

# The Wireless 6<sup>d</sup> Constructor

Vol. XV.

NOVEMBER, 1932.

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THE  
**S.T.**  
400

Preliminary  
Article

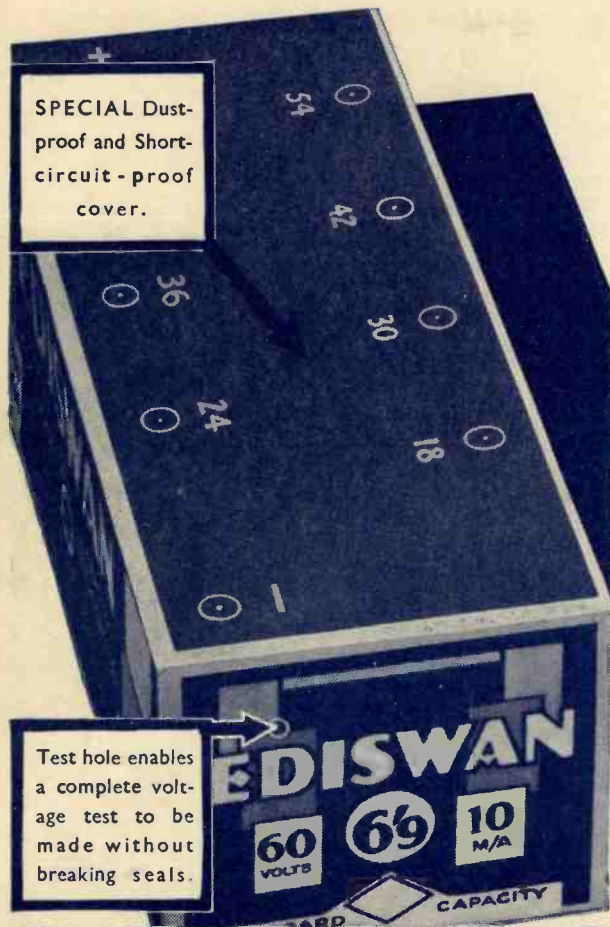
DETAILS  
of GREAT  
"AERIAL"  
TOUR.

BY

*John  
Scott-Taggart*



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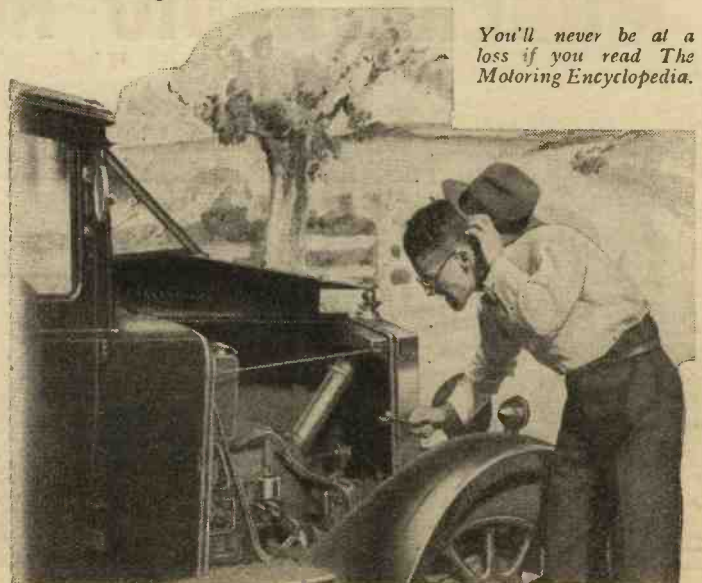
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# The WIRELESS CONSTRUCTOR

## The EDITOR'S CHAT

Mr. Scott-Taggart's "S.T.400" Receiver—Valuable Gifts for our Readers—What a Query!

FOUR weeks to go! At the moment of writing, Mr. John Scott-Taggart is doing a final "finishing-off" tour with his great new set.

When he last called in on us he was quietly confident that he had produced a receiver which would capture new records. He showed us typical letters from readers who had heard the set in their own homes.

Three such letters are given in this issue. They come from three great broadcasting centres, and are enough to whet the appetites of the most inactive of constructors!

### Great Benefits

The full scope and value of "S.T.'s" preparations will only be realised next month when he himself tells us what he has done. But one needs little imagination to appreciate the great benefits which must accrue from such a home-to-home tour.

The whole scheme was as daringly original and of as great practical utility as any of his set inventions. To carry it out successfully required a circuit of more than ordinary ingenuity and merit. Next month you will see it, together with full constructional details of the "S.T.400."

### There are Four Valves

The only information available so far is that there are four valves! How would *you* arrange four valves, and what kinds would you use, for a set to prove successful everywhere in Great Britain? A fascinating problem! It is little wonder that everyone is eager to see the solution offered by the most successful set designer in the country.

This is certainly going to be a four-valve winter—an "S.T.400" winter—although those who are graduating to the three-valve stage cannot do better than build the "S.T.300." Mr.

Scott-Taggart says that he cannot, as far as three valves are concerned, better the "three hundred." He has no plans whatever for another three-valve set.

### Many Pleasant Surprises

There are going to be many surprises next month, but they will all be pleasant ones! The most ardent three-valve adherent is going to find his objections to four valves "not only foreseen but forestalled," to borrow Mr. Scott-Taggart's own phrase. It is his secret now, but it will be yours on November 15th.

In addition to the details of the "S.T.400," each copy of next month's WIRELESS CONSTRUCTOR will contain

as gifts a 1s. full-size blueprint of the "S.T.400" and, in addition, a 6d. book entitled "Everybody's Wireless Handbook"—a guide of permanent value to all users of wireless sets. Surely there has never been offered to the wireless public such a treble bargain—and yet the price of this bumper issue will remain as usual at 6d.!

We expect to break all records in circulation. Tens of thousands were too late to buy the "S.T.300" number. Tell your friends about this new "S.T. 400," but see you do not miss your own copy. November 15th!

### The Top Dogs!

The Manchester Show served to remind us that Lancashire and Yorkshire are the two "top dog" counties as regards licence figures.

The latest figures show that the number of licences in Lancashire is 542,194, an increase during the last three months of 21,845. Yorkshire comes next with 460,202, an increase over the same period of 22,199. The Greater London area comes next.

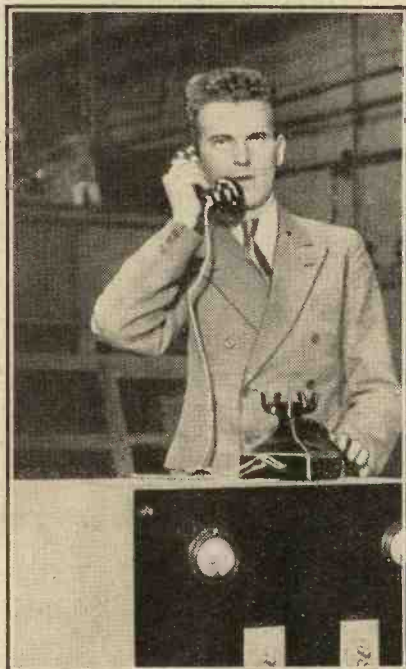
### A Reader's Poser

A correspondent sends us the following query, and as it presents a technical problem of such difficulty that our staff technicians cannot solve it, perhaps readers may care to have a shot at it.

"It is reported," states our querist, "that the B.B.C. is to install a £10,000 organ at Broadcasting House. Can you tell me how much 'wind' is required to play 'In a Monastery Garden' in three different (so-called) programmes from three different (so-called) stations? And, further, would it reduce the cost of the organ (and consequently the drain on funds supplied by licensees) if some of the B.B.C. talk 'stars' supplied 'hot air' direct instead of pump-driven?"

No prizes are offered!

### POLICEMAN INVENTOR



A member of the Bradford Police Force, who has invented a portable radio receiving set for use on the motor-cycles of police patrols.





# Announcing

# S.T. 400

**N**EXT month we publish all details of the second great set by John Scott-Taggart, F.Inst.P., A.M.I.E.E.

It will be known as the "S.T.400," and without displacing its famous predecessor, the "S.T.300," it will prove very much more sensitive and selective.

The "S.T.400" will be a four-valve set—economical to run, brilliant in performance. The utmost secrecy has been maintained with regard to its circuit, which is a triumph of originality and effectiveness. On November 15th an immense radio public will besiege the bookstalls and newsagents. When the "S.T.300" "came out" tens of thousands of late-comers were told: "Sold out!" See that you do not "miss the boat"!

The "S.T.400" will contain features of intense interest even to

those who are not contemplating the building of a new set. It is designed to work equally well on poor aerials, under bad conditions, in flats, in the remotest places and near the B.B.C. stations. It is calculated to make an irresistible appeal to the constructor who would normally build a three-valve set.

And, remember, the "S.T.400" is not only the work of Britain's leading set designer, but embodies all the experience gained by Mr. Scott-Taggart in his great tour of the country testing experimental models on readers' own aerials.

Spread the good news amongst your friends! Just the words: "S.T.400"—November 15th."

*The Editor*



# GET READY!

I AM in London. Fagged out. For exactly four weeks I have toured Great Britain from top to bottom and from side to side. On Tuesday I start off again, to fill in odd gaps; to visit late writers who offered to let me use their aerial and conduct tests with the all-but-final version of my new receiver.

"S.T.400." The initials of my surname and a number. As I write, announcements are being made regarding other sets. Their names make my choice look pallid. "S.T.400." Nothing pretentious about it, is there? And yet it represents the concentrated essence of the hardest preparatory work I have done for any set since I began to design for the constructor—which means since pre-war days.

I am in London because I have to see about certain advance preparations in connection with my contributions to this journal. I am fagged out because I have travelled thousands of miles in these weeks; because—except for three odd nights—I have been in different readers' homes every night.

## New Conditions Daily

Travelling by air under all conditions of weather, entering a large town and, with letter in hand, asking policemen, shopkeepers, loiterers at street corners, where the required street is. Doing the test. Talking. Finding an hotel. And then off again. Loading, packing, checking.

I took no risks; I took batteries, a wavemeter (to assist in verifying each station), a cheap speaker of a popular type, copies of the programme papers to check stations, wire, a few tools—in fact, the ordinary accessories which constructors possess. I did not want to be told that batteries were being charged or that the speaker was defective.

Remember that every home I entered was a strange one. I asked readers who were willing to give me shelter for two hours to drop me a card. Armed with a selection of replies, chosen as representative of districts, I set off. I knew nothing of



By

## John Scott-Taggart

A.M.I.E.E., F.Inst.P.

*In the midst of his aerial tour, undertaken to ensure that his great new set will be a universal success, Mr. John Scott-Taggart has made time to pen this article, the last before the curtain goes up on a receiver which we believe will sweep the country.*

the aerial, nothing of the man, nothing of local conditions except the general position.

"Are you Mr. Scott-Taggart? You found your way all right?" "Yes, thanks." But what a way in most cases!—"You go down this street about a mile till you come to the second cross-roads; then you turn left and go along the tram-lines till you come to the Picturedrome: don't turn right, but go on till you get to the Co-op. Turn sharp left and go along Bucks Road. You take the fifth—no, wait a minute, it's the sixth turn on the right. Go straight on till the road forks. . . . Anybody will tell you where Bridges Avenue is. You can't go wrong."

## Unfavourable Circumstances

I have said I knew nothing of local conditions. I am wrong. In most cases I was ignorant of conditions. But some readers had explained the impossibility of their putting up an average aerial. Others said local conditions were unfavourable. But each and every offer of an aerial was in reply to my appeal to be allowed to

carry out tests under unfavourable circumstances. If you look up my original request you will find the wording.

## Invaluable Tests

How the set performed you will know next month. Sample preliminary letters from readers in the Scottish, North Regional and London areas appear in this issue. They will give you some idea.

Remember that the tests, each brief but cumulatively invaluable, were carried out without any practical knowledge of the aerial and earth or the degree of selectivity I should want. In all my tests, all the B.B.C. stations were working.

Where a reader gives the number of stations received, there are obviously omissions of some which were closed down by the time they were reached.

There were always some stations not loggable through heterodyne interference, spark jamming,

"bad nights," fading. These would probably be capable of being added to any figure given if listened for, say, the next evening.

But the next evening meant for me a new home, new conditions, a new test.

## Quick Results—Easy Handling

Let any reader of this take his set—factory-built or home-made—to an unknown aerial in a different district and see how many stations he can get during one test! His eyes will be opened at the difficulty of doing it to order. That the "S.T.400" has done much means that it will do even more in the leisurely conditions of an established home.

If, say, normally reliable stations do not happen to come in well on a given night, well—it's a pity! They don't figure in my log.

And remember two things: All stations were identified—and that meant some delay. There was no time—and no need—to get the most out of the set either as regards selectivity or sensitivity. Quick results and easy handling were obviously



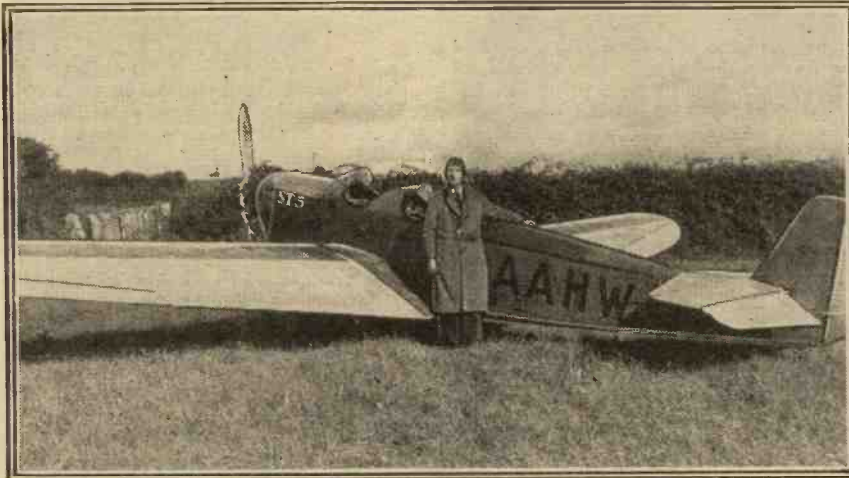
## "Tested in August—Built in November"

necessary. This is a high tribute to the set. The explanation of the successful results lies in the fact that the set has ample reserves for practically any conditions.

The second point to remember is that the letters describe tests made

and darkness will have set in by the time you get down to a night's radio work. Please remember my August evenings, when you, perhaps, were bathing, cycling, playing tennis! "Tested in August, built in November" means that you will be in clover.

### "DROPPING IN" ON A READER



A typical photograph of "S.T." calling on a Cornish reader. The 'plane, loaded with the "S.T.400" equipment and piloted by Mr. Scott-Taggart himself, would land in a convenient field and be left "in the corner" for the night. Next day—off again to a different field, different aerial and different conditions.

in August—for several reasons one of the worst months in the year for reception.

I began my first London tests before

I want you to understand the difficulties the set has surmounted. There is so much ambiguity about claims for sets that a full account of

heard the set in one spot—in Central London. I also published the dial readings of stations I had received on the set, although I knew, as every sensible reader knew, that some would get fewer stations, either because of aerial or location disadvantages.

### An Unprecedented Step

In the case of the "S.T.400" I have done an unprecedented thing. It is not only unprecedented, but an extraordinarily convincing thing. I have taken the set under conditions which you can compare directly with your own. You will hear stark reports about its performance. Facts. Facts, not vague opinions. You already are hearing in this issue some of the results—not from me, but from the mouths of men like yourselves—you who will ultimately build and use the set.

Radio journalism tends unconsciously to drift into vagueness and adjectival exaggerations. The few sets that are quietly described without hysteria are usually either very bad or very good. In neither case are they built in any quantities. If they are good, their lack of success is a great pity. The fault, however, lies largely with the wireless public, who are drugged by fancy names and fancier claims.

### WHAT THE NORTHERN REGION THINKS

112, Church Road, Kearsley,  
Lancashire.

Sir,—In the September issue of "The Wireless Constructor," Mr. Scott-Taggart advised anyone who, having built the "S.T.300" and were considering adding another stage, to wait until his latest set was published—and no wonder! It was, indeed, a pleasure to have him at the above address demonstrating his new production, the "S.T.400."

The set was absolutely uncanny, what every wireless enthusiast has only dared to dream about.

My own aerial is a mediocre inside one, and I did not expect very much in the way of results.

Fifty-five stations from the "World Radio" list were on the ether, and each one of them was received clearly, strongly, distinct and absolutely separate on the loudspeaker.

Königswusterhausen was clear. Eiffel Tower was separated from Warsaw with ease, as was Prague from North Regional. Hilversum and Bordeaux-Lafayette were clear of North National.

Muhlacker, London Regional and Graz were clear of each other. Leipzig and London National did not interfere. Lwow, Scottish Regional and Hamburg could all be got without interference from each other.

It must be noted that during the tests all the B.B.C. stations were working all the time.

Stations such as Vienna, Rabat and Riga came in wonderfully; truly everything at your feet—with an inside aerial be it noted!

Throughout the scale on both wavebands the volume was wonderful.

The richness of tone I did not think could be achieved without the use of mains-operated valves, yet it was there in its entirety.

I have no hesitation whatever in saying that, in my opinion, 1933 all-mains super-het. models will have to give way to this truly marvellous "S.T.400"; and if what I have seen and heard had only been reported to me, I would not and could not have believed it. Yet the above results were obtained on my own aerial.

Thanking Mr. Scott-Taggart for a very wonderful radio evening,

I am, Yours truly,  
FRED HOWARTH.

the flying tour began. Obviously, there was no need or use for an aeroplane around London.

It will be October when you read this; clocks will have been altered

all the attendant conditions has, in my opinion, become essential.

When my "S.T.300" article was published, I also gave the written opinions of several readers who had

Set after set, set after set—all, of course, "better" than the rest! This was the state I found things in when on January 15th of this year I returned to radio journalism. I told



## Follow the Lead of a Designer of Reputation

readers plainly that I disagreed with such a policy and would be no party to it. I have more than kept to my word. Nearly a year before bringing out a new set—and then it has four valves! And I have nothing in three-

The wireless public is getting sick of drug-taking. A few novices will continue the habit, but seasoned amateurs will tend to follow the lead of a designer of proven reputation. There is a tremendous amount of scepticism abroad.

in building up the confidence of the home-constructor. If I were a self-satisfied sort of person I should sit back and say: "Here's the 'S.T.400.' If you don't like it, well——"

People have said to me: "What on

### WHAT THEY SAY IN SCOTLAND

Gardonald Gardens,  
Glasgow.

Dear Sir,—I had intended to apply for inclusion in Mr. Scott-Taggart's list of S.N.U.'s (stiff-necked unbelievers), but after he had "flown" in on us with his forthcoming new set, the "S.T.400," I was immediately converted.

We had a very pleasant evening with the new set on my aerial here, which is not too good, the lead-in being 25 ft. long, coming through the house from back to front and just tacked to the wall. (I offered to let Mr. Scott-Taggart test his set in the back room, and so cut out this lead-in, but he said he wanted to take conditions as he found them.)

The set was fixed up, and Mr. Scott-Taggart bagged a list of 55 stations on the medium waves and 12 on the long waves. Of these stations, two were not definitely identified, but were good, while three were common waves and of no value. There was thus a grand total of 64 stations, all at real loudspeaker strength and perfectly clear of each other. This omits several stations which had closed down when their turn came.

The quality of reproduction was very fine indeed.

What struck me most was the keen selectivity of the set. Not only was a 9-kilocycle separation easily obtained, but when greater selectivity was needed the receiver proved equally satisfactory (e.g. separating Algiers from Stuttgart, 6.7 kc. apart, or Eiffel Tower from Warsaw, on the long waves, 5 kc. apart). The station-separating powers of the set, with the B.B.C. in operation, were most marked, and were not obtained at the expense of quality.

The operation of the set seems perfectly simple, and, to my surprise, Mr. Scott-Taggart used no calibration chart to obtain the stations. But, once received, their identity was established by relative position, language, programme, etc., and in each case by an accurate wavemeter.

Mr. Scott-Taggart is, I consider, the real friend of the constructor. He has faith in his work, and sets out on the bold policy of visiting the readers he caters for, coming right to their fireside and demonstrating what his set can do—not only to his host, but to himself.

He intends his sets to get certain results, and he travels round gathering experience as he goes, and this policy which he so whole-heartedly carries out for the constructor must be of great benefit to his readers.

I await with keen anticipation the published details of this new set, and I am confident that there will be very many constructors here in Scotland who will build this real "star" set which has proved itself suitable to our geographical position.

I have been a radio enthusiast for many years, have built 26 different sets, and now possess a 50-guinea mains radio-gramophone, a leader in its class. All I can say is that the "S.T.400" far outstrips anything I have heard.

Mr. Scott-Taggart will be responsible for my hunting out the old tools and having a "go" again! I will report later on *re* the set I produce.

Yours faithfully,  
ROBERT YOUNG.

valve sets to beat my "S.T.300," described in the February WIRELESS CONSTRUCTOR. It is this winter's three-valver, and ready to compete with any new three-valve set produced. You can tell your friends that.

But about this drugging accusation of mine. Once you lap up highly coloured accounts of sets' behaviour you encourage and expect further exaggeration when new sets are produced. The reader is largely to blame. On January 15th I started reversing the process. I started not by the extreme of presenting a bald, uninteresting account of the set, but by introducing the "facts" system. I gave demonstrations and published reports by "demonstratees." Facts, in short.

### No Artificial Enthusiasm

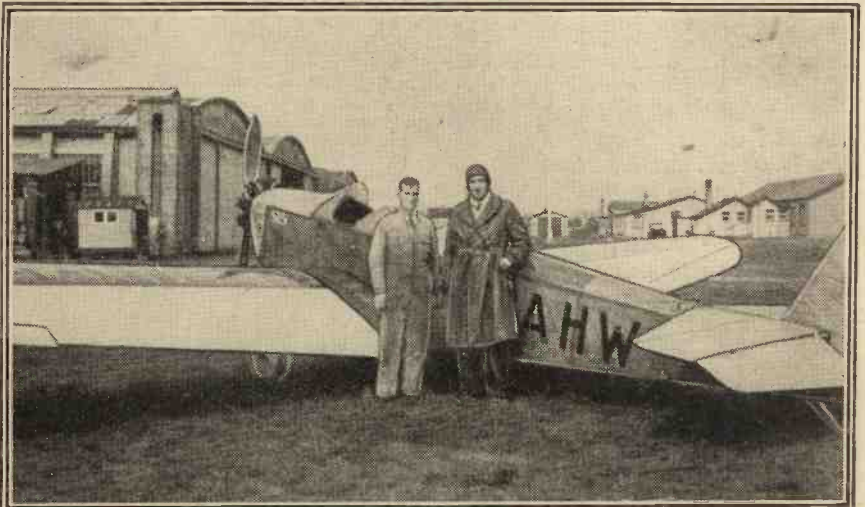
I want the WIRELESS CONSTRUCTOR reader to be a "sober" reader. If the Editor or the staff exhibit any enthusiasm, it will be based on the facts of my article or readers' opinions. It will not be an artificial enthusiasm specially manufactured for injecting under the skins of readers.

But the stiffest-necked unbeliever, if at all keen on his hobby, shrugs his shoulders and builds still another set.

I, personally, have spent a decade

earth do you want to go careering round the country for? You don't need to do that to make a success of your next set."

### SCOTLAND BACKS THE "S.T.400"



Here is our famous contributor photographed on September 4th at Renfrew Aerodrome, Glasgow, after concluding his first Scottish tour with the "S.T.400." He is seen with the assistant ground engineer of the Scottish Flying Club. Although the latter was not to blame, forty minutes after this snap was taken Mr. Scott-Taggart's engine failed and a forced landing was necessitated. Three hours later, the engine failed again, necessitating a highly dangerous forced landing. Scotland evidently wanted to keep the "S.T.400"!



## The "S.T.400" Gives Better Results

It may sound smug, but I am inclined to agree. But a string of successful sets and no failures is not enough. My tour has proved of extraordinary value not just to the "S.T.400," but for any work I may

facts which will have to compete with the exaggerated generalisations attending the launching of many sets competing for your patronage.

I can tell you little about the set this month. It has four valves. It is

valve set has not only been foreseen but forestalled.

If you simply must make a three-valve receiver before November 15th, my advice is, and will be, to build the "S.T.300." Remember, it can be

### HERE IS LONDON'S OPINION

5, Peatrice Road, Bermondsey,  
London, S.E.1.

Dear Sir,—It gave me the greatest pleasure to hear a demonstration of your new receiver, the "S.T.400," in my own home.

The test was carried out on a 30-ft. aerial, and the results were, in my opinion, extraordinarily good. Fifty stations were recorded during the test, which lasted, approximately, one and a half hours. Each of these stations was received at excellent loudspeaker strength, without any interference whatever from any other station.

The quality was very pleasing, and what impressed me more than anything throughout the whole test was that while London stations were broadcasting, foreign stations separated by only a few kilocycles were able to be received without the slightest mush from any other more powerful station.

Muhlacker, London Regional's neighbour, was received with excellent volume, and without the slightest trace of the powerful London station.

Algiers, only 6.7 kc. from Muhlacker, was also received very well. Lower down the medium waveband, Moravska-Ostrava, 10 kc. above the London National, and Leipzig, 10 kc. below, both came through at full speaker strength, without any interference, while London National was broadcasting.

On switching over to the long waves, Konigs-Wusterhausen, only 9.5 kc. from Daventry National, came through equally as well as any before-mentioned station on the medium waves.

I think that it will be a set that not only amateur constructors will welcome, but will be of universal appeal. I certainly think that you have designed a four-valve receiver which, when known, will be far in advance of any other four-valve set yet designed, and I think it will take a lot of surpassing.

No matter how congested the ether may become, or whether the stations increase their power, the unique selectivity controls on your set will always be able to combat the ever-changing conditions.

Hoping to see soon the details of this wonderful set,

I am, Yours faithfully,

F. SCHUMACHER.

P.S.—I will be pleased to communicate with any "Wireless Constructor" reader who wishes to hear more about the test.

do for this journal. I have got to the heart of readers' problems, and as I write now I feel more as though I am talking to you than writing.

### Confidence Must Be Gained

Besides, there is a new public whose confidence must be gained. This tour is the most ambitious thing any designer could attempt. In fact, I cannot imagine his doing more both to test out and prove the worth of his set.

A few habitual cynics and disbelievers burnt their fingers when, without having built the set, they gave half-hearted opinions about the "S.T.300" when it was first published; they have lost caste as "experts." I venture to think—again at the risk of being thought self-satisfied—that very few will take any risks when asked after November 15th: "What do you think of the 'S.T.400'?"

Scepticism can be fought with two weapons. One is the reputation of the designer, and the other is facts. I am naturally glad if you build a set because I have designed it. But I do not intend to assume anything. When you get details of the "S.T.400" you will be presented with naked facts of its performance—

essentially calculated to appeal to the man who, in the ordinary way, would have built a three-valve set.

Those who want to get out of the rut, to get the extra power and selectivity which an extra valve properly used will give, will not complain. Any objection a three-valve man could have to building a four-

made progressively more selective and so remains up to date.

The "S.T.400" will give better results under worse conditions than the "300," but this involves no criticism of the latter.

There will be a special article for every existing "S.T.300" user next

(Please turn to page 63.)

### STUDYING LONDON'S PROBLEM

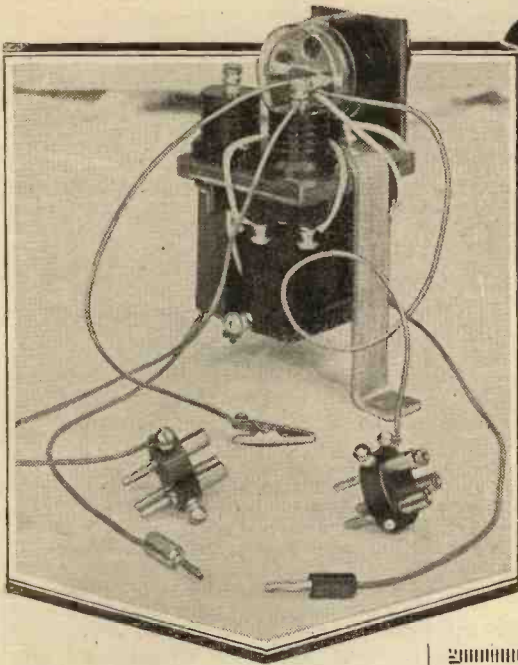
A snapshot taken on August 14th of Mr. John Scott-Taggart at Brookmans Park. He is seen studying his own problem in the London area—and that of hundreds of thousands of listeners. His solution is the new "S.T.400," details of which appear next month.





# The "PLUG-IN" TONE CONTROL

By  
G. T. KELSEY.



If anyone had mentioned the subject of tone control a matter of three or four years ago they would not have got very far with it, for in those old days there was no tone worth speaking about to control.

But what a different complexion the subject has taken on in these days of high-quality reproduction.

## Speakers That Hiss

Nowadays our ears have become attuned to real music as opposed to the thin noises of three or four years ago, and the result is that we are able to notice any appreciable over-accentuation or falling off in the frequencies employed in broadcasting.

If we hear a loudspeaker that is over-accentuating the bass, and if we hear one that tends to hiss we are conscious of too much high stuff.

Fortunately, in these advanced days it isn't common to encounter either of these failings to any appreciable extent, but it is necessary to remember that perfect reproduction isn't only dependent upon the characteristics of the loudspeaker. Fidelity of reproduction is a much more complicated business.

## Faithful Distortion !

It must start right up at the aerial end of the set, and only when every unit in the chain from the first valve to the loudspeaker is giving more or less a straight-line response is it possible to obtain perfect reproduction.

Alas, it isn't every listener that realises that, and it is probably for

*An ingenious and inexpensive adaptor that can be added to your set in a matter of moments, and which will allow radio or record reproduction to be varied to suit individual requirements. It is extremely easy to construct, many of the parts being of the type to be found in nearly every listener's junk-box.*

this reason that so many people are disappointed when they first use a moving-coil speaker in conjunction with an old set.

But when such a thing happens, usually the moving-coil speaker sounds worse by far than the existing one, and that is only because the moving-coil is reproducing the dis-

tortion more faithfully! And then people blame the speaker!

But as far as WIRELESS CONSTRUCTOR readers are concerned, we are confident that most of the old sets have been dumped long enough ago, and so it is only with more or less modern sets that we are concerned in discussing this question of tone control.

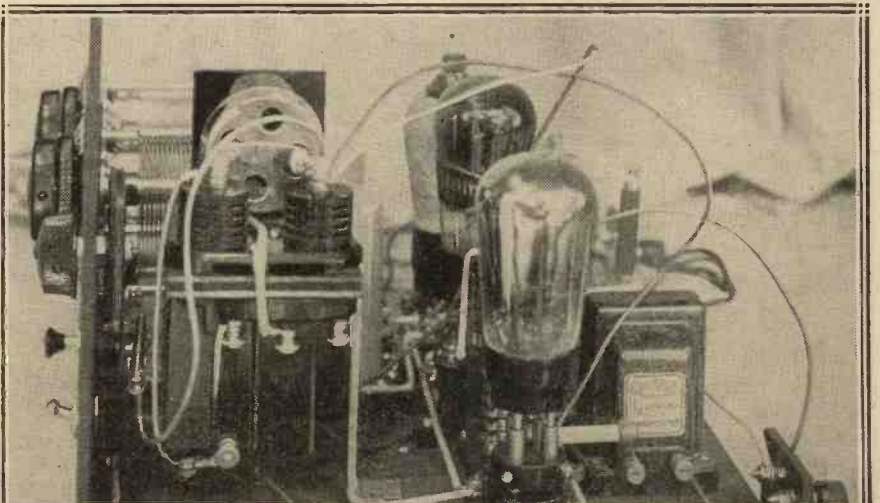
## Cutting High Notes

Naturally, the question that immediately occurs to the mind is why should tone control be necessary with a reasonably modern set?

One could give an answer, and it would be a perfectly true one, by saying that it was for the purpose of adjusting to your own ears whatever type of music you happen to be listening to.

For instance, when you are listening to a violin solo you might find

## ADD IT TO YOUR OWN RECEIVER



*Connecting the unit to your set is simplicity itself. It is necessary only to withdraw the two valves concerned, say the detector and following L.F., insert the two adaptor plugs, and then replace the valves. The unit can be fixed to the baseboard in any convenient position by means of the bracket provided.*



# The "Plug-In" Tone Control—continued

it an advantage to have just a slight over-accentuation of the high notes and a diminution of bass to obtain that realistic "edgeness" of the strings. Or, on the other hand, perhaps when you are playing a gramophone record you find needle scratch a bit too preponderant, in which case you might consider it an improvement to cut down the high notes a bit in order to diminish the scratch.

### Selectivity Considerations

These are quite sound reasons, and, in our opinion, ample justification for the use of a tone control, but in these days of high selectivity there is another—and probably more important—way in which it can serve a really useful purpose.

The complete separation of stations only nine kilocycles apart is a problem that engineers are only just beginning to solve in a really effective way.

### A Vicious Circle

It is easy enough to separate the stations, but it isn't so easy by any means to do so without sacrificing some of the side-bands, which, in terms of music, mean high notes. If you arrange the response of your tuning circuit so that it does not cut off any of these side-bands, then the chances are that you will hear something of the station on the adjacent wavelength; in other words, you may hear heterodyne interference.

