

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

Vol. X'II. FEB., 1932. No. 64.

**FULL-SIZE  
1/-  
BLUE PRINT  
OF  
S.T. 300**

—JOHN SCOTT-TAGGART'S  
AMAZING NEW SET —

**FREE**

FULLEST CONSTRUCTIONAL  
DETAILS INSIDE



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A Lewcos H.F. Choke (Type MC) and a 20,000-ohm Spaggetti resistance are specified for the "S.T.300" receiver described in this issue.



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THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED, CHURCH ROAD, LEYTON, LONDON, E.I.O

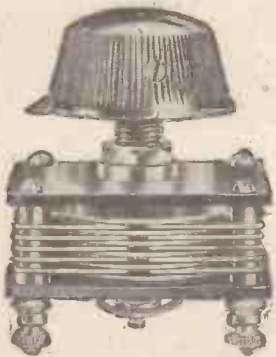
# CONTENTS

	Page		Page
The Editor's Chat .. .. .	193	The Month on Short Waves .. .. .	216
Portrait of John Scott-Taggart ..	194	As We Find Them .. .. .	217
A National Set for International Reception .. .. .	195	My Plans .. .. .	219
The "S.T.300" Is Here! .. .. .	196	Round the Dials .. .. .	222
The Rapid Construction Guide .. ..	210	Points for Purchasers .. .. .	222
The "S.T.300" Circuit .. .. .	211	Pick-Up Hints and Tips .. .. .	224
A Radio Map of Europe .. .. .	212	A Visit to W G Y .. .. .	225
Test Reports on the "S.T.300" .. ..	213	Quear Queries .. .. .	229
With Pick-up and Speaker .. .. .	215	Concerning Condenser Capacities ..	230
On the Grid .. .. .	216	Is Wireless Getting Easier? .. .. .	232
		In Lighter Vein .. .. .	239
		B.B.C. News .. .. .	242
		Our News Bulletin .. .. .	249

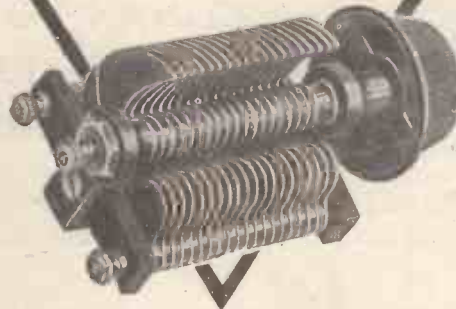
As some of the arrangements and specialties described in this journal may be the subjects of Letters Patent, the amateur and trader would be well advised to obtain the permission of the patentees to use the patents before doing so.

Chief Radio Consultant:  
**Capt. P. P. ECKERSLEY,**  
 M.I.E.E.

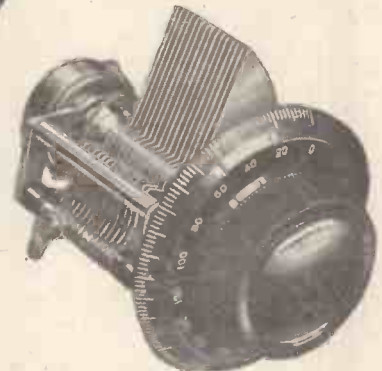
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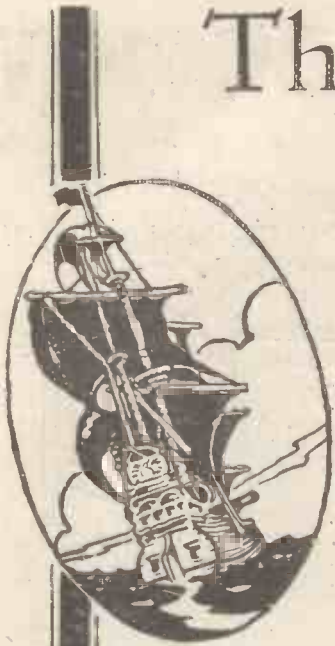
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**72/6**

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1 Graham Farish "Megite" 1-meg. grid leak . . . . .	1	6	
1 Lewcos H.F. reaction choke, Ref. M.C. . . . .	2	6	
1 Lewcos Spaghetti resistance, 20,000 ohms . . . . .	1	6	
1 Varley "Nictet" L.F. transformer, 3-5:1, type D.P.21 . . . . .	7	6	
2 Lotus valve holders, type T.H.K. . . . .	1	0	
1 W.B. valve holder (S.G. horizontal) . . . . .	1	0	
10 Balgin terminals, marked . . . . .	2	6	
1 J.B. midget condenser, 'oooo4 mfd. . . . .	4	0	

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- Officially approved therefore by a world-famous technical authority you can trust implicitly.
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- The only kit of parts that guarantees strict adherence to the Author's first specified components.
- Enables the Author's published set to be duplicated exactly in every respect.

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for which I enclose  
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# Seven-point suspension

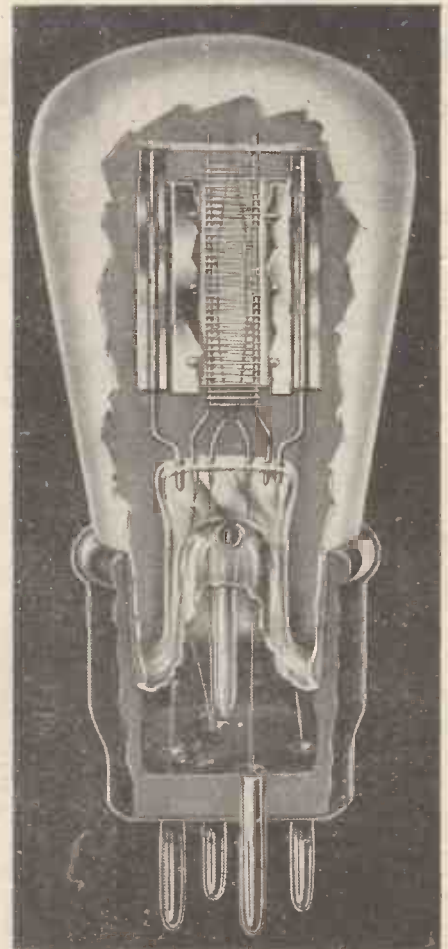
## Mica Bridge Mounting

both these advanced constructional features are incorporated in this Cossor 2 volt special Detector Valve

**S**PECIALY designed for use as a Detector the Cossor 210 DET incorporates all the most advanced constructional features.

By the use of Seven-point suspension and Mica Bridge Mounting complete freedom from microphonic noises is obtained (a feature of special interest to users of portable sets). Due to its grid current characteristic distortionless rectification is ensured.

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 Impedance 13,000. Amplification  
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# The WIRELESS CONSTRUCTOR

Published by the Amalgamated Press, Ltd., Fleetway House, Farringdon Street, London, E.C.4.

## THE EDITORS' CHAT



A few words by the Editor concerning Mr. John Scott-Taggart, who is to contribute exclusively to "The Wireless Constructor."

**T**HIS issue of THE WIRELESS CONSTRUCTOR is outstanding in several ways. As I announced in our last issue, Mr. John Scott-Taggart has returned to radio journalism, and in this issue offers readers the first and exclusive details for building the "S.T.300" receiver.

This issue heralds the beginning of a renewed and close association with one who has achieved a reputation for a vigorous and far-seeing attitude towards radio development, and I am sure readers will be glad to hear that, commencing with this issue, Mr. John Scott-Taggart will contribute a number of exclusive set designs which, in my opinion, will stand out as milestones on the road of radio progress.

### The "S.T.300"

Mr. Scott-Taggart will also write regular articles on various aspects of radio for this journal. Elsewhere in this number he outlines some of his ideas, and plans for the future. Readers will notice that a considerable amount of space has been devoted to the detailed description of the "S.T.300," and when reading this article they will, I feel sure, be struck at once by the unconventional attitude of the author.

His provocative challenges to some of the technical radio set conventions of to-day will inevitably arouse interest and, possibly, a good deal of controversy—but that is all to the good. Radio always welcomes controversy, for it is only by controversy that progress is made.

### His Disconcerting Habit

Mr. Scott-Taggart ruthlessly pushes his way through some rather sticky radio compromises, but in doing so it is not with the object of posing as an iconoclast, but as one who earnestly desires to let in more light upon a sub-

ject which is of so much interest both to him and to readers of this journal.

Many of our readers will remember that in the past Mr. Scott-Taggart had a disconcerting habit—that is, disconcerting to his critics—of being right. I am glad to say he has not lost this habit!

### TELEGRAPHISTS IN THE MAKING



Students practising the Morse code at a United States Radio School. The young lady in the foreground is Miss Juanita Burns, who proposes making a flight across the Pacific in the Spring. She is acquiring sufficient knowledge of radio to enable her to make use of a small transmitter.

The many thousands of new readers who will join us in this issue will, probably, not be so familiar with Mr. Scott-Taggart's reputation as those of us who have been acquainted with THE WIRELESS CONSTRUCTOR since its inception. Perhaps a brief recapitulation about our distinguished contributor's career may not be out of place.

As long ago as 1914 Mr. Scott-Taggart wrote his first article on wireless, and it is interesting to remember that at the time he was seventeen, and at school. The article dealt with an invention he had developed.

From the birth of that article he has written upon radio in a way which has lifted him to the front rank of radio engineers of this age. And he has not only written. Many very important inventions stand to his credit.

### Classic Work

Although only thirty-four, Mr. Scott-Taggart has crammed in a great deal of achievement. After service as a wireless officer during the war—and being mentioned in despatches and awarded the Military Cross—he took charge of the manufacture of Government valves at the Ediswan works.

His well-known classic on Thermionic Valves was published about ten years ago, and since then he has written other books, the importance and popularity of which may be gauged by the fact that 750,000 copies have been sold.

By 1919 he had achieved a reputation as an authority on valves and their uses, and in 1920 he became Adviser on Patents and Inventions to several leading radio concerns, including the Radio Communication Co. and the Mullard Co.

### Many Inventions

His own inventions have been numerous, and their importance may be gauged by the Companies which have from time to time acquired them—the Marconi Co., the Radio Communication Co., the Telefunken Co. (of Germany), the Hazeldine Co. (of America), Commercial Cable Co., etc., etc.

(Please turn to page 246.)



*JOHN SCOTT-TAGGART, M.C., F.Inst.P., A.M.I.E.E.*



# A NATIONAL SET FOR INTERNATIONAL RECEPTION

The Editor introduces the "S.T.300" to readers:

NOTHING could give me greater pleasure than writing this introduction to the "S.T.300" receiver. There is at the present time a need for a great popular set which will provide a person with the means for bringing into his home the great variety of foreign programmes which are in the ether around him, and which only ask to be invited in.

Unfortunately they all want to come in at once! And, worst of all, we have the gate-crashers of the B.B.C. forcing their way past our defences, intent on us hearing what they have to say.

### When Foreigners Are Welcome

This winter has illustrated, as no other winter has shown, that we no longer have to depend on our own broadcasting service—fine though it is—for entertainment. More and more is there a tendency to look, in imagination, across the Channel or the North Sea to other countries that provide entertainment which, for one reason or another, may not be coming at that hour from the B.B.C. Where formerly we thought these foreign stations a challenge to our skill in tuning, but not worth serious consideration, we now know that they can provide us with programmes as

good as our own. But, even though we know this, we also know to our cost that 75 kilowatts near at hand has more effect than two on the Continent!

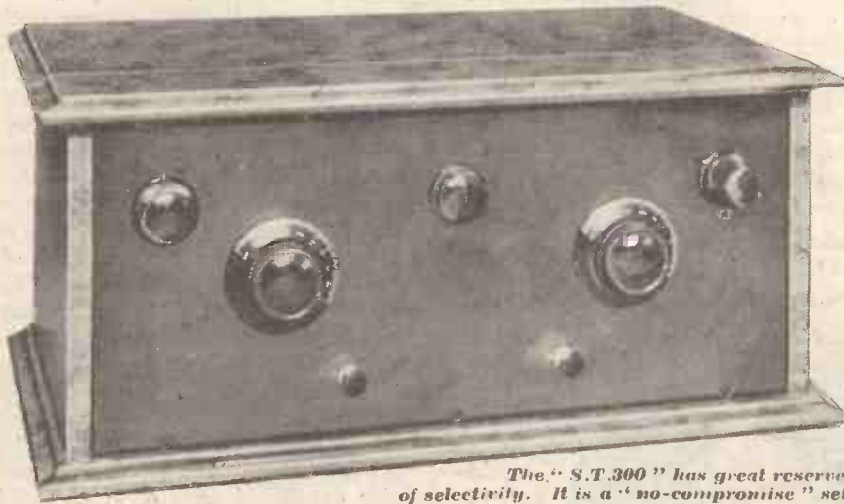
The other now is like an untidy office with documents scattered about. The programmes are valuable—just as the documents are—but they need sorting, filing, pigeon-holing. The time is ripe for some set which can

different periods, stood forward and given a lead to broadcast receiver design. In 1923 people were looking round for some set to build which would give them what they wanted.

### A Famous Predecessor

The famous "S.T.100" was forthcoming from him. It was built in enormous quantities. Then came the "Elstree Laboratory" days, when his enterprise and foresight was acknowledged by two set designs from his laboratories being granted first-prizes in international contests in Amsterdam and in New York. He re-enters the field of designing for home-constructor at what I feel is just such a moment as in 1923.

### GREAT RESERVES—NO COMPROMISES



The "S.T.300" has great reserves of selectivity. It is a "no-compromise" set.

be acclaimed throughout the country as the remedy of our troubles.

### Just What You Need

That set, I believe, will be the "S.T.300." It has been invented and designed by an expert of international reputation who has proved to have an almost uncanny knowledge of what the home-constructor really needs—and, what's still more important, how to give it to him.

Mr. John Scott-Taggart has, at

Everyone is searching amongst the multitudinous designs published for a set which gives them high selectivity, innumerable stations, and all at low cost. Mr. Scott-Taggart has, I am convinced, solved the problem.

No receiver has ever been so completely described and illustrated as this one, and none has had such invincible arguments put forward for its merits.

And now, if you will turn over the page, Mr. John Scott-Taggart will himself tell you everything about the set.

### READ WHAT READERS SAY ABOUT THE "S.T.300"

Last month Mr. Scott-Taggart offered to demonstrate the "S.T.300" to readers who wrote to him. Here are extracts from four typical letters received from keen, critical constructors who availed themselves of the offer:

"I should like to testify to its amazing sensitiveness and selectivity."

"I do not think anything that I may say can convey my astonishment at its capabilities. . . . The set is extraordinarily selective and sensitive. . . . Its range covered Europe, and its quality

and volume on all stations, with a cheap speaker, are what one would only expect on expensive receivers and speakers. . . . This set must be heard to be believed."

"Having heard the 'S.T.300,' I am convinced that here is a set that will do all that is claimed for it. . . . Selectivity

remarkable. . . . This set will be going strong when most of the present sets will be out of date."

"Mr. Scott-Taggart has certainly a unique system of selectivity control which will place this set miles in advance of any S.G.3 yet designed."

# The S.T. 300

*A Set that Disciplines the*

WHEN the Editor said to me: "We want you to design for us a set which will give something really outstanding in the way of performance," I replied that I should require a "designer's mandate."

We then began to talk. I said that in evolving such a set I should want to be perfectly free to develop or devise any method of achieving range, quality and volume regardless of ultimate price or anything except the necessity of getting the utmost out of each of the valves used.

## Good News

The Editor looked uneasy at the mention of price, but finally agreed.

and the "S.T.300" is the culmination of four months intensive work, both in creating the final circuit and design and also in eliminating alternative schemes I desired to try. It will, no doubt, come as a piece of good news to the reader that a set developed without restrictions should turn out to cost only a trifle over seventy shillings in materials and components.

Before you yourself build the "S.T.300" set you will rightly want to know why you should do so in preference to any other. I should, therefore, like to suggest that we review the desirable features which should be in a set and what points I have had in mind throughout my development work.

I was convinced from the start that three valves could—if used in such a way as to bring out their full efficiency—be made to give the listener more than he needed in the way of innumerable programmes to choose from. But an array of three-valve sets

for home constructors is already laid out before you. Each one in turn has been dangled before your eyes. Each one is better than the others!

To-morrow something claiming to be even better than somebody's else's something will be brought out, and the new reader can well be excused for being confused as to which to construct. Some of these sets are very good, some are indifferent. How is the average person to know which one to build?

If the wrong one is chosen, experience may be gained, but that will not lessen the subsequent bitterness. Many people, however, remain reasonably satisfied with an indifferent set—all unconscious of the imprisoned powers of entertainment which invention can release from only three valves.

## Elimination Trials

During my experiments in developing the "S.T.300" I lined up a group of recently designed three-valve sets, each of which had been chosen from my experience as representing the best current practice.

I actually did what the average reader would like to do in his own home, viz., try them all out against each other and against the "S.T.300." While appreciating the good points, I was reminded more than ever of some of the pitfalls to avoid. A frequent fault was lack of sensitivity and especially selectivity on the long waves.

Another point to look out for in a receiver is absence of selectivity or sensitivity at the lower or



*The inventor with his set. There are only two tuning controls, but provision is made for ultra-selectivity.*

# IS HERE!

## Broadcast Stations of Europe

upper readings of the condenser dials. Various other matters, such as not providing "room" on the dial at one end or the other for useful stations, difficulty of wiring, inadequate general selectivity, and other matters forced themselves again before my attention, and—to be frank—in some cases made me raise my standards for the final "S.T.300."

### An Important Decision

But one thing I decided from the start: **THERE WOULD BE NO COMPROMISE!** This, in my opinion, is the curse of radio to-day. The man who lives under the shadow of a 75-kilowatt B.B.C. station requires a different sort of set than that which a dweller at Scarborough, say, might be happy with.

The man with a full-size aerial differs from the one who *has* to sling his bit of aerial from a first-floor window to a clothes-prop in the yard. Very many sets—especially commercial sets—have to appeal to old ladies who find it difficult enough to twiddle a single knob. All this results in **COMPROMISE**—and designers of such sets know that they are losing all along the line in efficiency as they cater for different people, different aerials and different localities.

### The Utmost Efficiency

I decided to fight this temptation to compromise. The result, I believe, is a set which is not just a good average for all localities, for all aerials and for all people, but one which can be made to give the selectivity the locality necessitates, to get the utmost out of the aerial used, and to be workable at will either by the constructor himself or (with some reduction in the number of stations logged—but not much!) by the constructor's grandmother.

But this is not the whole story by

any means. There are other compromises which have been made by designers. There is the well-known one of sensitivity versus selectivity.

### Sensitivity v. Selectivity

Everyone knows that beyond a certain stage as you increase the selectivity you decrease the sensitivity (i.e. range, and therefore "power," on weaker stations) of the set.

The art of the designer is to minimise this loss, but what normally happens?

### "NO COMPROMISE"

This set introduces

- (1) **MULTIPLE VARIABLE SELECTIVITY**
- (2) **DIFFERENTIAL ANODE COUPLING**
- (3) **AN AERIAL "COUPLER" WHICH ENABLES YOU TO GET THE MOST OUT OF EVERY STATION AND OUT OF YOUR AERIAL FACILITIES**

He has to design a receiver which will work well in different hands, different localities and on different aerials. He strikes an average.

The man who lives some distance from a B.B.C. station gets weaker or fewer "foreigners" than he might, and the one really near to the B.B.C. gets more "jamming," i.e. the set is not selective enough for him. It is a compromise set. We've all designed them. I have done so. But in the "S.T.300" I have broken away from this idea.

I have aimed at a set which will enable you to get more selectivity if you need it, more range if you need it, more power if you need it.

In brief, it is designed to enable you to get the utmost out of your par-

ticular circumstances—and my tests have varied from two miles from a B.B.C. regional to twenty-five miles, and a "standard" aerial to a 12-ft. indoor bit of wire round the picture-rail.

The set goes farther than this, however. No matter where you live, no matter who operates your set, no matter what size your aerial may be, you know perfectly well that there are two cases where selectivity may be relaxed.

One is when the local B.B.C. (or some powerful foreign station) is closed down, and the other is when you are receiving a station on some point of the dials where there is not much interference. A *compromise set will not enable you under either of these conditions to get either the range or the strength you could otherwise obtain.*

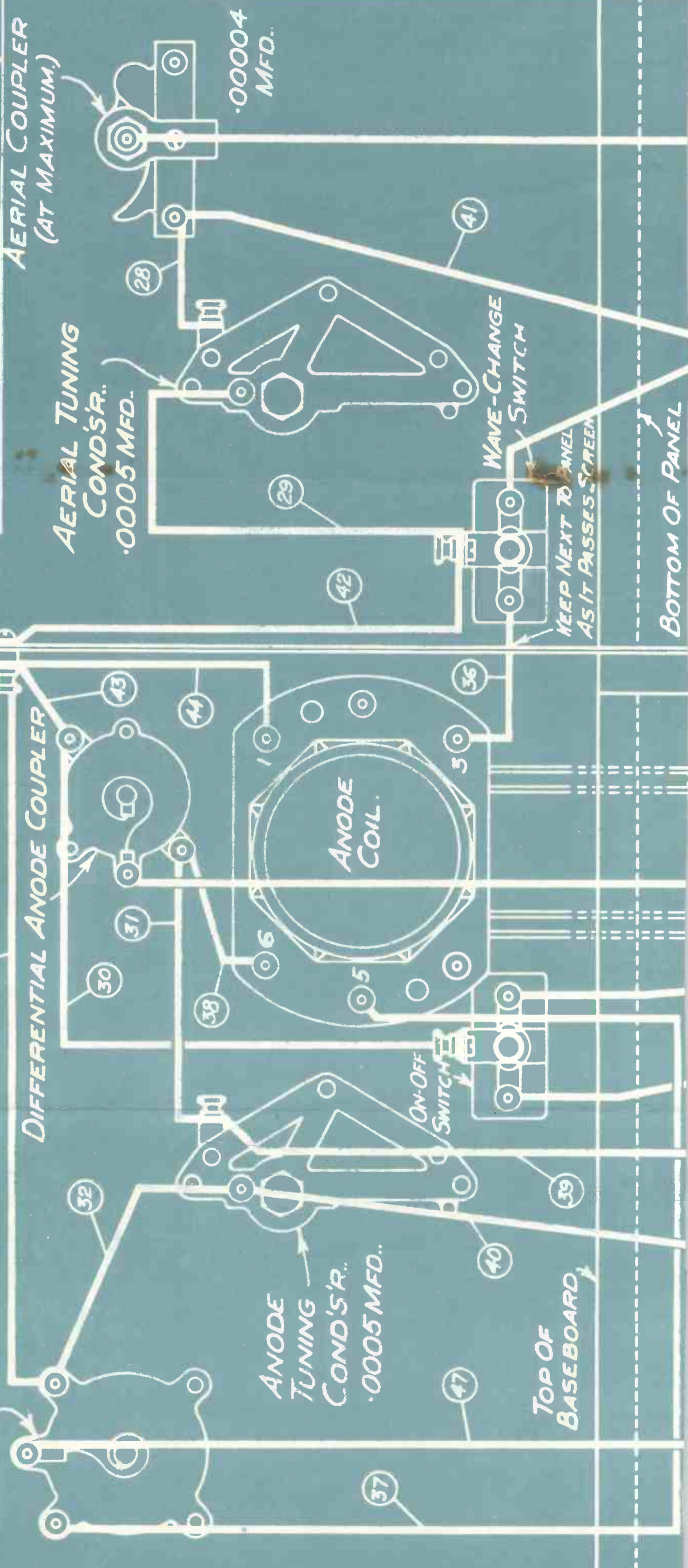
### Extra Range and Power

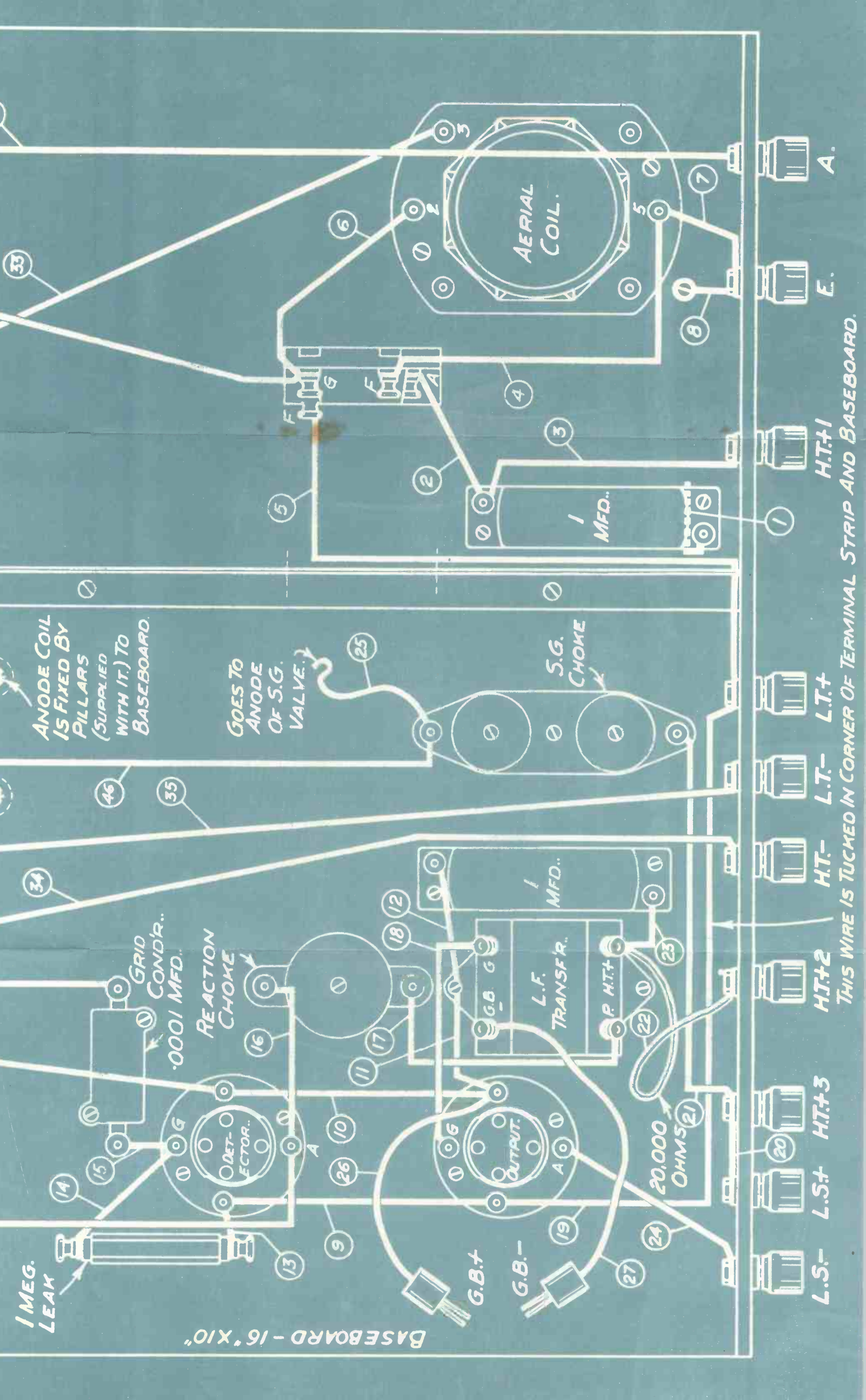
The "S.T.300," however, enables you to get the extra range and power by a slight panel adjustment, and yet by a slight adjustment in the other direction obtain the ultra-selectivity you need when desiring to receive a station very close on the dial to, say, a "regional" or very powerful foreign station. But for normal use the reserve selectivity and sensitivity of the "S.T.300" is such that the special selectivity controls are set at "normal," and the receiver will provide excellent entertainment from dozens of stations.



# S.T.300 FULL SIZE BLUEPRINT 1/-

DIFFERENTIAL REACTION PANEL 16'x7' 45





1 MEG. LEAK

BASEBOARD - 16" X 10"

ANODE COIL IS FIXED BY PILLARS (SUPPLIED WITH IT.) TO BASEBOARD.

GOES TO ANODE OF S.G. VALVE.

S.G. CHOKE

GRID COND'R. .0001 MFD.

REACTION CHOKE

G.B.+

G.B.-

1 MFD.

L.F. TRANSF'R.

P. H.T.+

20,000 OHMS

OUTPUT.

L.S.-

L.S.+

H.T.+3

H.T.+2

H.T.-

L.T.-

L.T.+

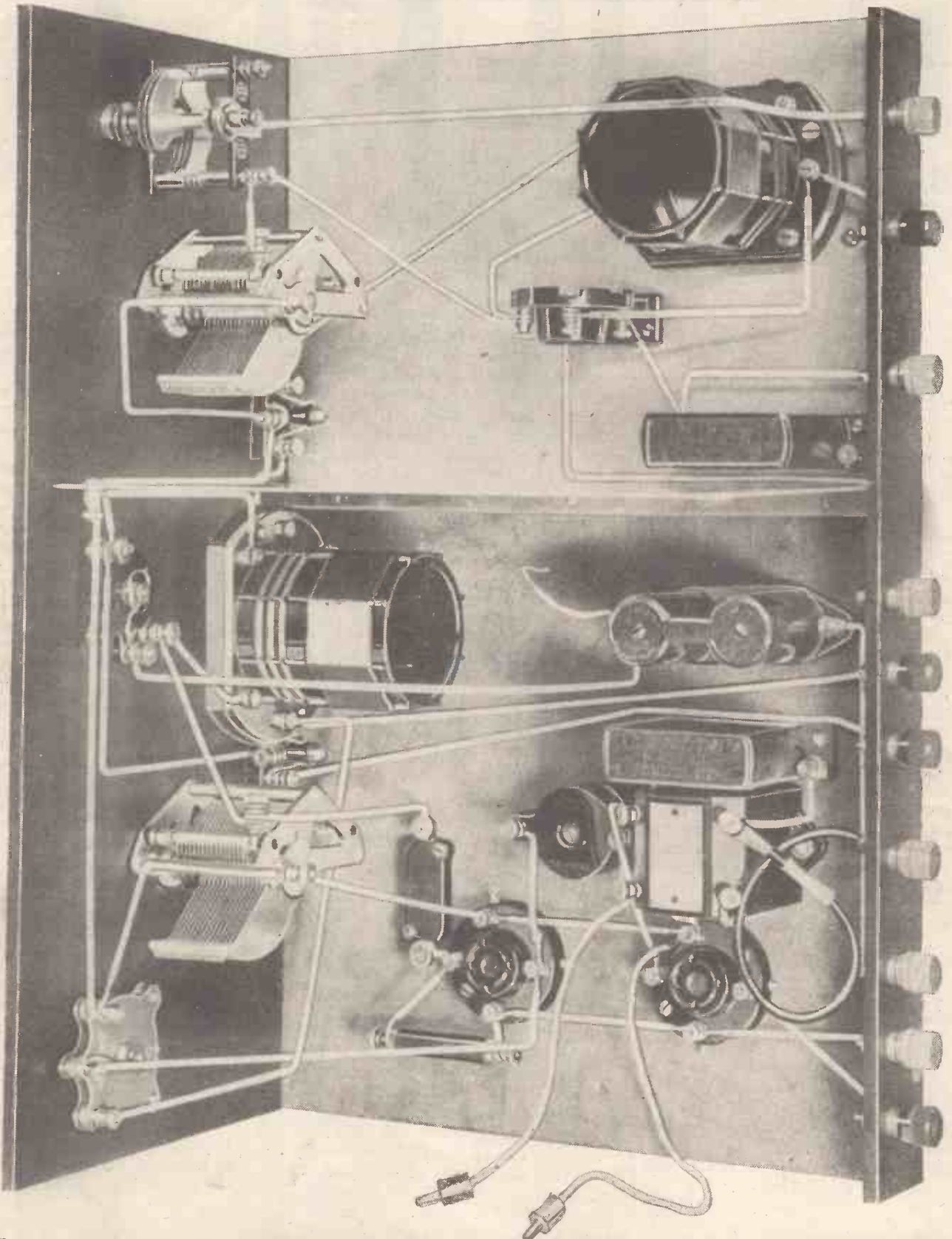
H.T.+1

E.

