (assuming, of course, that the voltage to be rectified is not too great for the single rectifier).

Generally speaking, full-wave rectification gives you a much smoother and more satisfactory effect, and when used for supply to the set—as distinct from battery charging—much easier to smooth out with the minimum of condenser and inductance.

The direction in which the current can flow through the various rectifiers is indicated in the Figure by means of small arrows.

(Continued on next page.)

TECHNICAL NOTES

(*Continued from previous page.*)

Multiple Tuned Circuits.

In view of the very exacting requirements of multiple tuned circuits and high selectivity, it is not surprising that the ganged condenser has become almost a laboratory precision instrument and a very different proposition from the ordinary single variable air condenser of a few years back. Perhaps we do not sufficiently appreciate all the work which has gone into the design and construction of the better class of ganged condenser of to-day.

One of the principal mechanical points to watch is the twisting or distortion of the chassis or framework of the condenser. It will be obvious that if any action of that sort takes place it will be impossible to rely upon really fine and accurate ganging as the rotor is turned. Rigidity in the framework of the condenser is most important, as also in the construction of the individual rotor assemblies.

Ganged Condensers.

Some people still believe in threading the movable vanes on to the axle or spindle, with spacing washers inserted between them, but other manufacturers now consider this method to be unsatisfactory owing to the variations which are liable to occur in commercial spacing washers.

Another point raised against this method is that oxidation may take place between the spacer and vane and so introduce high-frequency resistance, whilst a still further point is that this spacer method does not make for very high mechanical rigidity of the finished assembly and consequently, when high-frequency potentials are applied to the condenser, high-frequency mechanical vibrations may be set up, which will result in losses and inefficiency.

Moving Vane System.

A method which is now employed by some manufacturers to get over this spacer system is to use a very stout and substantial axle, slotted at regular intervals so as to admit of the vanes being inserted in the slots. These slots can be cut with great precision. When the vanes are assembled, the whole is subjected to a suitable pressure parallel to the axle, and in this way the vanes are permanently locked in their positions in the slots. The assembly produced by this method has the advantages of mechanical strength, geometrical regularity, low electrical resistance and comparative freedom from high-frequency vibration.

Another very important point to look for in a ganged condenser is the number and character of the bearings. Too often the axle rests in an insufficient number of bearings, with the result that sloppiness or sagging occurs.

(*Continued on next page.*)

PHOTOGRAPHS FROM READERS

The Editor is always glad to receive from readers topical photographs with a radio interest, suitable for publication in "P.W."

10s. 6d. will be paid for each photograph accepted for publication.

TECHNICAL NOTES

(*Continued from previous page.*)

Matching.

In the ordinary way you would not worry about a very small defect of this kind, but when you consider the extremely small capacity differences which can be tolerated and how small a mechanical movement will put the individual condensers "out," you realise the importance of first-class mechanical design.

The specification laid down by the Standardisation Committee of the Institute of Radio Engineers say that for first-class ganged condensers "the rotor and stator sections shall be matched to an accuracy of one-half of one per cent, plus or minus one micro-microfarad (0·000001 mfd.) at any position of angular rotation of the shaft."

To compensate for any discrepancies in the matching of associated circuits trimming condensers are usually provided and these may conveniently have a range of, say, one micro-microfarad up to 50 micro-microfarads (0·000001 mfd. to 0·00005 mfd.). Incidentally, when using the trimmers for balancing up the circuits it is a good plan to select a medium-frequency, such as 400 metres, at which to work.

Pentode Output.

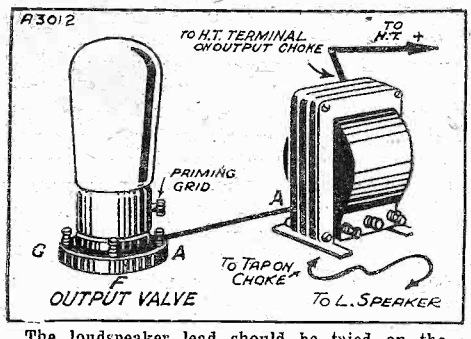
When you are using a pentode output you will find that the tone-correcting circuit is particularly useful, as it helps a good deal in getting over the effects of the pentode and the loudspeaker being unsuited to one another.

In this case the tone-corrector, that is, the resistance and capacity in series, may be connected from the anode of the valve to earth or, if you prefer it, to the remote terminal of the loudspeaker. A choke should be introduced into the high-tension feed to the anode of the valve.

Loudspeaker with Transformer.