And if you arrange the tuning response to cut off sufficiently sharply to avoid the heterodyne interference, then bang go the high notes again! It's rather a vicious circle, isn't it?

But that is where tone correction comes into it, for even if you do have to put up with a diminution of high notes in order to get rid of heterodyne interference, you can adjust for better tonal balance by means of the tone corrector.

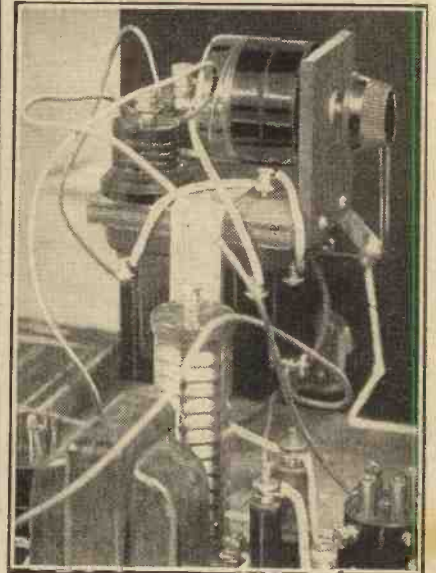
### Smoothing Peaks

In other words, tone correction enables you to make up for the deficiencies in your set, for it cannot be assumed that any set is absolutely perfect. It will make up for the losses that are incurred as a result of really sharp tuning, it will help you to smooth out any little "peaks" or failings in the chain from the input to the loudspeaker, and last, but not least, it will enable you to

adjust the response of your loudspeaker to your own particular liking.

Now, having endeavoured to state the case for tone correction from the theoretical point of view, what of its practical application?

### ONE-KNOB CONTROL



The tone of reproduction is varied by turning the single control knob mounted on the unit. It does not require frequent adjustment, so its position behind the panel is not inconvenient.

As a matter of fact, it is really quite a simple business. In view of the uses to which it can be put, and because it can be applied successfully to almost any circuit arrangement, we have actually designed a tone-correction unit which you can fit to your set in about five minutes!

It is a complete intervalve coupling unit which takes the place of one of the coupling schemes in your existing circuit. To fit it, you simply have to insert a couple of valve adaptor plugs into the appropriate valve holders in your set, and you can then tone control to your heart's content!

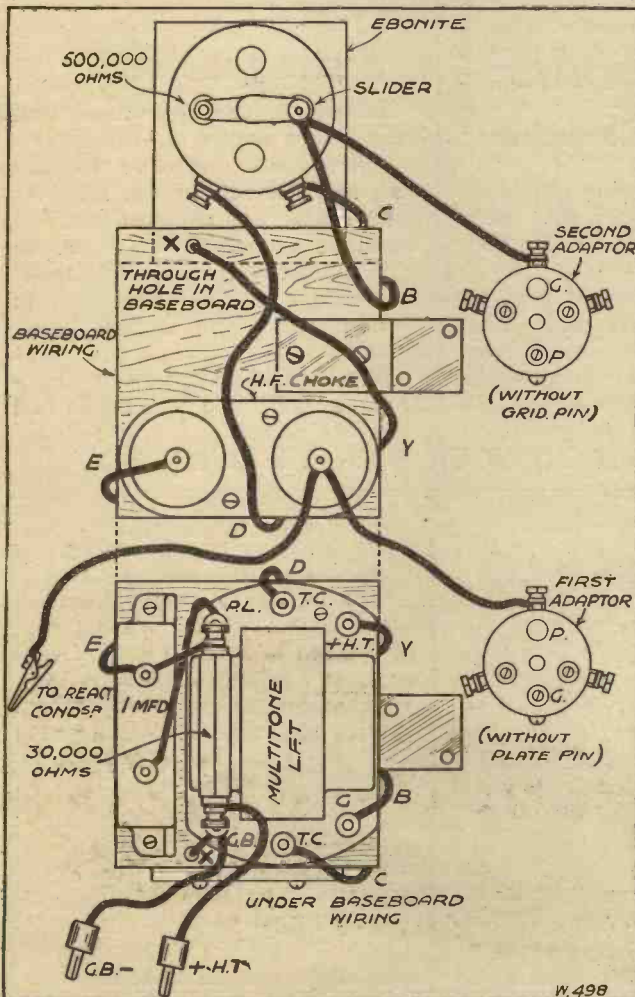
### Few Components

That is simple enough, isn't it?

Then why not have a go at this unit yourself?

All it consists of is a "Multitone" transformer with the appropriate components for parallel-feeding it, an H.F. choke and a potentiometer. The few bits and pieces which are required for the construction of the unit you will find in the junk box, and with the possible exception of

### FLEX LEADS WILL DO



Wiring up is a very simple job, for there are but a dozen or so leads required. If desired, short lengths of flex can be used for the purpose.

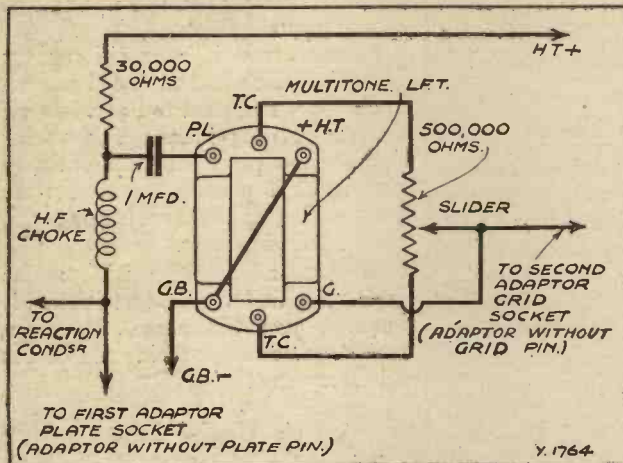


## The "Plug-In" Tone Control—continued

the valve adaptor plugs, which you may not have by you, that is all that is required.

The "Multitone" transformer and the coupling condenser are first secured to a piece of  $\frac{3}{8}$ -in. plywood measuring 3 in. by  $2\frac{3}{4}$  in. To the

### CIRCUIT SIMPLICITY



The unit comprises a parallel-fed "Multitone" transformer, with a high-resistance potentiometer connected for control purposes.

other side of this piece of wood you secure the H.F. choke and the 2 in. by  $2\frac{1}{2}$  in. strip of ebonite on which is mounted the potentiometer.

The wiring you will best be able to follow by referring to the diagram in which it is shown, and the same thing applies to the flex connections.

Now with regard to the fixing of this little unit, you will notice that a metal bracket is secured to one side of the "baseboard," and this is for the purpose of mounting the unit on a vacant part of your set baseboard.

In this connection, if your set has two L.F. stages the best position for the unit is in the second stage, which means to say that it should be fixed in the most appropriate position available between the penultimate and the last valves.

### A Question of Room

On the other hand, if your set employs only one L.F. stage you will have no option but to fix it as near as possible to the existing coupling unit. Incidentally, you may have to secure it to the side of the cabinet if there is insufficient room for it on the baseboard. But that is a matter depending upon the layout of your present set.

Assuming that your set has only one L.F. stage, then remove the detec-

tor valve, and insert into its holder the adaptor plug that has the plate pin missing. The detector valve should be replaced into the holder on the top of this particular plug.

Having done that, do exactly the same thing with the remaining adaptor plug and the last valve and holder, replacing the valve on top of the adaptor plug as before.

Now if your set employs reaction on to the detector valve there is another little alteration to make before you can put the unit into use. If you examine the plate terminal of the detector valve holder you will find a lead going either to one terminal of the reaction condenser or else to one side of the reaction coil.

Carefully note the point to which the lead goes at the end remote from the valve holder, and then remove the lead and connect the crocodile clip from the unit to the same point.

### With Two L.F. Stages

After that little alteration, you just have to remove the existing G.B.—plug, fixing in its place the G.B.—plug from the unit, and the H.T.

positive plug from the unit should be taken to a socket on the H.T. battery or mains unit somewhere between 70 and 90 volts.

### YOUR SHOPPING LIST

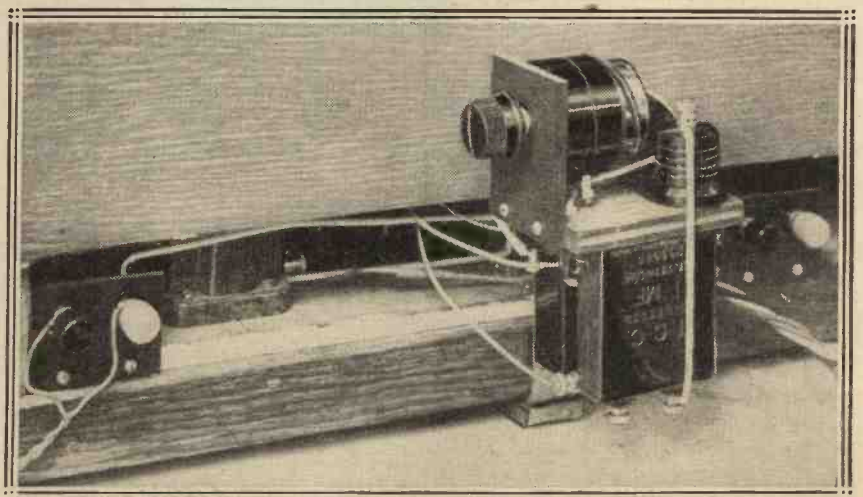
- 1 Multitone transformer (Multitone).
- 1 1-mfd. condenser (T.C.C., Ferranti, Dubilier, Igranite, Telsen, Lissen).
- 1 H.F. choke (Goltone, Lotus, R.I., Tunewell, Wearite, Sovereign, Telsen, Peto-Scott, Leweos, Ready Radio).
- 1  $\frac{1}{2}$ -meg. potentiometer (Leweos, Igranite, Tunewell, Ready Radio, Wearite).
- 1 30,000-ohm resistance (Graham Farish, Dubilier 1-watt type, Ferranti, Wearite).
- 1 Valve-holder adaptor (without plate pin) (Bulgin).
- 1 Valve-holder adaptor (without grid pin) (Bulgin).
- Brass bracket, ebonite, baseboard (see text).
- 2 Wander plugs (Belling & Lee, etc.).
- 1 Croc. clip.
- Flex, wire, screws, etc.

If your set is one that employs two L.F. stages, the fixing of the unit is even more simple, for you can ignore the clip altogether.

The adaptor plug minus the plate pin goes into the valve holder of the valve before the last with the valve replaced on top of it, and the one minus the grid pin goes into the last valve holder, this time with the output valve on top of it.

With regard to the two plugs, G.B.— will take the place of the existing G.B.—2 plug, and the H.T. lead should go to a voltage somewhere between 90 and 120.

### AN ALTERNATIVE POSITION FOR THE UNIT



If the baseboard inside your set is rather crowded, you can mount the unit behind the set. When it is in this position the various leads should be taken through the terminal strip aperture.





*Gas-Pipe Earths—A Much Misused Term—Freak Aerials.*

**A**LTHOUGH many of us may be quite sceptical about it, we are more or less familiar with the advice that a gas-pipe earth should not be used, because it is dangerous as well as inefficient. Danger from shorts is certainly very remote, and I am sure many listeners use a "gas connection" in face of it; but there is another danger!

**Earthing to Gas-Pipes**

Granted that you must use a "gas connection" (because the water-pipe is "miles away"), don't connect on to the tap of the gas bracket. There is a big temptation to do this because the tap is usually the cleanest and the brightest part.

But there are such things as loose taps, and stiffish wire that may turn

them, and then—well, we don't want to see head-lines in the dailies such as: "Gas Poisoning Caused by Radio!"

**Misleading Terms**

If people who so blithely talk about "powerful locals" and "powerful foreigners" would give these phrases a little thought, they would realise how very misleading they could be.

It so happens that they do not often mislead because most of us read the same—but incorrect—meaning into them. But that's no justification!

"Powerful locals" as a rule indicate local stations which are so near as to produce swamp area effects, although they might only be relays with comparatively small power. "Powerful foreigners" is the term usually used

when continental stations that happen to come in loudly on the set in question and under the particular conditions in consideration are meant, and has no bearing whatever on the actual power used by the transmitters.

**About Aerials**

Many are the freak and unusual aerials I have come across, from the good old bed-spring to a disused telephone wire goodness knows how many miles long! But I think the following gave the best results, if it was not the most unusual.

I came across it in an old country mansion, which had at one time seen better days and used to boast its own electric lighting plant. The wiring was still in place, and an ordinary plug made it possible to connect the house wiring up to the set in any room, via a fixed condenser.

We are all familiar with mains aerials for mains sets, but it's a bit unusual, you will agree, when the mains are no longer mains and the set a battery one!

**A Useful Hint**

Triangular pieces of wood make jolly good panel supports and are cheaper than metal brackets.

A. S. C.

**A**PROPOS my remarks in a recent issue of THE WIRELESS CONSTRUCTOR about the reception of G 5 S W overseas, I feel that it must be my first duty this month to thank all those members of our "gang" in distant countries who have kindly supplied the required details.

I have had letters from all parts of the world, and much as I should like to reply to each one individually, I am afraid that I should have to give up short-wave listening for some time to come in order to carry out such a project! But at least I can say here how much I have appreciated the reports, and, as proof of my joy, to discover that we have got so many friends overseas, I extend to all a hearty invitation to write to me just whenever they feel like it.

**First Overseas "H.M."**

On all but special occasions, such as the last one, when my overseas mail grew to incredible proportions, I will endeavour to reply to every letter received.

But to revert to this question of the reception of G 5 S W in other lands, I have singled out four letters which seem to be very representative speci-

\*\*\*\*\*  
\* **THE MONTH ON** \*  
\* **SHORT WAVES** \*  
\*\*\*\*\*

mens, and to the writers of these letters (details of which you shall hear in a moment) I am going to award the first overseas "H.M.'s."

They are Captain C. L. Stokes, of Delhi, India; Mr. E. W. Hill, of Mlanje, Nyasaland; Mr. G. W. Muir, of Tebing Tinggi, Sumatra; and Mr. F. H. Holmes, of Nakuru, Kenya Colony.

Captain Stokes brings to light the fact that Delhi, G 5 S W and Rome (on his 25-metre wave) are received are equal strength and are easily separated.

Mr. Hill's letter, which is most informative and interesting, shows that G 5 S W is also received quite clear of Rome in Nyasaland, but in this case, apparently, Rome is always the better signal. It appears that G 5 S W is very inconsistent, and that by about 7 p.m. G.M.T. his carrier has almost disappeared.

I was interested to hear in this case that with the exception of Johannesburg—which is Mr. Hill's "local"—

Radio Colonial, on 25.2 metres, is by far and away the best signal received in British Central Africa.

The letter from Mr. Muir, which is dated 7th August, informs me that G 5 S W is received much better than Rome in Sumatra, and that the two are easily separated. Incidentally, I have a suspicion from his letter that Mr. Muir suffers from our complaint—burning of the midnight oil—for he tells me quite cheerily that he frequently gets up at midnight to hear the first news bulletin from G 5 S W, and that so far he has never been disappointed. Very glad to hear it, G. W. M.

**S.W. Reception in Kenya**

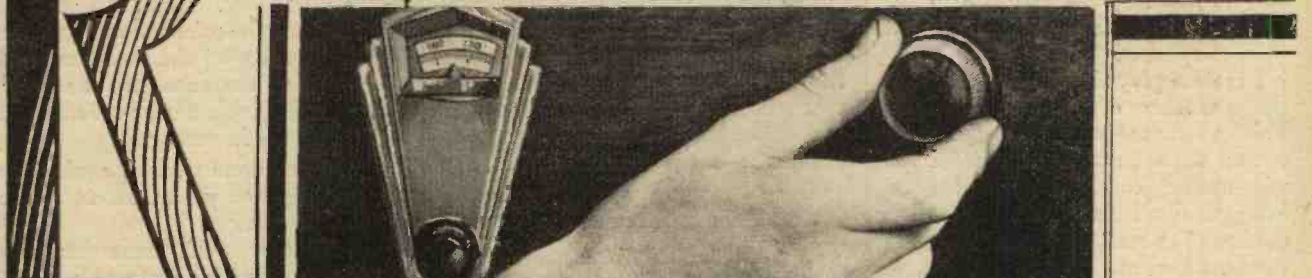
The communication from Kenya stirs up old memories for all my CONSTRUCTOR friends who have been reading these notes for twelve months or so, and I am wondering if Mr. Holmes remembers our special broadcast from Kenya?

Mr. Holmes is apparently very lucky, for he gets G 5 S W consistently at R7 or R8, and always clear of Rome. That is much better than I can do in this country!

G. T. K.



# REACTION



**-NEVER  
WAS IT SO  
NECESSARY!**

IS

*Herbert K.  
Simpson's  
Opinion*

*"In spite of all efforts to do without reaction we have failed, and now not only do we not look with disfavour on the invention, but we welcome it with open arms. The congestion of the ether requires drastic methods for dealing with the interference, and reaction is our greatest ally."*

tialities have, even yet, not been plumbed.

The old English custom of giving dogs bad names has not failed us as regards the word "reaction." The word means nothing. It is meant to mean "acting again."

### The Other Man's Fault

However, all our radio words from "wireless" downwards are subject to attack and abuse. But who on earth cares? As long as we know what reaction means, why worry?

Reaction in the past, however, has had a bad name for other reasons. There may be a twittering around Turin's wavelength which you try to believe is the nightingale interval signal; but you know jolly well that it is that hulking fellow Thomson next door. Oscillating, of course, will appear in future dictionaries as: "The operation of misusing reaction as performed by people other than oneself."

### Our Greatest Ally

At one period an attempt was made, especially by set-manufacturers, to cut out reaction and rely solely on high-frequency amplification for the strengthening of the H.F. currents.

The gallant attempt failed—because those blackleg manufacturers who kept loyal to reaction (in spite of the extra

knob and extra twiddling) could give the public more for their money.

In spite of all efforts to do without reaction, we have failed, and now not only do we not look with disfavour on the invention, but we welcome it with open arms. The congestion of the ether requires drastic methods for dealing with the interference, and reaction is our greatest ally.

In the early days of wireless the *strengthening* effect of reaction was all that we appreciated. To-day the wireless public is beginning to appreciate how greater *selectivity* is obtainable with this invention.

### Like a Lubricant

If I were asked to give in a sentence a word-picture of what reaction does, I should say: "It oils the wheels of reception." You will immediately think of Brooklands track, your Rolls-Royce car, or your tricycle, according to your means or age.

Personally, I think of a push-bike, because in no other example would one suffer more through neglect of the bearings.

If there were no friction, an infinitely small force would propel a vehicle along a level road. In the case of a motor-car we get speed by increasing the force and decreasing the friction (e.g. by roller bearings, oil, etc.).

FOR ten years we have tried to kick reaction off its pedestal. Occasionally it has tottered, but it has never fallen. To-day we no longer bruise our toes; we sing hymns to our idol instead.

Only the complete novice to wireless—someone, say, from the Solomon Islands—has never heard the magic word "reaction." Practically every set—home-constructor's or factory-built—is fitted with a knob engraved with a word of eight letters meaning better radio.

Sometimes the knob is called "volume," although it really controls reaction. The reason is simple: Reaction is one of the greatest signal strengtheners we possess. Its poten-



## Reaction—continued

In the case of a wireless set we can do the same thing. We collect with our aerial a small amount of energy and we normally magnify it by H.F. and L.F. amplification until it will work a speaker.

Reaction plays its part by reducing the resistance of the H.F. circuits. This resistance (which is not merely due to the ordinary resistance of the wire-wound coils, but includes all losses) is like friction in a mechanical device. The resistance of the circuits can be wiped out by reaction.

When it is completely wiped out, any oscillations will be built up and will continue. The set is then "oscillating" and becomes a miniature wireless transmitter.

### Like a Pendulum

In this condition it is practically useless as a receiver of broadcasting. You will hear squeals as you tune, and if you live in a modern house you will hear your neighbour squeal—with rage. For every squeal you make on your own set, exactly the same noise will be heard in hundreds of homes around you. One, therefore, for two reasons, adjusts reaction so as to be "this side of oscillation."

A clearer way of looking at reaction, perhaps, is to consider it as a means of feeding energy into an H.F. circuit (a tuned circuit).

Consider a pendulum; a stone on the end of a piece of string, if you like. Set the pendulum swinging; after a short time it will come to rest.

We can keep it swinging, however, by giving the stone a slight tap at the right moment, i.e. in such a way as to help its motion. If the pendulum is only swinging feebly to begin with, we can increase its amplitude of oscillation (i.e. length of swing) by giving it strong knocks at the right time.

### Keeping in Time

Note particularly that we must *time* the helping taps. If the "bob" of the pendulum is approaching and our tap is in the opposite direction, the pendulum will tend to stop.

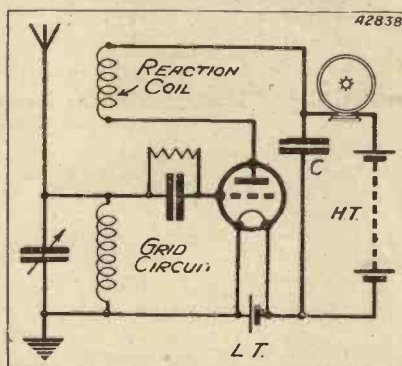
Now reaction, as obtained by a valve, is very much like this. The circuit I give is about the simplest reaction receiver one could have.

A leaky-grid condenser system of detection is employed, but an inductance coil is connected in the anode circuit of the valve, which now acts

not only as a detector, but as a means of strengthening the currents in the tuned-grid circuit.

The strengthening action is obtained as follows: High-frequency currents due to signals are applied to the grid. Rectification occurs, but the grid still fluctuates at H.F. potential and so amplified H.F. currents pass round the anode circuit.

### OBTAINING REACTION



An inductance coil (marked Reaction Coil) is connected in the anode circuit of the valve, which now acts not only as a detector, but as a means of strengthening the currents in the tuned-grid circuit.

In the ordinary way these H.F. currents are not used; they are an accidental by-product. But the inventors of reaction (several claim the honour) found—by chance or experiment—that the H.F. currents could be fed back into the grid circuit to strengthen the exactly similar currents originally flowing there.

The feeding-back is done by "coupling" the reaction coil to the grid coil, i.e. placing one suitably near to the other. If the reaction coil is connected the wrong way round (or is wound wrongly) the feed-back will oppose the currents in the grid circuit and signals will be *reduced* and not increased in strength.

You have done what is equivalent to tapping the pendulum so as to oppose its motion.

Occasionally, coil manufacturers send out coils with a reversed reaction winding, and the novice is seriously perplexed because of poor results; if manufacturers were suitably tapped every time this happened it would be a good thing!

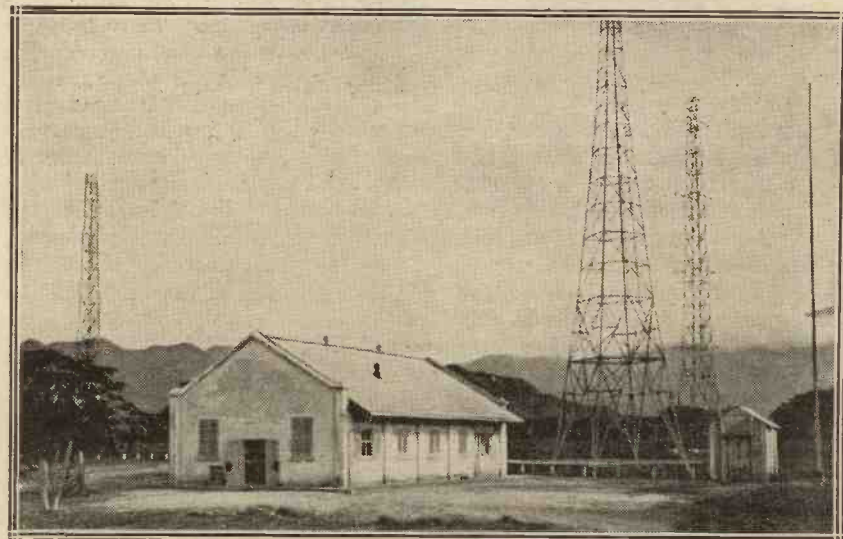
### An Essential Item

Reaction must be adjustable. In the figure we can alter the distance between the coils and so vary the feed-back.

The ways of applying and controlling reaction are as countless as the grains of sand on Blackpool shore. I will deal with some of them another time.

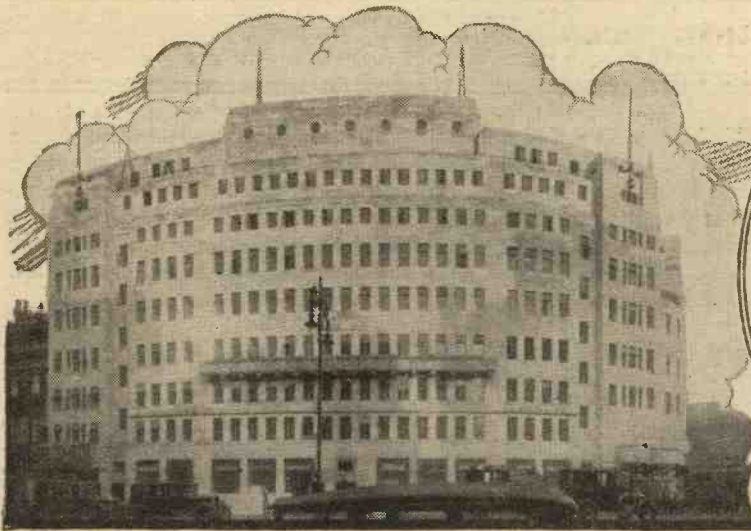
For the present, I merely urge you to respect reaction as an essential to any straight set. It is amusing to think of those H.F. currents as once a wasted-by-product. But, then, when tea was first imported to this country the stewed leaves were eaten as a vegetable and the water thrown away.

### ONE OF SOUTH AMERICA'S STAR STATIONS



This Venezuelan station is situated some 4,000 miles away, but programmes from other South American stations at far greater distances have been received in this country on simple sets. And such extraordinary long-distance results are rendered possible by the effects of reaction.





# B.B.C. NEWS

Topical notes regarding British Broadcasting Stations and Programmes.

By Our  
Special Correspondent

## The Christmas Surprise

I HAVE heard most intriguing accounts of the Special Christmas Surprise which the B.B.C. has in store for listeners, not only in this country, but all over the world. I do not wish to steal the thunder of my friends the producers, so I shall not give full particulars at this stage. Suffice it to say for the moment that, through the enterprise of the B.B.C. and the ready co-operation of other broadcasting authorities, there will be community singing in which literally many millions will participate throughout the length and breadth of the British Commonwealth of Nations.

## Filling Those Gaps

Now that the B.B.C. has developed its lunch-time programme and included Sunday with reasonable entertainment, I am not surprised that there should be a demand that the further gaps in the morning should be filled.

I know that Broadcasting House looks upon this as an irrational demand, and is inclined to suggest that it contains an ingredient of ingratitude; truth, of course, is that engineers and other routine officials are overworked as it is. For example, the routine engineers were unable to take advantage of the special reduction of working hours which applied to other members of the staff during the summer months. But I suggest that this is not an adequate answer to the demand that the morning gap should be filled.

It seems to me that the trade in particular has a real grievance, because for considerable periods the demonstration of sets for selling purposes cannot be carried through. If Broadcasting House pleads poverty, why

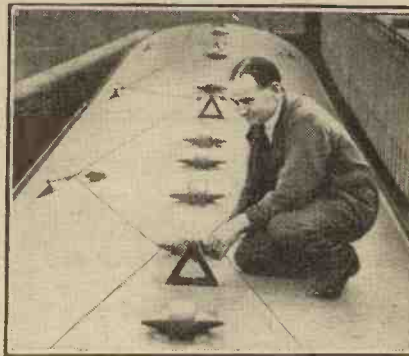
does it not make more definite attempts to enlist public and trade support for a larger share of the licence revenue than is at present allotted.

Anyway, the gaps must be filled sooner or later, and the sooner the better for B.B.C. goodwill.

## News from Madrid

News from the Madrid Conference is surprisingly scarce. Apparently, the Americans are the only delegation to reveal anything that is going on. This is all the more surprising in view of the fact that most of what the Americans are saying bears upon European problems.

## TUNES FOR TIRED TRAVELLERS



Following a long series of experiments, the L.N.E.R. have now fitted two of their Scottish expresses with radio receiving equipment, so that weary travellers may while away the journey with popular programmes from the main B.B.C. stations. The acrials are installed on the roofs of the carriages.

For instance, it has emerged that Mr. F. W. Phillips, the chief delegate of the British Post Office, has distinguished himself in his strenuous advocacy of the claims of broad-

casting. Sir Charles Carpendale, who has been holding a double watching brief for the International Union of Broadcasters and the B.B.C., has found his task considerably simplified by the unexpected and effective support of the official British delegation. Apparently, this is another example of closing the ranks abroad!

## Religious Broadcasting

There are persistent rumours of a move to alter radically the present system of religious broadcasting. The B.B.C. up to now has always relied upon the advice and, incidentally, the support of the main religious bodies. The advantage of this procedure has been the avoidance of special difficulties and the alignment of the organised Christian community.

The disadvantage, however, has been an irregularity of standard of preaching brought about by the admission of many clergymen and ministers possessing little or no microphone manner. It is now felt, not only at Broadcasting House, but also in religious circles where the importance of the B.B.C. to religion is adequately recognised, that a new method should be substituted.

The point is that religious broadcasting is now suffering from some of its exponents over the microphone. The time has come when the selection of preachers should be determined fearlessly on microphone merit, with only a subsidiary regard for denominational affiliation. And the sooner the problem is solved in this way the better.

There was a chance some time ago of getting it done through Dr. Sheppard. I do not know whether Dr. Sheppard is now well enough or



## B.B.C. News—continued

willing to handle it. If not, then somebody else should be secured.

### The Case of Wales

The B.B.C. has not been fortunate or even well advised in the way it has dealt with the problem of Wales. Of course, there have been technical difficulties, and the poverty of wavelengths has been a big barrier in the way of progress.

On the other hand, the Principality has always felt aggrieved that the Cardiff Station Director has not been a Welshman. True, Mr. Appleton

has done his best to live this down, and has even succeeded in being admitted as a Druid at an Eisteddfod. On the other hand, there has been great irritation, particularly in North Wales, at the absence of programmes calculated to be palatable locally.

Every now and then the B.B.C. has managed to do something to take the edge off the bitterness. For instance, the recent broadcast from Zion Chapel, Wrexham (so ably contrived by Mr. Emyr Williams), did a great deal of good. But the

Welsh problem needs tackling in a comprehensive way, and I suggest a solution could be secured by consideration in consultation between a little committee, preferably unofficial, and including Mr. Lloyd George, Mr. Tom Jones, and Sir John Reith.

### Newspapers and Broadcasting

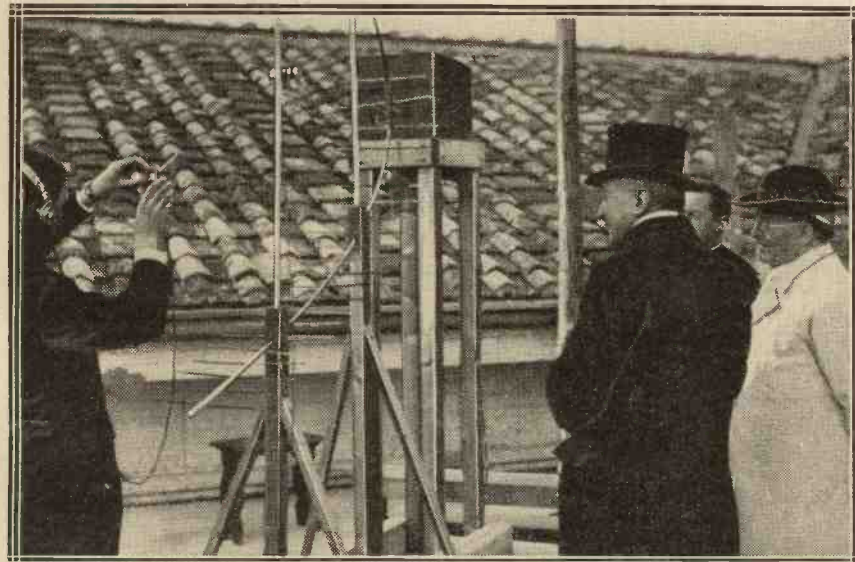
Broadcasting House is naturally interested in the fact that several national dailies have pinned their faith to broadcasting to see them through the autumn scramble for circulation. I was amazed, however, to discover that there is a division of opinion in the B.B.C. about the value of this fact.

It is, unfortunately, yet another sign of the deplorable detachment from real issues of some B.B.C. officials that they should frown upon programme popularity competitions, sponsored and paid for by national newspapers. Fortunately, this view does not prevail when it comes to the decision stage.

### In the Highlands

Provost Murray of Dingwall has not abandoned his advocacy of independent broadcasting for the Highlands. He has not appeared much in print lately, but I understand that the holiday season has not been wasted, inasmuch as both the Prime Minister and Sir Archibald Sinclair, the Secretary of State for Scotland, have been furnished with very definite views on the post-Madrid position.