A.

THIS WIRE IS TUCKED IN CORNER OF TERMINAL STRIP AND BASEBOARD.

NOTICE THE "CLEAN," BRACED WIRING SYSTEM



*Every wire has been thought out with an eye to efficiency and simplicity of construction: "Steam-pipe" wiring on the one hand and "cat's-cradle" wiring on the other have been discarded. Wherever possible each wire goes straight to its destination.*

# *I confidently leave this set to*

What do I mean by ultra-selectivity? Simply this: When you are close to a B.B.C. station you get "swamp" conditions. On some sets a "regional" or "national" is received over a quarter of the dial. This, of course, indicates at once that the set is hopelessly obsolete.

## Adjustable Kilocycle Separation

Unless you can restrict these stations to within a division or two, you are going to miss excellent stations near (on the dial) to, say, London Regional, Northern National, etc., according to where you live. But if you live near such a B.B.C. station, a set which can separate stations close together on a clear part of the dial may prove completely inadequate when the transmitter you want is close in wave-length to the B.B.C. station.

We talk of sets and tuners giving a nine-kilocycle separation, meaning that they will separate stations nine kilocycles apart (the usual standard).

But what is often forgotten is that selectivity is a matter of more than kilocycles; it is also a matter of the power of the interfering station compared to that of the desired one. To snatch Mühlacker from under the very nose of London Regional or drag Hilversum from under the shadow of Northern National (according to where you live) requires more than mere talk of getting nine-, ten- or eleven-kilocycle separation on a receiver. You need more than this.

And the "S.T.300" enables you, if it becomes necessary in difficult "swamping" circumstances or where station separation is less than nine kilocycles (e.g. Eiffel Tower and Warsaw), to get down to four- or five-kilocycle separation and less on both medium and long wave-bands.

## Think of the Advantages!

Think of the advantages of being able to vary by a simple turn of a knob the kilocycle separating powers of your set! And then think of the fixed or semi-fixed selectivity of the usual set!

I admit I have gone outside the usual conventions, but conditions are so bad—and are going to get so much worse (with more "regionals" and vastly higher-powered foreign stations coming on to the ether)—that

I decided to cut adrift from usual practice and introduce multiple full-range smoothly-variable selectivity.

This may sound complicated, but every word is vital, and though you need not understand the technical side to work the set, I should like you to follow why I have introduced this principle so different from that of the ordinary run of sets.

By "multiple" I mean that I vary the selectivity of *each* tuned circuit. Some sets have a fixed degree of selectivity. They will work better in some places than others.

If stations put up their power, or new stations are erected, the whole foundation of the set design crumbles to pieces. Another and better type of set involves variable aerial circuit selectivity—i.e. that of the input

## Read about

# MULTIPLE PROGRESSIVE SELECTIVITY

The "S.T. 300" has unique controls for enabling you to keep pace as stations increase in number and power.

circuit of the screened-grid valve (for I have assumed that an up-to-date long-range set uses H.F. amplification as a matter of course).

## "Is That Good Enough?"

This leaves the intervalve circuit, which I prefer to call the anode circuit; for so it really is. This sometimes has a tapping, but where has the tap to go?

You need a high dynamic resistance of the tuned circuit in the output of the screened-grid valve, and if you want to get maximum signal strength you should use all the coil. On the other hand, this will give you blunt selectivity on this circuit. So what does the designer do? He strikes that average again. He chooses a point on the coil (or uses a transformer with a certain primary winding) which gives reasonable signal strength with reasonable selectivity.

You—you who are reading this—will lose in selectivity or sensitivity

(one or the other) according to where you live, the kind of aerial you use, or the station you want to listen to. Is that good enough?

There is a third and better method which has been used, and this is to provide, say, a couple of tappings on the intervalve coil. This again, however, is a compromise, since each tapping provides for only two sets of conditions.

## Full-Range Selectivity

There is the additional disadvantage that a change of the tapping involves delving inside the set, and the fixing of the "tap" will be governed by the district of the constructor.

This means a selectivity versus sensitivity compromise again. If near London Regional, for example, the set may be reasonably selective around London Regional on the dial, but signal strength will be unnecessarily low on, say, Fécamp or Cologne on the one hand, or North Regional and Budapest on the other.

*My own solution is to give you full control of both selectivity and sensitivity, so that where you need ultra-high selectivity (owing to position of your home or the part of the dial you happen to be working on) you can get it. But when you can afford to relax back to nine-kilocycle separation and gain some extra strength, the set permits it.*

You can use the "S.T.300" as you would a four-speed-gear-car. No one would care to drive a "compromise" car with one or even two speeds!

The "S.T.300," as you will see later, provides a *full-range* of selectivity on both tuned circuits. That is to say, the selectivity of each circuit may be varied from medium to the highest theoretical obtainable with a resonant circuit.

## "Tapping on Every Turn"!

And this selectivity is *smoothly variable*! There are, however, no clips, tappings, etc. It is an advantage to have a four-speed gear-box on a car instead of a three-speed one; how much more useful it is to have a full-range smoothly-variable selectivity device on each circuit of a receiver! The "S.T.300" system is comparable to a tapping on every turn!

But I have not exhausted the advantages. This multiple full-range

## *the verdict of the wireless constructors*

selectivity is adjustable on the panel where you need it. I don't expect you want to change your neighbourhood every week, but you may change your station every half-hour and get near an area on your dials which would normally be "swampy." The top left-hand and the top middle knobs on the panel of the "S.T.300" will then look after you. And if you hear that Barcelona has gone up to 75 kilowatts during the night, or some hitherto insignificant station has suddenly dominated Europe, you can afford to smile, and—more than likely—rejoice.

Although there are two selectivity controls you must not imagine you are going to use them for ordinary purposes. They are for (a) receiving stations which are very close to a very powerful station; (b) getting stations which are separated from others by four or five kilocycles, and which you want "clear"; (c) enabling your set to keep up with an ether which is getting more and more cluttered up; (d) helping readers who get bad "swamping"; (e) getting the most out of your aerial possibilities (details of this are given later).

### Long-Wave Reliability

And now to deal with the long waves. This side of a set often receives scant consideration—probably due to the idea that Daventry is primarily for country listeners, and that nobody really bothers much about the long waves—except perhaps to hear Radio-Paris on Sunday while the B.B.C. are at lunch, afternoon tea, or at church.

If this is so, and you who read this have neglected the long waves, I think half an hour on the "S.T.300" will change your whole outlook.

Without ever changing to the medium waves you will get a fund of clear, loud entertainment, starting with physical jerks at an incredibly early hour and ending late at night with, say, dance music or opera.

These long waves do not suffer the fading and daylight weakening noticeable on all sets on some of the medium-wave stations; so if you wish to hear "It's the Girl," you can do so from Leningrad, Oslo, Moscow, Motala, Warsaw, Eiffel Tower, Konigs-Wusterhausen, Radio-Paris, Huizen, and others. (On second thoughts, I am doubtful about Moscow. Usually

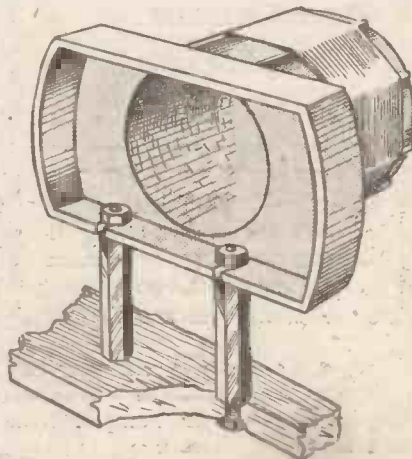
when I have tuned in they have been asking for subscriptions to be sent to some address in Moscow.)

### It Excludes the Unwanted

One of the first things, therefore, that I underlined as essential was full sensitivity combined with selectivity on the long waves. Very many sets have a wide spread for "Daventry," and others cannot get an enjoyable programme from Warsaw, Eiffel Tower, Daventry, and Konigs-Wusterhausen at will, while all four are working. I used, just above, the words "combined with selectivity." The "S.T.300" has been designed not merely to tune stations in, but to tune others out.

The modern inventor and set designer has—in order to be really

### MOUNTING THE ANODE COIL



*Pillars are supplied free with coils, and mounting only takes a minute.*

successful—not only to make a sensitive set which *could* bring in many foreign stations, he has also to make it highly selective so that a station is not drowned or interfered with by a neighbouring one, or by a B.B.C. station. In this process of attempting selectivity he must aim at avoiding reducing the desired station's strength.

### A Tip for Designers!

As regards selectivity, the home of the average designer has some influence. He may live in London and regard "North Regional" as small fry and no source of annoyance. But the constructor in Manchester may have quite different views—and probably regards London Regional (and

perhaps its clientele as well!) as of no serious importance.

It would be a good idea if all of us who design receivers lived in turn in different districts so as to appreciate local difficulties. I have in the case of the "S.T.300" endeavoured to get the same effect by testing it out in different parts of the country. The results according to those accustomed to the local conditions have proved very satisfactory. You will, in due course, hear their own testimony.

### What Will It Do?

Before you build this receiver you will want to know what it will do in the way of selectivity and "station-getting." As regards interference, this in the ordinary way depends on how close you are to one of the B.B.C. high-power stations, and, secondly, on the power of the station to be received. In order to test the "S.T.300" I took it out in its first experimental form in a car one evening.

A length of bell-wire with a stone attached to its end was flung up a tree, and I connected the other end of the wire to the set placed on a suitcase on the grassy bank at the side of a country lane. Excellent loud-speaker entertainment was at once received from eight or nine long-wave stations, and—this is the important point—from a score of medium-wave stations. And while this was going on, London Regional and London National were blazing away only two miles across the fields.

### The Two-Mile Test!

With the headlamps of my car shining on the receiver panel, I carried out a long series of tests, using different coils, trying them "canned" and "uncanned" and making circuit changes. It was a change to receive a visitor in the form of a constable of the local "C" Division; who descended from his bicycle and watched my activities. He nodded appreciatively and said: "You can leave that set there when you go."

Feeling very stiff after sitting until eleven o'clock in an uncomfortable position, I walked up the road with him, leaving the set working. At the top of the rise—some two hundred yards away—we stopped. The policeman listened again.

"Coming in strong, isn't it?" he said; adding, however: "Still it



## of this country — John Scott-Taggart

ought to—” and he jerked his head towards the red lights on the masts of Brookmans Park which glowed through the intervening darkness.

We then said good-night. I did not tell him that the signals he thought so strong were not from those masts but from Radio Toulouse—four divisions on the dial from London Regional.

### Pick Which You Like!

A vast number of receivers in use to-day in London suburbs cannot get Toulouse and his gong really clear of London Regional on the one hand and Midland Regional on the other. The incident related above should cheer them, but there is more to come in my test report. I hope the policeman referred to—if he reads this—will spend an evening building the “S.T.300.”!

I regard the “space” between London Regional and Midland Regional within sight of the Brookmans

Park aerials as being the “stickiest” there is. In general, I can say that a nine-kilocycle separation with the “S.T.300” is obtainable with the greatest ease. Thus in London, North Regional, Langenberg, Lyons and Beromünster, each nine (or ten) kilocycles apart, may be chosen at will. Stockholm is not worried by

### TENS OF THOUSANDS

of discriminating constructors are going to build this S.T. set.

*When you have read this article you will know why.*

its near neighbour, Rome; and Brno—nine kilocycles from Strasbourg—can be received undisturbed.

But the set is adjustable to give a selectivity much higher, and this is what you would use if you lived close to a B.B.C. station and

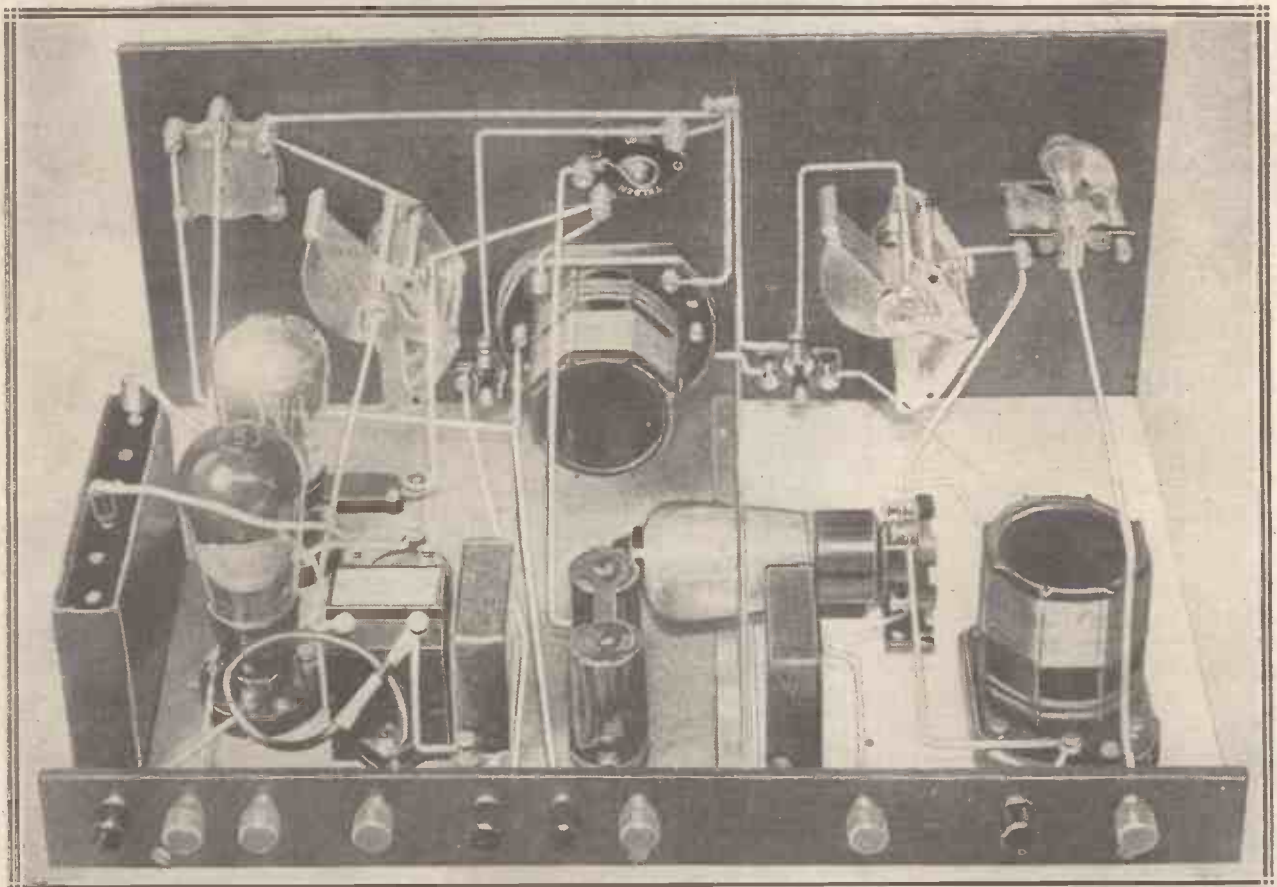
desired a “foreigner” whose wavelength was close to that of the B.B.C. station.

The “S.T.300” circuit, which embodies the principles given above, will be found described under a separate heading. This is because it possesses patented and unique features which can be incorporated in other sets and because the “S.T.300” is more than a design—it involves the smoothly progressive multi-selectivity principle, the peculiarly effective differential anode coupling, and a complete circuit which can be made up in different ways.

### About the Controls

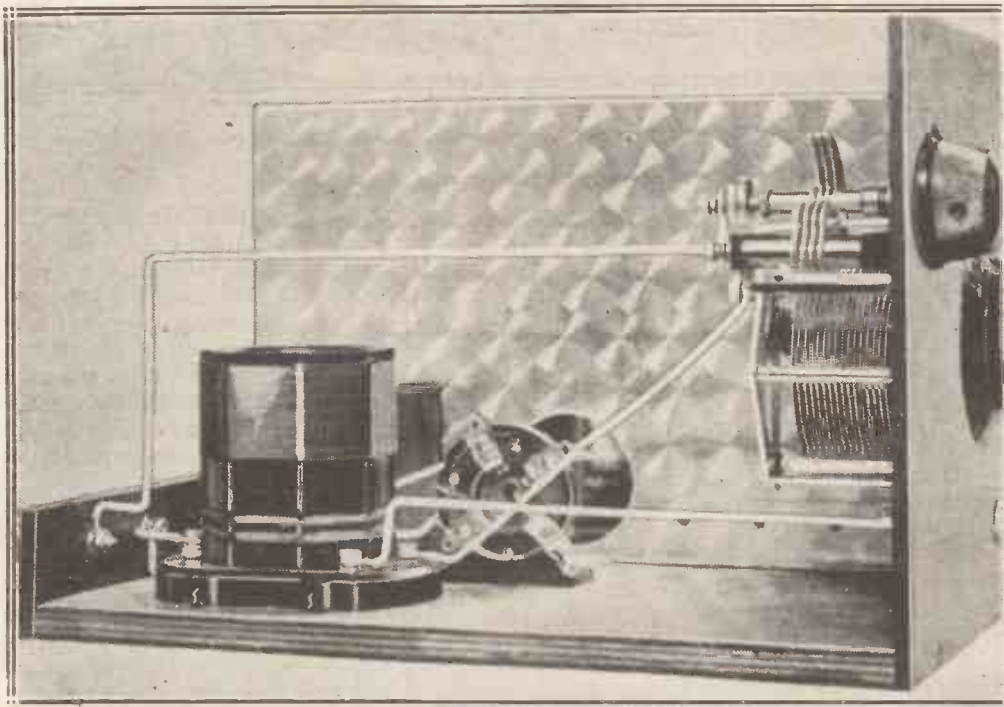
Why have I made it up as shown in this article? Each decision has only been made after careful thought, and you may be interested in my reasons for each factor in the design. There are two main controls on the set, viz., the two condenser dials seen on the front of the panel.

### COMPLEX IN THEORY, BUT SIMPLE TO BUILD AND OPERATE



*The set is much easier to make than the average three-valver, but it is a clean breakaway from the policy of designing a set to suit average conditions. It is adjustable to get the maximum out of every locality, every aerial and every station.*

THE "AERIAL SIDE" FROM TWO VIEW-POINTS



*The "aerial coupler" is part of the progressive selectivity system which is such a feature of the set.*

The left one tunes the first grid circuit, which I will refer to as the aerial circuit, and the right-hand dial tunes the composite inter-valve circuit, which I shall call the anode circuit.

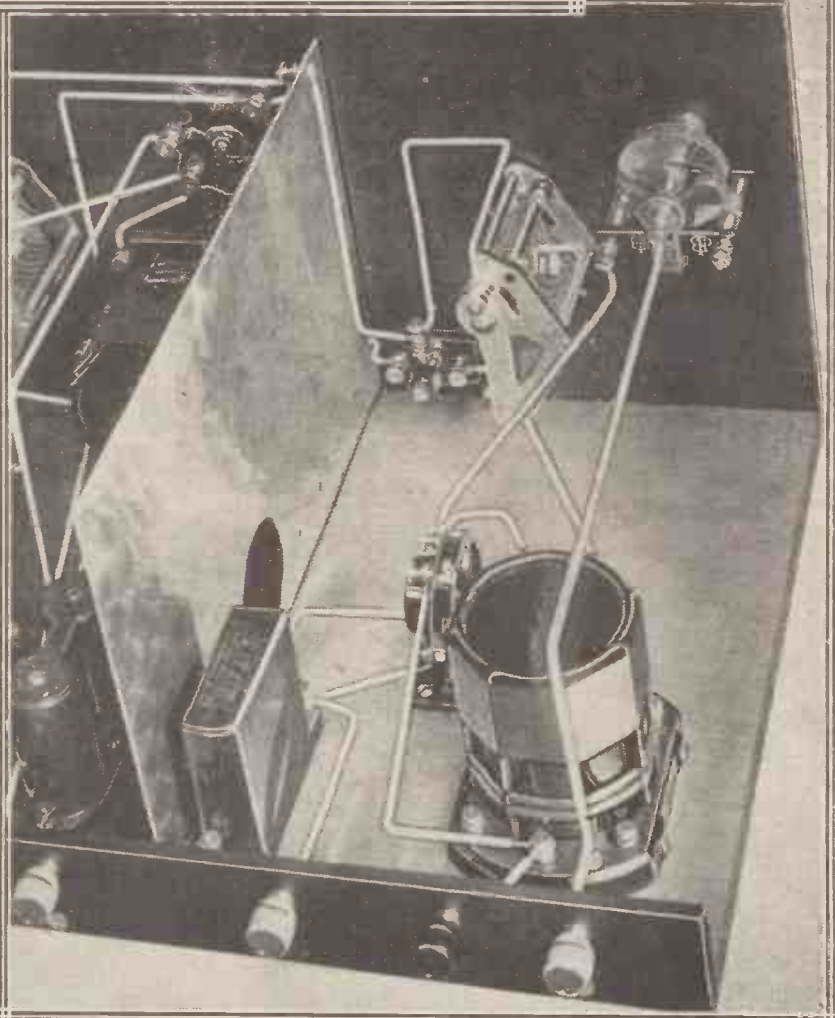
These two dials alone will give you all you want in the way of higher-powered stations on the medium or long waves. A reaction knob will be seen in the right-hand top corner, and helps on weaker stations and ultra-selectivity when this is needed.

**Fight That "Swamping"**

The small aerial coupler knob (which controls a low-loss variable condenser of exceptionally low minimum) and the middle small knob (above the dials) place in your hands the weapons to fight "swamping," more stations, and higher power, and, moreover, enable you to avoid "compromise." Their function is explained in my circuit article, but in nearly all cases you leave these knobs at "normal," i.e. vertical.

You therefore have only two dials (and the reaction) on which you can set off on a loud-speaker tour of Europe, visiting the fjords of Norway, the cities of Poland, the thronged, lighted streets of Europe's capitals, or the sun-lit shores of Southern Spain.

Those of your household who have no knowledge of how to tune can always set the dials at once to their proper readings and get all the principal stations.



The left-hand bottom knob is a wave-change switch, and the right-hand bottom knob is an on-off switch. Even here I have studied

## 4½-kilocycle Separation Obtainable!

simplicity and effectiveness; the wave-change switch operates both circuits at one operation and the on-off switch disconnects the H.T. battery as well as the L.T. You can, therefore, avoid the often fiddling process of removing the plugs in your H.T. battery, and go to bed with an easy conscience!

The whole of the controls on my set are thus on the panel. The last two take no part in tuning, and the two special selectivity controls are only for special use or when "jamming" gets worse, or for getting more out of weaker stations. *They are not tuning controls; you don't "tune" with them.*

### Accessible Controls

I have not the slightest intention of apologising for these extra controls. There is a definite tendency, in fact, for most designers to increase the number of knobs. They ingeniously contrive, however, to conceal a few round corners or at the back. One almost feels like looking underneath a set for some!

I sympathise with these designers. If the "S.T.300" were for utterly un-wireless-minded folk I might do the same. As it is, you have the controls where you can see them, and where you can get at them if you need them.

I said at the beginning of this article that I insisted on a "designer's mandate." When it came to putting the circuit into "set" form I had to decide whether to use one-knob control or employ two separate variable condensers for tuning. One-knob control has much to commend it.

### One Dial or Two?

Many readers will recall that the "Solodyne" was developed at my Elstree laboratories, and that it was the first set to introduce both one-knob tuning and "canned" coils. I cannot, therefore, be said to be prejudiced against a "single control" set! But there is no doubt that ganged circuits of all types do not "gang" exactly all over the dial. If your set is to give full efficiency, each circuit must be exactly tuned to the station desired. Some designs of variable condenser may give a tuning variation of thirty or more kilocycles per division at the bottom quarter of the dial. That means three or four

stations have to be got within each division.

A high order of accuracy of ganging is essential and the same applies to inductance matching. Then comes that delightful process of "trimming" each condenser—and this "trimming" has to last on every fraction of a division on the whole of the dial on both wave-bands!

### About That Ganging

It is the ideal achievement—and one to which I hope to contribute—but I agree with those technicians who

### IN SIGHT OF THE LONDON REGIONAL AND NATIONAL AERIALS

the "S.T.300" gave an amazing selection of "foreigners."

feel that something is almost invariably lost—even in the hands of a very skilled designer and operator. Much of the apparent success of ganging is due to "average tuning." If, of course, you make the selectivity blunt on each of your circuits, ganging is comparatively easy, but would this be fair to the public?

I have therefore plumped for two tuning condensers. As my operating notes will show, the tuning of the "S.T.300" is perfectly simple, and you know beyond any shadow of doubt that you are getting—and MUST be getting—each of the circuits dead in tune and absolutely selective to the extent you desire.

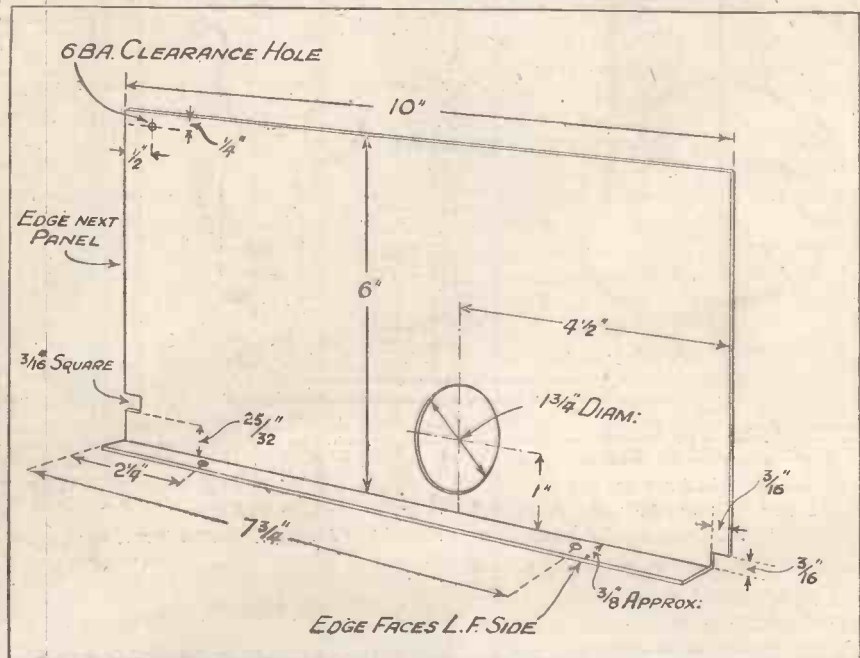
What a difference from some sets, in which the mistuning and/or bad selectivity of one of the circuits is disguised and masked by one-knob tuning! The listener gets merely the average effect of the circuits. He does not know that each circuit is pulling its full weight as regards sensitivity and selectivity, as he does in the case of the "S.T.300."

### "I Ask You This"

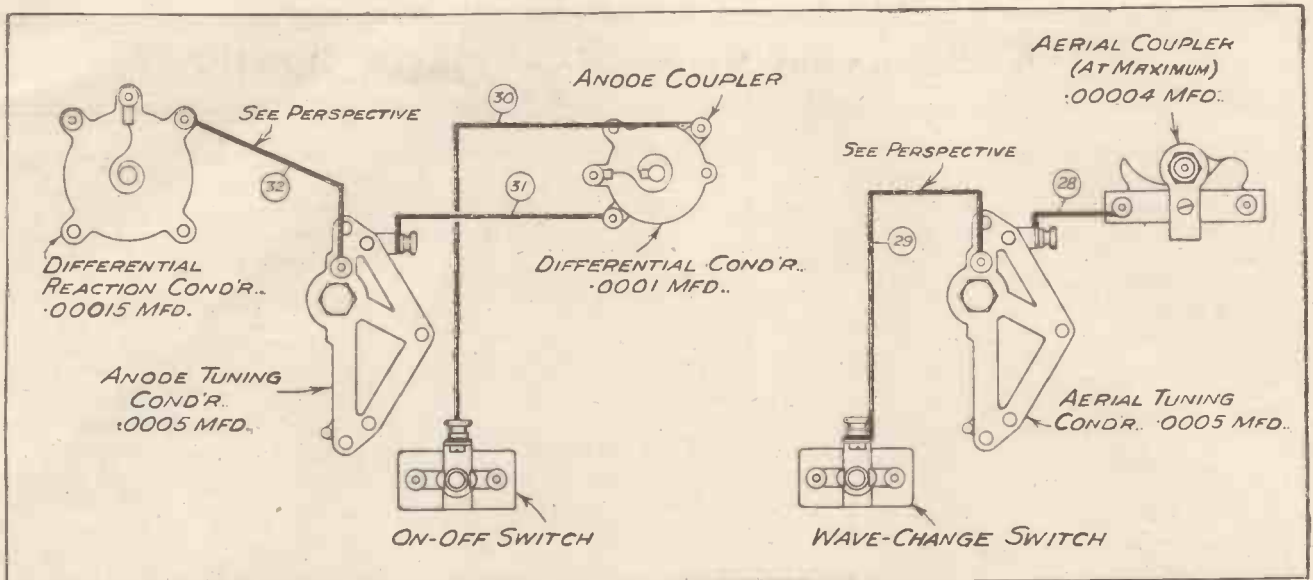
I do not wish to put the case too strongly, but if you hanker after one-knob control, I ask you this: Are you prepared to risk loss of efficiency in one or more circuits, and therefore in the whole set? Are you prepared, perhaps, to delve into your set (or take it out of its cabinet), to trim and re-trim, or to twiddle a tiny trimmer, in order to get a certain station?