If a loudspeaker is used with its own output transformer, such as a moving-coil, for instance, you can use this with a pentode valve, but it is very desirable

TRY THE TAPPINGS



The loudspeaker lead should be tried on the different tappings provided to see which suits it best. (You should switch the set off before altering the connections.)

to use a tapped choke. If the choke is provided with a fair number of tappings, you can easily find out by actual trial which tapping gives the best results.

This is really much more convenient than using an untapped choke and having to find out for yourself what is the best position for the tapping. When you use this arrangement, by the way, it is not necessary to use the co rrector.

(*Continued on next page.*)

TECHNICAL NOTES

(Continued from previous page.)

Why Bother?

Before leaving the subject of the output stage and the loudspeaker, I should perhaps say that many people give themselves a lot of unnecessary trouble by choosing a speaker which is unsuited to their receiver and which is, in any case, unnecessary for their requirements.

For instance, I have seen people using a set in quite a tiny room with a large moving-coil loudspeaker which, if properly operated, would be sufficient to fill a room ten times the size. Needless to say, in some cases the receiver is totally inadequate for the speaker, with the result that this hefty loudspeaker is being half-starved and putting up in consequence a wretched performance.

If they had had the wisdom to choose a speaker suited to the requirements of the room, which would also have been much more suited to the output capacity of the receiver, they would have killed two birds with one stone by getting reproduction which was not only better in itself but better suited to the requirements.

Remember this when you are considering the use of a particular speaker for a receiver. It is no use being foolishly ambitious and choosing something which is altogether beyond your requirements and which you haven't the means of operating under its best conditions. To use a commercial phrase, it is like having "champagne taste and beer money."

Induction Motors.

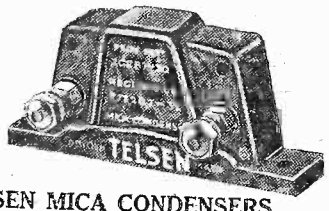
Several readers have asked me whether there is any advantage in using an A.C. synchronous gramophone motor instead of an ordinary A.C. induction motor or a universal A.C.—D.C. motor with commutator.

As regards the last-named, I would certainly advise you, if you definitely want to work on A.C., not to go in for the universal type of motor. The induction type or the synchronous motor is preferable since there are no sparking contacts to cause interference in the amplifier.

The induction gramophone motor is extremely silent, with freedom from mechanical vibration. The main advantage of the synchronous motor is that it turns at a precise speed and does not, therefore, require mechanical regulation of speed.

TELSEN SELF-SEALING CONDENSERS

MICA CONDENSERS AND GRID LEAKS



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Adaptable to flat and vertical mounting. H.F. losses, even in the larger sizes, have been virtually eliminated. Grid leak clips supplied free with the smaller capacities.

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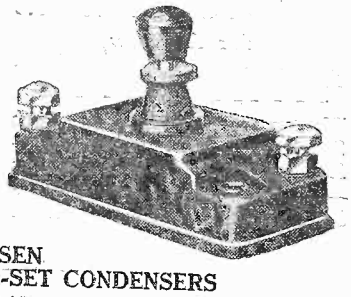
Also ·006 mfd. - - - - - - - **1/3**



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Absolutely silent and practically unbreakable, the resistance being unaffected by the application of different voltages. Guaranteed completely non-inductive. Produce no capacity effects. In capacities of from 5 to ¼ megs. - - **1/-**

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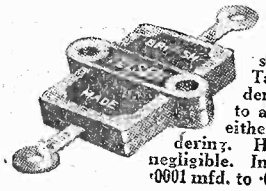

Of compact and sturdy construction. May be mounted on either insulated or metal panels. Tags enable the condensers to be connected to any other components, either directly or by soldering. H.F. losses are negligible. In capacities of ·0001 mfd. to ·002 mfd. - **6D**