### SHORT WAVES FOR SHORT DISTANCES



Radio waves having a length of a few inches only are proving extremely useful for short-distance communication, and in recent months there has been a concentrated drive in their development. The apparatus illustrated is one of the directional transmitters used by Marconi in some of his recent experiments.

WIRELESS enthusiasts who are also motorists will be glad to know of a new work that is just being put on the market at a ridiculously low figure, giving all the information about motors and motoring that can possibly be wanted. This is called "The Motoring Encyclopedia," and it is being issued in about thirty weekly parts at sixpence a part. The information is given in alphabetical order, so that no matter what may be required it can be turned up in a moment or two.

The book has been written by expert motorists and mechanics, and is absolutely reliable. It has the very latest information on the subject, and is illustrated by a unique series of explanatory drawings and diagrams

\*\*\*\*\*  
 \* AN ENCYCLOPEDIA \*  
 \* OF THE ROAD \*  
 \* Some details of a remarkable new \*  
 \* publication. \*  
 \*\*\*\*\*

which make clear the most difficult and intricate detail.

Whatever the motorist wants he will find here. It embodies the fruits of thirty years' experience of many experts, and its object is to help the motorist by giving him readily accessible information on all topics connected with his hobby.

### It Covers Everything!

In addition to mechanical information the book gives knowledge on

legal matters connected with motoring, on touring and camping and caravanning, with descriptions of the best routes to take and places of interest on the journey.

There is instruction in the art of driving, and while all the general information that a motorist needs is found in the book, there is also particular information dealing with specific makes and types of car.

No such exhaustive and authoritative work on motoring has ever been issued at such a price, and when completed the book will form the finest work on practical motoring that is available. The method of publishing it is in sixpenny weekly parts.

Part 1 is now on sale, so be sure of getting the work week by week.





# The "DETRODE"

I have mentioned my little chat because it makes an ideal introduction to the "Detrode," which I am describing this month. Also, because it helps to emphasise yet another case where the constructor of his own set scores over the man who buys "ready built."

The home-constructor has the choice of a design that exactly fits his requirements, and does not have to put up with extras and inefficiencies that are introduced simply because someone else may find them necessary. If you want a small set and you are not bothered by locals, then this two-valver is exactly what you want.

### Balanced Quality

Many foreigners are within its scope; it does not lack selectivity; the power will surprise you; and the quality is absolutely first-class. Small and compact, it is as fascinating a "two" as you have ever come across.

Let me tell you some more about it. For instance, it has a pentode output valve following the detector, which will give you volume that will fill any room in a normal house, and I don't

"You know the mistake many of you home-constructor designers make?" queried a radio enthusiast with whom I often have a talk in the train on the way up to the office. He is a very knowledgeable sort of gentleman, so I thought I should like to know exactly what he had in mind, and decided to pursue the matter.

"What do you reckon it is?" I queried.

### A Candid Critic

"Well," he replied, "you follow the designers of commercial sets far too much!"

That was putting it bluntly enough, and since I could not see eye to eye with him in the matter, I asked him to explain in detail.

"It's like this," he continued; "makers of commercial sets have to design their receivers to suit those right in the swamp areas as well as those farther out in the country. That goes without saying, or he would have one hundred and one different models. But why assume that all home-constructors live under the shadow of a local?"

"But we don't make that assumption!" I hastened to interrupt.

### The Constructor Scores

Ignoring my remark, he continued:

"Out in the country and away from locals there are any amount of listeners who need only a simple receiver. Surely the same degree of selectivity is not needed by them as by those with nearby giants to contend with?"

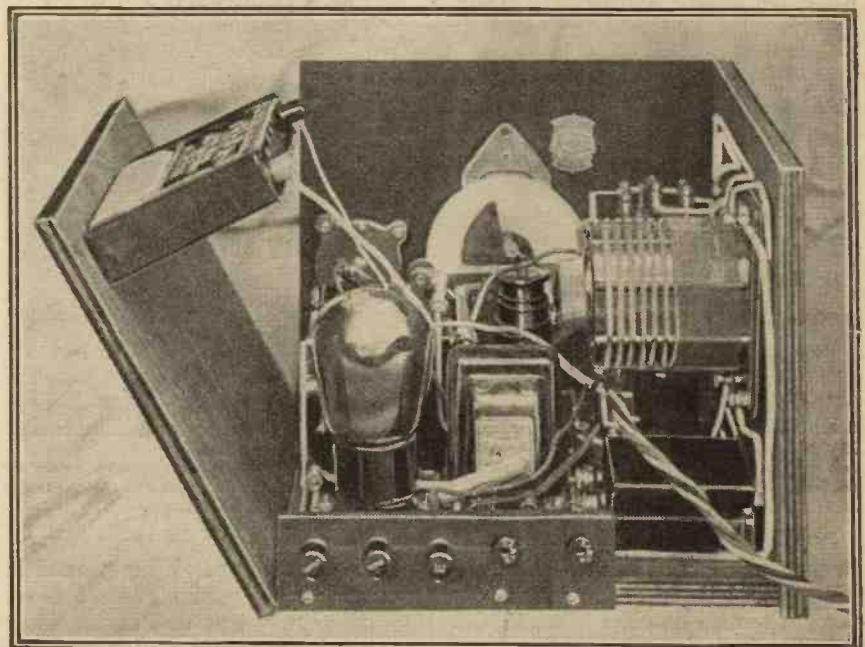
It was a perfectly disinterested point so far as he was concerned, for he, unfortunate fellow, can see the masts of Brookmans Park out of the

*A compact and efficient two-valver that will provide real entertainment from your local station and some of the more powerful foreigners. It is both sensitive and powerful, and the selectivity is continuously variable to meet the requirements of different localities.*

Described by VICTOR KING.

back bedroom. And, whilst naturally I cannot agree with him that every set is designed with the town-dweller in mind, I have always held that there is a very strong demand for small, simple receivers that will deliver the goods in an efficient but unassuming manner.

### ALL AVAILABLE SPACE IS UTILISED



By giving much thought to the layout of the components it was found possible to make the set extremely compact, and, as readers will see for themselves, there is very little waste space indeed. The complete set measures 8 1/4 inches square.



## The "Detrode"—continued

mean one of those houses where there is not room to swing a cat, or a Yo-Yo (if you want to be ultra-modern!).

And don't imagine that you may have trouble from L.F. instability because of the compactness. Oh, dear, no!—the parallel feeding of H.T. to the detector, and the output filter, take care of this.

The filter is tapped to enable proper matching up with your loudspeaker, and so ensure that your quality shall

latest ideas are included, and give you a design that is modern as well as all-efficient.

This latest-in-everything idea is carried to the controls as well. These are kept as few and as simple as possible, the wave-change switch also serving as an on-off switch.

The midway position is the off position. When it is in one direction the set is switched on to long waves and the filaments of the valves are

it must have a fair degree of selectivity these days to separate properly some of the closer (that is in wavelength) foreign stations. The "Detrode," as already mentioned, does not fall short in this way at all, and provision is made for varying the selectivity through very wide limits.

### Variable Selectivity

To start with, there are alternative aerial tappings into which the aerial lead can be plugged. In one of these the aerial goes directly to the top of the aerial winding on the tuning coil, and in the other it is joined up to this point via a variable condenser.

Altering the capacity of this series condenser affects the selectivity, so that the latter can be adjusted to a nicety. The fact that sockets are provided for the aerial lead to be plugged into makes it an easy matter to cut out the series condenser if this is found undesirable when going over to the long waves from medium waves.

The series condenser is mounted on the top of the tuning coil, of which it is part and parcel, and may quite well be set for your particular conditions and then not altered; the two aerial sockets providing all the variation desired.

Now a word or two about the general design. A quick glance at the photographs will show you how the compactness has been obtained.

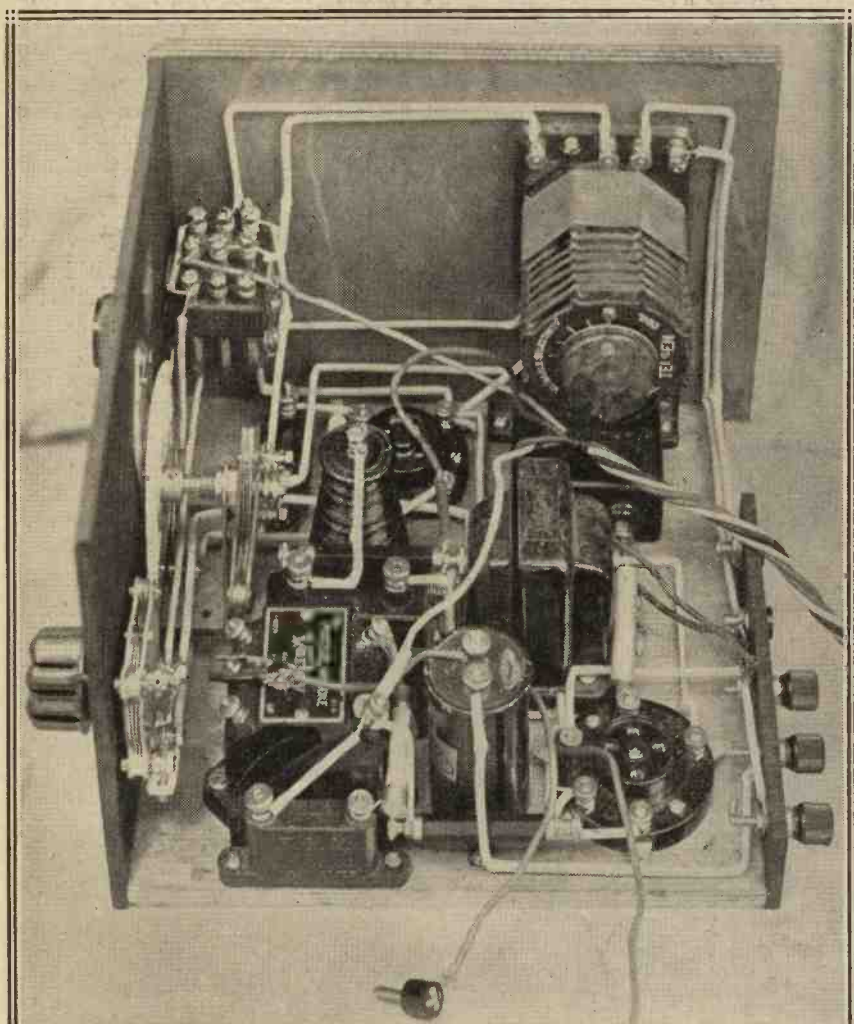
You notice the coil mounted on one of the sides of the case? That is a large part of the secret, but lest you get the impression that it's going to make the wiring difficult let me hasten to assure you that such is not the case. The wiring is just as straightforward as if a single and larger baseboard had been used on which to mount the components.

### Careful Packing

The wires going to the lower terminals on the coil can be put in place while the side (which forms part of the home-constructed cabinet) is laying flat alongside the baseboard proper. That will leave four wires to the top terminals, and both ends of these leads are easily "got at" with the side screwed in place. So there you are!

Of course, careful packing of the components and the use of a solid-dielectric condenser for tuning also contribute towards the compactness.

### THE PENTODE PROVIDES PLENTIFUL POWER



*By the provision of a special variable-ratio tapped filter choke it has been possible to make the set work efficiently with different impedance loudspeakers with or without incorporated transformers. This filter arrangement also has the advantage that it excludes the H.T. from the loudspeaker windings.*

be properly balanced; and the equalising resistance and condenser across the choke also do their share in this direction.

Nothing that will help to make it a really fine set is omitted. All the

also connected up. When turned in the opposite direction the set is set for medium waves and at the same time it is turned on again.

Even if the set is not to be used very close to powerful transmitters,



## The "Detrode"—continued

Incidentally, it is because of the proximity of many of the parts that fewer alternatives are given than usual for a number of the components required to build the receiver, and it is necessary to remember the point of "how much room" when considering using makes of parts that are not mentioned as alternatives.

### Cabinet Dimensions

The panel is 7 in. high and 8 in. long, and five pieces of wood are required to make the case. Their dimensions are as follow, all wood being  $\frac{3}{8}$ -in. plywood.

One piece 8 in. square for the baseboard. Two pieces  $8\frac{9}{16}$  in. by 7 in. for the two sides. If you use a  $\frac{1}{4}$  in. thick panel instead of a  $\frac{3}{16}$ -in. one, these side-pieces should be  $8\frac{3}{8}$  in. by 7 in. This also applies to the top piece, which is  $8\frac{9}{16}$  in. by  $8\frac{3}{4}$  in. The back is the same size as the panel, but has to have a small piece cut out to allow the terminal strip to fit in.

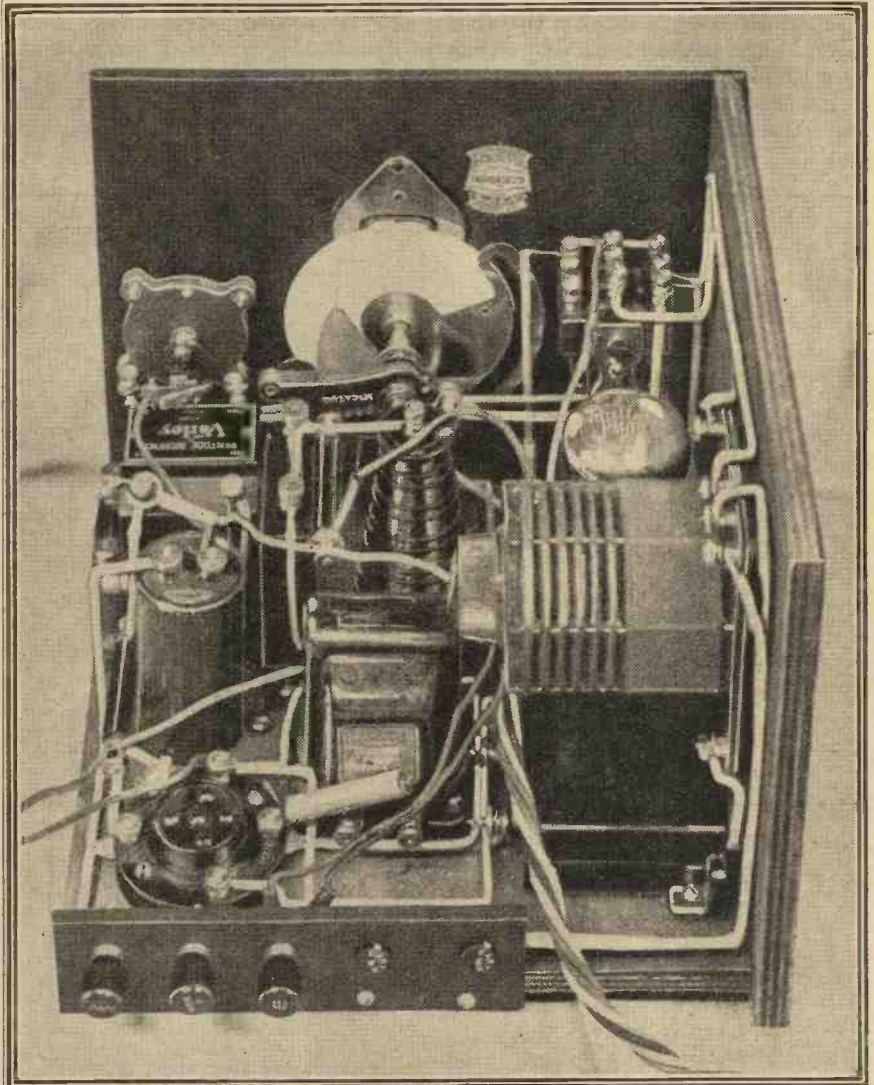
The side to which the tuning coil is fixed is naturally left permanently screwed in place. The remaining three pieces can be arranged as a three-sided lid which fits over the set, and is held in place with one or two wood screws.

### A Finishing Touch

The arrangement of the pieces of wood is such that the sides overlap the baseboard-panel and back, while the back overlaps the baseboard only. The top covers the edges of sides, back and panel.

The appearance of the completed receiver is very greatly improved if the front edges of the sides and top

### WIDE RANGE OF SELECTIVITY ADJUSTMENTS



Two aerial terminals are provided on the receiver. The right-hand one ( $A_1$ ) gives maximum volume, while when the aerial is plugged into the left-hand socket ( $A_2$ ) a small variable condenser is brought into circuit for increasing the selectivity.

### SELECT YOUR COMPONENTS AND ACCESSORIES FROM THIS COMPREHENSIVE LIST

- |  |   |   |
|--|---|---|
| 1 Panel, 8 in. $\times$ 7 in. (Permol, Peto-Scott, Goltone, Wearite, Becol).   | 1 L.F. transformer (Lissen "Hypernik," Tunewell, Slektun, Ready Radio, Telsen, Ferranti, Varley, Lewcos).   | 1 $\frac{1}{4}$ -meg. grid leak (Lissen with wire ends, Dubilier, Igranic).   |
| 1 Baseboard, 8 in. $\times$ 7 in.  | 1 .00025-mfd. fixed condenser (Ferranti, Dubilier, T.C.C., Telsen, Ready Radio, Formo).                     | 1 Dual-range coil, unscreened (Telsen).   |
| 1 .0005-mfd. tuning condenser (Ready Radio, Polar, Telsen, Utility).   | 1 .01-mfd. fixed condenser (T.C.C., or as above).   | 1 H.F. choke (Tunewell, Slektun, Ready Radio, Lewcos, Peto-Scott, Telsen, Sovereign, Wearite, Goltone, R.I., Igranic, Lotus, Varley). |
| 1 Slow-motion drive assembly (Ready Radio).  | 1 2-meg. grid leak (Dubilier 1-watt type, Ready Radio "Thermium," Graham Farish, Lissen, Ferranti, Telsen). | 1 30,000-ohm resistance (Graham Farish, Dubilier 1-watt type, Ferranti, Wearite).   |
| 1 .0001-mfd. differential reaction condenser (Ready Radio, Lotus, Telsen).   | 1 2-mfd. condenser (T.C.C., Ferranti, Igranic, Dubilier, Lissen, Peto-Scott).                               | 1 5,000-ohm resistance (Graham Farish, or see above).   |
| 1 3-pole change-over switch (Wearite, Utility).  | 1 1-mfd. condenser (Ferranti, or see above).  | 1 15,000-ohm resistance (Dubilier 1-watt type, or see above).   |
| 1 Valve holder, 4-pin (Benjamin, Lissen, Graham Farish, W.B., Telsen, Lotus, Igranic, Wearite, Ready Radio, Bulgin, Ferranti, Clix). | 1 2-mfd. condenser (Dubilier non-inductive, or in above makes where available).                             | 1 Pentode output choke (Varley).  |
| 1 Valve holder, 5-pin (Benjamin, or as above in makes where available).  |   | 3 Engraved-type terminals (Belling & Lee, Igranic, Bulgin, Clix, Ealex).  |
|  |   | 2 Sockets (Clix, etc.).   |
|  |   | 1 Terminal strip, $5\frac{1}{4} \times 1\frac{1}{2}$ in.  |



# The "Detrode" —continued

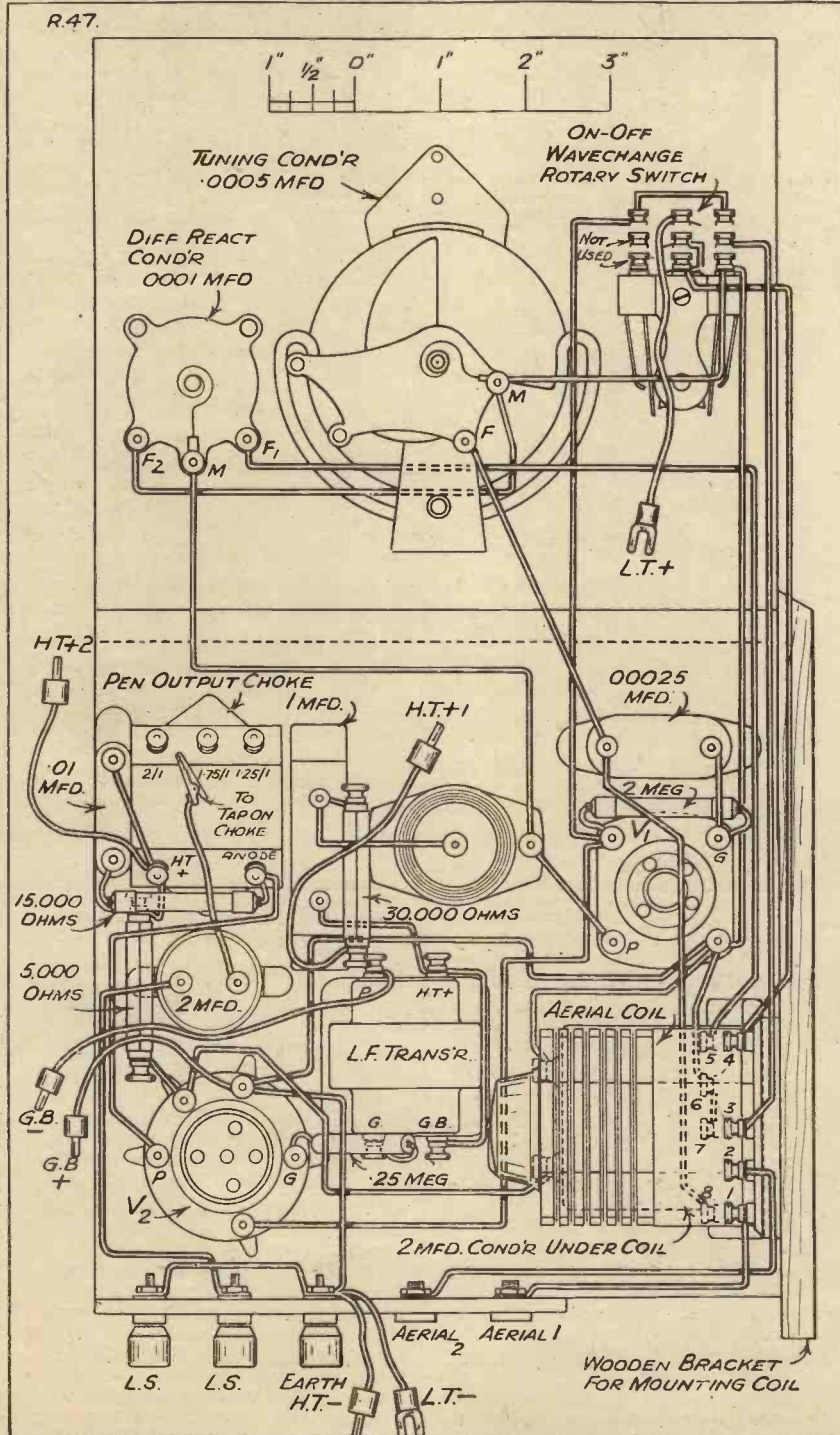
are rounded off. On the inside of the side which does not carry the coil, the grid-bias battery is fixed by means of a metal clip.

As this battery cannot be got at once the cabinet is screwed in place,

the correct bias should be found before the three-sided lid is finally fixed. Of course, if preferred, the case can be arranged without a back, when it will just be possible to get at this G.B. battery when the complete case

is in place. An open back will also enable adjustments of the selectivity condenser to be made without disturbing the woodwork.

## FOLLOW THIS WHEN WIRING UP



This is your guide for wiring up the receiver, and it is a good plan to tick each wire off as you do it, for this will reduce the possibility of leads being left out. A final check over before connecting up the batteries is also advisable.

### "DETRODE" ACCESSORIES

**Batteries.**—1 H.T., 120-150 volts, super-capacity types to be preferred. (Lissen, Pertrix, Magnet, Ediswan, Ever Ready, Marconi-Phone.)

1 G.B. (voltage depending upon output valve chosen. See maker's recommendations). See above list.

1 L.T. accumulator (Oldham, Ediswan, Pertrix, Lissen, G.E.C., Exide).

**Loudspeaker.**—W.B., Blue Spot, Epoch, Marconi-Phone, Atlas, Lanchester, Ferranti, Celestion, H.M.V., B.T.H., Ormond, Igranic.

**Mains Unit.**—NOTE: A model should be chosen which will give 20 milliamps. at 120-150 volts. (Heayherd, Atlas, Ekco, R.I., Tunewell, Formo).

**Earth Equipment.**—Graham Farish "Filt" earthing device.

Drilling the panel is a perfectly straightforward job. A template for the tuning condenser and its escutcheon plate should be included in its packing box. The other two components are of the single-hole-fixing type.

### Beware of "Shorts"

When screwing the components in place follow the layout of the wiring diagram as exactly as you can. Note that the grid-leak type resistances are all kept in place by their connecting wires. For this reason they should be of either the type with terminals at their ends or with short lengths of wire for connecting up.

So far as the wiring is concerned, just take your time and make sure you get all the connections correct. Use some sort of insulated wire, as the compactness of the receiver makes bare wiring a danger because of the risk of short-circuits which it entails.

### THE VALVES TO USE

	Detector	Output Valve
Mullard	P.M.1H.L.	P.M.22A.
Cossor	210 H.L.	230 P.T.
Mazda	H.L.2	Pen. 220
Marconi	H.L.2	P.T.2
Osram	H.L.2	P.T.2
Lissen	H.L.210	P.T.225
Eta	B.Y.2020	—
Tungram	H.210	P.P.230
Six-Sixty	210 H.L.	230 P.P.

No terminals are used for H.T. and L.T., flex leads being run directly to the various points of attachment.

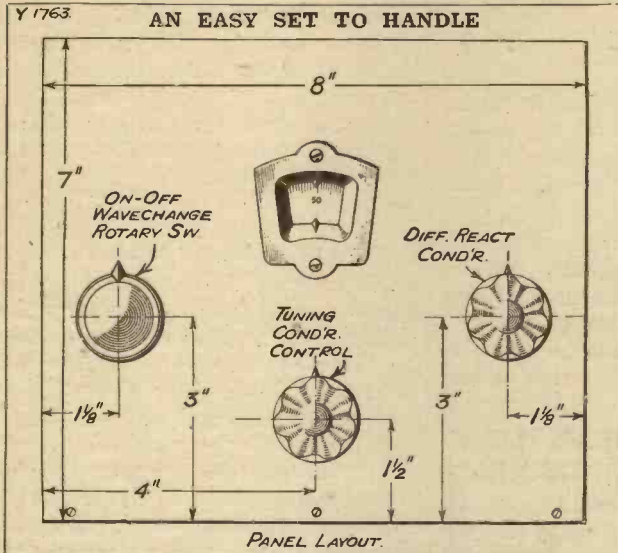


# The "Detrode"—continued

These wires may be separate pieces of flex, or you can use one of the multicables supplied for the purpose; in any case, a slot should be provided in the back of the wooden case to accommodate them.

concerned, use a small one if you are going to work on H.T. batteries. If you intend to employ a mains unit for H.T., then you can use one of the larger pentodes so long as your unit is capable of supplying a large enough current to

That, I think, concludes all I have to write about the set, and if my friend of the train comes across this article I hope he will not take all the credit for its being designed. It is not the outcome of just one discussion, but



Three knobs and an escutcheon plate are the only components on the panel.

Although the operating details and information about accessories is contained in convenient and compact form in the operating panel, there are one or two points in connection with them which call for special mention. First of all there is the question of the taps on the output choke.

## Matching Speaker to Pentode

There are three of these, and they provide a step-down effect so that loudspeakers of ordinary resistance and impedance may be adequately matched up with the pentode valve. Actually the best scheme is to try all three by moving the flex lead from the 2-mfd. output condenser from one to the other, noting which gives the most pleasing results from your point of view.

Should you be using a loudspeaker which has its own input transformer, which is intended for direct connection to a pentode valve, the flex lead just referred to should be placed on the terminal of the output transformer marked "Anode." You will then be getting a 1:1 ratio output, so that matching will still apply. This is also the right method of connecting if your speaker is one which is specially wound to go direct into the anode circuit of a pentode valve.

So far as the pentode valve is

supply its needs. The larger valve will increase the amount of power which can be obtained from the set without distortion, but will not have any effect on its distance-getting properties.

the result of very careful investigation of the requirements of many listeners who are not within the "piece of coke and spring mattress" area of a broadcasting station.

## THE "WIRELESS CONSTRUCTOR" "DETRODE"

Circuit: Transformer-coupled detector and L.F., using pentode output valve.

### VALVES

- 1st (nearer panel): H.L., H.F., or special detector type.
- 2nd: Small pentode with dry battery H.T. With a mains unit a larger pentode valve may be used if desired.

### CONTROLS

- Centre knob: This is for tuning both on medium and long waves.
- Left knob: On-off and wave-change switch combined. Centre position is off, turn to left for long waves and right for medium waves.
- Right knob: Controls reaction. Turn in clockwise direction to increase.

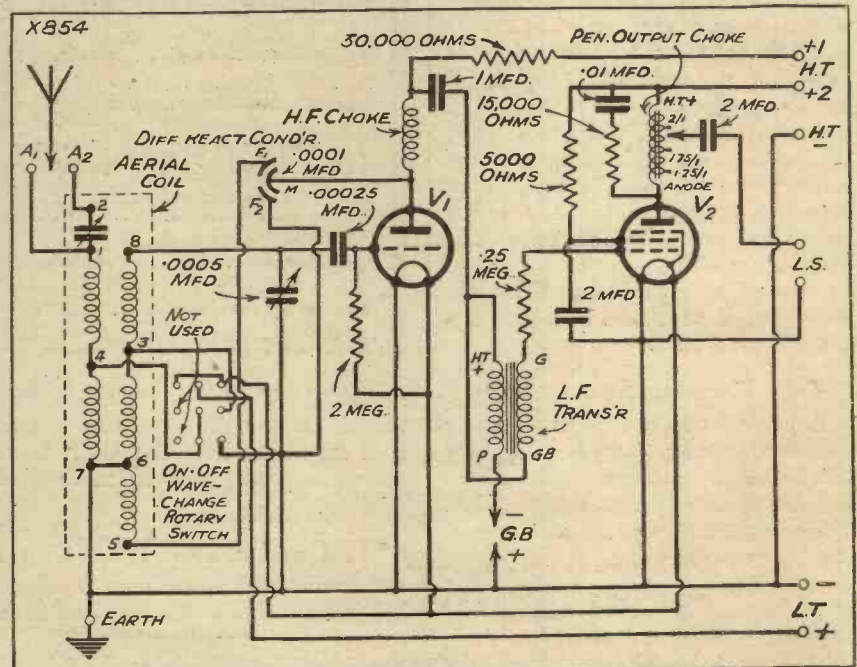
### VOLTAGES

- L.T.: 2 volts for 2-volt valves supplied by accumulator.
- H.T.+1: 60 to 90 volts. Adjust for smooth reaction control.
- H.T.+2: 120 to 150 volts. (Use maximum voltage available up to 150 volts.)
- G.B.—: This depends on H.T. voltage and pentode valve used. Consult valve-maker's details.

### ADJUSTMENTS

- Try flex lead to output choke on the various taps to find the most satisfactory one.
- Knob on top of coil adjusts selectivity, but aerial sockets on terminal strip give large variation in selectivity by cutting out and in this selectivity control on coil.

## UP-TO-THE-MINUTE TWO-VALVE TECHNIQUE



A parallel-fed transformer, differential reaction, tone corrector and continuously variable selectivity are a few of the many features included in this up-to-date two-valver. The set is delightfully smooth in operation, and it has ample power for all normal requirements.





# PICK-UP HINTS AND TIPS

*Some interesting notes on various practical aspects of radio-gram. reproduction.*

By A. BOSWELL

SOME people when demonstrating their radio-gram to their friends bung on any old record and then stand back and expect to create a wonderful impression. But really, you know, that's not the right way to go about the matter at all.

Agreed we like visitors to get the best impression of our outfit, then its well worth a little time and experimentation to find out the type of records that suit our installations best. I say "installation" because pick-up, amplifier, loudspeaker, and even the volume available, have their bearing on the matter.

## Tonal Balance

Of course, the frequency-characteristic curve, which is another way of saying the tone, is the most important factor. Records that are largely composed of bass and low frequencies will not be so good on an outfit that is particularly brilliant as records that have plenty of brass and "top stuff" on them.

At the same time, of course, it must be remembered that if results are generally too "toppish," a record with little top may tend to balance out things and give pleasing results. The ideal is an outfit that does well on records of all types, but there are very few, if any, of which this can truthfully be said.

## One Record, Two Needles

Another little tip, perhaps rather obvious to many, but yet completely overlooked by a large number, is to use comparatively new records when "showing off" your radio-gram. Entirely new ones are naturally even better.

Unfortunately, records will not last for ever; and particularly on those with extra heavy passages wear may take place more quickly than you realise. You see, the trouble is that one gets used to the wear as it occurs,

and therefore a record that might strike a fresh listener to it as "simply awful," may fail entirely to elicit a single tiny spark of irritation from yourself.