Or would you rather get it at once on an "S.T.300" by setting a large, properly-marked slow-motion dial,

### NO THREADING OF WIRES THROUGH THIS!

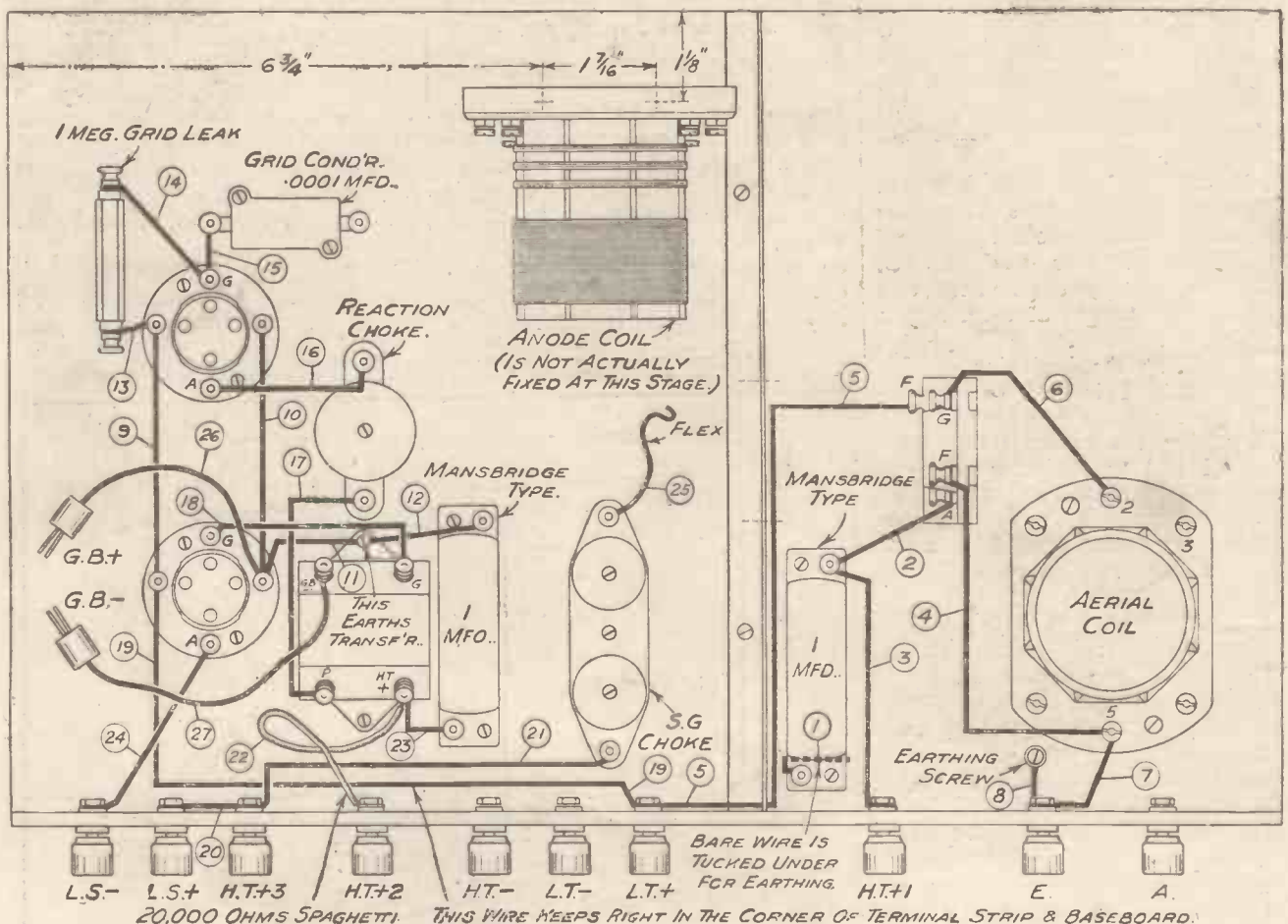


The screen is simply slipped into place when the components are mounted and partly wired. This saves fiddling in awkward corners.



**COMPONENTS ON PANEL AND BASEBOARD SEPARATELY WIRED**

Top drawing shows components in position on panel, and wired. Bottom drawing is of baseboard components and connections. Final process is to screw panel to baseboard and add a few wires.



frankly called a tuning condenser, and which enables you to go back at any time to the station desired?

Trimmers are too often the equivalent of extra dials without any of their

merits. I give credit to all who have followed the lead my Elstree laboratories gave in regard to the ideal of one-knob tuning; manufacturers and designers have done excellent work

and are deserving of high praise. But since this "S.T.300" has been planned to squeeze the last ounce out of the ether, I very definitely decided on two-dial tuning.

## Over 60 Stations on Your Loud Speaker

Another very interesting and useful development which I tried in various forms was "band-pass" tuning. In this set I decided it would not help me—for the simple reason that it proved unnecessary. Band-pass tuning by itself, of course, even if the band could be kept perfectly constant over the whole scale (on both wavebands), is not of itself enough.

### When Jamming Is Strong

The inevitable extra-mural residuum outside the band passed is dependent on signal strength, and this is the snag in band-pass tuning. Greater selectivity, of course, is obtained, but the amount of jamming one gets from a strong station depends

not only on the stated "band" passed by the tuner, but on the strength of the interfering signal. Put differently, you could in Birmingham, say, separate two foreign stations of medium strength; and yet if you took the same set—complete with its fixed band-pass tuner—near one of the foreign stations, you might never hear the other!

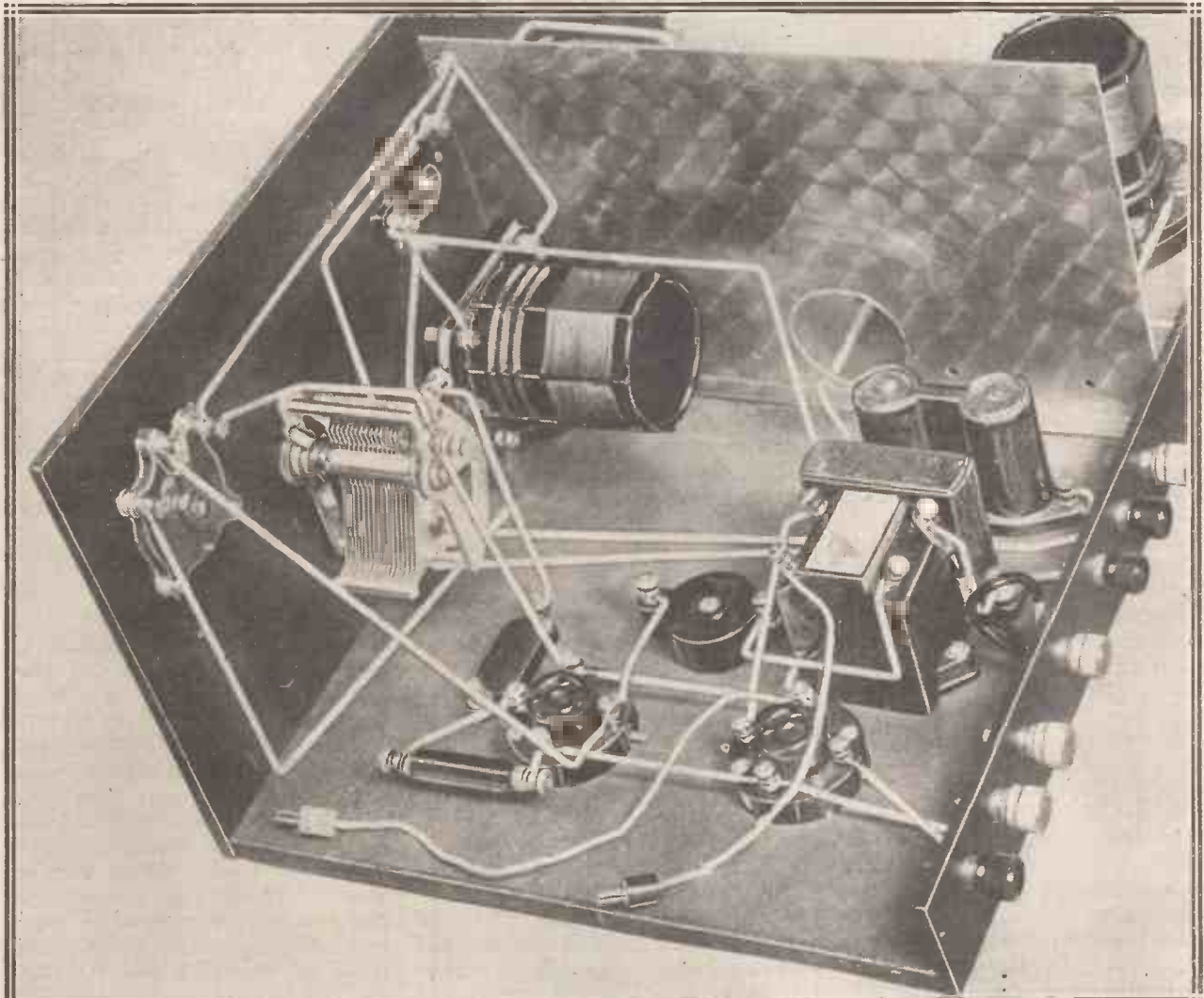
Unfortunately, many of us live next door to powerful stations, and therefore we have to fight this "swamping" with sharpened weapons. A plain fixed band-pass tuner as now used is essentially a big advance on a plain coil, but it is also essentially a compromise device.

The extra-mural residuum—and therefore the jamming—depends on the strength of the station we want to keep out. And the power of nearly all stations is going up!

### Multiple Variable Selectivity

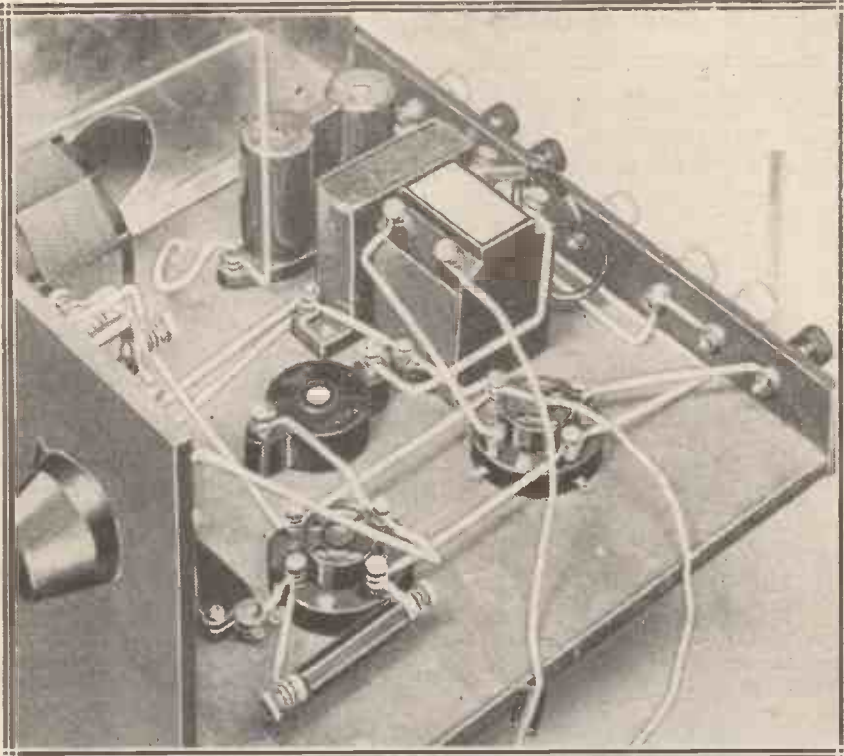
Am I labouring my argument against fixed and semi-fixed selectivity too much? If so, it is because I am anxious to remind readers that the selectivity of a set is not a definite quality of a set at all. Its selectivity is at the mercy of the power of the station that is interfering. If that station puts up its power in the night your "selective" set loses much of its selectivity immediately.

### DIFFERENTIAL ANODE COUPLING, REACTION AND L.F.



*Extraordinary stability of the H.F. stage is a feature of the set. Moreover, the composite interlatch circuit is under panel control to provide the greatest selectivity when needed. As the number and power of stations increase you keep your set up-to-the-minute by a simple panel adjustment.*

## TONAL QUALITY—A GREAT FEATURE



The unique panel-controlled intervalve circuit enables you to get the utmost from your screened-grid valve. Silky smooth reaction adds to the power of the set to bring station after station rolling in as you idly turn the dials, picking and choosing from scores of European stations the programme that suits your mood.

Hence my argument for multiple variable selectivity, so that you can cut down the extra-mural residuum to suit your circumstances.

*I feel that using a fixed or semi-fixed selectivity set is like going round a golf course with only one club. The club which will serve to drive a ball in the open is not the one to get you out of a bad bunker. The "S.T.300" gives you a whole bag of clubs suitable for any golf course or any shot, and you have only a simple control of two knobs.*

#### "Reserves in Hand"

Let us remind ourselves of what is happening in the ether: New British "regionals" are being erected. Every week, almost, some foreign station which has been working on about 1 kw. shoots up to 50! The Russian "steam-roller" is also on its way.

The Moscow-Stalin station, with its 100 kw., has begun its work on the medium waves—and its power is to go up to 300 kw. About forty more Russian stations are to be erected! The Soviets refuse to join the International Broadcasting Union, so they just seize any wave-lengths they fancy.

Are you—you who are contemplating building a set—going to be prepared for this? Are you going to be satisfied with fixed or half-fixed selectivity?

**Remember: More power, more blot-out! At present you need SOME, but not ALL, the selectivity I can give you on the "S.T.300."** But in six months, a year, two years, you will need more than the average. And when that time comes—if you own an "S.T.300"—you simply turn those two knobs a little more to the left! You have a set which can cope with conditions as they arise. You have the knowledge that you have big reserves in hand. Isn't that worth having?

Talking about "reserves in hand" brings me to the question of sensitivity, i.e. the ability to reach out and get at loud strength distant or weak foreign stations. The upper left and middle knobs enable you not only to cope with special jamming circumstances, but to strengthen up foreigners.

#### Perfectly Smooth Volume Control

Also the "aerial coupler" (upper left knob) at its extreme positions round to the left gives a perfect volume control. In fact, when its pointer is at zero (horizontal towards the left) the aerial is virtually disconnected! (This is because the "aerial coupler" is a condenser of a design chosen for its very low minimum.)

Perfectly smooth volume control is possible, and this control of H.F. input combined with high selectivity prevents cross-modulation distortion (a form which cannot be got rid of in any set once it arises; in fact, it gets amplified).

#### The Truth About Aerials

Now about aerials. I have given a list of 75 stations. This list is not complete and represents what I happened to get and *identify* during a test on an aerial considerably smaller than the average. But what have aerials to do with a set design?

Nothing, many people would say. I disagree. (I seem to be disagreeing with a lot of things, by the way, but I am giving you the reasons.) I want to ask you this: How often have you been advised to shorten your aerial to improve selectivity? A dozen times? A hundred times? Have you done so?

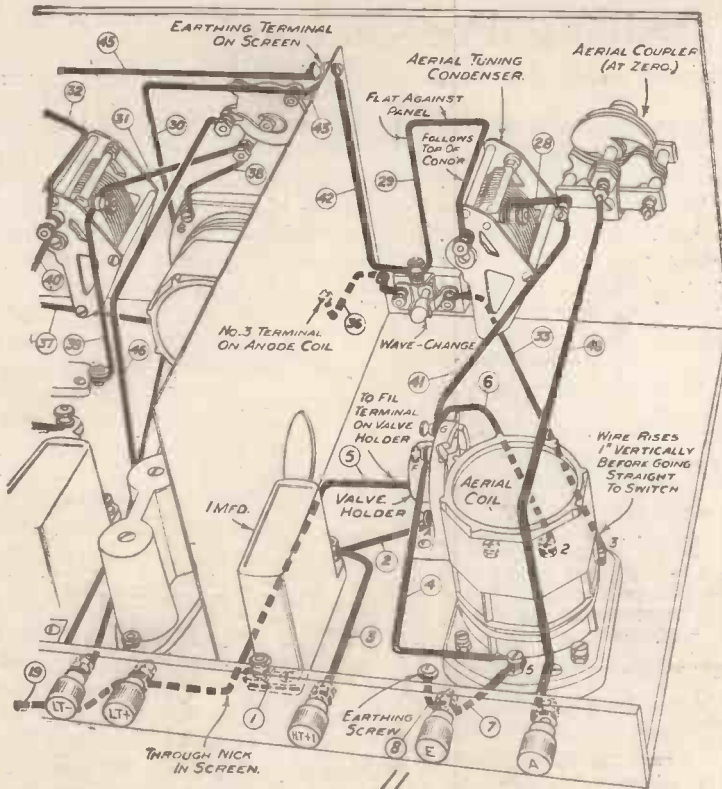
If you have, you have fallen a victim to that demon "compromise." You have deliberately cut down the signal-collecting powers of your aerial in order to make up for a deficient set. Hundreds of thousands of aerials have been shortened to give a selectivity which should be obtainable on the receiver.

Yards of useless rope are strung from aerial poles because of fixed or semi-fixed selectivity. The list of stations appearing elsewhere in this issue was obtained on an aerial 14 ft. high and 20 ft. long—a modest affair. But with a "standard" aerial weaker-powered, more-distant stations came in more strongly and could have been added to the ones listed. If you can extend your aerial, you will—with this set—be able to make use of all its greater signal-collecting powers and yet achieve extreme selectivity when you want it.

#### The Aerial Coupler

This big advantage is best discussed under the heading of operating notes, but before leaving the subject of aerials I would like to say that the "S.T.300" lends itself to use on all kinds and sizes, and a small setting of the aerial coupler away from "normal" (even if necessary) would cover the most extreme variations.

My own tests have all been repeated with a 12-ft. indoor aerial, the modest one mentioned above, and the "standard" 100-ft. aerial. Tests for swamping were also, as I have said, carried out two miles from Brookmans Park. You can rest assured that the set will make the



utmost of whatever aerial you have; but the "S.T.300" is emphatically not a set which forces you to cut down the size (and therefore the collecting power) of your aerial in order to provide selectivity.

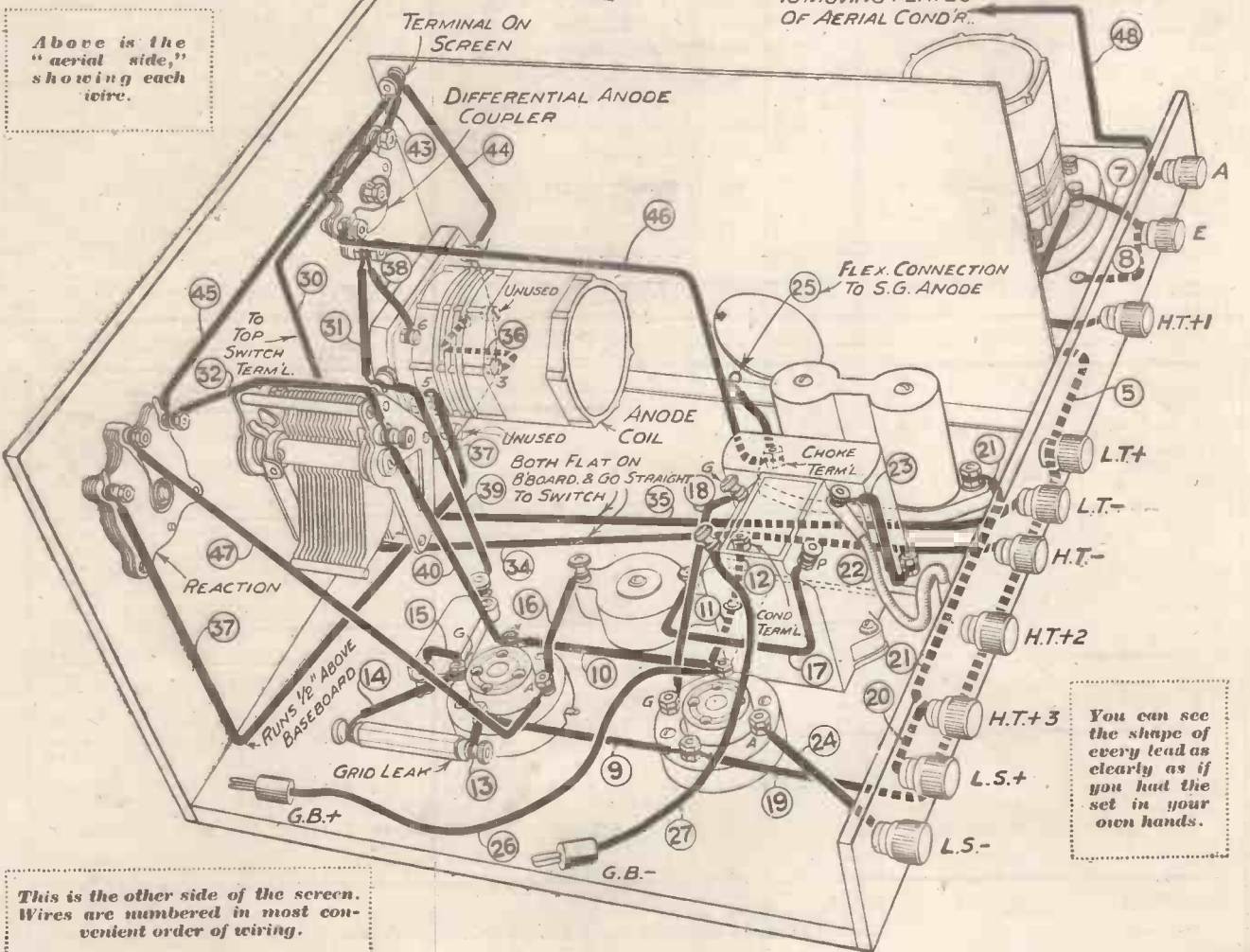
When summer comes, I think you will be glad you made an "S.T.300." When next winter comes and "nation shall speak unto nation"—not as the B.B.C. hoped, in whispers, but in the angry shouting of more and more kilowatts—I think you will be even more glad.

**Roaming Round Europe**

You will have gathered by now that I am not a "local station" advocate! While I am all for "Buying British" (and you will be helping our British industry when you make the "S.T.300") I like to roam round Europe on my dials.

If I cannot sit in a night-club in Budapest, I can at least listen to the finest Tzigane music in the world coming clear and strong from the very banks of the Danube. I want to hear the tango from Spain rather than from Broadcasting House. And as for opera—the greatest singers in the two hemispheres aspire to the famous Opera House of Milan.

The whole of Germany and its "roondunks" is at your command. Dance music is yours from



Above is the "aerial side," showing each wire.

This is the other side of the screen. Wires are numbered in most convenient order of wiring.

You can see the shape of every lead as clearly as if you had the set in your own hands.

## It Only Costs a Shilling Per Station!

orway, Sweden, Spain, Holland, Czechoslovakia, Italy, Belgium, Switzerland, Hungary, Austria, Poland, Russia—in fact, you can at the most unlikely times of the day enjoy any kind of musical programme—fox-trots for breakfast, opera in your bath, and if you feel that the number of B.B.C. talks is inadequate, or desire to become a communist and do not know how to start, you can switch over to Moscow!

### A Personal Note

May I end this section on a personal note? I have had dozens of wireless sets through my hands in recent years—super-hets, six-valve receivers; every kind, in fact. They have included the pick of this country's sets, those of the Continent, and those of America. But none has given me greater pleasure in handling or more enjoyment in listening to; and none will have, I believe, a greater national appeal.

As an inventor and adviser on inventions, it is my profession, as well as my temperament, to look ahead; and in the shifting sands of set-design I have sought a foundation on which to build a receiver which could be made progressively up to date—not one which would begin to get obsolete from the day it was made, but one

which, step by step, could be simply adjusted to keep pace with conditions.

The fascination of radio grips me afresh as I idly turn its dials. I tire often of the B.B.C. and want to roam around Europe selecting whatever suits my mood. Although the actual time is different, I want to hear midnight sounding out—not from Big Ben, but from the stark towers of the Kremlin in snow-covered Moscow; I

### EVERYONE

who has taken advantage of Mr. Scott-Taggart's offer of a demonstration has been amazed by the adjustable selectivity, the ease of control, the number of stations obtained, and the superb tone of the "S.T.300."

want gypsy music from Hungary or waltzes really from Vienna; opera from Milan.

**In short, I want to savour the romance, the gaiety, the glamour of a dozen different countries, each with its own temperament, its own music, its own passionate or joyous spirit. All these I want, and they are yours—if you build this set.**

### BUILDING THE SET

The controls on the panel will have been your first interest on seeing the

outside of the "S.T.300." You will then no doubt have examined the "works." The "cleanness" and simplicity of the wiring will, I believe, appeal as strongly as the layout, which is straightforward and uncramped.

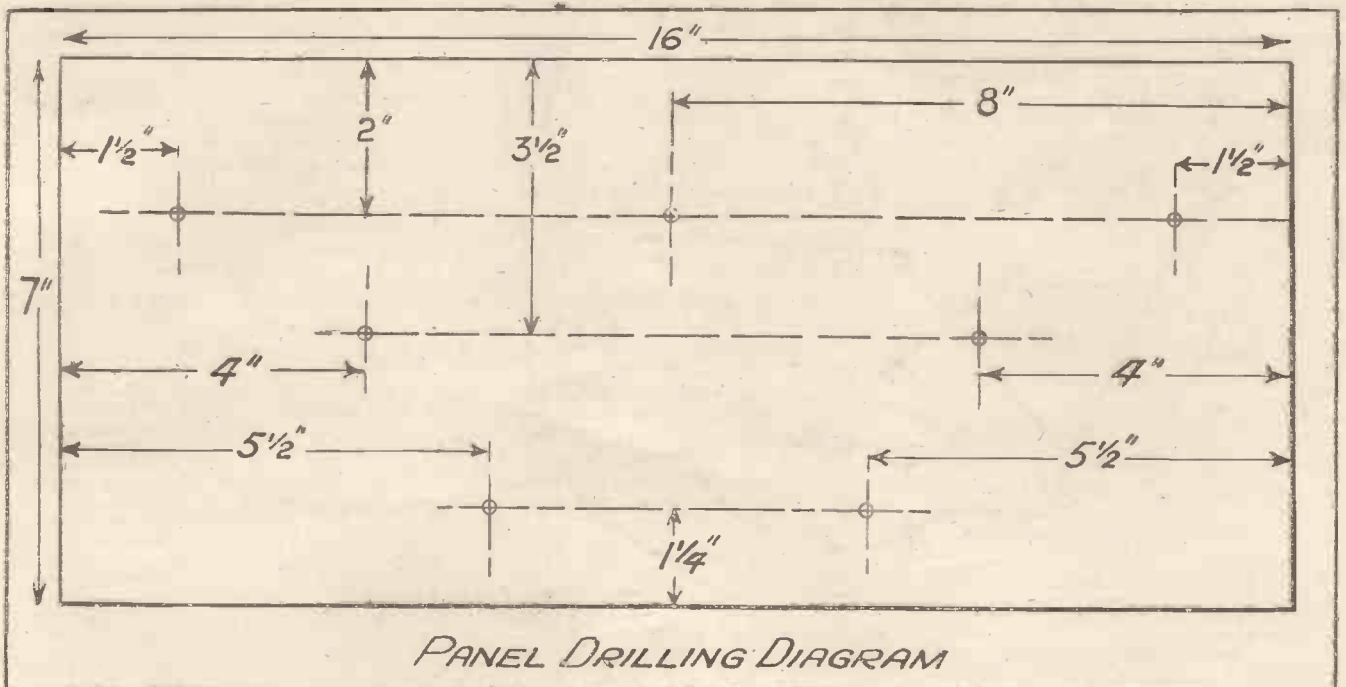
There are no insecure tapping points which require internal jugglery and which become oxidised, with resultant bad contacts; there are, in fact, no adjustable devices of any kind inside. When the set is made it is finished; you put it in a cabinet (or a home-made four-shilling cover of three-ply), and there is no reason to look inside again.

### Your Components

The list of components used is given in a separate table. Many of these you may have already. The "S.T.300" coils, which, in view of the large anticipated demand, are being sold at a price which must be unprecedented in dual-range coil history, the "aerial coupler," and perhaps a .0001-mfd. differential (the right capacity is *essential*), may be the only additions to your list.

As regards alternative components, a designer is always in a quandary. There are excellent different makes of the same component, but there are always variations. It is absurd to suggest that *every* make of component

### SYMMETRICAL HOLE POSITIONS PREVENT DRILLING ERRORS





## Makes the Most of Any Aerial Conditions

is as good or as reliable as another; and the manufacturers certainly do not think so!

But you must not imagine that because I have used a certain brand of component in this set (and the ones I used personally are mentioned first in the list) I therefore do not think there are others equally good. But if you are "starting fresh" on this set I suggest avoiding unnecessary departures from the original model.

### Rapid Construction

The details of construction are given in a rapid construction guide which appears in this issue. But you could make the set from the drawings alone. Never has any set, I think, been so amply illustrated as this one, and I cannot conceive of even the absolute novice going wrong.

A look at the back of the set shows at once that there are no difficulties of construction. But as many totally inexperienced people will build this set, many views are shown and wires are given numbers (in the order I advise for rapid wiring), which remain the same in all diagrams.

You will notice there are two perspective drawings which show exactly how each wire goes. This practice I firmly believe in, because a blue print alone, while it shows which points are joined, is only a "single-dimen-

sion" drawing, while the "three-dimension" perspective shows you *how* the wires go. You must not imagine that you have to adhere *exactly* to the wiring shown. But why change it unless you have a special reason?

There is not a single soldered joint in the set. The terminals on all components should, however, be well tightened *once you see from the blue*

effect is obtained by making wires go in parallel lines and do several right-angled bends (usually in different planes!) to get to their destination.

This method results in capacitative and magnetically inductive effects, stray fields, extra resistance, high-frequency losses, etc. It is also very difficult for the constructor to see from the set description the direction and different planes in which the wires are bent.

### The Wiring

Even if he could see how the wires went, the work of contorting them all presents no little difficulty, and adding the later connections is very apt to disturb the earlier toilsome efforts owing to the mechanical weakness of the system. And when, finally, the maze is somehow completed—however unlike the original designer's—wires "in the air" can easily be sent awry.

Another method on which I have highly-tinged views is "cat's-cradle" wiring—where loose flexible wires just sag anywhere—as if tired by their "basket-work" activities. The claim that a set which can be thus wired is not "critical" should be modified to suggest that the constructor is not critical!

(Please turn to page 252)

### MR. SCOTT-TAGGART'S OFFER TO READERS

Those who desire to hear a demonstration of the "S.T.300" are invited to send a card to him:

c/o "The Wireless Constructor,"  
Tallis House, Tallis St., London, E.C.4.  
Demonstrations will be given in different radio centres of the country.

print or drawings that all the wires are on. If you find another wire has still to go on to it, do not use pliers for tightening a terminal.

A great deal of the ease of construction and "clean" look of the set is due to the method of wiring. I have avoided what I regard (more disagreement coming!) as two faulty methods of wiring: One is the "steam-pipe" arrangement, where a pretty-pretty

### THE COMPONENTS AND ACCESSORIES NEEDED FOR THE "S.T.300"

- 1 Ebonite or paxolin panel, 16 in. × 7 in. ×  $\frac{1}{8}$  in. (Peto-Scott, or Permeol, Ready Radio, Goltone, Lissen, Parex, Wearite).
- 1 Strip of ebonite for terminal strip, 16 in. × 1½ in. (Peto-Scott, etc.).
- 1 Cabinet for above panel size with baseboard 10 in. deep (Ready Radio, or Peto-Scott, Camco, Gilbert, Lock, Pickett).
- 2 .0005-mfd. variable condensers, slow-motion type, or with vernier dials (Ormond No. 6 slow-motion, or Polar No. 2, Lotus, J.B. type D.).
- 1 Midget-type condenser, maximum capacity .00004 mfd. (J.B.).
- 1 .00015 differential reaction condenser (Ready Radio, or Telsen, Polar, J.B., Igranic, Dubilier, Cyldon, Formo).
- 1 .0001-mfd. differential condenser (Telsen, or Polar, J.B., Cyldon).
- 2 Special "S.T.300" coils (Colvern).
- 1 Horizontal-type valve holder (W.B., or Parex).
- 2 Four-pin valve holders (Lotus type VHK), or Graham Farish, Telsen, Bulgin, Wearite, W.B., Parex, Clix, Formo).
- 1 S.G. H.F. choke (Telsen Binocular,

or Leweos, Wearite, R.I., Ready Radio, Varley).