TELSEN

TELSEN SELF-SEALING CONDENSERS

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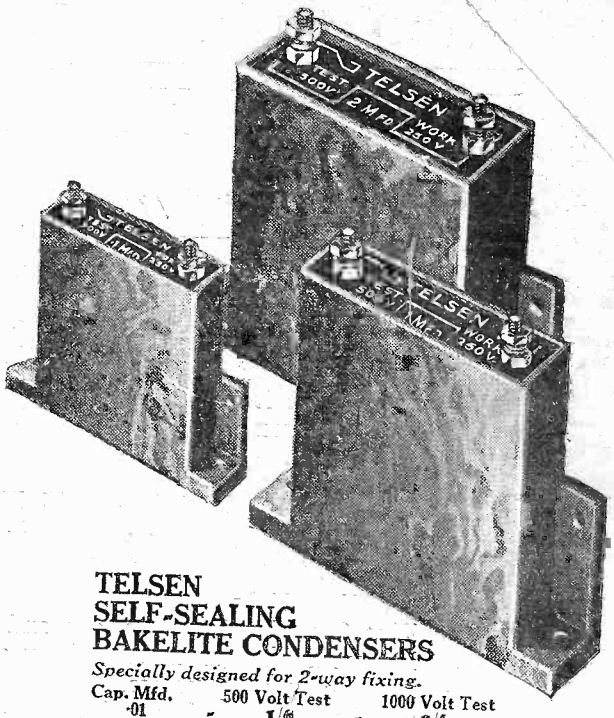

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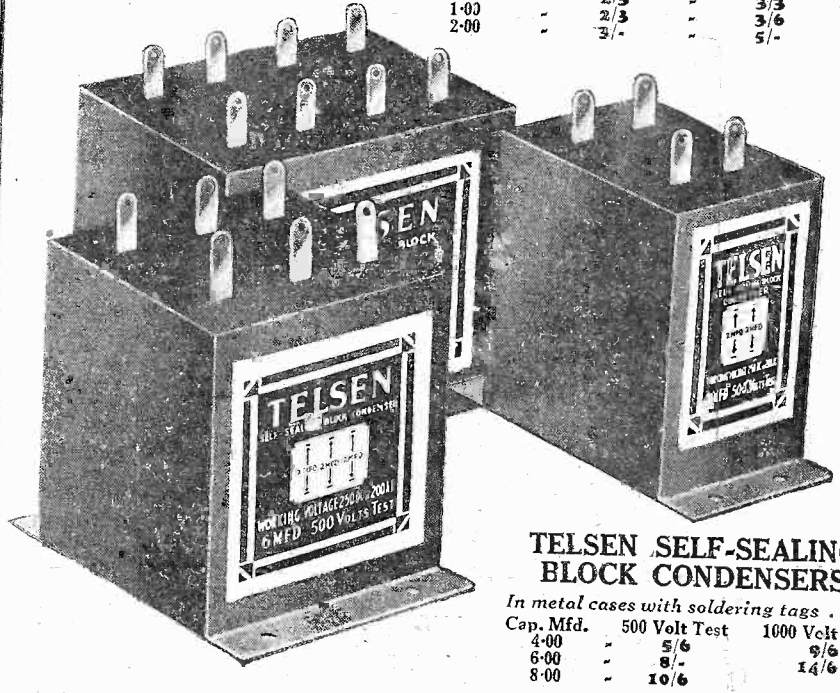
Cap. Mfd.	500 Volt Test	1000 Volt Test
·01	1/6	2/6
·04	1/9	2/9
·1	1/9	2/9
·25	2/-	3/-
·5	2/3	3/3
1·00	2/3	3/6
2·00	3/-	5/-



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In metal cases with soldering tags . . .

Cap. Mfd.	500 Volt Test	1000 Volt Test
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6·00	8/-	14/6
8·00	10/6	

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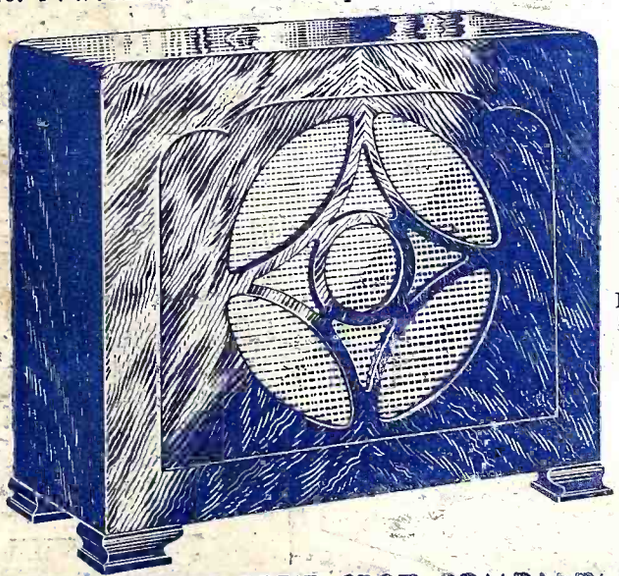

BLUE SPOT 100D 52/6

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