And while on the question of record wear, if you use ordinary needles may I be permitted to impress on you that the statement "use once only" means that the needle should be changed for "the other side of the

## YOU SHOULD HEAR THESE

### SELECTED RECORDS

A Posy of Popular Tunes.	
Peggy Cochrane . . . . .	Broadcast
Waltzing Time in Old Vienna.	
Gracie Fields . . . . .	H.M.V.
Bahama Mama.	
Terry Mack and His Boys . . . . .	Zonophone
The "Oi" Song.	
The Blue Lyres . . . . .	Zonophone
Big Ben Calling.	
Flotsam and Jetsam . . . . .	Columbia
O Sole Mio.	
Famous Choir of Canaries . . . . .	Broadcast
Troubles are Like Bubbles.	
Harvard Dance Club Aces . . . . .	Broadcast
Hill-Billy Songs.	
Carson Robison and His Pioneers . . . . .	Columbia
Underneath the Arches.	
B.B.C. Dance Orchestra . . . . .	Columbia
Everything But You.	
Frances Day and Max Kirby . . . . .	H.M.V.
Lullaby of the Leaves.	
Sam Browne . . . . .	Zonophone
Humming to Myself.	
Ambrose and His Orchestra . . . . .	H.M.V.

record." The "one-needle-one-record" man is far too common, and it is surprising how difficult it is to persuade people not to make this mistake.

## "Hill and Dale" Recording

I understand that much work is being done at the present time on a new type of recording in which the needle movements are made up and down in a vertical plane instead of sideways in a horizontal plane. The main claim for the system, I believe,

is that greater variations between loud and soft passages is possible.

It seems, at least on the surface of things, that the wear with this kind of record would of necessity be much greater than that on an ordinary record. Apart from the bigger movements due to the larger amplitudes recorded, surely there would be a tendency for more wear to take place on the "up" part of the recording than on the "down."

When comparing two loudspeakers to see which you like better for record reproduction, it is most desirable that the volume from them both should be exactly the same. An easy way of ensuring that this is the case is the following.

## Comparing Speakers

Sit between the two speakers with them at equal distances away, one on either side. Arrange volume controls so that the volume of either can be adjusted independently of the other.

When they are both giving the same volume it will appear as if the sound was coming from a point directly ahead and not from either side. The slightest alteration of the volume from one speaker will immediately be shown up by all the sound appearing to come from right or left.

Having made this adjustment, it is best to compare the speakers by covering each alternately with a blanket to stop the sound. Disconnecting or shorting may upset the volume of the other speaker, so that they will not both be working at the same power.

Now that the really hot weather has gone, loudspeakers in the open have also vanished. But I have not yet forgotten the fun a friend had with a neighbour who apparently wanted to show off the colossal amount of power—not undistorted, mark you—that he was pumping into his speaker.

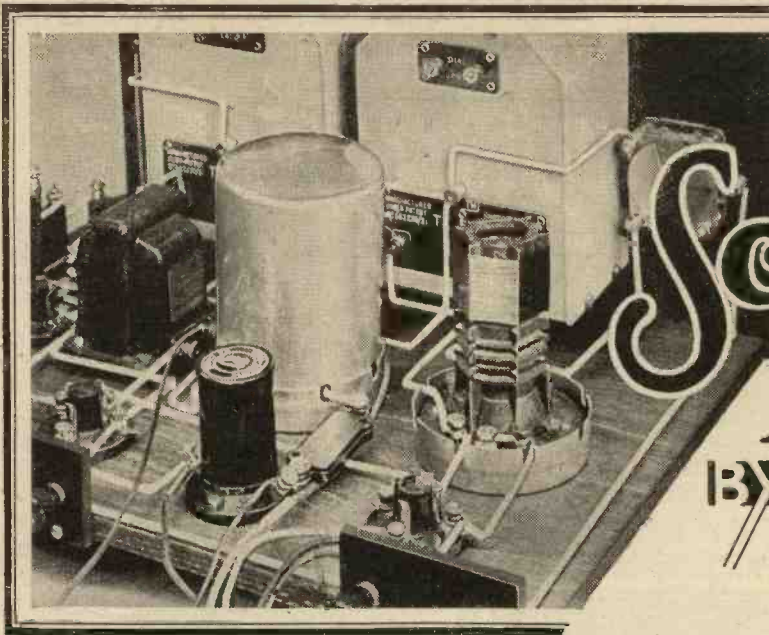
## A Garden Broadcast

Perhaps some of my readers have had similar bothers, if so they may be interested in what was done to stop the broad-blaring. He put up his power to something like five watts undistorted, and attached a microphone to the input.

The speaker in the garden, a little imitation broadcast into the microphone on "Swank," with blaring loudspeakers out-of-doors as an example, and the trick was done.

As a final word though, don't think that I abhor speakers in the garden—I don't. It's just simply that bad quality gets on one's nerves, that's all.





# Modern Screening Methods

BY Victor King

THE introduction of wide-scale "canning" has entirely changed our set design technique. With screened coils, shielded condensers and metallised valves, the necessity for more or less elaborate baseboard, panel, and partition screens has almost disappeared.

## Compactness and Efficiency

Is it a change for the better? It certainly tends to make receiver construction vastly easier. There isn't much building to be done in a modern set; it is now mostly a mere matter of assembly.

Another advantage is that greater compactness is rendered possible, and, in general, the parts can be bunched instead of having to be spread out. The coils of two H.F. stages may be only an inch or two apart; a state of affairs which would have horrified us two or three years ago.

All forms of screening are apt to occasion losses, and the more confining the screening the more the loss. But it does not necessarily follow that the very compacted set built up from closely shielded components will be less efficient than the average wide-separation, partially-screened design.

## Scientific Screening

In any one of these latter there was always the likelihood of electric and magnetic fields wandering over metal partitions and causing coupling effects of a serious character, and these had to be reduced in their effectiveness by cutting down the amplification of one or more of the H.F. stages.

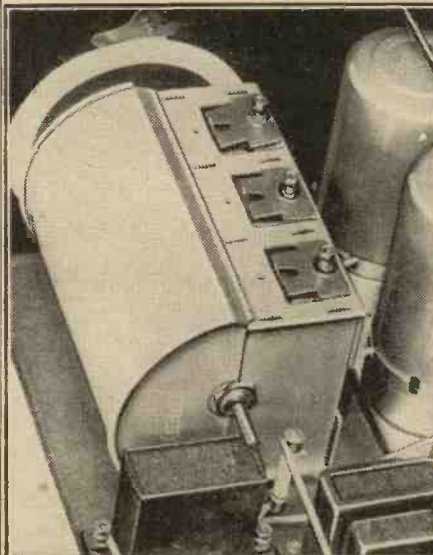
Many of the so-called "stabilising"

*—who discusses present-day tendencies in screening methods, and their effect on efficiency. Mr. King also describes some interesting experiments recently carried out by himself, and the valuable information obtained as a result.*

schemes were of the "losser" kind. That is to say, stability was achieved by a reduction of amplification effectiveness.

I believe the height of efficiency was achieved by those designs in which large screening boxes for the electrical and magnetic isolation of

## UP-TO-DATE PRACTICE



*An up-to-date screened ganged condenser assembly of a type to be seen in many modern receivers. This form of construction has greatly simplified the problem of planning the layout of a high-efficiency receiver.*

the vital parts of an amplification stage were used.

However, these screening boxes were comparatively bulky, and a three-valver using them would occupy as much or more space than a present-day four- or five-valver.

With scientifically screened components I do not think the losses will be greater than is justified by the easier construction, tidiness, and compactness which results.

## Modern Valves in Old Sets

It must always be remembered that modern valves are many times better than their predecessors, and it is not fair to make comparisons with earlier sets unless this fact is borne in mind. (Many of the pre-screen designs simply could not be held down with 1932 "tubes" !)

You will note, however, that I have referred to scientifically screened components; I fear that not all the "canned" components which are now being made are entitled to that description.

Indeed, it would seem that some manufacturers hold the view that you have only got to make, say, a coil a bit smaller and pop an aluminium cover over it in order to produce a screened coil.

## To Cover or Conceal?

It would certainly be screened to some extent, but its efficiency would be open to question. I wonder how many firms have conducted really serious research into the subject of screening? Very few, if any, I should imagine.

Some of the screens are actually



## Modern Screening Methods—continued

only covers. I was standing in the Research Department the other day waiting to have a word with one of the staff technicians—a particularly bright young man noted for his sense of humour. He was engaged in conversation with the executive of a firm who has just produced a new coil. I forget the name of the firm, but that doesn't matter.

The Bright Young Technician interestedly dissembled the coil.

"And what," he asked, "is this for? Mechanical protection, or to conceal the shellacked windings?"

and the set was perfectly stable and gave good "mag." (a technical colloquialism which indicates the degree of magnification or amplification).

### A Vital Factor

I then changed the coils for another make. These coils were of the partially screened type. At once the set became unstable. Incidentally, the tuning was flat, and there was breakthrough of a medium-waver on the long-wave band.

You would think anyone engaged in the task of manufacturing radio

a few of the coils I have tested!

I would like to hear of intensive experiments in the design of coils, and if any radio firm has any literature on the subject, well, I'd find it most interesting reading.

I wonder if any work has been done on the use of different metals for coil screens? I know that there are metals which are better than those commonly used.

### Coil Design Problems

Is any attempt being made to investigate the possibilities of mixed-metal screens? You could easily render a racing motor-car more stable by piling blocks of lead on it. But although its road-holding qualities might be improved, it is highly probable that its speed would be seriously reduced by such measures.

And so with screened coils. The shielding as such is not difficult to obtain; all that has to be done is totally to enclose the coil in metal, although, as I have shown, this elementary fact seems to have escaped the notice of many!

But a haphazard enclosing in metal will probably reduce the coil's efficiency quite a lot; you can't bottle up H.F. coil windings in the same way as you can the windings of an L.F. transformer without occasioning considerable sacrifices.

The problem confronting the coil designer is to waste as little as possible in the process. The way to approach the problem is first to fashion windings of the most efficient nature within the limited compass of the prescribed dimensions, bearing in mind that the greater the separation between the screening and the windings the better.

### Advantages of Iron

And then the kind of metal to be used for the "can" should be decided upon. Iron is much more effective than copper or aluminium as a screen, and I fancy its magnetic effect is an advantage.

Aluminium or copper will decrease the inductance of the coil and necessitate larger windings for a given wavelength. Iron increases the inductance and so the windings can be smaller.

Any aperture in the screen will permit appreciable escape of the field of energy from the coil, and so an

(Please turn to page 63.)

### AIRCRAFT RADIO DEPENDS ON EFFICIENT SCREENING



In aircraft receivers particular attention has to be paid to screening, not only to stop interaction between the components, but to reduce interference from the ignition systems of the 'plane. It is usual to screen the sparking plugs thoroughly, as well as their associated wiring.

He was smilingly indicating the "screen." Of course, the visitor thought he was joking. And so, to a large extent, he was, but it was a joke with a sting in it.

The "screen" went no farther than the insulated base of the coil, and even if the set in which it were incorporated had a metal baseboard the screening would still be incomplete.

### Comparative Tests

At a later date I conducted some simple experiments. I built a set along conventional, compact lines. There were two stages of H.F. amplification. I first used two entirely shielded coils of a well-known make

apparatus would realise that screening is as vital a factor as, for example, the gauge and method of winding the wire of a coil. And yet it does appear that at least some do not.

(I must point out right away that there are notable exceptions and that screened coils as good as science can make them are to be obtained. You see them specified for THE WIRELESS CONSTRUCTOR sets.)

It is probably felt that owing to valve improvements there is a greater margin to play with and that it is easy to make up for what is lost in an inefficient coil. For my part I consider that any such margin is eaten right up, and then some, with



# WITH PICK-UP AND SPEAKER



by  
A.  
JOHNSON-  
RANDALL

IN connection with two of his latest receiver designs, the "Double-Tune" Three, described in last month's WIRELESS CONSTRUCTOR, and the compact "Detrode," of which full details are given in this number, Victor King has suggested that it would be a good idea if I covered the use of a pick-up with them in this monthly page for radio-gram enthusiasts.

## Volume Control Position

For certain reasons a pick-up switch was not incorporated in the design of either of these receivers, but it is quite a practical proposition to use them for the electrical reproduction of records. As a matter of fact, these two sets form very good illustrations to my remarks of last month, both as regards using only the last two valves of a detector and 2 L.F., as well as regarding pentode receivers.

In connection with the latter, I remarked that quality might not be too good without an equaliser across the output choke, which should be tapped. Both these points you will find are covered in the output circuit of the "Detrode," which is a detector and pentode receiver.

With both the sets under consideration a volume control connected directly across the pick-up will be advisable. This control can be mounted on the motor-board, where it will be handy for adjusting volume to suit the particular record to be played, as it is being put on.

## Across Transformer

The two leads from the volume control are connected up to the pick-up switch in the same way as the two leads from the pick-up itself would be were no volume control joined across it.

A 50,000-ohm type of potentiometer is usually quite satisfactory with most pick-ups. Its ends—that is, the ends of the resistance element—are connected to the two leads from the pick-up. Then from its slider terminal and from one of the other terminals of the potentiometer (it does not matter which) the two leads are taken to the receiver.

In the case of the "Double-Tune" Three, to connect directly into the grid lead of the first L.F. valve would entail long leads to the switch, so it is better to connect across the primary of the first L.F. transformer. A single-pole change-over switch is required, and can be best mounted on the panel below the volume control,

which will be inoperative when the pick-up is in use.

First of all, you must disconnect the plate terminal of the first transformer from the H.F. choke, and take it instead to the centre or common contact of the switch. One of the outside contacts of the switch goes to the side of the H.F. choke, from which you have just removed the lead, and the other to one of the leads from the pick-up volume control (again it does not matter which).

## Grid-Circuit Connection

The remaining lead from the pick-up volume control has to be joined to H.T. on the first L.F. transformer. That completes the alterations, the switch giving radio in one position and record reproduction in the other.

In the case of the "Detrode" a similar type of switch is needed, but in this case we can obtain short grid wiring if it is connected in the grid circuit of the detector valve. The best place for the switch is on the wooden side which carries the tuning coil, and as near as possible to the grid condenser.

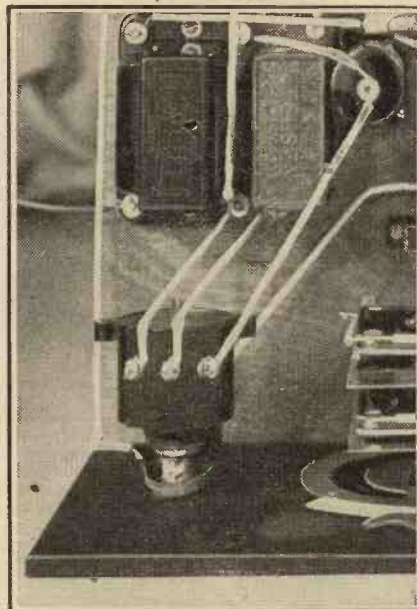
When fitting the switch, don't forget the detector valve has to go in; so be sure the switch will clear its bulb. When the switch is in place the alterations to be made to the connections are as follow:

## Switch Wiring

Disconnect the short lead which joins the grid of the detector valve to its grid condenser, and wire the grid up to the centre contact of the switch instead. The free side of the grid condenser should now go to one of the outside switch contacts, the other going to one of the pick-up input leads.

The other pick-up lead goes to  $1\frac{1}{2}$  volts negative of the grid-bias battery.

## EASILY ADDED



With the help of this photograph and the description in the article you will find adding a pick-up to the "Double-Tune" Three a remarkably easy job.





Some details about unusual radio faults and some suggestions that may help you to better radio reception.

By P. R. BIRD

### Using Metallised Valves

As a great many readers will be using metallised valves for the first time within the next few weeks, unusual interest attaches to the recent crop of complaints about unsatisfactory H.F. stages and run-down H.F. grid-bias batteries.

The coating of a glass bulb with metal turns the valve itself into a conductor, instead of an almost perfect insulator, as is the case when the glass is untreated. And it is this unsuspected conductivity that causes the trouble.

By means of the filament leg the valve and coating is connected to one side of the filament circuit, and consequently is liable to short either the grid bias or H.T., or even the other side of the L.T. circuit if it comes into contact with a bare wire attached to any of these points!

The mere touching of the valve against a metal screen may, in certain circuits, lead to this trouble, so particular care should be taken when inserting or withdrawing such valves from their holders, and also to see that when in position the valve is making no unwanted contact through its coating.

### Resurrected Receivers

Old sets, which in the palmy days of their youth behaved like gentlemanly lambs, have a disconcerting habit of becoming far too frisky and lively when fitted with new valves.

Numbers of readers have remarked on this rejuvenation, and a large proportion have guessed rightly that it

proceeds from instability due to high-magnification valves in circuits that are insufficiently decoupled.

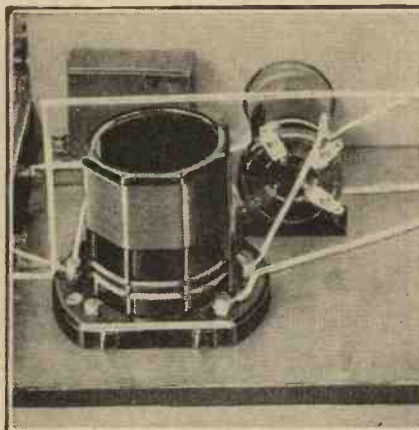
"Can it be cured without pulling the set to pieces?" is the usual query asked in such circumstances. And the answer is: "Generally."

If the detector valve has a separate H.T. feed (usually it will be marked "H.T.1"), instability can be removed by the following simple alteration.

Undo the H.T. plus lead in question and connect a resistance of 20,000, 25,000 or 30,000 ohms between it and the terminal to which it formerly went direct. Then join to this terminal one side of a large fixed condenser, say of 1- or 2-mfd. capacity, though sometimes a smaller capacity will serve.

Finally, run a lead from the vacant terminal on the new condenser to the

### AIM AT SHORT LEADS



*In all radio receivers it is most important to keep leads carrying H.F. currents as short as possible, and if pains are taken when planning the layout of the components, this desirable quality is not difficult to obtain.*

H.T. negative terminal of the set, and the decoupling is complete.

(Note that as the extra condenser will be joined across a portion of the

H.T. battery or mains unit, it needs to be of good quality.)

### His "Him Hum"!

A laconic Derbyshire reader raises a rather interesting query, and apparently obtains at the same time some practice on a typewriter, for his question is typed in a manner that suggests that stenography is an art of which he has but recently acquired the rudiments.

He says:

"Using 12-ft. earth lead results good ordinary and long waves. No hum. But short waves get him hum unless earth off. Why?"

Assuming that "earth lead" is earth lead, and that "him hum" is plain hum, we gather that the latter is troublesome only on short waves.

### HOW IS YOUR SET BEHAVING NOW?

If you are troubled by a radio problem, remember that "The Wireless Constructor" Technical Queries Department is fully equipped to help you.

Full details of the service, including scale of charges, can be obtained on application to the Technical Queries Department, "The Wireless Constructor," Fleetway House, Farringdon Street, London, E.C.4.

SEND A POSTCARD, on receipt of which the necessary application form will be sent by return.

LONDON READERS, PLEASE NOTE. Application should not be made by telephone, or in person at Fleetway House or Tallis House.

Even with full details of the circuit, etc., such a hum is not easy to cure "at a distance," but apart from alterations to wiring or spacing there are two things worth trying in cases of this kind.

First try the effect of working on short waves without any earth lead at all. It is often completely successful.

Secondly, if this is unsatisfactory, try inserting a largish condenser in the earth lead.

Sometimes a variable (tuning or pre-set) condenser is useful, and the capacity to which it is adjusted may prove of some importance. But it may be that a really large condenser, say a couple of mfd. or so, will be necessary.

Failing these expedients the circuit itself will have to be tackled, and re-spacing, extra de-coupling and by-passing are all worth investigating as removers of such a "him hum"!





**T**HIS is my last armchair chat before the "S.T.400" is published. To call it an armchair chat at all makes me give a hollow laugh—or whatever noise people make when trying to be bitter and sardonic.

I have not sat in my old armchair for a month, but as—in spite of my exhaustive and exhausting tour—I can still see plenty of fun in wireless, I have collected and added to my various jottings destined to appear under the above comfortable photograph.

### Secret Ceremonies

I have been struck today by a paragraph in the papers headed: "Indian Priests play with Death." It reminds me forcibly of this season when set designs are offered to the public. It goes on: "Priests played with deadly snakes and conducted mysterious rites in underground caverns at the age-old ceremony of the annual snake dance and prayer for rain by the Hopi Indians.

"After nine days of secret ceremonies in the underground cavern, where the priests prepare their strange ritual equipment, the day of the dance was ushered in with the booming of drums which had thundered throughout the nights."

If you substitute the wireless public for "snakes," and the less responsible wireless designers for the "priests," it seems like the elaborate preparation for the public of a special

autumn set, doesn't it? Read it again.

The paragraph ends: "There has not yet been discovered any satisfactory explanation of why the Hopi priests are never bitten by the snakes." I suggest the latter never have a chance of getting really close enough.

My bitterest enemy—yes, you at Watford—could (after this flying tour) hardly accuse me of mysterious rites in underground caverns!

### Look at the Lino!

Herewith is the latest television bulletin in the Press: "To-day it is

**H**IS aerial tour of the country for the purpose of testing his outstanding new circuit has robbed Mr. John Scott-Taggart of the comfort of his armchair.

**NEVERTHELESS, "S.-T."** can always see plenty of fun in wireless, and his monthly chat with **CONSTRUCTOR** readers is just as entertaining, just as informative and just as comprehensive as it always has been.

possible to transmit wireless images over hundreds of miles, and they are sufficiently clear for an observer in Newcastle to have distinguished the check linoleum on the floor of a studio in Broadcasting House."

### A Brisk Trade

Here is a big treat for Newcastle readers (locally known as Novocastrians). No doubt the shops in that ancient Roman citadel will do a brisk trade in television receivers. "Look in to-day! All our sets are guaranteed to reproduce faithfully the linoleum at Broadcasting House."

The only thing that worries me is

that readers in those parts will be so busy purchasing linoleum-receivers that they will be too late to buy next month's **CONSTRUCTOR**. Still, I am all for encouraging a little good clean, honest fun, and "checking the checks" surely comes in this category.

### Good, Clean and Honest

I believe that all the best "columnists" (i.e. writers of chatty columns) allow their admiring public to catch glimpses of their "personality." In previous issues you have had the privilege of noting my interest in all kinds of things quite outside of radio. In the previous paragraph you have learnt that I am a believer in fun—provided that it is (a) good; (b) clean, and (c) honest.

I am now going to reveal more intimacies. *I am a bit of a nudist.* No, I have never pushed a policeman into the Serpentine,\* nor have I been arrested for sun-bathing at the Welsh Harp.† But I have shown a leg on the Riviera, sprawled on Waikiki Beach at Honolulu, and done a bit of paddling in my time at Clacton.

What has this to do with wireless? Wait a minute. I am merely pre-facing a criticism by explaining that I experience no revulsion towards

\* A stretch of water in Hyde Park, London, surrounded by policewomen and peculiarly suitable for their immersion.

† Another stretch of water, nearer Brookmans Park, on the shores of which nudist colonies congregate. Police arrests are made regularly on the first Thursday of every month.



## Music Out of a Manservant!

the sun, and that I believe in air—except that existing in St. Helens\*.

I have groped my way into that busy town very recently, but soon left as the metal panel of my wave-meter became coated with copper st.-helensite, and I feared I might become similarly coated.

### Prelude to a Protest

All this is a prelude to a protest against the increasing bravado shown by firms exhibiting at Olympia. We have been getting stronger and stronger doses of exotic femininity recruited from Elstree, Twickenham and other places where they "super." Valve manufacturers are particularly partial to decorating their stalls in this way, and I fear many a potential valve customer has had his mind

saw two young women in exiguous bathing costumes. They passed close to me and were closely guarded by two tall grim-faced individuals. Plain-clothes men, obviously. I should think so, too! Half the exhibition followed the group with their eyes. (The other half could not see them.)

Instead, however, of passing through the exit doors, the party entered Lyons' café. Apparently, they were just two radio salesmen taking the ladies out to lunch.

### Braver of Storms

As I wilted towards Olympia on the hottest day for five hundred years, I saw outside the exhibition a gentleman with a placard protesting against the licence fee. I believe it was our

saying to the Postmaster-General: "Shoot if you dare!" Those of us who were working for the freedom of the amateur in a less spectacular manner were compelled to admire Mr. Ford risking ten years in prison, a fine of £1,000, or both.

### A Dog Which Resonates

Of course, before the B.B.C. livened up the ether there was no particular reason why one should pay a bawbee for "operating a receiving station." Concerts came from abroad or from British amateurs. The licence fee, however—as you probably know as well as I do—is still not for receiving the B.B.C. It is for installing a receiving station.

It probably is on a par with a dog licence. You don't get much music out of a dog—although there is one next door to me which resonates at 3,000 cycles.

Again, those of you who keep a manservant are accustomed to pay the annual licence fee payable to the Exchequer; you don't get much music out of a man-servant, and if you did you would probably gag him.

Still another example: If you ever sport a coat of arms (mine will probably be four valves rampant on a verdant field of aeroplanes) you will have to enter your nearest post-office at least once a year.

### Writ for Libel

No; those who are out to sweep aside the licence tax are fighting for a lost cause. We English (and Scots, Welshmen, Northern Irishmen, Free Staters, Manxmen, citizens of Chorlton-cum-Hardy, and Carlos X of Portugal) are submissive to discipline and scuttle to that "nearest post-office" when the green van is in the next-street-but-two.

I should probably immediately receive a writ for libel if I suggested that Mr. Ford had ever listened to the B.B.C., but I wager there are few of the dissenters and rebels (who boast that their dials have never fluttered near a Nat. or Reg.) who have never taken a surreptitious "listen" to the Dead Meat prices. And if they have only heard on one night the price of one poor, fat, dead Aylesbury duck they haven't a leg to stand on.

### More News from Carlos

By the way, I've heard from good old Carlos. Yes, that's the fellow. He

## WINGS OVER EUROPE



To hear Frankfurt at its best you must hear it on the "S.T.400," to be described next month. The above snapshot of the city's airport was taken while Mr. Scott-Taggart was piloting his first aeroplane, which he called "S.T.1."

taken off fifty-point suspension and microphony.

I feel, however, that the extreme limit was reached at the last Radiolympia, although the valve people were not the guilty parties. I am no prude (see above), but I was amazed and dazed when, looking up from examining an on-off switch, I

\* Centre of Lancashire chemical industry. Visibility there is nil. No aeroplane has ever been able to find the town. By road it is easily found, because of its subtle aroma, which is a piquant medley of chlorine, fish and chips. The two latter are consumed in enormous quantities by the inhabitants to counteract the effects of the former. Local doctors claim that fish-chloride and chips-chloride are harmless, and even beneficial, as tending to produce bone.

old friend, Mr. Ford (no, not the Detroit manufacturer), who for years was Braver of the Storms of Officialdom, Police-court Challenger, the Harasser of the G.P.O.

### Freedom of the Amateur

I have in the past admired him as a brave man—a trifle misguided on some wireless points, but the most cheerful picker-out-of-the-fire of chestnuts for the amateur I have known.

As a keen lover of a fight—more especially as a spectator—it was most edifying to read of Mr. Ford working his little crystal set and deliberately



## "Risking His Life to Lasso the Inkstrain"

has sent me a postcard of Setubal, the native haunt of the silver inkstrain. I thought we had heard the last of him, although he is a man after mine own heart, and bears the hall-mark of the true radio enthusiast—to wit, a desire to make use of his old . . . \*

Well, Setubal disappoints me. Before the "relic" arrived I had conjured up visions of a desolate country surrounding a small village nestling on the Atlantic. I had had visions of Carlos spending weeks—perhaps months—hunting the rare and almost extinct silver inkstrain, perhaps risking his life to lasso it alive.

### Super Cat's Basket

I dreamt of its sharp snout, bushy silvery tail, and wild eyes glaring from a thicket. And then the triumphant gleam in Carlos' own eyes as he put it in a kind of super cat's basket† and shipped it off to me.

I was on the point of ordering a special kennel when the silver inkstrain finally arrived and turned out to be what you saw last month. Well, anyway, here is a verbatim reproduction of the business side of the postcard.

Setubal, 20th Aug., '32.

Forward.

Dear Mr. Scott-Taggard,—I have seen in the Sept. number the sequel of July's, all about the mysterious "Inkstrain" from Portugal, but, conjecturing to kept in the garden and by a chain, is more than good sport, as it by now has develop into a relic. Well you have free hands on "him," can do what you please and, I am not only astonish but, curious to see "his" picture in the next number, enabling me to assert the mystification, since sailing one March evening from Setubal port—with a strong friendly shakehands. —Yours admirer,

CARLOS.

### Full Constructional Details

This, perhaps, is not up to Carlos' usual good form, but I feel there is more to come. Will you, my dear Carlos, tell us how to work the "inkstrain"? You are a famous man in this country. Readers would be glad to give you a strong, friendly shakehands. In practically every

\* Word of four letters beginning with "j," meaning "hitherto profitless material of antique value."

† I've only seen one cat's basket in my life, but I've heard dozens in railway carriages.

home I have entered during my aerial tour anxious enquiries have been made about your "gift." All I could say was: "A photo of it will appear next month." ("Next month," of course, will be "last month" to readers of this.)

In fact, the interest has been far greater than I imagined. I shouldn't be a bit surprised if the publishers of this magazine were to announce: "Next month: Full constructional details of how to build your own 'Silver Inkstrain' (1s. blueprint FREE!)."

One reader puts a P.S. to his letter: "Are you prepared to sell the inkstrain?" Yes, certainly. Now that I have "free hands on him," it is up for auction. When Carlos "asserts the mystification" the price will probably

not paying tribute. Although not personally a member of the same clan (I am, however, entitled to wear the priesthood tartan—believe it or not), I spent many moons hitching up a Mackenzie plaid kilt—during the war. I feel I could do worse and perhaps fare better than my Covenanter friend and fellow Scot. Why not travel on an expired season ticket\*, and then, when summoned at the police court, plead that the railways have no right to work on the Sabbath?

### Blackpool Rock

Personally, I am strongly against any work being done on a Sunday—or almost any other day. But, apart from that, I cannot help feeling that those who consider there should be no musical programmes on a Sunday have



A POSTCARD FROM PORTUGAL

Another interesting "relic" from the now famous Carlos! This is a facsimile of a picture postcard which "S.T." has received in connection with the "silver inkstrain." The text of the postcard is reproduced on this page.

soar. No doubt it is of great historical interest, so bids should be sent in at once. (Send no money—or, if you do, address it to me.)

### A Brand-New Excuse!

A report in the newspapers states that one of the Mackenzie clan, "summoned at Liverpool Police Court yesterday for having worked a wireless set without a licence, said that he had not renewed the licence because the B.B.C. were breaking the law by broadcasting musical programmes on the Sabbath." Mr. Mackenzie, who described himself as a member of the Covenanters' Church of Scotland, Ireland, England and America, was fined 10s. for not having a licence.

This, I believe, is a new excuse for

had nearly ten years of their own way. How many of us can claim as much?

Towns have a habit of being associated with certain things in one's mind. That is my experience, at any rate. Wigan, for example, does not call to mind its famous pier or its old-world (very old, when I was there last) atmosphere.

I simply remember that I once left a stick of Blackpool rock in a railway compartment when changing at Wigan†. I therefore have a grudge

(Please turn to page 62.)

\* Lancashire readers will understand the term "contract" better. The equivalent term in Scotland is unknown to me. Perhaps they don't buy "seasons." You've probably heard of the Scotsman who, travelling to London, got out at each station and booked to the next, in case he should die on the way, and so waste part of the fare.

† Most people change at Wigan.





Practical notes on what stations to look for and how to get the foreigners that are coming over well.

IN last month's notes tribute was paid to the distant stations for their vigorous onslaught on British aerials at the beginning of autumn. Since then they have continued to "come on" with a vengeance.

Fécamp (or Radio Normandie, if you prefer that name) has been the star-turn at the bottom of the medium-wave dial, but both Trieste and Heilsberg have sometimes blossomed out into serious rivals, with Bari, the new Italian on 270 metres, as an outsider worth noting.

Of stations nearer the middle of the dial, Hilversum (radiating Huizen on 296.1 metres) was at first the ringleader, but Bordeaux, Breslau, and Poste Parisien—respective wavelengths 304, 325, and 328.2—all paid for watching closely. Milan, Brussels No. 2, and Barcelona, too, in this part of the waveband, have all been outstanding.

Nearer to the top of the dial there were numbers of good programmes going all the time. Langenberg (473 metres) and Brussels No. 1 (509

metres) were top-notchers, with Vienna and Budapest just above them in wavelength and below them in performance. Prague, curiously enough, does not seem to be coming back quite so well as some of the others, but perhaps that is because we remember too clearly the astonishing strength of some of the programmes which he put over last year.

\* \* \*

Even if you give a dog a bad name and refer to Beromunster by his official title of "Schweizerischer Landessender," you are bound to admit he is a good station. For the benefit of those who have entertained him unawares I would explain that he is the German-speaking Swiss Regional on 459 metres.

\* \* \*

The long-wavers have all been excellent, and as there seems to have been a decrease in the Morse and mush interference above the 1,000-metre mark this waveband threatens to become more popular than ever.

**Past Reflects Future**

AND THE PAST REFLECTS THE FUTURE" is the title of an attractive brochure issued by Burne-Jones & Co., Ltd., of 296, Borough High Street, London, S.E.1. It gives a brief history of the radio activities of this company during the past ten years, and is available to all interested and applying at the above address.

The firm has also issued an excellent "Stenode" brochure, which contains full operating instructions and much of general interest about this widely-discussed principle for extreme selectivity.