- 1 Reaction-type H.F. choke (Leweos, or Peto-Scott, Telsen, Ready Radio, Varley, Parex, Lotus, Lissen, Wearite, R.I., Magnum, Watmel, Sovereign, Atlas, Graham Farish, Tunewell).
- 2 Three-point switches, push-pull type (Ready Radio).
- 1 L.F. transformer (Varley Niolet, or Ferranti type A.F.8, R.I. Hypermite, Igranic Midget).
- 1 .0001-mfd. fixed condenser (Dubilier type 670, or Telsen, T.C.C., Lissen, Ferranti, Igranic, Formo, Graham Farish, Goltone, Sovereign).
- 1 1-megohm grid leak with terminals or tags (Graham Farish Ohmite, or Dubilier, Igranic, Loewe, Ferranti with holder, Mullard).
- 2 1-mfd. condensers (Telsen, or T.C.C., Dubilier, Helsby, Hydra, Sovereign, Formo, Lissen, Igranic).
- 1 20,000-ohm Spaghetti resistance (Leweos, or Bulgin, Sovereign, Varley, Telsen, Magnum, Igranic, Graham Farish, Peto-Scott, Goltone, Ready Radio, Lissen).
- 10 Indicating terminals (Bulgin, or

Belling & Lee, Igranic, Clix, Eelex).  
1 Standard screen, 10 in. × 6 in. (Peto-Scott, or Parex, Magnum, Wearite, Ready Radio).

Copper foil, 10 in. × 7 in. (Peto-Scott, Ready Radio, Paroussi).  
Glazite, or Lacoline, Jifflix, Quickwyre for wiring up.  
2 Battery plugs for grid-bias leads (Eelex, Clix, Belling & Lee).  
Screws, flex, etc.

VALVES (See Test Report article for types and makes).

BATTERIES (1 120-volt H.T., and 1 9-volt G.B.). Drydex, Pertrix, Ever Ready, Lissen, Magnet, Columbia, Ediswan.

ACCUMULATOR (Voltage to suit valves). Exide, Ediswan, Lissen, Pertrix, G.E.C.

LOUD SPEAKER. Blue Spot, Celestion, Amplion, R. & A., W.B., Epoch, H.M.V., Graham Farish, B.T.H., Marconiphone, Undy.

MAINS UNIT (Output not less than 20 milliamps at 120 volts). Regentone, Ekco, Tannoy, Formo, Atlas, R.I., Heayberd, Lotus, Tunewell.

## THE RAPID CONSTRUCTION GUIDE

This guide tells you every step to take to build the "S.T.300" in the minimum of time and will ensure success to the absolute novice.

- (a) Mark out and drill panel (or buy same).
- (b) Mark out and drill terminal strip (or buy same).
- (c) Prepare holes in baseboard for anode-coil supporting pillars.
- (d) Prepare notches in vertical screen (unless bought ready-prepared). Position and size of notches need only be approximate.
- (e) Fix terminal in vertical screen. (In my set I removed, for this purpose, the unused terminal C on the W.B. universal valve-holder, discarding the bent metal socket.)
- (f) Lay copper sheet on baseboard and screw down screened-grid valve holder, the screws going through into the baseboard. (As its size indicates, the copper sheet covers the whole of the baseboard up to where the vertical screen will come; the "L.F." side of the baseboard is not covered.)
- (g) Clean copper sheet (with emery paper) where it will later be held down by ledge of vertical screen. Clean patches of copper sheet where connection with wires (1) and (8) will be made.
- (h) Screw down 1-mfd. Mansbridge-type condenser on copper sheet, wire (1) having been previously bared and cleaned, and then tucked under the condenser. Wire (1) is thus pressed in contact with a cleaned patch of copper sheet.
- (j) Prepare holes through copper sheet and into baseboard for fixing vertical screen. (Vertical screen is not screwed down at this stage.)
- (k) Fix aerial coil, screened-grid choke, the other 1-mfd. Mansbridge-type condenser, L.F. transformer, reaction choke, detector valve holder, output valve holder, grid condenser (.0001-mfd.).
- (l) Screw terminal strip to edge of baseboard with three screws and fit terminals loosely.
- (m) Wire baseboard components with stiffish insulated wire (bell-wire will do, or one of the advertised varieties). To save the reader time I have numbered the wires in their most convenient order for connecting. Use the following list to find the wires quickly on the blue

print and, if in doubt as to their shape, consult the perspective drawings. You need not read the wording after the number of the wire, if you can find the wire without. But tick off the numbers on this list as you complete each connection.

1. One terminal of 1-mfd. condenser to copper sheet. (A bare wire is simply tucked under condenser, as explained already.)
2. Other side of condenser to screening-grid terminal (marked A) on S.G. valve holder.
3. H.T.+1 terminal to the 1-mfd. condenser.
4. Upper filament terminal F of S.G. valve holder to No. 5 terminal of aerial coil.
5. L.T.+ terminal to lower filament terminal F of S.G. valve holder. (When the vertical screen is later in position this wire passes through the corner nick.)
6. Aerial coil terminal No. 2 to control grid (marked G) of S.G. valve holder.
7. Aerial coil terminal No. 5 to Earth terminal.
8. Earth terminal to earthing screw in copper sheet. (This earthing screw is simply a brass screw going through the copper sheet into the baseboard; this earthing of the copper sheet is essential.)
9. Detector valve filament positive to output valve filament positive (the positive terminals in both cases are those nearest the edge of the baseboard).
10. Detector valve filament negative to output valve filament negative.
11. Output valve filament negative to eyelet on L.F. transformer. (This earths the core.)
12. Eyelet on L.F. transformer to one side of neighbouring 1-mfd. Mansbridge type condenser.
13. Detector valve filament positive to one side of 1-megohm grid leak.
14. Other side of grid leak to detector valve grid terminal (marked G).
15. Detector valve grid terminal G to grid condenser.
16. Detector valve anode terminal A to reaction choke.

17. Other side of reaction choke to L.F. transformer terminal P.
18. Output valve grid terminal G to grid terminal G on L.F. transformer.
19. Output valve filament positive to L.T.+ terminal.
20. L.S.+ terminal to H.T.+ 3 terminal.
21. H.T.+ 3 terminal to S.G. choke.
22. This is a 20,000-ohm spaghetti wire joining H.T.+ 2 terminal to H.T.+ terminal on L.F. transformer.
23. L.F. transformer terminal marked H.T.+ to 1-mfd. condenser.
24. L.S.— terminal to output valve anode terminal (marked A).
25. Piece of insulated wire (preferably flex) connected to S.G. choke. The loose end goes to the anode terminal on the screened-grid valve when set is finished.
26. Grid-bias positive flex to output valve negative.
27. Grid-bias negative flex to G.B.— terminal on L.F. transformer.

### THIS CONCLUDES THE BASEBOARD WIRING.

The next step is to fit components to panel. Then do this panel wiring:

28. Aerial coupler (.00004 mfd.) (fixed plates terminal) to aerial tuning condenser (fixed plates terminal).
  29. Aerial tuning condenser (moving plates terminal) to top terminal of wave-change switch.
  30. One set of fixed plates of anode coupler (.0001-mfd. differential) to top terminal of on-off switch.
  31. Other set of fixed plates to fixed plates of anode tuning condenser.
  32. One set of fixed plates of reaction condenser (.00015-mfd. differential) to moving plates of anode tuning condenser.
- NOW SCREW PANEL TO BASEBOARD. (THREE SCREWS.)
33. Aerial coil terminal No. 3 to wave-change switch.
  34. H.T.— terminal to on-off switch terminal.
  35. L.T.— terminal to on-off switch.
- NOW FIX ANODE COIL IN POSITION.

First attach pillars to coil former in manner shown in sketch. Then place coil in position and fix it to baseboard by tightening up the screws from underneath.

36. Anode coil terminal No. 3 to wave-change switch (keeping wire close to panel where specially provided nick in screen will come).
37. Anode coil terminal No. 5 to differential reaction condenser (one set of fixed plates).

(Please turn to page 251).

# THE "S.T.300" CIRCUIT

*A First Outline of Its Technical Features and Advantages.*

BELOW you will find the circuit which I developed for the "S.T.300" set. As there are different features which are capable of being—and will be—embodied in future WIRELESS CONSTRUCTOR receivers, the circuit is dealt with under this separate heading, although it is exactly the one employed in the set.

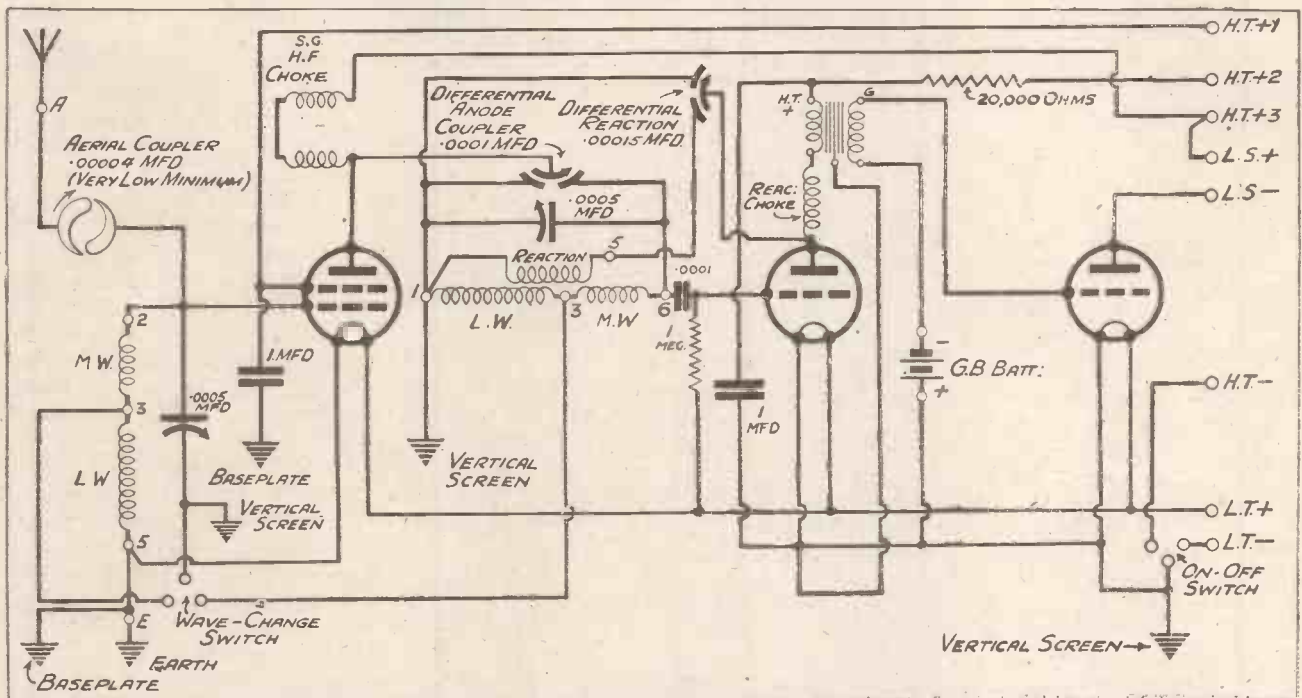
the valve stable, and this "something" always reduces efficiency.

Windings on intervalve transformers, tapings on intervalve coils, rheostats on the first valve, are all apparently harmless, but how often have these devices been designed or introduced to stop the tendency of the first valve to oscillate! And in doing

out. In the "S.T.300" I have adapted double-plane screening which is extremely simple to carry out and works very effectively. On the set itself you can readily convince yourself of the stability over the whole of both wave-ranges.

The complete absence of feed-back in an S.G. valve is not, however,

## HERE IS THE BASIS FOR THE "S.T.300" SET



The circuit shown adheres to the set design. Coils are at right angles, and the "aerial coupler" is shown as it is, viz., a condenser of VERY low minimum capacity and one adhering to a logarithmic-type law. The H.F. input is actually screened in two planes to secure stability and maximum amplification, and earthing points are shown above.

You will see that it is a combination of H.F. valve (screened-grid), detector and "note-mag." The need for a screened-grid H.F. valve for obtaining real "range" requires, in these days, no explanation. A highly effective degree of pre-detector amplification is obviously desirable, but the use of an S.G. valve in a set is not, in itself, an indication of high amplification.

For example, there may be parasitic couplings—magnetic or capacitive—which will tend to make the screened-grid valve oscillate. If the set is not properly designed, this cuts down very greatly the amplification obtainable from the valve, because the designer has to do something to make

so have cut down the high-frequency amplification in a roundabout way?

Where there is extreme screening of

**JOHN SCOTT-TAGGART'S  
CIRCUITS will appear exclusively in the "Wireless  
Constructor."**

**Don't Miss Future Issues!**

everything, on the other hand, this may be done merely to enable compactness and ganging to be carried

desirable, as a small and controllable amount will greatly add to the amplitude of the currents in the input circuit and to the selectivity of that circuit. Some sets I have tried (including experimental models of my own) have been accidentally good.

I say "accidentally" because they act differently on different aerials; their sensitivity and selectivity will vary on different aerials, different parts of the dial, and on different values of H.T. and L.T. In the "S.T.300" you have control of the aerial load, the anode circuit load, the aerial selectivity, the intervalve selectivity—in fact, the set is under control.

(Please turn to page 250.)



# TEST REPORTS ON THE "S.T.300"

*Mr. Scott-Taggart gives briefly a report of a test carried out on a small aerial with the "S.T.300." Calibration readings are given and readers' own sets should vary only slightly from these.*

IF I have been at all vague about the performance of the "S.T.300," this page will bring the facts and figures before you. Some seventy-five stations have been received on the loud speaker on a small aerial (20 ft. long and 14 ft. high).

Experience shows, however, that although some are satisfactory at times, they are not so at others, and I believe in leaving a generous margin. Nobody has yet been able to persuade the "Heaviside Layer" to do its work consistently, so I prefer to speak in round numbers and put the list at 60 stations. Some of the stations, especially the British small-powered ones, will come in much better elsewhere than in London.

## The Aerial

Although my report and calibration readings are based on a small aerial, you will have gathered from my main article that I recommended the best aerial you can put up.

You need not worry about the selectivity. The set will see to that. But there are many readers who are compelled by circumstances (not technical considerations) to use only small aeriels, and therefore I felt my own report should be based on such an aerial.

## Selectivity Control

I have no doubt that many readers, especially those outside the 25-mile range of a B.B.C. regional, will be able to exceed my list. I shall be very glad to have any lists which include other or more stations than those given.

There are going to be so many "S.T.300" sets made up all over the country that a pooling of information, hints on local conditions, etc., will form the basis of further notes on this set.

I want those readers who build the receiver to feel that they are joining a big club which has been started to-day—a club where we can discuss our

experiences, any local difficulties we have overcome, etc. I cannot over-estimate the usefulness of such a contact between readers.

There are, as you will know by now, two selectivity controls. As the set is flexible to give the best results in every district, the settings for these controls will vary unless you are content to leave them at normal, in which latter case you are operating the set as a "compromise set"; you will get excellent results, but you have reserves in hand which I am sure you will want to try out.

## Operating Outline

Next month I shall deal with the operating of the set, but many will want an outline at once. Here it is: The knobs of the aerial coupler, the anode coupler, and the reaction are all fixed so that these condensers are half-in when the pointers are vertical. When the aerial coupler is tuned so that its knob pointer points to the left we are getting most selectivity on the aerial and least signal input.

## LIST OF STATIONS AND DIAL READINGS

MEDIUM WAVES.								
Budapest .. ..	169	165	London Reg. .. ..	103½	96	Trieste .. ..	49	33
Sundsvall .. ..	166½	162	Graz (Austria) .. ..	102	94½	Belfast .. ..	46	28½
Munich .. ..	164½	160	Barcelona .. ..	100½	92½	Nürnberg .. ..	45	25
Riga (Latvia) .. ..	162	157½	Strasbourg .. ..	99½	91	Christiansand .. ..	41	22½
Vienna .. ..	160	155	Brno .. ..	98	89	Cologne .. ..	36	15
Brussels (French) .. ..	157½	152½	Brussels (Flemish) .. ..	96½	87	Cork .. ..	34½	12½
Prague .. ..	151	146	Milan .. ..	92½	84	Fécamp .. ..	31½	8
North Reg. .. ..	148	143	Poste Parisien .. ..	91	82	Flensburg .. ..	30	4½
Langenberg .. ..	146	141	Breslau .. ..	90	80½			
Lyons .. ..	144½	139	Göteborg .. ..	88	79			
Beromünster .. ..	142	137	Genoa .. ..	84	74½			
Rome .. ..	136	130½	Cardiff .. ..	82½	73			
Stockholm .. ..	134	129	Bordeaux-Lafayette .. ..	79	69½			
Madrid .. ..	130	124	North National .. ..	78	68			
Berlin .. ..	128	122½	Hilversum .. ..	76	66			
Dublin .. ..	126	120½	British relays .. ..	70	60			
Katowice .. ..	125	118	Berlin relays .. ..	69	56½			
Sottens (Switzerland) .. ..	123	116	Heilsberg .. ..	66	51			
Midland Reg. .. ..	121	115	Turin .. ..	64	49			
Bucharest .. ..	119	112½	Valencia .. ..	61	47½			
Frankfurt .. ..	117	111	Lille .. ..	60	46			
Toulouse (Radio) .. ..	115½	109	Moravska-Ostrava .. ..	58½	45			
Lwow (Poland) .. ..	114	107	London National .. ..	57½	43½			
Glasgow .. ..	112	105	Leipzig .. ..	56	42			
Hamburg .. ..	110½	103	Hörby .. ..	55	40½			
Mühlacker (Stuttgart) .. ..	105	98½	Toulouse .. ..	53½	39			
			Gleiwitz .. ..	52½	37½			

## LONG WAVES.

Kaunas .. ..	152½	150½
Huizen .. ..	148	145½
Radio Paris .. ..	134	131
Königswusterhausen .. ..	125	122
Daventry .. ..	117	114
Eiffel Tower .. ..	105	100
Warsaw .. ..	100	95
Motala (relays Stockholm) .. ..	93	86½
Moscow (Trades Union) .. ..	87	80
Vienna (Experimental) .. ..	78	69
Reykjavik .. ..	72	62
Kalundborg (relays Copenhagen) .. ..	64	54
Oslo (Norway) .. ..	52	40
Leningrad .. ..	40	27

N.B.—Of the above 75 stations, Belfast, Christiansand, Cardiff and Glasgow are really too irregular in strength to deserve inclusion in a Londoner's list, although I received them on the speaker. In other parts of the country most of them come in well, of course. Cork fades badly, but can be very loud. Berlin is on the border line, but I do not think much of him; his power is only 1.7 kw., and you get the same programme from Königswusterhausen. Madrid is only receivable when Moscow (Stalin) is off; the latter had a liking for the former's wave-length, and took it. All the long-wave stations are reliable, but Kaunas (Lithuania) and Reykjavik (Iceland) come in better on something longer than the 20-ft. aerial used on this London area test. Scheveningen comes in excellently, but is not an ordinary broadcasting station, and is therefore omitted. If you omit the stations mentioned in this footnote you still have well over sixty stations.

## Readers' Own Opinions Given Below

When the anode coupler is over to the left we are getting most selectivity on the intervalvé circuit and least signal strength.

But in this ultra-selectivity position—or when near it—signals fall off to only a surprisingly small extent if the dynamic resistance of the circuit is maintained by use of the reaction.

When the aerial coupler is over to the right you get less (but still great) selectivity on the aerial and—especially on the long waves—some increase in signal strength. When the anode coupler is full over to the right you will gain a little in strength and lose in selectivity.

### A Very Hard Test

The two selectivity controls will cause small changes in tuning of the two circuits, which are therefore re-adjusted on the main dials; but this is no disadvantage really, because in logging sixty stations for maximum results on each you would write down the readings and the position of the selectivity controls.

My own method is to scratch a mark on the panel for the approximate vertical position of the aerial and anode couplers. An approximate quarter way may be marked likewise. (Accuracy is quite unnecessary.) This gives you full left, quarter, vertical, and full right.

Both controls full left (or nearly so) will give Mühlacker practically clear of London Regional in Central London (a very hard test), while both controls full right will give Oslo at full—and quite unnecessarily full—strength.

### Valves and Voltages

This may sound complex, but it is not at all so, in fact. In the "normal" position, without ever touching the selectivity controls, you can get a very large number of stations. A very simple method of logging will be described next month. The information given here is primarily for technical readers.

The valves used during the above test were: 2-volt Mullard P.M.12 screened-grid valve, P.M.2D.X. detector, and Marconi L.P.2 (or Osram L.P.2) small power valve. Alternative makes will be given next month.

The H.T.3 is 120 volts; H.T.2 is 72 volts; H.T.1 is 48 volts normally; grid bias, normally, 3 volts.

### "AMAZINGLY SENSITIVE AND SELECTIVE"

—say readers who have responded to the demonstration invitation extended in our last issue.

Sir,—I have been fortunate enough to be present at a demonstration given by Mr. John Scott-Taggart of his new wireless receiver, the "S.T.300."

I should like to testify to its amazing sensitiveness and selectivity. The quality and volume (which latter is controllable) are very good, and the cost of construction most moderate for a receiver of so high a class.

I shall have no hesitation in recommending it to the notice of my friends.

Yours faithfully,  
S. MILLS.

27, Seymour House,  
Compton St.,  
London, W.C.

### "Covers Europe"

Sir,—I was very pleased to receive an invitation to a demonstration of your "S.T.300."

I do not think anything that I may say can convey my astonishment at the capabilities of a set which can be purchased at such a price.

You seem to have exploded the theory that one must have large coils, ganged condensers and band-pass tuning to get a 9-kilocycle separation and good quality.

The set is extraordinarily selective and sensitive for a 3-valver. Its range covered Europe, and its quality and volume on all stations with a cheap speaker are what one would only expect on expensive receivers and speakers.

During two hours of demonstration about 40 stations were logged, and that bugbear to most listeners, Mühlacker, was not to be heard when tuning to L.R.

This set must be seen and heard to be believed.

I have constructed a number of sets and am now working a S.G. 4-valver which in no way compares with your "S.T.300," and as soon as the circuit appears in the WIRELESS CONSTRUCTOR I am scrapping my "4" for your "3," and I shall feel

(that at last I have a set which will function under any conditions for a few years to come.

Yours faithfully,  
W. IRONS.

173, Gosset St.,  
London, E.2.

### Amazing Results

Sir,—It was my pleasure to be present at a demonstration of Mr. Scott-Taggart's new receiver, the "S.T.300." The designer has certainly achieved most amazing results from his new set. The first test was made with the selectivity controls set for what could be described as normal working conditions, this being a near balance of medium selectivity combined with fair volume. Foreign stations were received at excellent strength without having to push the reaction to too critical a setting. Toulouse was received quite clear of the Regional and a bit to spare, this being a good test without the set being adjusted for selectivity.

On the medium waves all the important foreign stations from Trieste to Budapest were tuned in, and a very pleasing feature I noticed was the absence of falling off in the efficiency of the coils even about 500 metres; reaction remained constant throughout the whole wave-band.

On going over to the long waves it was found that wooliness of reaction, a fault of many sets, was particularly absent; in fact, no difference of reaction from that of the medium wave-band was noticed at all.

Later the set was tried for real selectivity, and I must say I was most impressed; both the Regionals could be tuned out in the space of a few degrees, and although the test was made in Central London, Mühlacker could be almost received clear of the Regional—a no mean feat, considering the cheapness and simplicity of construction, and taken a few miles out I should say that these two stations could be separated. Mr. Scott-Taggart has certainly a unique system of selectivity control which will place this set miles in advance of any S.G.3 yet designed. With foreign stations increasing their power almost weekly most sets are rapidly going out of date, but here is a set capable of dealing with these difficulties as they arise, and which is suitable for operation in any part of the country.

(Continued on page 243.)

# WITH PICK-UP AND SPEAKER



by  
A.  
JOHNSON-  
RANDALL

*R.C. Amplification—Speaker Cabinets—An Inexpensive Pick-up.*

"Is it worth my while to use an 'all R.C.' amplifier for pick-up work?" asks a reader.

Well, yes and no. You see, it depends on the values you choose. For instance, with resistance-coupling one can, if one wishes, make the amplifier capable of going down to as low as 25 cycles or so.

Although, for perfection, the very low notes are desirable, there is no point in attaining such an excellent characteristic for "gramo" work. A gramophone record covers a range of frequencies from roughly 100-5,000 cycles.

## R.C. Amplification

So if you decide to use R.C. coupling it need only be designed to give adequate amplification over this frequency range—plus a little on each end to make quite sure that the range is covered.

Provided this fact is borne in mind, then R.C. coupling can be very good indeed, *but* the overall mag. is not great.

With two stages the values I would suggest are anode resistances 100,000-150,000 ohms, coupling condensers .01 mfd., and grid resistances .5 meg. You can probably reduce the coupling condensers to .006 mfd. without noticing any aural difference, but .01 mfd. is a convenient size in condensers, and with two stages gives the low stuff down to about 60 cycles.

There is one thing about R.C. amplification and that is it is compact, doesn't give much trouble from instability, and it's cheap. It is the least inexpensive method of achieving high quality that I know, but, as I mentioned previously, you don't get much mag.

The modern transformer provides much more punch, and the response curve of a decent instrument is substantially level over all the frequencies needed for first-rate reproduction.

For all-round work I am in favour of the good old R.C.-transformer combination. This provides for more volume than two stages of R.C., together with excellent reproduction and trouble-free operation.

And I haven't yet struck a pick-up that doesn't require volume control-

must be solid so that it doesn't resonate.

In addition, the box shouldn't be too deep, and a back should not be employed. Dust and dirt can be kept away from the speaker innards by using a backing of muslin instead of wood.

A good housing for a moving coil is a console type cabinet having a front 2 ft. or so square, and a depth of about 18 in. The wood should be as thick as you can afford—

## ATTRACTIVE AND SENSITIVE



*The B.T.-H. Minor is a sensitive pick-up selling at a very moderate price.*

ling with a couple of stages arranged in this way. In fact, for ordinary domestic use the pick-up can often be switched into the input circuit of the transformer stage.

## Speaker Cabinets

I have been asked why the average cone speaker sounds so "muffled" and "boomy" directly it is placed in a cabinet. This is a snag with loud speakers. If you put them on a baffle they sound natural and give a not over-emphasised bass response.

But immediately you house them neatly in an attractive cabinet the results often go "phut."

This need not happen if care is taken to design the cabinet properly.

For instance, it is undesirable for the cabinet to be of thin wood. The thicker the wood the better. It

that is one of the troubles, a solid article costs money.

## An Inexpensive Pick-Up

Everybody knows the B.T.-H. Senior pick-up. It is a splendid component capable of giving excellent gramophone reproduction, and possessing high sensitivity.

The same firm also markets a very moderately-priced pick-up which they call the "Minor." I was recently listening to one of these when it was on test in the WIRELESS CONSTRUCTOR laboratory, and I was agreeably surprised at the results.

It is well in the front rank as regards sensitivity, and the reproduction is well balanced. In appearance the pick-up is most attractive, and there is no doubt about it being remarkably good value.



Concerning the Heaviside Layer—A Driver that holds the Screw—Overloading Valves in Super-hets.

SINCE writing my last notes a letter has been received inquiring whether I have ever seen a Heaviside layer in the wild. Although occasionally piloting myself a few thousand feet in the right direction, I am, unfortunately, no Professor Piccard!

**An Interesting Point**

But this I feel is no justification for the correspondent suggesting that the fading effects I mentioned were due to demodulation of a weaker station by a more powerful one. True, the symptoms are somewhat similar, but they are not quite.

Had my friend given as much thought to the matter when reading my notes as I gave to the subject when writing about it, he would have spotted the following two points

First, that the second station built up in the intervals of fading, and therefore there was a gap when neither station was heard. With de-

modulation you should, if I read the theory aright, hear one or other of the stations the whole time.

Secondly, I wrote nothing that indicated that one transmission was stronger than the other, as a matter of fact they were of about equal strength. Again, as I understand the de-modulation idea, one station must be distinctly stronger than the other. Enough said!

**A Novel Screwdriver**

What do you do when you have to fit a screw in a place where, although you can get the screwdriver, you cannot get your fingers and therefore cannot put the screw so that the screwdriver can screw it home? For myself, I generally grow red in the face, utter a few peccant words, and then either pull the set to pieces and start again, or else throw it out of the window!

All of which I now find is unnecessary, for as a result of my remarks the

other month regarding screwdrivers I have received a leaflet describing a very useful one. In effect it is two thin blades lying together, but springing apart at the business end unless fixed close together by a little gadget on the driver.

When this gadget is in use the screwdriver is like any other screwdriver, but if you insert it in the head of a screw and then operate the gadget the screw sticks on the end of the screwdriver. It is then the easiest matter to put said screw into any awkward place without any risk of bursting an artery!

Although I have not tried one (the people only sent me an illustration), it seems a very good idea.

**The Super-Het Revival**

Super-het theory is by no means so advanced as that of ordinary set practice to-day. No doubt this is due to the fact that they have been out of fashion for quite a long period; and that now they are in vogue once again light will no doubt be thrown on some of their peculiar points.

For instance, perhaps we shall learn why it is that an output valve apparently will not carry so much volume in a super-het as in a straight type of circuit. This is often most noticeably the case, even though proper filters are connected in both the detector's plate circuit and that of the last valve.

WHAT did you think of the Yuletide DX conditions? Personally, I thought they were far from being "full of good cheer." Nevertheless, I did manage to hear my old friend H R B, in Honduras, and that always leaves me with a feeling of satisfaction.

**The "Voice of the Tropics"**

I often wonder whether my reception of H R B is a freakish business, for judging by the reports on the "H.M." test in which H R B was the "leading lady" it would seem that there are very few of you who receive it satisfactorily.

I haven't yet decided who is in the running for the "laurels" for this particular test, but, quite apart from that, take my tip and if you have not yet managed to log H R B have another shot for the "Voice of the Tropics" station, as it is announced.

This isn't the first time that I have "let go" about H R B, as you have

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

probably noticed, but take it from "one-as-knows" the transmissions emanating from Tegucigalpa are among the most fascinating of all short-wave transmissions.

There is the "Marimba" Band (the Tropical version of J.P.'s Boys!), the State Concert Band, the El Cronista newspaper programme, the—but there, I won't spoil it for you! Have a try for yourself. Remember, from midnight to 5 a.m. G.M.T. is the time, and H R B, with announcements in Spanish and English and an interval signal of three cuckoos, is on the air every night except Sunday on 49-96 metres.