**What's In a Name?**

Some considerable curiosity seems to have been aroused over the Mullard development of "golden" valves, and questions have been raised as to whether the attractive colour is a main or subsidiary consideration.

Actually the golden effect is due to the decision to use a new combination of metals—one of which is copper—for the coating. The advantages of copper are its high conductivity and effective screening properties, coupled with the facts that the coating adheres better to the glass and does not soil so readily as the zinc previously employed.

Add to this the attractive colour, and you have the reason for "golden" valves.

\*\*\*\*\*  
**POINTS FOR PURCHASERS**  
 \*\*\*\*\*  
 Interesting details from manufacturers about recent trade activities.  
 \*\*\*\*\*

**A Useful Manual**

Have you seen the new Bulgin catalogue? If not, take out your pencil and paper—as they say in the Sunday evening appeals—and write down this address:

A. F. Bulgin & Co., Ltd.,  
 Abbey Road, Barking.

You certainly won't regret sending for it because the catalogue proper is filled with interesting stuff and appended to it is a very useful manual bristling with information about circuits, facts about switching, fuses, and so forth, which every enthusiast will enjoy reading.

**Speakers and Sets**

"Why so sad, fellah?"

"Wal, my ole loudspeaker sounded so bad, mah wife always went round to her mother's to listen in."

"Oh, yeah?"

"Yeah! Now ah got a Blue Spot speaker she says there's no place like home—and she brings her mother!"

That is one of the bright spots of the Blue Spot literature recently received. It deals with "Loudspeaker Units," "Blue Spot Receivers," and

"Loudspeakers of Distinction and Quality," and particulars of any or all of these will gladly be sent to readers of THE WIRELESS CONSTRUCTOR on application to The British Blue Spot Co., Ltd., Blue Spot House, 94/6, Rosoman Street, Rosebery Avenue, London, E.C.1.

**Build Your Own**

If you are thinking in terms of mains units, etc., you will be glad to know of the new Heayberd catalogue. It is a packed-with-information production that embodies Technical Tips and Servicing amongst its many attractive features, which include enough mains circuits to satisfy the most inveterate fuse-blower!

The address is F. C. Heayberd & Co., 10, Finsbury Street, E.C.2.

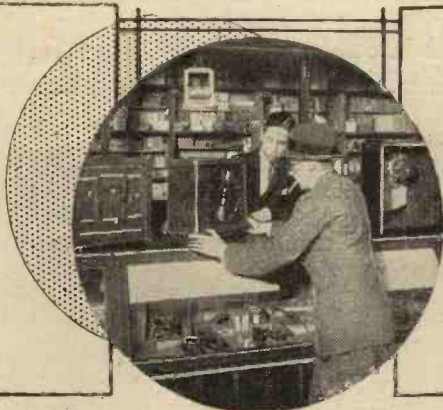
**Choosing Your Condensers**

Nowadays most people realise how important a subject is the choice of condensers, but the man who is not a dyed-in-the-wool radio fan often gets a bit confused with all the types that are now available.

Dubiliers (of Ducon Works, Victoria Road, N. Acton, London, W.) have now issued a guide for the constructor and set-user entitled "Choosing Your Condensers and Resistances." It will be forwarded to any reader who asks for it, and is very informative and well illustrated.



# AS WE FIND THEM



# NEW APPARATUS TESTED

## The Varley "Rectatone"

THE congested state of the medium broadcast waveband has created a demand for very selective receivers. But unfortunately this high degree of selectivity tends to produce a certain amount of "top" cut-off, or, in other words, a loss of high-note amplification, with the result that much of the brilliance in loudspeaker reproduction may be missing, and the general tone characterised by a lack of crispness.

To what extent this effect takes place is determined by the type of tuning circuits used and the degree of selectivity aimed at.

Bearing in mind the fact that the present-day conditions render high selectivity essential, we must look around for some method of correcting for the reduced amplification of the upper musical register, so that we can "feed" into our loudspeaker the bass, middle, and top frequencies in their proper proportions and so preserve the correct tonal balance.

## The Response Curve

The logical method is to adjust the tone on the L.F. side, and last month we dealt with a new transformer called the "Multitone," which is specially designed for tone compensation.

Messrs. Varley are another firm who have given the matter considerable thought and the outcome of this is the "Rectatone."

"The "Rectatone" can be used as an ordinary L.F. transformer, but with the addition of a variable resistance it instantly becomes a tone compensator, the frequency curve depending upon the value of the resistance.

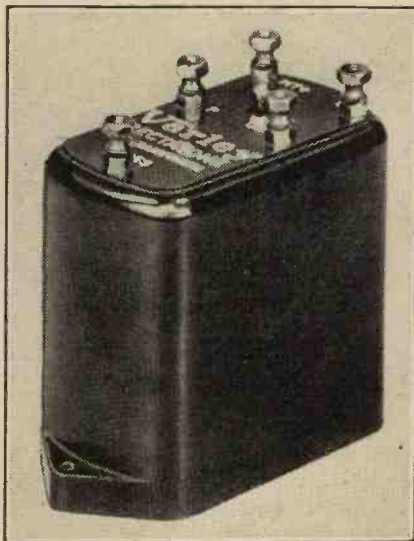
The response curve, when the instrument is employed under the conditions recommended by the makers, rises sharply at approx. 1,000 cycles and continues to do so up to about 4,500 cycles, after which

*Under this heading we publish reviews of apparatus submitted by radio manufacturers and traders for examination and test in "The Wireless Constructor" laboratories.*

there is a rapid fall to 5,500 cycles.

The increase in amplification between these limits provides a convenient means of correcting for any high-note losses in the high-frequency circuit, or elsewhere in the set, and greatly assists in maintaining a satisfactory tonal balance.

## BALANCE YOUR TONE



*The Varley "Rectatone," when used in conjunction with a variable resistance, enables the tone to be adjusted so as to compensate for any deficiencies due to a super-selective H.F. side.*

The "Rectatone" has a ratio of 7-1 and retails at 15s.

The makers are Messrs. Varley, Kingsway House, 103, Kingsway, London, W.C.2.

Remax Cables, Ltd., of Tottenham Court Road, London, W.C.1, have sent us one of their screened wiring kits, each of which consists of a 3-ft. length of closely braided tinned-copper

screened sleeving, a 3-ft. 6-in. length of tinned-copper flexible connecting wire, and twelve combination soldering tags and earthing clips.

The screened sleeving has an inner sleeve of rubber, and a "megger" test at 500 volts between the metal sleeving and a length of connecting wire passing through it gave an insulation reading of "infinity."

The sleeving is easily handled and the kit retails at 1s.

## The Becker "Kitswitch"

The latest addition to the extensive range of Becker switches is a model suitable for chassis assembly. In common with the other models in the range, this new model employs an all-bakelite construction, except, of course, for the phosphor-bronze terminals and contacts and the metal lock-rings.

The switch is screwed straight on to the metal chassis and not to the panel, a scheme which simplifies assembly.

A slot is cut in the panel, and when the switch is in position the chassis is slid into the cabinet and the switch knob is passed through the slot and screwed into place.

The "Kitswitch" is rated at 4 amps. 250 volts, and retails at 2s. 6d., complete with escutcheon plate, which incidentally is obtainable in various finishes.

## "Utility" Straight-Line Dial

A essential factor of a good tuning dial is to be able to read it easily, and of the various types available a horizontal scale having a pointer moving across its face probably fulfils this requirement best of all.

This, at any rate, is the opinion of Messrs. Wilkins & Wright, Ltd., of Holyhead Road, Birmingham, who have sent us one of their new straight-line dials for test.

It is an ingenious component. There is the usual tuning knob, and

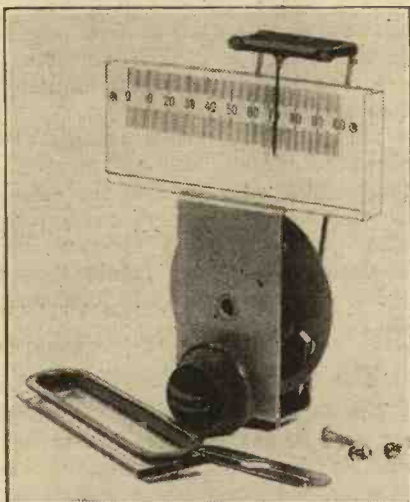


## As We Find Them—continued

this actuates a slow-motion friction drive which is equipped with an eccentric cam.

The sides of the cam bear against two uprights supporting the pointer framework, and as the drive is rotated the cam causes the pointer to travel horizontally across the tuning scale.

### A GOOD DIAL



This "Utility" dial has a slow-motion drive. The pointer moves across the scale horizontally and is remarkably easy to read.

A little over three and a half complete turns of the tuning knob are required to cover the full range of movement over the 0-100 division ivory scale (a distance of  $4\frac{1}{2}$  inches).

The scale is illuminated, and we found the movement to combine perfect smoothness with a firm, positive action.

The price, complete with escutcheon, is 7s. 6d.

### Lewcos Potentiometer

Although a high-resistance potentiometer is, to all intents and purposes, a "simple sort of gadget," there are, from the standpoint of practical design, numerous difficulties that have to be overcome.

For instance, a potentiometer is frequently called upon to carry current, as in the case of a screening-grid voltage control, and to condense a good, reliable high-resistance element into a small space so that it shall maintain its value under all conditions and function noiselessly is no easy matter.

Similarly, a potentiometer employed as a volume control, either in the

pre- or post-detector positions, is required to give silent working.

There are two sources of noise. One of these is variations in the resistance element itself, and the other poor contact between the "slider" and the resistance. A "rubbing" contact between the "slider" and the element rapidly produces wear, and in time the resistance may break if it is of wire, or, alternatively, cause crackles to manifest themselves in the loud-speaker, due to small changes in the resistance of the contact path during working.

One of the cleverest attempts we have seen to overcome the inherent "snags" in potentiometer design is the method employed by the Lewcos people.

### Silky Movement

The resistance element is wire-wound, but the outstanding feature

### PERPETUALLY DAMP



"Filt" maintains a damp condition in the soil, and so ensures a permanent and satisfactory earth.

is the scheme used to ensure a satisfactory connection between the adjustable contact and the wire resistance. Briefly, the rotation of the control knob causes the edge of a circular metal plate to rock lightly but firmly upon that particular portion of the element immediately beneath it.

The movement is delightfully silky, and our measurements proved the nominal rating of 100,000 ohms for the sample submitted to be substantially correct. In operation the component functioned noiselessly and well.

This Lewcos potentiometer is a quality job, and the price is 3s.

The makers are The London Electric Wire Co. & Smiths, Ltd., Leyton, London, E.10.

### Kniffy Pins

The Kniffy pin is something like a drawing-pin with a slotted and grooved insulating head. It is manufactured in six different colours and can be used for securing twisted flexible or separate twin wires to plaster or woodwork. Kniffy pins are 1d. each, and will be found useful for running speaker extension leads, bell wire, etc., along the wall of a room in an inconspicuous manner.

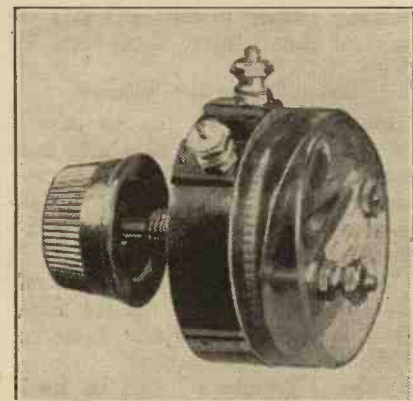
### The "Filt" Earth

The importance of a good earth is not always appreciated, and in many cases those used by constructors are definitely of a high resistance, and therefore inefficient.

Messrs. Graham Farish, realising this fact, have recently produced a device which they call the "Filt," and which, when buried, constitutes an excellent earth.

The "Filt" is a copper receptacle which contains a quantity of a special chemical material of a highly hygroscopic character; that means to say, it has the power of attracting moisture to it, and so when you bury the "Filt" in the earth the surrounding

### EFFECTIVE AND PRACTICAL



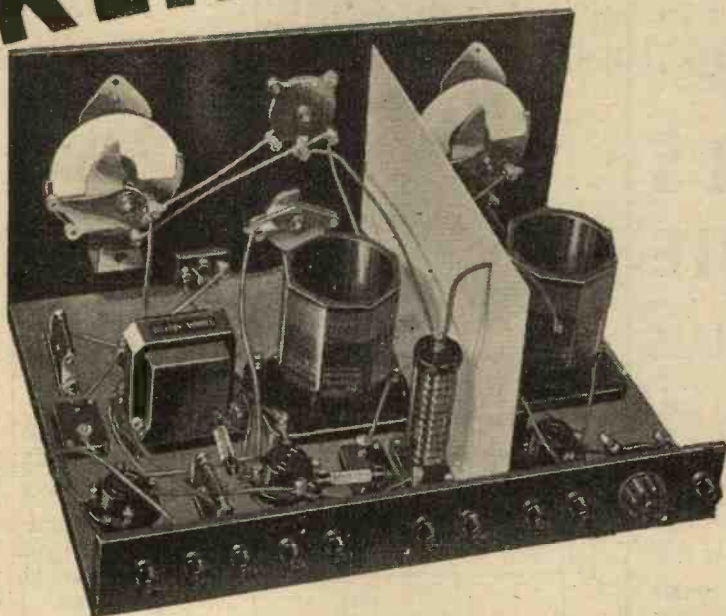
The main feature of the Lewcos potentiometer is the clever method of ensuring a satisfactory connection between the "slider" and the resistance element.

soil becomes highly conductive for an area of several feet, and consequently you are assured of a thoroughly sound earth connection.

The "Filt" constitutes a new application to radio of a valuable chemical principle, and the cost is 2s. 6d.



# Build the KENDALL-PRICE S.G.4



Post coupon now or go to your dealer for your FREE 36-page 1/- Book. It gives all building instructions and plans of the Kendall-Price S.G.4, and also shows you how, at the cost of a few shillings, you can bring your present set right up to date. It contains complete instructions, photographs and diagrams of ten modern circuits, both battery and mains-operated.

The sets described can be built from the diagrams in the book, but if you require full-sized dimensioned blue-prints of the ten circuits, enclose 1/- with your coupon.



GET YOUR  
KENDALL-PRICE S.G.4  
KIT FROM YOUR  
LOCAL DEALER.

For really long-distance radio you must build the Kendall-Price S.G.4. It will satisfy the most enthusiastic and exacting DX man.

It gives a minimum of forty or fifty stations on the speaker after dark with ease and great volume, in addition to short-wave stations from all parts of the world.

## Price List of Components for KENDALL-PRICE S.G.4

	£	s.	d.
1 Ready Radio Dual-Range Aerial Coil, complete	8	6	
1 Ready Radio Dual-Range H.F. Coil, complete	8	6	
1 Ready Radio Short-Wave Aerial Coil	4	0	
1 Ready Radio Short-Wave H.F. Coil	4	0	
2 Ready Radio Disc Drives	8	0	
1 Ready Radio '00004-mfd. Condenser	1	6	
2 Ready Radio '0005-mfd. "Micalog" Condensers	7	0	
1 Ready Radio '0001-mfd. Differential Condenser	2	6	
1 Ready Radio '0002-mfd. Brookmans Condenser	2	0	
1 T.C.C. '1-mfd. Fixed Condenser, type 50	1	10	
1 T.C.C. '0001-mfd. Fixed Condenser, type "S"	1	3	
1 T.C.C. '01-mfd. Fixed Condenser, type 40	1	9	
1 Ready Radio Wave-change Switch	1	6	
1 Ready Radio On-Off Switch	1	10	
1 Ready Radio 1-meg. Thermium Grid Leak, type 1	1	0	
1 Ready Radio, type 2, 2-meg. Thermium Wire-end Grid Leak	1	0	
1 Ready Radio 20,000-ohm Thermium Wire-end Resistance, type 2	1	0	
1 Ready Radio 50,000-ohm Thermium Resistance, type 1	1	0	
2 Ready Radio Grid-Leak Holders	1	0	
1 Ready Radio L.F. Transformer, 3-1	8	6	
1 Ready Radio S.G. H.F. Choke	5	6	
4 Ready Radio Valve Holders	2	0	
1 Screen, 10 x 6 in.	1	9	
1 Panel, 14 x 7 in.	3	9	
1 Terminal Strip, 14 x 2 in.	1	0	
10 Belling-Lee Terminals: A, E, L.T., L.T. +, H.T., H.T. +, H.T. + 2, H.T. + 3, L.S., L.S. +	2	6	
3 Plugs: G.B. +, I, - 2	5	6	
Sheet of Copper or Aluminium Foil, 10 x 14 in.	1	3	
Jiflinx for wiring (Ready Radio)	1	6	
	<b>£4</b>	<b>5</b>	<b>9</b>

Any component can be purchased separately



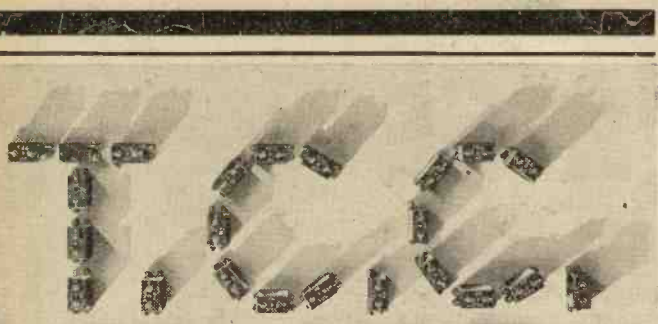
Announcement of Ready Radio Ltd., Eastnor House, Blackheath, S.E.3.

To READY RADIO LTD. (Book Department), Eastnor House, Blackheath, S.E.3.  
Please send me the 1/- Kendall-Price Book of Ten Circuits—FREE. I enclose 1/4d. stamp for postage.

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

If you wish to have, with your free book, ten full-sized blue-prints, enclose 1/- in stamps with this coupon. W.C.3.

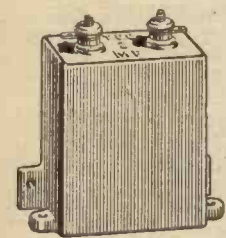




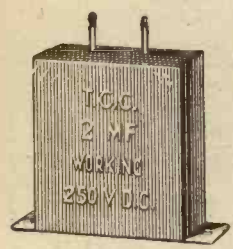
# CONDENSERS OF REPUTE

WHAT THE INITIALS T.C.C. MEAN TO YOU

WHEN you see a condenser with the initials T.C.C. on it you see a condenser that is the result of 25 years specialized research—one that is built up of the finest materials procurable, by highly skilled workers. It is a condenser of unquestioned reliability—one in which radio technicians, set designers, experimenters and amateurs alike pin their faith. Be guided—use only T.C.C.



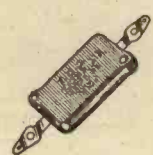
A 2 mfd. Non-Inductive T.C.C. Condenser. Price 3/10d. Made in capacities from .01 to 2 mfd. prices 1/10 to 3/10. Working voltage 200 D.C.



Here is a 2 mfd. T.C.C. Paper Condenser type 64 tested 500v. D.C. for working up to 250v. D.C. peak—in capacities from 0.1 to 10 mfd. Prices 1/10 to 14/-.

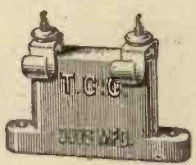


The latest T.C.C. production—a chassis mounting aqueous Electrolytic condenser. In capacities 8 mfd. 440 volts working, 9/-, 4 mfd. 440 volts working, 8/-, and 7 mfd. 460 volts working, 9/-.



The Upright Mica Condenser with grid leak clips. In capacities from .00005 to .25 mfd. Prices 1/6 to 18/- Working voltage 250 D.C.

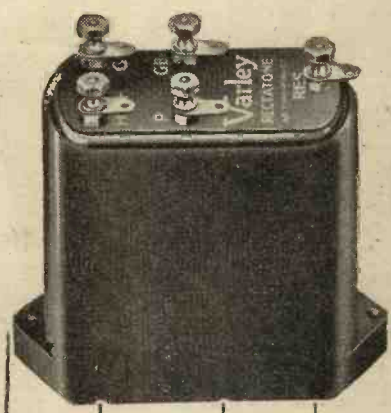
Here is shown the T.C.C. type "M" Mica Condenser. Made in capacities from .00005 to .01. Prices 1/- to 2/3. Working voltage 250 D.C.



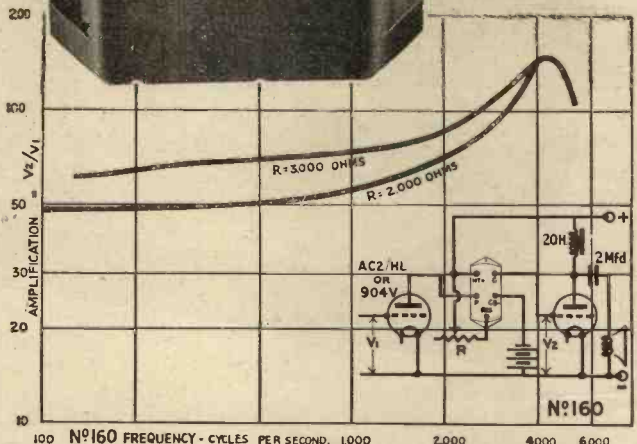
# T.C.C. ALL-BRITISH CONDENSERS

The Telegraph Condenser Co., Ltd., Wales Farm Road, N. Acton, W.3

# RECTATONE L.F. TRANSFORMER



Over 1000 cycles — a rising curve



The above curve shows the increased amplification of high notes which can be obtained. The Rectatone can, of course, be used after any detector valve, suitable adjustment of the compensating resistance producing the above characteristics.

1. Has a rising response curve from 1,000 to 4,500 cycles.
2. Balances any form of sound reproduction.
3. Restores a weakened treble to its correct value.
4. Gives a variable compensation and therefore complete control of tone-correction.
5. Gives the required tone-correction without an extra L.F. stage.
6. Becomes at will and instantly a normal straight-line transformer.

The ideal L.F. coupling for selective sets. Particularly useful where the same L.F. amplifier is used for radio and gramophone reproduction.

**15/-**  
Ratio 7:1.

The degree of compensation is variable and may be suited to the particular tuned circuits in use or employed to correct deficiencies due to the loudspeaker or to the acoustics of the room.



POST THIS COUPON TO-DAY

To Messrs. Varley, Kingsway House, 103, Kingsway, London, W.C.2. Please send me, free and post free, the "BOOK of the RECTATONE"

Name..... Date.....  
Address.....  
..... W.C.2.





# A PRACTICAL MAN'S CORNER

By R. W. HALLOWS, M.A.

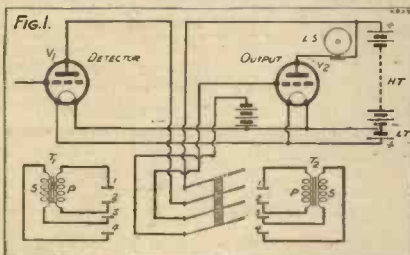
*Into these pages, month by month, our contributor packs a wealth of practical information and advice on constructional work. The regular reader of this "Corner" cannot help picking up a more or less complete training in radio workshop practice, while every month there are wrinkles to read, gadgets to make, or hints to help you.*

## Comparisons Made Easy

WHEN you are building a new set or contemplating alterations in an existing one it often becomes desirable to compare the performances of different intervalve transformers, whether high-frequency or low-frequency.

A very handy way of making such comparisons is illustrated in Fig. 1, where a four-pole change-over switch is used. So long as it makes sound contacts the switch may be of any

## QUICK CHANGE-OVER



*A very useful circuit arrangement that allows a quick change-over from one L.F. transformer to another when making comparison.*

type, though it is preferable to use a barrel switch of low-capacity design.

So useful is it to have a means of this kind of comparing components that I keep a four-pole change-over switch specially for the purpose. Fig. 2 illustrates the way in which the switch is arranged.

It will be seen from the drawing that the twelve terminals are arranged in three groups of four, those on the left and right being connected to the fixed contacts and those at the top of the panel to the moving contacts. The terminals are numbered to prevent any possibility of mistakes in connections.

Thus terminal No. 1 in the top row will be connected to terminal No. 1 on the left if the knob is moved in that direction, or to terminal No. 1 on the right if it is turned the other way.

A switch-box of this kind is a most valuable addition to the wireless man's outfit, for it enables him to make all kinds of comparisons for which any number of contacts up to four are required. He can, for instance, try one valve against another, one loud speaker against another, one resistance against another, and so on.

Fig. 1 also illustrates in detail the way in which two low-frequency intervalve transformers are tried against one another as couplings between the detector and the output valve of the receiving set.

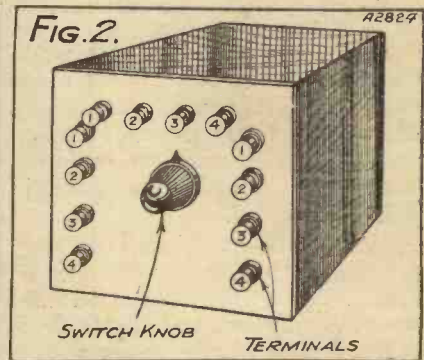
## Testing Transformers

Moving contact No. 1 is connected to high-tension positive, and No. 2 to the plate of the detector valve. No. 3 goes to the grid of the second valve, and No. 4 to the negative pole of the grid battery. The primary terminals of transformer No. 1 are connected to fixed contacts Nos. 1 and 2, and the secondary terminals to Nos. 3 and 4 on the left-hand side. The other transformer, T<sub>2</sub>, is similarly connected to the terminals on the right.

Flex leads may be used for connections, but they should always be as short as possible, for it is most important to keep them well away from one another in order to avoid introducing more than the absolute minimum of stray capacities. With the switch over to the left the two valves are coupled by transformer No. 1, and when it is turned to the right No. 2 comes into action.

One word of warning is necessary here. The knob or lever of the switch must not be turned so as to break the circuits until the filaments have been switched off, or the output valve may be damaged by the heavy flow of current that takes place if its grid is left unbiassed. This is particularly important in case the output valve should be a pentode.

## PERFECTLY STRAIGHTFORWARD



*The practical representation of the switching scheme is quite simple and straightforward, all the switch contacts being brought out to the numbered terminals.*

The great point about the use of a comparing switch is that it enables you to change from one component to another in a matter of a second. In this way the effects upon the loud-speaker's reproduction are instantly detected, for there is no time for your mind to lose one impression before the next comes along.

If, on the other hand, you have to unwire one transformer and wire up another when making the change it is most difficult to arrive at a satisfactory comparison, for even when crocodile clips or similar aids to speed



## A Practical Man's Corner—continued

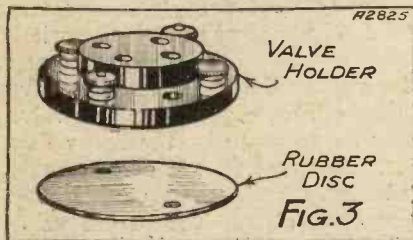
are used the first impression becomes dimmed by the time the change is completed.

### A Valve Safeguard

Not a few readers, I expect, have had experience of the accidental short-circuits that may occur when valve holders are mounted directly upon a metal chassis. Sometimes the holders are so low and the contacts so springy that if the valve is pushed right home the contacts or the points of the valve pins may touch the metal with surprising, but far from delightful, results.

And there is another possibility

### SAVING SHORTS



*Metal-covered baseboards are becoming increasingly popular, and with their use there is always the risk of a short occurring with such components as valve holders. This difficulty can be got over by slipping a piece of rubber underneath.*

of a less spectacular and far more puzzling kind. Some weeks ago, a set which had been sent to me for test purposes absolutely refused to work, though no fault whatever could be found in the valves, the wiring or any of the components.

It was more by luck than anything that the fault was eventually tracked down. The springy connection between the grid socket and grid terminal of the detector valve holder was a little lower than the other three, and was actually making contact with the metal surface of the chassis. In other words, the grid of the detector valve was effectually earthed.

As a result of this and a few other adventures, I never mount a valve holder nowadays directly on the metal. One method of safeguarding is to screw each valve holder to a little wooden base and to screw the latter to the chassis. A simpler way, though, is to cut from an old inner tube a disc of the same size as the base of the valve holder. Pierce a couple of holes in this for the bolts that secure the holder, and place it between the latter and the chassis, as shown in Fig. 3.

It doesn't take an instant to cut

out the discs, and their use is very well worth while.

### For the Short-Waver

In the short-wave receiving set it is desirable, particularly if you want to be able to go down much below about 20 metres, to mount both valves and coils so that they are well removed from the metal of the chassis or the screens. In this way valve-holder capacity is kept down.

A method that I find useful is illustrated in Fig. 4, which shows how a valve holder is raised upon distance-pieces made from short lengths of ebonite tubing. Coils and chokes can be mounted well away from metal parts in the same way.

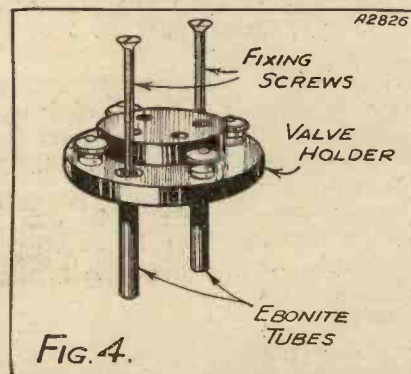
There is one tip worth noting here, for the long bolts necessary don't use the rather heavy 4 B.A. size. Use 6 B.A. These are neater and, incidentally, a good deal cheaper.

### Oiling Without Fears

Radio-gram and plain gramophone motors do not need a very great deal of attention, but all of them, whether clockwork or electric, should be lubricated from time to time—though all too frequently they are left untouched until they positively scream for attention by irregular or short running. Neglect of this kind leads to excessive wear, particularly of the spindles and bearings of fast-moving parts such as the governor.

Some day we shall have a radio-gram motor with a single lubricating point, a little nipple on the top of the motor-board. So far as I know, though, this has not yet arrived.

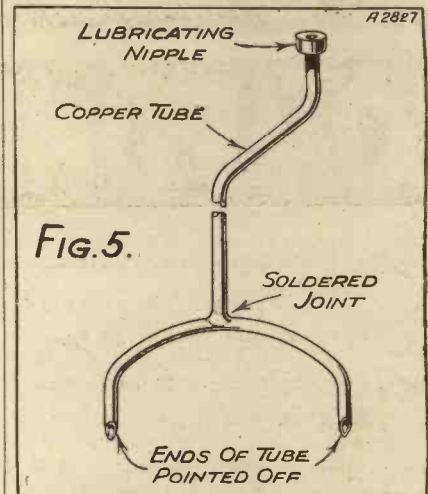
### INCREASED EFFICIENCY



*In short-wave sets, where the slightest amount of unwanted capacity is detrimental, it is often advantageous to mount valve holders "up in the air," well away from all earthed objects. The method illustrated here is very effective.*

Here is a suggestion which I am going to try out on my own radio-gram as soon as I have an hour to spare to carry out the job. Obtain a

### FOR EASY OILING



*A handy gadget that will end all your radio-gram motor oiling difficulties. It consists of short lengths of tubing joined together and bent to the requisite shape, for guiding oil to the inaccessible places.*

length of thin copper tubing, such as that used for motor-cycle petrol pipes—tubing of still smaller diameter can be purchased from shops which deal in the parts of model engines.

Cut off a piece about 4 in. in length and bend it into a wide, shallow "U" shape, as shown in Fig. 5. Point off each of the ends so that they will act as drippers for oil drops. In the middle of the "U" drill a hole.

Shape one end of the rest of your piping with a round file, so that it fits closely over the hole made in the "U" piece and make a neat soldered joint. Arrange the lubricator so that the ends of the "U" piece are just above the points where the governor spindle enters its bearings. Shape the pipe carefully, measure off the exact length required to reach the upper surface of the motor-board, and solder or screw on a small lubricating nipple.

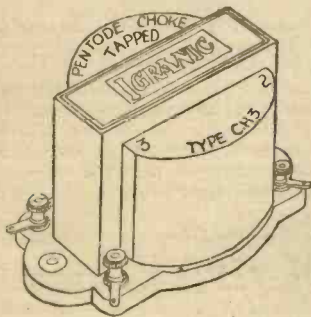
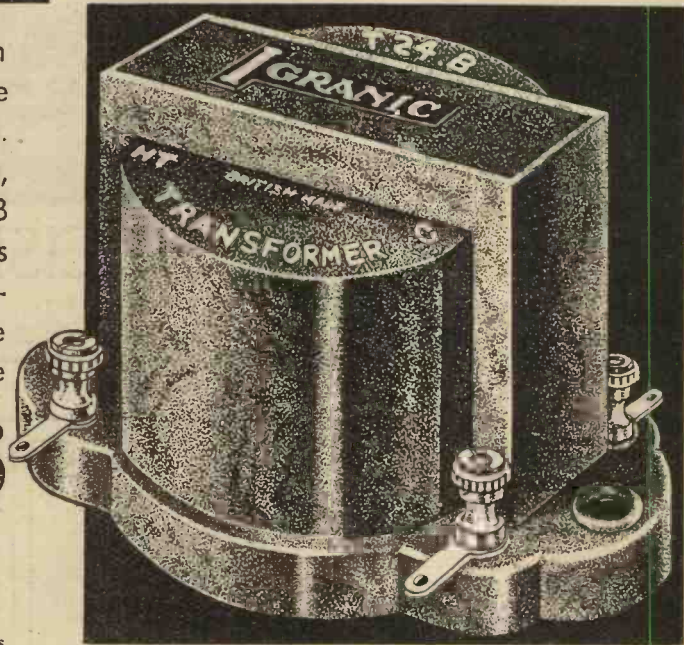
You can now administer two or three drops of fine machine oil once a week with the comforting knowledge that it will find its way to the place where it is most required; the governor can be lubricated without the need for removing the motor-board, which generally means the entire panel of the radio-gram.



# IGRANIC QUALITY COMPONENTS

The quality of your reproduction depends upon the quality of your components. You can be certain of both if you use Igranic components. Nothing is left to chance in the designing, construction and finishing of this Igranic T.24B Transformer. The primary inductance of this transformer is high, permitting a high amplification of bass notes, whilst at the same time reproducing faithfully all notes over the whole scale of musical frequencies. Supplied in two ratios 3 : 1 and 5 : 1

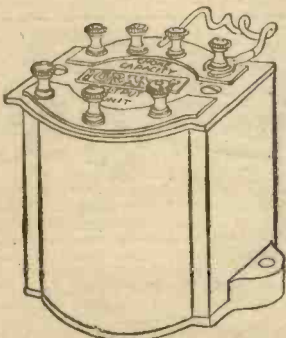
Price **5/6**



### PENTODE TAPPED CHOKE

The Igranic Pentode Choke is designed so that the impedance of various types of loud-speakers may be matched to that of the pentode valves whilst keeping the inherent self capacity of the choke at a minimum.

Price **10/6**



### TAPPED "C.C." OUTPUT UNIT

Invaluable for receivers employing a power output valve. It prevents de-magnetisation and makes possible a closer adjustment of loud-speaker movement. Designed to pass a maximum current of 30 milliamps.

Price **12/6**

Write to-day for fully illustrated Catalogue No. J.1203 of complete new range of Igranic Quality Components. Igranic Electric Co., Ltd., 149, Queen Victoria St., E.C.4.

**SEND FOR THE 1932 CATALOGUE**

**IGRANIC  
COMPONENTS WILL  
BE THE MAKING  
OF YOUR SET.**

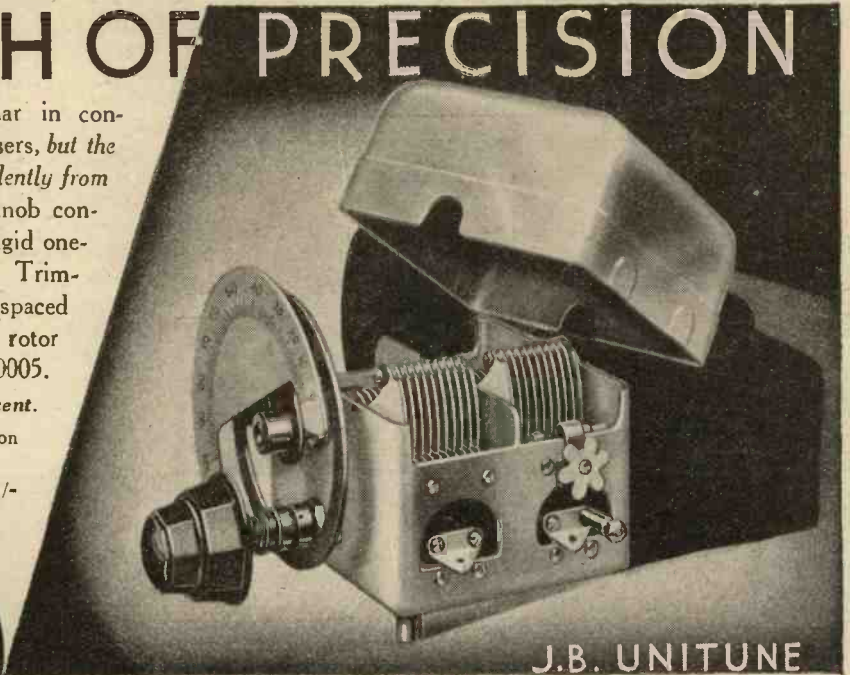




# A TRIUMPH OF PRECISION

● Gives extremely fine tuning. Similar in construction to the "NUGANG" Condensers, but the trimmer of front section is operated independently from the receiver panel by means of a second knob concentric with the main tuning knob. Rigid one-piece chassis, very robust construction. Trimmer to each stage. Heavy gauge wide spaced aluminium vanes. Special bearings to rotor ensure permanent accuracy. Capacity '0005. Matched to within  $\frac{1}{2}$  mmfd. plus  $\frac{1}{2}$  per cent. Complete with disc drive and bakelite escutcheon plate.

2 gang - 18/6      3 gang      27/-



J.B. UNITUNE

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### THIS POPULAR CABINET 75/-

The ideal cabinet for converting your set into a modern Radio-Gram. This example of cabinet craftsmanship is only one of the many fine cabinets from the Camco Range. See them at our Showrooms, open 9.15 to 5.45 (Sat. 12.30), or send the coupon for a FREE COPY of the NEW Camco Cabinet Catalogue.

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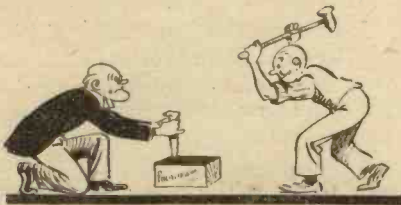
IN our time the Professor and I have, I think, handled most departments of radio journalism. We have designed sets; we have given clear explanations of difficult things, or possibly difficult explanations of clear things; we have answered correspondents; we have given hints for the workshop. (And, speaking of workshops, I have always wondered why somebody does not invent an unworkshop. That's just the kind of place that would appeal to me, and I have no doubt to the reader, after lunch.)

### Well Equipped

Never, though, so far as I can recall, have we been asked to take over a Test Department for the month. It was, therefore, with extraordinary joy that we received the Editor's letter asking us if we would be so kind as to do so for the present issue.

I need hardly say that our test reports are completely unbiassed, and if this leads to grid current and con-

### THE BATTERY BASHERS



"After the test, the battery was dismantled—"

sequent distortion we are sure the gentle (or even the ungentle) reader will understand.

We would like to point out that the Goop-Wayfarer laboratories can boast a superlative equipment of testing instruments, including a moving-iron voltmeter, a pair of pre-war headphones, a speedometer, a clinical thermometer, an egg tester (particularly useful for valves), a gas meter, a spring balance, a recording barometer, a prismatic compass, an exposure meter, a spring rule of the kind that flies out and bites you, a tyre-pressure gauge and a micro-

goopmeter, which gives direct readings in micro-goops—the goop being, of course, the unit of mutual combustance.

### The "Phlattkatcha" High-Tension Battery

This battery is stated on the label to be the world's best, and we are sure that the maker would not indulge in terminological inexactitudes. The case is exceedingly pretty, being a

Recently the Goop-Wayfarer partners were invited by the Editor to take over the Test Department for a period of one month. We feel sure you will be interested in their totally unbiassed reports, and appreciate their very thorough, if somewhat destructive, methods!

delightful symphony in blue and gold.

Owing to its attractive appearance it is sure to make a wide appeal to members of the alleged gentler sex who are wireless enthusiasts. This battery shows the flattest discharge curve of any that has yet come our way; in fact, there was no detectable fall in the E.M.F. after 943 hours' use. The remarkable figures for this battery are:

Initial E.M.F. : 0.0000 volts.  
E.M.F. after 943 hours : 0.0000 volts.

After the test the battery was dismantled to allow an examination of its interior economy to be made. Its construction was most original, since in place of the usual zinc pots it was filled with small cylindrical pieces of wood.

On the case there appeared in very small letters the words:

"Made in Yugo-Toblaia."

The price of the 120-volt unit is 2s. 11d., and we have no doubt that those who purchase the "Phlattkatcha" will be surprised at what they obtain for their money.

### The "Needlesharp" Three

The "Needlesharp" Three claims to be the most remarkable three-valve

set in existence from the point of view of both selectivity and fidelity, and after exhaustive tests we can fully confirm the makers' claims. Trials were made at a distance of forty-five miles from Brookmans Park and the same distance from Daventry.

On the long waves such was the fidelity of the set that the Midland National was heard at every setting of the condenser from 0 to 180; and you can't beat that for faithfulness to one station. The only criticism that we have to make about the performance of the set on the long waves is that there was a slight break-through of the London Regional, but as this extended only from 0 to 175 degrees plenty of room was left for pure reception of 5 X X.

On the medium waveband there was never a dull moment with the "Needlesharp" Three, since the London National, the London Regional, and the Midland Regional stations were all to be heard in chorus over the whole of the dial.

The beginner will appreciate this, for it means that there is no fiddling

### AFTER THE TEST



"—Tottle is expected out of hospital in about six weeks from now."

about with knobs to bring in stations. You just switch on and there they are! Anyone who purchases this set at the amazing price of £2 12s. 3d. will immediately endorse our opinion that he has never heard anything like it.

### The "Sparxo" Lightning Arrester

This neat little device is connected between the aerial and earth terminals of the set. The makers' instructions are: "Don't earth your aerial. Fit the 'Sparxo' and turn



## In Lighter Vein—continued

the aerial into a protector when thunderstorms are about."

We thought it might be as well to get Tootle to conduct the test in his house, since we were pretty busy ourselves—also we were getting rather fed-up with Tottle; so much so, in fact, that we prayed hard for a thunderstorm. Tootle had promised faithfully not to earth his aerial. It was the father and mother of a storm, and Tootle is expected out of hospital in about six weeks from now.

The "Sparxo" is certainly cheap at 1s. 3d., and we can strongly recommend it as a birthday present to ex-friends.

### The "Boompha" Loudspeaker

Though described as a balanced-armature loudspeaker we found that this had a moving coil which had to be tightened up with a spanner before the tests could begin. Under test it proved to be a remarkable instrument.

It has three bass notes, Do, Ray, and Boop, which recur with amazing regularity. If it isn't Do it is almost sure to be Ray, and when it is neither of these it is certain to be Boop. This instrument gives the genuine plummy character to speech and makes the efforts of a warbling contralto sound like a particularly sticky sweet.

A smaller model produced by the same firm is the "Kahpetbeetah,"

### A CLEAN SHEET!



"—returning them to him completely purged of all their original horrors."

which differs from the "Boompha" in having only one bass note. This one is Boop. The woolliness of its reproduction will be much appreciated by those who always wear flannel next the skin.

With either the "Boompha" or the "Kahpetbeetah," the Oxford accent of announcers is automatically converted into Oxford Street—with heavy traffic in full swing. We can confidently recommend these two loudspeakers to those who hold that

wireless reproduction should be something very different from what it generally is.

### The "Independo" Three-Gang Condenser

This neat little component is exceedingly interesting. The makers claim that in the past designers have foolishly striven to make compactness rather than efficiency their watchword when turning out ganged condensers.

The "Independo" three-gang measures  $19\frac{3}{8}$  in. in length by  $11\frac{5}{16}$  in. in height by  $9\frac{3}{8}$  in. in width. There has thus been no fooling about on the part of designers with Tom Thumb models. Since, however, the condenser is made on the concertina or camera bellows principle, it can be fitted in almost (but not quite) anywhere.

Its rated capacity is .0005 maximum for each section with a minimum of .000000001 mfd. As our capacity bridge had been lent some time previously to an uncle and still remained unredeemed—that is to say, unreturned, we were unable to carry out such precise tests of the various capacities as we could have wished.

However, by employing the familiar Corblimistein-Pinwinkle test—which consists in utilising a valve oscillating close to busting point and remembering that the higher you go the fewer—we were able to arrive at a very close approximation of the maximum and minimum values of each section of this epoch-making condenser. The figures obtained for the "Independo" are quite remarkable.

First section: .0006 microamperes.

Second section: 2.432 microhenries.

Third section: 173.062 decibels.

It is therefore clear that the matching has been carried out in an entirely novel manner and that there is no ganged condenser of similar characteristics upon the market. We are sure that one trial of this wonderful piece of apparatus will be sufficient for any reader.

### The "Tonetwista" Pick-up

This neat little device consists of a special tone-arm made of an alloy of high-speed steel and low-speed lead and a pick-up of outstanding characteristics.

One notable point about the

"Tonetwista" is that it does not employ ordinary gramophone needles. Instead disused razor blades are mounted in a special fitment and made to follow the track upon the gramophone record.

Probably one of the most perplexing problems in the past has been how to dispose of your time-expired razor blades. There are some who dig deep holes in the garden; others

### THOSE RADIO-GRAM NEEDLES



"—handed to tramps who call at the back door."

filing them into canals or reservoirs; others again make them up into neat parcels, which are handed to tramps who call at the back door.

The "Tonetwista" completely solves one of the most distressing problems of modern civilised life. Old razor blades, as discarded, are simply placed in the receptacle on the right-hand side. A small button is pressed when the pick-up is to be brought into action.

It then justifies its name by picking up the razor blade, tucking it neatly into place and swinging itself into position above the record. A second pressure of the button causes the pick-up to descend upon the face of the record. The blade then performs the double function of playing the record and of shaving its surface clean.

### A Boon and a Blessing

To the Professor and myself the "Tonetwista" appears to be something quite out of the ordinary.

Our practical test consisted in borrowing a large number of appalling-jazz records from Pimpleson and in returning them to him completely purged of all their original horrors. It will come as a boon and a blessing to middlebrow readers who have arty next-door neighbours with large stocks of highest-brow gramophone records.



**OLYMPIA**

... **Proved**  
**ORMOND**  
**Value & Quality**  
**Greatest of all!**



**ORMOND Permanent Magnet**  
**M.C. LOUDSPEAKER**

One of the most popular exhibits at Olympia was this speaker, which offers reproduction of the best, at a price within the reach of all. Its performance is admirable, excellent response being obtained throughout the frequency range. Its construction is robust, the fitting of a large cobalt Permanent Magnet ensuring long life and reliability. Complete with Input Transformer, it measures 8 ins. in diameter by 4½ ins. in depth.  
 Cat. No. R/475.

**38/6**

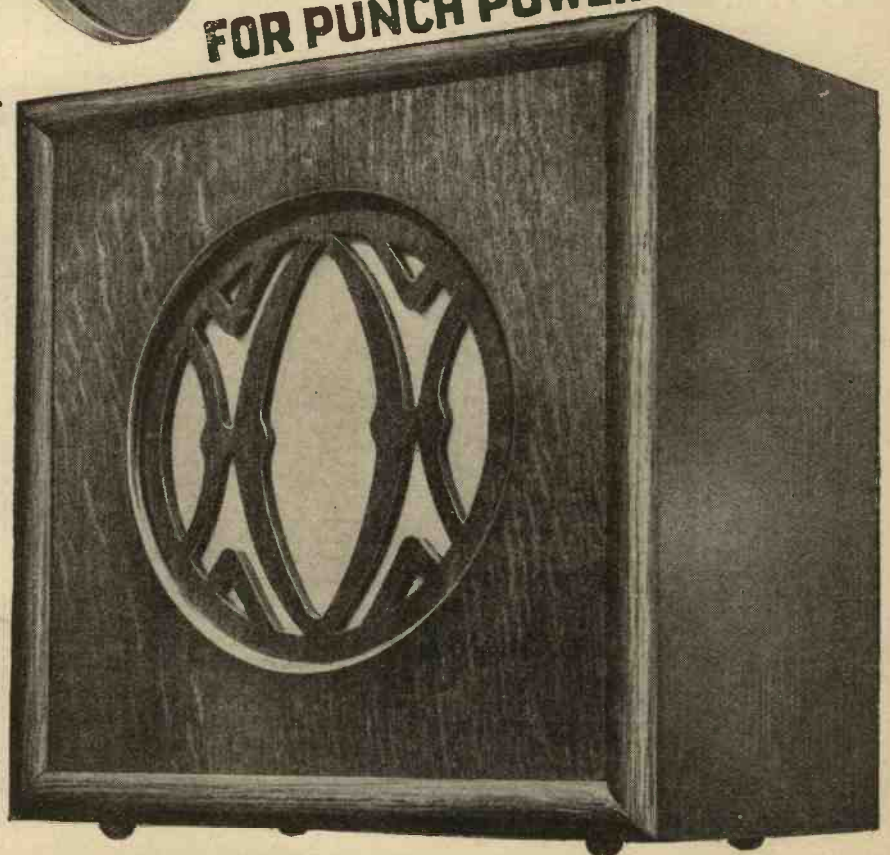
**FOR PUNCH POWER & PURITY**

**ORMOND M.C. CABINET**  
**LOUDSPEAKER**

This Ormond exhibit also provoked widespread interest at the exhibition. It incorporates the chassis described above, in a figured Oak Cabinet of handsome appearance and acoustically correct design. It is supplied complete with Input Transformer and provided with terminals for connections. Size 14 ins. by 14 ins. by 8½ ins.  
 Cat. No. R/477.

**59/6**

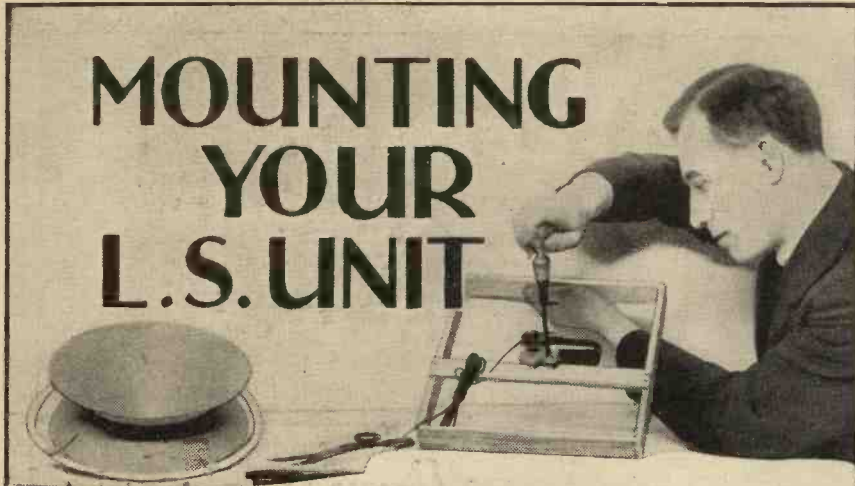
This speaker may also be obtained incorporating the Electro Magnet Moving Coil Unit. Cat. No. R/476. Price 51/-



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# MOUNTING YOUR L.S. UNIT



An efficient and inexpensive baffle-board assembly for a cone loudspeaker that can be made by anybody who possesses a few simple tools.

Described by F. W. HANSELL.

THE economy exercised in the construction of this speaker in no way deprives it of quality of tone or appearance.

The constructional details are quite easily followed by the amateur possessing a fretsaw and a few joiner's tools.

## Mounted in the Centre

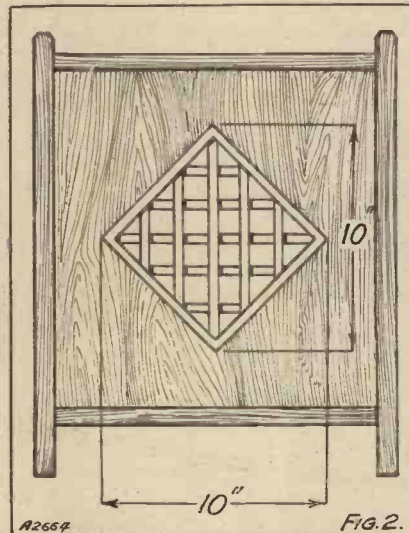
Commence with the chassis, which is made of three-ply wood. First cut out a ring  $\frac{3}{4}$  in. broad and  $14\frac{1}{2}$  in. in diameter on the outside, i.e. 13 in. inside diameter. Next screw to this ring two pieces of three-ply 4 in. broad and 4 in. long; these are then joined by bar A, which is 4 in. broad, see Fig. 3. In the centre of this bar mount your loudspeaker unit.

The cone is  $10\frac{1}{2}$  in. in diameter, made of drawing or kraft paper of a medium weight. At three points

small pieces of soft cloth are Secotined to the cone. The other end of the cloth is then fixed to the ring. In mounting the cone, care must be taken to see that the cloth is not stretched tight, but left a little loose between the ring and the paper cone.

Having completed the chassis, start on the baffle-board. The frame is

## ATTRACTIVE DESIGN



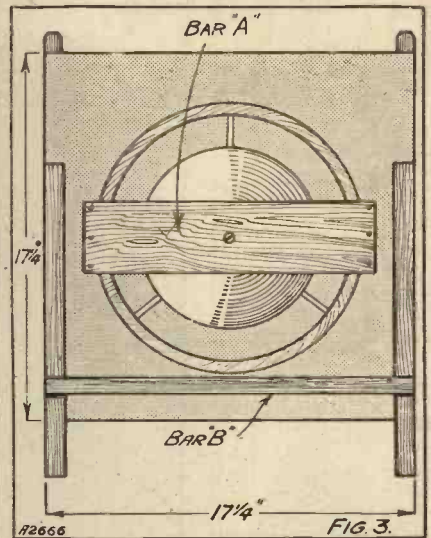
The baffle-board can be nicely polished to tone with the furniture in the room, the fret being just large enough to take the cone.

made of  $\frac{3}{4}$ -in. square wood, the two uprights are each 24 in. long and are screwed to two  $15\frac{3}{4}$ -in. cross-bars (see Fig. 2). On the back of this frame a three-ply baffle-board is nailed. This may have a small design cut out, as shown in Fig. 2. A small piece of silk or satin gives a very pleasing effect behind the fret. On the back of the three-ply tack down with very small tacks a piece of roofing felt, as shown

in Fig. 4. This prevents echoing off the wood baffle.

Two supports (on the angle) are

## NO BOX RESONANCE



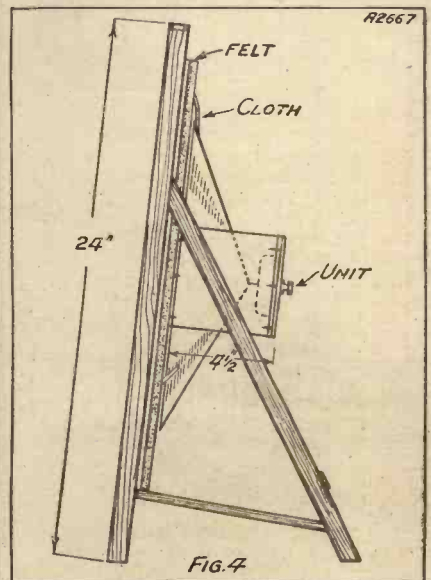
The back of the baffle is left completely open, thus preventing excessive boominess which is so often present in boxed-in loudspeakers.

now screwed to the back of the frame and are tied together at the foot with bar B (see Fig. 3), also two small bars to the two uprights, as shown in Fig. 4.

The chassis may now be mounted to the back of the speaker with short screws, care being taken that they do not protrude through the front of the baffle-board.

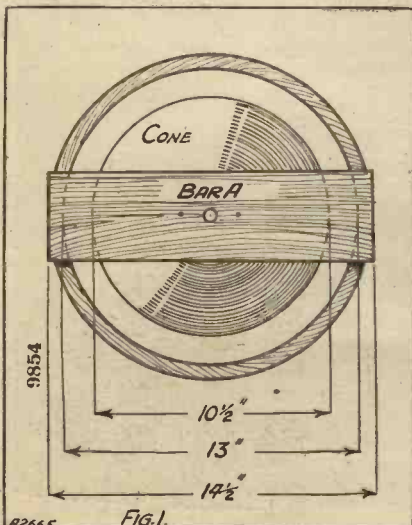
For finishing, a coat of oak or mahogany stain greatly improves the appearance.

## SEEN FROM THE SIDE



Arrange the baffle board so that it leans back slightly. This can be done by adjusting the length of the legs at the rear.

## THE SUPPORTING RING



The cone is fixed to a ring of three-ply wood,  $\frac{3}{4}$  in. wide and  $14\frac{1}{2}$  in. diameter on the outside. It takes a  $10\frac{1}{2}$ -in. cone.



# Read what J. H. REYNER says about FILT!



J. H. Reyner, B.Sc., A.C.G.I., D.I.C., A.M.I.E.E., M.Inst.R.F., Consulting Radio Engineer. The well-known designer of many famous sets described in the foremost wireless publications.

THE FURZEMILL LABORATORIES,  
BOREHAM WOOD,  
HERTS.

TELEPHONE: ELSTREE 130.  
RAILWAY STATION: ELSTREE (L.M.S.)

24th September 1932.

J. H. REYNER,  
B.Sc., A.C.G.I., D.I.C., A.M.I.E.E., M.Inst.R.F.,  
CONSULTING RADIO ENGINEER.

JHR/MW.

Messrs. Graham Farish Ltd.  
Masons Hill,  
Bromley,  
Kent.

Dear Sirs,

I have been much interested in the Filt Percolative Earth which you have submitted for test. The importance of a good earth connection is often overlooked, although attention to this point is repaid by improved signal strength and less liability to interference from external sources, particularly with Mains receivers.

A low electrical resistance is the first essential, and you appear to have gone to the root of the matter by providing an earth bowl filled with chemicals which firstly attract the moisture from the surrounding soil and then saturate it with salts of high electrical conductivity.

My tests indicate that the device is both simple and effective and that the earth resistance is definitely lower than is obtained by the usual methods.

I imagine that in the majority of cases the installation of the Filt Earth will give a definite improvement in results.

Yours faithfully,

## Why YOU should fit a FILT

Efficient earthing is vital to good reception. Without it you cannot obtain the power, purity or volume of which your set is capable.

Filt is the most efficient scientific earthing system ever invented. As soon as the copper receptacle is buried, the wonderful chemical it contains begins to spread through the soil, making a permanent highly conductive area to a depth of several feet, ensuring perfect earthing in any climate.

Get a FILT to-day. It may put right faults that you thought could only be remedied by expensive new valves or parts.



GRAHAM FARISH

# FILT

## PERCOLATIVE EARTH

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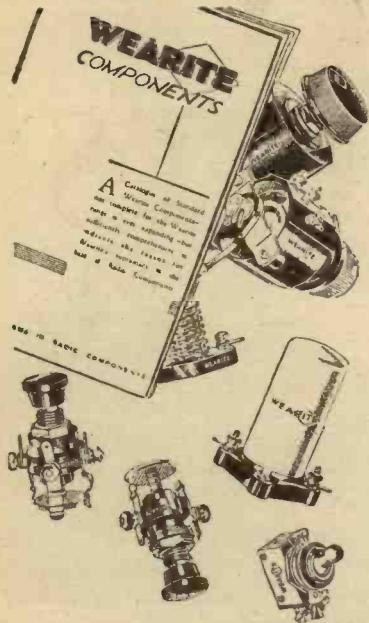
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## Comparisons

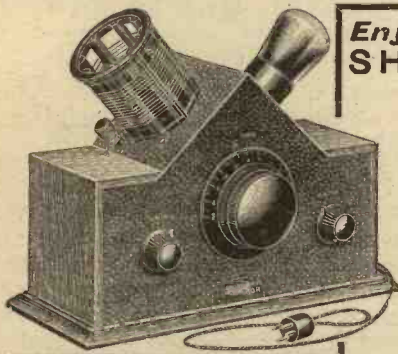
*This is an age of comparisons. We form opinions by comparison; assess values.*

*We may listen to radio and vow the loudspeaker to be the "best ever." We've heard worse—hence the verdict.*

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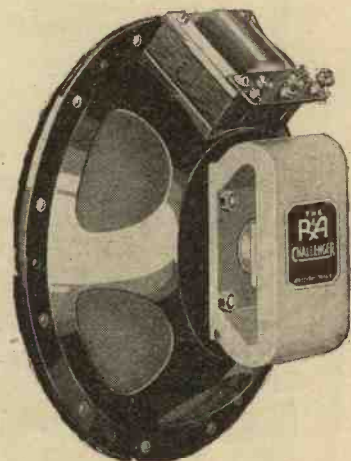


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# OUR RADIO ORGANISTS

*Of all the "old-timers" of broadcasting, none seems to retain favour longer than the cinema organists. Reginald Foort, Quentin Maclean, Edward O'Henry, Reginald New—all these names are household words with listeners. Now you can read what they are really like as seen by*  
A SPECIAL CORRESPONDENT.

THE man or woman who can hear a radio organ recital and still not envy the performer is scarcely human. There is something vastly impressive in the skill of a single being controlling so immense a musical contrivance as the modern organ.

## Human or Robot?

One wonders what manner of man it is who wields such power; whether he is *really* human like us lesser mortals, or whether he is not more in the nature of a mechanical contrivance in human form, something which, like the organ he plays, can scarcely be ranked with things of ordinary flesh and blood.

Let us make a round of the more popular broadcasting organists; put them, so to speak, under the microscope. First on our list is Reginald Foort, whose name must be known to every man, woman, and child who has turned the knob of a wireless set.

We find him in shirt sleeves in his room at the new Regal Cinema, Kingston-on-Thames. Human?—Well, he's assembling a wireless set, and scratching his head over it. That's human enough for us. He's broad and jolly looking. Not yet forty, he tells us, and was at Jutland. We get him to tell us more.

## A Born Broadcaster!

He was born at Daventry, so perhaps he couldn't help being a good broadcaster, and studied the organ with Basil Johnson, music master at Rugby, and later went by an open scholarship to the Royal College of Music. Like most organists he got his early experience in church work; and later, when in 1913 he joined the R.N.V.R., he organised concerts in the Grand Fleet.

There were hard days after the war. He got employment at last by

deputising for cinema pianists on their one free day of the week. In this way he played in a different cinema every day for four months. Great experience, he says, but darned hard work.

He broadcast, too—as a pianist—in those early days at Marconi House. Then a Wurlitzer organ was installed at an Edinburgh cinema. It was completed at midnight on a Saturday, and the opening was due for the following day.

## Perseverance Did It

He had never seen an organ like it before, but he practised all night and mastered it. His first broadcast was



**REGINALD FOORT**

*is a popular Saturday afternoon broadcaster, when he plays the organ at the Regal, Kingston-on-Thames.*

from the New Gallery Kinema, London, and he's been broadcasting more or less regularly ever since.

## An Enthusiast

"I'm a Wurlitzer enthusiast," he says; and who can wonder? He has written a standard book on the cinema organ; and a letter from Holland addressed to "Reginald Foort, England," reached him without the delay of a single post. He takes us into the organ lofts and we stand a little aghast in the forest of pipes and trumpets. We leave him still scratching his head over his wireless set.

We next move to the Trocadero Cinema, Elephant and Castle, London. Quentin Maclean is our man—tall, dark and clever-looking.

He's English born of Scots descent. We ply him with questions, but somehow the conversation drifts round to motor-cars. Maclean is that sort of chap.

We like him tremendously. Thirty-five he is, and educated in Germany, where he was interned throughout the war. We were right when we thought him clever: at twelve he won an organ scholarship at the Leipzig Conservatoire, and in June, 1914, was soloist at the Bach Festival.

## First Radio Organist

We pull him back from cylinders and sleeve valves, and discover that in 1919 he was honorary organist at Westminster Cathedral under Sir Richard Terry. In 1923 he played on one of the first Wurlitzer organs to be erected in England—at the Shepherd's Bush Pavilion—and was actually the first cinema organist to broadcast, a year later. He opened the largest unit organ in Britain at the Regal,



## Our Radio Organists—continued

Marble Arch, in November, 1928—a British organ, by the way—and migrated thence to his present home.

His great aim in broadcasting is to get away from hackneyed music, and that's no easy job these days. His regular Wednesday morning broadcasts bear testimony not only to his playing skill, but to his ingenuity as a programme builder.

We cannot imagine a Maclean broadcast misfiring. But there was

### A TRIO OF—



**QUENTIN MACLEAN,**  
who was the first cinema organist  
broadcast in 1924.

an occasion when the signal lights failed, and for two whole minutes he sat waiting at his organ whilst listeners tinkered with their sets.

Let us move now into the atmosphere of Ireland—to Edward O'Henry at Tussaud's Cinema. O'Henry is English-born, but native charm runs in him. He is young and friendly, and has the appearance of a business man rather than of a successful musician.

### Musical Director As Well

He is more than an organist; he is the musical director not only of the cinema, but of the famous exhibition which adjoins. There are seven thousand musical manuscripts in his

room, and many hundreds of gramophone records. With true Irish ingenuity he sometimes places a portable receiving set on the console of his organ and listens with earphones to himself broadcasting.

### An Eventful Career

He has a distinguished record. He was Professor of Art and Music to the Army of Occupation on the Rhine, and is a certified teacher and a gold medallist of the Royal Academy of Music. His triumphs as a solo organist are far too numerous to mention here; he seems to have done most things that are humanly and

### OUR MOST POPULAR—



**REGINALD DIXON**  
is only twenty-seven, but his playing  
from the Tower, Blackpool, is already  
famous.

musically possible. Before we go, though, we persuade him to tell us an astounding broadcasting drama which is hitherto unrelated.

Two years ago a stranger asked to see O'Henry. The stranger explained that he had come all the way from Cornwall to proffer thanks for his son's life.

The son, it seemed, was taken seriously ill; peritonitis set in, and he was moved from hospital as a hopeless case. One day, in a fever,

he said he wanted nothing so much as to hear "that organist fellow at Tussaud's."