By the way, here's an item of New Year news to gladden your hearts,

and, perhaps, to make you have a "dig" in the short-wave ether this very night!

In consequence of some special arrangements I have recently been able to make, I am glad to inform you that, given sufficient details, I can now offer an unrivalled short-wave station identification service.

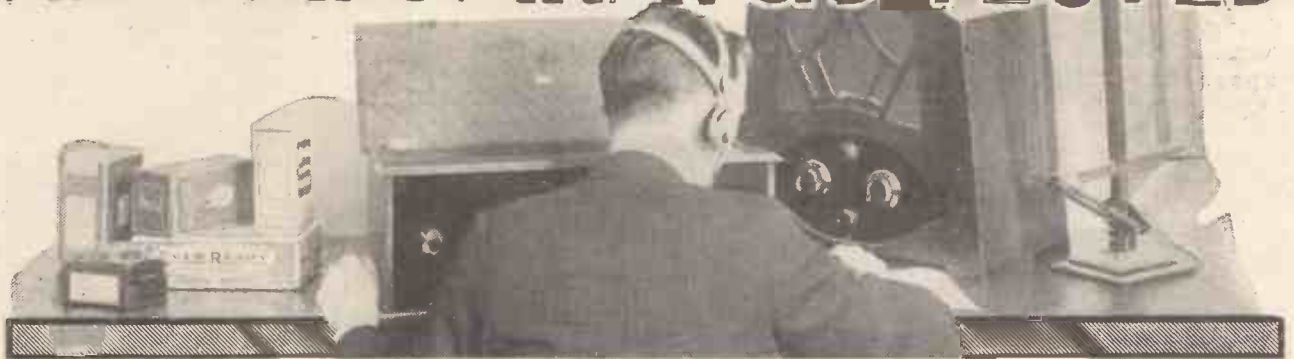
**Good News!**

So don't forget, if you do happen to hear a "mystery" station and can supply details of (a) approximate wave-length; (b) time and date on which you heard it; (c) interval signal or any peculiarities noticed, and (d) if possible (though not absolutely essential) language spoken, I do not think it will remain in the "mystery" class for very long!

Just give the above details on a postcard (if you prefer to be "matey" and send a letter I will try to answer it), and send it along to the WIRELESS CONSTRUCTOR. G. T. K.



# AS WE FIND THEM NEW APPARATUS TESTED

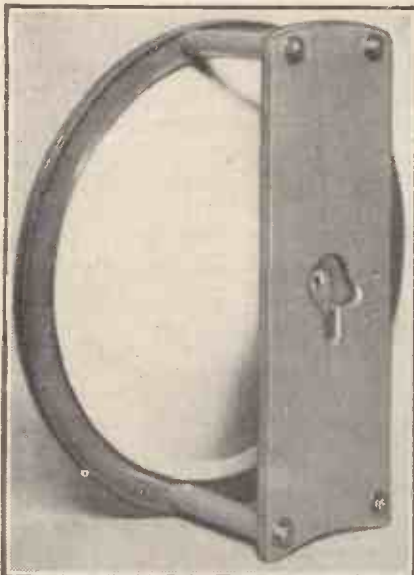


Under this heading we publish reviews of apparatus submitted by radio manufacturers and traders for examination and test in the "Wireless Constructor" laboratories.

## "Wufa" Universal Chassis

A GOOD speaker unit is of little value without a properly designed cone. The "Wufa" Universal chassis is an excellent mounting for those who prefer to make up their own loud speakers and comprises a 13-in. diameter cone diaphragm arranged on a sturdy framework.

### A USEFUL CHASSIS



This is the "Wufa" cone chassis, which is designed to suit cone units of every type. The framework is strongly constructed and well finished.

It can accommodate practically any unit—naturally we ourselves have not been able to try all the available units—and is capable of giving a very pleasing performance.

The price of the chassis is 10s. 6d.,

and it is handled by Messrs. Lichtenburg, Ltd., 4, Great Queen Street, London.

## Belling-Lee Terminals

The Belling-Lee type "B" terminal is too well known to need description. It has been used freely in WIRELESS CONSTRUCTOR designs, and is a terminal we can thoroughly recommend.

Unfortunately there have been cases where readers have been unable to obtain supplies of these terminals when required from their local retailers. The makers now inform us, however, that they are inaugurating an immediate sales campaign to ensure that dealers in every part of the country will have ample stocks, so that readers should in future have no difficulty in obtaining this high-grade terminal.

## Magnum Resistances

Messrs. Burne-Jones & Co., Borough High Street, S.E.1, have sent us a new type of Spaghetti resistance which they claim overcomes certain weaknesses existing in previous types.

Messrs. Burne-Jones state that even after a prolonged exposure in the open air extending over several weeks the resistances show no sign of deterioration.

The resistance submitted certainly seemed to be a hardy specimen and continued to function unperturbed after undergoing rough treatment at our hands.

## Wearite Volume Control

Among the various volume controls we have had on test may be

mentioned the .5-meg. potentiometer listed by Messrs. Wright and Weaire.

This volume control has a nice smooth movement and is perfectly silent in operation.

On measurement the resistance value of the particular sample on test was found to be within reasonable limits of the makers' rating, and the component can be safely used both in R.C. and transformer-coupled L.F. stages. The finish is well up to the "Wearite" standard, and the price is 4s.

## Blue Spot Components

The British Blue Spot Co., Ltd., 94-96, Rosoman Street, Rosebery Avenue, London, E.C.1, have sent us two components which they are now listing.

The first is a mains disturbance eliminator, and is intended for use in

## A GOOD VOLUME CONTROL



The "Wearite" high-resistance potentiometer is suitable for use as a volume control in both R.C. and transformer-coupled amplifiers.

## As We Find Them—continued

cases where interference is picked up on the mains wiring and thence passes through into the receiver circuit, thus producing undesired background effects in the speaker.

Certain forms of high-frequency apparatus—and, in fact, high-frequency currents in general—often tend to cause trouble in mains-operated receivers.

The unit employs a well-tried condenser filter circuit, and is plugged into the mains supply socket. The leads to the set are then taken from two of the sockets on the disturbance eliminator, and the third socket is joined to earth.

### A WELL-DESIGNED UNIT



The R. & A. "100" is a permanent-magnet moving-coil speaker selling at a popular price. The special tapped output transformer may also be seen in the photograph.

Those who are troubled with interference picked up by the mains wiring will do well to try this little unit. The price is 10s. 6d.

The second component is a wave-trap for cutting out interfering broadcast transmissions.

There are many sets in operation in which difficulty is experienced in receiving distant stations because of the "spread" due to a powerful local, and in these instances a wave-trap or rejector is frequently the only practical remedy.

The Blue Spot wave-trap is inserted between the aerial and the aerial terminal of the receiver. Three different couplings are provided, giving varying degrees of rejection,

and the trap is designed to cover the medium broadcast wave-band. It is a neat, effective and beautifully finished little unit and retails at the moderate price of 15s.

### The R. & A. "100"

We recently received for test one of the R. and A. "100" moving-coil speakers marketed by Messrs. Reproducers and Amplifiers, Ltd., Frederick Street, Wolverhampton.

This is a loud speaker selling at the very moderate price of 45s. (output transformer is 12s. 6d. extra). A 7½-in. diameter cone diaphragm is employed and the usual leather or linen surround is omitted. A 120-degree angle is used with the object of reducing any focussing effect.

Owing to the fact that the speech coil has a low resistance, a suitable output transformer is necessary, and the makers supply a tapped transformer giving ratios of 18, 23, and 32-1. It is thus possible to employ output valves of the super-power, power, or pentode types, as desired.

The loud speaker submitted was exceedingly well finished, and on test was found to be sensitive, the response over the musical frequency range being surprisingly good, especially in view of the moderate price. Those who are considering the purchase of a moving-coil instrument should certainly hear the R. & A. "100."

### "Atlas" Mains Unit

Messrs. H. Clarke & Co., Ltd., the well-known makers of "Atlas" com-

ponents, have brought out a new D.C. mains unit for H.T.

The unit is styled the model D.C. 15/25, and is designed for mains having voltages from 200-250.

There are three H.T. tapings, these providing voltages of (i) 60-80; (ii) 50-90; (iii) 120-150. (i) and (ii) have tapings for intermediate voltages, while (iii) is fixed.

The unit has a novel switching arrangement which enables these voltages to be obtained either on a load of 15 m.a. or 25 m.a. The price is 35s. 6d.

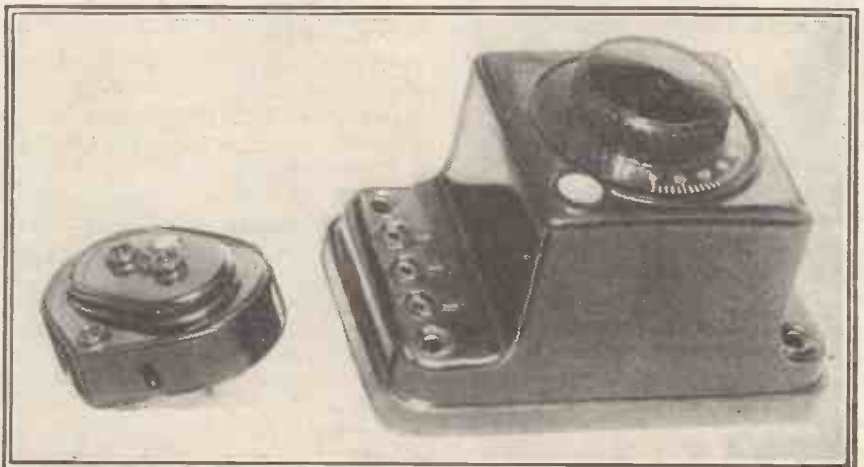
### FOR D.C. MAINS



This Atlas mains unit has a switch enabling two different current outputs to be obtained.

We found the unit to function satisfactorily when connected to a receiver of the det. and 2 L.F. type. It was, however, necessary to insert a large fixed condenser in series with the earth lead on the set, since no special "E" terminal (apart from one which earths the case) was fitted to the particular sample submitted.

### TWO OF THE LATEST BLUE SPOT COMPONENTS



On the left is the "Blue Spot" mains interference eliminator, and on the right a wave-trap made by the same firm. The wave-trap is provided with sockets giving varying degrees of rejection.



# MY PLANS

## BY JOHN SCOTT-TAGGART

*In the following article "S.-T." outlines the methods he proposes to adopt in his new co-operation with the "Wireless Constructor." With his own able pen he explains why he finds himself in the closest sympathy with that type of radio enthusiast who reads the "Constructor," and how he is convinced that he can greatly further the interests of home-constructors in general.*

*We have no hesitation in fully endorsing this view—and we feel sure every reader will realise, after reading Mr. Scott-Taggart's article, that a virile, driving force is to be concentrated in the "Wireless Constructor" which cannot but establish it on even greater heights of success.*

*The "Wireless Constructor" has always maintained a pre-eminent position—it produced the most successful set of 1931—but with "S.-T." still further to augment its powers, who can predict the advances that are yet to be made?*

**I**N taking up my pen to write for this magazine I feel a curious sense of being "at home." There are several reasons for this.

In the first place, as the founder of the WIRELESS CONSTRUCTOR, I am returning to a journal which I planned and cherished. It always held the position of being the most successful, not only of my own periodicals, but of all the wireless papers, and such sustained success is not attainable without real merit.

The CONSTRUCTOR has—since its very beginning—appealed to a type of man with whom I have always felt in closest sympathy, namely, the man who wants to do more than "think" wireless.

### Where You Come In!

We have in this country two extreme classes of those interested in radio: the engineers and semi-professionals on the one side, and the utterly non-technical non-constructive people whose sole interest is in pressing a button and twiddling a knob—and not twiddling it very well at that!

Between these extremes lies the public which buys the WIRELESS CONSTRUCTOR—the public, in fact, which builds as well as thinks and which constructs as well as uses.

This class did more to popularise broadcasting than any other, and to-day you who are reading this are probably an unofficial adviser to a group of non-technical friends who rely on your opinion before choosing a set, battery, valve, or other accessory. In becoming the principal contributor to this journal I realise

my own responsibilities, but they are ones I have shouldered before.

The difference, however, is that whereas I formerly had to distribute my energies and ideas amongst a group of papers, I shall now be concentrating exclusively on the WIRELESS CONSTRUCTOR.

### TO ALL READERS

"I propose to give of my best in your service. I want to hear of your successes and establish that friendly contact so essential in my opinion to a proper appreciation of a reader's needs and problems.

"I want to get into some of your homes—those who are working under particularly adverse conditions—and try my sets there while in the final design stages.

"I don't mind the trouble. I shall welcome it if it means that better sets will thereby result."

The principal work I shall do will be the designing of a strictly limited number of receivers. There is, in my opinion, too much chopping and changing about in receiver design. I am left unconvinced by announcements of new miracles every week or every few weeks.

### What Is Wanted To-day

It will be my intention to break away from this method and to produce only two or three sets a year, each of which will be the result of the most careful preliminary work.

The "S.T.300" is the first of these sets. If you build it—and I am building on *you* building it—you need not fear that next month I shall have changed my mind and pro-

duced an entirely different sort of three-valve set.

The "S.T.300" will stand. I don't say I shall never produce a better receiver. That would be absurd. But I do say that it represents what I believe is wanted to-day.

Actually, with its double-selectivity controls, it has been designed with an eye to worse interference in the ether than exists at present. The designer's duty should obviously be to produce sets which are not only up-to-the-minute now, but which will be up-to-the-minute in six months or twelve months time.

### The "S.T.300"

It would be no use your building an "S.T.300" if it were going to be obsolete next month. It is my ambition for the home constructor of this country to have a complete sense of security about S.T. sets. It will be my aim to design each one ahead of its time and, by limiting myself to a few sets, I am confident that I can do this.

So you need not fear that in next month's CONSTRUCTOR the "S.T.300" will be "dropped." You will hear a good deal more about it.

This standardising on one or two very special designs will enable a reader to go ahead and build a set with the fullest confidence that he will not be "let down."

There will, of course, come up for consideration other types of sets, such as two-valve, four-valve, super-hets. But the "S.T.300" is my screen-grid three.

So much for my ideas on how I propose to produce set designs. The

# My Plans—continued

Editor has asked me to contribute other articles apart from these. Such articles will give me a chance to discuss various technical matters and current progress, and I welcome the opportunity to do so.

There are three classes of reader to whom the CONSTRUCTOR will appeal as and from this issue. First of all there are those loyal supporters who have consistently read the pages of this magazine since its early days.

### For the Beginner

They and I are old friends. Next there are readers who have "joined up" during the last year or so and who are not so familiar with my work. There will also be many entirely new readers, whom the Editor is catering for by a Beginner's Course.

Finally, there will be some tens of thousands of readers who used to buy the WIRELESS CONSTRUCTOR in the exciting days of broadcasting development, but who eventually

conditions and enable them to enjoy the amazing range of entertainment now available from every part of Europe.

But I want these old supporters of mine to do more than build this set. I want them to resume their old interest in radio as a hobby. Speaking the other day to a man who gave up active interest in 1926, I asked him why he had not taken up his old pastime.

He replied: "Oh, I've occasionally bought an odd copy of a wireless paper—but it only makes me realise what

write a series explaining the changes which have taken place in broadcast receiver design. The first of these articles appears in this issue, and should convince the person who feels himself a bit "rusty" that wireless as a hobby is now cheaper, is easier than it ever was, and has infinitely more to offer in results.

### On Your Aerial

To all readers I want to say this: I propose to give of my best in your service. I want to hear of your successes and establish that friendly contact so essential in my opinion to a proper appreciation of a reader's needs and problems.

I want to get into some of your homes—those who are working under particularly adverse conditions—and try my sets there while in the final design stages.

I don't mind the trouble; I shall welcome it, if it means that better sets will thereby result. Meanwhile, I offer you the "S.T.300," and stake my reputation on it, because I believe you will back it up.

\*\*\*\*\*  
\* **FRETS FOR LOUD** \*  
\* **SPEAKERS** \*  
\* **Some New Ideas.** \*  
\*\*\*\*\*

A NEW idea for frets is "poker-burning," which, while retaining any recognised beauty of a picked design, allows it to be made individual by this method. Many artists' dealers have on view verses inscribed on three-ply by a red-hot poker.

It needs no great imagination to carry this idea one step farther for the different cause, and pierce out the design of the loud-speaker fret, or burn away the "body" wood.

"Leadette" light bars—miniature bars on the same principle as the lead light bar, but containing 50 per cent soft solder—give another new and pleasing effect when used in the place of a wooden fret. This material can be twisted or bent to any desired shape by warming it over a lighted candle or gas ring.

Joints are made with a warm soldering iron; and any silk mesh can be fitted in from the back after the pattern has been approved. At the cost of 6d. per yard no anxiety need be felt in the case of spoiling.

W. W.

"S.-T."  
ANNOUNCES  
HIS POLICY  
TO READERS



Mr. Scott-Taggart's motto is: "Fewer and better sets." He thinks there is far too much "chopping and changing." His plans are for sets which will last, not ones which are superseded immediately they are produced. He asks: "If set designers change their minds, what chance has the constructor?"

settled down with a set which gave them satisfactory results.

To these I give a special welcome. They belong to the "old brigade" of enthusiasts. Perhaps they realise that their sets are now obsolete and feel that in the "S.T.300" they will get something to cope with modern con-

big changes have taken place; different words, different technique, different valves." In fact, he was rather scared at screening, screened-grid valves, band-pass tuning, de-coupling circuits, pentodes and other features.

It is all so simple really that I suggested to the Editor that I should

# S.T.300

**Ready Radio  
celebrate  
Scott-Taggart's  
return by  
offering these  
Wonder Kits  
for the  
"S.T.300"**

**Kit "A"** (less valves and cabinet) **£3:18:6**

**OR BY EASY PAYMENTS**

**7/3** down, and 11 monthly payments of 7/3

**Kit "B"** (with valves less cabinet) **£5:17:6**

**OR BY EASY PAYMENTS**

**10/9** down, and 11 monthly payments of 10/9

**Kit "C"** (with valves and cabinet) **£6:16:0**

**OR BY EASY PAYMENTS**

**12/6** down, and 11 monthly payments of 12/6

Mr. G. P. Kendal, B.Sc., who was associated with Mr. Scott-Taggart for many years says:—

*"I particularly welcome Mr. Scott-Taggart's return to radio because I know that any set designed by him can be relied upon to be the finest of its kind and to do all that he claims for it.*

*"I would emphasise the importance of strictly following Mr. Scott-Taggart's specification by using a Ready Radio Tested Kit."*

Ready Radio are sure that everyone who remembers the wonderful "S.T.100" will want to build Mr. Scott-Taggart's latest triumph, the "S.T.300." New constructors also will be well advised to build this set the simplest way—with a Ready Radio Kit. That this is a truly remarkable set, which fully lives up to Mr. Scott-Taggart's reputation, has been proved up to the hilt by our Technical Department. Its wonderful station-getting powers, its simplicity of operation and quality of tone make it a real winner, while its price—as low as £3.18.6—places it within the reach of all.

Every Ready Radio S.T.300 Kit consists of specially chosen components which are matched in order to extract the utmost efficiency from the circuit. By building with a Ready Radio Kit you are sure of obtaining designer's results.

*See also page 223 for  
complete list, order forms,  
accessories, etc.*

**IMMEDIATE DESPATCH**

Head Office and Works:

EASTNOR HOUSE,

BLACKHEATH, S.E.3.

'Phone: Lee Green 5678.

'Grams: Readirad, Blackvil.

**Ready Radio**

Showrooms:

159, Borough High Street,

London Bridge, S.E.1.

'Phone: Hop 3000.



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

At one time not so very long ago the enthusiastic listener always judged whether conditions were good or bad by the number of stations he could tune in. If he got, say, ten different programmes he would call that a "good" day, while if he could only raise five he would next day shake his head and report "conditions were rotten last night."

Nowadays that kind of criterion does not apply. Nobody with a fairly good set can possibly spare the time to count all the programmes available on it. And so whether conditions are good or bad must be decided on other than a numerical basis.

One of the best ways of deciding what kind of conditions are prevailing is to choose two or three seldom-well-

received stations, and to listen for them when in doubt. In my own case, Copenhagen is one suitable station and Berlin Witzleben is another, for neither of these is good unless conditions are above reproach.

Judged by a "weak-station test" of this kind, the past few weeks have been very interesting; occasionally just a little "off colour," but mostly good and sometimes very, very good indeed.

On promising nights Norwegians and Swedes who were total strangers to my aerial came in with a thump at the top of the dial. And Czechoslovaks, Swiss, Austrians, Poles and other welcome strangers shouted for attention between the well-known stations lower down.

Prague continues to be an enormous voice, but some of the Germans run him close, while Radio Normandie, Palermo, Trieste and Hilversum all deserve favourable mention. Both Beromunster and Sottens are in form, and Katowice was on one occasion so loud that it was mistaken—until it began to fade—for the Midland Regional.

For some reason the long waves have not proved so attractive as usual, though the stations are there in quantity and in good enough form to satisfy the most exacting demands. Perhaps a recent determined effort to separate Leningrad from those D.F. stations on 1,050 metres—an effort which failed, of course!—made the lower wave-band seem more attractive than the long waves. Whatever the reason, most of my listening has been well below the 1,000-metre mark.

But even a comparatively short stay on long waves each evening has revealed the wonderful consistency of this wave-band. Kalundborg comes next to the Paris stations for sheer reliability, and Warsaw, Oslo, and Huizen stand out as the next group. At the time of writing, Radio-Paris is still erratic, and is apparently sometimes using either his old transmitter or else lower power.

**Mazda's Answer**

WITH Income Tax always on his mind, and bills daily delivered on the doormat, the average good citizen will be glad to know there is at least one really cheery piece of industrial news. It is this. In the middle of all this financial gloom the Mazda factory, at Brimsdown, Middlesex, is working day and night to cope with its orders!

When their Mazda S.G. and pentode types were launched the firm expected a big demand. In fact, they were sure of it.

But they confess themselves astonished at the whale of orders they have caught. Good hearing in these days!

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Arundel Chambers, 188-9, Strand, London, W.C.2), mentioning the name of the local dealer. They will be supplied direct, and the dealer credited with his appropriate discount.

**The Telsen "Radiomag"**

This is the title of a large 32-page book incorporating the Telsen radio component catalogue, Telsen circuits and building and operation instructions for these.

It is a most attractive compilation. There are "blue-prints," coloured illustrations, circuit diagrams, hints, tips and reminders galore, all of value to the set builder.

A particularly interesting feature is an explanatory section called "Hints and Tips on Construction."

This is intended for the novice who finds the usual brief description of set assembly a little too condensed for clarity.

Another article on "Making Reception Simple" is packed with operational hints, notes on selectivity, aerial and earth, etc., which are sure to prove of value. Altogether the Telsen "Radiomag" is a thoroughly attractive newcomer, full of help and interest, and we hope to see many future editions.

If you have not yet seen a copy you will be glad to be reminded that the address is: The Telsen Electric Co., Ltd., Aston, Birmingham. There is sure to be a big demand, so applications should be made without delay.

**An Attractive Book**

Among the specially interesting radio literature now available to the public the Peto-Scott 1932 catalogue holds a prominent place. It contains over one hundred pages, and is absolutely packed with condensed information about components, accessories and popular sets.

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**This is the Kit of Parts that makes the "S.T.300" a world-beater!**

You can only get the best results from the S.T.300 if you use the best accessories. Those listed below have been proved to be reliable and eminently suitable for the circuit.

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Everything Radio can be supplied against cash. In case of doubt regarding the value of your order, a deposit of one-third of the approximate value will be accepted and the balance collected by our agent upon delivery of the goods. All goods are very carefully packed for export and insured, all charges forward.

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see page 221.

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1 ReadRad .00015 differential condenser . . .	2	6	
1 Telsen binocular choke . . .	5	0	
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1 Graham Farish 1-meg. Ohmite . . .	1	6	
2 T.C.C. 1-mfd. fixed condensers, type 50 . . .	5	8	
1 Lewcos 20,000-ohm spaghetti . . .	1	6	
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Flex, screws, etc. . . .		6	
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W.C.2/32

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W.C.2/32



# PICK-UP HINTS AND TIPS

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

By A. BOSWELL.

Fibre needles—Super-het radio-grams—Metal-covered leads—Automatic motor switching—Record-changing devices.

MANY are the types of needles obtainable to-day—loud, soft, medium spear-point, “permanent” fibre and so on. But it is about the last that I want to raise a point, a point that is often overlooked and which really constitutes one of the advantages of electrical reproduction over mechanical.

## Fibre Needles

Some maintain that they do not like the tone of fibre needles; but, then, every type of needle has its adherents who claim some special advantage for their “pet piece.” Be that as it may, there is one way in which the fibre needle scores, and that is in not wearing the records so much as metal ones.

If you want any proof of this, just look up the instructions for a home-recorder. You will find that nothing but fibre needles must be used for playing the records. Actually, if you tried, you could not use an ordinary needle, for it would not move in the grooves, but simply cut a nasty gash right across the aluminium disc.

But to return to our theme. If the fibre needle wears the record less, it also acts as a soft needle, and with mechanical reproduction that would mean soft playing. On the other hand, with electrical reproduction there is usually something in hand, so the softness can be turned into loudness.

So if you like the tone of a fibre needle you can have little wear, and plenty of volume, at the same time. Personally, I find that old or badly-worn records sound a lot better when played with a fibre needle—another advantage.

## Super-Het Radio-Grams

Have you ever wondered why provision for a pick-up is seldom made on a super-het receiver? It is not because of any inherent unsuitability of this

type of circuit for the purpose, but mainly because little low-frequency amplification is usually employed.

Also, of course, a set that is primarily intended for long-distance reception is not wanted so much as a means of obtaining entertainment from a musical point of view only.

## YOU'LL LIKE THESE

### RECORDS FOR YOUR PICK-UP

- Dance.
- The Twilight Waltz.
- Manhattan Melody Makers .. Broadcast
- Sweet and Lovely.
- Savoy Hotel Orpheans .. Columbia
- Speedboat Bill.
- New Mayfair Orchestra .. H.M.V.
- Time Alone Will Tell.
- Jack Hylton .. Zonophone
- Selections.
- Selections of Present-Day Hits.
- Henri Benito's San Marino
- Accordion Band .. Broadcast
- Columbia on Parade.
- Famous Columbia Artists .. Columbia
- Layton and Johnstone Favourites.
- Layton and Johnstone .. Columbia
- Tunes of the Times.
- Jack Payne and his B.B.C. Orchestra .. Columbia
- Vaudeville.
- Sandy Buys a Greyhound.
- Sandy Powell .. Broadcast
- Ali Baba's Camel.
- Cicely Courtneidge .. H.M.V.
- A Leakage in the Tank.
- Clarkson Rose and Company .. Zonophone
- Orchestral.
- Poet and Peasant Overture.
- State Opera House Orchestra of Berlin .. Broadcast
- Vocal.
- The Song of Songs.
- Terence O'Brien (Tenor) .. Broadcast
- Ave Maria.
- Isobel Baillie .. Columbia
- Organ.
- Serenade.
- Quentin M. Maclean .. Columbia

Not, I don't mean, because the quality would not be so good.

As a matter of fact, if a super-het uses a pentode output valve, or just medium volume is required, it is just as suitable as any other receiver for gramophone work. Also the method of connecting the pick-up into the grid

circuit of the detector is the same, except that you must see that you put it on to the second detector.

## Metal-Covered Leads

When hum, howling or other unwanted noises are present on a gramophone amplifier, and when they prove difficult to get rid of, try armoured cable for the pick-up leads before finally giving it up as a bad job. This is a tip which seldom seems to be tried, although in some cases it can prove remarkably effective.

Either lead or braided covering is suitable, and the covering is connected to earth. Wire similar to that used for the heater leads in an all-from-the-mains set is just the thing. At the same time earth the tone-arm and the frame of the pick-up if you can.

## Automatic Motor Switching

No doubt you have spotted the adverts recently which concern apparatus for controlling electrical gear by means of a light ray. The principle is simply that as soon as a ray of light falls on to a light-sensitive cell its resistance drops, enabling an increased current to pass through it from a local battery.

This current is made to operate a relay, which switches on another circuit, or which can be made to switch off another circuit. Used in the latter way the apparatus could be rigged up very easily as an automatic switch for an electric gramophone motor.

All you would have to do would be to fix a piece of cardboard to the pick-up arm in such a way that it came between the light source and the light-sensitive cell; and to cut it so that the light was allowed to pass immediately the needle reached the end of the record. Such an arrangement would be very interesting from the scientific point of view, and would not in any way require alterations being made to the gramophone.

## Record-Changing Devices

The value of records as programme providers is being greatly enhanced by the placing on the market of various automatic record-changing devices. These devices enable a number of records to be played one after the other, without any attention.

Unfortunately, though, only one side of a record is played, so that with items such as symphonies where the recording is on both sides of several records, a duplicate set is necessary. What we want is a device, at a reasonable price, which turns the records over and plays both sides.





*A Special Correspondent now in America describes a visit to the WGY station at Schenectady. This transmitter is well known to many listeners in this country, on both medium and short waves.*

WGY—one of the several WGY's—has been heard I dare say by nearly every short-wave "fan" or owner of a powerful-enough broadcast-band set to get transatlantic stations. Eight months ago, before leaving for the States, I was getting regular reception of WGY, and that made it all the more interesting when, just recently, I visited the station.

### Like a Factory

The long, low buildings in which the transmitters are housed are not so graceful as the KDKA station building, which is more like an American country club. The Schenectady station is more like a factory, and is a great deal larger, of course.

As the station stands out in open country, somewhat resembling Richmond Park on a gigantic scale, and is a considerable distance from the city, there are elaborate garage arrangements, and at the side of the transmitter buildings is an extensive covered-in concrete building resembling one of those new super-garages which are an eye-sore on every main American road.

### An Aerial View

The road runs within a few hundred yards of the transmitter, and just before one gets to the station it rises and crosses the railway bridge. From the top of the bridge one can get almost an aerial view of the station, of the huge rigid steel masts and of the short poles—short in comparison with the aerial mast, but actually higher than telegraph poles—which support

the counterpoise earths for the various transmitters.

Across country, too, run new power cables on masts about a quarter the height of the aerial masts. It is rather surprising that the engineers have not had trouble with so much adjacent metalwork, with the power cables, telegraph lines along the road and railway, and with the metal lines of the track.

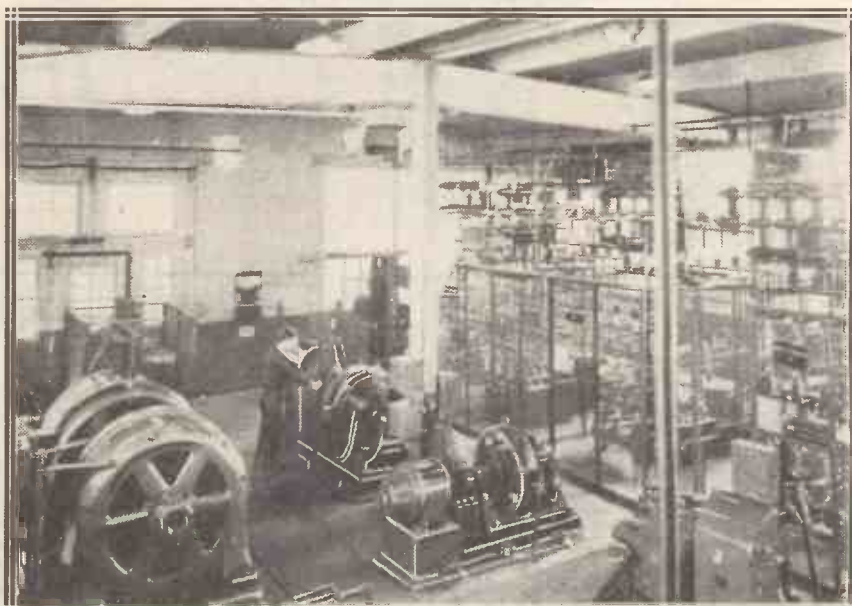
The station covers several hundreds of acres, and dotted all over the fields are brick outhouses, some for the station staff and others for experimental test gear which has to be kept well away from the transmitters

for fear of direct radiation. Still another large hut contains the usual coupling transformer down to which the leads from the three lattice masts are brought.

### Considerable Research

It is difficult to describe in a few words exactly the sort of impression the huge Schenectady station gives a visitor for the first time. The nearest station to it in general appearance is Nauen, where, too, there are several transmitters and a great deal of research work is done. Research is, of course, one *raison d'être* of Schenectady, and it certainly

### THE MACHINE ROOM



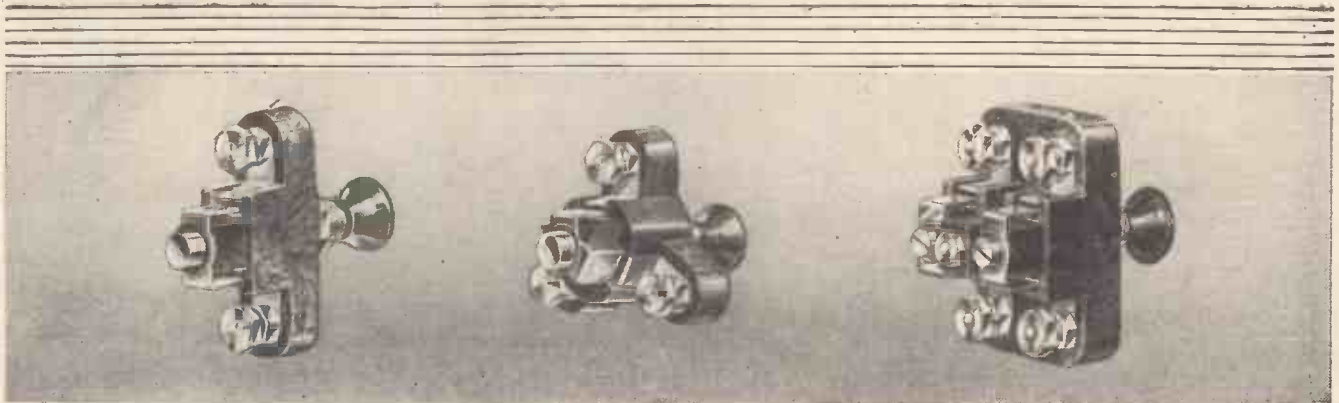
*This is where some of the generators are situated. The huge rectifier units are also located in this room, and can be seen on the right behind the wire netting.*

# TELSEN

THE SECRET OF PERFECT  
RADIO RECEPTION



NEARER . . .  
CLEARER . . .  
MORE LIVELY  
THAN BEFORE

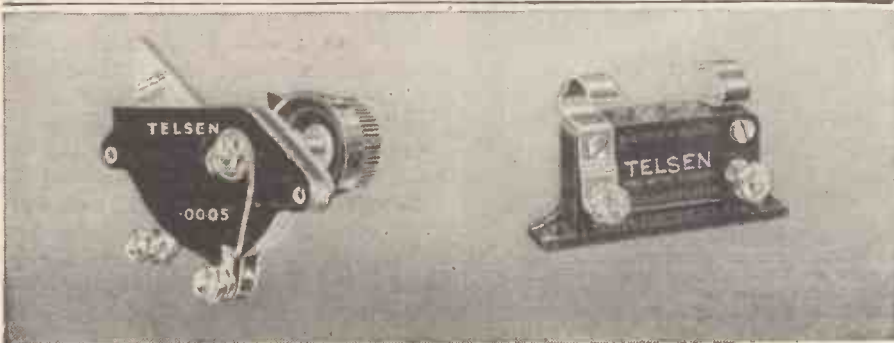
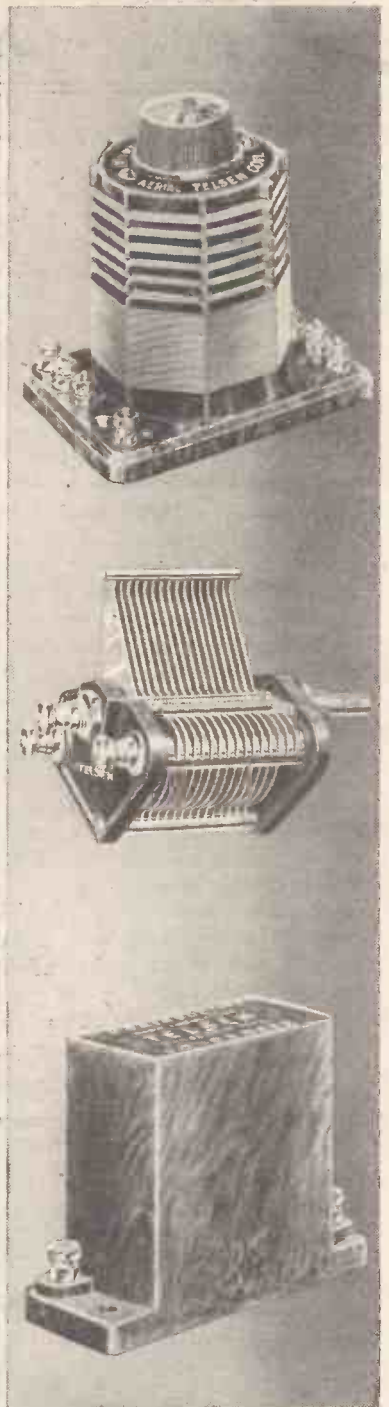


"**C**HANGING over to Telsen is like taking the wool out of your ears"—that is the verdict of an enthusiastic Telsen constructor which inspired the illustration on the opposite page. Telsen Components in your set give you a realism which is astonishing—they enable you to sit back and **hear**, without straining forward to listen—they bring every item on the programme 'nearer, clearer, more lively than before.'

- DUAL RANGE AERIAL COIL .. 7/6
- H.F. TRANSFORMER & AERIAL COIL 5/6
- LOGARITHMIC VARIABLE CONDENSER in capacities .0005, .00035, .00025 4/6
- BAKELITE DIELECTRIC DIFFERENTIAL, REACTION AND TUNING CONDENSERS in all capacities. From 2/-
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# TELSEN

100% BRITISH  
RADIO COMPONENTS



## A Visit to W G Y—continued

does look like a laboratory on a gigantic scale.

Each section of the research, short-wave work, direction-finding, fading, giant valve experimenting and so on, is in the charge of a separate branch of the Schenectady staff, and each staff leader has a little desk fitted up with remote controls, keeping him in touch with the studios (for a programme source) and with the research headquarters.

### The Short-Wave Gear

No ordinary broadcasting station has so many meters! A large proportion of the gear is built up on open units with ebonite fronts, the high-tension parts being protected, of course, by wire netting, but otherwise skeleton construction is the main idea. On the panels are meters for bias and plate voltages and knobs controlling the starting relays for the three circuits of each stage.

Each little control desk has a modulation meter and a bank of coloured indicating lights which tell the operator immediately any vital breakdown occurs, or if any change happens in the circuit, such as a drop in grid bias, which would be detrimental to the valves.

The short-wave gear in one corner of the room does not differ very much

in outward appearance from the broadcast transmitters, and it is only when one goes behind the panels, as I did, through the big wire grid gates,

which is used to cut down capacity "strays."

The control desk here is a little different from the others, a special

### HEARD ALL OVER THE WORLD



*Schenectady is one of the oldest-established broadcasting stations in the world, and has been heard in practically every country in the world. This photograph shows some of the engineers in the control room.*

that one sees the ultra-short-wave coils suspended on special glass formers, and the novel tape wiring

short-wave receiver forming part of it.

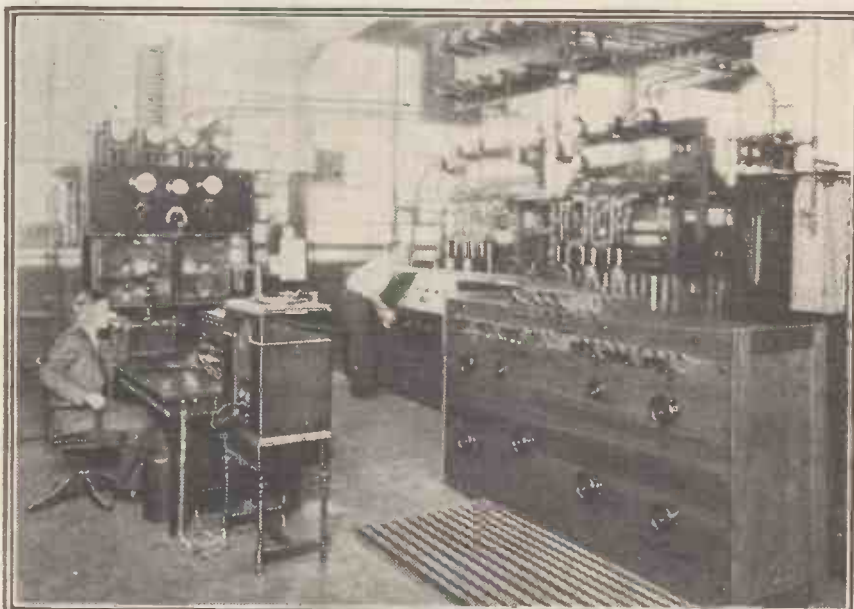
In another corner of the main building is an experimental 100-kilowatt transmitter. Its size is very deceptive and, remembering the six panels covered by the 50-kilowatt B.B.C. transmitters, it is difficult to realise that double this immense aerial power is being put out. It is another experimental job made up on a huge wooden framework and two new water-cooled valves form the basis of it.

### Water-Cooled Valves

There is a large test rack forming part of yet another transmitter, where six water-cooled valves, each nearly the height of a man, are constantly working. A great deal of this experimental work embraces factory secrets, and these water-cooled valves, for example, are in a special part of the building separated off by a wooden gate, beyond which only engineers carrying out research connected with water-cooled valves may pass.

(Please turn to page 246 for further details of W G Y's installations.)

### PUSHING OUT THE PROGRAMMES



*The transmitting room at W G Y. The banks of transmitting valves—"tubes" over there—can be seen on the right. Owing to the tremendous amount of power handled, their anodes are enclosed in water-jackets, through which a steady stream of water flows for cooling purposes.*

### A Hydrometer Hint

ONE often hears, reads or gives the good advice to use a hydrometer for checking the condition of the L.T. battery. But some of the very cheap hydrometers now on sale to an unsuspecting public are not so helpful in practice as might be hoped.

One London reader tells this, rather amusingly and effectively, in the following letter:

"Being convinced that no harm would be done by keeping a check on charging," he writes, "I got a good-looking hydrometer at a local shop for ninepence! Quite a good one it looked, with big bulb, stout rubber nozzle and plainly-marked scale—'Fully-charged,' 'Half-charged,' and 'Discharged.'"

### His Experience

"When the accumulator came home from the service station I tested it and found 'half-charged' in all the cells (three). So I sent it back.

"The usual 'Must be a mistake' yarn followed; and eventually I got it back again, tested it as a matter of form, and found *no improvement!*"

### A "SPAGHETTI" WARNING!



The practice of using a flexible resistance to act as a connecting lead (as well as provide the necessary ohms) sometimes results in the temptation to stretch it a little, or to bend it round other components out of the way. This is bad practice, and the Spaghetti should always be arranged loosely, as shown here, with no strain on its tags.

"I admit I was mad. Took it back and 'created,' got thoroughly worked up, and then—somebody at the shop had an idea and tested it again. Voltage O.K., hydrometer reading O.K. I felt silly.

"To cut a long story short, my cheap hydrometer must have been intended for cells of some special kind, and not for ordinary wireless batteries.

# QUEER QUERIES



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

By P. R. BIRD.

"A fully-charged L.T. battery could only just raise the float to 'half-charged,' and if others have been stung in the same way the dealers who do the charging will soon be looking for those who sell wrong-scale hydrometers!"

### That Second Loud Speaker

One of the advantages of a good loud-speaker set is that it will operate two loud speakers as willingly as one. And another advantage is that it is usually a very simple operation to extend the leads to a second room, and thus have radio "laid on" upstairs and down.

Most readers will remember that when such extensions are contemplated it is a great advantage to have a "loud-speaker filter circuit"—in other words, to arrange so that the H.T. current to the last valve does not have to flow through each loud speaker in the different parts of the house.

Such a filter circuit can very easily be added to a set which does not utilise the method. All that is needed is a good "output" choke (inductance 20 henries or more) and a big fixed condenser of, say, 2 mfd., in addition to a couple of new L.S. terminals.

The choke is connected across the old "L.S." terminals on the set; and that end of the choke which is thus joined (internally) to the plate of the power valve must be connected externally to one side of the new condenser.

Finally, the other side of this condenser goes to one of the new L.S. terminals, the other going to

L.T. negative, or "earth," terminal on the set, and the filter is complete.

### Distortion and Weakness

The fact of choke-coupling, or "filtering," the set's output does not, however, mean that the loud-speaker leads can be neglected and treated just anyhow. As a friend of mine proved recently!

He ran extension leads from one room to another; and as the most direct route for his purpose was out of one window and into the adjoining one, he adopted that method.

It worked splendidly for several days. And then one evening the programme sounded weak, and got weaker, and distorted, and in the end unbearable; so he switched off and tried to discover what was wrong.

Can you guess what had happened? Rain! Nothing more than a heavy shower of rain! He had quite overlooked the fact that loud-speaker cords are not intended to stand up against the weather, and that his outdoor leads which were O.K. in dry

### 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, "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.

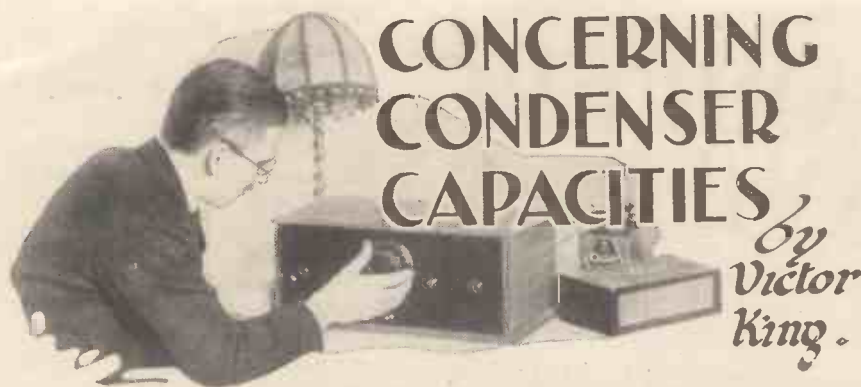
weather "leaked" like a sieve when wet!

The only wire likely to stand up to such a test is lead-covered.

### The Biasing Resistance

Builders of the D.C. "Ace" will be interested in a query about the value of the biasing resistance in that set. A reader, pointing out how the D.L. type of valve has now been improved, suggests that the 1,000-ohm resistance originally recommended is too high for the modern D.L. valve.

He is quite right, and a resistance of 350 ohms or so will be found ample, so this value is now recommended.



*A few facts which are apparently often overlooked by constructors, but which are of vital importance.*

At one time constructors used to experiment a great deal on their own with fixed condensers, and I well remember receiving many letters giving details of such enterprises. But nowadays there appears to be a great deal less of this experimenting.

From one point of view that may be a very good sign, and perhaps indicates that it is widely recognised that our modern receiver designs are not such temperamental things as those of earlier conception. All the same, I cannot help feeling a little sad at the closing of the chapter when every constructor had perforce to be an experimenter.

#### "Hit and Miss" Methods

Haphazard and "hit and miss" though their efforts were, they did, at times, contribute most valuably towards the march of progress, for more than once the chance remark in a letter of one of these enthusiasts gave a clue to the cause of puzzling effects, or helped to open up new avenues of research.

However, we now have the whole territory so well surveyed that it is possible scientifically to predict exactly what any novel arrangement is likely to do, without recourse to the laboratory.

Bearing this in mind, I would not be human if I were not amused by a note I received from a Manchester reader the other week. He wrote to announce the news that he had discovered an absolutely certain cure for mains hum in A.C. sets.

#### A 4-Mfd. Instance

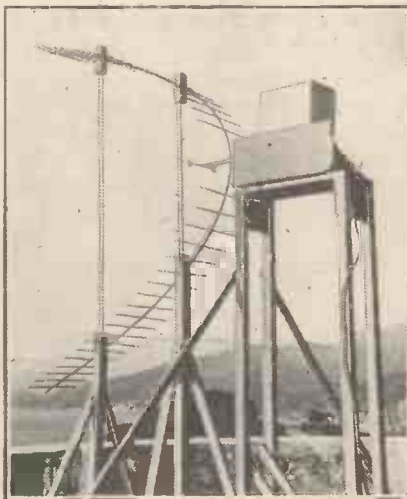
His plan, he admitted, is a remarkably simple one and merely comprises the connection of a 4-microfarad fixed condenser across the mains side of the power transformer of the set.

It is not an infallible hum curer; in actual fact, the addition of a condenser at such a point is not likely to

reduce hum to the slightest degree. But I am not concerned with the efficiency of the expedient (I have the suspicion that this constructor has confused the connections), but I feel the occasion is opportune to say something about condensers used in such a manner in view of the increasing popularity of mains sets, for I believe that the popularity of these is tending to create another and new type of condenser experimenter!

Now, you can do almost anything

#### 50-CENTIMETRE WAVE-LENGTHS!



*The short rod aerial and semi-circular reflector used by Marconi in his latest short-wave experiments.*

with a condenser in a battery set without any real harm arising, but it is very different in the case of the mains.

I suppose most of you will know that all fixed condensers which connect across "live" points should be able to stand a voltage of at least fifty per cent greater than that of the mains.

But is it equally common knowledge that a fixed condenser can constitute as much a "load" on A.C. mains as a very brightly glowing electric lamp?

Not so very long ago I was asked to

inspect a mains unit that a friend had made up to his own design. Always interested in amateur attempts of this nature, I carefully ran over the connections to the various components.

#### An Expensive Addition

"It works quite well," observed the proud builder.

And I admitted that I saw no reason why it should not. But I indicated a fixed condenser, and pointed out that that fixed condenser was unnecessarily consuming ten times the power of all the valves in the set to which the unit was attached.

You see he had the idea rooted in his head that a condenser offers a complete barrier to electric current. And so it does to D.C. But he had that condenser so joined up (similarly to that suggested by my Manchester correspondent) that it was, in effect, right across the 250-volt A.C. supply leads.

#### The Power Consumed

The power consumed depends upon the capacity of the condenser and the frequency of the current, which were 4 mfd. and 50 cycles respectively in this instance. And that one fixed condenser was consuming as much power as a household electric light bulb—no less than some 50 watts!

Of course, a man who doesn't know enough about the fundamentals of electrical theory and practice to realise such an elementary fact should not experiment in any way with a mains set or unit. I made that very clear to my friend while I was demonstrating the power consumption of that fixed condenser with a measuring instrument.

He took the advice in the greatest of good humour, and I trust I can pass it on to a wider audience with the same result.

If your mains set hums, don't experiment haphazardly with condensers and chokes, or the result may be even more serious than the wasting of power.

#### The "I.E." Three

By the way, I must take this opportunity of thanking the hundreds of readers who have written to me regarding the "I.E." Three receiver. At the same time I must place it on record that I realise to the full my responsibilities as the designer of the "most successful set of the season," and also that the basic novel idea of that receiver was suggested to me by a friend and colleague with whom I must henceforth share all the bouquets!

*Mr. John Scott Taggart chose  
Colvern Coils for the S.T. 3000.*



# IS WIRELESS GETTING EASIER?

## -JOHN SCOTT-TAGGART

*-And provides his answer in this review of Modern Methods*

"THE trouble with wireless," a clergyman once told me, "is that there is so much theory about it." I feel constrained by conscience to explain that my relations with this member of the clergy was more of a technical than a religious character. He was, as many of his cloth are, interested in high frequencies as well as in high principles, and I wonder what he thinks of conditions to-day.

### "Getting Progressively Dissatisfied"

If two or three years ago he abandoned the "theory" and settled down to the enjoyment of a set described in these pages he must have been getting progressively dissatisfied.

Higher power, new stations, every nation in Europe shouting down the other—what a game it has become! Perhaps my friend has discussed his troubles with another; perhaps he has been told not of interference, whistling, and mush, but of stations which he vainly seeks for "between forty and fifty on the dial." But between forty and fifty on his set he merely gets London National.

He has heard, of course, that radio has progressed, but has never bothered to keep up to date, and the expense of building a modern receiver has been a serious consideration—and would be still more so in these days were it not for the big drop in the prices of components.

### On the Threshold

How many are there like him? I should say, roughly, half a million. They are all a little hesitant about the new technique, the new methods by which we obtain with three valves not merely what was once obtained with five, but a great deal more in the way of enjoyment.

There lies before this half million a broad highway to better radio, but

they fear just a little the swift-moving traffic.

The Editor is making a special appeal in this issue of the WIRELESS CONSTRUCTOR to bring within the fold those who know a good deal about wireless and set-building, but

### EVERYBODY KNOWS—

*how profoundly the technique of radio reception has been modified and improved by recent research. The modern set embodies ideas not dreamt of a few years ago, when there were no screened grids, no mains valves, even no "spig-bellis"!*

*But, as is explained in this article, the new technique is no more difficult to understand or to embody in sets. Curiously enough, many designs are definitely easier to build than those of several years ago.*

### MODERN SETS NEED NOT BE COMPLICATED

*And you will enjoy this clear-cut and incisive analysis of the recent trends in design.*

*Simplified tuning, selectivity schemes, multi-grid valves, modern loud speakers, and band-pass filters—all are broadly reviewed here by Mr. John Scott-Taggart.*

*And you will find this article not only vitally interesting, but of practical and immediate assistance in helping you to decide what particular developments will help you most in your search*

### FOR GOOD RESULTS

who have hesitated to tackle the understanding of changes which have occurred since screened-grid valves became widely used.

He has suggested that I should write a simply explained account of technique as it is to-day. In this first article I only propose to review the situation briefly, but later I shall deal with modern methods more comprehensively, but avoiding unnecessary technicalities.

First of all, let me say this: Although the technique is changed, it is no more difficult to obtain a given result in the way of stations; it is, in fact, very much easier. One reason is that better (and sometimes different) valves have been evolved, and the other is that broadcasting stations all work on higher power.

### Bad for Selectivity

This extra power, unfortunately, while good for signal strength, is bad for selectivity. You may get a distant station while, say, a B.B.C. station is closed down, but the moment the B.B.C. starts up it swamps your foreign station. So really you are worse off than before. You know that the ether is simply alive with different broadcast programmes and yet you cannot "tap" them.

This is where circuit development comes in. You have to use a circuit which will give you the selectivity which modern conditions make absolutely essential.

The general order of valves remains much as it has always done. If we want local stations we can use a detector and one or two "note-mags" (i.e. note-magnifiers or, to use more technical terms, one or two stages of low-frequency amplification).

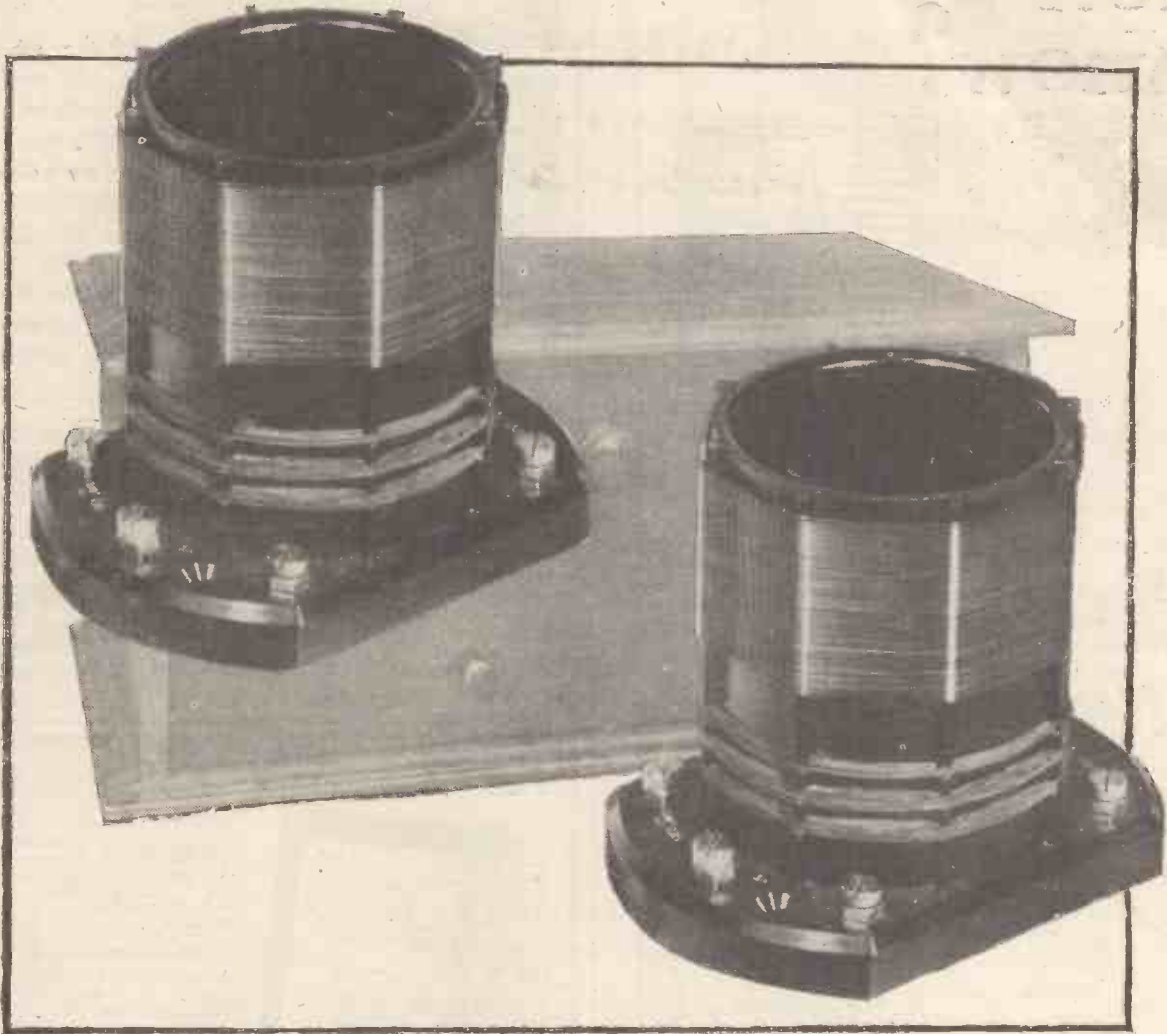
### Concerning Valves

With modern valves one stage of L.F. amplification is usually enough for loud-speaker reception. If two are used after a detector valve, using reaction, you will increase the loudness of weak "foreigners"; but the combination of valves which gives the best results is still the H.F., detector and note-mag.

We can use one or several stages of high-frequency amplification and one or more L.F. stages. But the need for more than one H.F. is not now so great, because the screened-grid valve has superseded the ordinary



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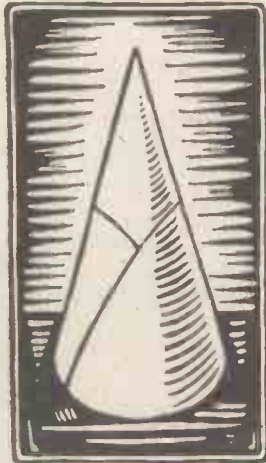
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Historical Signs—No. 2



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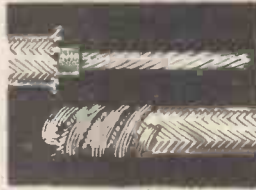
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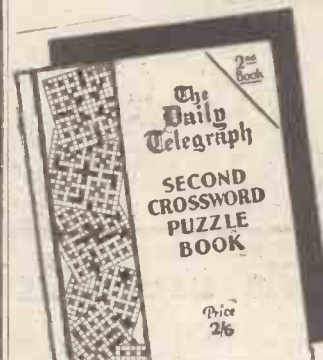
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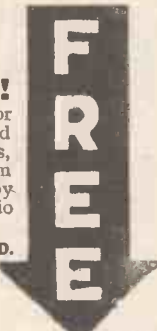
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THE "WAVERLEY"

## Is Wireless Getting Easier?—continued

three-electrode valve as an H.F. amplifier.

Also, the great improvement in detector and power valves has made the need for more than one stage of L.F. superfluous in most cases.

There is also a tendency to use the sensitive "pentode" (a five-electrode power valve) as the last valve—a tendency which makes more than one L.F. still more unnecessary.

### Detector Valve Fallacies

There is, however, a good deal of reluctance on the part of the amateur to use pentodes, and their use is limited chiefly to commercial receivers. More and more home constructors are, however, overcoming their initial prejudices to the pentode, which is likely to come into its own in due course.

Mr. P. K. Turner has said some pungent and effective things about detector valve fallacies, and the "leaky-grid condenser" system—used first in 1907 in primitive form—is still the most popular.

### Why "S.G.'s" Are Used

The wide use of screened-grid valves is the most noteworthy feature of modern technique and one in which this country has been well to the fore.

The ordinary three-electrode valve used as an H.F. amplifier tended to oscillate, because the metalwork of the grid and anode (or "plate") formed a little condenser inside the valve, and the amplified currents in the anode circuit "fed back" into the grid circuit and so the valve was unstable.

If we placed a solid metal sheet between grid and anode and connected the sheet to the earthed filament there would be no "capacity coupling" between grid and anode and therefore no self-oscillation. An excellent idea, but unfortunately no electrons could flow past the grid to the anode!

But we can get the desired effect by using not a solid sheet but a perforated one, i.e. a sort of grid or "screen." Such a screen will let the anode attract the electrons without impeding their progress.

### Higher Amplification

This "screen" is found in all screened-grid valves. It is not connected to earth actually, but to a positive point on the high-tension supply, e.g. +72 volts. The benefit of giving the screen a positive potential can be explained later.

All I would like you to realise is that the screened-grid valve is nothing more than a three-electrode valve. You simply have an extra H.T. plug.

The "screen" does not act at all like the ordinary grid. Consider it just as a means of cutting down to a negligible value the "feed back" in the valve.