The father switched on the wireless set, and by an astounding coincidence O'Henry was broadcasting. When the recital was finished, the boy fell into his first natural sleep for days, and eventually recovered. The father was convinced that O'Henry had saved his son from the grave.

### Played in Germany

We take a two hours' train journey for our next interview. Frank Newman is broadcasting from Lozell's Picture House, Birmingham, and we must see him at all costs. Thirty-seven he is, and a Fellow of the Royal College of Organists. His war experiences seriously handicapped him in post-war days, and much of his time was spent in hospital.

### CINEMA BROADCASTERS



**EDWARD O'HENRY**  
has made Tussaud's a favourite by his  
Wednesday morning recitals.

In 1922 he was appointed organist at St. Peter Mancroft Church, Norwich, and his broadcasting experience rivals that of Reginald Foort. He arrived at Lozell's in 1927, left in 1929 to play in Germany, but was invited back last summer. He has broadcast in all about 250 times.





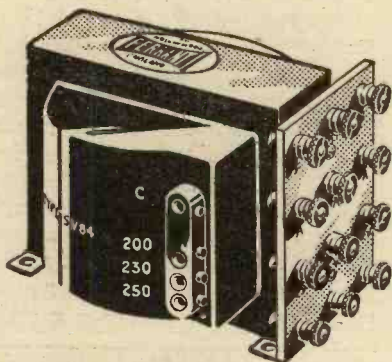
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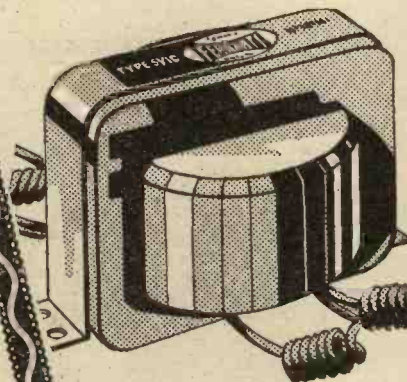
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P.X.4 Push-Pull Output Valves **87/6**  
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# FERRANTI

## MAINS TRANSFORMERS



# THOSE RADIO PATENTS

*Some details of the important modifications in Patent Law resulting from the findings of a recently appointed Government Committee.*

By Our Legal Correspondent

LAST year a Government Committee was appointed under the chairmanship of Sir Charles Sargent to inquire into ways and means of reforming the present system of granting patents for invention. As a result a new Act of Parliament has been passed introducing certain new requirements of considerable importance, both to inventors who apply for patents and to the public who use them. This new measure is scheduled to come into force on November 1st, from which date the changes set out below will become operative.

## Establishing Novelty

The first change relates to the steps to be taken to ensure that no patent is granted unless the invention which it covers is really new or novel. This, of course, lies at the very root of the matter, since no patent is valid in law if it claims something which has already been used or publicly described.

The difficulty is how is the novelty of an invention to be established? Up to the present the test applied by the officials at the Patent Office consisted of a search through all similar British patents for the previous fifty years. This was excellent so far as it went, but it did not go far enough, because it did not cover all the publications in which a previous disclosure might be found.

So there is a danger of a patent being issued to an inventor who then takes it into Court to sue for infringement. Here he finds that his invention has been "anticipated" in some unsuspected quarter, such as in a previous foreign patent or by prior publication in some technical journal.

In such a case the patent, although formally issued to him, is void in law and the Courts will not enforce it.

## Extended Search

In order to lessen risks of this sort the new Act lays down that the official search made by the Patent Office shall cover not only previous British patents, but foreign ones as well, and also all available text-books, technical journals, and similar publi-

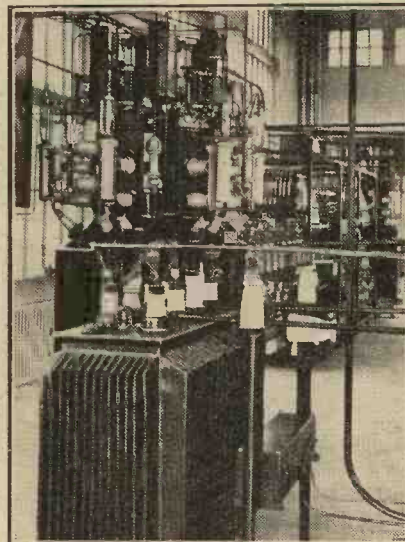
cations, so that when an inventor gets his patent he may be reasonably confident that it is at least valid on the ground of novelty.

## Increased Fees

The task of undertaking what amounts to a "world-wide" search is, of course, so enormous that it will take some years to accumulate and arrange all the necessary material to make it really effective. A start, however, is to be made from November 1st, and the area of scrutiny will be gradually extended from year to year.

To cover the cost of the wider search an extra stamp fee of £1 must be paid when filing a Complete

## INTERFERENCE PROBLEMS



*Many of the latest patents relate to the prevention of interference, rendered necessary by high-power stations such as "Poste Parisien," the transmitting room of which is illustrated above.*

Specification, making the charge £4 instead of £3. All other stamp fees—including the £1 paid when filing a Provisional Specification—remain unaltered.

## Frivolous Inventions

As more time will naturally be required for the Official Examination, the present period of nine months allowed for filing a Complete Specifi-

cation after a Provisional is extended to one year. The time for acceptance is similarly increased from fifteen to eighteen months, and that for "sealing" from eighteen to twenty-one months.

The new Act also gives the Comptroller of the Patent Office power to refuse a patent if an invention (a) has been completely described in a prior publication, or (b) is so obviously contrary to well-established natural laws as to be frivolous. The latter provision is intended to prevent inventors from taking out patents for such things as "perpetual motors," and should also prevent the issue of any more patents for perfectly "fantastic" wireless schemes.

## Protecting the Public

The public is also to be better protected against patents which have already been issued, but which are not really valid or effective in law. For instance, power is given to revoke a patent on various specified grounds, amongst which the following are worth mention:

That the invention is obvious and does not involve any real inventive step having regard to what was already known or used prior to the date of the patent.

That the invention is not useful.

That the Complete Specification does not disclose the best method of carrying out the invention known to the inventor at the time when he filed his application.

That the Complete Specification does not clearly define the scope of the monopoly claimed.

## Groundless Threats

Patentees are sometimes in the habit of sending circulars or letters and issuing advertisements threatening to sue various people for infringement. The new Act strengthens the law against making such threats in cases where they can be shown to be groundless, i.e. where the threats are based upon patents which are not in fact legally valid.

## Reduced Legal Costs

Finally, a special Appeal Tribunal is created for the purpose of hearing appeals from decisions of the Comptroller in matters relating to the grant of Letters Patent. The Tribunal, which will consist of a High Court Judge to be nominated by the Lord Chancellor, is given power to examine witnesses on oath, and to award costs, though special provision is made to minimise expense to the parties involved.



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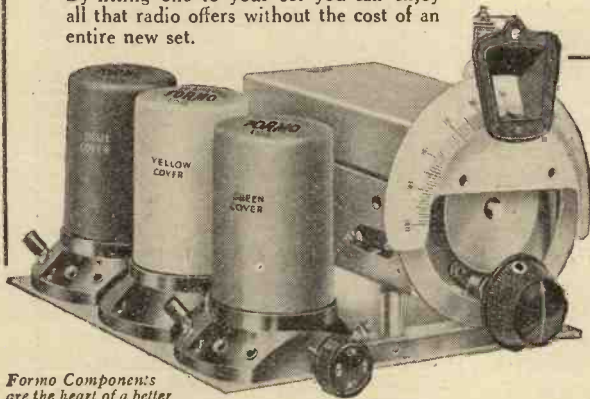
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# A NOVEL SCREW-HOLDER

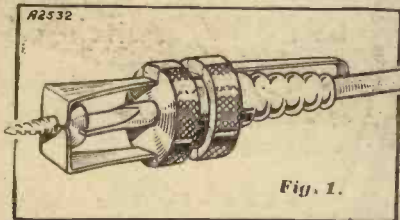
In the following letter to the Editor, one of our readers describes a handy little gadget that can be made from odds and ends of the workshop.

Sir,—Having seen a paragraph in your magazine of this month (Feb., 1932, "On the Grid," page 216.—Ed.) concerning a gadget for holding screws on the end of a screwdriver for use where one cannot use the fingers, I am sending along this idea which occurred to me some years ago, and has more than proved its worth.

## Out of the Scrap Box

I have been used to handling clock-work and other small machinery, and something of the kind was necessary. The one I have I made out of bits from the scrap box. Just the big-

## THE SPRING JAWS



This diagram shows how the jaws grip the screw, while the screwdriver passes through the slider and engages the slot.

end off a cycle pump connection and three bits of clock spring, that's all; and the gadget can be made by anyone who is a "bit handy."

I am going to describe for the sake of clearness how I made it. I use for mine a watchmaker's turncrew, but I discarded the blade, and made another one with a longer stem. I used an ordinary knitting needle of steel, one about  $\frac{1}{8}$  in. in diameter, or near it. These are very good for the purpose and also for making small diamond-pointed drills. The same method applies as regards making both small turncrews and drills.

## Mind the Wax!

The following is the method I use: Having obtained a knitting needle, file off one of the tapered ends, as the full diameter is needed here. Then heat in the fire to cherry red, spread out the end on a beck iron with a few smart blows with a hammer, and file to shape.

Cut off long enough so that 3 in. is outside the handle. You will have to allow for that which goes in the handle. To harden and temper at one operation, heat the end which

forms the blade to red again, and push it into a wax candle (but mind the hot wax).

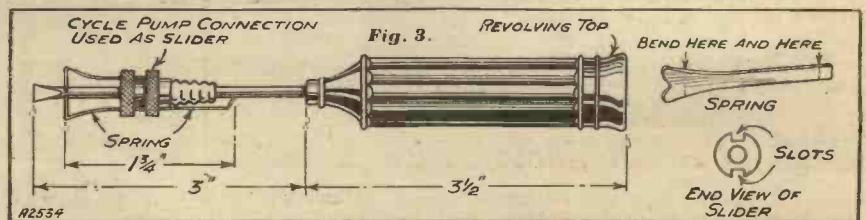
Now for the gadget (the pump connection, which I call the slider). In this, slots are filed on opposite sides, as shown,  $\frac{1}{8}$  in. wide and deep enough to allow the edge of the slots to be hammered over slightly. This will help to keep the steel springs in place while being soldered. (See Fig. 3.)

File the steel pieces to shape, make a small "V" in the end of each, soften a little and bend over  $\frac{1}{4}$  in. from the end, making them a nice tight fit in the slots. Tap the edge of the slots over and then solder. A small flat is filed at the back for the third bit of spring, whose purpose is to hold the slide friction tight on the stem and rigid, so that when a screw is placed in the jaws, the blade of the turncrew is brought up to it and is held secure.

## Old Safety Razor

I might say that it is not necessary to buy a turncrew for this purpose, for once the blade is made it can be soldered into the handle of a discarded safety razor. If it happens to be a solid one, it will need drilling down the centre with a  $\frac{1}{8}$ -in. drill (about  $\frac{1}{2}$  in. down would do), and when the job is completed all surplus solder should be trimmed off with a file and made neat and clean.

## MADE ENTIRELY FROM ODDS AND ENDS



All the details you are likely to want are given in the above sketches. The handle, by the way, is part of an old safety razor.

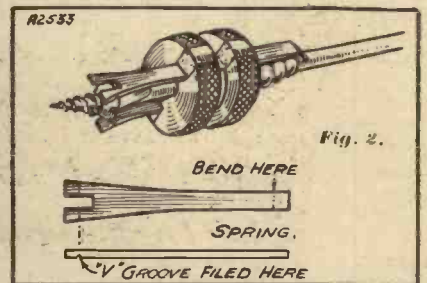
The cycle-pump connection is ready made and not bulky, but nothing should be cut off it, especially the tail end where the rubber pipe was originally fitted, as this helps to keep it rigid. Another method of making the jaws is as follows: For this, two small pieces of brass strip are required, about  $1\frac{1}{4}$  in. long and  $\frac{1}{8}$  in. wide, and thick enough to allow a small "V" to be filed in near the end. These

two pieces are filed to shape, and tapered on the flat side to make them springy. A small slot is filed in the end, leaving a small pair of horns, so to speak. (Fig. 2.) Both pieces being made exactly alike, and left straight, they should now be fixed on the slider. When this is done, a small "V" is filed across both pairs of horns as near the end as possible, making the "V" square with the turncrew

## Used for Years

It will be seen that this contrivance grips the screw at four points round the sharp edge of the screw head,

## ANOTHER TYPE



If you prefer it, you can make the jaws as illustrated in this diagram. A small slot in each spring holds the screw in position.

and only needs a slight straight pull to release it once the screw is started.

Of course, it must be understood that this gadget is only used to start a screw. It is then taken off, the screw being driven home with an ordinary screwdriver. I should also mention here that [the sliding screw-holder should be put on the stem before it is made fast to the handle, as the blade of the turncrew will be wider than the diameter of the stem! The

two examples here shown are entirely my own idea, and I have used them for years.

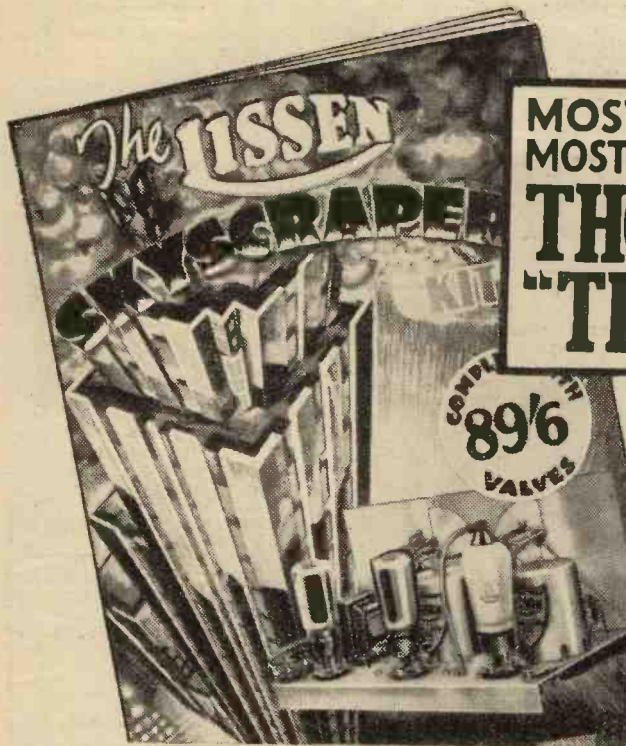
The first method is for screws with half-round or cheese heads, and the second for small countersunk screws (see Figs. 1 and 2). A few bits of scrap, a little work, and then laugh!

Yours truly,

ERNEST BENNETT.

Notts.





**MOST SUCCESSFUL SET EVER BUILT  
 MOST SUCCESSFUL CHART EVER PUBLISHED—  
 THOUSANDS BUILDING  
 "THE SKYSCRAPER"**



**The ONLY set you can  
 build yourself employing  
 METALLISED S.G.—HIGH MU DETECTOR & ECONOMY POWER PENTODE**

There never has been the equal of this set within the range of the home constructor—this new Lissen Skyscraper is the only one on the market that you can build yourself, employing Metallised Screened Grid, High Mu Detector and Economy Power Pentode Valves. No factory—however well-equipped—can build a better receiver. No manufacturer, however large, can produce a receiver whose results will surpass those you will get from the Lissen Skyscraper you build yourself. It is the *only* battery set that *can* deliver such power—yet the H.T. current consumption is far less than that of the average commercially-designed 3-valve set.

Yet the Lissen Skyscraper is made simple for you to build. Elaborate care has been taken to ensure your success by giving—in the Skyscraper Constructional Chart—such detailed instructions and such profuse illustrations that everybody, with no technical knowledge or skill at all, can build it quickly and with complete certainty of success.

You buy the Lissen Skyscraper Kit complete with valves—a Lissen Metallised S.G., a High-Mu Detector, and a Lissen Economy Power Pentode Valve—and the price is only 89/6. Or you can buy the Lissen Walnut Console Skyscraper Cabinet and Loudspeaker combined as illustrated. It holds all batteries, and accumulator and loudspeaker as well. It makes everything self-contained. A special Pentode Matched Balanced-armature Loudspeaker of great power is supplied with the cabinet and the price of the Skyscraper Kit complete with valves and this cabinet and loudspeaker is only £6 5s.



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# CROSS — MODULATION



THE term "cross-modulation" is commonly heard nowadays in wireless circles, but it is safe to say that many who use it would have difficulty in giving an explanation of it.

Actually, it is an effect which tends to destroy selectivity in receivers which employ screen-grid valves as H.F. amplifiers. The loss of selectivity is of a special kind, and only manifests itself when an attempt is made to receive a distant station which works on a wavelength very near to that used by a strong local station.

## Take Something for Granted

Such, for example, would be the case if a London listener tried to receive Mühlacker while the Regional was working. As is well known, such a listener's best endeavours would be rewarded by Mühlacker plus lots of Regional, even if his set were selective enough to receive Barcelona free of interference from the Regional.

The cause of this unfortunate state of affairs is rather involved, but the following explanation may make the matter clear if the reader is prepared to take one or two things for granted.

The first statement that must be taken on trust is that every valve, no matter how biased or operated, will act as an anode-bend detector if it is asked to accept too large a signal. Of course, a hefty valve like an L.S.5A. will take a signal of about 100 volts or more on its grid before it starts misbehaving and rectifying.

## The Other End

That is why such a valve is always found in the output stage of a set, after all the other valves have amplified a signal which probably started life at something like a tenth of a volt.

At the other end of the scale (and the other end of the set) we have the screen-grid valve.

If a signal of more than very small intensity (about a volt or so at the most) is applied to the control grid of an S.G. valve, rectification of that signal occurs before such signal is

*When you read or talk about "cross-modulation" are you sure that you know what it means? Here is a clear explanation of the trouble which so often affects users of S.G. valves.*

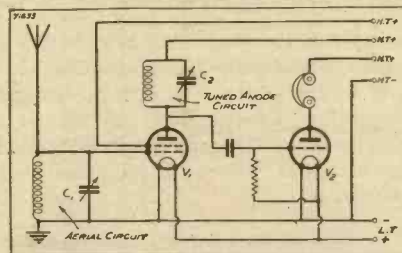
By T. B. SANDERS.

passed on to the real detector. This rectification does not affect ordinary reception seriously, and, anyhow, the proper use of a S.G. valve is to deal with weak signals.

## First Impressions

Bearing this important feature of the S.G. in mind, let us examine the circuit in the diagram below. Is such a circuit likely to be selective? At first one would be inclined to say that it would not, since it does not even employ any such obvious aids to selectivity as a tapped aerial coil or even a series aerial condenser.

## IS IT SELECTIVE?



*Although this set employs two tuned circuits, it would probably be impossible for a listener in London to receive Mühlacker clearly while Regional was working.*

Further examination might incline one to modify this view, since there are two tuned circuits, and the more tuned circuits a set has the better its selectivity ought to be.

However, suppose a set is made in London using the circuit, and the London Regional is tuned in. Let us imagine that this is done by setting  $C_1$  at 40 degrees and  $C_2$  at 45 degrees. Now, if we want to receive Mühlacker we won't have to shift the dials very many degrees. Perhaps  $C_1$  will have to be at 43 and  $C_2$  at 48.

But shifting  $C_1$  only 3 degrees, with such an aerial circuit as in the diagram, will make hardly any difference to the amount of signal volts the grid

of  $V_1$  will receive from London Regional. But the aerial circuit will be tuned to Mühlacker, so the grid of  $V_1$  gets some signal volts from that station. Because the aerial circuit is unselective, the grid of  $V_1$  gets signal volts from London Regional and from Mühlacker.

## Might as Well be "Dead"

Some readers will be inclined to say: "Why worry? There's the S.G. valve's tuned-anode circuit. That'll sort 'em out." That would be quite true if the London Regional was coming in weakly.

Of course, the aerial circuit is tuned to Mühlacker's wavelength, but since Mühlacker's wave is only about 4 metres from that of London Regional, the circuit is also very nearly tuned to London Regional. A circuit only 3 degrees "off tune" of a local station like Brookmans Park might just as well be tuned "dead" to it for all the difference it makes to the signal volts received by the grid of  $V_1$  from that station.

The actual state of affairs, then, is that the grid of  $V_1$  not only receives volts from both Mühlacker and London Regional, but it gets lots of volts from the latter and only a fraction of a volt from the former.

## Lots of Volts

Now, what happens when a S.G. valve gets lots of volts applied to its grid? This article has already told you—the S.G. valve becomes an anode-bend rectifier!

In the anode circuit of the S.G. valve there will, therefore, appear, as well as the desired Mühlacker currents, the rectified speech and music of London Regional.

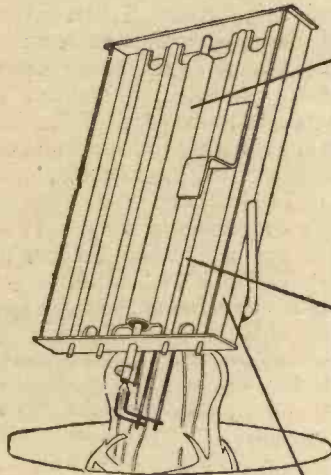
Not many readers are perhaps familiar with the transmission side of radio, so another thing that will

*(Please turn to page 64.)*



# Micromesh

THE  
MODERN VALVE  
FOR MODERN  
RADIO.



Extremely close spacing of the electrodes, assuring high slope.

Large surface radiation fins eliminate distortion through grid emission and furnish extra cooling for anode.

Assembly, constructed as separate unit, gives unusual accuracy and rigidity.

The new methods employed in Micromesh construction assure a valve having really remarkable characteristics. The Detector (type H.L.A.1), for example, has a mutual conductance of 8.0 ma/v.

Leaflet giving details of the under-mentioned types will be sent on request.

**Detector, Type H.L.A.1, list price 13/6.**

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**Type R.2, list price 15/-.**

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## VALVES

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**3** They are not of the "Mansbridge" pattern but are of the rolled foil type giving extremely low internal resistance. This facilitates the smoothing action and greatly reduces the possibility of back coupling.

**4** They are easily capable of withstanding all service conditions for a long period, being designed and made by Engineers whose experience includes the building of condensers for working pressures of more than 1,000,000 Volts.



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London: Bush House, Aldwych, W.C.2.



# TRACKING RADIO TROUBLES

*An illuminating account of some sets that wouldn't work.*

**O**F radio troubles there is no end. Fortunately for the wireless enthusiast, or he might be reduced to the prosaic business of continuous listening, without those exciting interludes of set dismantling, which add pep to life, if indeed they do not constitute the real aim of his existence.

## Puzzling Symptoms

Quite recently I had two very tantalising patients on my list. The symptoms were exactly similar—a complete stoppage of all sound, and both had, strange to say, one identical fault, masking the really serious trouble in the background.

To take them in order, the first breakdown was peculiarly unfortunate, as the owner had just got married and, returning home, switched on the set to let his wife hear just what

a really good set could do. Result—dead silence!

The valves were tested and found O.K., and the L.T. and H.T. passed with flying colours. Next the leads were examined for breaks. Oh, joy, the L.T. — lead was defective inside the spade terminal. Hooked up again and switched on. Absolutely dead, so there was nothing for it but to investigate inside.

The blocking condenser attached to one side of the L.F. transformer was found to be shorting. The condenser itself was quite sound, so there was evidently a short somewhere in the metal baseplate.

## A Similar Case

On removing a lead from the transformer the short disappeared, and on replacing it had apparently vanished for good. Then a light dawned. A

bare piece of the wire had been pressed down on to the metal case of the transformer, screwed to the baseplate. Very simple, wasn't it?

The other case was a straight Det. and 2 L.F. In this case also the batteries and valves were found to be faultless, but a break in one of the L.T. wires, found and repaired, failed to set things going, so the transformers were tested for breakdown.

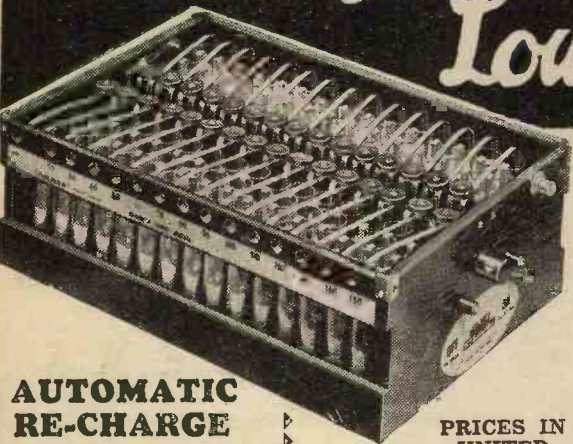
## Crossed Wires

Then a test with 'phones showed that valves Nos. 1 and 2 were working their little hearts out, delivering the programme at the primary of the second transformer. I had given a rough glance over the circuit, but not very carefully, as the owner assured me most solemnly that nothing had been touched since last Wednesday, when the set stopped functioning.

In addition to a loud-speaker output on the terminal strip there were two sockets for 'phones on the panel itself.

In some mysterious manner the H.T.+ lead and the lead to the plate had got transferred to the same socket, with the result that not only was one side of the 'phones in the air, but H.T.+ was attached direct to the plate, and also to both sides of the loud speaker.

*Run your set on Low Tension*



**MILNES H.T. SUPPLY UNIT**  
will provide  
**H.T. CURRENT**  
from your  
**L.T. ACCUMULATOR**

THE Milnes Unit will supply High Tension for the largest set from your Low Tension Accumulator, with very little increase in current consumption. The steady, noiseless discharge of current from the Milnes Unit will give more power and improved tone to your set. The Unit requires no attention—charging is entirely automatic and no renewals are necessary.

**PROVED BETTER THAN MAINS ELIMINATORS**

**MILNES**  
**H.T. SUPPLY UNIT**

**AUTOMATIC RE-CHARGE**

**NO HUM**

**STEADY CURRENT**

**NEGLIGIBLE UPKEEP COST**

PRICES IN UNITED KINGDOM

90 volt £2:18:0  
120 .. £3:16:0  
150 .. £4:14:0

*Money returned if not satisfied.*

WRITE TO-DAY for FULL DETAILS

**MILNES RADIO CO., TANFIELD WORKS, BINGLEY, YORKS.**

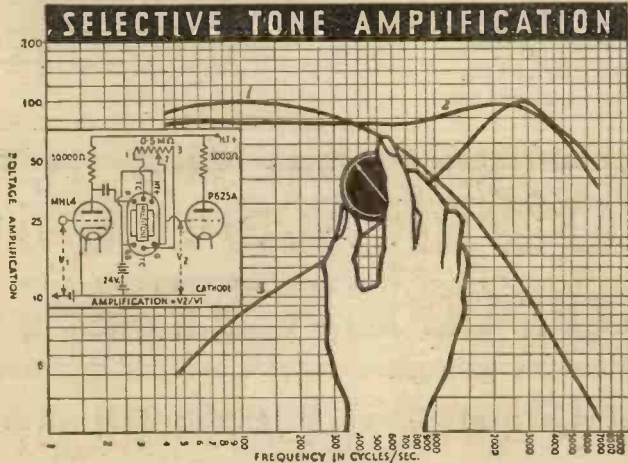


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MOST DEFINITELY DOES!**

Multitone is the only tone control which gives you *selective tone amplification*. Any other form of tone control suppresses one part of the scale in order to give apparent emphasis to other parts. This results in loss of volume, overloading of valves and smaller range of variation. Get a *Multitone* transformer from any reliable dealer. It's very easy to substitute for your existing L.F. transformer or add to an existing Resistance Capacity coupling. Your dealer will be able to do this for you if you are not a constructor, and you can then have perfect tone control.

If you are in any difficulty, write direct to us. Specified in "Plug-in Tone Control Unit"



By changing the setting of a Potentiometer, the response-curve of the Multitone Transformer is progressively altered from a falling (1), through a level (2), to a rising (3) characteristic. The limiting responses and an intermediate level-response are shown by these curves. When the response is level, the transformer ratio is 4:1. True Two-way Tone Control is immediately at your disposal on any set. In use all that is necessary is to turn the Potentiometer until the desired overall response is obtained.



Any good Potentiometer exceeding 0.5 megohms can be used with the Tone Control Transformer, but the best results are obtained with the Multitone Graded Potentiometer (price 3s. 6d.) which has been specially designed for this purpose.

**17/6**

Our Booklet on *Tone Control* will be sent post free on receipt of a postcard.

## MULTITONE TONE CONTROL L.F. TRANSFORMER

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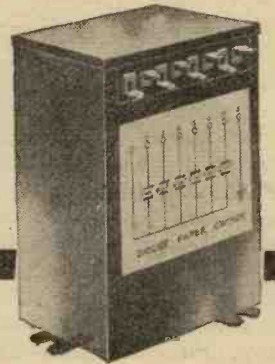


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\*\*\*\*\*  
**HOW TO CLEAN YOUR  
 SOLDERING IRON**  
 A letter about the use of  
 electrically-heated types.  
 \*\*\*\*\*

Sir,—We were interested to read in the October issue of THE WIRELESS CONSTRUCTOR the method recommended for cleaning the bit of a soldering iron which has acquired a "scaly" condition. Presumably the remarks only apply to the old-fashioned type of iron.

As electric soldering is now so popular, we wonder whether it would be advisable to caution your readers that the simple but rather drastic treatment which is recommended should not be employed in the case of electric soldering irons. As a matter of fact, if a reliable electric soldering iron is used, such as our own SOLON (as advertised in your pages), trouble of this sort will not be experienced. It is only where low-grade copper is used for the bit, and where the action of flame and dirt can have effect, that this trouble is likely to occur.

An experienced worker would not need to be told that to "heat an electric soldering iron up to a bright-

red heat and then plunge it into a basin or bucket of cold water" would be a very unwise thing to do, but it is quite likely that beginners among your readers might be less inclined to give the matter a moment's consideration before acting on the advice given.

Yours truly,  
 W. T. HENLEY'S TELEGRAPH WORKS  
 Co., LTD.  
 London, E.C.1.

\*\*\*\*\*  
**SOME USEFUL HINTS**  
 \*\*\*\*\*  
 Mains Plugs—A Tension Tip.  
 \*\*\*\*\*

**M**ANY people operate all-electric sets by means of bayonet plugs which fit into ordinary electric lamp holders. These can be a source of considerable trouble, as I know from bitter experience, for it not infrequently happens that the contacts on the plug are not sufficiently raised to press tightly against the spring points within the socket.

If this is the case the set may be excessively noisy owing to the bad connection made between the plug and socket, or it may be silent altogether when the socket is turned so

that the pins on its rim fall into the little notches prepared for them at the ends of the slots in the holder. The remedy is quite simple, though not everyone knows it.

Get out your soldering outfit and apply a little blob of solder to each of the contacts on the plug. Don't be satisfied with a plug of this kind until you have put on so much solder as to make it a really tight fit.

**A Coil-Winding Gadget**

If you do your own coil winding you may often have found it a difficult matter to keep the wire taut and to prevent it from unwinding itself too much from the reel.

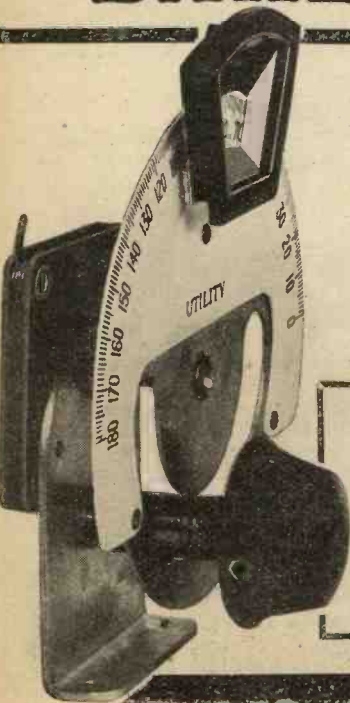
Different experimenters and constructors have different ways of overcoming this difficulty. One of the best of these, however, is the device illustrated in the accompanying photograph.

Fix the wire reel on a large nail, as shown in the illustration. Over this fix a strip of wood, attached to the upper side of which (by means of drawing pins) is a length of cloth, in width comparable with the width of the reel of wire.

The lower end of the cloth should be sewn into a loop, through which is

(Continued on page 59.)

**UTILITY PRODUCES A  
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Most modern circuits make use of Bakelite condensers, but care should be exercised in buying one, particularly when used for reaction control. A shilling saved on the price of a condenser may easily cost you a set of valves. Don't take any risks, insi on the Utility condenser and your valves will always be safe.

This new Utility job is as good a bakelite condenser as can be made. We have profited by other people's mistakes and produced a condenser worthy of the name Utility. Therefore when Bakelite condensers are specified insist on Utility and you cannot go wrong.

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**PRICE**  
**4'6**  
 complete with  
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 Condenser  
 separate.  
**2'6**





**SOME USEFUL HINTS**

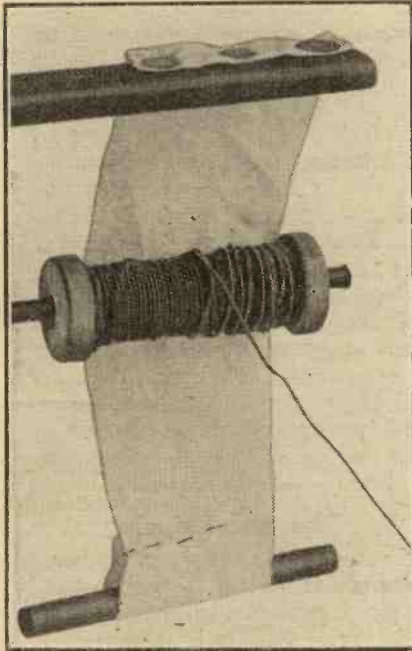
—continued from page 58

inserted an iron rod to act as a downward weight.

The upper wooden piece should be placed somewhat in front of the reel, so that the cloth, in virtue of its lower weight, drags against the back of the wire reel.

You will now have an excellent braking system for your coil winding.

**PUTTING ON THE BRAKE**



The weight of the iron rod below acts as a brake on the reel of wire.

\*\*\*\*\*  
 \* **SIMPLIFIED CONE** \*  
 \* **CUTTING** \*  
 \*\*\*\*\*

Sir,—“ Help’s ” calculations, as given in the August number, may be simplified considerably if we remember that it is quite unnecessary to find the circumference of the circle to be cut out and also that of the mouth of the cone, as the radius is always proportional to the circumference.

With the measurements given, viz., 4 in. high, 14 in. across the mouth and 8.06 in. radius of circle to be cut out, the sector to be cut away will be :

$$\frac{(8.06 - 7) \times 360}{8.06} = 47.34^\circ$$

Yours faithfully,  
 W. W. GARNHAM.

Norwood, S.E.19.

*Your Set needs*

**constant H.T. voltage**



—how to ensure it

Smooth, unvarying H.T. voltage is vital to your Set. Fluctuations in the H.T. supply mean shortened range, distorted tone and reduced volume. The only way you can definitely ensure steady, constant H.T. voltage is to use an H.T. Accumulator. And the most efficient H.T. Accumulator you can use is the Lively ‘O’.

**Why the Lively ‘O’  
 H.T. Accumulator  
 gives constant voltage**

Because each 2-volt cell is “ air-spaced ” from its neighbours the Lively ‘O’ H.T. Accumulator is leak-proof. As a result it gives all its power to work your Set. Cell-to-cell leakage is eliminated. It is full of life and vitality right up to the time when it needs recharging (every 3 or 4 months). It gives your Set the constant voltage that it needs. Every Wireless Dealer sells the Lively ‘O’.

**TWO TYPES:**

Standard 10 volt unit  
 capacity 2,750 **5/6**  
 milliamps.

Extra large capacity  
 5,500 milliamps **6/9**  
 (10 volt unit).

BRITISH MADE by  
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The **Lively O**

**H.T. ACCUMULATOR**

PUT THE LIVELY O INTO YOUR RADIO





HEAYBERD  
MODEL AO.2  
BATTERY  
CHARGER

2, 4, or 6v.  
at ½ amp.

35/-

CHARGE  
YOUR  
ACCUMULATORS

**AT HOME**—You can easily charge your accumulators by plugging one side of the Heayberd AO.2 Charger to the mains and connecting the other side to your accumulator. Write for 1933 catalogue explaining all about battery charging and mains power for your radio. Sent to you for 3d. stamps.



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7 DAYS' FREE TRIAL (or 10/- monthly.)  
Polished Oak! and Piano built! the acousto Tone brings a fine thrill. Makers to (Radio Press, B.B.C., 3,000 clients).  
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Send your list of Radio needs for our quotation—Kits, Parts, Sets, etc. Everything in Radio stocked; prompt delivery. 7 days' approval. Catalogue free. Taylex and standard Wet H.T. replacements stocked.  
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**SCREENS & COPPER FOIL FOR THE NEW "S.T.300" RECEIVER**  
Aluminium Screen, Silver-frosted finish, 10" X 6", with S.G. Hole and Notched, as specified. 1/9. Copper Foil, 10" X 7", 5d. Special Offer. Screen and Foil, 2/8 post free.  
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The ACME of CRAFTSMANSHIP  
High Grade RADIO GRAMOPHONE CABINET  
of exclusive modern design, with record wells, hand-made and polished, on Queen Anne legs.  
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Cabinets made to order a speciality.  
**GILBERT**  
Cabinet Maker, SWINDON  
Estimates Free. Estd. 1866.



the B.B.C. as a research department.

An official of the B.B.C. tells us that the Corporation has had, for about two years, research premises in Avenue Road, Clapham Common, and there, as well as at the Nightingale Lane house, the work carried on includes transmitter design and acoustical research.

**Pity the Children**

Sir Walford Davies, giving a specimen broadcast lesson, under the auspices of the B.B.C., to children attending the Summer Course in Music Teaching at Oxford, a few weeks ago, said: "Many children, apart from the wireless, have nothing in the way of music except the appalling noise made by the precentor in church or chapel, and occasional school hymns."

We regret to say we have never heard a precentor; but if he (she or it?) is as bad as some loudspeakers we have heard—well, pity the poor kiddies!

**Wireless and Shipping**

The story of the birth and progress of wireless is told in "Wireless and Shipping," published by The Shipping World, price 2s. It is thirty-seven years since Marconi carried out the first experiment which laid the foundation of commercial wireless communication. Every succeeding year has brought some advance or new development, until this month representatives of some eighty nations are gathered at Madrid to review the regulations which govern the world-wide use of this means of communication. This book deals principally with wireless in relation to shipping. The contributors include Sir Archibald Hurd, Mr. W. A. Souter, Mr. J. Herbert Scrutton, Mr. E. H. Shaughnessy, M. Auguste Hubert and Mr. A. R. Harding, and Marchese Marconi himself has written an interesting historical article.

**Licence Increases**

The opening of the Northern National Radio Exhibition at Manchester coincided with an appreciable increase in the number of listeners in the big towns during the previous month.

Sheffield heads the list with 65,943.

(Continued on page 61.)

**Value for Money**

SIR KINGSLEY WOOD, the Postmaster-General, spoke about "wireless pirates" at a luncheon of the Radio Manufacturers' Association recently.

Some 4,750,000 people paid for their wireless sets each year he said. The vast majority of people were honest. They realised that they were getting the best 10s. worth that money could buy, and they paid regularly and cheerfully.

A certain number, it was true, needed a little stimulation, and it had been unfortunately necessary to prosecute a steady average of five "wireless pirates" a day.

**Even Grandfather!**

Sir Kingsley remarked that in most respects Britain led the world so far as broadcasting was concerned. Some foreign observers constantly asserted that we were a nation of grumblers, but it was right and useful that there should be constructive and stimulating criticism of our broadcasting service.

Nothing was more remarkable (added the Postmaster-General) in this age of miracles than the progress of broadcasting. The Ottawa Conference was an illustration, and enthusiasts were already declaring that it would be practicable in a reasonable period for another Dominion Conference to be held without any of the delegates having to leave their own countries.

Modern wireless sets were wonderfully simple and efficient, and children, or even grandfathers, could handle them easily.

Judging by the sincerity with which he paid this tribute to modern sets, we feel that the P.M.G. probably had the "S.T.300" in mind!

**"Nightingale" Notes**

A house in Nightingale Lane, Clapham Common, which until recently was used as the nurses' quarters of a Jewish home, has been acquired by



**OUR NEWS BULLETIN**

—continued from page 60

an advance of 2,234, while Manchester, with 143,069, comes a good second, showing an increase of 2,001. Other figures are :—

	Increase
Leeds & Bradford 123,329	1,513
Liverpool . . . . . 119,027	1,412
Hull . . . . . 40,666	465
Nottingham . . . . . 60,966	355
Newcastle-on-Tyne 62,378	345

Manchester, which includes Salford, has the largest number of listeners of any town in the country outside London.

**The "Bathysphere"**

Listeners throughout the United States a few weeks ago heard a scientist describing his experiences as he was being lowered to the bottom of the sea in a steel ball known as a "bathysphere."

Dr. William Beebe, who made the experiment, is the director of the New York Zoological Society and an authority on undersea life, whose studies in zoology are well known in Britain.

**Getting Down To It!**

He descended 2,100 feet into the sea off Nonesuch Island, in the Bermudas, which is the greatest depth that man has ever reached.

The "bathysphere" is a hollow ball made of 1 1/4 in. thick steel and 4 ft. 6 in. in diameter.

It is fitted with portholes into which thick panes of quartz are fitted. A powerful searchlight attached to the "bathysphere" enabled the scientist to watch strange varieties of undersea life in the intense darkness that prevails at such depths.

In front of him was a microphone, through which he described scenes never before observed by the eye of man.

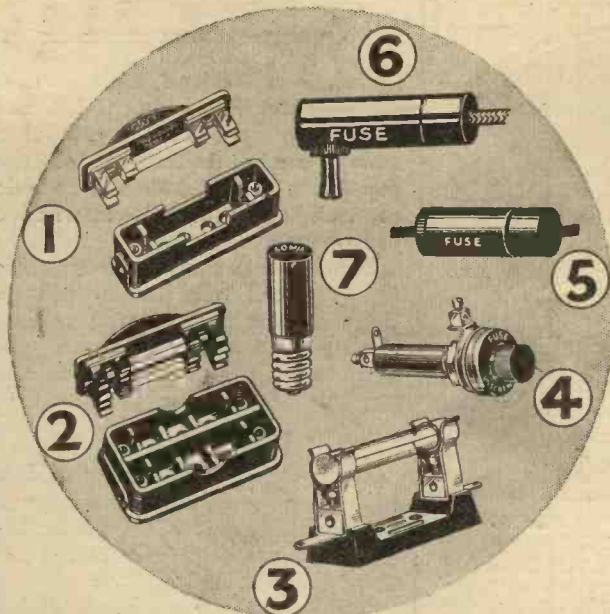
**Scotland's Regional**

The new Scottish Regional station at Westerglen, near Falkirk, is working well, and there now only remains the West Regional station, which is already well on its way to completion, and the B.B.C.'s scheme of high-power stations with dual transmitters serving the various areas of Britain will have become an accomplished fact.

**Three-Quarters at Least**

Although the B.B.C. does not claim that the new station will cover  
(Continued on page 62.)

**FUSE HOLDERS AND FUSES**



- 1 SINGLE SAFETY BASEBOARD FUSE-HOLDER. Fuse carried on lid, making shocks impossible. Complete with 1 amp. fuse . . . . . 1/6
- 2 TWIN SAFETY BASEBOARD FUSE-HOLDER. Fuses carried on lid rendering shocks impossible. Complete with two 1 amp. fuses . . . 2/6
- 3 SINGLE OPEN FUSE-HOLDER. With 1 amp. fuse 9d.
- 4 PANEL FUSE-HOLDER. For panel mounting. With 1 amp. fuse . . . 1/6
- 5 FLEX FUSE-HOLDER. With 1 amp. fuse . . . . . 1/-
- 6 WANDERFUSE. With 150 m/a. fuse . . . . . 1/-
- 7 "SCRUFUSE." Not bulb, not cartridge, yet both! . . . 6d.

SPARE FUSES. LONG FUSE. 60, 150, 250, 500, 750 m/a., 1, 2 or 3 amp.  
SHORT FUSE (For Wanderfuse only) 60, 150 and 500 m/a.  
All ratings and sizes 6d. each.  
Each rating a different colour, avoiding possibility of error.

**BELLING-LEE**

Advert. of Bellins & Lee, Ltd., Cambridge Arterial Road, Enfield, Middlesex.

Ratings:—(Black) 60 m/a. (Red) 150 m/a. (Brown) 250 m/a. (Yellow) 500 m/a. (Green) 750 m/a.

Dealers will fit other ratings in any of these holders at the time of purchase.

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SHORT-WAVE PLUG-IN COILS, Nos. 2-9 TURNS

8 D. AIR DIELECTRIC STANDARD SIZE  
4 for 2/4, 8 for 4/6, all Post Paid. The set of eight covers whole S.W. range. Base-board Coil Holders 4d.



SCIENTIFIC SUPPLY STORES, DEPT. C, 126, NEWINGTON CAUSEWAY, ELEPHANT & CASTLE, LONDON, S.E.1.  
Phone: Hop 4177

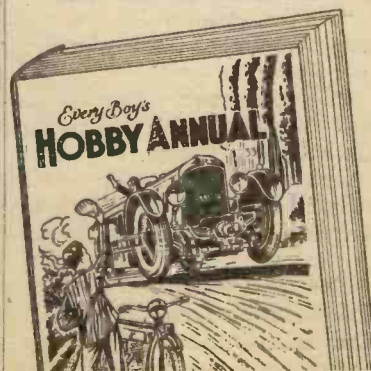
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As far as possible all advertisements appearing in "W.Con." are subjected to careful scrutiny before publication, but should any reader experience delay or difficulty in getting orders fulfilled, or should the goods supplied not be as advertised, information should be sent to the Advertisement Manager, "The Wireless Constructor," 4, Ludgate Circus, London, E.C.4.

**The Most Up-to-date Book for the Boy with a Hobby!**

The fascination of discovering "How it works" and "How to make" is blended with lively talk about the world's most recent mechanical marvels in the HOBBY ANNUAL.

**A Home-made Model SPEED-BOAT**



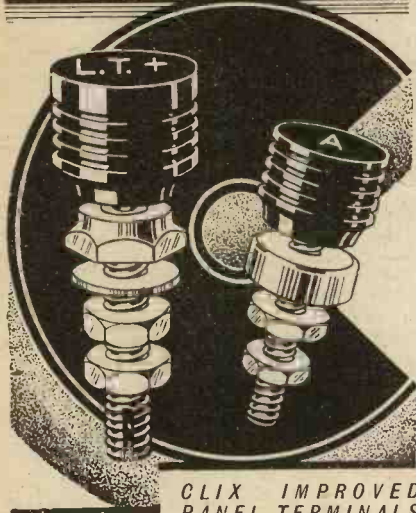
Any fellow can easily build this nippy model speed-boat by following the directions in the 1933 HOBBY ANNUAL—the book which tells you how to make things and how things work. Profusely illustrated, it contains interesting articles on stamp-collecting, model railways, wireless, woodwork, ships, aeroplanes, motor-cars and so on. Make sure of a copy.

**HOBBY ANNUAL**

At all Newsagents and Booksellers 6/- net



**CLIX**  
CHEAPEST PERFECT CONTACT



**CLIX IMPROVED  
PANEL TERMINALS  
FOR THE CONSTRUCTOR**

From the "T. & R. Bulletin" (Official organ of the Radio Society of Gt. Britain):  
"What we particularly like about this is the fact that the body is provided with a hexagon shoulder so that it can be held with a spanner while the nuts behind are made tight."  
Clix terminals are more robust; completely insulated, non-removable heads. Red or black. Full range of easily read markings.

**Prices:**  
Type B, with hexagonal shoulder **4d.**  
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Interesting folder 'C' free.

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"First in Their Class"  
MODEL V26. Beautiful Radiogram Cabinet 3 ft. 2 in. high, 1 ft. 10 in. wide, 1 ft. 4 in. deep. Accommodates any type of Gramophone Motor and set with Baseboard, 18 in. by 14 in. or smaller. Hand polished.

OAK	£3 15 0
MAHOGANY	£4 0 0
WALNUT	£4 5 0

Write for Free Catalogue of Latest Models Post Free.  
STAND No. 9. (Block B) Scottish National Radio Exhibition, Edinburgh Waverley Market. Oct. 12-22



**STENIBAC LTD.** Dept. C., 303, Essex Road, Islington, London, N.1.

**TAYLEX WET H.T. BATTERIES.**  
Give long service, improved volume and tone; very economical.  
Replacements for Taylex or Standard batteries at low prices; details post free; also Bargain List. Radio Kits and parts at lowest prices.  
**C. TAYLOR, 57, Studley Rd., Stockwell, London.**

**WILL INSURE YOUR VALVES**

**COMPETA**  
THE WORLD'S SELECTED

You have at least 30/- worth of valves to risk when you use unknown makes. Don't experiment—insist on genuine branded "Competa" fuses in the little orange boxes.

Advt. of **A. F. BULGIN & CO., LTD.,**  
ABBEY ROAD, BARKING.

06A  
1 M  
15 P  
2 S

**OUR NEWS BULLETIN**

—continued from page 61

the whole of Scotland, it claims that approximately 80 per cent of listeners will be reached, which means that more than three-fourths of the population of Scotland will be able to take advantage of alternative programmes.

Scottish listeners who wish to receive the National programme will in future tune in to 288.5 metres, while if they want a more Scottish programme they will find it on the Regional wavelength of 376.4 metres.

**Marconi Built**

In its anxiety to keep up to date with the progress of radio communications, the Chinese Government has placed an order for a new beam station capable of telephony.

The Marconi Company is to undertake the work and a reliable estimate places the cost at somewhere near £40,000.

**Constructors' Components**

Although sales of radio sets have increased enormously recently, there has been no falling off in the demand of home-constructors for components. We learnt this from Mr. E. M. Lee, one of the principals of the firm of Belling and Lee, Ltd.

In ten years Belling and Lee have built up a great industry from the odds and ends of wireless, for the firm make such things as terminals, fuses, wander-plugs, and nothing larger than gramophone pick-ups. It is now difficult to buy or make a British receiver which has no Belling-Lee product in it.

Tiny oddments are turned out at the rate of 250,000 a day, and there are 16,000,000 in stock. Incidentally, how many listeners know that those red and blue plugs in their sets are made from specially treated cheese, disguised under the name of casein?

**"Radio Nations"**

"Radio Nations," the new short-wave League of Nations' station, is now on the air.

One transmitter is now working on two wavelengths, 20.64 and 40.3 metres.

Some 200 broadcasting stations recently picked up a speech by Sir Eric Drummond, Secretary-General of the League, and re-broadcast it in various European countries, Canada, U.S.A., Argentine, China and Japan. The B.B.C., however, did not re-broadcast it in Great Britain.

**The Great Adventure**

Sir Eric spoke of the League of Nations as a "living organism" and a "great adventure." He also stressed the importance of the new radio station from the point of view of League strategy in time of crisis.

He mentioned that in order to make it of real value they were going to invite the world's newspaper men to propound a series of questions to the League, which would be answered at the regular Sunday night eleven o'clock broadcasts in English, French and a third language.

**Leicester's Week**

Five industrial broadcasts are to be included in the special Leicester broadcasting week, arrangements for which are being made by a joint committee composed of members of the City Council and of the Industrial Development and Local Affairs Committee of the Leicester and County Chamber of Commerce.

The joint committee has recommended to the B.B.C. that the week be about the middle of November.

**FROM MY ARMCHAIR**

—continued from page 31

against Wigan. Curious; no doubt unjust; but there you are.

On my aerial tour I have avoided Chorlton-cum-Hardy. I have no doubt that it is favoured by Manchester business men as a place to which they may retire in their old age. Statistics probably show that it is the healthiest spot in England; but I feel it would not be healthy for me.

**Seeking My Blood**

Ever since the postman delivered that letter from an "S.T.300" builder who received only one station and wanted to "get me by myself," I have avoided being by myself as much as possible. I picture the whole of Chorlton-cum-Hardy as seeking my blood, digging pits in all the local fields, and praying for fog.

And so this Queen of Spas will not be on my list. But I am going to Newcastle. I shall mix with the local linoleumists. I expect their talk amongst themselves will not be of getting Minsk or Traalberg, but on the lines of: "Have you ever seen that thirty-fourth square near the leg of the sofa?" And the retort: "That's child's play; last night I clearly saw the scratched check where the television announcer slipped—and without any reaction!"



**GET READY!**

—continued from page 10

month. I ask all "S.T.300" constructors to help the popularising of this new set. The facts will be there to be adjudged on their merits, and, technically, there are going to be surprises and information useful to all wireless constructors.

**Worth Waiting For**

This is the season for building new receivers. Designs are being dangled before you now. Will you grasp one or wait a month—and advise your friends to wait—until you "see what the 'S.T.400' is like?" My advice is that the "S.T.400" is worth waiting for. I suggest you ask yourself what other set has had such exhaustive tests.

**NEXT MONTH**

Full details of

**JOHN SCOTT-TAGGART'S**

latest design for the home-constructor.

**THE "S.T.400"**

with

**1/- BLUEPRINT FREE.**

Also a valuable

**FREE BOOK**

**ORDER YOUR COPY AT ONCE**

**On Sale Nov. 15th. 6d.**

Are you a Scottish reader? I have tested the set in probably the area in which you live. Are you a Lancashire man, or do you hail from Yorkshire? There are men in your very town probably who will tell you how the "S.T.400" fared. Birmingham? But wait till November 15th!

**Proved on Scores**

Londoners, of course, will know how they stand, but this set has not been designed in one laboratory in one city. It has been tried out and improved and demonstrated in dozens. Not tested on one aerial, but proved on scores.

This article is the last thing I am doing in London before setting off again on my aerial tour. Fagged, yes. But if only half the value of this tour is appreciated by readers, I shall be content.

**MODERN SCREENING METHODS**

—continued from page 26

open base or wide wiring channels ought to be avoided.

And now I think I have said enough about screened coils to show that they are not quite as simple as may be thought.

Even with properly designed screened coils, metallised valves and shielded condensers, precautions against coupling defects still have to be taken.

The wiring has to be done with moderate care or instability may result through this. The H.T. lead to the anode terminal of an S.G. valve is a frequent source of trouble. And in order to keep this as short as possible it is frequently arranged that the S.G. valve should be mounted on its side instead of vertically.

**Extended Grid Wiring**

Of course, the grid wiring has to be carried out with discrimination. It is sometimes forgotten by constructors that in many circuits the wiring to a coil and its connection with the aerial may virtually be extensions of the grid circuit of the first valve.

I had an interesting experience in connection with this. A certain set with which I was experimenting had "break-through" trouble. In order to cure this I tried the effect of connecting a small fixed condenser in series with the aerial terminal of the coil.

The set then became unstable. This may have been due to either one of two causes, or perhaps both contributed in some measure. In the first place there was a removal of some of the aerial damping on the first grid circuit, and, secondly, there was an extension of grid circuit wiring or wiring directly associated with the grid circuit.

**Total Screening Required**

That the latter was the more marked effect was proved by the fact that the set remained stable when there was no aerial joined to it, although the trouble developed when the condenser was wired into circuit whether or not there was an aerial.

Incidentally, this receiver employed the same make of partially-screened coils as mentioned previously, which only goes to prove the advisability of total screening.

After all, we might as well be allowed to go all the way with the new technique.

**TUNEWELL VOLUME CONTROL**  
Increases power of reception. Losses much less than with ordinary types. Logarithmically wound with double-silk-covered wire. Paper laid between windings.  
Type V. All sizes up to 50,000 ohms. 5/6. Sizes from 50,000 to 100,000 ohms. 7/6.  
Type P. Variable Resistance or Potentiometer. Equal resistance between studs. Max. Dissipation 3 watts. 5/6.



**TUNEWELL WIRE-WOUND ANODE RESISTANCES**  
All values from 10,000 to 100,000 ohms. 3/6 each. Bakelite Hold. " 1/6.

**SPECIFIED for the "DETRODE" described in this issue**

**TUNEWELL H.F. CHOKE 3/6**

Use this and all the other Tunewell Components whenever you can and be certain of "Super-Radio at Lower Cost."



**TUNEWELL ALL-POSE H.F. CHOKE**  
Wound on hollow-cored moulding. Capacity reduced to absolute minimum. Results unequalled by any other. Range 20-2,000 metres. 3/6.

**The NEW TUNEWELL COMPONENTS**  
give you **SUPER-RADIO** at Lower Cost!

The standard of quality achieved by the new TUNEWELL Components has hitherto been approached only by the highest-priced products, but by careful design and lowering our profits, TUNEWELL have removed the old price-bar to Quality Radio. Send the coupon now for the TUNEWELL "Guide to Super-Radio"—an interesting folder you will keep for reference. It includes 8 Blue Prints (Band-Pass All-Mains 3, Kit Eliminator, etc.) and details of the new range of TUNEWELL Components.

**8 FREE Blue Prints**

To Tunewell Radio Ltd., 54, Station Rd., London, N.11.

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Address.....

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\*\*\*\*\*  
**AN INEXPENSIVE MOULDER**  
*How you can add that "professional" finish to your wood-work.*  
 \*\*\*\*\*

**T**his simple gadget will appeal to those of you who are contemplating building a new cabinet. Little need be said about the actual making of the thing beyond that the various mould cutters you will need can be shaped with a file from odd pieces of thin steel, or, for small moulds, sheet tin or iron.

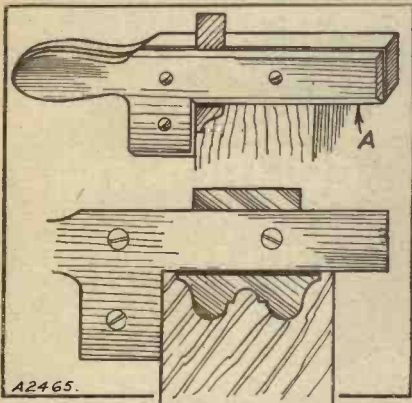
**Easy to Handle**

The handling of a scratch moulder gives little trouble. Where possible, it is an advantage to take off the rough wood to as near as possible the shape of the mould decided upon with other tools on hand.

It will be found that different kinds of wood necessitate this kind of moulder being used at different working angles, but a few experiments on odd pieces of the material you are using will decide this factor.

By carefully extending the cutting

**DETAILS OF HOLDER**



The cutting irons are held between a wooden stock and a metal face plate.

iron every few strokes taken, the best results are obtained. Remember, the pattern of the cutting iron is always reversed to the mould pattern.

For small rebates and plough grooves your chisels can be used. A wider stock (A) will help to stabilise them. Curved mouldings are worked in a similar way, the butt of the stock being curved or shaped to fit the shape or sweep.  
 W. W.

casting House, and the other bearing every indication of having been "made in Germany"!

**It "Hasn't Helped"**

You will see that the high selectivity of the tuned-anode circuit hasn't helped at all, because that circuit *received* Mühlacker's wave all right and *rejected* London's, but, unfortunately, only after Mühlacker's

**A SIXPENNY — & — SHILLING FULL-SIZE BLUEPRINT**

**WILL BE PRESENTED FREE**

with next month's

**WIRELESS CONSTRUCTOR**

OUT NOV. 15th.

ORDER NOW.

**CROSS-MODULATION**

—continued from page 54

have to be taken for granted from the present writer is that if you mix an H.F. carrier with L.F. speech currents the latter *modulates* the former. It does not matter if the H.F. carrier has already been modulated. You can do it twice, quite easily.

**Twice-Modulated Carrier**

Now, the function of a detector is to separate L.F. from H.F. The detector in our London listener's set will, of course, do this in the ordinary course of events. But it will be doing it on a carrier which has been modulated twice, and will give the bewildered London listener two lots of programme — one originating in a studio at Broad-

wave had become modulated by the London programme.

We can sympathise with our London listener if at this stage he throws his 'phones on the table and retires disgruntled to bed because there does not seem much to do about it all.

**Overcoming the Trouble**

True, we can arrange for London's strength to be negligible when the aerial circuit is tuned to Mühlacker by connecting the aerial nearly to the bottom of the coil, or by dispensing with all but a few feet of aerial. So doing will, however, result in Mühlacker not being heard at all, which doesn't help much.

"Band-pass" tuning of the aerial circuit is a solution, but it involves ganged condensers, trimming, and extra inductances. A far simpler solution is to be found in the aerial input control scheme and anode coupling principle employed in the "S.T.300."

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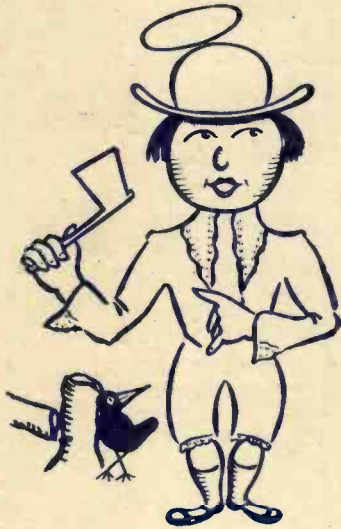
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# Like George Washington—



# 99 PM CANNOT LIE!

**T**HE difference between the performance and tone of Blue Spot 99PM and many so-called "cheap" moving-coil speakers is so very marked that nearly everybody who appreciates good reception considers it well worth while to pay "just a little more" and have real quality. Blue Spot 99PM gives you exactly what the studio broadcasts—like George Washington, it cannot lie.

99PM is by way of being a genuine masterpiece; it has certainly made new history for moving-coil speakers. It reproduces every note in the whole musical range with absolute clarity and fidelity. Write for Catalogue No. W.C.22.S.

## SPECIAL FEATURES

- 1 Heavy Magnet forged from highest grade magnet steel.
- 2 Powerful and permanent energy.
- 3 Magnetic energy in air gap is exceptionally high—1,320,000 ergs.
- 4 Pole pieces cadmium plated to prevent rusting.
- 5 Milam side plates are fitted to the Magnet to exclude dust and magnetic particles from being attracted into the air gap.
- 6 Specially designed cone and speech coil. Astonishingly faithful reproduction.
- 7 Valve matching transformer incorporated. Undistorted output  $3\frac{1}{2}$  watts.



PRICE  
**59'6**  
BRITISH MADE



ANTI-INTERFERENCE UNIT.  
Cuts out mains disturbance caused by electric vibratory apparatus in use during broadcasting reception.

Price 10/6

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Last Season's De Luxe Model Moving-Coil Speaker again repeated in response to demand  
75 P.M. Price 75/-



# FACTS YOU SHOULD KNOW ABOUT THE MAZDA 2-VOLT RANGE



In this exceptionally efficient range of 2-volt valves will be found types to suit all battery operated sets.

**THE HL2**, an outstanding example of Mazda sensitivity, is an excellent cumulative grid detector. Amp. Factor: 31. Imped: 20,000 ohms.

**THE S215 VM**, is a new variable-mu screened grid valve of extreme sensitivity and low inter-electrode capacity.

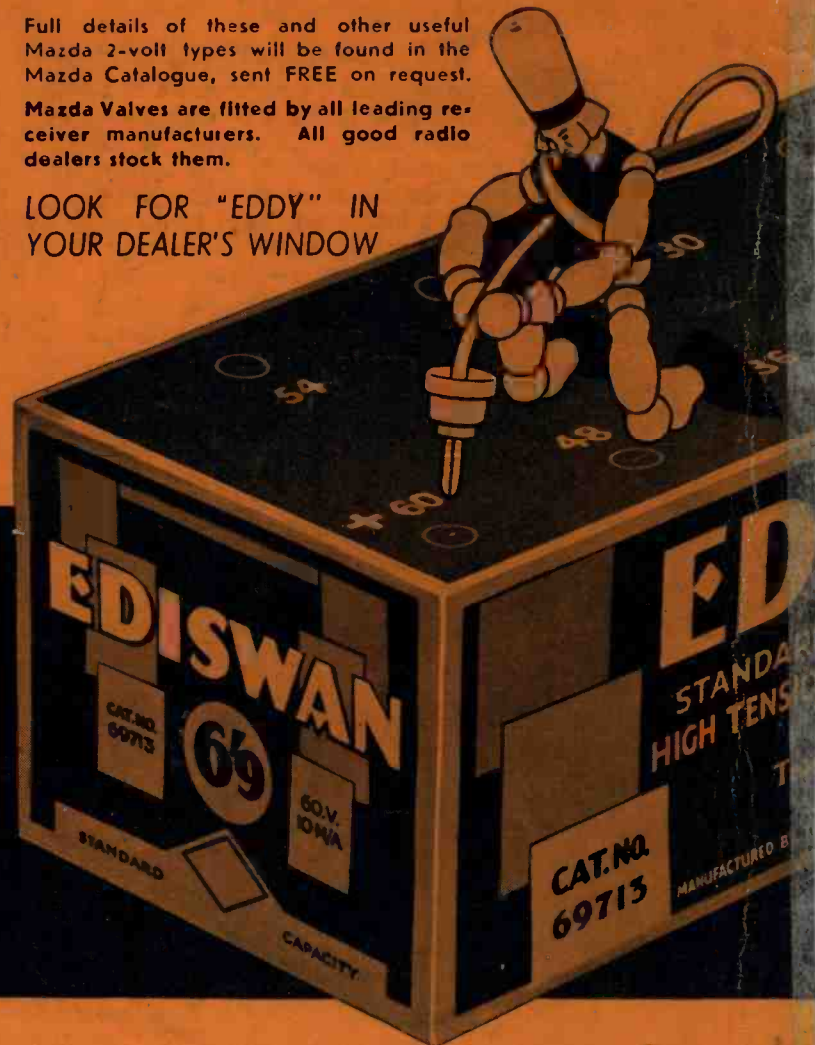
**THE PEN 220 and PEN 220A** are two economical pentodes, which will give ample volume with a very low signal input.

**THE P220 and P220A**, will operate balanced armature and moving coil speakers respectively at full volume with extremely economical anode consumptions.

Full details of these and other useful Mazda 2-volt types will be found in the Mazda Catalogue, sent FREE on request.

Mazda Valves are fitted by all leading receiver manufacturers. All good radio dealers stock them.

LOOK FOR "EDDY" IN YOUR DEALER'S WINDOW



The amazing

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BRITISH  
VALVES

100% BRITISH—Designed by British Engineers

The Edison Swan Electric Co. Ltd.



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