The screened-grid valve of to-day, however, although only a specialised form of three-electrode valve, gives a higher amplification than what was obtained with the ordinary type. Neutralising with all its complications and snags is unnecessary and better amplification is obtainable. Hence the popularity of the screened-grid valve.

From a constructional point of view the S.G. set is—if properly designed and operating on a suitable circuit—definitely more attractive than any other. So if you fear S.G. valves are going to introduce complications, please rest assured; they make construction and operation easier as well as more effective.

### Coils in "Cans"

The old neutralised set was improved by putting the different inductance coils in aluminium or copper "cans." These "cans" prevented interaction between the coils and so prevented (amongst other things) the chief trouble in set design, namely, instability, i.e. the tendency of the H.F. valves to oscillate on their own.



### CONCERNING CONTROLS

*Mr. Scott-Taggart makes some very pointed remarks concerning set controls and, among other things, tells you why he has abandoned "one-knob tuning" in his "S.T. 300," although it was his laboratories which first introduced it to this country.*

It is, however, at present rather an expensive valve and normally requires extra components such as an L.F. choke and a tone-corrector circuit. This puts up the price of a set considerably.

As regards its detector, much the usual arrangement is employed, i.e. a grid condenser and leak. The "anode bend" method of rectification has received a set-back in practice and theory, and what is called "power grid detection" is in favour where linear rectification is desired with substantial H.F. inputs; the circuit looks the same, but a high anode voltage is used, while the grid-condenser and grid-leak values are smaller (e.g. .0001 mfd. and .25 megohm).

This trouble was overcome to a large extent by "neutralising" circuits and several valves could be made to act as H.F. amplifiers without "spilling over." What, in effect, was often done was to feed equal and opposing voltages on to the grid.

But at this stage the S.G. (screened-grid) valve emerged as an entirely different way of solving the problem. The idea in the S.G. valve is to prevent the grid and anode forming a condenser at all.

If we can do this there will be no feed-back and no self-oscillation. And the "obvious" way to do this is to use the idea of a screen which Michael Faraday—the great pioneer of electricity—demonstrated so effectively many years ago.

## Is Wireless Getting Easier?—continued

With the screened-grid valve we still sometimes find it necessary to use the screening cans to enclose the coils, especially when the latter have to be close together. The use of coil-screens also assists selectivity in some cases.

There is nothing new in all this, but the S.G. valve requires some metal screen between its grid circuits and the anode circuit. The ideal would be to box up the circuits in metal cannisters, but this is usually impracticable and unnecessary.

### Screening in General

In my "S.T.300" set you will notice a vertical screen and a "ground-floor" screen, both of which are earthed. The reason for screening is principally to prevent self-oscillation. Even the ideal S.G. valve with absolutely no grid-to-anode capacity would be unstable if no external screening were used, because the coils, even though separated, may interact. There are also lots of opportunities for "stray" capacity couplings, which can, however, be "short-circuited" by screening.

Some commercial receivers go to extreme lengths in screening and some home-constructor's designs have elaborate screening of coils, variable condensers, etc. Sometimes this screening is to enable compactness to be attained or one-knob tuning.

### A KEEN CRITIC

*Mr. John Scott-Taggart examines one of the sets in the "Wireless Constructor" Research Dept.*



*It is interesting to note that several of the most popular receivers of this present radio season employ principles originally evolved by this eminent technician. In adding "S.T." to its already brilliant list of contributors the "Wireless Constructor" assumes a position second to none in the whole world.*

If more than one H.F. stage is employed, screening becomes more important, but, fortunately for the constructor, the increase in apparent complexity does not worry him, because the British component manufacturer—ever enterprising—can provide him with ready-made-up things such as screened-ganged condensers, ganged switching, sets of screened coils, etc.—and all at very reasonable prices. It is perfectly obvious that "home construction" will be a permanent institution in view of this adaptability of manufacturers.

Now about one-knob control. In my "S.T.300" article I discuss the reasons why I have abandoned in that set what I was the means of introducing to this country some years ago.

### One-Knob Tuning

I definitely regard one-knob tuning as the ideal to aim at, and a scheme which has had a great measure of success, but years of work have not brought perfection; and while the general public undoubtedly should be given only one knob, the full glamour and thrill of "one control" has disappeared for the man who makes sets.

He looks suspiciously for inoffensive-looking gadgets which he may have to twiddle to get the most out of a distant station. The need for greater selectivity every day almost—certainly every week—is not helping those designers who have to cater for old ladies. On this point, therefore, there is rather a tendency—even in commercial sets—towards more controls.

### Mains-Operated Sets

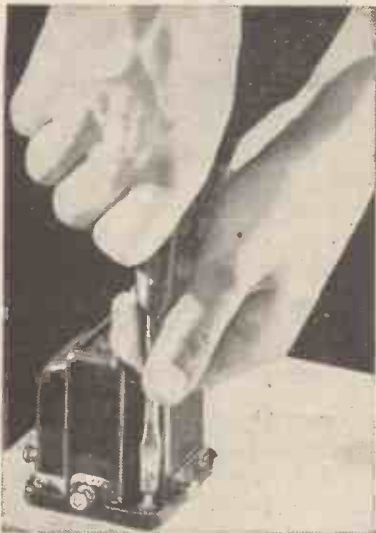
The beautiful panel with one glorious knob in the centre is beginning to suggest compromise to the technically-minded wireless enthusiast. He feels that something is being sacrificed to get the simplicity.

To turn now to mains-operated sets. The average constructor felt a few years ago that these were difficult—and even dangerous!—to make and use. He feels quite differently now.

The valves for A.C. and D.C. mains are superb in performance. The circuits for such sets differ little in essentials from ordinary circuits. Once the new reader "gets the hang" of why resistances, chokes and condensers

are added, he will feel quite at home with such circuits.

And if he doesn't want to bother with technicalities,

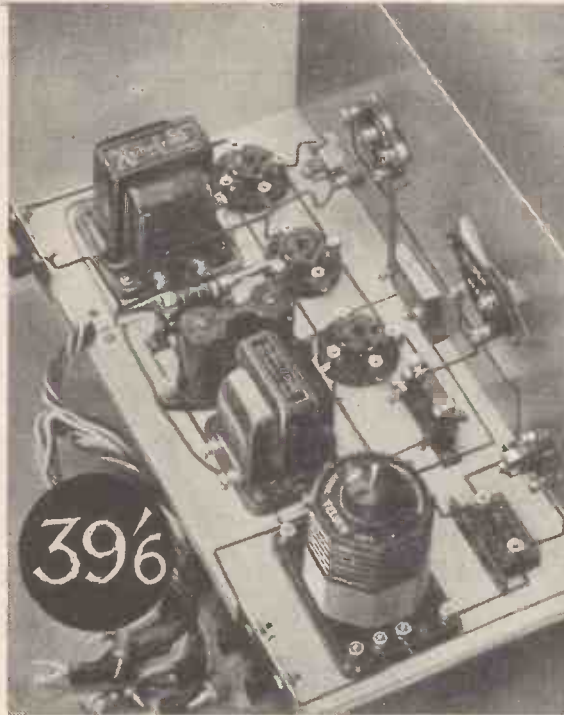


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## Is Wireless Getting Easier?—continued

that will not stop him building an excellent set and getting excellent results with it. He should, however, not vary from the author's design unless he knows exactly what any change will mean.

Higher amplification has brought in its train the need for greater stability precautions in both H.F. and L.F. circuits. Hence we get what are commonly known as "de-coupling" arrangements. They consist usually of a large-capacity fixed condenser and a high resistance.

### Moving-Coil Loud Speakers

They are used to stop undesired H.F. oscillation, L.F. oscillation (due to L.F. feed-back), and alternating current hum. They make circuits look more complicated than they are, but they are usually essential additions. The extensive use of battery eliminators accounts partly for the increased use of "de-coupling."

As regards loud speakers, moving-coil speakers are having a wide popularity. In this type the currents from the last valve of the set are passed by a transformer in the speaker to a coil of wire which moves in a magnetic field.

The diaphragm of the speaker is connected to the coil so that varying currents in the latter cause the diaphragm to move. This principle, of course, is old, but the speakers I refer to are very much up to date, give excellent results and are cheap. Improvement has meanwhile taken place in "moving-iron" speakers, and several types can be bought with absolute confidence at really cheap prices.

The last two years has seen the development of what is called "band-pass" tuning. The term is rather loosely used. It implies a circuit which will only allow a given "band" of frequencies to pass through it.

### Band-Pass Tuners

Since broadcasting stations in most cases operate on waves nine kilocycles apart from the next station "above" and nine kilocycles from the next one "below," it would seem desirable to have a "band-pass" tuner which would allow—on a given adjustment of condenser—only the desired station (with four-and-a-half kilocycles of each "side-band") to come in.

In its simplest form the "band-pass" tuner consists of two similar

coils loosely coupled, each coil being tuned by half a twin-gang condenser.

This idea, of course, is as old as wireless itself—except for the ganging, but the scheme has been developed to produce a special effect.

In some cases the two tuned circuits are coupled by placing the coils near to each other; in other cases they are coupled by a condenser of, say, 01-mfd. capacity which is common to both circuits. A third arrangement is a subtle mixture of the two which combines some of the characteristics of each.

### A RADIO RETIREMENT



Count Arco, the great German scientist, founder and technical head of the Telefunken Co., has now retired from active work and intends to pursue private study.

These band-pass tuners are a great improvement as regards selectivity, although, of course, it is fixed and will not suit all conditions. They require, of course, two condensers, but this is no theoretical disadvantage because in ordinary circuits you can no more "make" selectivity without condensers than the Israelites could make bricks without straw—unless one introduces reaction.

In practice, the use of band-pass units involves a triple-gang condenser and a matched kit of coils if you employ a screened-grid circuit. There is also the necessity for "trimming" the condensers, and to be effective

the "band" passed must remain the same on every degree on both medium and long waves. That a very considerable degree of success has been obtained is a tribute to manufacturers and designers alike.

### Wave-Changing

It is superfluous at this late date to mention that all sets nowadays must cover both the medium wave-band (the Regionals, etc.) and the long waves (Daventry, etc.), and that the simpler the change-over the better. There is no changing of coils, of course! Mr. G. V. Dowding has, in his Extenser (which can be ganged), provided automatic wave-changing as one turns the condenser dial. Three-point and two-point switches are used frequently in different ways for wave-changing.

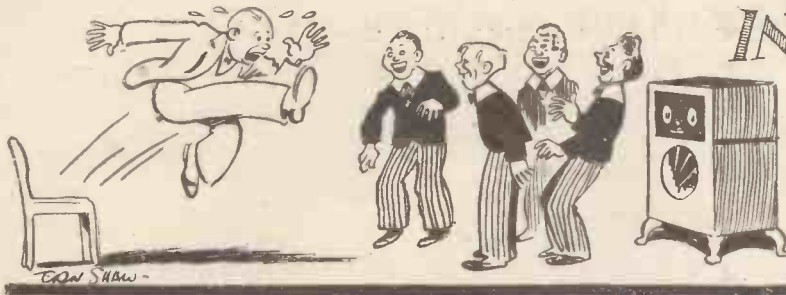
Methods of obtaining selectivity cannot well be described in this first article. Band-pass tuning has been touched upon, and in my "S.T.300" article I express some critical views on those selectivity methods which involve compromise.

What I have written on this occasion is merely a brief summary for those who are somewhat out of touch with present conditions. Next month I propose to deal with matters in detail.

The sum total effect I want this article to have on you is this. That whereas many changes have taken place, they are, if anything, towards simplification in many directions; where things seem a little complicated you will find on closer examination that they are not so, or that component manufacturers have smoothed the path for us.

### Glittering Prizes

And remember this: In the realm of stations and programmes never were more glittering prizes held out for you to grasp. In this issue of the WIRELESS CONSTRUCTOR I am commencing to divert to radio journalism some of the energy given in the last year or two to private consulting and research work. If you are not a regular reader of this magazine, I ask you to become one so that we can work together from this number onwards. I want you to feel the same enthusiasm that I have for what is a profession to me, but a hobby to both of us.

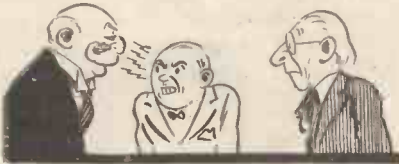


# IN LIGHTER VEIN BOYS WILL BE BOYS

By WIRELESS WAYFARER

GOSHBURTON-CRUMP, as you may remember, is a leading light on the staff of St. Habbakuk's, the Mudbury Wallow seminary for the sons of gentlemen. Since he can just distinguish a grid leak from a kilocycle he occupies the office of president of the school wireless society, a job which he takes exceedingly seriously.

## "A GHASTLY GRIN!"



"With what was intended to be a sweet smile, but was probably much more like a ghastly grin, I agreed—"

The man, after the manner of schoolmasters,\* is a perfect nuisance at times owing to the way he has of picking the brains of those who, like myself, have them. I mean, he will come into my house, light one of my cigarettes with one of my matches, splash some of my soda water into one of my glasses containing a generous allowance of my whisky, sink into my most comfortable chair, having pulled it well in front of my fire, and then proceed to bother me about his absurd worries.

## The Wet Dry-Cell

"I have to explain to the boys," he says, "just how a dry cell works. Now, I wonder if you would mind giving me your ideas on the subject?" And then when I begin by saying that a dry cell is called dry because it is really wet, or, at any rate, sticky inside, and that it works because you pay the makers so much to see that it jolly well does, he shushes me into silence, starts talking himself, and never stops until I positively put him out.

The other night he turned up at Captain Buckett's to pay one of his periodical visits. Tootle, Primpleson,

\* Schoolmasters may skip this and pass on to the next paragraph. I have been one myself.—W. W.

Sir K. N. Pepper, Professor Goop and I were all there. Goshburton-Crump came bounding into the room, obviously very excited about something.

"Look here!" he cried.

I intimated that I was doing so, though I found it rather painful. With a ferocious glare at me he went on with his grouse.

## Greatest of All Subjects

"That fellow Gubbworthy, of Bilgewater Magna," he shouted, "is an absolute outsider. He had promised to come to give a demonstration to my wireless society to-morrow evening, and now he has gone and let me down flat. He has just written to say that he cannot come."

"That," I said, "is absolutely unforgivable. The fellow who promises to give a wireless show and then cries off is an utter skunk."

"Hear, hear," chorused the rest.

"And," I went on, "that kind of thing is completely inexcusable. The school wireless club consists of enthusiastic youngsters who are burning to know something of the greatest of all subjects. Every man worth his salt should be only too glad of the opportunity of doing his bit towards helping the fellows to know more about wireless."

"Thank you," said Goshburton-Crump. "Then you agree that the man who is asked to give such a demonstration and either refuses or cries off is, shall we say, a stinker?"

"Absolutely," I assented with some fervour.

## A Difficulty Solved

"Thank you, my good friend," cooed Goshburton-Crump. "Then my difficulty is solved."

"How do you mean?"

"Why, I ask you to step into Gubbworthy's shoes, to fill the breach, to—"

"What ME?"

"Yes, you."

"Unfortunately," I said, "I shall have, greatly to my regret, to decline the proffered honour. You see, I am

dining to-morrow night with Sir K. N. and Lady Pepper. You will see that I have a perfectly good alias or alibi, or whatever it is."

And then Sir K. N. Pepper did his little bit in the matter of letting down.

"My wife and I," he remarked, "will be only too glad—hrmp—hrmp—that is to say, much as we shall regret Mr. Wayfarer's absence, we will quite understand that in the circumstances he will have to decline our invitation."

## The Great Night

And I had always thought that Sir K. N. was a real friend.

"Since only stinkers and outsiders refuse such things," smiled Goshburton-Crump, "I can, of course, count upon you, my dear Wayfarer."

## "HITTING THE MARK"



"...and fell upon my face with a word that was neither cheery nor strictly polite."

There was nothing for it. With what was intended to be a sweet smile, but was probably much more like a ghastly grin, I agreed to act as understudy to the utterly horrible Gubbworthy.

On the following night I sat in a chair on the dais listening to the flattering introductory remarks of Goshburton-Crump, whilst I examined with no small interest the four-score young ruffians who occupied the seats of the lecture theatre at St. Habbakuk's. Such dear little lads they looked that I felt exactly like a lion in a den of Daniels.

"And now," said Goshburton-Crump, winding up his oration, "I will call upon the illustrious lecturer to entertain you." ("Got to be off

## In Lighter Vein—continued

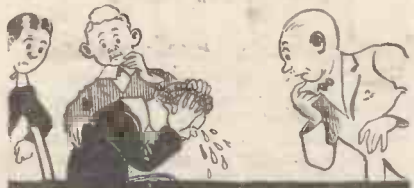
myself," he whispered. "You will find them a charming lot. Get on with the good work.")

With that he travelled at a close approach to the speed of light through a door behind the dais.

### Unexpected Resistance

I had been conscious during his introductory speech that the eyes of the audience were focussed admiringly upon my boots. I was not surprised at this, since they were a particularly elegant pair that I had borrowed during the afternoon from Primpleson, who was away from home when I called upon him. Springing to my feet with a bright smile and a cheery word, I made a step forward, found an unexpected obstacle, and fell upon my face with a word that was neither cheery nor strictly polite.

### "TOO SENSITIVE!"



"My small questioner buried his head in his hands whilst his shoulders began to heave."

Round upon round of applause ensued, mingled with cheers and cries of encore. About twenty of my audience surged forward armed with pocket knives, with which they cut the bootlaces that had in some strange way become tied together. In their work of mercy they also inflicted several severe jabs upon various parts of my person and did considerable damage to Primpleson's boots.

### Close-Coupled Circuits

I have always said that when you are dealing with boys you must be able to see a joke. I therefore laughed as heartily as the rest, and, making a neat little jest about close-coupled circuits, proceeded to radiate *bonhomie* with an output of about 100 kilowatts.

"One of the first things that I want to show you," I said, "is how to tune a wireless set."

"Please, sir," cried one young imp, holding up a hand.

"Yes?" I said with a dazzling smile.

"What tune does your set play?" "That," I remarked icily, "is a silly question. Please let us be serious."

My small questioner buried his head in his hands whilst his shoulders began to heave.

Every hand in the room shot up.

"Well," I inquired wearily. "What is it now?"

"Please, sir," came the chorus, "you've hurt old Blogg's feelings. He is very sensitive. Do be kind to him."

### The Practical Part

"Look here," I roared. "Behave yourselves like decent human beings. If any other fellow asks me a footling question I will send him straight to the headmaster and have him caned on the spot."

"Please, sir."

"Yes?"

"What spot?"

When silence had been restored after an interval, it occurred to me that the best thing to do was to go straight on to the practical part and to do as little talking as possible.

With one finger on the switch of the set, I cried: "What you must never do is to allow the set to oscillate. Observe that I place the reaction control at zero before I switch on, and am most careful never to let the set howl. If the set itself is oscillating you will hear squeals going up and down the scale as the tuning knobs are turned. Notice that as I tune nothing of the kind occurs."

### A Howl of Howls

Flicking over the switch, I advanced the reading towards that required by the London Regional. There was the most appalling howl that I have ever heard. It ran down the scale with a melancholy SWEEoop and then up it again—oopSWEE.

The reaction definitely was at zero. A hasty look over the set showed that nothing was obviously wrong; yet every time I so much as touched a knob those ghastly howls burst from the loud speaker. Then I observed a lad in the second row with a box upon his knees and, pouncing upon it, found a heterodyne wavemeter. Having expelled him from the room and confiscated his little toy, I went on with the demonstration.

"The first thing," I said, "when

operating a wireless set in this part of the world is always to find the two London stations. Owing to their enormous power, this is exceedingly easy. You observe that I merely turn this knob and—"

I was meanwhile slowly traversing the dial. Sounds of music had been apparent with the setting at 0, and they were still there—the same sounds when I reached 180.

"I'm afraid," I remarked, "the selectivity of this set is extraordinarily bad. You will observe that the London National covers the whole dial." Just then the loud speaker brayed: "Hier Heilsberg." This was something of a puzzle.

### THE MAGIC TOUCH!



"The little chap jumped on to the dais, produced a screwdriver from his pocket, opened the lid and did something."

"Please, sir."

"Yes, my little fellow."

"Could I have a look at the set?"

"Why, certainly," I said with the utmost geniality.

The little chap jumped on to the dais, produced a screwdriver from his pocket, opened the lid and did something.

"Please, sir."

"Yes?"

"Doesn't it matter if the dial wasn't connected to the condenser spindle?"

By this time half a dozen or more had assembled on the dais, obviously most interested in the working of the set. One of them began twiddling the knobs and produced quite a number of foreign stations.

### Characteristic Change

"Well," I said with a smile, "since you are all so proficient I think that I had better sit down and let you do the tuning."

I sat down, then leaped into the air as a sudden pang ran through my frame. Hastily removing the drawing-pin which was causing it, I made my exit through the door that Goshburton-Crump had used.



*You want  
the Best  
Results!*

# Recommended for the S.T. 300

## ORMOND N°6 Slow Motion CONDENSERS



**W**HEN an "extra special" component is required for an "extra special" job, it is only natural that "the man who knows" should specify Ormond. For he, above all others, appreciates the "extra" quality in Ormond products that makes them indisputably superior.

This new Ormond condenser is constructed of brass and is very robust. The vanes are perfectly rigid, being firmly secured to slotted spindles. Di-electric losses are reduced to a minimum by the special mounting of the fixed vanes support. The moving vanes are connected to the frame, thus eliminating stray capacity effects.

A slow-motion device, ratio approximately 9 to 1, is incorporated in the condenser and is controlled by the upper small knob, direct drive being obtained on the dial, which is engraved 0 to 180 degrees.

Easy to mount, "one-hole" fixing. Terminals and soldering tags for connections. Complete with 2½ in. dial and slow-motion control knob.

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NEAT - RIGID - ROBUST





# B.B.C. NEWS

Topical notes regarding British Broadcasting Stations and Programmes.

By Our  
Special Correspondent.

## New Menace to Birmingham

IT is nearly two years since the famous descent upon Birmingham of Lord Clarendon and Mrs. Philip Snowden (as she then was) to put a stop to the move to close down that station. The staff at Savoy Hill—then, as now, predominantly “centralist” in policy—knew nothing of this expedition until it had taken place.

The result saved Birmingham for the time being. But I hear on good authority that there is a new move to extinguish the last flickering spark of B.B.C. activity in the Midlands.

Mr. R. H. Eckersley, the Director of Programmes, has never made any secret of his desire to concentrate in London all programme activities. The latest urge to economise has given him, and those who think with him, an additional argument to achieve their purpose.

I gather the new plan is not to make a concerted attack on all the Regionals, but rather to wear them down separately and, if possible, break up their present united front.

The Regions have come to look to Sir John Reith as their traditional friend *in extremis*, and it will be interesting to see if the Director-General cares this time to extricate Birmingham from its dangers. The plan takes the form of holding up further building development and the provision of a new studio.

## Enemies of the B.B.C.

The defeat of the “talkists,” after years of hostilities, news of which has appeared exclusively in this feature, has added powerful new elements to the forces arraigned against the B.B.C.

The highbrows have for some time been regarded as important allies of the B.B.C. outside, however much they have caused bother inside. The situation is now reversed; their exclusion from inside liberates their wrath outside, and throws most of them into the camp of those who advocate commercial competitive broadcasting as a preferable alternative to a public service monopoly not controlled by the “talkists.”

Of course, even if their case had been sound, the tactics of the talkists have been hopeless. The suggestion that any sort of little junta could dictate B.B.C. policy is intolerable, and the authorities are to blame for having suffered it so long.

I am not happy, however, that the

right use will be made of this victory for the ascendancy of common sense. We have not been shown exactly how and when we are to have the increased entertainment that we have been promised.

It would be a good plan from several angles if Sir John Reith would take an early opportunity to clear the air about the reforms that are to be effected now that obstruction has been eliminated.

## Less Peace-Mongering?

An incidental part of the change involved in the defeat of the “talkists” is the withdrawal of a lot of the calculated peace propaganda which the B.B.C. used to put out to the considerable disgust of healthy listeners:

(Continued on page 244)

## THE SCULPTURAL WORK AT BROADCASTING HOUSE



“Ariel hearing celestial music.” An example of the sculptural work on the front of Broadcasting House.

## Test Reports on the "S.T.300" continued from page 214.

*A little idea of the sharpness of tuning will be gathered by the fact that on the long waves Warsaw was received quite clear of Eiffel Tower.*

Quality was superb throughout, with the foreign stations received very clear, with a complete absence of mush. I do not need to wish the designer the best of luck with his new product, for I feel sure that here at last is a set that will appeal to not only the enthusiastic amateur constructor, but a set that is rapidly becoming a necessity to all who are interested in English and foreign reception.

Anxiously waiting for full details.

Yours faithfully,

R. J. SALMON.

P.S.—I would be pleased to communicate with any reader who is interested in this receiver.

4, Harveystone Road,  
Leytonstone, E.11.

### "Stands Above the Rest"

Sir,—I wish to thank you for your demonstration of the "S.T.300," and to mention how impressed I was with the efficient working of this set. *In these days, when there are so many good sets from which to choose, it is really difficult to find one which stands above the rest. Having heard the "S.T.300," I am convinced that here is a set that will do all that is claimed for it, and, moreover, is designed with an eye to the future. I thought the selectivity and separation down to 5 kilocycles remarkable, which, together with the more than ample volume, left nothing to be desired. As you have also made provision for the continual power increase of present-day broadcasting stations, it will readily be seen that this set will be going strong when most of the present sets will be out of date, a very important point to remember. As the cost is extremely moderate and the performance so remarkable, I can confidently recommend the "S.T.300" to my friends and to all WIRELESS CONSTRUCTOR readers who really want a tip-top set irrespective of price.*

Please accept my congratulations

on designing such a fine set, and wishing you every success.

I remain,

Yours, very truly,

C. M. PUDDEFOOT.

24, Kersley Street,  
Battersea Park, S.W.11.

### Complete Flexibility

Sir,—I wish to thank you for the pleasure you gave me by demonstrating your receiver yesterday. Although I have been keenly interested in wireless for twenty years, it was a revelation to hear what could be done with three valves.

I feel confident that were you to demonstrate the range and selectivity of your set to an experienced and discriminating audience, and then ask for estimates of the circuit, the

with but the faintest background of London Regional. On the long waves Warsaw came in clear of Eiffel Tower at ample strength and pleasant quality.

It was difficult to believe that all the while you were using an aerial, low and screened by high surrounding buildings, and yet a personal inspection satisfied us that this was correct. I feel sure but few people in London suffer worse conditions under which to place their aerial.

The complete flexibility of the "S.T.300" was delightful. It will bring joy to the heart of the listener who likes to get the "last ounce" out of his set.

I certainly think your receiver marks a distinct advance on any three-valve receiver I have yet known,

### MUSIC BY THE MASTERS



*A broadcast by famous musicians gathered in Schubert's room. Many such musical treats are in store for the builder of the "S.T. 300."*

majority would say it was a 2 H.F., detector, and power, with band-pass tuning.

On the medium waves we heard station after station roll in, identified each, and assured ourselves that although but 9 k.c. apart they were yet quite clear of one another audibly. We heard Mühlacker at great strength

and when one considers the low cost of 70s., I can only characterise it as remarkable indeed.

Faithfully yours, C. ROPSEY.

21, Princes Avenue,  
Greenford, Middx.

[This demonstration, like the others, was given just north of Hyde Park.—Ed.]

### JOHN SCOTT-TAGGART'S MESSAGE TO YOU—

"I propose to give of my best in your service. I want to hear of your successes and establish that friendly contact so essential in my opinion to a proper appreciation of readers' needs."

## B.B.C. News—*continued from page 242.*

I believe Sir John Reith was heartily sick of all that has flowed from the "Nation Shall Speak Peace Unto Nation" motto inscribed on the coat of arms considerably against his wishes.

Sir John is understood to be one of those not by any means sure of the wisdom or the rectitude of the League of Nations; he would, I believe, put justice far ahead of peace, and, therefore, in certain circumstances, might welcome war as an instrument of international or domestic policy.

So now that Sir John has got his own way with talks we shall not be oppressed with so much of what was considered to be wishy-washy internationalism.

### Television

The newly-awakened interest of the B.B.C. in television has had sequels in various directions. For instance, I hear the Marconi Company has achieved some remarkable results on six metres or thereabouts, and plans a special transmission on this frequency to Australia.

Also, the Gramophone Company is reported as having secured permission from the Post Office to transmit experimentally in order to develop the new line of television receivers on which that Company is now working.

Neither of these moves is aimed directly against the Baird Company, which will have a longer run with the B.B.C. than was anticipated a few months ago. I should think those interested in television will tend to coalesce as they develop, thus making development easier and more rapid. Baird television from the B.B.C. will be extended appreciably this year.

### Married Women in the B.B.C.

I understand that the rule against the employment of married women by

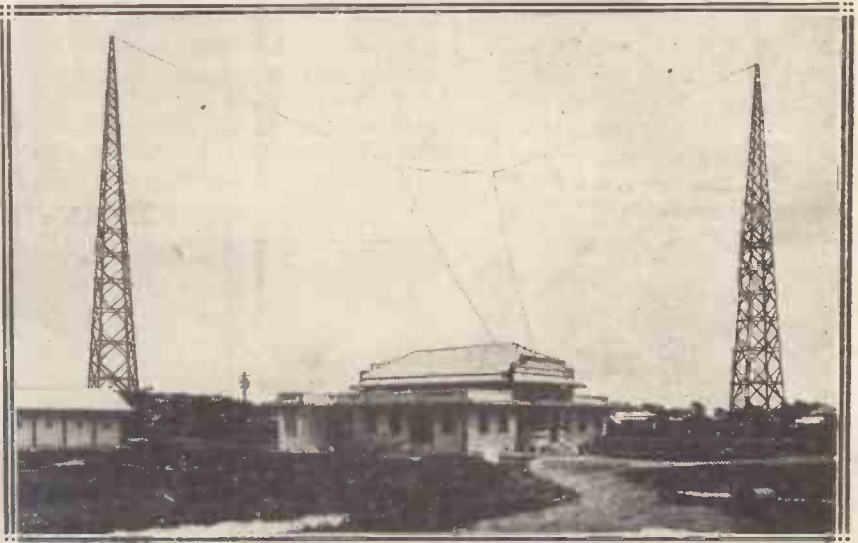
the B.B.C. is to be applied with rigour this year. It has not yet been made retrospective; but I believe there will be a thinning of the ranks of the married women before long all the same.

In pursuance of a general policy which has found favour with so many other large Corporations and employers of labour, men applicants are being given preference when questions

a scaling down by about fifty per cent to apply to all those above the rank of departmental heads.

This would cut the Chairman to £1,500, the Vice-Chairman to £500, the other Governors to £350 each, the Director-General to £3,500, and the Assistant-Controllers to £1,000 each, which henceforth would be their maximum emoluments.

### A FAMOUS STATION OF THE FAR EAST



*This is a general view of the short-wave station at Bangkok, Siam, which works on 41 metres.*

of new staff appointments are under consideration.

### B.B.C. Salaries

In spite of the steadily augmenting revenue, and the difficulty in dealing with the money coming in, I hear that at least two members of the present Board of Governors are uneasy about the high scale of salaries of senior B.B.C. staff, and will shortly advocate

### B.B.C. Orchestra Not to Travel

It has now been decided that the B.B.C. Symphony Orchestra is not to travel either on the Continent or in America next summer. The growth of international ill-will and the reprisals and counter reprisals against orchestras and artistes have so modified the chance of success of such a venture that it is to stand over *sine die*.

## BIG CHANGES IN BROADCASTING IN 1932

The special service of broadcasting news given by this journal has long been famous for its revelations concerning programme policy and its fearless commentaries on B.B.C. administration.

The year 1932 will be a momentous one for broadcasting. New stations, new headquarters and new administrative forces will be affecting the service and programmes, and exclusive details of these developments will appear in *THE WIRELESS CONSTRUCTOR*.

# Build your eliminator with a metal rectifier

Ever since Metal Rectifiers for home-constructors' use were first introduced they have increased steadily in popularity; and there are many reasons for this. They are remarkably easy to use—the circuits\* are simpler than for any other kind. A less expensive transformer may be used with the metal rectifier than that required for other types. And—most important—they are very economical, they do not burn out or deteriorate (rigorous tests made in this connection with units which have been in continuous service for over five years reveal no falling-off in output). \* "The All Metal Way" contains a great deal of information concerning the operation of radio sets from A.C. mains. It gives full details of how to use various types of Westinghouse Metal Rectifiers, together with tested circuits. The booklet will be sent to you if you forward the coupon with threepence in stamps.

## WESTINGHOUSE METAL RECTIFIERS

The Westinghouse Brake & Saxby Signal Co. Ltd., York Rd., King's Cross, London, N.1. Phone North 2415.

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PLEASE WRITE IN BLOCK LETTERS.

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Carriage Paid.

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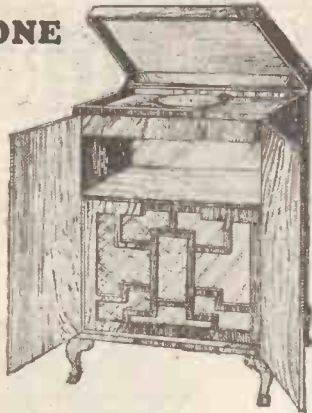
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## WIRELESS CONSTRUCTOR

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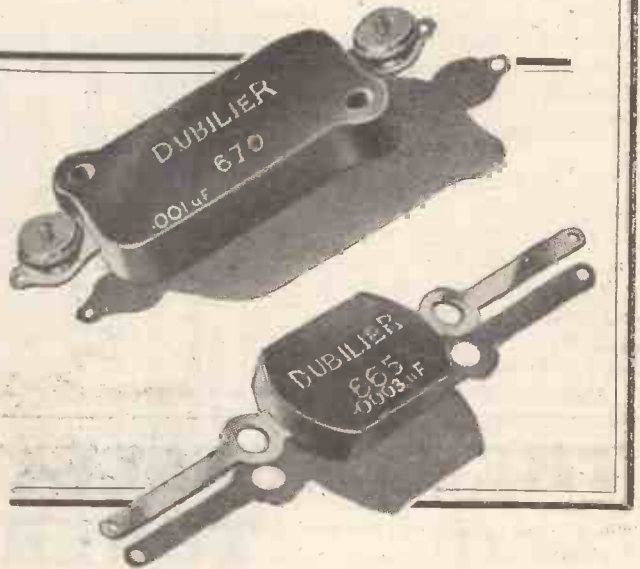
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Dubilier condensers are famous the world over for their infallible accuracy and uniformity. Therefore, when you buy condensers, always demand Dubilier, the condenser in which you can place absolute reliance. They are made in England by British workpeople by a British company.

This latest range of moulded-in mica types fulfils the long-felt need for the best possible condensers at an extremely low cost, built as only Dubilier can build them.

All radio dealers stock them.

### PRICES

#### TYPE 665

'0001, '0002, '0003 mfd. 6d. each.

'0005 mfd. 9d. each.

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'0001, '0002, '0003 mfd. 1/- each.

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'005 and '006 mfd. 1/6 each.

TYPES 610 and 620

Prices from 1/8 to 3/- each

# DUBILIER

CONDENSER Co. (1925) LTD.

DUCON WORKS, VICTORIA ROAD, N. ACTON, LONDON, W. 3

**THE EDITOR'S CHAT**

—continued from page 193

Mr. Scott-Taggart's interest in the legal side of patent work has always been well to the fore, and eventually led him to study for the Bar. In 1928 he became a barrister, but his interests and profession have definitely remained that of a radio engineer, and he has always maintained a very close association with the great set-constructing public.

In 1922 he was the first Technical Adviser of our associated publication, "Popular Wireless," while in 1923 he founded and edited his first radio journal—"Modern Wireless." A little later he founded this journal—THE WIRELESS CONSTRUCTOR—so he is, in fact, writing again for many thousands of his old readers.

**Do You Remember Them?**

Mr. Scott-Taggart's return to radio journalism after two or three years' private consulting and research work will undoubtedly be welcomed by all interested in the great art of radio. A brilliant string of sets—including the "S.T.100," the "Elstree" Six, and the "Solodyne"—have been associated with his name and

the technical laboratories he directed ever since the early days of broadcasting.

Readers of THE WIRELESS CONSTRUCTOR will have the full benefit of Mr. Scott-Taggart's experience and inventive genius in the pages of this magazine—in this and successive issues.

**Latest and Best**

In this particular number Mr. Scott-Taggart makes a big debut on his return to radio journalism by describing in detail, and in a way which cannot fail to arouse tremendous interest among constructors, the "S.T.300" receiver.

When Mr. Scott-Taggart outlined this receiver to me he naturally wanted to know what editorial facilities—as regards pages for his article, etc.—I could place at his disposal. When I had listened to his description of the set and had heard it on test my answer was: "Just what you want."

In fact, Mr. Scott-Taggart was given *carte blanche*. And I think readers will agree that if he had used every page in THE WIRELESS CONSTRUCTOR, the amount of space devoted to his receiver would have been fully justified.

**A VISIT TO WGY**

—continued from page 228

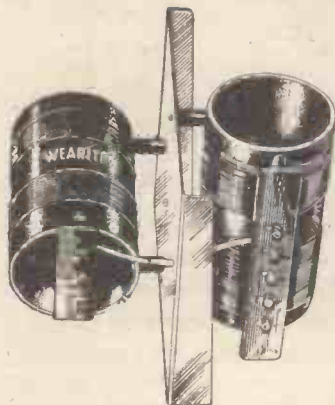
Immediately in front of these valves is another control desk, at the side of which stands an electric gramophone for broadcasting, made up from a commercial console-type radio-gram. The loud-speaker opening of this is blanked off, and the electric turntable drive and pick-up on top supply "canned" music for the experimental short-wave transmitters. The mains-driven amplifier in the base of the radio-gram has been converted to act as the first modulation stage.

**Plenty of Noise!**

There is a separate power house which converts from the supply mains and provides power for all the transmitters. For the smaller jobs, such as filament lighting, there are rotary converters, while behind wire cages are three rectifier banks, using valves. The great feature of all this is noise and yet more noise!

A really amazing thing is that the whole transmitter can be controlled from an office back in the City by means of a large panel like a Post Office telephone board.

**THE ECKERSLEY TUNER**



A new tuner Prov. Pat. 29404-22/10/31, produced by a firm with over twelve years' Radio component manufacturing experience—strictly made to specification and approved by Capt. P. P. Eckersley, R. E. H. Carpenter (Joint Patentees) and the research dept. of "W.C." Price 15/6.

**"WEARITE" EARTH TUBE.**

All copper Patent Earth Tube, the best of its kind—no soldering iron, no clamped joints, no screws.

Price 3/6

**WEARITE COMPONENTS**

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**Permanent Magnet Moving Coil Speaker**



**Amazing Tone-Purity**

The extraordinary purity of tone, combined with brilliant clear-cut reproduction of voice and music, will satisfy the most critical ear.

Size of Cone 10 in. dia. Supplied complete with Input Transformer.

May we arrange a demonstration for you?

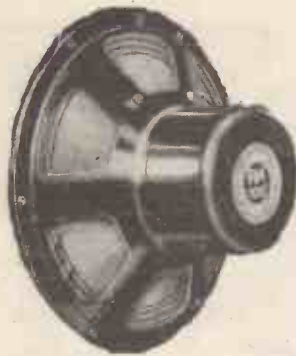
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R. & A. '100' PERMANENT  
MAGNET MOVING COIL  
REPRODUCER 45/-

3-ratio Transformer to  
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R. & A. 'TYPE 40'  
REPRODUCER

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FREDERICK ST., WOLVERHAMPTON



16/6

## MAGNUM STENODE

*The set that  
is years ahead*

This receiver represents the latest development in British Radio design and is manufactured under the British Radiostat Corporation Licence. Five kilocycle separation is guaranteed, tuning being controlled by one knob. The only other controls are a wave-change switch and volume adjuster.

Supplied only for A.C. Mains operation for any standard voltage and periodicities from 40 to 100 cycles.

PRICE, including handsome Walnut Cabinet as illustrated, Moving Coil Speaker, Valves and Royalties

**£45 : 0 : 0**

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TESTED  
for the  
"S.T. 300"

by  
**John Scott-Taggart**



**POLAR**  
"No.2"  
0005  
**6/6**

The combination of Fast and Slow motion in this condenser gives quick and accurate tuning. The rigid construction and bonded rotor vanes ensure long service with permanent accuracy. Smooth, easy control is secured by the Polar ball-bearing action.

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**POLAR DIFFERENTIAL CONDENSER**  
Direct drive. Solid di-electric. Constructed of highest quality materials. Smooth action gives very accurate control! Insulated spindle. Supplied with knob. **3/-**

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# POLAR

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# THE GRAHAM FARISH SPEAKER



## to use with the S.T.300

For its purity of tone and ability to handle large outputs faithfully, this Graham Farish A.C.4 type Cabinet Speaker is recommended for use with Mr. Scott Taggart's new receiver. Driven by adjustable 4-pole Unit using powerful Cobalt steel magnet and housed in distinctive Bakelite Cabinet in Walnut, Mahogany or Oak finish.

Price at all Radio Dealers **42/-**

## SCOTT-TAGGART CHOSE THIS



**RESISTANCE**  
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# OUR NEWS BULLETIN

instead of fortnightly, also for thirty minutes instead of twenty as hitherto."

It appears from this official circular from the B.B.C. that these two critics have been

asked to deal with their subjects more generally, but in no way to slacken the fight for better films and better plays. They have been informed that while there is no embargo on the mention of any particular film or play, there is no need for them to cover every first night or release.

### Unfounded Fears

So it would seem that Mr. Cochran's fears are not very well founded and that the B.B.C. has not instructed its critics to be more vague or in any way to restrict the scope of their criticisms.

In fact, it should be all to the better that the official critics for the B.B.C. can pick and choose the plays or films they think worthy of general criticism. Even Mr. Cochran would be the first to admit that many plays and many films these days receive public presentation when their merits are definitely mediocre.

### An Official Statement

There has also been a good deal of rumour lately about changes in B.B.C. policy as the result of the resignation of Miss Matheson, Director of Talks. The B.B.C.'s official answer to these rumours is: "In view of the continuance of misunderstanding, the B.B.C. states that rumours respecting changes in policy with regard to talks are without foundation.

"The range of programme material is kept as wide as is compatible with the particular and, in fact, unique circumstances of the service. Experiments are frequent, and such changes as are now made are of method and not of policy.

"Mr. Desmond McCarthy and Miss Sackville-West are to continue their weekly talks on books, old and new, their time being extended from twenty to thirty minutes. Criticism of novels is to be suspended for the time being."

### A Welcome Feature

The question is: "Why have the critics been asked to suspend criticism

### That "Bogey Van"

I HEAR there has been a wireless pirate drive conducted by the Glasgow postal authorities during the last two months which has had salutary effects. The number of new licences taken out reached the figure of 3,000 per month, as compared with 1,200 per month a year ago, and altogether there are now 70,000 licences held in Glasgow. This represents an increase of 11,000 on last year.

### Still Going Up!

Talking of licences reminds me that a statement made by the Postmaster-General in the House before Christmas was to the effect that the number of wireless receiving licences in force in October 31st was about 4,101,000. This figure was made up as follows:

England .. .. .	3,682,000
Wales .. .. .	140,000
Scotland .. .. .	244,000
Northern Ireland ..	35,000

At the beginning of 1931 there were 3,411,910 licences in force.

### Exit Specific Criticisms?

In a letter to the "Sunday Times" recently, Mr. C. B. Cochran, the famous theatrical producer, expressed his surprise and regret that henceforward the B.B.C. will no longer broadcast criticisms of current London plays by Mr. James Agate. "Instead," writes Mr. Cochran, "we shall have talks of vague scope and application about the drama.

"I submit that the living theatre of to-day will suffer a severe blow by no longer being brought to the notice of listeners, and I think the B.B.C. will find that its own public will be the first to complain about the change."

### No Need to Particularise

In an official circular from the B.B.C. I read that "Mr. James Agate and Mr. Francis Birrell, the theatre and film critics, are to speak monthly

(Continued on page 249.)



**OUR NEWS BULLETIN**

—continued from page 248

of novels for the time being?" Do the B.B.C. fear giving publicity to publishers? If so, they should stop reading out the numbers of gramophone records.

Helpful advice from book critics is a welcome feature in the B.B.C. programmes, and how on earth listeners are to derive much benefit from talks on books if novels are excluded is a matter of some mystery.

Supposing Mr. Priestley, the author of "The Good Companions," writes another fine novel, are listeners to be deprived of a recommendation to get the book, either by buying it or from a library, for some obscure reason of the B.B.C.'s policy? I hope this matter will be cleared up very soon.

**B.B.C. Independence**

Mr. Hopkin Morris, M.P., has expressed the intention of exploring every avenue by which he can draw the notice of Parliament to the B.B.C. finances when the House meets again in February. One of his complaints is that the House has granted £25,000 a year for five years to the B.B.C. without a word of discussion.

Mr. Morris maintains that failure to provide an opportunity to discuss the financial provisions in question reduces Parliamentary control of the B.B.C. to a farce, and that the position of the B.B.C. affords a striking example of the modern Parliamentary tendency to create independent Corporations over which the House of Commons has little or no control.

**A Very Good Idea**

It was reported in the "Daily Telegraph" recently that there is to be no official opening in the ordinary sense of the new B.B.C. headquarters in Portland Place. It appears the B.B.C. prefers to "fade into" the new building as its various sections are completed.

There is, however, states the "Daily Telegraph," Wireless Correspondent, some expectation of a possible visit from the King soon after the occupation is complete.

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As far as possible all advertisements appearing in "Wireless Constructor" are subject 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, "Wireless Constructor," 4, Ludgate Circus, London, E.C.4.

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Inset on a "PIX."

2!

## THE "S.T.300" CIRCUIT

—continued from page 211

The "aerial coupler" is a .00004-mfd. J.B. Midget variable condenser, chosen for its "law," its low-loss construction and its very low minimum. As most sets adopt "aperiodic" coupling (an aerial transformer or tapped coil), this arrangement will arouse, perhaps, some interest.

### Recommended by the B.B.C.

Actually the device is not new. It was introduced by me in 1923.

British Patent 232659 of Nov. 1 of that year was granted to me for the use of small capacities in series with the aerial followed by a tuned circuit "beneath," as in this "S.T.300." At that time various series and parallel arrangements were employed and my scheme enabled one to employ a stated size of coil on any aerial. The idea proved extremely popular, and the fixed .0001-mfd. condenser which I recommended (and which is actually specified in Claim 3 of my patent) jumped into immediate favour. Not only could sets be more standardised, but (to quote from my patent) "a further advantage is that greater selectivity is obtainable with this arrangement." To this day, I believe, the B.B.C. advocates a .0001-mfd. series condenser in some of their suggested circuits.

The next trend was towards tapped aerial coils, and my Elstree laboratories published much data on optimum tappings, etc. The best tapping (or aerial winding in the case of a transformer) varies with the aerial. The tapping used in a set is a compromise—an average one; and, of course, there is the usual compromise between strength and selectivity! Even the variable series condenser frequently used with aperiodic coupling often gives inadequate flexibility.

### Where You Want It

I decided, after various tests, to provide an up-to-date form of "single-circuit" aerial input. The .0001 mfd. of 1923 was good enough then. It is no good now for the high selectivity required. I therefore cut it down to .00004 mfd. (four noughts!), make it variable, make it variable according to "log." law, and put it on the panel.

This means that wherever you live, whatever aerial you use, and whatever station you wish to receive, you can get the most out of that station

without compromise. If jamming is very bad in your district when near a B.B.C. or powerful foreign station on the dial, you can set the aerial coupler at a lower value. If you do not need extra selectivity you set it at "normal," which is satisfactory for scores of stations.

When "full in" (round to the right) the selectivity is blunter but still high, and extra strength is obtainable in most cases. The aerial coupler enables you also to use a full-size aerial if you have room. If desiring a station very close on the dial to a B.B.C. station you may require a setting of the aerial coupler nearer the left. But as you get farther away on the dial you simply set the coupler at normal.

Now for the intervalve circuit. This uses what I am calling "differential anode coupling." It involves a composite circuit comprising the anode coil, the tuning condenser, the "anode coupler" (a .0001-mfd. differential—the value is important) and incidental capacities. It is tuned in a straightforward way, but the "anode coupler" enables you to get any degree of selectivity up to the theoretical maximum attainable with a single circuit. In the usual coupled circuit your selectivity is fixed for you. You have either an H.F. transformer or a tapped coil (or often not even a tapped coil).

### Complete Control

This means that your selectivity, even if variable on the aerial, is tied down on the intervalve circuit—a good average being chosen, which means it is good for one district and not another; good for one aerial and not another; good for one station and bad for another. And in striking this unsatisfactory average the designer is losing signal strength, because with a screened-grid valve you get more signal strength (but less selectivity) as you include more "coil" in the circuit.

In the "S.T. 300" circuit you have a knob on the panel which controls the selectivity of the intervalve circuit "from top to bottom," so that you need never strike an average between selectivity and strength. Whatever the conditions (i.e. place you live, aerial you use, and place on the dial) you can get the maximum strength available without interference.

You have thus two "non-compromising" controls to get the best out of your set and to safeguard you against the increase in the number of stations and their power. In the heart of London I am demonstrating the loud-speaker reception of

(Continued on page 251.)

## YOU SAVE 50%

By Purchasing this Handsome  
**RADIOGRAM  
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Direct from our Factory,  
3' 3" high, 21" wide, 18" deep.  
Fakes panel 18" x 8" or smaller.

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All-British.  
Cabinet No. 114

**THE "S.T.300" CIRCUIT**

—continued from page 250

Mühlacker with only a little "shushing" from London Regional (11 kilocycles away). Eiffel Tower and Warsaw (5 kilocycles apart) are on each clearly separable, and give excellent loud-speaker entertainment. The "two miles from London Regional" test is described elsewhere.

A fuller account of the composite circuit and its operation when reaction is used will appear next month. The high sensitivity obtainable on ultra-selective adjustments when the dynamic resistance of the circuit as a whole is increased will be discussed then. The circuit and its operation is a trifle more complex than a casual glance would indicate.

But this does not worry the non-technical builder and operator. He gets all the simplicity of design and operation without the need for detailed explanation.

**THE RAPID CONSTRUCTION GUIDE**

—continued from page 210

- 38. Anode coil terminal No. 6 to anode coupler (one set of fixed plates).
- 39. Grid condenser to anode tuning condenser (fixed plates).
- 40. Anode tuning condenser (moving plates) to detector valve filament negative.
- 41. Control grid terminal G. of S.G. valve-holder to aerial coupler (fixed plates).

**NOW FIX VERTICAL SCREEN.**

The middle fixing screw of terminal strip may be slacked off if necessary while fixing screen.

- 42. Top terminal of wave-change switch to terminal on vertical screen.
- 43. Anode coupler (one set of fixed plates) to terminal on vertical screen.
- 44. Anode coil terminal No. 1 to terminal on screen.
- 45. Reaction condenser (one set fixed plates) to terminal on vertical screen.
- 46. S.G. choke to anode coupler (moving plates).
- 47. Detector valve anode terminal A to reaction condenser (moving plates).
- 48. Aerial terminal to aerial coupler (moving plates).

**YOUR SET IS NOW COMPLETE.**  
J. S.-T.

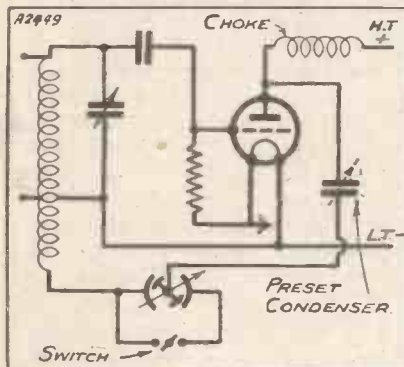
**A REACTION WRINKLE**  
Whilst giving full control of reaction, this scheme can be made entirely non-radiating.

Sir,—The diagram given here shows a method of obtaining a fully variable dual range of reaction control, the first being non-oscillating at all settings and the second giving the full available range up to the point of oscillation.

It may be of interest to any of your readers who are haunted by the fear that, in their absence, the less expert members of the family may cause interference by the careless use of the reaction control. I have tried the arrangement shown and find that it works admirably.

It will be seen that the reaction condenser is one of the "bridge" type, having two sets of fixed plates at opposite sides of a diameter, and a double set of rotor vanes carried by the central spindle.

**OUR READER'S CIRCUIT**



The effective capacity of the reaction condenser is instantly variable by means of the switch.

The diagram is almost self-explanatory, and it will be seen that the closing of the switch brings the second set of stator plates into parallel with the first, thus greatly increasing the capacity and intensifying the reaction.

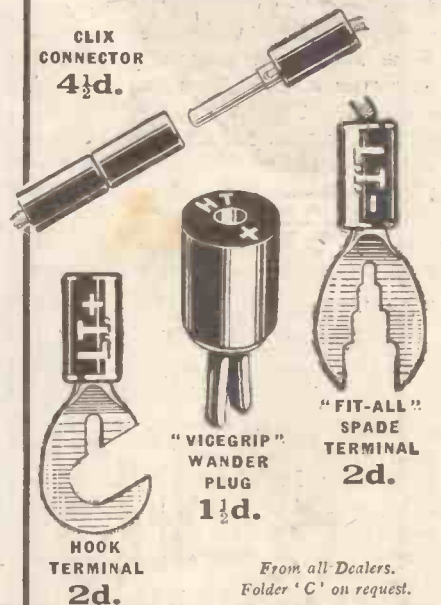
The pre-set condenser shown sets the intensity for both the variable capacity ranges, and when once this is matched for the particular reaction coil used it need not be touched again.

Any suitable form of lock-switch may be used, or an ordinary push-pull switch can be made to serve by the simple expedient of unscrewing the knob and withdrawing the spindle. The receiver is then completely safe against any careless use of the control.

Yours faithfully,  
Surbiton. C. W. R.

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—gives it a better connection



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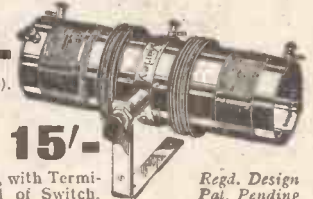
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The Ideal pre-selective device for every set—S.G., Reacting Detector or Superhet. Gives 9 kilocycles separation over both wavebands. Makes wave-traps unnecessary. Needs no screening.

Write for section B C of the Varley Catalogue.

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Advert. of Oliver Pell Control Ltd., 103, Kingsway, London, W.C.2. Telephone: Holborn 5303.

**THE "S.T.300" IS HERE!**

—continued from page 209

The method I submit for use in the "S.T.300" is readily seen in the photographs—so readily that you could, I believe, make the set from these alone. Wherever possible a wire goes straight from one point to another. This shipshape, braced method of wiring is more than pleasing; it is technically efficient, mechanically strong, and logically sound. You can do it in ordinary bell-wire, you can see where every connection goes, and you save time, money and temper.

**Every Detail Shown**

The various components are mounted either on the ebonite panel or on the baseboard. The drawings, photographs and blue-print show everything. In fact, they show everything several times over! The blue-print (slipped loose into this issue) is actual size, so you can tell at once where everything goes.

The rapid construction guide I have prepared gives you every detail of construction. Most builders will need only a fraction of the "easy-to-digest" data in this article.

**200 to 2,000 Metres**

The "S.T.300" coils (called "aerial coil" and "anode coil") are wound on Colvern formers, but neither is a standard coil. They have been designed for this set, and I arrived at the best values for the windings only after extensive tests as to efficiency, selectivity, full wave-length range (slightly over 200 metres to 2,000 metres—no important station just

off the dial!) and very smooth reaction. The aerial coil is mounted in a vertical position on a thin sheet of copper (its thickness is not important), which is laid on the baseboard and covers the wood from the aerial end of the set to the screen. The rest of the baseboard is not covered.

The anode coil is mounted at right angles to the first (to avoid magnetic coupling) by means of two little pillars supplied free with the coils; the

vents "leakage" under the vertical screen, which is itself high enough to prevent leakage over its top. The base-plate is earthed by a screw going into the baseboard and connected by a wire marked (8) to the earth terminal. But all this is given in my guide.

**Mains Unit or Battery**

In next month's issue will appear full operating notes. Brief ones are given in the test report in this issue for those—and I understand they are exceptionally numerous—who have given advance orders for their parts and who will have the set made long before next month. The actual time taken for construction should be a couple of evenings—unless you are well-experienced and are able to do it in less time without sacrificing efficiency.

Next month I will show also how a gramophone pick-up may be added if desired. It is a very simple addition and need in no way prevent the building of the set as it is. The set, incidentally, is designed to operate very effectively from mains units as well as batteries.

**"My Best Set"**

A last word! Please do not expect another three-valve set from me next month, the month after, or the month after that. This receiver is not going to be made obsolete in that way. I have looked forward, and I hope you will also look forward—and build it.

And please write to us from all over the country—and abroad—and tell us of the stations you have bagged and your success with what I regard myself as my best set.

JOHN SCOTT-TAGGART.

**NEXT MONTH**

The MARCH Issue of the "WIRELESS CONSTRUCTOR"

will be an unusually interesting number. Among the other features will be

**FULL OPERATING DETAILS**

of the

**"S.T.300"**

enabling you to

**GET THE BEST RESULTS**

from this magnificent receiver.

Out February 13th. Order Now. USUAL PRICE.

mounting only takes a minute to do. The terminal connections on the anode coil, by the way, are specially arranged to shorten wiring and to simplify it. The coils (although valuable for other purposes) have been designed expressly for this set.

There is a vertical screen, through which pokes the top end of a screened-grid valve. There is thus a double screening of the input side of the valve. The copper base-plate pre-

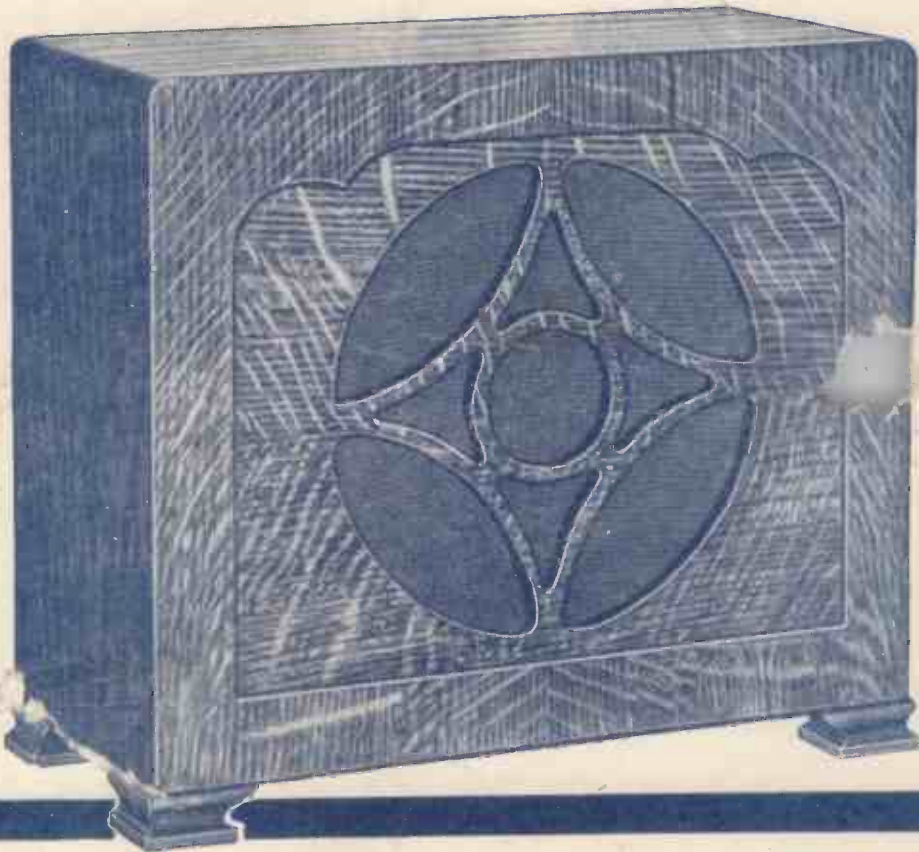
**INDEX TO ADVERTISERS**

"Argosy Magazine" .. .. .	PAGE 190
Belling & Lee, Ltd. .. .. .	234
Bird, Sydney S., & Sons, Ltd. .. .. .	249
British Blue Spot Co., Ltd. .. .. .	Cover iii
British Harl' Rubber Co., Ltd. .. .. .	249
Bulgin, A. F., & Co., Ltd. .. .. .	249
Burne-Jones & Co., Ltd. .. .. .	247
Carrington Manfg. Co., Ltd. .. .. .	234
Colvern, Ltd. .. .. .	231, 233
Cossor, A. C., Ltd. .. .. .	192
Dubilier Condenser Co. (1925), Ltd. .. .. .	245
"Daily Telegraph" .. .. .	234

Edison Swan Electric Co., Ltd. .. .. .	PAGE Cover iv
Gilbert, J. C. (Cabinets) .. .. .	245
Graham Farish, Ltd. .. .. .	248
Heyberd, F. C., & Co. .. .. .	250
Igranic Electric Co., Ltd. .. .. .	246
Jackson Bros. .. .. .	189
Lectro Linx, Ltd. .. .. .	251
London Elec. Wire Co. & Smiths, Ltd. .. .. .	Cover ii
Ormond Eng. Co., Ltd. .. .. .	241
Peto-Scott Co., Ltd. .. .. .	191
Pickett's Cabinets .. .. .	250
Pure Radio .. .. .	250

Ready Radio, Ltd. .. .. .	PAGE 221, 223
Reproducers & Amplifiers, Ltd. .. .. .	247
Taylor, C. .. .. .	249
Telegraph Condenser Co., Ltd. .. .. .	234
Telsen Electric Co., Ltd. .. .. .	226, 227, 237
Varley Products .. .. .	251
Westinghouse Brake & Saxby Signal Co., Ltd. .. .. .	245
Wingrove & Rogers, Ltd. .. .. .	247
Wright & Wearo, Ltd. .. .. .	246
Woodcrafts Co. .. .. .	250

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